



REPUBLIC OF BULGARIA

MINISTRY OF ENVIRONMENT AND WATER

**REPORT
FOR IMPLEMENTATION OF THE
THIRD NATIONAL ACTION PLAN ON
CLIMATE CHANGE
2013 - 2020**

2022

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Abbreviations

NAPCC	National Action Plan on Climate Change
UNFCCC	The United Nations Framework Convention on Climate Change
LULUCF	Land Use, Land Use Change and Forestry
RDP	Rural Development Programme
OPE	Operational Programme Environment
NIP	National Investment Plan
NAAS	National Agriculture Advisory Service
GHG	Greenhouse gases
MP	Management plan
MR	Maintained reserve
RCEW	Regulatory Commission for Energy and Water
t CO ₂ equiv.	tons of carbon dioxide equivalent

I. Introduction

In fulfilment of the commitments undertaken by the Republic of Bulgaria at the European and international level to limit greenhouse gas (GHG) emissions, the Decision of the Council of Ministers No. 439 of 01.06.2012 adopted **the Third National Action Plan on Climate Change for the period 2013-2020**. The NAPCC is an instrument through which the framework of the state policy in the field of climate change is determined for the intended period of action according to the policy of the European Union and the international treaties in the field of climate change to which the Republic of Bulgaria is a party, namely the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol.

The third NAPCC foresees specific measures to reduce GHG emissions in all sectors, and these measures are consistent with the country's climate change policy and the potential of the national economy to reduce emissions.

The sectoral policies and measures presented in the NAPCC are formulated in a way that meets the main objective of the Plan - reducing greenhouse gases in Bulgaria and implementing the current European legislation in the field of climate change. Priority axes for the development of the given sector and the corresponding measures for each priority axis are identified. They are summarized for each of the sectors, and the overall effect of their application is reflected in scenarios and forecasts for GHG emissions until 2020.

The measures are grouped into two directions – those with a measurable effect on the reduction of greenhouse gases and measures with an indirect effect, where a reduction in emissions is also achieved, but it is more difficult to measure. For each measure, tools are proposed that are necessary for its implementation. They can be legislative amendments, implementation of legal acts and by-laws, programs, plans, schemes, etc., as well as introduction of incentive mechanisms, conducting information campaigns, trainings, etc. For each measure, the target groups, the institutions responsible for reporting on its implementation, the launch and the deadline for implementation, as well as the necessary financial resource and funding sources are indicated. A performance indicator is set, which is directly or indirectly related to the calculation of the expected effect, as well as target values by years. Additional information about the measure is presented, which indicates in which normative act or strategic document it is based, what predictions were used in calculating the emission reduction, what is the relationship between the measure, the instruments, the responsible institutions, etc.

The Plan includes activities and measures to limit climate change and achieve reductions in greenhouse gas emissions in the following sectors: Energy; Household and Services sector (energy efficiency and energy from renewable sources); Industry sector; Waste sector; Agriculture sector; sector Land use, land use change and forestry; Transport sector; Education and Science sector.

II. Basis for developing the report. Description of the mechanism for monitoring and reporting the implementation of the Third NAPCC.

In order to report the implementation of the measures and activities laid down in the Third NAPCC, there is a monitoring and reporting mechanism. The first official report on the implementation of the Plan was prepared in 2017.

In accordance with the set structure in the monitoring and reporting part of the implementation of the Third NAPCC, the report presents information on the measures laid down in the Third NAPCC by sectors and priority axes, measures with a direct and indirect effect on the reduction of greenhouse gas emissions, including performance analysis – measures implemented/not implemented/partially implemented within the reporting period, achievement/non-achievement of interim targets, major achievements during the period, financial resources utilised, implementation problems, reasons for non-implementation/partial implementation/delay of measures or for non-achievement of objectives.

The current report of the Third NAPCC covers the period from the start of the plan's operation (2013) to the end of 2020, taking into account the results achieved in terms of measures that were launched before its adoption and start of operation.

III. Report on the implementation of the sectoral measures set out in the Third National Action Plan on Climate Change (2013 – 2020)

In this report, 87 measures, whose period of action covers the period 2014 - 2020, are evaluated, including:

- Sector Energy - 13
- Sector Household and Services - 9
- Sector Industry - 3
- Sector Waste -11
- Sector Agriculture - 16
- Sector Land Use, Change in Land Use and Forestry - 16
- Sector Transport - 15
- Measures in the field of Education and Science - 5.

1. ENERGY SECTOR

General information on the Energy sector

Sector Energy, for the purposes of this Plan, covers the following activities:

- Production and distribution of electrical energy, including in a combined manner;
- Production and distribution of thermal energy for public needs;
- Distribution of natural gas (pressure maintenance from compressor stations).

Greenhouse gases, for which the Energy sector is responsible, have the largest and growing share in total emissions, which determines their primary importance for the implementation of national goals for their reduction.

Table 1. Trends and structure of GHG emissions in the Energy sector

	2005	2010	2015	2020
Total emissions, million tons of CO₂ eq., including:	62.07	59.32	62.40	49.15
Sector Energy	45.86	46.23	45.77	35.06
Share of Energy sector, %	74	78	73	71

Priority axes for development of the sector

The measures aimed at reducing GHG emissions in the Energy sector are grouped into five priority axes as follows:

- **Priority axis 1:** Low-carbon electricity generation from coal-fired power plants;
- **Priority axis 2:** Reducing the carbon intensity of the electricity mix;
- **Priority axis 3:** Modernized development of the central heating system;
- **Priority axis 4:** Accelerated penetration of decentralized energy production;
- **Priority axis 5:** Development of low-carbon networks for transmission and distribution of electricity and natural gas.

ENERGY SECTOR

Priority axis 1 *LOW-CARBON ELECTRICITY PRODUCTION FROM COAL POWER PLANTS*

Measure 1. Increasing the efficiency of production in existing coal plants

Description of the measure and implementation activities

During the implementation period of the National Investment Plan (NIP), a large number of investment projects were included for implementation, all of which were planned for implementation in a long 5-6 year period.

Evaluation of the effect

According to this measure, the operators of coal-burning installations included in the NIP ("Brickel TPP" EAD, "Maritsa TPP 3" AD, "Bobov dol TPP" EAD, "Maritsa Iztok 2 TPP" EAD, "Toplofikatsia Pernik" AD, "Toplofikatsia Ruse" EAD, "Toplofikatsia Sliven" EAD, TPP at "Solvay Sodi" AD, and "VIDAHIM" AD) have implemented a total of 48 projects with their own financial resources.

