Ministry of Environment and Water of Bulgaria

FIRST BIENNIAL TRANSPERANNCY REPORT OF BULGARIA

under

the Paris Agreement

12/31/2024

Contents

1. INTRODUCTION

This report represents the First Biennial Transparency Report (BTR) from Bulgaria.

The BTR is a pivotal part of the Enhanced Transparency Framework, established by Article 13 of the Paris Agreement. The purpose of this BTR is to provide a clear understanding of climate change action in the light of the objective of the Convention and enhanced implementation thereof as set out in Article 2 of the Paris Agreement, including clarity and tracking of progress towards achieving Parties' individual nationally determined contributions (NDCs) under Article 4, support provided and received by relevant individual Parties and Parties' adaptation actions under Article 7, including good practices, priorities, needs and gaps, to inform the global stocktake under Article 14.

The BTR of Bulgaria was prepared according to decision 18/CMA.1[1] of the Conference of the Parties under the UNFCCC.

The information in the report is structured as follows:

Chapter 1 provides a brief introduction to the BTR.

Chapter 2 summarizes the main trends in national greenhouse gas emissions and removals over the period 1990-2022, as described in the annual National Inventory Report of the Bulgaria (submitted as a separate report).

Chapter 3 first sets out the particular national circumstances and institutional arrangements of Bulgaria that are of relevance in the context of climate action, before outlining the key aspects of the joint EU NDC (indicators, definitions, methodologies). It then goes on to describe the climate policy framework of Bulgaria, highlighting policies and measures (PaMs) per sector and the impact thereof; as well as the main projections results for greenhouse gases for the period 2025 – 2040, based on the National Climate and Energy Plan.

Chapter 4 describes the institutional arrangements and governance of climate adaptation in Bulgaria, in which the different roles, responsibilities and policy frameworks within the government are outlined regarding adaptation.

[1] https://unfccc.int/resource/tet/0/00mpg.pdf

Chapter 5 details Bulgaria's support for climate action in developing countries and provides information on financial, technology development and transfer and capacity-building support provided and mobilized.

Chapter 6 identifies some areas of improvement in reporting by Bulgaria compared to previously submitted national reports.

Bulgaria submitted its most recent National Inventory Report (NIR) for the 1990-2022 period to the UNFCCC in December 2024 as a separate report. The NIR consists of the National Inventory Document (NID) with accompanying methodology reports and the Common Reporting Tables (CRT).

The Common Tabular Format (CTF) tables as required by decision 5/CMA.3

The list of tables can be found in the Annex 1 of the BTR1 of Bulgaria.

2. NATIONAL INVENTORY REPORT

2.1. INTRODUCTION

Bulgaria submitted the National Inventory Report (1990-2022) to the UNFCCC as a separate report. The NIR consists of the National Inventory Document (NID) on its GHG Inventories for 1990 to 2022 in line with 18/CMA.1 and the Common Reporting Tables (CRT).

The summary of the GHG inventory data presented in this chapter of the Biennial Transparency Report (BTR) is consistent with the GHG inventory of the EU submitted in its 2024 National Inventory Report.

2.2. SUMMARY OF GHG EMISSIONS TRENDS

This section provides a brief description of the trends in GHG emissions.

TRENDS IN TOTAL GHG EMISSIONS

In 2022 Bulgaria's greenhouse gas emissions totalled 58 420 Gg CO_2 eq. without reporting of sequestration from LULUCF sector. The emissions decreased by 48.59% compared with the base year. Emissions in 2022 were 8.12% increase in comparison with the emissions of the previous year.

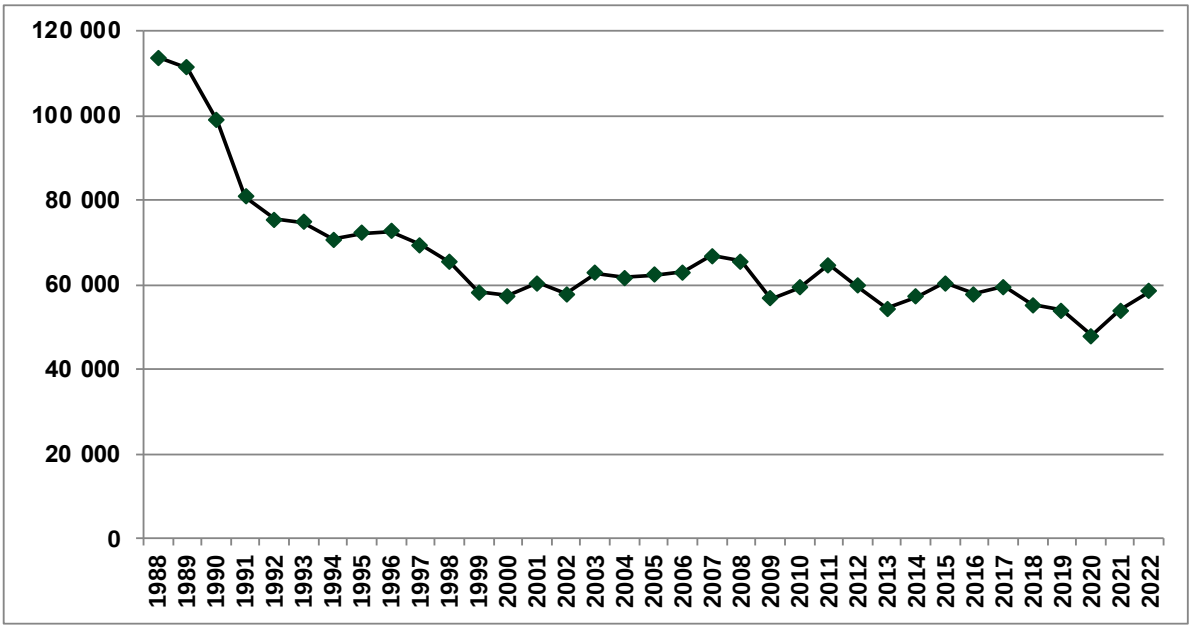


Figure 1 Total GHG emissions (without LULUCF) for 1988 – 2022, Gg CO_2 eq.

The net emissions including reporting of sequestration from LULUCF sector were 48 880 Gg CO_2 eq. The emissions decreased by 49.05 % compared with the base year.

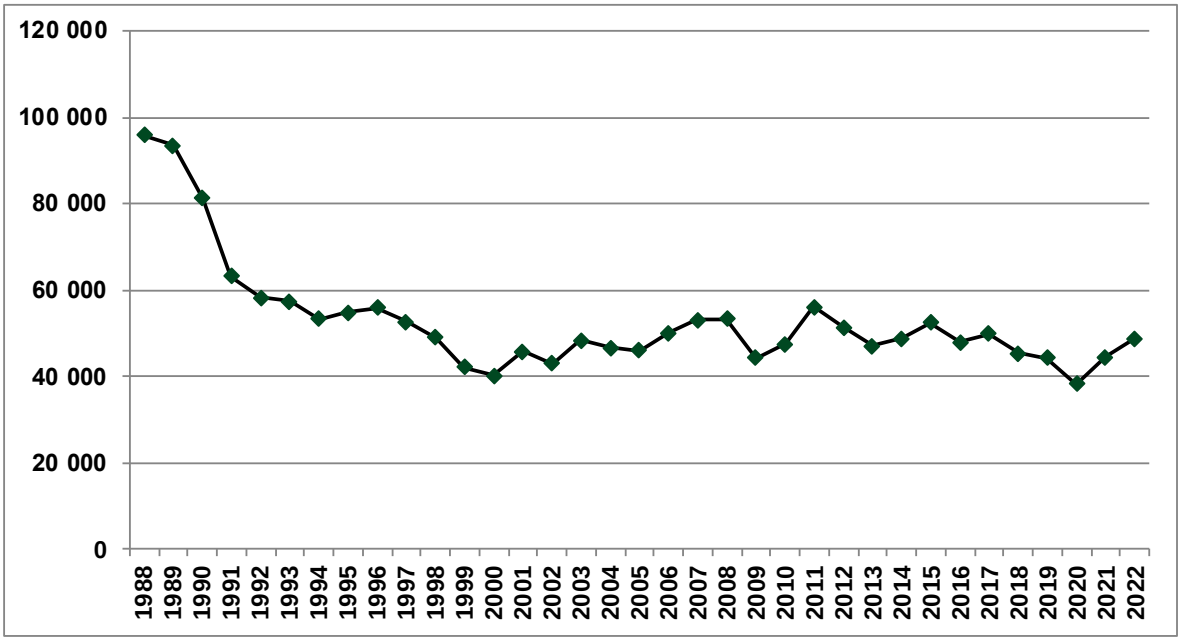


Figure 2 Total GHG emissions (with LULUCF) for 1988 – 2022, Gg CO_2 eq.

The main reasons for the declining GHG emission trend in Bulgaria are the structural economic changes due to the radical transition process from a centrally-planned economy to a market-based economy. This led to a decrease of power production from thermal power stations (and an increase of the shares of hydropower and nuclear power), structural changes in industry (including a decline in production by energy-intensive enterprises and energy - efficiency improvements), introduction of energy efficiency measures in the residential sector and a shift form solid and liquid fuels to natural gas in energy consumption. This also led to a decrease in GHG emissions from the agricultural sector stemming from the decline in the cattle and sheep populations and the use of fertilizers.

Bulgaria experienced a steady declining population trend during the period 1990-2022, which resulted in the reduction of population by 28.25%.

EMISSION TRENDS BY GAS

The most important greenhouse gas in Bulgaria is carbon dioxide. The share of CO_2 emissions from the total greenhouse gas emissions varies around 80.33% excluding LULUCF and 76.24% including LULUCF. In absolute terms CO_2 emissions have decreased 49.05% since 1988. Around 77.19% of total CO_2 eq emissions originate from the Energy sector. The amount of energy-related CO_2 emissions has fluctuated much according to the economic trend, the energy supply structure (including electricity exports) and climate conditions.

Methane emissions (CH_4) have decreased by 56.80% from the 1988 level. This is mainly due to the improvements in waste collection and treatment and a reduction in animal husbandry in the Agriculture sector. Correspondingly, emissions of nitrous oxide (N_2O) have also decreased by 52.72% which has been occasioned mostly by the reduced nitrogen fertilisation of agricultural fields, the biggest decline was in the beginning of time series.

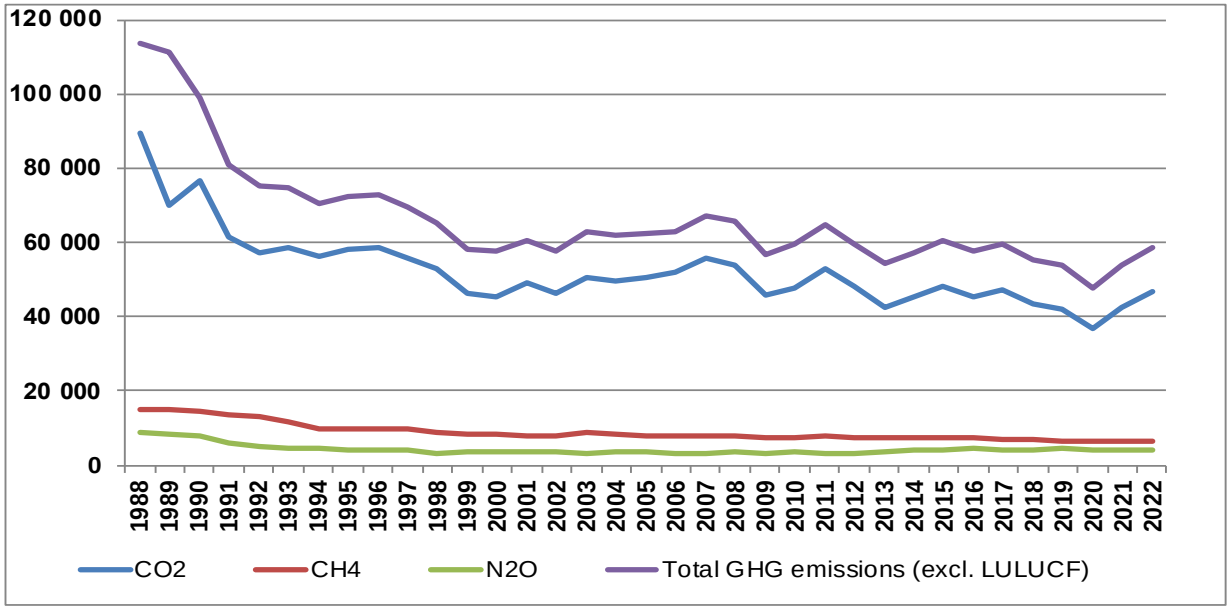


Figure 3 Total GHG emissions in Gg CO_2 eq. for 1988 – 2022

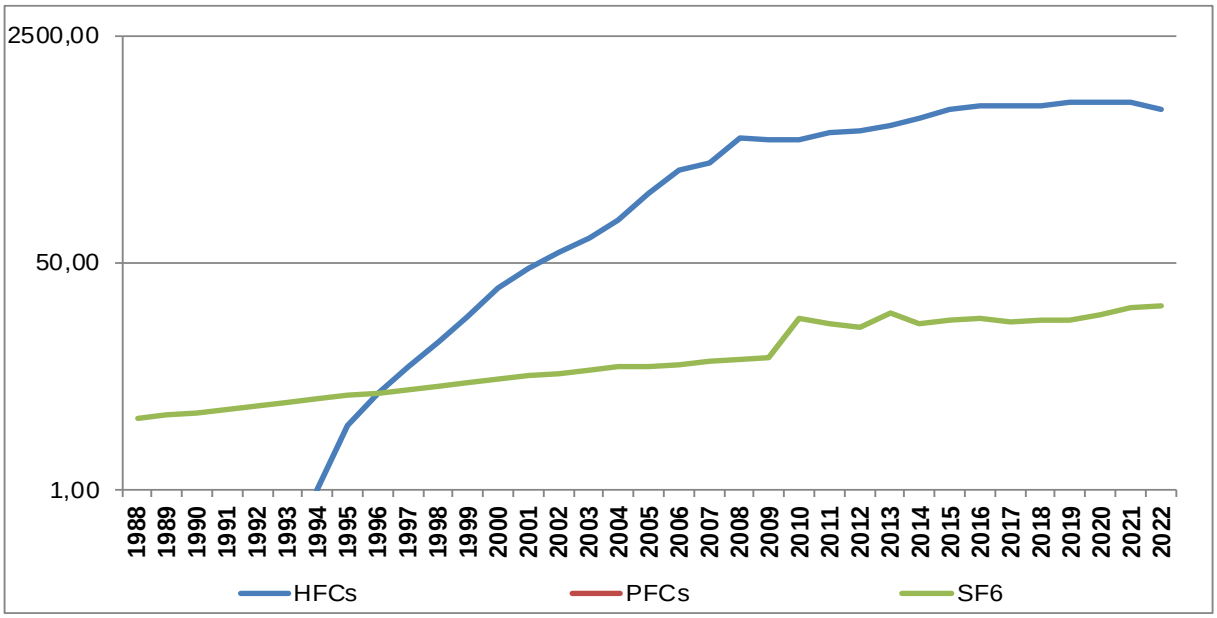


Figure 4 Actual emissions of HFCs, PFCs and SF6 for 1988 – 2022, Gg CO_2 eq.

The emissions of F-gases have increased over tenfold during 1995-2022. A key driver behind the trend has been the substitution of ozone depleting substances (ODS) by F-gases in many applications.

EMISSION TRENDS BY CATEGORY

Figure 5 below shows the GHG aggregated emission trends by IPCC sectors. The Energy sector, where GHG emissions come from fuel combustion, headed the list in 2022 with the biggest share – 77.19%. Sector Agriculture ranked the second place with 10.17% and sectors IPPU ranked the third place with 7.83% and Waste with 4.81%.

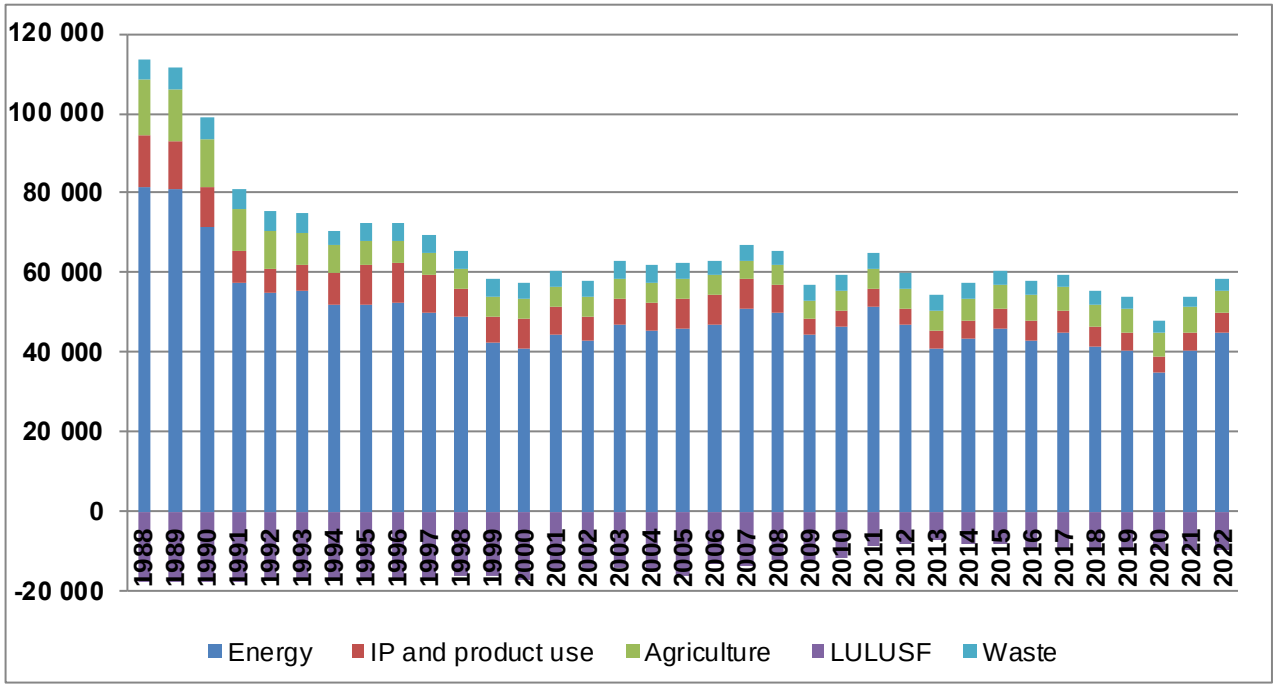


Figure 5 Total greenhouse gas emissions in CO_2-eq. per IPCC sector 1988-2022

Table 1 The reductions of GHG emissions by sectors by base year

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Change from base to latest reported year
1. Energy	-44.71%
2. Industrial Processes and product use	-65.28%
3. Agriculture	-56.36%
4. Land Use, Land-Use Change and Forestry	-46.13%

5. Waste	-46.85%
6. Other	0.00
Total (including LULUCF)	-49.05%

ENERGY

Emissions from the energy sector in 2022 decreased by 44.71% compared to the base year (45 094 Gg CO_2eq in 2022 compared to 81 562 Gg CO_2eq in 1988). Compared to previous year, the emissions in 2022 increased with 11.3%.

The main source of emissions in the energy sector is combustion of solid fuels, which is responsible for 46.25% of the emissions from fuel combustion in 2022.

The main reasons for the decrease of the GHG emission trend in energy sector are the transition from a centrally – planned economy to a market-based economy, reconstructing of the economy and subsequent economic slowdown. This led to a sharp drop in demand for electricity production from thermal power production.

The trend of GHG emissions between 1988 and 2022 was defined by a substantial fluctuation of emissions from fuel combustion in energy industries. Fuel combustion decreased by 45.5% compared to the base year. The energy use in manufacturing industry and construction decreased by 75.08% compared to the base year and in other sectors (commercial, residential, agriculture and forestry) (76.8%), as well as a clear increase in GHG emissions from transport (40.7%).

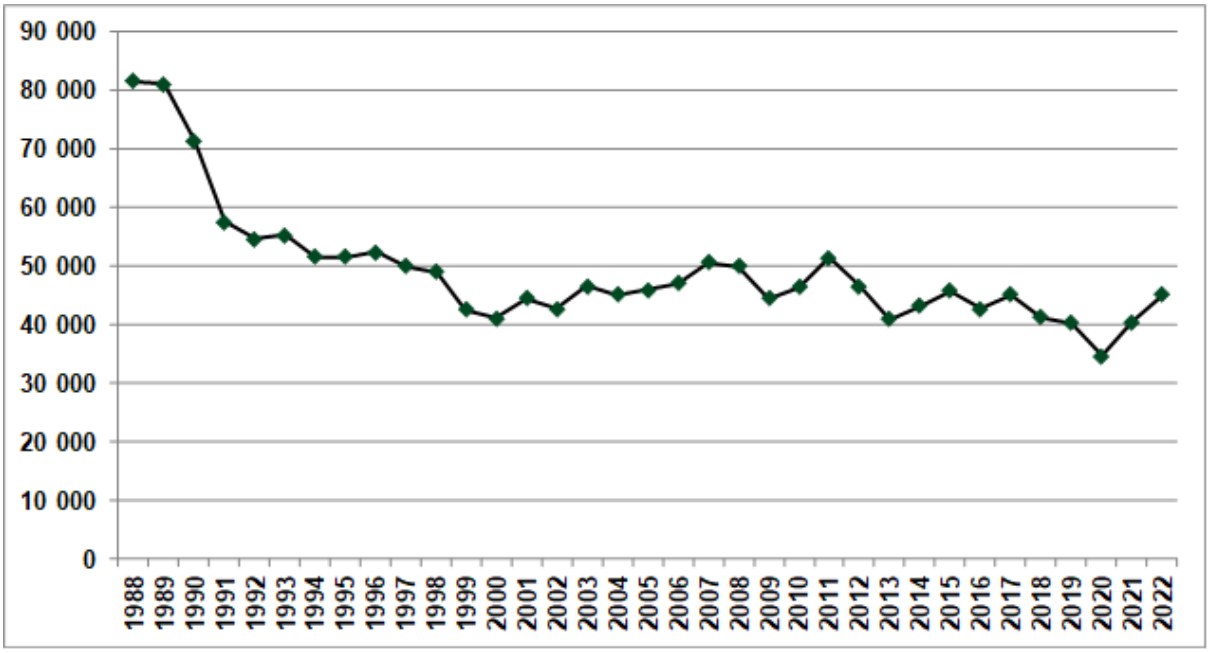


Figure 6 GHG emissions from Energy sector for 1988 – 2022, Gg CO_2 eq.

Chapter 3 of Bulgaria's National Inventory Report 2024 contains a more detailed analysis of GHG emissions in the sector.

INDUSTRIAL PROCESSES AND PRODUCT USE

A non – steady trend with some fluctuations towards emission reduction in this sector is observed since 1988. The emissions in 2022 decreased with 65.28% compared to the base year.

In the year 2022 – 7.83% of national total greenhouse gas emissions (without LULUCF) originated from industrial processes and product use, compared to 11.6% in the base year 1988. In 2022, greenhouse gas emissions from Industrial Processes and Product Use are 4 574.92 Gg CO2eq compared to 13 176.76 Gg CO2eq in the base year.

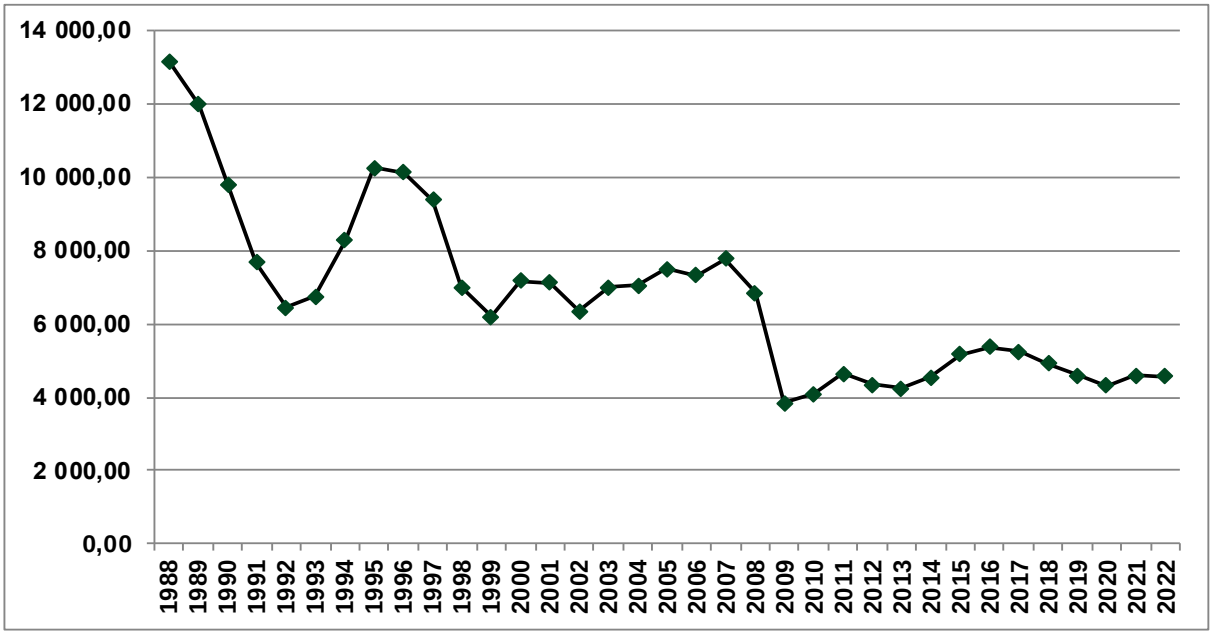


Figure 7 GHG emissions from Industrial processes and Product Use sector for 1988 – 2022, Gg CO_2 eq.

In 2022 the most important emitting category is Mineral products (mainly production of clinker and quick lime), which share in the total Industrial processes and product use emissions is 57.95%. The second category by share is Chemical Industry (ammonia and nitric acid production) with 21.77% share, followed by Product uses as ODS substitutes (Consumption of Halocarbons) with 15.34% and finally Metal Production (steel) with 3.31%.

Greenhouse gas emissions from the Industrial Processes and Product Use sector fluctuate during the period and reach a minimum in 2009. The reduction in 2022 for the whole sector is 65.28% while the biggest reduction (compared to the base year) can be seen in Metal Production category – 96.2%.

This is mainly due to economic crisis and in particular the world economic crisis in 2009. The periods around 1989/1991 and 1997/1999 represent the economic crisis time after which stabilization and increase in the production rates begins. After 1996 a process of privatization begins which leads to decrease in the plants' production. This process is followed by restructuring and modernization of the production while at the same time some of the enterprises cease operation.

The general reduction in the emissions in the later years of the time period is influenced also by the starting introduction of better technologies on plant level.

Chapter 4 of Bulgaria's National Inventory Report 2024 contains a more detailed analysis of GHG emissions in the sector.

AGRICULTURE

The overall emission reduction in the sector has amounted to 56.4% since 1988. In the year 2022 the sector agriculture contributed 10.17% to the total of Bulgaria's greenhouse gas emissions (without LULUCF).

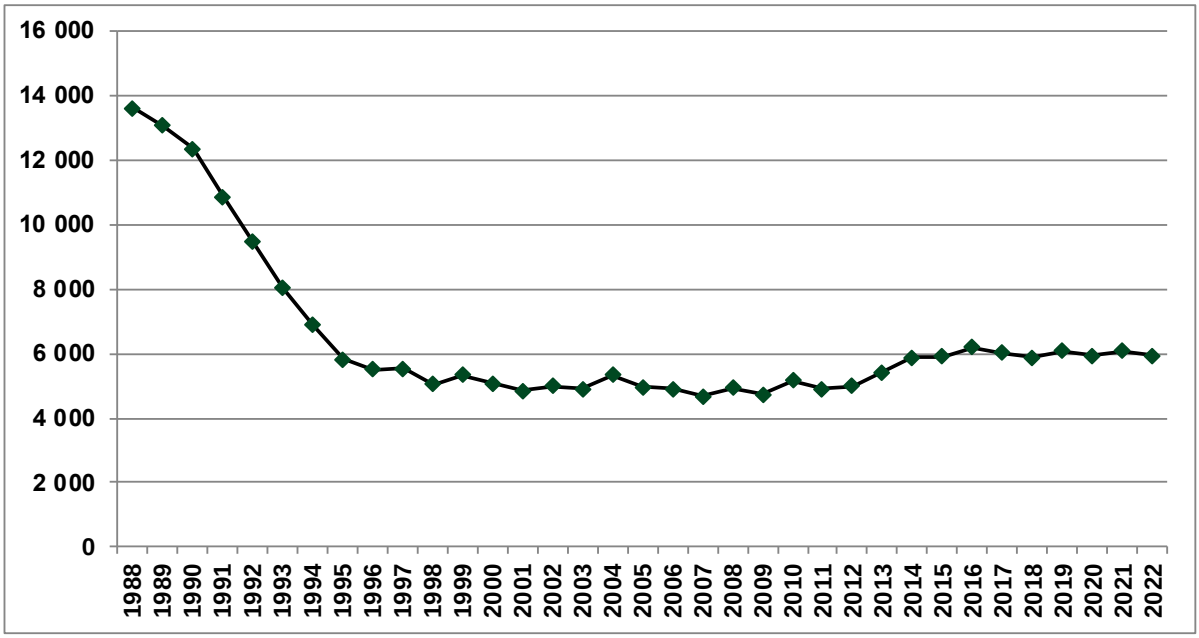


Figure 8 GHG emissions from Agriculture sector for 1988 – 2022, Gg CO_2 eq.

The emission reductions were mainly driven by systematic declines in the agricultural land area due to abandoning of arable lands and reduction in livestock population. Another driver for the emission reduction was the decline in the use of fertilizers.

Chapter 5 of Bulgaria's National Inventory Report 2024 contains a more detailed analysis of GHG emissions in the sector.

LAND USE, LAND-USE CHANGE AND FORESTRY (LULUCF)

The LULUCF sector is serving as a sink of greenhouse gases for Bulgaria. The two categories – "Forest land" and "Grassland" are removals of CO_2. All other categories are sources of CO_2 emissions. The trend of net CO_2 removals (CO_2 eq) from LULUCF decreases by 53.87% compared to the base year. The main reason for the overall decrease of the uptakes of CO_2 emissions from LULUCF is due to the fall in removals from category Forest land and the slight increase in emissions from CL, WL and SM categories. The key driver for the fall in removals from FL is the observed decline in the rate of forest growth as the average age of the forest stands increases steadily over the reporting period. In spite of the decrease

observed, the share of the removals from the total GHG emissions (in CO_2 eq) is still remarkable. The reason for this is that the emissions in the other sectors have dropped dramatically. For the current inventoried year, the share is – 16.3%.

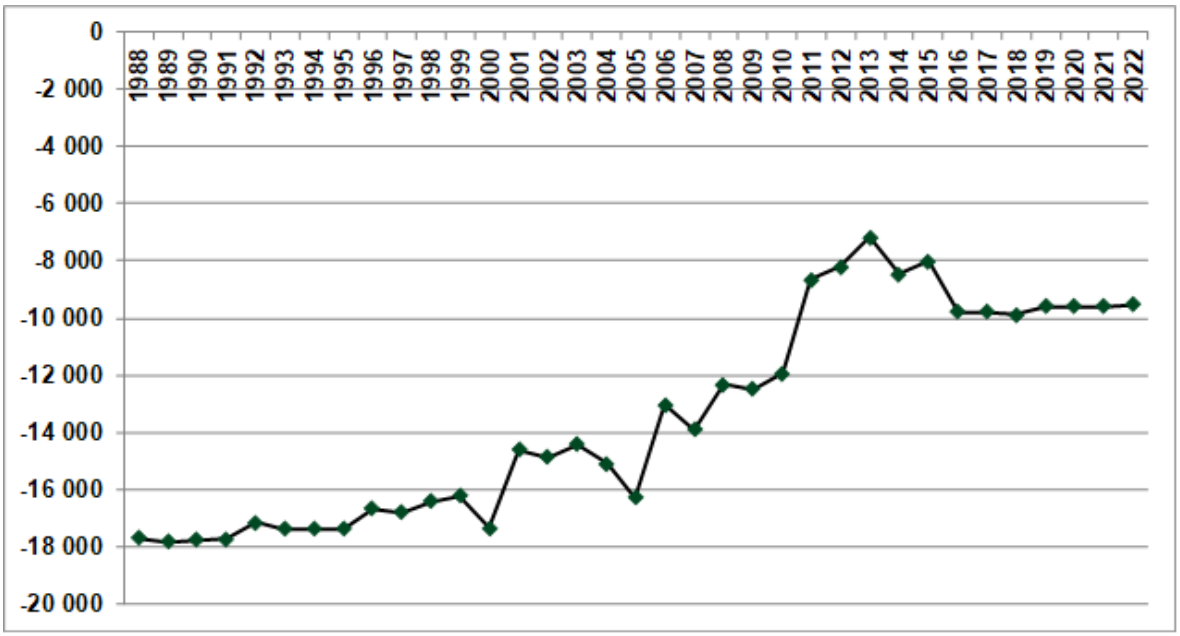


Figure 9 LULUCF emissions and removals for 1988 – 2022 CO_2 eq.

Comparing with the base year an increase in the emissions in croplands, settlements and wetlands is observed. The total emissions from croplands fluctuate during the whole time series. The emissions from Settlements increase last couple of years due to changes from other land uses to Settlements according to the risen infrastructural activities since Bulgaria's joined the EU.

Chapter 6 of Bulgaria's National Inventory Report 2024 contains a more detailed analysis of GHG emissions in the sector.

WASTE

The total sector emission reduction from the base year is 46.9 %. The decline was mainly driven by a steady population decrease over the past 25 – 30 years.

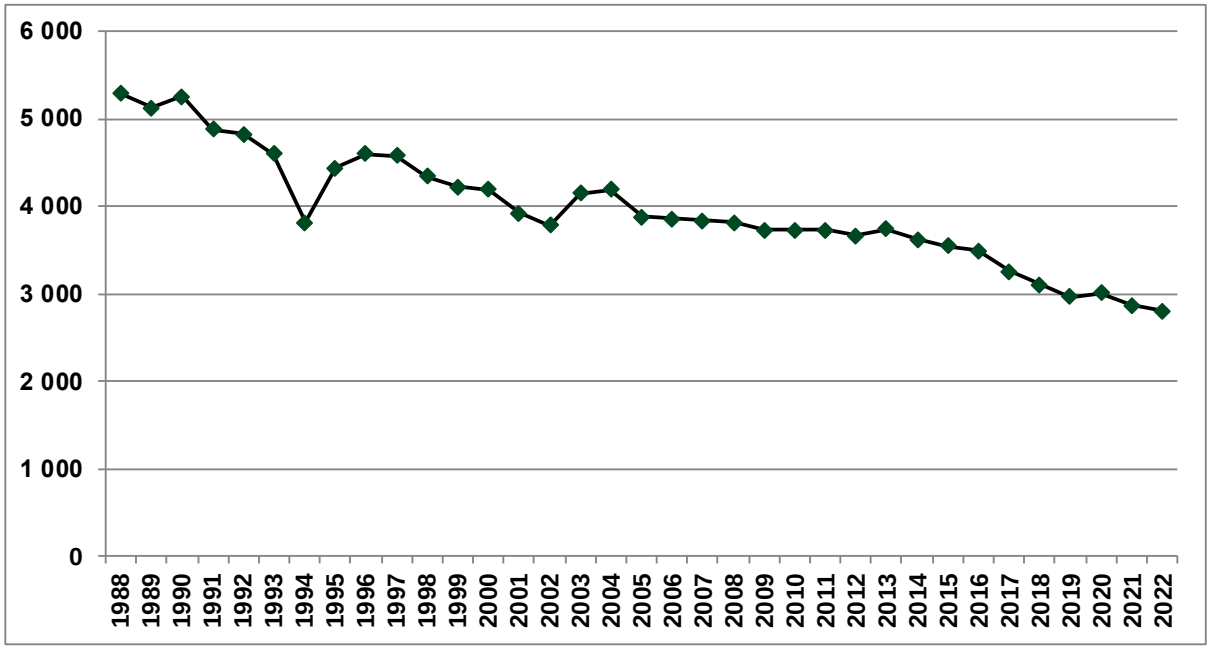


Figure 10 GHG emissions from Waste sector for 1988 – 2022, Gg CO_2 eq.

Chapter 7 of Bulgaria's National Inventory Report 2024 contains a more detailed analysis of GHG emissions in the sector.

INDIRECT GREENHOUSE GASES AND SO2 EMISSIONS

Compared to the base year the emissions of non-GHGs emissions decreased as follows:

- NOx with 51.92%
- CO with 88.54%
- SO_2 with 28.92%
- NMVOC with 62.19%

2.3. DESCRIPTION OF THE NATIONAL INVENTORY ARRANGEMENTS

The Bulgarian National Inventory System (BGNIS) is developed following the requirements of the provisions of Decision 19/CMP.1 Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol.

HISTORY OF GHG INVENTORY PREPARATION

The Bulgarian National Inventory System changed over time two times because of decisions of the particular government. In the following table the national circumstances are outlined:

BGNIS until 2007	Present BGNIS (submission 2008-2024)	Prospected BGNIS
←	Centralized inventory	→
Single institute	Single agency	→
Out-sourced inventory	In-sourced inventory	→
Private consultants	**Public/Governmental** (submission with cooperation of consultants)	→
National Inventory Focal Point: Private consultants	National Inventory Focal Point: ExEA	→
←	National Focal Point: MEW	→

Until 2007 the national emissions inventory as well as the relevant NIR under UNFCCC was prepared by an external company through an open tender procedure under the rules of the Public Procurement Law. Since 2008 the Executive Environment Agency (ExEA) is responsible for the whole process of inventory planning, preparation and management.

The national system defines the "road map" in which Bulgaria prepares its inventory. This is outlined in the national inventory preparation cycle.

As it is illustrated in figure 11 and outlined in the following chapters the preparation of the inventory has an institutional "home" that is ultimately responsible for managing the process and has a legal authority to collect data and submit it on behalf of the Bulgaria.

Bulgaria's reporting obligations to the UNFCCC, UNECE and EC are being administered by the MEW. All activities on preparation of GHG inventory in Bulgaria are coordinated and managed on the state level by MEW.

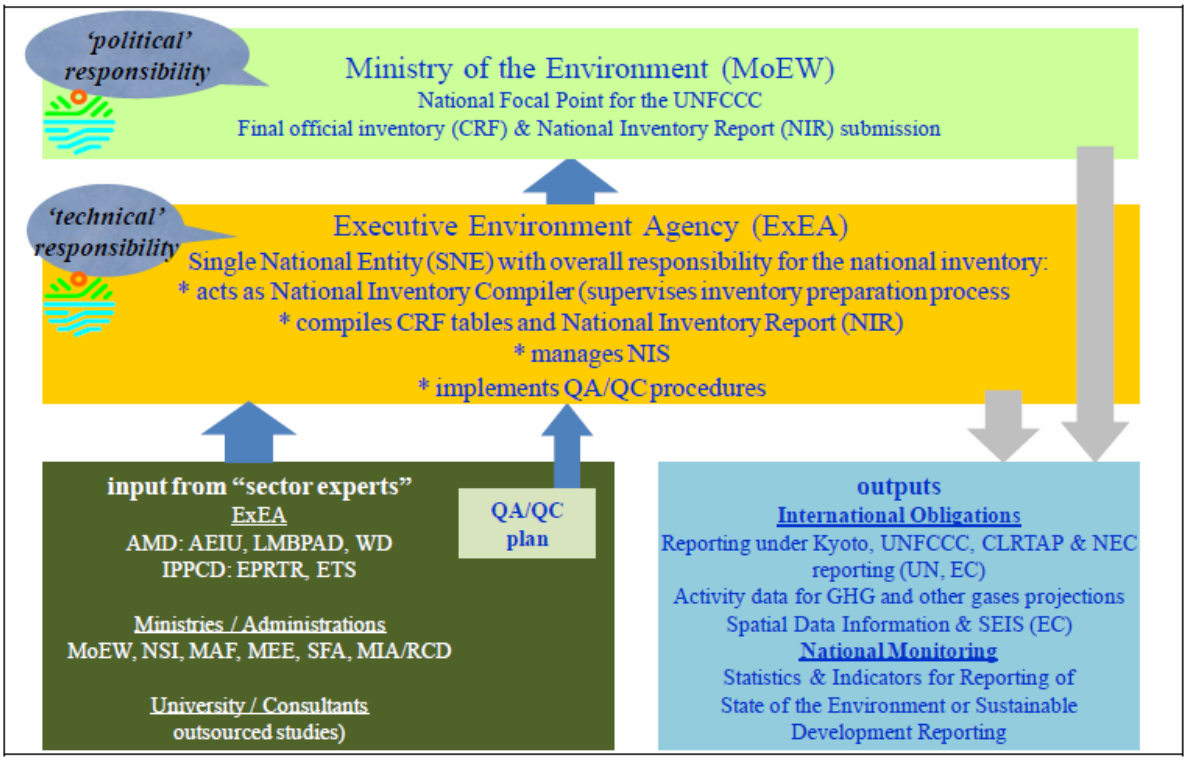


Figure 11 Organizational Chart of the Bulgarian National Inventory System

The Bulgarian Government by MEW (Climate Change Policy Directorate) has the political responsibility for compliance with commitments under the UNFCCC and the Kyoto Protocol, including for functioning of BGNIS in accordance with the requirements of Decision 19/CMP.1 under Article 5, paragraph 1, of the Kyoto Protocol.

The following strategic goals in climate change area were achieved by the Ministry of Environment and Water in 2022:

Climate change mitigation law

Climate change mitigation law adopted on first reading in the National Assembly on 23.10.2013. It regulates public relations in implementation of the policy on climate change – powers and duties of the competent authorities and individuals. Absolute prerequisite for the timely implementation of Bulgaria's obligations as a party to the UNFCCC and the Kyoto Protocol and as a country - member of the European Union, is the effective involvement of the competent authorities and private operators in the procedures, which requires clear and comprehensive regulation of their powers, rights and obligations. As a member of the European Union the Republic of Bulgaria has a number of obligations on the legislative package "Climate & Energy" and participating in the scheme for trading greenhouse gas emissions within the European Union (EU ETS), introduced by Directive 2003/87/EC. This fact is linked

to the performance of many obligations that form the whole sector in climate policy and the implementation of which our country should strike a balance between the interests of industry and the ambitious EU targets for the progressive reduction of greenhouse gases.

National Green Investment Scheme

In June 2010 an Amendment to the Environmental Protection Act (EPA) was approved by the Council of Ministers and the National Assembly. The new legislation creates the main legal framework of the Bulgarian National Green Investment Scheme (NGIS) and allows Bulgarian government to participate in the International Emission Trading mechanism according to the Article 17 of the Kyoto Protocol. EPA defines the entire process from selling of AAUs to "greening" of the revenues. EPA empowers the National Trust Eco Fund (NTEF) to administer and implement the NGIS. NTEF elaborates rules for selection, assessment and approval of projects that would reduce emissions and would be reimbursed by the NGIS.

In order to exploit the possibilities for financing projects to reduce greenhouse gas emissions through the National Green Investment Scheme is a decision of the Council of Ministers № 546/12 September 2013 for addition to the agreement with Austria for the purchase of AAUs in Scheme green investments. It is accepted and a decision of the Council of Ministers № 547/12 September 2013 in connection with the implementation of projects under the Green Investment Scheme.

The funds from the sale of AAUs of the Republic of Austria have implemented projects for energy efficiency of the 77 public facilities state and municipal property in Bulgaria. Public projects to improve energy efficiency in municipal buildings, kindergartens and primary schools. Realized are energy efficiency projects at 13 public sites throughout the country.

In 2015 was started the Investment Climate Programme, which is a kind of continuation of the National Green Investment Scheme. The new programme is implemented by Trust Eco-Fund and it is financed by the revenues from so called "early auctions" of greenhouse gas emissions allowances from installations paid into the budget of the Ministry of Environment and Water by 31st December 2012.

The funds are designated to be used for financing of the projects aiming at improving of energy efficiency of state and municipal public buildings, as well as for promoting the use of electric and hybrid vehicles by public institutions (since 2016).