The utilized financial resources are worth 477 million BGN, compared to the initially assigned 240 million BGN.

Measure 2. Change of fuel – from coal to natural gas

Description of the measure and implementation activities

In the NIP, there are no investment projects included for implementation to change the fuel base for electricity production from coal to natural gas.

Measure 1. (Measure with indirect effect) Pilot projects with clean coal technologies

In the NIP, there are no investment projects included for implementation to change the fuel base for electricity production from coal to natural gas.

Measure 2. (Measure with indirect effect) Geological studies for CO₂ emission repositories

For the reporting period, there were no applications for the study of CO₂ storage sites.

Measure 3. (Measure with indirect effect) Introduction of mandatory efficiency requirements for new coal plants

The introduction of increased requirements for new and existing coal-fired plants should be reviewed and, if necessary, amended by the European Commission, after which EU Member States will update their national energy and climate plans to reflect the new climate ambitions. For the reporting period, RCEW did not adopt by-laws related to the introduction of similar requirements for the efficiency of new coal-fired power plants.

Priority axis 2: *REDUCING THE CARBON INTENSITY OF THE ELECTRICITY MIX*

Measure 1. (Measure with direct effect) Increase in combined high efficiency production

Description of the measure and implementation activities

The energy strategy of the Republic of Bulgaria envisages that in 2020, the electric energy produced in a combined way will reach 15% in the electricity mix. According to Art. 21, para. 1, item 8 of the Law on Electricity (LE), RCEW carries out price regulation in the cases provided for in the LE, by approving marginal prices for thermal energy and

determining preferential prices for electric energy produced in a highly efficient combined way by plants with combined production of electric and thermal energy, when applying the "rate of return on capital" method of price regulation.

Evaluation of the effect

The produced high-efficiency electric energy by year is as follows:

- for 2017 – 2,526,282 MWh, which is a 5.77% share of the net electricity produced by all power plants in the country in 2017 (43,737,555 MWh).
- for 2018 – 2,541,141 MWh, which is a 6.0% share of the net electricity produced by all power plants in the country in 2018 (42,348,983 MWh);
- for 2019 – 2,762,200 MWh, which is a 6.99% share of the net electricity produced by all power plants in the country in 2019 (39,466,296 MWh);
- for 2020 – 2,736,895 MWh, which is a 7.32% share of the net electricity produced by all power plants in the country in 2020 (37,376,037 MWh);

For the period 2017 - 2020, the total amount of electricity produced by plants with combined production of electricity and thermal energy, for which quantities certificates of origin have been issued, amounts to 10,566,518 MWh.

According to this measure, 6 investment projects for the construction of new and the modernization and rehabilitation of operating installations for the combined production of electricity and thermal energy with a total value of BGN 115,275,779 have been implemented.

The saved emissions for the entire period are 400,883 tons of CO₂ eq.

Measure 1 (Measure with an indirect effect) - Institutional support for investments in emission-free power generation capacities - nuclear energy

Description of the measure and implementation activities

The measure leads to stimulating the production of electricity from low- and zero-emission sources. The energy strategy of the Republic of Bulgaria envisages support for nuclear energy not only as a promising resource for the production of emission-free electrical energy, but also because of the accumulated successful experience and professional capacity for operating nuclear facilities.

The expected result of the implementation of the measure is a 45% share of nuclear energy in the electricity production mix.

Evaluation of the effect

According to the Bulletin on the state and development of the energy sector of the Republic of Bulgaria, the share of nuclear energy in the electricity mix by year is as follows:

- For 2017 - 34.4 %;
- For 2018 - 34.5 %;
- For 2019 - 37.4 %;
- For 2020 - 40.8 %

Measure 2 (Measure with indirect effect) Increasing the share of electricity from renewable sources in the electricity mix

Description of the measure and implementation activities

The production of electrical energy from renewable sources makes a significant contribution to reducing the carbon intensity of the country's electricity mix. The national policy in this area is well developed through the adopted National Action Plan for Renewable Energy until 2020 and the Law on Energy from Renewable Sources.

An indicator of the implementation of the measure is reaching a 15% share of electrical energy from RES in the gross final energy consumption.

The determined intermediate sectoral targets for the share of electric energy from renewable energy in the gross final consumption of electric energy in the country according to

NAPERS are: for 2016, 19.0%; for 2017, 20.1%; for 2018, 20.4%; for 2019, 20.6%; for 2020, 20.8%.

Evaluation of the effect

The reported values for the share of electrical energy from RES in gross final energy consumption are as follows:

- 2016 - 19.15 %;
- 2017 - 19.02 %;
- 2018 - 22.36 %;
- 2019 - 23.51 %;
- 2020 - 23.59 %.

For 2016, 2018, 2019 and 2020, overachievement of the target is observed.

Measure 3 (Measure with indirect effect) Increasing the capacity for the production of PSHPP

NEC EAD invests in the rehabilitation and modernization of its HPP and PSHPP in order to effectively use the available hydropower potential and ensure the balancing of the production of electricity from wind power plants. According to this measure, the investment project "Construction of the Yadenitsa Dam" is included in the NIP. For motivated reasons, the implementation of this project has been delayed.

Priority axis 3: MODERNIZED DEVELOPMENT OF THE CENTRAL HEAT SUPPLY SYSTEM

Measure 1. Increasing the share of heating and cooling from renewable sources

Description of the measure and implementation activities

The measure aims to create conditions for the sustainable development of the district heating sector in the Republic of Bulgaria and to replace part of the used conventional fuels for heat energy production with renewable sources.

Evaluation of the effect

The national target for the share of renewable energy for heating/cooling in gross final energy consumption for 2014 according to NAPERS is 19.8%. The performance is a 28.52% share of renewable energy for heating/cooling in gross final energy consumption in 2014 (according to Eurostat data). The target was exceeded by 8.5%.

The target value according to the Third NACCC is 256,000 MWh of generated energy by 2016, 556,000 MWh of generated energy by 2018, 976,000 MWh by 2020.

According to Eurostat data, the gross final consumption of heat energy and cooling energy from RES by year is as follows:

- In 2016, 13,983,912 MWh were produced;
- In 2018, the amount was 15,691,196 MWh and
- 16,333,172 MWh were produced in 2019.