The ExEA has been identified as the responsible organization for preparation of Bulgaria's National GHG Inventory under the UNFCCC and the Kyoto Protocol and designated as single national entity.

The ExEA is represented and managed by an Executive Director

The ExEA's directorates and departments, which are directly involved in operation of the BGNIS are Environmental Monitoring and Assessment Directorate with the Emission Inventory Department (EID) and Waste Department (WD) and

Permit Regime Directorate with the Integrated Pollution Prevention and Control Department (IPPCD) and Emission Trading Permit Department (ETPD).

The legal bases for BGNIS are:

Environmental Protection Act (EPA, State Gazette No. 91/25.09.2002; corrected, SG No. 96/2002; last amendment March 2021);

Statute on the organization and structure of ExEA (Decision of Council of ministers 162/03.08.2010 – final update 20.09.2019);

Order № 344/01.12.2020 by the Executive Director of ExEA (Sector experts/QC experts);

Order № RD-218/05.03.2010 by the Minister of Environment and Water (QA experts).

Regulation of the Council of Ministers 261/05.09.2014 SG 76/2014 on the way and order of organization of the National Inventories of hazardous substances and greenhouse gases in the ambient air (last update 227/16.10.2017 SG 84/2017)

In order to strengthen the institutional arrangements and to fulfil the required general and specific functions of BGNIS an official agreement between MoEW and the main data providers were signed in 2010:

- National Statistical Institute (RD21-35/12.02.2010);
- Ministry of Agriculture and Food and its body Executive Forest Agency (04-00-517/26.02.2010 and RD 50-47/15.03.2010);
- Ministry of Economy, Energy and Tourism (14/06/2010);
- Ministry of Interior (MI) (08/06/2010).

The agreements ensure the support from these organisations regarding the choice of the activity data and EFs and methods, in the compilation of emission estimates and QA/QC of these estimates.

The ExEA as Single National Entity coordinates all activities, related to collecting inventory data and aggregates the data relevant for GHG emissions on a national level by the following state authorities:

- National Statistics Institute (NSI);
- Ministry of Agriculture, Food and Forestry (MAFF) and their relevant services (Agrostatistic Directorate and Executive Forest Agency);
- Ministry of Energy (ME);
- Ministry of Interior (MI);
- Ministry of Environment and Water (MoEW);
- Ministry of Transport, Information Technologies and Communications (MTITC).

LEGAL BASIS OF THE BULGARIAN NIS – SPECIFIC FUNCTIONS

SINGLE NATIONAL ENTITY

The postal and electronic addresses of the single national entity are:
Executive Environmental Agency at the Ministry of Environment and Water
136 “Tzar Boris III” Blvd
Sofia 1618, Bulgaria
P.O.Box 251
Tel.:+359 2 9559011
Fax: +359 2 9559015
E-mail: iaos@eea.government.bg
http://eea.government.bg/en

National Inventory Focal Point (NIFP): Detelina Petrova
Organization: Ministry of Environment and Water
Address: 22 “Maria Luiza” blvd., 1202 Sofia, Bulgaria
E-mail: dpetrova@moew.government.bg
Tel.: +359 2 940 61 44

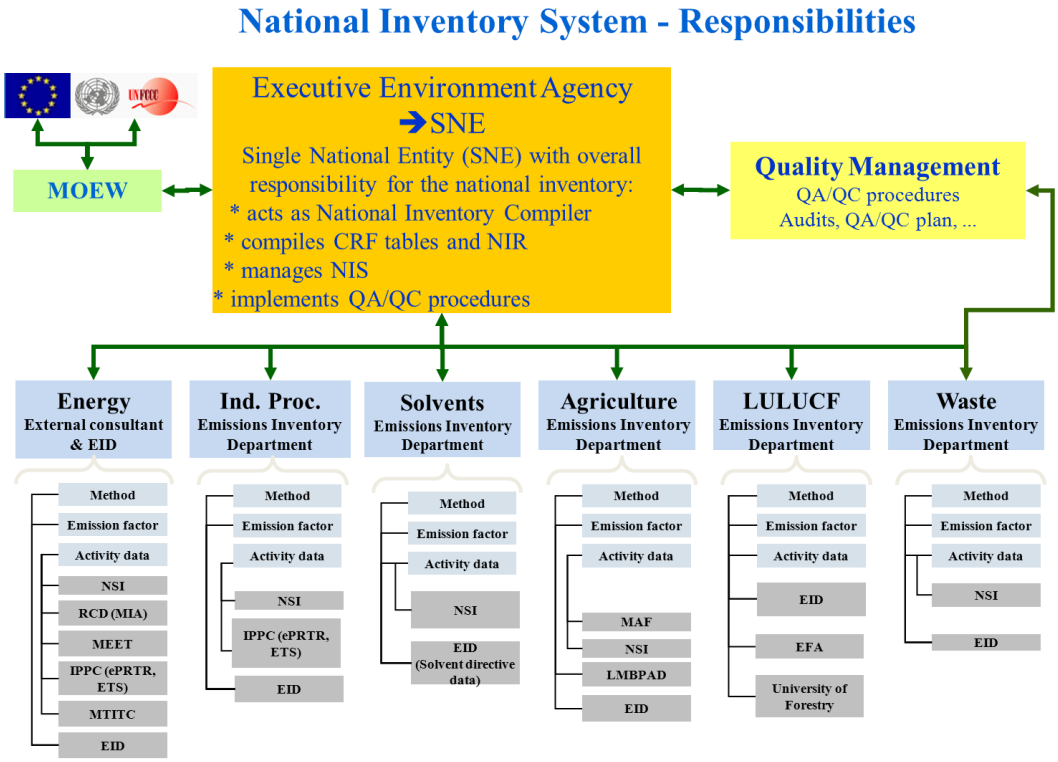
Head of Emission Inventory Department & National Inventory Compiler: Violeta Stoeva
Organization: Executive Environmental Agency
Address: 136, “Tsar Boris III” blvd., 1618 Sofia, Bulgaria
e-mail: v.stoeva@eea.government.bg
Tel.: +359 2 940 64 66
Fax: +359 2 955 90 15

INVENTORY PREPARATION
The inventory preparation process covers:
- Identification key source categories;
- Prepare estimates and ensure that appropriate methods are used to estimate emissions from key source categories;
- Collect sufficient activity data, process information, and emission factors as are necessary to support the methods selected for estimating anthropogenic GHG emissions by sources and removals by sinks;
- Make a quantitative estimate of inventory uncertainty for each source category and for the inventory in total recalculations of previously submitted estimates of anthropogenic GHG emissions by sources and removals by sinks;

- Compile the national inventory in accordance with Article 7, paragraph 1, and relevant decisions of the COP and/or COP/MOP;
- Implement general inventory QC procedures (tier 1) in accordance with its QA/QC plan following the 2006 IPCC GL;
- Apply source category specific QC procedures (tier 2) for key source categories and for those individual source categories in which significant methodological and/or data revisions have occurred;
- Collection of all data collected together with emission estimates in a database (see below), where data sources are well documented for future reconstruction of the inventory.

The Executive director of the ExEA through internal administrative order and based on the Regulation on the organization and structure of ExEA appoints sector experts for preparation of emission inventory in Energy, Industrial processes and products use, Agriculture, LULUCF and Waste.

The ExEA, agreed with the MoEW engages external consultants for preparation of tasks, which are out of competence of the Agency and are related with improvement of the inventory.



Bulgarian National Inventory System – Responsibilities

QUALITY ASSURANCE, QUALITY CONTROL AND VERIFICATION

The ExEA is also responsible for coordination and implementation of QA/QC activities for the national inventory. A quality manager is in place.

The Bulgarian Quality Management System was established in the frame of project with Bulgarian Academy of Science, Geophysical Institute. The project was carried out and finished in 2008.

The QA/QC plan is an internal document to organise, plan and implement QA/QC activities. Once developed for the next submission, it is referenced and used in subsequent inventory preparation, or modified as appropriate.

The QA/QC plan has been updated in 2014 in order to implement the new established legal, institutional and procedural arrangements within the BGNIS. The updated National QA/QC Plan was approved by the Ministry of Environment and Water in December 2014.

National QA/QC Plan includes following elements:

- Responsible institutions;
- Data collection;
- Preparation of inventory;
- Category-specific QC procedures;
- QA and review procedures;
- Uncertainty analyses;
- Organisation of the activities in quality management system;
- Verification activities;
- Reporting, documentation and archiving.

BRIEF GENERAL DESCRIPTION OF METHODOLOGIES

The most recent greenhouse gas inventory for the period 1988 to 2022 (NIR 2024) was compiled according to the recommendations for inventories set out in the UNFCCC reporting guidelines according to Decision 24/CP.19, the Common Reporting Format (CRF) and the 2006 IPCC Guidelines.

The GHG inventory represents a process, covering the following main activities:

- Collecting, processing and assessment of input data on used fuels, produced output, materials and other GHG emission sources;
- Selection and application of emission factors for estimating the emissions;
- Determination of the basic (key) GHG emission sources and assessment of the results uncertainty.

Each year during inventory, some changes occur that affect directly the activities above enlisted. Important inventory stage is the process of data transformation into a form, suitable for CRF Tables format. During this process, aggregation of the fuels by type is made (solid, liquid and gaseous), and further data is added, regarding parameters and indices, specifying the systems for transportation and distribution of oil and natural gas, the systems for fertilizer processing, etc. These activities are just a part of additional data, filled in the CRF Tables.

National Inventory Methodology

According to Clean Air Act, article 25 (6) The Minister of Environment and Water in co-ordination with the interested ministers issues an order for the approval of a Methodology for the calculation, with balance methods, of the emissions of harmful substances (pollutants), emitted in the ambient air. The national Methodology (approved with Order RD 77 from 03.02.2006 of MEW) is harmonized with CORINAIR methodology for calculation of the emissions according to the UNECE/LRTAP Convention.

During 2007, MEW/ExEA had a project for development of Common methodology for emissions inventory under UNECE/LRTAP Convention and UNFCCC, i.e. to update the present Methodology under article 25 (6) CAA. (Approved with Order RD 40 from 22.01.2008 of MEW). The aim of the project was harmonization of the national Methodology with IPCC, including the three main greenhouse gases – CO2, CH4 and N2O (plus relevant ODS and SF6).

The Bulgarian national GHGs inventory and NIR are compiled according to requirements of the following documents:

- 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006 IPCC GL);
- EMEP/EEA air pollutant emission inventory guidebook – 2019.

The emission factors are mainly from:

- 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006 IPCC GL);
- EMEP/EEA air pollutant emission inventory guidebook – 2019;
- Country-specific.

3. INFORMATION NECESSARY TO TRACK PROGRESS

3.1. NATIONAL CIRCUMSTANCES AND INSTITUTIONAL ARRANGEMENTS

NATIONAL CIRCUMSTANCES

Governmental structure

The government type in Republic of Bulgaria is a parliamentary democracy. The Bulgarian unicameral parliament - the National Assembly consists of 240 deputies who are elected for 4-year-terms by popular vote. The Head of state is the President (Rumen Radev since January 2017) directly elected for a 5-year term with the right to one re-election. Executive power is exercised by the government. Legislative power is vested in both the government and the National Assembly. The Judiciary is independent of the executive and the legislature.

The Council of Ministers is the principal organ of the executive branch, being chaired by the Prime Minister. The central administration consists of 20 ministries. The main competencies and responsibilities related to climate change lie in the Ministry of Environment and Water. The Executive Environment Agency is responsible for the National inventories of GHG emissions, for monitoring, reporting and verification and for GHG permit issuance.

Given the horizontal nature of the climate change policy, the principle of integrating the climate considerations in key sectoral policies such as energy, households and services, industry, transport, agriculture, forestry and waste management is applied. Taking into account the close interaction of the policies in these areas with the strategic planning related to climate change, the government aims at an active involvement and commitment of all institutions responsible for carrying out the relevant policies.

Population profile

The demographic picture in Bulgaria is unfavourable at the beginning of the XXI century. It ranks the country amongst those in Europe with negative rate of natural increase, low birth rate, high adult mortality and child death rate, increasing average age of population.

Table 2 Demographic parameters

Years	Birth rate ‰	Natural increase ‰	Marriage rate,‰	Average age of population	Population annual average (mil)
1960	17,8	9,7	8,8	32,4	7,87
1970	16,3	6,0	8,6	34,4	8,49
1980	14,5	3,4	7,9	35,8	8,86
1990	12,1	-0,4	6,9	37,5	8,72
2000	9,0	-5,1	4,4	38,9	8,41
2010	10,0	-4,6	3,2	41,9	7,5
2012	9,5	-5,5	2,9	42,8	7,28
2013	9,2	-5,2	3,0	43,0	7,24
2014	9,4	-5,7	3,4	43,2	7,2
2015	9,2	-6,2	3,9	43,3	7,15
2020	8.5	-9,5	3,2	44,0	6,92
2022	8,8	-9,6	4,0	45,2	6,45

According to calculated data, Bulgaria's population is 6 447 710 people at the end of 2022, representing 1.5% of the EU population. The population density is 58.1. per sq. km at the end of 2022.

During the period between the last two Censuses 2011-2021 the population in the country decreased by 11.5.% due to the negative natural growth rate and due to international migration (from 7 364 570 people in 2011 to 6 519 789 people in 2020 - https://infostat.nsi.bg/infostat/pages/reports/result.jsf?x_2=1962). The progressive decrease of the Bulgarian population is hindering economic growth and welfare improvement, and the management measures taken to mitigate the negative consequences do not address the essence of the problem. The Government Program for the period 2017 - 2021 is the first one that aims at overturning the trend. The program also identifies the priority means for achieving this goal: measures to increase the birth rate, reduce youth emigration, and build up regulatory and institutional capacity to implement a modern immigration policy tailored to the needs of the Bulgarian business. The tendency of increasing relative share of urban population and decreasing relative share of rural population is kept. 73.6% live in urban areas and 26.4% live in rural areas.

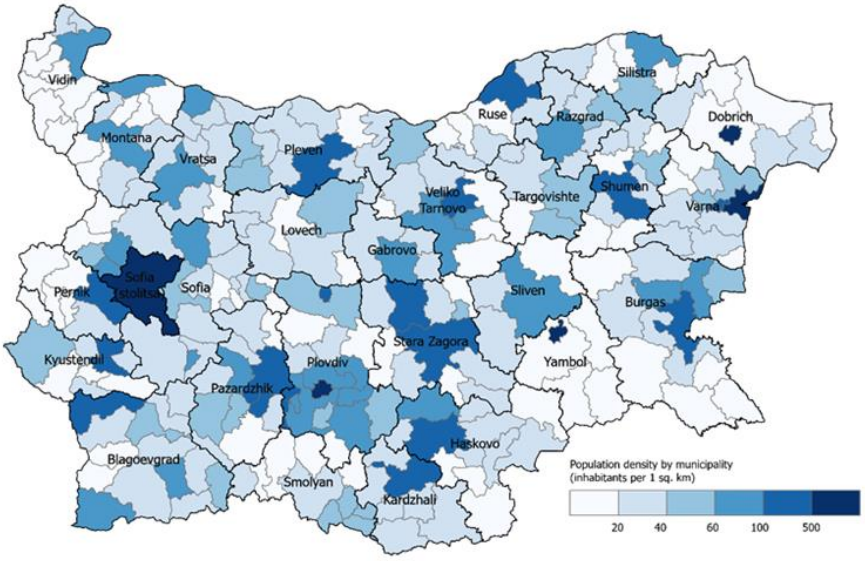


Figure 13 Density of population per sq. km by district as of 2021

Most of the population is concentrated in the urban areas. Sofia – the largest city and the capital of the country – has a population of over a million inhabitants. The next largest cities – Plovdiv and Varna – have population of about 300,000 people. Despite the positive natural rate for the urban population the emigration process led to its decrease. The relative share of the population in working age decreases. In 2022 the share of population at working age is 58.5% of the total population. The population ageing over the years lead to increase of the population mean age. It has increased from 40.4 years in 2001 to 45.2 years at the end of 2022. The mean age of the population is 44.3 years in urban areas, compared to 47.5 years in rural areas. Average life expectancy in Bulgaria is 68.3 for male and 75.8 for female for the 2022. In comparison, the average life expectancy for 1935-1939 was respectively 50.98 and 52.56, and for the period 1984-1986 it was 68.17 for male and 74.44 for female.

In total, women continue to be more (51.9 %).

The severe demographic decline is explained with low birth rates, high mortality rates and significant emigration. Bulgaria's age structure has changed radically. Its median age increased from 30 in 1960 to 45.2in 2020.

Geographic profile

The Republic of Bulgaria is situated on the Eastern Balkan Peninsula in South-eastern Europe, along the Black Sea. With a territory of 111 001.9 square kilometres, Bulgaria is Europe's 16th-largest country. The neighbour states are Greece and Turkey to the South, Republic of North Macedonia and Serbia to the West. The River Danube separates it from Romania to the North. Its natural eastern border is the Black Sea. 60% of the total area is covered with hills and mountains with lowlands in north and southeast. The mountains are part of the Alpine-Himalayan mountain chain situated on two continents - Europe and Asia, 34% of the country's territory is covered with forests (deciduous and coniferous). The varied environment is a natural habitat for valuable animal species.

The most notable topographical features are the Danubian Plain, the Balkan Mountains, the Thracian Plain, and the Rhodope Mountains. The southern edge of the Danubian Plain slopes upward into the foothills of the Balkans, while the Danube defines the border with Romania. The Thracian Plain is roughly triangular, beginning southeast of Sofia and broadening as it reaches the Black Sea coast.

The Balkan Mountains run laterally through the middle of the country. The mountainous southwest of the country has two alpine ranges—Rila and Pirin, which border the lower but more extensive Rhodope Mountains to the east. Bulgaria is home to the highest point of the Balkan Peninsula, Musala, at 2,925 metres and its lowest point is sea level. Plains occupy about one-third of the territory, while plateaus and hills occupy 41 per cent. The country has a dense network of about 540 rivers, most of which are relatively small and with low water levels. The longest river located solely in Bulgarian territory, the Iskar, has a length of 368 kilometres. Other major rivers include the Struma and the Maritsa in the south.

The Danube river is the biggest one with total length of 470 km on Bulgarian territory. There are also 6 lakes with total area of 87 km^2 and water volume of 211 mln m3, and 23 dams with total area of 376 km^2 and water volume of 4,571 mln m3. Bulgaria has three National Parks – Pirin, Rila and Central Balkan. They have a total area of 193,049 hectares and comprise more than one-third of all protected areas in Bulgaria. The National Parks belong to the state. They are managed and administered by Directorates, operating under the Ministry of Environment and Waters. The Bulgarian National Parks offer excellent opportunities for tourism, scientific research and education.

Economic profile

Bulgaria has an emerging market economy in the upper middle income range where the private sector accounts for more than 80 per cent of GDP. From a largely agricultural country with a predominantly rural population in 1948, by the 1980s, Bulgaria had transformed into an industrial economy with scientific and technological research at the top of its budgetary expenditure priorities. The loss of COMECON (Council for Mutual Economic Assistance) markets in 1990 and the subsequent "shock therapy" of the planned system caused a steep decline in industrial and agricultural production, ultimately followed by an economic collapse in 1997.

The country has successfully achieved and continues to deliver macroeconomic stability after 1998. The introduced Currency Board, sound fiscal policy, limited pay raise, etc. have been rules, administrative in their nature, which are in the basis of the macroeconomic and financial stability. The functioning of the companies of the real economy, despite some positive trends, mainly in the sales growth, is still not leading to overcome the crisis in the real economy.

Economic indicators have worsened amid the late-2000s financial crisis. After several consecutive years of high growth, GDP contracted with 5.5 per cent in 2009 and unemployment remains above 12 per cent. Industrial output declined with 10 per cent, mining with 31 per cent, and ferrous and metal production marked a 60 per cent drop. Positive growth was restored in 2010, although investments and consumption continue to decline steadily due to rising unemployment. The same year, intercompany debt exceeded 51 billion euro, meaning that 60 per cent of all Bulgarian companies were mutually indebted. By 2012, it had increased to 83 billion euro, or 227 per cent of GDP.

At the start of the COVID-19 pandemic, economic conditions in Bulgaria were favourable. The positive trend of robust economic growth over the period 2015-2019 (3.2% on average) has been underpinned by growing private consumption and positive labor market developments.

The Bulgarian economy has almost fully recovered from the pandemic-induced shock. After falling by 4.4% in 2020, real GDP rebounded by 4.2% in 2021, driven by household consumption and goods exports. Private consumption remained relatively unaffected in 2020 compared to the EU average, given that the sectors most hit by the supply restrictions, such as accommodation and catering services, account for a much smaller share of consumer.

In 2021, private consumption expanded robustly, supported by job retention schemes, positive wage dynamics, higher pension expenditures, low household debt, and improvements in consumer sentiment. Conversely, investment growth remained subdued in 2020, but dropped significantly in 2021. Exports of goods reached their pre-pandemic level in 2021, after a sharp drop at the start of the pandemic. In contrast, in 2021 real exports of services were still 18% below their 2019 levels, as nominal revenues from foreign tourism stood at only 55% of the prepandemic levels. Price pressures are set to weigh on household consumption in 2022.

In 2022, growth rate of GDP is 3.9% compared to 2021. In 2022, GDP (PPP) was estimated as 168 360 mil. lv.

The labour force is 2.30 million people, of whom 2,8 per cent are employed in agriculture, 23,6 per cent are employed in industry and 73,6 per cent are employed in the services sector. Extraction of metals and minerals, production of chemicals, machinery and vehicle components, petroleum refinement and steel are among the major industrial activities. Mining and its related industries employ a total of 120,000 people and generate about five per cent of the country's GDP. Bulgaria is Europe's sixth-largest coal producer. Local deposits of coal, iron, copper and lead are vital for the manufacturing and energy sectors. Almost all top export items of Bulgaria are industrial commodities such as oil products, copper products and pharmaceuticals. Bulgaria is also a net exporter of agricultural and food products, of which two-thirds go to OECD countries. It is the largest global producer of perfumery essential oils such as lavender and rose oil. Agriculture has declined significantly in the past two decades. In last years between 2015 and 2022 there are study increase in the agricultural output in bouth – livestock breeding and crops. Of the services sector, tourism is the most significant contributor to economic growth. In recent years, Bulgaria has emerged as a travelling destination with its inexpensive resorts and beaches outside the reach of the tourist industry. Most of the visitors are British, Romanian, German and Russian. The capital Sofia, the medieval capital Veliko Tarnovo, coastal resorts Golden Sands and Sunny Beach and winter resorts Bansko, Pamporovo and Borovets are some of the locations most visited by tourists.