The determined intermediate sectoral targets for the share of heat energy and cooling energy from renewable energy in the gross final consumption of heat energy and cooling energy in the country according to NAPERS are: for 2016 21.9%, for 2017 22.0%, for 2018 22.3%, for 2019 23.0% and for 2020 23.8%.

According to Eurostat data, the share of heat energy and cooling energy from RES in the gross final consumption of heat energy and cooling energy by year is: for 2016 29.99%, for 2017 29.88%; for 2018 33.3%, for 2019 it is 35.51%. and for 2020 – 37.18%.

The measure is exceeded.

Measure 1. (Measure with indirect effect) Rehabilitation of existing and construction of new low-carbon heat supply networks.

A National Program for stabilization and development of the heating sector in the Republic of Bulgaria has been developed.

During the period 2013 - 2019, some of the heating companies in the country, included in the NIP, have implemented, with their own financial resources, investment projects or stages of projects for "Rehabilitation of existing and construction of new heat supply networks", consisting in the replacement of old and amortized heat transfer network of different diameters with a new, highly efficient one made of pre-insulated pipes.

Priority axis 4: ACCELERATED ENTRY OF DECENTRALIZED ENERGY PRODUCTION

Measure 1. (Measure with indirect effect) Provision of public information on resources, status and development plans of electricity networks

In 2014, an information platform was created to achieve interoperability of spatial data and services for use by the state administration and citizens regarding renewable energy sources.

The measure was executed successfully.

Priority axis 5: DEVELOPMENT OF LOW-CARBON NETWORKS FOR THE TRANSMISSION AND DISTRIBUTION OF ELECTRICITY AND NATURAL GAS

Measure 1. (Measure with indirect effect) Energy efficiency in energy transport and deployment of "smart" grids and energy storage facilities

The table below presents reporting data by year in the period 2017-2020 for the technological costs of the transmission of electrical energy on the electricity distribution networks owned by "CEZ Razpredelenie Bulgaria" AD, "Elektrozpredelenie YUG" EAD and "Elektrozpredelenie SEVER" AD.

Table 2. Reporting data on the technological costs of the transmission of electric energy on the power distribution networks in the period 2017-2020.

Name of the company	2017		2018		2019		2020	
	MWh	%	MWh	%	MWh	%	MWh	%
CEZ Razpredelenie Bulgaria AD	1,106,545	10.35	950,829	9.06	820,710	8.01	760,251	7.49
"Elektrozpredelenie YUG" EAD	817,723	8.51	724,191	7.62	650,048	6.96	619,238	6.8
"Elektrozpredelenie SEVER" AD	632,098	10.02	506,402	8.01	438,175	7.20	386,884	6.56

It can be seen from the table that in the period from 2017 to 2020, all three electricity distribution companies reduced the technological costs of the transmission of electrical energy on the electricity distribution networks, reporting the lowest values in 2020.

2. HOUSEHOLD AND SERVICES SECTOR (ENERGY EFFICIENCY AND ENERGY FROM RENEWABLE SOURCES)

Priority axes for development of the sector

Measures aimed at reducing GHG emissions in the Home and Services sector (energy efficiency and energy from renewable sources) are grouped into four priority axes as follows:

- **Priority axis 1:** Proactive national policy to stimulate the efficient use of energy resources and the economically expedient development of RES;
- **Priority axis 2:** Improving the energy performance of buildings. Improving efficiency and realizing savings in the final consumption of fuels and energy;
- **Priority axis 3:** Increasing the efficiency of primary energy carrier conversion;
- **Priority axis 4:** Promotion of decentralized energy production, including energy from RES.

SECTOR HOUSEHOLD AND SERVICES

Priority axis 1: A PROACTIVE NATIONAL POLICY TO STIMULATE THE EFFICIENT USE OF ENERGY RESOURCES AND THE ECONOMICALLY EXPEDIENT DEVELOPMENT OF RES

Measure 1. Implementation of measures in the Accelerated Gasification Program (APG) of the Republic of Bulgaria

Description of the measure and implementation activities

In 2018, gas distribution companies (GDC) built 160,080 m of gas distribution network (GDN) and made investments in the amount of BGN 23,376 thousand. The total number of customers in the Natural Gas sector at the end of 2018 was 107,669, of which 100,439 (93%) were household customers and 7,230 (7%) non-household customers. The total consumption of natural gas by GDC customers in 2018 was 531,136 m³ (5,607,026 MWh), of which 432,243 m³ (4,563,045 MWh) of non-household customers (81%) and 98,893 m³ (1,043,980 MWh) to household customers (19%). The quantities of natural gas have been converted from cubic meters to energy units (MWh), and for their conversion, an average arithmetic coefficient of the representative calorific value of natural gas for 2018 in the amount of 10,557 was used, which is determined monthly by the operator of the gas transmission network "Bulgartransgaz EAD. From 01.01.2019, the unit of measure for natural gas quantities is in energy units (MWh).

In 2019, the constructed network was 186,771 m, and the investments made by GDC amounted to BGN 26,548 thousand. The total number of customers at the end of 2019 was 119,745, of which 112,153 (93.7%) were residential customers and 7,592 (6.3%) were non-residential customers. The total consumption of natural gas by GDC customers in 2019 was 5,436,093 MWh, of which 4,367,246 MWh by non-household customers (80%) and 1,068,846 MWh by household customers (20%).

In 2020, 154,347 m of underground water supply was built, the investments made by the GDC amounted to BGN 27,031 thousand. As of the end of 2020, the total length of the built GDN in the country was 5,262,221 m. The total number of GDC customers as of 31.12.2020 was 132,424, of which 124,652 (94.1%) were household customers and 7,772 (5.9%) non-household customers. The total consumption of natural gas by GDC customers in 2020 was 5,605,628 MWh, of which 4,314,224 MWh by non-household customers (77%) and 1,291,404 MWh by household customers (23%).

Evaluation of the effect

The total number of natural gas customers for the period 2018-2020 increased by 23% - from 107,669 in 2018 to 132,424 in 2020. Household customers increased by 24.11%, and non-household customers by 7.50%.

The increase in the number of gasified household customers in 2020 compared to 2018 is related to the implementation of the project "Measures for energy efficiency at the end users of natural gas through the gas distribution companies in Bulgaria" DESIREE GAS, which aims to provide a special and an effective mechanism to support the gasification of Bulgarian households in accordance with the requirements of the EU Energy Efficiency Directive, promoting the most efficient technologies and supporting the transition from carbon-intensive energy sources to natural gas. The term of the project was extended until June 2020. The grant for gasification of Bulgarian households under the DESIREE GAS project is 30% of the allowable costs for building installation. 100% joining fee is additionally financed free of charge.