GDP growth is at moderate, balanced pace with no sudden fluctuations, typical for past periods. During the last few years of the analysis, the pace of GDP growth is bigger due to favourable economic climate in the country. The main economic indicators are given in Table 3.2.1.

Table 3 Statistical information on the main economical indicators

	GDP, real growth	Real annual GDP growth	Export	Import	GDP per capita	Unemploy-ment
	% per year	% per year	EUR million	EUR million	Lv	%
2005	14,1	7,1	9 466	14 668	6 075	10,1
2010	2,3	1,5	15 561	19 245	9 938	10,3
2015	6,5	3,4	22 982	26 357	12 483	9,2
2020	3,6	-4,0	28 008	30 743	17 299	5,1
2021	7,7	7,7	34 988	39 238	20 207	4,9
2022	3,9	3,9	47 508	55 175	25 956	4,3

Source: National Statistical Institute

Real GDP growth is approximately 2% for the period 2010 - 2011, and due to the COVID pandemic, the GDP growth decreased dramatically reached -4% in 2020.

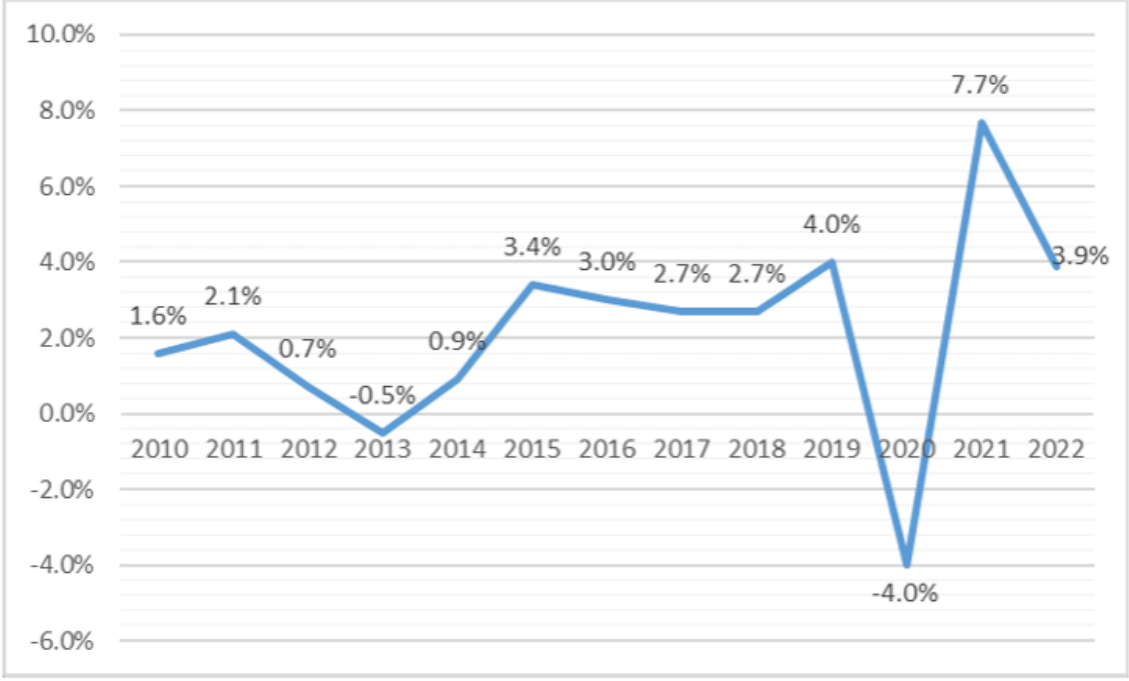


Figure 14 GDP Growth – Bulgaria

Source: National Statistical Institute

GVA in total and by economic sectors

The relative share of Industry sector in GVA in 2022 is 28.6%, which is an increase of 4.8 percentage points compared to 2021.

The Agriculture decreases its relative share in GVA of the national economy by 0.6 p.p. to 4.4%.

The relative share of the value added of the activities in the Services sector decreased to 67.0% compared to 71.2% in 2021.

Updated annual data show an increase of the GDP for 2022 in real terms by 3.9% compared to 2021. For the same period, GVA increased by 5.3%.

The increase in Gross Value Added is determined by the growth in the following economic activities:

- Mining and quarrying; manufacturing; electricity, gas, steam and air conditioning supply; water supply, waste management and remediation activities - 13.1%;
- Financial and insurance activities - 8.0%;

- Public administration and defence; compulsory social security; education; human health and social work activities - 7.0%;
- Construction - 5.4%;
- Professional, scientific and technical activities; administrative and support service activities - 5.0%;
- Real estate activities - 4.1%;
- Information and communication - 1.6%;
- Wholesale and retail trade; repair of motor vehicles and motorcycles; transportation and storage; accommodation and food service activities - 0.9%;
- Arts, entertainment and recreation, repair of household goods and other services - 0.4%.
- A decline by 4.4% was registered in Agriculture, forestry and fishing.

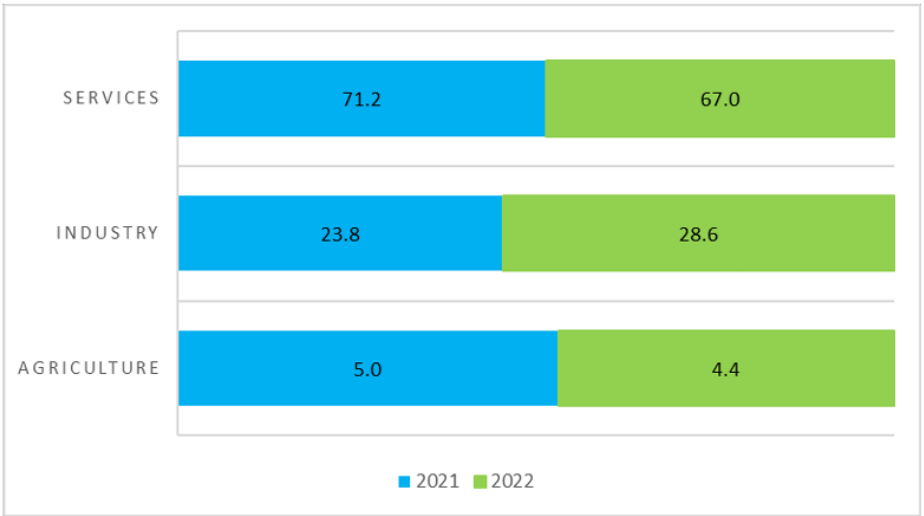


Figure 15 Gross value added by economic sector in 2021 and 2022*Source: NSI*

Unemployment

The main problems for the country come from the relatively high unemployment, high current account deficit, uneven level of economical development and living standard in different regions.

As seen from the chart (Fig. 3.6.) in the Republic of Bulgaria the objective unemployment has decreased and has reached levels lower than the EU..

In 2022 there were 140.4 thousand unemployed persons, of whom 78.2 thousand (55.7%) men and 62.2 thousand (44.3%) women. The unemployment rate was 4.3%.

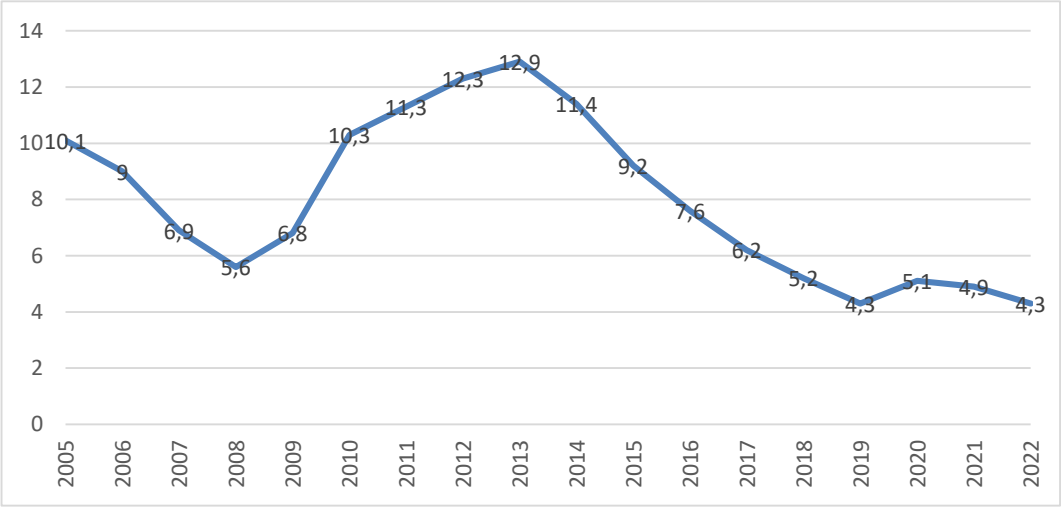


Figure 16 Unemployment, %

Currency exchange rate

Since the beginning of 1999 Bulgaria has pegged the euro at 1.95583 lev./€.

The external trade of the country shows the level of economic development, currency stability, technological development, etc.

Increasing exports over the past two years have substantially improved the trade balance to render a positive position.

Import significantly surpasses export and this negative trend increases.

Table 17 Trade balance

Year	Export mil. EURO	Import mil.	Trade balance
2005	94 66,3	14 667,7	-5201,4
2010	15 561,2	19 244,8	-3683,6

2015	22 982	26 356,7	-3374,4
2020	28 008	30 743	-2734,3
2021	34 988	39 238	-4250
2022	47 508	55 175	-7667

Source: NSI

In 2022, regarding the expenditure components of GDP, contributors to the registered positive economic growth are the Final consumption with a growth of 4.2% and Gross fixed capital formation - 6.5%. In 2022, the exports of goods and services increased by 11.6% and imports of goods and services - by 15.0%, compared to 2021.

Climate profile

The climate of Bulgaria is temperate continental with a transition towards the subtropical climate of the Mediterranean type and has four distinct seasons. Despite its small area, Bulgaria has unusually various climate conditions due to the combined influence of the strongly differing continental and Mediterranean climates and the diverse landscape. Mountains and valleys act as barriers or channels for air masses, causing sharp contrasts in weather over relatively short distances. The barrier effect of the Balkan Mountains is felt distinctly till the late 1990s – on an annual basis, Northern Bulgaria is cooler at about 1°C and receives about 192 mm more precipitation than Southern Bulgaria. Since the beginning of the 21st century, temperatures have been rising. The northern half of the country is warming faster than the southern half, equalizing the average annual temperature on both sides of the Balkan Mountains. The growing number of torrential precipitation events in south Bulgaria leads to an increase in total precipitation in this region, which results in a relatively more evenly distributed annual precipitation in the southern and northern parts of the country. The Balkan Mountains appear the south boundary of the area in which continental air masses circulate freely. The Rhodope Mountains mark the northern border of the Mediterranean weather systems domination. The intermediate area, which includes the Thracian Lowland, is influenced by a combination of the two systems, but the continental one predominates. The climate in this region is generally more severe than that in other parts of Europe at the same latitude. Because the Black Sea is too small

to be a primary influence over much of the country's weather, it only affects the immediate area along its coastline, but strong winds and local storms are frequent during the winter. Depending upon the depth to which they study the area, climatologists list four or more climatic subzones. Commonly used classification subdivides Bulgaria into five climatic zones: Moderate-Continental zone; transitional zone; Continental-Mediterranean zone; Black Sea coastal zone; and alpine zone in the mountains above 1000 m altitude. Winters along the Danube River are bitterly cold, while sheltered valleys opening to the south along the Greek and Turkish borders may be as mild as areas along the Mediterranean or Aegean coasts. The many valleys scattered between the uplands have temperature inversions resulting in increased air pollutions and smog in the industrial and urban zones. Much of the higher land remains white well into springtime. Lower elevations are snow covered an average of twenty-five to thirty days per year. Abundant snowfalls may occur throughout the country from December to end of March, especially in some higher mountainous areas. The heating season varies between 160 and 220 days for the different locations. An important indicator of the energy requirements for heating is the number of degree days. The heating degree days for indoor temperatures of 20 □C vary between 2100 and 3500 on average annual basis (2500 for Sofia). Typical continental and changeable is the climate in spring. The temperatures range from 15 °C to 25 °C, steadily increasing from March to June. Summer starts in the beginning of June, when temperatures can reach above 30 °C. July and August are the hottest months and sometimes temperatures reach above 35-38 °C. Summer usually ends in mid-September, when temperatures drop and the days become shorter. September and October can still be quite warm and pleasant with temperatures between 10 °C and 25 °C; autumns are not particularly rainy compared to the west and central parts of Europe.

The long-term annual mean air temperatures in Bulgaria vary from -3.0 °C to 14.0 °C, depending on the location and elevation. Air temperature normally reaches minimum in January and maximum in July. The monthly mean temperature varies from -10.4 °C to 2.8 °C in January and from 5.2 °C to 25.2 °C in July. During severe winters, minimum temperatures may drop below -20 °C, even below -30 °C. Dobrudzha in the northeast, the Black Sea coastal area, and parts of the Thracian Lowland sometimes receive less than 500 mm precipitation per year. The Thracian Lowland is often subject to summer droughts. High altitude areas, which receive the most precipitation amount in the country, may average over 1000-1100 mm per year. The air

humidity is between 66 and 85% in the different areas of the country. Average cloudiness is about 55-56 percent. The prevailing winds are northwest/west. The average wind speed varies between 1.2 and 4.0 m/s in non-mountainous areas. In some mountainous regions and northern coastal zone, the average wind speed is over 5 m/s, which is the threshold for effectiveness of wind energy projects.

In the period 1988-2020 (Source: NIMH), the average annual air temperature for the lower part of the country (for areas up to 800 m altitude) is increased on average with 0.8 °C relative to the climatic normal for the reference period 1961-1990 and ranges between 10.6 °C and 13.3 °C. The tendency in the long-term variations of the average annual air temperature remains positive. Temperature anomalies for all years after 2007 (except 2011) are equal or over 1°C. Against this background, 2022 (with an average annual temperature 12.8 °C) is the fourth warmest year in the period 1988-2022, and the month of December is the fourth warmest since 1930. with an average anomaly of +2.7°C in Northern Bulgaria and +3.4°C in Southern Bulgaria.Since 1970s, a tendency towards global warming is observed. As a whole, the winters were milder in the second half of the 20th century. In Bulgaria, 29 of the last 32 years since 1988 have positive anomalies of the average annual air temperature compared to the climatic reference period 1961-1990. There are many hot and droughty spells followed by severe storms and heavy floods incurring damage and casualties. The annual amplitude between the maximum and the minimum air temperature decreases – the minimum temperature rises faster than the maximum one. Data from the phenological observations indicate an accelerated active growth of about 7-10 days in the different climatic regions, which represent clear evidence of the global warming over the past 30 years compared to previous periods. Since the beginning of the 21st century a significant increase in the average number of days with 24-hour precipitation above 100 mm has been observed (above 30%). Convective precipitation, which is typical for spring and summer become more frequent during the winter months. The snow cover persistence in the mountains decreases and the average snow cover depth shows a positive tendency towards thinning. The areal of deciduous forests is shifted to higher elevations.

SCENARIOS FOR BULGARIA

Source: NIMH-BAS

Most climate models simulate an increase in air temperature in Bulgaria from 2 to 5°C by the end of the century (the scenarios vary according to model simulations used). Winters classified as cold under the current climate will occur less often in the 2020s and will probably disappear by 2080s. In contrast, hot summers will occur more often and almost every summer is expected to be unusually hot in the 2080s. According to most climate scenarios winter precipitation will increase in Bulgaria by the end of this century but rainfall during the warm half of the year and especially during the summer is expected to decrease.

The results from the studies of water resources in Bulgaria based on current trends of air temperature and precipitation as well as on simulation models and climate scenarios show that the annual river runoff is likely to decrease during this century. The main reasons for this – the observed trends of warming and rainfall deficit – are expected to persist over the coming decades as well.

The expected global warming will be accompanied by an increase in the frequency of the hot air waves combined with increased humidity and urban air pollution. The result will probably lead to a large number of heat strokes. Besides the risk of further limitation of water resources, more forest fires, landslides and floods, the global warming means also a possible outbreak of infectious diseases (including diseases, such as malaria, that are not typical for our latitudes).

Since approximately 61% of forests in Bulgaria are in the zone below 800 m altitude, the majority of Bulgarian forests would be affected by drastic climate changes. Increasingly vulnerable in the future will be the spring crops sown on infertile soils and the arable land in south-eastern Bulgaria where the precipitation even under the current climate conditions insufficient to ensure normal growth, development and yield of crops.

South East European Virtual Climate Change Center (SEEVCCC) provides results of climate projections over Euro-Mediterranean region obtained with coupled atmosphere-ocean Regional Climate Model (RCM-SEEVCCC). Climate simulations are performed for three time slices (1961-1990, 2001-2030 and 2071-2100), using two IPCC scenarios (A1B and A2). A1B is characterized as a “medium sensitivity” and A2 as a “high sensitivity” scenario, in sense of carbon dioxide concentration. On Figure 1 are shown anomalies of the annual air temperature (°C) and annual precipitation amount (%) for the periods 2001-2030 (A1B scenario) and 2071-2100 (A2 scenario). For the whole model domain temperature increases, in first 30 years (2001-2030) with about 1-1.5°C and in last 30 years (2071-2100) with more than 3°C. During

the last thirty years generally the whole model domain is drier than in the first 30 years of the century (on average over 20% for Bulgaria). These results are consentient with results obtained from a set of 21 global climate models (IPCC Fourth Assessment Report).

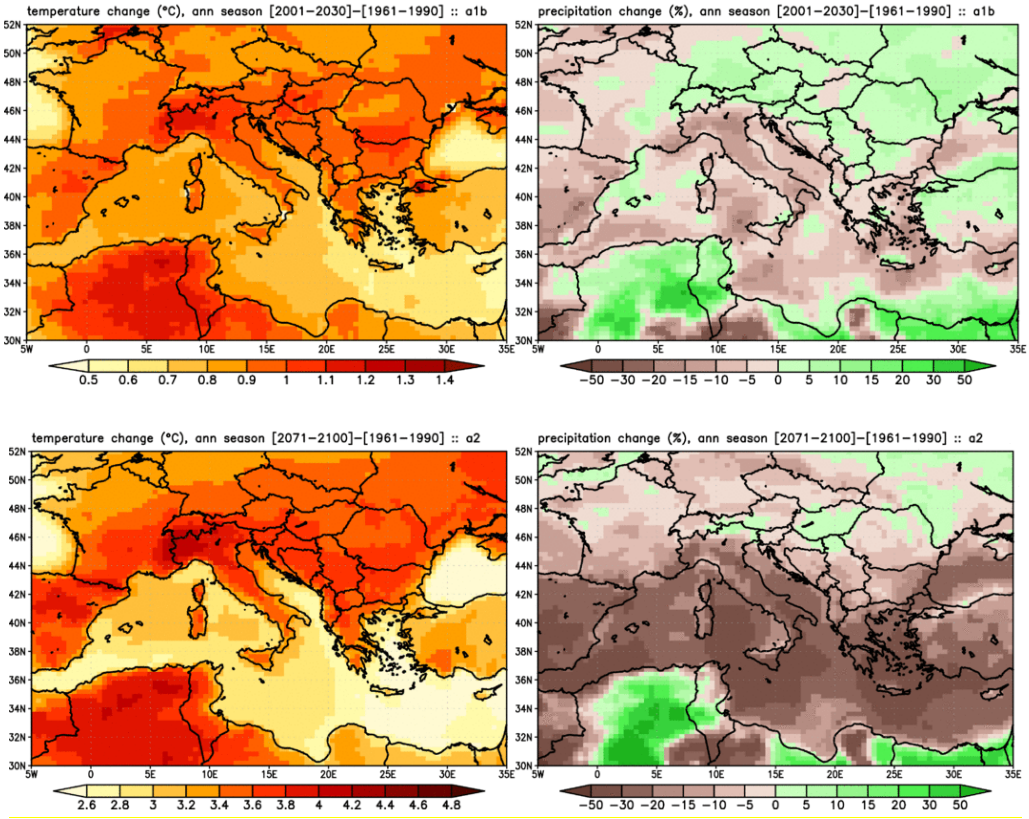


Figure 18 Temperature and precipitation annual change for periods 2001-2030 (A1B scenario) – upper panel, and 2071-2100 (A2 scenario) – lower panel

The climate scenarios for Bulgaria, obtained in NIMH-BAS within the framework of the CECILIA project (http://www.cecilia-eu.org/description.htm), present the regional climate for the "near future" (2021-2050) and "distant future" (2071-2100) periods like a trends for the average annual air temperature and the mean annual precipitation amount in comparison to the current reference climate period. The expected increase of mean annual temperature is about 1.5-2°C for the "near future" and about 2.5-3.5°C for the "distant future". The difference in spatial distribution of annual precipitation amount in some parts of the country is observed. The negative trend with an average of 5-10% (in individual regions up to 15-20%) in both periods is expected for east half of the country. In the second period the areas with negative trends for precipitation become larger and cover also parts of West Bulgaria.

Energy profile

Bulgaria covers more than 70% of its gross energy demand by imports. The dependency on import of natural gas and crude oil is very high and has a traditional single origin - the Russian Federation. Our country relies completely on the import of nuclear fuel from Russia, although nuclear energy, according to a Eurostat methodology, is considered as indigenous energy source.

The prevailing quantity of heat is produced on the basis of natural gas and the risks for the final consumers are much lower. The structure of the Final Energy Consumption (FEC) for the Bulgarian economy predetermines a big share of secondary energies and necessity of transformation of a significant quantity of energy resources and lost of energy resources in the transformation processes.

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Table 19 Structure of final energy consumption (Per cent)

	1990	1995	2000	2005	2010
Industry	51.9	52.2	41,8	38,4	29,2
Transport	15.2	6.1	21,5	27,8	31,4
Households	22.0	29.1	25,6	22,4	25,9
Others	10.9	12.6	11,2	11,5	13,4
Total	100	100	100	100	100
	2015	**2020**	**2021**	**2022**	
Industry	28,8	27,8	27,8	27,4	
Transport	34,7	33,8	33,8	35,2	
Households	23,6	25,0	23,6	21,7	
Others	12,8	13,4	14,8	15,7	
Total	100	100	100	100	

Source: NSI

Industry is the biggest energy consumer in Bulgaria's economy, but it's share in 2022 decreased with 56% compared to 1990. Instead energy consumption in transport sector in 2022 has increased from to 35% of the final energy consumption.