The regulatory mechanism applied by RCEW provides incentives for gas distribution companies to continue the development of gas distribution networks and the joining of new customers with the aim of gradually increasing the consumption of natural gas. In this regard, RCEW approves marginal prices for the sale of natural gas, which enables gas distribution companies to sell to final customers at prices lower than those approved, thus stimulating the gasification of households.

The measure was executed.

Priority axis 2: IMPROVING THE ENERGY PERFORMANCE OF BUILDINGS. IMPROVING EFFICIENCY AND REALIZING SAVINGS IN THE FINAL CONSUMPTION OF FUELS AND ENERGY

Measure 1. Renovation of buildings, public and state property with a built-up area of more than 250 m²

Description of the measure and implementation activities

The measure is included in the National Action Plan for Energy Efficiency (NAPEE) 2014-2020. It is reported annually with the annual reports on the implementation of the NAPEE, which are approved by the Council of Ministers and sent to the EC. The annual reports are publicly available on the website of the Agency for Sustainable Energy Development (ASED).

For the period 2014-2019, the renovated area of the buildings amounted to 28.2% of the total gross floor area, or an average of about 5.6% per year; as of 31.12. 2019 - 229 buildings meet the requirements for minimum energy performance or 28.2% of the total built-up area of the buildings within the scope of art. 5 of the Directive.

According to the requirement of Art. 5 of Directive 2012/27/EU, all Member States must ensure that at least 3% of the built-up area of the heated and/or cooled buildings owned and used by the central administration are renewed annually, starting from April 1, 2014. In the Republic of Bulgaria, with the provisions of the EEA, a more ambitious goal of 5% was adopted, which, in addition to the buildings of the central administration, also covers part of those used by the territorial administration.

Measure 2. Introduction of a mandatory scheme for energy efficiency (reducing the consumption of fuels and energy in the final energy consumption)

Description of the measure and implementation activities

Pursuant to Art. 7 of Directive 2012/27/EU, through the Energy Efficiency Act (EEA) a scheme for obligations for energy savings has been introduced. In Art. 14 of the EEA, the persons who have an obligation to fulfil individual goals for energy savings are defined. The measure is included in the NAPEE, and its implementation is reported annually.

The cumulative target for the period 2014-2020 under the obligation scheme is 4,977 GWh. The total assessment of the effect of the implementation of the measure for the same period amounts to 2,226 GWh. The realized energy savings under the obligation scheme and taking into account the implementation of the alternative measures lead to the achievement of 48% of the national cumulative target for 2020.

By 2019, 40.91 GWh new savings from the implementation of the measure; by 2018, 68.6 GWh new savings from the implementation of the measure.

As part of the national policy to reduce greenhouse gas emissions and adapt to climate change, financial support for projects to reduce greenhouse gas emissions continues under the Climate Investment Program (CIP) and the Climate Micro-Projects Program of the National Trust Ecofund. At this stage, the CIP has made the most progress, as under the program measures have been implemented to reduce energy consumption in 114 public buildings and 63 electric vehicles have been purchased for the needs of the administration. According to the CIP, the following results were achieved:

- Implemented measures to reduce energy consumption in 114 sites, including: 40 schools, 22 nurseries and kindergartens, 15 administrative buildings, 8 community centres, 6 public buildings, 6 universities, 7 health services, 4 street lights and 6 municipal hospitals/polyclinics.
- To date, 63 electric vehicles (EVs) have been purchased, including: 37 EVs, category M1 (4+1 seats) or N1; 8 Plug-in hybrid vehicles, category M1 (4+1 seats); 17 EVs, category L7e; 1 EV van M1 (6+1, 7+1 seats).
- Greenhouse gas emissions saved from supported projects with accumulation since the launch of the Climate Investment Program (CIP) in tCO₂eq: 849,000

To support the implementation of the national goal for energy efficiency in the period 2013 - 2020, the following alternative measures were implemented:

- National program for energy efficiency of multi-family residential buildings (NPEEMFRB/The Program).

The NPEEMFRB was launched in 2015, which is implemented decentralized and with 100% administrative management of the process and public resource. The benefits of the Program are indisputable from the point of view of improving the energy performance and the overall condition of the housing stock, while at the same time it contributes to the protection of air purity, the reduction of greenhouse gas emissions and acts as a catalyst for a purposeful long-term housing policy.

At the moment, the financial resource for the implementation of the Program is almost exhausted.

Table 3 presents information on the scope of the NPEEMFRB for the entire program period, as well as the general progress in implementation as of 31.12.2020.

Table 3. Summary data on the implementation of the NPEEMFRB

A. General information about NPEEMFRB	
Concluded financing contracts between municipality, regional governor and BDB, number	2022
Expected improved housing infrastructure (for all 2022 buildings), sq.m. Built-up area	11,538,597
Residences to be renovated (for all 2022 buildings), number	136,104
Expected energy savings from renovated residential buildings (estimated for all 2022 buildings), MWh/year	975,00
Estimated annual reduction of greenhouse gas emissions (estimated for all 2022 buildings), 1CO₂/year	327,000
B. General information on the implementation of the program as of 31.12.2020.	
Buildings with started activities, number	2010
Renovated buildings, number	1921
Buildings under construction, number	16
Buildings with signed contracts for engineering without started CAW, after completed surveys, number	16
C. Information on buildings put into operation as of 31.12.2020.	
Renovated buildings, number	1921
Improved housing infrastructure, sq.m. Built-up area	10,855,018
Renovated homes, number	128,439
Expected energy savings from renovated residential buildings, MWh/year	922,300
Expected annual reduction of greenhouse gas emissions, 1CO₂/year	313,000
Value of all activities on the buildings, BGN.	BGN 1,931,682,300

- Project BG161P0001-1.2.01-0001 "Energy renovation of Bulgarian homes" under the Regional Development Operational Program 2007-2013:

The project was implemented in the period from 2012 to 2015, and the beneficiary under the program is the "Housing Policy" Directorate of the MRDPW.

- Number of renovated residences - 2203;
- Estimated energy savings from the renovated residential buildings - the estimated value of the expected energy savings from the renovated residential buildings indicated in the project application form is 17,500 MWh/year. According to the information available in the MRDPW - Analysis of the implementation of the "Energy renovation of Bulgarian homes" project (2016), the reported value of the expected energy savings from the actually renovated residential buildings, after the implementation of the project, is 16,355.14 MWh/year. Energy savings are estimated given the fact that they are determined on the basis of energy audits carried out before the renovation of the buildings.