The largest relative share of input fuels for electricity production was occupied by nuclear energy – 41 %, followed by local coal – 33 %, RES – 17 %, gaseous fuels – 6 %, imported coal – 1 % and liquid fuels - 0.1%.

Table 20 Main energy parameters

	Primary energy production	Gross domestic energy consumption	End consumption of energy	Share of energy from RES in gross domestic energy consumption	Energy dependency
	1000 toe	**1000 toe**	**1000 toe**	**%**	**%**
2005	10 643	20 081	9 602	9,4	47,5
2010	10 453	17 916	8 699	14,1	40,5
2015	12 033	18 681	9 389	18,2	36,7
2020	10 831	17 836	9 514	23,3	37,9
2021	12 136	19 371	9 857	19,5	36,2
2022	13 154	19 635	9 520	19,1	37,1

Source: NSI

Public administration responsible for energy and industry includes:

- Ministry of Energy
- Ministry of Economy
- Energy Efficiency Agency (EEA)
- Ministry of Innovation and Growth
- State Energy and Water Regulatory Commission
- Agency for Nuclear Regulation
- Ministry of Environment and Water

Transport sector

In 2020 Bulgaria had 19,9 thousand km roads. In structural terms the majority are class III roads with a 61,3 % share, followed by class II – 20,2 %, and class I – 14,5 %. Highways are 806 km with the lowest relative share – 4,0 %.

The total length of the railway network is 5 464 km, which, when related to the area of Bulgaria, makes an average density of the railway network of 36,3 km / 1,000 km2.

In Republic of Bulgaria there are 10 civil airports, 5 of which have the status of international airports (Sofia, Varna, Burgas, Plovdiv, Gorna Oryahovitsa), 6 airports serve the agricultural aviation and there are 150 aircraft movement areas to be used by airline operators with scope of business performing specialized aviation flights and other type of aviation activity.

The port system of the Republic of Bulgaria consists of two port types - sea and river ports:

• The seaports are situated on the Black Sea coast, representing the eastern border of Bulgaria respectively.

• The river ports are situated along the Bulgarian section of the Danube, representing the northern border of the country.

As of now, the national port system of the Republic of Bulgaria has 14 628 m total length of the quay front in the public transport sea ports and 13 964 m in the public transport river ports.

The main policy and strategy documents in the sector is the Integrated Transport Strategy for the period 2030.

Table 21 Goods carried by different transport modes 2005 – 2022, thousand tonnes

Year	Goods carried – thousand tonnes			
	Land transport	Waterway transport	Air transport	Total
2005	102 100	16 315	21	118 436
2010	79 441	7 964	11	87 416
2015	123 626	1 867	5	125 498
2020	110 270	2 827	21	113 118
2021	120 781	3 992	31	124 804
2022	126 881	3 608	15	130 504

Source: NSI

Table 22 Passengers carried by transport modes 2005-2022, thousand tonnes

Year	Passengers carried – thousands				
	Land transport	Waterway transport	Air transport	Urban electrical transport	Total
2005	698 014	86	2 071	288 410	988 581
2010	542 536	166	2 327	291 167	836 196
2015	464 770	115	2 240	248 081	715 206
2020	318 768	91	591	193 008	512 458
2021	307 614	152	603	191 815	500 184
2022	348 402	214	2417	230 498	581 531

Source: NSI

Environmental categories of the road vehicles

A unique feature of the Bulgarian vehicle fleet is its age structure. In 2022 about 88.1% of the vehicles were above 10 years old, whereas new vehicles (1 to 5 years) were 4.6 % of the total and 7.3% were aged between 6 and 10 years.

The age of most of the vehicles is above 20 years and that determines their existence at a lower environmental category.

Only 4.20% of the vehicles comply with Euro standard 5. The largest share is of vehicles without Euro standard – 33.40%. This is due to the great number of registered vehicles of more than 20 year age. 24.40% of the vehicles have Euro 1.

Transport generates effects with negative impact on the environment and people by emissions of pollutants and greenhouse gases. The limitation thereof is an element of the sustainable development of the transport system. The key indicators for the assessment of the negative impact of transport on the environment and human health are the energy consumption, emissions of pollutants (ozone precursors, unsyav, acidifying substances and precursors of PM10) and greenhouse gases.

Industry sector

In the past, the main industry sectors of Bulgaria were metallurgy, machine manufacture, chemicals, and agriculture. Recently, however, the priority has shifted to sectors like energy, tourism, transportation, IT and telecommunications, food and beverage, pharmaceuticals, and textile and clothing.

The governmental policy of rapid privatization led to almost complete privatization of industrial installations. As a result, the most inefficient enterprises were closed. The new owners introduce various measures to save energy which are mainly of organizational nature and “no cost” or “low cost” measures.

Currently, the ‘Industry’ comprises the activity of industrial enterprises, classified in the mining and quarrying industry, manufacturing, electricity, gas, steam and air conditioning supply and water supply, sewerage, waste management and remediation activities. The indicator ‘Production value of industrial enterprises’ refers to the entire of the industrial enterprises i.e., it includes receipts from their non-industrial activities. The production value comprises the following elements: receipts from sales of industrial production and services; expenditure on

acquisition of tangible fixed assets on own account of the enterprises, other receipts, changes in stocks of finished goods and changes in stocks of work-in-progress.

Table 23 Output (Production value) of industrial enterprises, thousand BGN

	Total	Mining and quarrying	Manufacturing	Electricity, gas, steam and air-conditioning, supply	Water supply, sewerage, waste management and remediation
2015	645483388	2578600	52666985	7882904	1478627
2020	73658021	3097435	61759156	7005546	2000441
2021	88100015	3713231	70861171	11559868	1965745
2022	120045561	4323326	90775334	22617058	2329843

Source: NSI

Agriculture sector

Agriculture sustains a major part of the Bulgarian economic landscape. The country enjoys a number of favourable geostrategic, climatic and natural endowments, which have significantly contributed to the development of century long traditions in both plant-growing and livestock breeding strong and promising sectors are the growing of roses, cotton and tobacco in the South Central parts of the country. Underdeveloped because of economic factors remain pepper, tomatoes, grapes and apples production, which are otherwise favoured by natural condition. In terms of livestock breeding and livestock products processing, the country has excellent outlooks for increasing the exports of specific high quality milk and dairy commodities, as well as meat products. Predisposed by climatic and natural conditions, organic farming is also gaining speed in recent years. Investments in organic production are strongly encouraged by both Bulgarian and European authorities. Today, agricultural entrepreneurs in Bulgaria enjoy a number of competitive advantages and investment favourable factors. As a member of the EU, the country benefits from free access to the growing European market and is also subject to financial and technical support by the EU.

Forests

Forestry is a traditional important economic sector for Bulgaria, where significant state investments for the last 40 years have created a potential for significant and sustainable logging in the future, when young plantations will grow and become suitable for felling.

The forests cover some 35 % of the total area of the country, support valuable ecosystems and control erosion. A big share of these forests (39.8 %) has special function – protective and rehabilitation. A potential problem in the sector is the slow pace of reforms and restructuring.

In the following two tables, data for the forest areas in Bulgaria is given and also – activities for afforestation.

Table 24 Total and wooded forest area, 1000 ha

Type of forest	**1990**	**1995**	**2000**	**2005**	**2010**
Total	3871	3876	3914	4077	4138
Coniferous	1330	1304	1282	1279	1279
Deciduous	2541				2859
High-stemmed		1579	1535	1460	904
Low-stemmed		993	1097	1338	1955
of which: Wooded forest area	3348	3334	3375	3674	3761
Coniferous	1213	1154	1115	1147	1146
Deciduous	2135				2615
High-stemmed		1251	1237	1268	846
Low-stemmed		929	1023	1259	1769
Type of forest	**2015**	**2020**	**2021**	**2022**	
Total	4223	4270	4269	4273	
Coniferous	1261	1237	1232	1229	

Deciduous	2962	3033	3037	3044	
High-stemmed	938	967	972	974	
Low-stemmed	2024	2066	2065	2070	
of which: Wooded forest area	3858	3603	3921	3926	
Coniferous	1134	1117	1115	1113	
Deciduous	2724	2801	2806	2813	
High-stemmed	878	911	913	915	
Low-stemmed	1846	1890	1893	1898	

Source: National Statistical Institute, Statistical Reference Book 2023

Table 25 Activities for afforestation, ha

Year	**1990**	**1995**	**2000**	**2005**	**2010**
Preparation of area	22368	10911	6056	3658	764
Afforestation	35551	14367	6313	5397	1727
Reforestation of artificial forest	8840	4892	2086	2065	1062
Year	**2015**	**2020**	**2021**	**2022**	
Preparation of area	2025	1613	1508	2420	
Afforestation	1592	1760	1645	1179	
Reforestation of artificial forest	298	482	625	760	

Source: National Statistical Institute, Statistical Reference Book 2021

Waste sector

After the global economic and political change and regime change of government in our country start to lay the groundwork for approval of plans and strategies outlining guidelines on sustainable management.

At the beginning of the nineties years in the country began to develop practices for separate collection of household waste and their subsequent recycling.

During the last couple of years the measures in national legislation aimed at decreasing CH4 emissions from landfills - limiting the disposal of municipal waste, measures for closure and rehabilitation of municipal landfills with terminated operation; coverage of all household waste in a managed system of waste treatment, including all waste to be disposed of in managed landfills and capturing, utilizing or flaring of landfill gas.

Bulgarian legislation introduce the specific quantitative targets for separate collection, recycling and recovery of municipal bio waste as well as targets for diverting biodegradable municipal waste from landfills. The provisions of the Waste Management Act require that by 31 December 2020 there shall be limiting the amount of biodegradable municipal waste to 35 percent of the total of those wastes in the Republic of Bulgaria in 1995. This is compliant with the requirements of the European directive on the landfill of waste.

The effect of the legislative measures will be visible in the future. Currently, some positive tendencies are observing, concerning SWD on the managed and unmanaged disposal sites.

Since 2000 the share of population, land filling on unmanaged sites decreases and the share of population, which dispose of wastes on managed sites is increasing.

The landfills are classified as managed and unmanaged (see below: Activity data).

As the main criteria for whether landfills are managed and unmanaged, is considered the fact if the landfills meet the requirements laid down in EU Directive 1999/31/EC on the landfill of waste.

Landfilling as a method of waste disposal still holds the biggest share in the management of municipal waste, but there is a steady decline in this indicator in recent years (the percentage of waste disposed in landfills drop from 77% in 1990 to 52% in 2020). Recyclable waste collection, which was a scarce practice at the beginning of the nineties, has been increased.

The total amount of municipal waste generated in Bulgaria in 2022 is 3157 kt. The total amount of municipal waste generated in the country is following a positive trend towards permanent decrease.

The amounts of separately collected fractions from municipal waste are gradually increasing. Since 2009, collection schemes have been improved for management of six special waste categories - packaging waste, waste oils, end-of-life vehicles, waste electrical and electronic equipment, waste tires, batteries and accumulators. This resulted in increased quantities of collection and recovery of those waste streams and decrease in per capita waste generation. Bulgaria is among the member-states with close to the average level of recycling in recent years. In the country exist regional systems for waste management where before land filling the waste is subjected to pre-treatment (separation) as recyclable fractions such as paper and cardboard, metals, glass, plastics and wood are sent to recycling facilities. This practice reduces the amount of waste which going to landfills, additionally development of composting activities concerning the decreased land filled degradable fraction of MSW.

The emissions from SWDS are emitted from MSW (including AMSW-assimilated municipal solid waste and sludge from wastewater treatment plant) which are landfilled. MSW are disposed of on managed and unmanaged disposal sites as from 2000 the share of population, landfilling waste on unmanaged is decreasing and the share of population, landfilling on managed MSW sites is increasing.

Sludge from wastewater treatment plants has also been considered, because it can be disposed of at the same landfills as municipal solid waste, once it meets a specific requirements. The fraction of sludge, disposed at ladfill sites has been estimated to be 22.53 Gg in 1988 (extrapolated value) decreasing to 1.60 Gg in 2022 (decreased by 92.9%).

On the basis of its characteristics, sludge from wastewater treatment plants is also used in agriculture, in compost production with red Californian worms, landfilled or temporarily stored on special platforms.

Information about sludge is available from 2005 (Regulation EC No 2150/2002 on waste statistics).

Data are collected by NSI from public water supply companies, dealing with water collection, treatment, water supply and wastewater collection, discharge and treatment (water supply companies/urban wastewater treatment plants operators and irrigation systems).

Another source of information is Executive Environment Agency through National legislation (Ordinance on the way of recovery of sludge from wastewater treatment through its use in

agriculture; Ordinance No 1 on the procedures and forms for providing information about waste management activities and the procedure for keeping public records).

Table 26 Time series of sewage sludge production and landfilling

Year	1990	2000	2005	2010	2015	2020	2021	2022
Sewage sludge production (Gg)	45,8	43,06	41,7	49,8	57,36	33,47	39,19	
Sewage sludge landfilled (Gg)	21,73	20,43	23,4	13,97	8,54	1,6	1,8	1,9

Source: National Inventory Report 2024

INSTITUTIONAL ARRANGEMENTS

Institutional arrangements for tracking progress

As an EU Member State, Bulgaria contributes to the implementation of the European Union's NDC (see paragraph 3.2). To track progress of its implementing and achieving the European target for 2030, institutional arrangements are in place both on the EU-level as on Member State level, as outlined below. As such, those sections regarding specific arrangements at the EU-level may contain common text for the BTRs of the EU and the Member States.

Institutional arrangements in the European Union

The EU's Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action ('Governance Regulation') establishes a governance mechanism and specific arrangements to track the progress of the Union and its Member States towards the implementation and achievement of the EU's climate and energy targets and commitments under the UNFCCC and the Paris Agreement. These arrangements include the monitoring of GHG emissions and removals, the reporting of policies and measures, projections of GHG emissions and removals and progress on adaptation to climate change.

Under the Governance Regulation, the EU has established a Union Inventory System to ensure the timeliness, transparency, accuracy, consistency, comparability and completeness of the data reported by the EU and its Member States. This inventory system includes a quality assurance and quality control programme, procedures for setting emission estimates, and comprehensive reviews of national inventory data to enable the assessment of compliance towards climate goals.

Each EU Member State compiles its GHG inventory in accordance with the requirements of the Paris Agreement and the relevant Intergovernmental Panel on Climate Change (IPCC) guidelines. Inventory data on GHG emissions and removals, including information on methods, are submitted electronically using a reporting system managed by the European Environment Agency (EEA). The submitted data are subject to quality control procedures and feed into the compilation of the GHG inventory of the EU. Net GHG emissions, calculated from emissions and removals reported in the GHG inventory of the EU, are the key information used for tracking progress towards the EU NDC target of a least -55% net emission reduction by 2030 compared to 1990.

Given the scope of the EU NDC related to international aviation and navigation, a specific share of international aviation and navigation emissions as reported in the GHG inventory data is calculated based on the Joint Research Centre's Integrated Database of the European Energy System (JRC-IDEES). Details on the methodology applied to identify GHG emissions from international aviation and navigation in the scope of the EU NDC, which are added to the national totals from the EU GHG inventory, are given in Annex 2 to this BTR.

Under the Governance Regulation each Member State must report to the Commission biennially on the status of implementation of its integrated national energy and climate plans (NECPs). This process allows the Commission to ensure that the EU and the Member States remain on track to achieve the climate-neutrality objective and progress on adaptation. Under the Governance Regulation, Member States further operate national systems for policies and measures and projections and submit and report standardised information, which is subject to quality and completeness checks. Based on the submitted data, the EEA compiles projections of GHG emissions and removals for the EU. The EU-wide information is summarised annually in the Climate Action Progress Report by the European Commission and in the 'Trends and projections' report by the EEA. Both the Union and the national systems are subject to continuous improvements.

The national energy and climate plans (NECPs) were introduced by the Governance Regulation.

For Member States, the NECP for 2021-2030 play a key role to enabling the tracking of progress towards the 2030 climate and energy targets. The update of the NECPs provides

an opportunity for Member States to assess their progress, identify gaps and revise existing measures or plan new ones where needed.

Member States were due to submit their final updated NECPs, taking account of the Commission's assessment and recommendations, by 30 June 2024.

Member States also report biennially on the progress of implementation of their National Energy and Climate Plan, the so-called "NECP Progress Reports", as required by the Governance Regulation. The progress reports integrate reporting on both the implementation of climate and energy policies, various indicators and the progress towards the achievement of contributions to EU targets.

Institutional arrangements for tracking progress in Bulgaria

Climate Change Mitigation Act (CCMA)

The Climate Change Mitigation Act (SG 22/2014, last amended SG /2024) adopted on first reading in the National Assembly on 23.10.2013, provides the legal basis for climate change policies in Bulgaria. It governs the public relations relevant to the implementation of the European greenhouse gas emission trading scheme and regulates the activities related to the allocation of greenhouse gas emission allowances and the issuance and modification of greenhouse gas emission permits. The act also regulates: the relations involving plans for monitoring and reporting of greenhouse gas emissions; the operation of the national registry for greenhouse gas emission allowances and the activities of the national registry administrator; the issuance, surrendering and cancellation of allowances; the terms and conditions for closure of stationary installations; and the emission allowances for the aviation sector.

outlines the overall policy to climate change mitigation and its impacts and fulfil international obligations within the UNFCCC and Paris Agreement, as well as the EU legal framework.

The Act integrates the already existing climate change mitigation related articles of the Environmental Protection Act, namely provisions on:

- the National System for Environmental Monitoring (including the National GHG Inventory System), directed by the Minister of Environment and Water through the Executive Environment Agency, originally established by the EPA and related regulation;
- the implementation of the EU Emissions Trading Scheme;

- The Act also reaffirms the National Action Plan on Climate Change as the "instrument which determines the framework of state policy in the field of climate change for each separate period of action under the policies of the European Union;
- The Act further establishes the National Expert Council on Climate Change as an advisory body to the Minister of Environment and Water. The Council includes representatives of the relevant Ministries, the State Agency for National Security, the Executive Environment Agency, Bulgarian Academy of Sciences, the National Association of Municipalities and non-profit organisations, whose activity is directly related to climate change mitigation".

The Act also mandates the Minister of Environment and Water and other competent ministers to draft, a national strategy on climate change adaptation. The adaptation strategy is to be prepared for not less than 20 years, with the exception of the first strategy to be drawn up for the period up to 2030 inclusive, CCMA consolidates the numerous provisions relating to its subject that are currently found in various regulatory acts. It settles the connections between national legislation and EU standards in the field of the regulated matter.

Integrated national energy and climate plan until 2030

Bulgaria's integrated national energy and climate plan (NECP) aims to meet, with additional measures its 2030 target for greenhouse gas (GHG) emissions not covered by the EU Emissions Trading System (non-ETS) of 0 % compared to 2005. It also plans to comply with the Land Use, Land Use Change and Forestry (LULUCF) no-debit commitment (i.e. emissions do not exceed removals).

The NECP sets a share of 27 % renewable energy in gross final consumption of energy for 2030 as contribution to the EU renewable energy target for 2030. This contribution is in line with the share of 27 % in 2030.

For energy efficiency Bulgaria's contribution to the EU 2030 target amounts to 17.5 Mtoe for primary energy consumption and to 10.3 Mtoe for final energy consumption.. Bulgaria has indicative interim targets for renovation of residential and non-residential buildings in renovated area with estimates for energy savings and CO2 emission savings. For buildings owned and occupied by the central government, there is an intention to go beyond the 3 % annual renovation target enshrined in the EU legislation and take measures to improve the energy performance of at least 5 % of the total gross floor area of all heated and cooled state-owned buildings used by the public administration.

In its plan, Bulgaria sets objectives for energy security and internal energy market in terms of diversification of supply of energy resources; enhanced flexibility of the national energy system; increased resilience of the regional and national energy systems as well as in terms of enhanced network and information security (cybersecurity). The electricity interconnection level foreseen for 2030 amounts to 15 %.

The NECP contains several national objectives and funding targets related to research, innovation and competitiveness focusing inter alia on the long-term development of a low-carbon economy; on the improvement of energy and resource efficiency in transport; on the modernisation of existing electricity networks; on innovation in the field of nuclear energy, on the competitiveness of the core energy-intensive industries and on the development of electric cars and hydrogen technologies.

Long-term strategy until 2050

The LTS presents alternative scenarios, including a pathway to approach climate neutrality by 2050. The LTS is a strategy starting from NECP without committing to a specific strategy to achieve the long-term objectives, but shows pathway(s) to develop the energy system beyond 2030 in order to comply with drastic emission reduction targets.

Starting point is thus the NECP until 2030, which implies that drastic changes need to occur in the decade 2030-2040.

The LTS's analysis includes all the main greenhouse gases. The LTS's analysis covers all domestic sectors, including LULUCF. It is not specified whether it includes international maritime and aviation. Decarbonisation scenarios consider the capture and storage of CO2 for electricity generation, including BECCS.

In addition to the baseline scenario (NECP), aligned with Bulgaria's National Energy and Climate Plan, the LTS presents five long-term decarbonisation scenarios:

- Electricity and Energy Efficiency (EE) Improvement for 2 °C (EE2°C)
- Electricity and Energy Efficiency (EE) Improvement 1.5 °C (EE1.5°C)
- New energy carriers (NC) for 2 °C (NC2°C)
- New energy carriers (NC) for 1.5 °C (NC1.5°C)
- New energy carriers, nuclear and CCS (NC_var)

Institutional arrangements for implementation of the NDC

The EU and its Member States have set up a comprehensive system for the implementation of the EU climate change mitigation targets. The European Climate Law sets the goal of climate neutrality by 2050 and the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels. This target for 2030 corresponds to the target of the EU NDC.

To ensure that the EU and its Member States achieve their target, the 2030 Climate and Energy Framework was put in place. The main elements of this framework are the EU Emissions Trading System (EU ETS), which caps GHG emissions in energy, industry, aviation and maritime transport; the LULUCF Regulation which includes national net removal targets for the LULUCF sector; and the Effort Sharing Regulation (ESR) which establishes national reduction targets for GHG emissions not covered by the EU ETS or the LULUCF Regulation. The implementation of the ESR is supported by additional sectoral policies and measures (details can be found in this BTR in the chapter on mitigation policies and measures). The legislative acts under the 2030 Climate and Energy Framework require the European Commission and the EU Member States to set up the institutional arrangements for implementing the specific policies and measures.

The revised EU ETS Directive increases the level of ambition in the existing system from 43% to 62% emissions reductions by 2030, compared to 2005 levels and extend the system to also apply to international maritime transport. A separate carbon pricing system will apply to fuel combustion in road transport and buildings and small-emitting sectors (ETS2) with a 42% emission reduction target compared to 2005 across the sectors covered. The amended Effort Sharing Regulation (ESR) increased, for the sectors that it covers, the EU-level GHG emission reduction target from 29% to 40% by 2030, compared to 2005, which translates in updated 2030 targets for each Member State. The new LULUCF Regulation sets an overall EU-level objective of 310 Mt CO_2 equivalent of net removals in the LULUCF sector in 2030.

The ESR sets national targets for the reduction of GHG emissions in the Member States by 2030. Member States are also subject to gradually decreasing annual emission limits for each year from 2021 to 2030. The annual progress towards the national targets under the Effort Sharing Legislation is assessed by comparing effort sharing sector GHG emission levels with the relevant annual targets under the legislation. To achieve compliance under the ESR, Member States are permitted to use flexibility options to a certain extent.

Under Article 9(2) of the ESR, any debit (i.e., excess emissions) under the LULUCF Regulation in the period 2021 to 2025 is automatically deducted from Member States' AEAs under the ESR first compliance period.

Progress in the implementation of these policies and measures is monitored under the Governance Regulation. Relevant information which is reported regularly and archived at the EEA include GHG inventories, approximated GHG inventories for the previous year, information on policies and measures, projections, and progress towards the implementation of integrated National Energy and Climate Plans (NECP). This information helps the EU and its Member State to correct their course if progress towards the targets of the 2030 Climate and Energy Framework is behind schedule. As an example, the European Commission assesses the drafts of new or updated NECPs and provides recommendations for improved planning and implementation. In addition, the reported information is subject to quality checks, and the GHG inventories reported by EU Member States are subject to comprehensive reviews in 2025, 2027 and 2032.

All EU legislation, including the legislation under the 2030 Climate and Energy Framework, is subject to a stakeholder engagement process. So-called 'better regulation tools' ensure that policy is based on evidence and the best available practice. During the preparation of legislative proposals, the European Commission invites citizens, businesses and stakeholder organisations to provide their views on the subject of the new legislation. These comments are documented in a dedicated portal, and the European Commission reports on how it takes these comments into account in the development of the legislative proposals.

3.2. Description of the Nationally Determined Contribution

Under their updated NDC20 the EU and its Member States, acting jointly, are committed to a legally binding target of a domestic reduction of net greenhouse gas emissions by at least 55% compared to 1990 by 2030. The term 'domestic' means without the use of international credits. The NDC consists of a single-year target, and the target type is 'economy-wide absolute emission reduction'. The scope of the NDC covers the 27 Member States of the EU.

The 17 October 2023 updated NDC scope is supplemented by additional information to clarify the precise amount of international aviation and maritime emissions which are covered under the EU NDC. Details on the EU NDC can be found in Table 27 and Table 28 below.

Table 27 Description of the NDC of the EU

Information	Description
Target and description	Economy-wide net domestic reduction of at least 55% in greenhouse gas emissions by 2030 compared to 1990. The term 'domestic' means without the use of international credits.
Target type	Economy-wide absolute emission reduction.
Target year	2030 (single-year target)
Base year	1990
Base year value	Net greenhouse gas emissions level in 1990: 4 700 168 kt CO_2eq.
Implementation period	2021-2030
Geographical scope	EU Member States (Belgium, Bulgaria, Czechia, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Croatia, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, the Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, Sweden) including EU outermost regions (Guadeloupe, French Guiana, Martinique, Mayotte, Reunion, Saint Martin (France), Canary Islands (Spain), Azores and Madeira (Portugal)).
Sectors	Sectors as contained in Annex I to decision 5/CMA.3: Energy, Industrial processes and product use, Agriculture, Land Use, Land Use Change and Forestry (LULUCF), Waste. International Aviation: Emissions from civil aviation activities as set out for 2030 in Annex I to the EU ETS Directive are included only in respect of CO_2 emissions from flights subject to effective carbon pricing through the EU ETS. With respect to the geographical scope of the NDC these comprise emissions in 2024-26 from flights between the EU Member States and departing flights to Norway, Iceland, Switzerland and the United Kingdom. International Navigation: Waterborne navigation is included in respect of CO_2, methane (CH_4) and nitrous oxide (N_2O) emissions from maritime transport voyages between the EU Member States.
Gases	Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6), nitrogen trifluoride (NF_3)
LULUCF categories and pools	The included LULUCF categories and pools are as defined in decision 5/CMA.3.

Information	Description
Intention to use cooperative approaches	The EU's at least 55% net reduction target by 2030 is to be achieved through domestic measures only, without contribution from international credits. The EU will account and report for cooperation with other Parties in a manner consistent with the guidance adopted by CMA1 and any further guidance agreed by the CMA.
Any updates or clarifications of previously reported information, as applicable	The information on the NDC scope contains clarifications/further details compared to the information provided in the updated NDC of the EU.

Note: This table is identical to table 'Description of a Party's nationally determined contribution under Article 4 of the Paris Agreement, including updates,' which has been submitted electronically together with this BTR. This table is also annexed to this BTR.

Source: Updated NDC of the EU2

As specified in X, the NDC covers the emissions and removals from all sectors of the EU GHG inventory. In addition, CO2 emissions from specific international flights (covered by the EU ETS) and GHG emissions from maritime voyages between EU Member States are included in the scope of the NDC.

3.3. Indicator, definitions, methodologies and progress

3.3.1. Indicator

For the tracking of progress towards implementing and achieving the NDC of the EU, an indicator is used which has the same unit and metric as the NDC base year and target values. The chosen indicator is 'annual total net GHG emissions consistent with the scope of the NDC in CO2eq'. Table 2 provides more information on this indicator.

Table 28 Indicator for tracking progress

Information	Description
Selected indicator	Annual total net GHG emissions consistent with the scope of the NDC in CO_2eq.
Reference level and base year	The reference level is total net GHG emissions of the EU in the base year (1990). The reference level value for the EU is 4 700 168 kt CO_2eq.

[2] The update of the nationally determined contribution of the European Union and its Member States, https://unfccc.int/sites/default/files/NDC/2023-10/ES-2023-10-17%20EU%20submission%20NDC%20update.pdf.

Information	Description
Updates	This is the first time the reference level is reported, hence there are no updates. The value of the reference level may be updated in the future due to methodological improvements to the EU GHG inventory and to the determination of international aviation and navigation emissions in the NDC scope.
Relation to the NDC	The indicator is defined in the same unit and metric as the target of the NDC. Hence it can be used directly for tracking progress in implementing and achieving the NDC target.
Definitions	Definition of the indicator 'annual total net GHG emissions in CO_2eq': Total net GHG emissions correspond to the annual total of emissions and removals reported in CO_2 equivalents in the latest GHG inventory of the EU. The totals comprise all sectors and gases listed in the table entitled 'Reporting format for the description of a Party's nationally determined contribution under Article 4 of the Paris Agreement, including updates'.

Note: The information in this table is identical to the information in Common Tabular Format (CTF) tables 1 ('Description of selected indicators') and 2 ('Definitions needed to understand the NDC'), which were submitted electronically together with this BTR. These tables are also annexed to this BTR.

Source: The reference level is based on the Annual European Union GHG inventory 1990-2022.

3.3.2. Methodologies and accounting approach

The EU and its Member States use the following accounting approach for tracking progress towards the EU NDC: Annual GHG data from the national GHG inventory of the EU, complemented for international aviation and navigation with estimations from the Joint Research Centre's Integrated Database of the European Energy System. The total net GHG emissions are provided in the scope of the EU NDC and are compared to the economy-wide absolute emission reduction target as defined in the NDC. The EU will account for its cooperation with other Parties in a manner consistent with guidance adopted by the CMA.

As far as emissions and removals from the LULUCF sector are concerned, net emissions are used for tracking progress towards the 2030 target of the NDC based on all reported emissions and removals. Details on methodologies and accounting approaches consistent with the accounting guidance under the Paris Agreement can be found in CTF table 3 ('Methodologies and accounting approaches'), which was submitted electronically together with this BTR. This table is also annexed to this BTR.

3.3.3. Structured summary – status of progress

An important purpose of the BTR is to demonstrate where the EU and its Member States stand in implementing their NDC, and which progress they have made towards achieving it. The most recent information on GHG emissions and removals in the scope of the NDC constitutes the key information for tracking this progress. Table 3 summarises the current status of progress.

Table 29. Summary of progress towards implementing and achieving the NDC

	Unit	Base year value	Values in the implementation period			Target level	Target year	Progress made towards the NDC
			2021	2022	2030			
Indicator: Total net GHG emissions consistent with the scope of the EU NDC	kt CO_2eq	4 700 168	3 276 832	3 210 895	NA	2 115 076 (55% below base year level)	2030	The most recent level of the indicator is 31.7 % below the base year level.

NA: Not Applicable.

Note that an annual emissions balance consistent with chapter III.B (Application of corresponding adjustment) will be provided in a subsequent BTR upon finalisation of relevant further guidance by the CMA, based on the annual information reported under Article 6.2.

Note: More detailed information can be found in CTF table 4 ('Structured summary: Tracking progress made in implementing and achieving the NDC under Article 4 of the Paris Agreement'), which has been submitted electronically together with this BTR. This table is also annexed to this BTR.

Source: The indicator values are based on the Annual European Union GHG inventory 1990-2022.

Based on the GHG inventory data and data on international aviation and navigation for 2022, the EU and its Member States reduced net GHG emissions by 31.7 % compared to 1990. The EU and its Member States made progress towards implementing and achieving their NDC. The legal and institutional framework is in place to make further progress in the years ahead and to achieve the NDC target by 2030.

3.4. Mitigation policies and measures

The European Union (EU) aims to be a global leader in the fight against climate change and is therefore striving to achieve the targets set in Paris Agreement reached by the Conference of the Parties (COP 21) to the United Nations Framework Convention on Climate Change while simultaneously ensuring clean energy across the Union.

As a Member State of the European Union, Bulgaria shares the common value of developing a fair and prosperous society with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050.

The formulation of clear climate targets allows them to be translated into legislation and contribute to home modernisation and lower energy bills, greener and more efficient transport for current and future generations.

For more effective implementation of climate policies and better predictability for business, decarbonisation is linked to sectoral policies with a focus on energy, industry, transport, buildings, agriculture and land use.

The EU's 2030 target is to reduce greenhouse gas emissions by 55% and reach 0% net greenhouse gas emissions in 2050. To achieve this, the European Union is renewing its legislation.

The 'Fit for 55' legislative package reflects the need to speed up the green transition. It includes (i) strengthening and expanding the EU emissions trading system (ETS), with the creation of a new, second, ETS for transport and buildings together with a dedicated Social Climate Fund to help citizens during the transition; (ii) increasing targets under the effort sharing regulation; and (iii) a revised regulation for Land Use, Land Use Change and Forestry (LULUCF). The package has been fully adopted, and the Member States have been implementing the legislation.

The Bulgarian climate change policy follows the multilateral and bilateral international agreements, the EU legislation in the field of climate change as well as the national legislation.**CROSS SECTORAL**

EU level

European greenhouse gas trading scheme (EU ETS)

The system sets a limit or cap on the total amount of GHGs that can be emitted at the EU level. Within this limit, companies buy emissions allowances (one allowance gives the right to emit 1 tonne of CO2 eq (carbon dioxide equivalent)), in auctions or through trading allowances with others. The cap is reduced annually to ensure that overall emissions in the sectors covered decrease over time.

The emissions under the ETS decreased by 42% from 2005 to 2023.

About 72% of the greenhouse gases from Bulgaria's ETS installations came from power generation, significantly more than the EU average of 57%. Of the total emissions from all industry sectors, 31% came from the chemical industry, 31% each from refineries and from cement and lime production, 21% from other industries, and 8% from the metals industry. Since 2019, the power sector's emissions have declined by 35%. The industry sectors' emissions have declined by slightly less, 33%. Since 2013, greenhouse gas emissions have declined by 48% in power generation and by 10% in the industry sectors. Greenhouse gas

emissions in both the power sector and the industry sectors showed both increases and decreases in that decade.

Emissions Trading System 2 (EU ETS 2)

In 2023, a new emissions trading system (ETS 2) was introduced, which also covers CO2 emissions from road transport, buildings and small industries not covered by the existing EU ETS. The introduction of carbon pricing in those sectors will provide a market incentive for investments in building renovations and low-emission mobility. Like the existing EU ETS, ETS 2 is a 'cap-and-trade' emission mechanism, but it will address fuel suppliers rather than end consumers such as households or car users. Fuel suppliers will have to monitor and report emissions from fuels supplied by them and buy sufficient allowances at auctions to cover these emissions. The ETS 2 cap will be set in such a way as to bring emissions down by 42% by 2030 compared with 2005 levels. Part of the revenues will be earmarked for the Social Climate Fund.

Effort sharing

The Effort Sharing Regulation (ESR) covers GHG emissions from domestic transport (excluding CO2 emissions from aviation), buildings, agriculture, small industry and waste. Emissions from these sectors account for around 60% of the EU's domestic emissions. The regulation sets the EU-wide target to reduce emissions from the effort sharing sectors by 40% by 2030 compared to 2005 levels. This overall target for the EU translates to binding national emission reduction targets for each Member State. Bulgaria's target is -10%.

In addition to the 2030 targets, Member States have annual GHG emissions limits (annual emission allocations), reducing every year until 2030.

There is some flexibility to take account of annual fluctuations in emissions, by trading emissions and transfers from the ETS and LULUCF.

IPPC DIRECTIVE

The national legislation is harmonized with the EU Directives 96/61/EC concerning integrated pollution prevention and control, 2008/1/EC and 2010/75/EU on industrial emissions (integrated pollution prevention and control). The implementation of EU legislation related to IPPC in Bulgaria is ensured by the Environmental Protection Act, promulgated, St. G. № 91/2002 and its amendments. The provisions of the Act are obligatory for new installations from 2002 and for existing installations from 2012.

The act is not dealing directly with greenhouse gas emissions. The IPPC legislation has an indirect impact on GHG emissions through emission limits for pollutants and use of best available technologies. The strengthened emission limits may have an important impact especially on coal-fired power plants and combined power and heat plants. However, it is difficult to estimate the impact of this directive on the GHG emissions.

National Instruments

An integrated and complex system of strategic and operational planning has gradually been created, which is further modified in line with international commitment of Bulgaria whether assumed pursuant to post-Kyoto processes or EU policies and legislation. Legislative measures also lay down rules for institutional responsibilities for coordination and implementation of various programmes.

- Draft 2030 Strategy for Sustainable Energy Development, with a 2050 horizon;
- Roadmap for Climate Neutrality of the Republic of Bulgaria;
- National Strategy for Development of the Mining Industry by 2030;
- Strategy for the Participation of Bulgaria in the Fourth Industrial Revolution;
- Long-term national strategy to support the renovation of the national stock of residential and non-residential buildings with an implementation horizon of 2050;
- Long-term Strategy for Mitigation of Climate Change by 2050 of the Republic of Bulgaria;
- Innovation strategy for smart specialisation;
- National Programme for Energy Efficiency of Multi-Family Residential Buildings;
- National policy framework for the development of the market for alternative fuels in the transport sector and for the deployment of the relevant infrastructure;
- An integrated transport strategy for 2030;
- National Plan for the Development of Combined Transport of the Republic of Bulgaria by 2030;
- National Action Plan for Forest Biomass Energy 2018-2027;
- National Strategy for Adaptation to Climate Change of the Republic of Bulgaria and Action Plan;

- National Strategy for the Development of Scientific Research in the Republic of Bulgaria 2017-2030;
- Bulgaria's electricity transmission network development plan for 2023-2032;
- National roadmap for improving the conditions for unleashing the potential for the development of hydrogen technologies and mechanisms for the production and supply of hydrogen.
- National Regional Development Strategy

Integrated national energy and climate plan until 2030

Delivering on the Energy Union's commitment to climate neutrality in line with the Paris Agreement and achieving the 2030 energy and climate targets requires the contribution of each MS. The integrated national energy and climate plans mandated by the Energy Union Governance Regulation therefore serve as strategic planning, focusing on the period 2021-2030, while taking into account longer-term perspectives

The INECP reflects the higher targets set by the European Green Deal and the European Climate Law, the Fit for 55 package, the RePowerEU Plan, as well as the latest report on Bulgaria under the European Semester.

The updated INECP defines ambitious targets and measures related to:

- The process of transformation of the national energy mix;
- Decarbonisation with sustainable and sufficient emission reductions in the energy sector thanks to new low-carbon technologies and a smooth transition to low-carbon sources;
- Adopt a national 2050 climate neutrality target.

The main objectives set out in the INECPs are:

- Stimulating the low-carbon development of the economy;
- Developing competitive and secure energy;
- Increasing energy efficiency and reducing carbon emissions, including by using the full potential of natural gas as an energy source and transitional fuel;
- Reducing dependence on imported fuels and energy;
- Ensuring affordable energy for all consumers.

Under the decarbonisation dimension, Bulgaria promotes and supports a reduction in greenhouse as emissions and an increase in the share of renewable energy in gross final energy consumption.

National GHG emission reduction target for 2030 compared to 2005 for non-ETS sectors (buildings, agriculture, waste and transport) under the Regulation (EU) 2023/857 (Effort Sharing Regulation), is minus 10% compared to its emissions in 2005;

National target in the land use, land use change and forestry sector under Regulation (EU) 2023/839 for the periods from 2021 to 2025, GHG emissions do not exceed removals, calculated as the sum of total emissions and total removals on its territory in all land accounting categories combined, and a national annual net removals target in the period from 2026 to 2030 of – 9 718 ktonnes CO2eq.

The national target set for the share of RES in gross final energy consumption by 2030 is 34.96%.

The electricity sector accounts for a 49.34% share of renewable energy in gross final electricity consumption. This share is projected to be achieved by increasing the electricity consumption of newly built renewable energy capacity (mainly wind and solar) by up to 7 160 MW for the period after 2022.

Important for the achievement of the target in the electricity sector is the promotion of investments for the development of the electricity transmission and distribution networks of the country, which will allow the technical connection and integration of the produced electricity from RES, in compliance with the criteria for security of the electricity system. The planned introduction of energy storage systems will allow the rapid deployment of new capacities using intermittent renewables and address grid congestion, balancing and market distortion.

Energy efficiency plays an important role in improving the country's energy security by reducing dependence on energy imports, reducing energy costs for businesses and households, creating more jobs, contributing to improving air quality and reducing greenhouse gas emissions and improving the quality of life of citizens.

In this regard, national targets have been set to achieve an 11.6% reduction in primary energy consumption and a 10.7% reduction in final energy consumption by 2030 compared to the Reference Scenario 2020.

In its plan, Bulgaria sets objectives for energy security and internal energy market in terms of diversification of supply of energy resources; enhanced flexibility of the national energy system; increased resilience of the regional and national energy systems as well as in terms of enhanced network and information security (cybersecurity). The electricity interconnection level foreseen for 2030 amounts to 15 %.

The NECP contains several national objectives and funding targets related to research, innovation and competitiveness focusing inter alia on the long-term development of a low-carbon economy; on the improvement of energy and resource efficiency in transport; on the modernisation of existing electricity networks; on innovation in the field of nuclear energy, on the competitiveness of the core energy-intensive industries and on the development of electric cars and hydrogen technologies.

Long-term strategy until 2050

The LTS presents alternative scenarios, including a pathway to approach climate neutrality by 2050. The LTS is a strategy starting from NECP without committing to a specific strategy to achieve the long-term objectives, but shows pathway(s) to develop the energy system beyond 2030 in order to comply with drastic emission reduction targets.

Starting point is thus the NECP until 2030, which implies that drastic changes need to occur in the decade 2030-2040.

The LTS's analysis includes all the main greenhouse gases. The LTS's analysis covers all domestic sectors, including LULUCF. It is not specified whether it includes international maritime and aviation. Decarbonisation scenarios consider the capture and storage of CO2 for electricity generation, including BECCS.

In addition to the baseline scenario (NECP), aligned with Bulgaria's National Energy and Climate Plan, the LTS presents five long-term decarbonisation scenarios:

- Electricity and Energy Efficiency (EE) Improvement for 2 °C (EE2°C)
- Electricity and Energy Efficiency (EE) Improvement 1.5 °C (EE1.5°C)
- New energy carriers (NC) for 2 °C (NC2°C)
- New energy carriers (NC) for 1.5 °C (NC1.5°C)
- New energy carriers, nuclear and CCS (NC_var)

Long term strategy for the renewal of the national building stock of residential and non-residential buildings until 2050

The long-term national strategy is a systematized target instrument, through which the vision for the renovation of the building stock of the Republic is outlined Bulgaria until 2050, the strategic goals for achieving the desired vision, the priorities within the scope of each strategic objective, the envisaged measures and policies on the identified priorities and the indicators for measuring the achievements results for the period 2021-2030.

Building fund of the Republic of Bulgaria, renewed and decarbonized by 2050, which provides a high quality of life in a healthy, safe, energetic efficient, modernized and high-tech living environment based of a complex of related factors, such as active participation of users for the efficient use of energy, production management and energy consumption in the building and professional management of the building fund.

The strategic objectives are synchronized with the EU's energy objectives efficiency and are based on the European strategic documents, the European and national energy efficiency legislation.

The strategic document defines indicators for measuring the results achieved for the following periods: 2021-2030, 2031-2040 and 2041-2050, which reflect staged target values of the renewal process the building stock of Bulgaria,

The national aspects of the implementation of energy efficiency policies to date, such as the use of high grant components in incentive schemes, the limited experience with the structuring and promotion of financial instruments. The low rate of renovation of buildings and poor awareness of users and owners for the effect of energy efficiency and its benefits in a broader sense, no contribute to the mass market entry of new technologies, materials and construction practices. In the period up to 2030, it is realistic to expect a gradual activation of renewal actions and a gradual increase in energy demand efficient services. Realistic and conservative goal setting is also related with the need to accumulate experience and funds for the financial instruments and gradually overcoming expectations of high levels of grant aid from citizens and owners of public service buildings.