Under the Operational Program "Growing Regions" 2014-2020 (OPGR 2014-2020), 272 grant agreements (GA) worth BGN 296,843,354.52 were concluded for improving the energy efficiency of public and residential buildings. 189 projects have been implemented. According to the projects, 685 buildings have been renovated by the end of 2020, of which 484 residential buildings and 201 public buildings. The annual primary energy consumption of public buildings was reduced by 76,932,311.30 kWh/year and 6,142 households moved to a higher energy consumption class. The expected annual reduction of greenhouse gas emissions is 39,455.77 tons of CO₂ eq.

Evaluation of the effect

The total effect of the implementation of the projects in the period of implementation of the measure is 1,765,190 tons of CO₂ eq. emissions saved.

Measure 1. (Measure with indirect effect) Development of a National Plan to increase the number of buildings with close to zero net energy consumption

During the reporting period, the following activities were carried out to implement the National Plan for increasing the number of buildings with close to zero net energy consumption:

In 2019, as part of the administrative measures provided for in the national nZeb plan, by order of the Minister of RDPW, a National Expert Council (the Council) was formed to coordinate the implementation of the National Plan for buildings with near-zero energy consumption 2015 - 2020 (nZeb plan).

The expert council is widely represented and includes experts from the state administration, branch organizations and financial institutions. MRDPW, Ministry of Energy, Ministry of Environment and Water, Agency for Sustainable Energy Development, Technical University-Sofia, University of Architecture, Construction and Geodesy-Sofia, National Association of Municipalities in the Republic of Bulgaria, Chamber of Engineers in Investment Design in Bulgaria, Chamber of Architects in Bulgaria, Chamber of Builders in Bulgaria, Chamber of Installers in Bulgaria, Chamber of Energy Auditors, Bulgarian Association of Architects and Consulting Engineers, DZZD "Fund for Sustainable Cities", Regional Fund for Urban Development AD, "Energy Efficiency and Renewable Sources" Fund. The work of the Council is organized by thematic areas in four thematic working groups (TWG) as follows: TWG-1 "Regulation, standardization and technical standards"; TWG-2: "Scientific applied, research and analytical activities and intelligent technologies"; TWG-3: "Financial mechanisms and policies for investment mobilization"; TWG-4: "Awareness and publicity, acquisition of knowledge and skills".

In the context of the COVID-19 pandemic, the work of the council is mainly conducted online. At the time of preparation of this report, two technical opinions have been developed. The first opinion was prepared with the leading role of the Centre for Energy Efficiency EnEffect and includes: Identifying the professional and user groups that need more information on near-zero energy buildings, defining the competences and knowledge that these groups need to acquire, a sample program of information seminars to stimulate interest in buildings with near-zero energy consumption, systematized information with online links to all nZEB projects that have been implemented or are being implemented in Bulgaria with information on useful practices, trainings and educational materials implemented on projects

with European and national funding on the subject, development of guidelines for a broad public campaign to promote the benefits and advantages of near-zero energy buildings at national and local level.

The second opinion was developed by the MRDPW together with the Chamber of Engineers in Investment Design and includes: analysis of the applicability of the current national definition of nZEB, study of completed buildings in Bulgaria up to the level of the zero consumption norm, analysis of errors and difficulties in engineering calculations, proposal to supplement the national definition and adapt it to the new Directive (EU) 2018/2001 to promote the use of energy from renewable sources, analysing the obstacles to the implementation of the national definition in urbanized territories, in areas with a built heating and gas transmission network. It is being discussed that the nZEB Council in partnership with the Technical University-Sofia should develop practical guidelines/instructions for designers and consultants with specific examples for calculating the share of renewable energy when using the various engineering technologies to maintain the microclimate in buildings. A rubric has been created on the website of the MRDPW to reflect the work of the Council, which is in the process of developing and publishing materials to promote nZEB.

<https://www.mrrb.bg/bg/ministerstvo/eksnertni-i-konsultativni-suveti/nacionalen-eksperten-suvet-za-koordinirane-izpulnenieto-na-nacionalniya-plan-za-sgradi-s-blizko-do-nulevopotreblenie-na-energiva/>.

Measure 2. (Measure with indirect effect) Introducing standards for sustainable buildings and energy management

The energy efficiency certification of buildings in operation and parts of buildings in operation aims to certify the current state of energy consumption in buildings, energy performance and their compliance with the scale of energy consumption classes. Certification is based on an energy efficiency survey. The BREEAM, LEED, DNGB standards are voluntary. The introduction and implementation of the standards has an indirect effect on the overall reduction of greenhouse gas emissions.

During the period 2014-2019, 4,616 public and residential buildings were certified.

Measure 3. (Measure with indirect effect) Raising awareness of requirements for buildings with zero net consumption, new materials, practices and technologies

The measure is informative and for increasing the knowledge and qualifications of the professional branch. In connection with the implementation of the measure by the end of 2020, at least 10 seminars on providing information on the nZEB.

Measure 4. (Measure with indirect effect) Introduction of a publicly accessible register of energy efficiency certificates and technical passports of buildings.

The measure does not have a direct effect on reducing emissions, but will ensure transparency and availability of data on the condition and energy performance of buildings.

According to SEDA, the register was created in 2015, but is not yet publicly available.

Measure 1. Replacement of old inefficient power generation equipment with new

Description of the measure and implementation activities

The measure refers to the final consumption of fuels, their conversion into energy for heating, cooling and DHW, as well as energy consumption. The assessment of the effect was made on the basis of predicted consumption of fuels in the Home and services sector, taking into account other related measures.

The measure is also tied to the activity provided for in the Second NAPEE, in accordance with the regulations for the specific product groups adopted pursuant to Art. 15 of Directive 2009/125/EC to create a framework for determining ecodesign requirements for products related to energy consumption.

In accordance with the activity of the SAMTS, inspections were carried out according to Directive 2009/125/EC to create a framework for determining the ecodesign requirements for products related to energy consumption.

In 2017, the following were checked:

- 639 models of vacuum cleaners within the scope of the ecodesign requirements of Regulation No. 666/2013. For 12%, corrective actions were taken to the instructions for use. 18 vacuum cleaners have been discontinued;
- 459 models of incandescent lamps for their compliance with the ecodesign requirements of Regulation No. 244/2009 (amend. Regulation No. 2015/1428). As a result of the inspection, 94 pieces of 12 lamp models were destroyed; 787 pieces were suspended from sale in the commercial outlet; 15 AEA V were drafted; the import of 35 models of ordinary incandescent lamps has been suspended.