In this scenario, by 2050, 60% of the residential building will be renovated fund and nearly 17% of non-residential. The area of the renovated buildings from the whole built fund will be over 45%. The reason for this distribution is as stated in item 1.1.3 that state and municipal

non-residential buildings represent only 29% of the non-residential building stock. A large part of the categories of buildings in the non-residential fund are related to economic activity, such as hotels, commercial buildings, business centers, establishments. The possibilities for improving energy efficiency in them is related to increasing their competitiveness and this is driven by market mechanisms that cannot be predicted.

The Bulgarian climate change policy follows the multilateral and bilateral international agreements, the EU legislation in the field of climate change as well as the national legislation. The most important legislative acts dealing with climate change issues are:

Climate change mitigation act (SG 22/2014, last amended SG /2024)

In pursuance of its international commitments and in order to synchronise Bulgarian legislation with the European law, the Climate Change Mitigation Act outlines the overall policy to be followed in order to mitigate climate change and its impacts and fulfil international obligations within the UNFCCC and Paris Agreement, as well as the EU legal framework.

The Act integrates the already existing climate change mitigation related articles of the Environmental Protection Act, namely provisions on:

- the National System for Environmental Monitoring (including the National GHG Inventory System), directed by the Minister of Environment and Water through the Executive Environment Agency, originally established by the EPA and related regulation
- the implementation of the EU Emissions Trading Scheme;
- The Act further establishes the National Expert Council on Climate Change as an advisory body to the Minister of Environment and Water. The Council includes representatives of the relevant Ministries, the State Agency for National Security, the Executive Environment Agency, Bulgarian Academy of Sciences, the National Association of Municipalities and non-profit organisations, whose activity is directly related to climate change mitigation".
- The Act also mandates the Minister of Environment and Water and other competent ministers to draft, after consultation with the National Council of Experts on Climate Change, a national strategy on climate change adaptation. The adaptation strategy is to be prepared for not less than 20 years, with the exception of the first strategy to be drawn up for the period up to 2030 inclusive, and should be adopted by the Council of Ministers.

Environmental Protection Act (EPA) (SG 91/2002, last amended SG 42/2022)

EPA is a framework law that regulates the basic conditions and principles of the management of the public relations related to environmental protection. It defines the competent authorities within the meaning of the act: the Minister of Environment and Water and the Director of the Executive Environment Agency are among the bodies holding powers with regard to EPA and the measures related to climate change, however all competent authorities under EPA may be involved with actions of other competent authorities under other laws - for example in the sectors “Energy”, “Land use, land use change and forestry” (LULUCF).

EPA establishes a scheme for trading greenhouse gas emissions. It regulates the existence of a National Plan for allocation of greenhouse gas allowances. EPA introduces a requirement for issue of greenhouse gas emission permits as a condition for execution of certain activities. The conditions and the procedures for issuing and revising a greenhouse gas emission permit and the consequences of this issuing are described in detail. A national register for reporting the issuance, holding, transfer and cancellation of greenhouse gas emission allowances is created. The Council of Ministers is delegated powers to issue bylaws detailing the management of activities related to greenhouse gas emissions. The obligations of aircraft operators and suppliers of transport liquid fuels are regulated. EPA designates the competent authorities in the field of environment responsible for Bulgaria’s relations with international and European institutions in this area as well as for the established administrative relationships. It specifies the boundaries of the competence of national authorities and EU bodies in the field of environment.

EPA regulates three of the most important horizontal mechanisms for management of activities related to environmental impacts and the effects of greenhouse gases – Environmental Impact Assessment (EIA) of specific investment proposals, environmental assessment (EA) of plans and programmes and access to information (AI) on the environment. The preparation of an environmental assessment is part of the procedure for preparation of all major plans, programmes and strategies in the fields related to activities that are sources of greenhouse gases – energy, agriculture, transport, waste management, etc. The purpose of EA and EIA is to integrate the considerations related to the environment in the process of development as a whole and the introduction of the sustainable development principle.

Relevant bylaws:

- Ordinance on the conditions and procedure for carrying out environmental impact assessment – SG 25/2003, last amended SG 55/2017;
- Ordinance on the conditions and the procedure for carrying out environmental assessment of plans and programmes – SG57/2004, last amended by SG 12/2016.

Clean Ambient Air Act (CAAA) (SG 45/1996, last amended SG 20/2022)

Clean Ambient Air Act regulates the limitation of emissions into the air from stationary sources and the quality requirements for liquid fuels – activities directly related to greenhouse gas emissions.

The marketing of liquid fuels that do not meet the quality requirements has been forbidden.

The Minister of Environment and Water jointly with the relevant ministers issues regulations that set emission limit values of harmful substances (pollutants) emitted into the atmosphere by facilities and activities with stationary emission sources. These standards are mandatory for all sites in Bulgaria. Exceptions are allowed for sites related to the national fuel and energy balance.

In addition, programmes to gradually reduce the total annual emissions of certain pollutants: sulphur dioxide, nitrogen oxides and other pollutants released into the air by certain operating facilities and activities such as large combustion plants and others, are also adopted.

Another approach in the Clean Ambient Air Act used to reduce air pollution is setting norms for harmful substances in exhaust gases from internal combustion engines. These norms are approved by the Minister of Transport, Information Technologies and Communications, jointly with the Minister of Environment and Water and the Minister of Health.

In June 2014 a new EU Regulation (№ 517/2014) on fluorinated greenhouse gases, repealing Regulation № 842/2006, came into force and applies from 1 January 2015. New F-gas Regulation 517/2014/EU, which repeals 2006/842/EC, is currently included in amendment of Clean Ambient Air Act (2015).

The Minister of Environment and Water, the directors of the regional inspectorates for environment and water or their authorized officials monitor the application of the measures specified for stationary refrigerating and air conditioning systems, thermal pumps, high voltage switchgear, air conditioning systems in motor vehicles and other equipment containing fluorinated greenhouse gases.

The Clean Ambient Air Act (CAAA) defines the powers of the supervisory authorities to enforce the set standards, as well as the obligations of other government bodies such as the Customs Agency and the Directorate General of Fire Safety and Population Protection under the Ministry of Interior, to provide information to the Ministry of Environment and Water.

Geological Storage of Carbon Dioxide Act (GSCDA) (SG 14/2012, last amended SG 14/2015)

This act regulates public relations relevant to the storage of carbon dioxide in suitable underground geological formations.

It formulates the assessment criteria and the conditions to be met by the geological formations for storage of carbon dioxide. The right to explore the earth for geological formations that are suitable to store carbon dioxide is provided through an exploration permit. A permit is required also for underground storage of carbon dioxide. The permits are issued by the Minister of Economy, Energy and Tourism. The permitting procedure is defined in the GSCDA.

The Council of Ministers determines the state policy on storage of carbon dioxide in geological formations by approving a programme for exploration of sites for storage of carbon dioxide.

GSCDA lays down obligations related to the periods of operation, closure and post-closure of carbon dioxide storage sites.

This law transposes Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 into the Bulgarian legislation.

Energy sector – production of electricity and district heating and residential and service sector

Instruments at EU level

Energy Efficiency Directive

First adopted in 2012, the directive was updated in 2018 and 2023, setting rules and obligations for achieving the EU's ambitious energy efficiency targets.

Energy efficiency helps reduce overall energy consumption and is therefore central to achieving the EU's climate ambition, while enhancing present and future energy security and affordability. To ensure that the EU's 2030 target of reducing greenhouse gas emissions by at

least 55% (compared to 1990) can be met, the Commission has revised the Energy Efficiency Directive, together with other energy and climate rules.

The revised Energy Efficiency Directive (EU/2023/1791) significantly raises the EU's ambition on energy efficiency. It establishes 'energy efficiency first' as a fundamental principle of EU energy policy, giving it legal-standing for the first time. In practical terms, this means that energy efficiency must be considered by EU countries in all relevant policy and major investment decisions taken in the energy and non-energy sectors.

Full implementation of the Energy Efficiency Directive will be key for the EU to comply with the commitment of the Global Pledge to double the global rate of energy efficiency improvements from about 2% to over 4% by 2030.

Renewable Energy Directive

The EU has adopted a binding target stating that the proportion of renewable energy has to increase up to 20% of total energy use over the period 2005-2020. The responsibility for attaining this target has been shared among the Member States.

Building on the 20% target for 2020, the recast Renewable Energy Directive 2018/2001/EU established a new binding renewable energy target for the EU for 2030 of at least 32%, with a clause for a possible upwards revision by 2023.

To meet the higher climate ambition, as presented in the European Green Deal in December 2019, further revisions of the directive were needed.

The revised Renewable Energy Directive EU/2023/2413 raises the EU's binding renewable target for 2030 to a minimum of 42.5%, up from the previous 32% target, with the aspiration to reach 45%.

It means almost doubling the existing share of renewable energy in the EU.

The national target for the share of energy from renewable sources in gross final consumption of energy from renewable sources set by the Republic of Bulgaria by 2030 is 34.96%. The national target thus set is higher than the 33% target set for Bulgaria in COM/2023/796.

Energy Performance of Buildings Directive 2010/31/EC

This is a framework directive within which the Member states decide on minimum requirements for example for energy performance, energy declarations and inspections or

advice on thermal boilers. Amendments of the Energy Efficiency Act (EEA) related to transposition of the requirements of Directive 2010/31/EU on the energy characteristics of buildings, stimulation of the energy services market and accelerated adoption of market mechanisms for promotion of energy efficiency are being prepared.

To boost the energy performance of buildings, the EU has established a legislative framework that includes the revised Energy Performance of Buildings Directive (EU/2024/1275) and the revised Energy Efficiency Directive (EU/2023/1791).

Together, the directives promote policies that will help achieve a highly energy efficient and decarbonised building stock by 2050 create a stable environment for investment decisions enable consumers and businesses to make more informed choices to save energy and money.

It also supports better air quality, the digitalisation of energy systems for buildings and the roll-out of infrastructure for sustainable mobility.

Eco-design Directive (2009/125/EC) and Energy Labelling Directive 2010/30/EU and their implementing regulations

The Energy Labelling Directive is used together with the Ecodesign Directive in order to set combined energy label requirements and energy efficiency requirements for products.

The directives state which products have to be labelled and contains provisions on how the labelling of household products is to be established. The aim is to reduce energy use from household products. The Directives and their implementing regulations are implemented in the Bulgarian legislation by the Act on the technical requirements for products and secondary legislation (Regulation on the labelling).

National instruments

Energy Act (EA) SG 107/2003, last amended SG 39/2024)

The Energy Act settles the public relations associated with the activities of production, import and export, transmission, transit, distribution of electricity, heat and natural gas, transmission of oil and oil products by pipelines, trade in electricity, heat and natural gas, and the powers of state bodies to define energy policy, to regulate and to exercise control. It designates the bodies carrying out the energy policy as well as the instruments underlying the energy policy.

The Energy Act lays down rules and principles for energy pricing - it regulates the prices of the produced electricity. The costs of energy companies arising from public obligations for environmental protection and energy efficiency are compensated by administrative measures determined by the Energy and Water Regulatory Commission (EWRC) – a specialized state authority regulating the activities in the field of energy. The obligation to purchase electricity produced from renewable sources is also considered as such a cost.

The activities related to electricity production and connection to the energy transmission network may be effected only after issuance of the relevant license/permit.

The Energy Act regulates the production of electricity from thermal power plants using a combined mode of production. The entire quantity of electricity from highly efficient cogeneration of heat and electricity, registered with a certificate of origin, is subject to purchase at preferential prices.

A bylaw issued on the basis of EA is Ordinance on the issue of certificates of origin for electricity produced by cogeneration.

Energy from Renewable Sources Act (ERSA) (SG 35/2011, last amended SG 106/2023)

The Energy from renewable sources act regulates the public relations associated with the production and consumption of electricity, thermal energy and cooling energy from renewable sources, gas from renewable sources, biofuels and energy from renewable sources in transport.

The main purpose of this Act is to promote and support the production and consumption of energy and fuels from renewable sources. This is to be effected through the introduction of support schemes, by raising the awareness and by encouraging research.

The Energy from renewable sources act takes into account the need for interaction between several different bodies of central executive authorities and local government in order to achieve the objectives of the law. The implementing powers are divided between the Minister of Economy, the Minister of Environment and Water, the Sustainable Energy Development Agency (SEDA), the district governor, the city council and the mayor of the municipality.

ERSA contains also specific measures to support the production of energy from renewable sources and biofuels.

Bylaws issued on the basis of ERSA are:

- Ordinance on the calculation of the total share of energy from renewable sources in the gross final energy consumption and the use of biofuels and renewable energy in transport;
- Ordinance on the conditions and procedure for issuance, transfer, cancellation and recognition of guarantees of origin of the energy from renewable sources.

Energy Efficiency Act (EEA) (SG 35/2015, last amended SG 41/2024)

EEA regulates the public relations relevant to the state policy for improving energy efficiency of final energy consumption and the provision of energy services.

The National Assembly adopts a **National Energy Efficiency Strategy of the Republic of Bulgaria** that determines the national indicative target of energy savings, as well as the stages, the tools and the measures for its achievement. The National Strategy is updated every five years. The Council of Ministers adopts national action plans on energy efficiency and annual reports on the implementation of these plans. The Minister of Energy prepares draft programmes on improvement of energy efficiency in final energy consumption and on the provision of energy services and submits them for approval by the Council of Ministers. The Executive Director of SEDA is responsible for the activities related to the implementation of the state policy for improvement of energy efficiency in final energy consumption and the provision of energy services. The local governments adopt energy efficiency programmes.

EEA contains detailed requirements to the content of the national action plans on energy efficiency. It establishes the legislative basis to link the different actions and steps for achievement of energy efficiency in the final energy consumption – setting individual and intermediate indicative energy saving targets, formulating specific actions to achieve energy efficiency, defining time frames for implementation, financing, division of obligations. The plans are reported on annual basis.

The national indicative targets determined in the action plans on energy efficiency are allocated as individual targets for energy savings to energy traders, owners of buildings with a total floor area over 1000 m2 (as of 12 March 2013 the threshold is reduced to 500 m2) and owners of industrial systems with annual energy consumption over 3000 MWh.

The operated buildings with a total floor area over 500 m2 are subject to mandatory certification.

Air conditioning installations in buildings and hot water boilers with specific power according to the used fuel type are subject to energy efficiency checks. SEDA maintains a database of the inspected systems.

The industrial systems with annual energy consumption over 3000 MWh are subject to mandatory energy efficiency audits, conducted at least once every three years.

EEA provides for the implementation of energy efficiency management which is responsibility of the owners of the audited industrial systems and the installations inspected for energy efficiency. The management activities are specifically defined in the act. The administrative authority may impose fines or property sanctions in case of violations of the activities related to the energy efficiency management.

SEDA establishes and maintains a national information system on the state of energy efficiency in Bulgaria.

EEA defines the term "energy services" and the scope of entities that may provide energy services. The energy services include implementation of one or more activities and measures to improve energy efficiency.

The financial mechanisms for improving energy efficiency are: voluntary agreements, performance contracting and financing from the Energy Efficiency and Renewable Sources Fund. The Fund supports the implementation of actions and measures for increasing energy efficiency and promoting the production and consumption of energy from renewable sources, except for those activities that are funded by the state budget. The Fund operates under the Energy Efficiency Act and the donor agreements and it is not part of the consolidated state budget.

Bylaws related to energy efficiency:

- Ordinance on labelling requirements and the provision of standard information on products related to energy consumption with respect to energy and other resources consumption - SG 41/2011, last amended SG19/2016;
- Ordinance № RD-16-267 of 2008 on estimation of the amount of electricity produced by cogeneration of thermal and electric energy – SG 37/2008, last amended SG 42/2015;
- Ordinance № 7 of 2004 on energy efficiency, heat and energy savings in buildings – SG 5/2005, last amended SG 31/2015;

- Ordinance on methodologies for setting national targets, the procedure for allocation of these targets as individual energy saving targets between the persons under art. 10, para. 1 of the Energy Efficiency Act, eligible energy efficiency measures, assessment methodologies and methods of verification of energy savings and for approval of the tariff for fees collected by the Energy Efficiency Agency for issuing energy savings certificates under art. 51 para. 1 of the Energy Efficiency Act – SG 27/2009, last amended SG 88/2011;
- Tariff of the fees collected by the Sustainable Energy Development Agency under the Energy Efficiency Act and the Renewable Energy Act - SG 35/2013;
- Ordinance on the conditions and the procedures for determining the amount and the payment of funds under performance contracts leading to energy savings in public and/or municipal buildings (№ RD-16-347) - SG 28/2009;
- Ordinance on energy consumption indicators, energy performance of industrial systems, on the conditions and the procedures for performing energy efficiency audits of industrial systems (№ RD-16-346) - SG 28/2009 - has been repealed.;
- Ordinance on the circumstances subject to entry in the register of persons carrying out certification of buildings and energy efficiency audits, on the procedure for receiving information from the register, the terms and conditions for acquiring qualification and the required technical facilities for performing audits and certification (№ RD-16-348) – SG 28/2009 - has been repealed;
- Ordinance on the circumstances subject to entry in the register of persons carrying out certification of buildings and energy efficiency audits, on the procedure for receiving information from the register, the terms and conditions for acquiring qualification and the required technical facilities for performing audits and certification (№ RD-16-301) – SG 27/2014
- Ordinance on the conditions and the procedure for auditing the energy efficiency of hot water boilers and air conditioning systems pursuant to art. 27, para. 1 and art. 28, para. 1 of the Energy Efficiency Act and on the creation, maintenance and use of a database for these systems (№ RD-16-932) – SG 89/2009;
- Ordinance on the conditions and the procedure for energy efficiency auditing and certification of buildings, on issuing energy performance certificates and the categories of certificates (№ RD-16-1057) – SG 101/2013;

- Ordinance on indicators for energy consumption and energy performance of buildings (№ RD-16-1058) – SG 10/2016;

For the energy sector, the majority of measures influencing decarbonisation are included in the sections on RES, energy efficiency,internal market and energy security, as general changes in these dimensions lead to GHG emission reductions.

All listed measures of the Third National Climate Change Action Plan (2013-2020) have been extended to 2030 as follows:

- Reconstruction of cogeneration installations and central heating boilers with natural gas turbines;
- Reduction of losses from distribution and transmission networks;
- Reduction of losses in the heat transmission networks;
- Substitution of fuels - from coal to natural gas;
- Increasing high-efficiency cogeneration;
- Increasing the share of heating and cooling based on renewable energy sources;
- Improving production efficiency in existing coal-fired power plants.

The main aggregated measures of direct and indirect relevance for reducing greenhouse gas emissions are:

EN1 - **Promoting and facilitating the development of renewable self-consumption and the creation of renewable energy communities**

Scope: Increase the production of energy from renewable sources

Directly affected greenhouse gases: CO_2, CH_4, N_2O

Implementation period: 2021-2030

Scenario in which the measure is included: WAM

Potential emissions reductions: 1125 - 2230.55 Gg CO_2

EN2 - **Promoting the use of high-efficiency heating and cooling systems, the introduction of innovative geothermal and solar technologies and the use of waste heat and cold**

Scope: The measure is intended to create conditions for sustainable development of the district heating sector in Bulgaria and for substitution of conventional fuel for production of thermal energy with renewable sources.

Directly affected greenhouse gases: CO_2, CH_4, N_2O

Implementation period: 2013-2030

Scenario in which the measure is included: WEM, WAM

Potential emissions reductions: 1440.81 - 1760.1 Gg CO_2

EN3 - **Promoting the use of biomass for centralised and local heat production**

Scope: The measure is intended to create conditions for sustainable development of the district heating sector in Bulgaria and for substitution of conventional fuel for production of thermal energy with renewable sources, subject to the requirements of Article 28(2) to (7) and (10) of Directive (EU) 2018/2001.

Directly affected greenhouse gases: CO_2, CH_4, N_2O

Implementation period: 2022-2030

Scenario in which the measure is included: WAM

Potential emissions reductions: 1137.25 - 2164.7Gg CO2

EN4 - **Promoting the production of advanced biofuels, renewable liquid and gaseous transport fuels of non-biological origin, recycled carbon fuels and renewable electricity**

Scope: Promoting the production of advanced biofuels, renewable liquid and gaseous transport fuels of non-biological origin, recycled carbon fuels and renewable electricity, for the road and rail transport sectors and, for air transport, sustainable aviation fuels. The consumption of these fuels and energy should contribute to achieving the policy objectives for energy diversification and decarbonization of the transport sector. For the use of electricity from renewable sources in transport, efforts will be directed towards the deployment of electric mobility, the development and stimulation of the use of public electric transport, as well as accelerating the integration of modern technologies in the railway sector.

Directly affected greenhouse gases: CO_2, CH_4, N_2O

Implementation period: 2021-2030

Scenario in which the measure is included: WAM

Potential emissions reductions: Including in the transport sector (IE)

EN5 - **Enabling offshore wind energy development**

Scope: Legislative changes are being developed that will regulate the conditions for exploring the potential of the energy resource, the suitability of selected areas for the implementation of investment projects and the construction of energy facilities in the marine spaces with a view to the effective utilization of wind potential and the creation of conditions for the implementation of future joint projects with other member states.
Directly affected greenhouse gases: CO_2
Implementation period: 2028-2050
Scenario in which the measure is included: WAM
Potential emissions reductions: NE

EN6 - **Introducing a process of planning priority zones for accelerated development of energy sites for the production of electricity from wind energy**
Scope: A Plan for determining priority areas for the development of wind power generation facilities is being developed. The planning process will prioritize artificial built-up areas, such as building roofs, areas with existing transport infrastructure, parking areas, waste sites, industrial zones, industrial parks, quarries, artificial water basins and reservoirs, urbanized areas, disturbed terrain, pastures, tailings ponds, waste dumps and degraded lands that cannot be used in agriculture. In the priority areas, short deadlines will be introduced for administrative permits for the construction, reconstruction and commissioning of energy facilities, as well as for the conduct of environmental impact assessments.
Directly affected greenhouse gases: CO_2
Implementation period: 2028-2050
Scenario in which the measure is included: WAM
Potential emissions reductions: NE

EN7 - **Enabling the transition from coal to low-carbon fuels**
Scope: It is appropriate to provide new incoming gas transmission infrastructure for transmission to thermal power plants and other potential consumers in coal regions to create market-based conditions for the modernisation of combustion plants of thermal power plants and other energy consumers, for switching from coal to natural gas.