In 2018:

- 50 models of refrigerators under the EEPLIANT2 project for their compliance with the ecodesign requirements of Regulation No. 643/2009. 2 models of non-compliant refrigerators were found, for which actions were taken.
- 195 products (routers, game consoles, cable TV decoders, home theatre systems, projectors, BlueRay players, fitness equipment, robotic vacuum cleaners, laptops and video surveillance systems) within the scope of network standby requirements Regulation No. 1275/2008 (amend. Regulation 801/2013). 2 non-conforming products were discovered, for which stop distribution orders have been issued.

In 2019, the following were checked:

- 412 models of halogen lamps for their compliance with the ecodesign requirements of Regulation No. 244/2009 (amend. Regulation No. 2015/1428). 3 lamp models were stopped from sale at the dealer, 34 in total; for 8 models of lamps, orders have been issued to stop the distribution under Art. 30c of the LTRP; for 3 models of lamps, orders have been issued to stop distribution and withdraw from the market under Art. 30a, para. 2 of the LTRP.
- 29 electric motor models for compliance with the ecodesign requirements of Regulation No. 640/2009. For 2 models, an order to stop distribution was issued under Art. 30c of the LTRP, for 3 models, corrective actions have been taken regarding the information on the technical data plate.

In 2020, the following were checked:

- 29 ventilation units, according to the EEPLIANT3 project, for compliance with the requirements for ecodesign specified in Regulation (EU) No. 1253/2014. Corrective action letters have been sent to the economic operators regarding the mandatory information, the product fiche and the energy label that must be found on the websites where the products

are offered. For 2 non-compliant recuperators, investigative protocols were drawn up and orders were issued to temporarily stop their distribution.

- 298 dryers, under the EEPLIANT3 project, for compliance with the ecodesign requirements of Regulation No. 932/2012. Inconsistencies were found on 3 dryers that have been purchased for testing. As a result of the tests, it was found that 1 tumble dryer does not comply with ecodesign requirements. A stop distribution and recall order has been issued.

- 267 air conditioners for compliance with the ecodesign requirements of Regulation No. 206/2012. The inspection found 15 models of air conditioners not meeting the requirements, for which the following actions were taken: 9 AEA V have been drafted; 2 trader stop orders; 3 air conditioners suspended from sale in the commercial outlet; corrective actions have been taken regarding the instructions for use for 5 air conditioners.

Evaluation of the effect

The effect of energy efficiency inspections of water boilers and air-conditioning installations in public buildings, which are mandatory under the EEA, during the period 2014 - 2019, is estimated at 134.68 GWh annual energy savings or 240 tons of CO₂ eq.

Priority axis 4: INCREASING THE EFFICIENCY OF PRIMARY ENERGY CARRIER CONVERSION

Measure 1. Development and phased implementation of the National Program "1000 Solar Roofs"

The implementation of the measure has not yet started.

3. SECTOR INDUSTRY

Measures aimed at reducing GHG emissions in the Industry sector are grouped into three priority axes as follows:

- **Priority axis 1:** Improving energy efficiency in industry;
- **Priority axis 2:** Use of alternative fuels;
- **Priority axis 3:** Construction of a technology park and business incubator.

INDUSTRY SECTOR

Priority axis 1: IMPROVING ENERGY EFFICIENCY IN INDUSTRY

Measure 1. Survey of energy efficiency and implementation of prescribed measures

Description of the measure and implementation activities

According to procedure BG161P0003-2.3.02 "Energy efficiency and green economy", implemented under the operational program "Development of the competitiveness of the Bulgarian economy" 2007-2013 (OPDCBE), a total of 437 enterprises were supported and funds in the amount of BGN 262,764,217.57 were certified (EUR 134,351,271.89). We would like to point out that the target group of the procedure was only SMEs and there was no requirement for an annual energy consumption of more than 3000 MWh.

During the 2014-2020 program period under the operational program "Innovations and Competitiveness" (OPIC), the only procedure for energy efficiency for large energy consumers was the procedure for selecting projects BG16RFOP002-3.002 "Increasing energy efficiency in large enterprises". The purpose of the procedure was to provide focused support to large enterprises in Bulgaria for the implementation of energy efficiency measures in order to achieve sustainable growth and competitiveness of the economy. As of 2020, 61 enterprises

have been supported under the procedure and payments in the amount of BGN 107,104,387.46 have been made.

As a result of the implementation of the projects, savings in CO₂ emissions in the amount of 281,116.60 tons/year were recorded.

Evaluation of the effect

Greenhouse gas emissions (CO₂) saved from the supported projects are approximately 126,603.77 t CO₂/year as of 2016, as of 2018 there were 650,230 tons of CO₂, and by the end of the period there were another 73,13 thousand tons of CO₂ - a total of 849,963.77 tons of CO₂

Priority axis 2: USE OF ALTERNATIVE FUELS

Measure 1. Use of biomass in the combustion systems of the installations

In implementation of the mentioned measure, procedure No. BG161P0003-2.3.01 "Investments in green industry" was implemented under OPDCBE.

Grant procedure BG161P0003-2.3.01 "Investments in green industry" was aimed at providing support to large enterprises in the country in the implementation of investment projects directly related to the production of products subject to recycling when they become waste, (including products that fulfil the conditions of the harmonized standard EN 13 432:2000 for the biodegradability of packaging), more efficient use of waste products and reduction of energy intensity in these enterprises, as a key factor in overcoming their negative impact on the environment and increasing "green" investments in the Bulgarian economy.

Within the framework of the procedure, 30 enterprises were supported, and 28 were successfully completed. The amount of certified funds under the procedure amounts to BGN 64,942,110.47 (EUR 33,204,883.15).

Priority axis 3: BUILDING A TECHNOLOGY PARK AND BUSINESS INCUBATOR

Measure 1. (Measure with indirect effect) Construction of a technology park and business incubator.

An indicator of the implementation of the measure is the construction of a technological park. The measure was executed.

Within the framework of OPDCBE, in line with the procedure for the direct provision of grant BG161P0003-1.2.05 "Creation of a science and technology park", the activities for the construction of the first science and technology park on the territory of the country were launched.

The construction of the park is divided into two phases, as phase 1 was realized within the framework of OPDCBE 2007-2013, and phase 2 under OPIC.

During the first phase (program period 2007-2013), activities were financed for the preparation and construction of the park and its commissioning, including construction of the infrastructure of the park, delivery and installation of LTA/LIA, promotional and information campaigns, provision of services to the incubator planned for construction.

During the first phase of the project, events and specialized forums were held with over 1,900 participants, such as: industrial panel on the topic "Financing of projects and innovative products of start-up companies and SMEs in the field of energy efficiency", etc. Under phase 1 of the project, funds worth BGN 67,332,359.28 (EUR 34,427,016.71) were certified as grants.

In the second phase, it was planned to carry out the final construction of all infrastructure sites, as well as the launch of the incubation program with included services for the incubated enterprises.

As a result of the implementation of phase 2 of the project, 33 start-up innovative enterprises were supported by providing them with financial assistance through subsidized rent in the amount of 50% of the market value; 10 partnerships were established with representatives of Bulgarian technological companies, with which innovative technological solutions and new products and services were developed; numerous companies (including start-ups) use services provided by the laboratory complex of Sofia Tech Park; an interactive museum "TechnoMagic Land" was created, which has been actively operating since 2017.

As of 30.12.2020, funds in the amount of BGN 8,591,720.25 have been disbursed under the project.

4. WASTE SECTOR

Brief information on measures in the sector

Measures aimed at reducing GHG emissions in the Waste sector are grouped into three priority axes as follows:

- **Priority axis 1:** Reducing and preventing the amount of waste, the disposal of which generates greenhouse gases;
- **Priority axis 2:** Capturing and burning biogas from landfilled waste;
- **Priority axis 3:** Capture of biogas in urban wastewater treatment plants (UWWTP) and its combustion.

WASTE SECTOR

Priority axis 1: REDUCTION AND PREVENTION OF THE QUANTITIES OF WASTE WHICH PRODUCES GREENHOUSE GASES

Measure 1. Construction of installations for mechanical and biological treatment (MBT) and installations for treatment with utilization of compost and biogas

Description of the measure and implementation activities

According to the procedure for the direct provision of the grant "Combined procedure for the design and construction of composting installations and installations for the pre-treatment of household waste" (OPE 2014-2020), contracts were concluded with the municipalities of 16 regional waste management associations (RWMA) with a total value of grant provided of BGN 130.4 million.

According to a procedure through direct provision of the grant "Second combined procedure for the design and construction of composting installations and installations for the pre-treatment of household waste" (OPE 2014-2020), contracts were concluded with the municipalities of 3 RWMA with a total value of BGN 23.7 million provided.

According to the concluded contracts for grants under both procedures, it is planned to build a total of 24 composting plants that will serve a total of 75 municipalities.

The construction sites of the projects implemented by the following municipalities have been opened: Madan, Gotse Delchev, Troyan, Velingrad, Oryahovo, Blagoevgrad, Dospat. The project implemented by the municipality of Sandanski has ended. The CAW for the construction of the installations under the project implemented by the municipality of Zlatitsa and for the construction of 2 of the 4 installations under the project implemented by the municipality of Pazardzhik have been completed. The installation under the project with the leading municipality of Petrich has been built and put into operation (a final package of reporting documents has been presented, which is in the process of being checked).

According to the procedure through the direct provision of grant "Design and construction of anaerobic installations for separately collected biodegradable waste" (OPE 2014-2020), contracts with municipalities from 3 RWMA with a total value of provided grant of BGN 85.2 million are in the process of being implemented.

Regarding the procedure through direct provision of grant "Design and construction of composting installations for separately collected green and/or biodegradable waste" (OPE 2014-2020) with specific beneficiary municipalities from a total of 39 municipalities from 7 RWMA:

- The project proposal of the municipality of Rodopi is under evaluation.
- Contracts were signed with 15 municipalities with a total value of grant provided of BGN 49.3 million, including: Karlovo, Montana, Harmanli, Plovdiv, Berkovitsa (in partnership with the municipality of Varshets), Maritsa, Svilengrad, Chiprovtsi (in partnership with the municipality of Georgi Damyanovo), Vratsa (in partnership with the municipality of Mezdra), Valchedrum (in partnership with the municipality of Yakimovo), Lom, Hisarya, Yambol, Saedinenie (in partnership with Stamboliyski municipality) and Krichim (in partnership with Perushtitsa).
- The installation was built and put into operation according to the project implemented by the municipality of Montana (the final package of reporting documents is in the process of being checked).
- The civil engineering works for the construction of the installations under the project, carried out by the municipalities of Harmanli and Plovdiv, have been completed.
- The implementation of the project with the leading municipality of Svilengrad has ended.

The contract for grant with the municipality of Sevlievo under the procedure "Completion of the project for implementation of a decentralized model for bio-waste management in one of the waste management regions in Bulgaria, including the construction of the necessary technical infrastructure - a separate collection system and a recycling facility - has been concluded of the collected bio-waste" (OPE 2014-2020), with a specific beneficiary municipalities of Sevlievo, Dryanovo and Suhindol from RWMA and a value of grant provided of BGN 1.8 million, has ended.

The project includes two composting installations on the territory of Sevlievo and Dryanovo and the allocation of a composting site on site for the municipality of Suhindol.

In order to complete the infrastructure for pre-treatment of waste and composting of bio-waste, according to the procedures for the direct provision of grants under priority axis 2 of the OPE 2014-2020 ("*Combined procedure for the design and construction of composting plants and pre-treatment plants of household waste*", "*Second combined procedure for design and construction of composting installations and installations for pre-treatment of household waste*", "*Design and construction of composting installations for separately collected green and/or biodegradable waste*", "*Design and construction of anaerobic installations for separately collected biodegradable waste*", "*Completion of the project for implementation of a decentralized model for bio-waste management in one of the waste management regions in Bulgaria, including construction of the necessary technical infrastructure - a system for separate collection and a facility for recycling of collected bio-waste*") contracts were signed for the construction of 43 installations for composting green waste, 3 anaerobic installations and 19 installations for preliminary treatment.

After their construction and commissioning, 61 green waste composting facilities, 45 regional pre-treatment facilities and 4 anaerobic digestion facilities will operate in the country.

When choosing operations according to the cited procedures, requirements are laid down to comply with the principle of sustainable development, in which the reduction of greenhouse gas emissions and the limitation of climate change are sought when financing projects.