This will also create the necessary conditions for the flexible and efficient operation of the installations after their modernisation, in line with the commitments to decarbonise the energy sector and transition to net carbon neutrality.

Directly affected greenhouse gases: CO_2

Implementation period: 2018-2030

Scenario in which the measure is included: WAM

Potential emissions reductions: 2451.31- 3943.88 Gg CO_2

EN8 - **Introduction of a national financing mechanism for energy efficiency - National Decarbonisation Fund**

Scope: The initiative is proposed for inclusion as a RePowerEU reform. The implementation of the reform should be carried out jointly by the teams of the Ministry of Finance, the Ministry of Labour and Social Policy, the Ministry of Regional Development and Public Works and the Ministry of Energy (responsible institutions for the implementation of appropriate support measures under the provisions of Article 38e of the Energy Act) and supported by an international financial institution following the example of the implementation of other major reforms in the country

Directly affected greenhouse gases: CO_2

Implementation period: 2026-2030

Scenario in which the measure is included: WAM

Potential emissions reductions: Regulatory

EN9 - **National Programme for Energy Efficiency of Multi-Family Residential Buildings**

Scope: The implementation of energy efficiency measures in multi-family residential buildings will contribute to:

- higher level of the energy efficiency of multi-family residential buildings and energy costs decrease;
- improving the exploitation features for extending the life cycle of the buildings;
- providing conditions of living environment in line with the sustainable development criteria

Directly affected greenhouse gases: CO_2

Implementation period: 2018-2030

Scenario in which the measure is included: WEM, WAM
Potential emissions reductions: 253.72 - 588.2 Gg CO_2

EN10 - **Long-term national strategy to support the renovation of the national stock of residential and non-residential buildings by 2050**

Scope: A long-term national strategy for the renovation of buildings in Bulgaria until 2050, is focusing on improving energy efficiency and decarbonizing residential and non-residential buildings. It includes an analysis of the current condition of the buildings, identifies cost-effective approaches for enhancing their energy performance, and forecasts expected energy savings and benefits for the environment and society. The document also outlines policies and measures to promote economically efficient deep renovation of buildings and provides a roadmap to achieve the goals by 2050.
Directly affected greenhouse gases: CO_2
Implementation period: 2023-2050
Scenario in which the measure is included: WAM
Potential emissions reductions: 1426.78 Gg CO_2

EN11 - **Introduction of a mandatory energy efficiency scheme** (reduction of fuel and energy consumption in final energy consumption);
Scope: This measure is proactive and is consistent with the announced direction and actions of the EC aiming at reducing fuel and energy consumption
Directly affected greenhouse gases: CO_2
Implementation period: 2015-2030
Scenario in which the measure is included: WAM
Potential emissions reductions: 1756.2 Gg CO_2

EN12 - **Households affected by the mandatory phase-out of stoves to switch to natural gas heating, district heating**

Scope: Households affected by the mandatory phase-out of stoves to switch to natural gas heating (reconnection and new connections), district heating (reconnection and new

connections) or eco-design-compliant heating appliances, in line with the National Air Pollution Control Programme 2020-2030

Directly affected greenhouse gases: CO_2, CH_4, N_2O

Implementation period: 2021-2030

Scenario in which the measure is included: WAM

Potential emissions reductions: 70.6 - 98.55Gg CO2

Industrial emissions from combustion and processes (including emissions of fluorinated greenhouse gases)

Instruments at EU level

Directives and Regulations governing emissions of fluorinated greenhouse gases

To control emissions from F-gases, including HFCs, two legislative acts are in place: the Mobile Air Conditioning (MAC) Directive3 on air conditioning systems used in small motor vehicles, and the F-gas Regulation4, which covers all other key applications in which F-gases are used.

The MAC Directive introduced a gradual ban on emissions of F-gases from mobile air conditioning systems with a GWP higher than 150 in passenger cars. Since 1 January 2017, the use of fluorinated greenhouse gases with a GWP higher than 150 has been banned in all new passenger cars and certain lorries put on the EU market.

Following a review of the F-gas Regulation, a revision laying down more ambitious targets was adopted in 2024. The aim is to phase out HFCs placed on the EU market by 2050. A quota system was established in 2015 to control and reduce HFC emissions. Annual quantitative limits (quotas) on HFCs placed on the EU market by producers and importers are set every year and will gradually be reduced over time, ending at net zero in 2050. This revision is expected to cumulatively prevent greenhouse gas emissions of 310 Mt CO2eq by 2050[5].

Further key measures of the new F-gas Regulation are:

- integrating HFCs used in metered dose inhalers into the quota system;
- stricter rules to prevent emissions where F-gases are produced or used;

[3] Directive 2006/40/EC relating to emissions from air conditioning systems in motor vehicles and amending Council Directive 70/156/EEC, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32006L0040

[4] Regulation (EU) 2024/573 on fluorinated greenhouse gases, amending Directive (EU) 2019/1937 and repealing Regulation (EU) No 517/2014, https://eur-lex.europa.eu/eli/reg/2024/573/oj

[5] Fluorinated greenhouse gases, https://climate.ec.europa.eu/eu-action/fluorinated-greenhouse-gases_en.

- facilitating better enforcement and monitoring through more digitalisation and electronic automation;
- initiating a gradual reduction in the production of HFCs in the EU

The measures in the industry sector aim to achieve:

- higher energy efficiency and lower heat losses in the industry sector;
- increased use of natural gas in industry through new gas infrastructure;
- use of alternative fuels;
- creating a technological park by introducing incentives to encourage the private sector to invest in research and development and in innovation in widely used production methods aimed at optimum resource efficiency;
- promoting the exchange of good practices between enterprises in reference to efficient use of inputs in production.
- Systems for monitoring of energy use in industry
- Energy efficiency audits and implementation of the measures prescribed

In addition to the EU Emissions Trading Scheme, EU law on industrial emissions (integrated prevention and control of pollution), the reduction of fluorinated greenhouse gases and the control of substances that deplete the ozone layer also contribute to lowering GHG emissions and air pollutants.

The main measures to reduce greenhouse gases in the industrial sector are:

IP1 - **Higher energy efficiency in industry and reduction of heat losses**

Scope: Measures to increase the efficiency of production in a cost effective way.

Directly affected greenhouse gases: CO_2, CH_4, N_2O

Implementation period: 2013-2030

Scenario in which the measure is included: WEM, WAM

Potential emissions reductions: 15.63 - 19.38 Gg CO_2

IP2 - **Energy efficiency audits and implementation of prescribed measures**

Scope: Industrial systems with annual energy consumption over 3 000 MWh are required to have their energy efficiency audited every three years. The prescribed measures are

mandatory. Energy Efficiency for Competitive Industry is a new programme that provides low-interest loans to small and medium-sized enterprises. The total amount of funds under the programme is €300 mln.. €150 million of this amount will be provided by Operational Program Competitiveness and the remaining amount - from EBRD credit lines through the Bulgarian commercial banks.

Directly affected greenhouse gases: CO2, HFCs, SF6

Implementation period: 2013-2030

Scenario in which the measure is included: WEM, WAM

Potential emissions reductions: Regulatory

IP3 – Prohibitions and restrictions on fluorinated greenhouse gases

Scope: Implementation of Regulation (EU) 2024/573 on fluorinated greenhouse gases, amending Directive (EU) 2019/1937 and repealing Regulation (EU) No 517/2014: aims to phase out the use of climate-impacting fluorinated gases by encouraging the use of climate-friendly natural refrigerant gases. Measures under the regulation include: measures for emission prevention and leakage controls; new provisions on the containment, use, recovery, recycling, reclamation and destruction of fluorinated gases; certification and training; restrictions on the placing on the market and sale of specific equipment with certain HFCs; gradual reduction of the amount of hydrofluorocarbons put on the market to zero by 2050..

Directly affected greenhouse gases: HFC, SF_6

Implementation period: 2024-2050

Scenario in which the measure is included: WAM

Potential emissions reductions: 2057.16 Gg CO_2

IP4 - **Promote the production and consumption of alternative renewable fuels, namely hydrogen, including through the development of alternative fuels infrastructure**

Scope: Developed and adopted in 2023, the National Roadmap for Improving the Conditions for Unleashing the Development Potential of Hydrogen Technologies and Hydrogen Production and Supply Mechanisms sets the path for building a hydrogen industry. The aim of the Roadmap is to create the basis for a coherent framework for the efficient, smooth and consistent introduction of technologies for the production, transport and use of hydrogen in industry,

energy, transport and households, to create favourable conditions for innovation and investment. It is envisaged that the introduction of hydrogen electric transport will start from the urban bus transport, for which the municipalities are responsible. This approach is more cost-effective due to the possibility of a larger start-up with a large number of means of transport and charging infrastructure with a high percentage of regulated usability..

Directly affected greenhouse gases: CO2, CH4, N2O

Implementation period: 2025-2050

Scenario in which the measure is included: WAM

Potential emissions reductions: 15.88 - 17.23 Gg CO_2

IP5 - **Promoting carbon capture and storage projects**

Scope: Supporting innovative low-CO2 technologies in energy-intensive industries

Directly affected greenhouse gases: CO2,

Implementation period: 2028-2050

Scenario in which the measure is included: WAM

Potential emissions reductions: 2950.32 Gg CO_2

Transport

Instruments at EU level

Regulation setting emission performance standards for new passenger cars

To deliver a more ambitious climate policy and the targeted reduction of GHG emissions by at least 55% by 2030 compared to 1990 levels, the Commission launched the following transport proposals in 2021:

- amendment of the Regulation setting CO2 emission performance standards for new passenger cars and for new light commercial vehicles;
- revision of the Alternative Fuels Infrastructure Directive;
- revision of the Energy Taxation Directive;
- new ReFuelEU Aviation Regulation;
- new FuelEU Maritime Regulation;
- revision of the Renewable Energy Directive,

In April 2023, the European Parliament and the Council amended the Regulation on CO2 emission performance standards[6]. The amendment increased the CO2 emission performance standards for new passenger cars and vans from 2030 onwards (compared to 2021 levels):

- from 2030: 55% for cars and 50% for vans;
- from 2035: 100% for cars and 100% for vans.

This is expected to reduce total CO2 emissions from cars and vans by 32-33 % by 2030 and 54-66 % by 2035 compared to 2005.

Aviation in the EU Emissions trading system

Aviation is included in the EU Emissions trading system from year 2012 in accordance to Regulation (EU) No 421/2014 of the European Parliament and of the Council of 16 April 2014 amending Directive 2003/87/EC.

The ReFuelEU Aviation Regulation[7], which entered into force in November 2023, aims to increase both demand for and supply of sustainable aviation fuels (SAF). It obliges aviation fuel suppliers at EU airports200 to gradually increase the minimum share of SAF supplied to aircraft operators from 2% in 2025 to 70% in 2050. The obligation also includes an increase in the minimum share of synthetic aviation fuels from 1.2% in 2030 to 35% in 2050. Airports are required to guarantee that aircraft operators can access all the necessary infrastructure to deliver, store and refuel with the required shares of SAF. The Regulation obliges all aircraft operators departing from EU airports to refuel with at least 90% of the fuel necessary for their flights.

Maritime transport

Starting from 1 January 2024, the EU Emissions Trading System has been extended to cover CO2 emissions from large ships entering ports in the European Economic Area regardless of the flag they fly. By defining the maximum amount of greenhouse gases that can be emitted under the system, the EU ETS ensure that all the sectors covered under its scope contribute to the EU's climate objectives following a pre-defined trajectory.

[6] Regulation (EU) 2023/851 amending Regulation (EU) 2019/631 as regards strengthening the CO2 emission performance standards for new passenger cars and new light commercial vehicles in line with the Union's increased climate ambition, http://data.europa.eu/eli/reg/2023/851/oj

[7] Regulation (EU) 2023/2405 on ensuring a level playing field for sustainable air transport (ReFuelEU Aviation), https://eur-lex.europa.eu/eli/reg/2023/2405/oj

The FuelEU Maritime Regulation, which enters into force in 2025, lays down rules limiting the greenhouse gas intensity of the energy used on board ships above 5 000 gross tonnage calling at European ports, regardless of the flag they fly. The rules apply to 50% of the energy used for voyages starting or ending outside the EU and 100% of the energy used for voyages between two EU ports.

The annual average reduction in greenhouse gas intensity will gradually increase (-2% in 2025 to - 80% in 2050 compared to the average in 2020). The targets cover not only CO2 but also methane and nitrous oxide emissions over the full lifecycle of the fuels used onboard, on a Well-to-Wake (WtW) basis. The Regulation contains an obligation for passenger and container ships to use onshore power supply while moored at a quayside unless they use another zero-emission technology as of 2030.

RES directive

The revised Renewable Energy Directive entered into force in November 2023[8]. For the transport sector, it sets a target of 14.5% lower greenhouse gas intensity of transport fuels by 2030 or 29% renewable energy in final energy consumption by 2030. The Directive also includes a target for renewable fuels of non-biological origin

National instruments

The main objectives of GHG emissions reduction policy in the transport sector are to:

- boost the production of electric and other environmentally friendly vehicles;
- boost the use of/demand for new environmentally friendly vehicles;
- accelerated deployment of the infrastructure for charging electric and hybrid cars;
- promote research and development in the area of environmentally friendly vehicles and toll systems;
- organise awareness campaigns and build stakeholder capacity for development of resilient mobility.

Integrated Transport Strategy for the period until 2030

The Integrated Transport Strategy for the period until 2030 was adopted by the Council of Ministers of the Republic of Bulgaria with Decision No 336/23 June 2017. The strategic

[8] Directive (EU) 2023/2413 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC, http://data.europa.eu/eli/dir/2023/2413/oj.

document is in compliance with the requirements of the Ex-Ante Conditionality's 7.1, 7.2 and 7.3 (Transport) of the European Structural and Investment Funds.

The Strategy is in accordance with the Partnership Agreement of the Republic of Bulgaria.

The Integrated Transport Strategy for the period until 2030 was adopted by the Council of Ministers of the Republic of Bulgaria on 21 June 2017.

The strategic objectives of the transport policy for the period until 2030 are:

- Increasing the effectiveness and competitiveness of the transport sector
- Improvement of the transport connectivity and access (internal and external)
- Limiting the negative effects of the transport sector development.
- The strategic priorities of the transport sector are as follows:
- Effective maintenance, modernization and development of transport infrastructure
- Improvement of the management of the transport system
- Development of intermodal transport
- Improvement of the conditions for implementation of the principles for liberalization of the transport market
- Reduction of the consumption of fuel and increasing the energy efficiency of transport
- Improvement of the connectivity of the Bulgarian transport system with the Single European transport space
- Ensuring quality and easily accessible transport in all regions of the country
- Limiting the negative effects of transport on environment and people's health
- Increasing security and safety of the transport system.

As a part of the Strategy a National Transport Model is prepared. The model covers freight and passenger traffic as well as all modes of transport. On the basis of the model different scenarios for the transport sector development are elaborated.

For the purposes of the investment programming some projects are identified and their realization will contribute to the sustainable development of the transport sector in medium and long-term period.

The main objectives of Bulgaria's policy to reduce greenhouse gas emissions in the transport sector are:

- Promote the production of electric and other environmentally friendly vehicles;
- Promote the use/demand of new environmentally friendly vehicles;
- Accelerated deployment of charging infrastructure for electric and hybrid vehicles;

- Promote research and development activities related to green vehicles;
- Promote the production of sustainable aviation fuels (SAF) by introducing mandatory blending mandates under Annex I of Regulation (EU) 2023/2405 of the EP and of the Council of 18 October 2023 on ensuring a level playing field for sustainable air transport (ReFuelEU Aviation initiative);
- Promoting the supply and use of sustainable aviation fuels;
- Provision of infrastructure for the refuelling of sustainable aviation fuels at airports for public use;
- Promoting research and development activities related to the production of sustainable aviation fuels;
- Organisation of awareness-raising campaigns, capacity building of stakeholders with regard to the development of sustainable mobility.

The priorities set out under the 2021-2027 Transport Connectivity Programme are:

- Priority 1 'Development of railway infrastructure along the "core" and "comprehensive" TEN-T networks';
- Priority 2 "Development of road infrastructure along the "core" Trans-European Transport Network" and road connections;
- Priority 3 'Improving intermodality, innovation, modernised traffic management systems, improving transport security and safety';
- Priority 4 "Urban intermodality".

They contribute to the implementation of the Green Deal, the Sustainable and Smart Mobility Strategy of the European Commission, as well as to the implementation of the national transport policy.

The investments foreseen under the priorities of the programme promote the use of environmentally friendly modes of transport and alternative fuels, improve the quality of road and rail infrastructure, promote intermodality and intelligent transport systems and thus contribute to reducing the harmful environmental impact of transport.

The investments foreseen under Priority 1 will contribute to attracting passenger and freight traffic to rail by improving the quality of rail infrastructure.

The investments for the development of the railway infrastructure are concentrated mainly along the section of the Orient/East-Mediterranean corridor, passing horizontally through the middle of the country.

The investments under Priority 3 will contribute to the development and expansion of inland water and sea ports for public transport for carrying out multimodal operations, modernization

and development of terminals and port facilities for combined transport, as well as to the development of the railway junctions Gorna Oryahovitsa, Ruse and Varna. Investments are also planned for the construction of alternative fuels infrastructure along the main directions of the national road network (RFN). Interventions are for road sections between some of the largest cities in the country, where transport has been identified as an air pollutant. In addition, the deployment of recharging infrastructure for alternative fuels also in public transport ports will be supported.

Under Priority 3, two main procedures are set out as follows:

Intermodal Operators procedure, under which a grant scheme of up to 50% is planned to support all intermodal operators for:

- Purchase of equipment;
- Construction/rehabilitation of railway/road infrastructure;
- Cargo handling sites;
- Implementation of IT systems and charging stations.

The investments will contribute to the development and expansion of intermodal terminals for combined transport, thus creating the necessary conditions and prerequisites for carrying out multimodal operations.

Alternative fuels procedure, which will finance the construction of alternative fuels infrastructure under the NFP (TEN-T) as well as in public transport ports (maritime and inland waterways) along the TEN-T.

The procedure aims to establish a national scheme to support the construction of recharging infrastructure to allow funding for the development of charging infrastructure for light and heavy-duty electric vehicles, as well as in public transport ports (maritime and inland waterways) on the TEN-T. It will be launched in 2024.

Integrated transport strategy up to 2030

The strategy outlines the main directions for the development of the national transport system in the period up to 2030.

The document sets out 3 strategic objectives covering 9 strategic priorities, each containing a framework of specific objectives (tasks). On this basis, measures have been identified which are the most appropriate to achieve the relevant objectives.

The strategic objectives of the transport policy until 2030 are:

- Increasing the efficiency and competitiveness of the transport sector;
- Improving transport connectivity and accessibility (internal and external);
- Limiting the negative effects of the development of the transport sector.

The strategic priorities in the development of transport are:

- Effective maintenance, modernization and development of transport infrastructure;
- Improving the management of the transport system;
- Development of intermodal transport;
- Improving the conditions for the implementation of the principles of liberalisation of the transport market;
- Reducing fuel consumption and increasing the energy efficiency of transport;
- Improving the connectivity of the Bulgarian transport system with the single European transport area;
- Providing quality and affordable transport in all regions of the country;
- Limiting the negative impact of transport on the environment and human health;
- Increasing the security and safety of the transport system.

Within the scope of the strategic document, a National Transport Model has been prepared, which has been developed for passenger and freight transport and is applicable to individual modes of transport within the country, international and transit transport.

The main measures affecting greenhouse gas emissions in the transport sector are:

T1 - **Increasing the share of public electric transport** - railway, trolleybus, tram, metro

Scope: Increase the share of public electric transport. Increasing the share of electric rail – improving infrastructure; Increasing the share of electric rail – rolling stock renewal; Increasing the share of electric mass public transport – infrastructure improvements; Increasing the share of electric mass urban transport – vehicle renewal

Directly affected greenhouse gases: CO2, CH4, N2O

Implementation period: 2014-2030

Scenario in which the measure is included: WEM

Potential emissions reductions: 92 - 110.1 Gg CO_2 eq.

T2 - **Increasing the share of biofuels**

Scope: Biofuels are fuels produced from biomass and used in transport. They diversify the energy balance and reduce dependence on mineral fuels. The main types of biofuels are bioethanol, biodiesel, biogas, synthetic biofuels, biohydrogen, pure vegetable oils. In Bulgaria, the most promising projects are for the production of ethanol and biodiesel. The Energy from Renewable Sources Act (Art. 47. (1) there are stages in which certain percentages of biodiesel and bioethanol must be achieved in the fuels concerned, as well as requirements on the type of biofuels and the sustainability criteria they must meet. Biofuels will continue to be used in the coming years, gradually increasing the share of new biofuels used.
Directly affected greenhouse gases: CO_2, CH_4, N_2O
Implementation period: 2014-2030
Scenario in which the measure is included: WEM, WAM
Potential emissions reductions: 292 - 510.1Gg CO_2 eq.

T3 - **Introduction of intelligent transport systems on the national and urban road network**

Scope: Intelligent Transport Systems (ITS) cover a wide range of technical solutions designed to improve transport by improving mobility and improving road safety. Telematics (a combination of telecommunications and informatics) uses advanced technologies to meet the needs of transport. Intelligent transport systems and telematics solutions help to improve road safety, promote the efficiency of existing infrastructure used and contribute to reducing environmental pollution by controlling traffic and managing traffic volumes.
Directly affected greenhouse gases: CO_2, CH_4, N_2O
Implementation period: 2014-2030
Scenario in which the measure is included: WEM, WAM
Potential emissions reductions: NE

T4 - **Development and construction of intermodal terminals for combined transport**

Scope: The measure aims to achieve a two-fold effect, consisting on the one hand in increasing the degree of usability of more environmentally friendly modes of transport and on the other - in creating the right conditions for increasing the added value of transport activity, with an overall reduction in transport costs per unit of GDP.