In addition, the implementation of measures for the construction of anaerobic installations for biodegradable waste will contribute to the implementation of measures in the

National Action Plan on Climate Change for the period 2013-2020, as well as the goal of the Europe 2020 Strategy for 20% reduction of greenhouse gas emissions.

Under OPE, the so-called demonstration projects in the field of waste management aimed at creating a zero-waste society and raising public awareness of compliance with the waste management hierarchy, **are also being implemented.** By the end of 2020, 27 contracts have been concluded under the procedure.

According to the main indicator under the priority axis "Solid waste: Additional capacity for waste recycling", as of 31.12.2020 progress of 30,366 tons/year is reported.

Given the specificity of the operations carried out under priority axes 1 and 2 of the OPE 2014-2020, aimed mainly at the construction of ecological infrastructure, the overall progress achieved in terms of physical indicators will be reported at the end of the projects, due to the need for a high degree of completion or introduction in operation of the objects. The expectations of the OPE MA are that with the mobilization of all participants in the process and adequate organization of activities, the projects will be completed within the period of eligibility of costs (31.12.2023).

Measure 1. (Measure with indirect effect) Further development of collective systems for separate collection of waste from the population

An Ordinance on packaging and packaging waste was adopted (promulgated SG No. 85/06.11.2012 amended and supplemented SG No. 60/20.07.2018 amended and supplemented with PMS 420/31.12.2020).

Orders have been issued by the Minister of the Environment and Water, which determined the members of the packaging waste recovery organizations that should / should not pay a product fee for packaging for 2016, 2017, 2018, 2019.

As of 31.12.2020 permits have been issued to 5 organizations for the recovery of packaging waste: "Ecopack Bulgaria" AD, "Bulecopack" AD, "Eco Partners Bulgaria" AD, "Ecobulpack Bulgaria" AD and "Eco Collect" AD. Covered population in separate collection systems – 6,227,311 citizens.

Measure 2. (Measure with indirect effect) Introduction of differentiated charging for discarded waste

Pursuant to the provision of § 13a of the Final Provisions of the Law on Amendments and Supplements (LAS) to the Law on Local Taxes and Fees (LLTF) (SG, no. 101 of 2013, amended and supplemented, SG No 105 of 2014) until March 30, 2015, the Council of Ministers, together with the National Association of Municipalities in the Republic of Bulgaria, develops a methodology for preparing the draft estimate with the necessary costs for the activities and for the types of bases that serve to determine the amount of the fee for household waste under LLTF, and submits to the National Assembly a project to amend Art. 66 and 67 of the LLTF.

In connection with the implementation of the provision of § 13a, Order No. R-7/09.01.2015 of the Prime Minister of the Republic of Bulgaria was issued, in which the composition of a new interdepartmental working group for the development of the methodology for preparing the draft estimate was determined with the necessary costs, as well as a draft of the LAS of LLTF.

A proposal has been received from the Waste Management and Soil Conservation (WMSC) Directorate of the MoEW to supplement the implementation indicator "Acceptance of methodological guidelines", so that it acquires the form of "Acceptance of methodological guidelines and change of LLTF".

According to the Third NAPCC it was planned that the measure would be implemented in the period 2013-2014, as it was expected that the methodological guidelines would be adopted in 2013 and that the differentiated charging would be applied in the municipalities from 2015. In accordance with the changes in the LLTF, the implementation of the measure started in 2015.

In the LLTF (promulgated SG, issue 117 of 1997, amended SG, issue 88 of 2017, amended SG, issue 98 of 2018) changes have been adopted, effective from January 1, 2022, according to which the tax assessment of real estate or their book value is no longer a possible basis for determining the fee for household waste, and a new way of determining the fee for household waste on the principle of bearing the costs by the causer or owner of the waste, the so-called "polluter pays" principle.

With the adopted changes in the LLTF, it is envisaged that the procedure for preparing and the model of the draft estimate, as well as the method of calculating the amount of the fee, will be determined in an ordinance of the Council of Ministers, which should be adopted by March 31, 2021. (Transitional and final provisions of the LAS of the LLTF. SG, issue 98/2018).

In this regard, and with the aim of fulfilling the regulatory requirements, a draft Ordinance on the procedure for preparing and the model of the draft estimate for the relative costs of carrying out the activities of providing the services for which the fee for household waste is paid is being developed in the LLTF (under Art. 62 of the LLTF) and for the method of calculating the amount of the fee when applying the bases adopted in the LLTF.

The bases for determining the fee for household waste defined in the LLTF are:

- For the service of collection and transportation of household waste and for the service of treatment of household waste in facilities and installations - an individually determined amount of household waste for the property, including through bags; amount of household waste for the property, determined according to the number and capacity of the necessary containers for collecting household waste and the frequency of their transportation, as well as the number of users of the service in the property;
- For the service of maintaining the cleanliness of the territories for public use in populated areas and settlements in the municipality - number of users of the service in the property and the expanded built-up and/or unbuilt area of the real estate.

In Art. 67, para. P of the LLTF it is also regulated that when accepting on the basis of "individually determined amount of household waste for the property, including through bags with a certain capacity and carrying capacity" or "quantity of household waste for the property, determined according to the number and capacity of the necessary containers for collecting the household waste and the frequency of their transportation" the municipal council, when determining the amount of the fee for household waste, may accept additional differentiation according to the type of household waste.

Measure 3. (Measure with indirect effect) Creation of stable markets for materials obtained from recycled waste

At the moment, the implementation of the measure has been postponed.

Measure 4. (Measure with indirect effect) Introduction of separate collection of "green" waste in municipalities.

Towards the end of 2020, as a result of the three completed projects along the axis, two composting installations were built on the territory of Sevlievo and Dryanovo, an on-site composting site for the Suhindol municipality; installation for composting separately collected green and biodegradable household waste - Svilengrad and accompanying infrastructure; composting plant and plant for pre-treatment of mixed household waste, located on a site within the Sandanski municipality and serving all municipalities from the Regional Waste Management Association - Sandanski, Kresna and Strumyani municipalities. By the end of 2020, the installations under the projects implemented by the municipalities of Plovdiv, Maritsa, Montana and Petrich were also built and put into operation.

The CAW for the construction of the installations under the projects implemented by the municipalities of Harmanli, Zlatitsa and for the construction of 2 of the 4 installations under the project implemented by the municipality of Pazardzhik have also been completed.

Priority axis 2: CAPTURE AND BURNING OF BIOGAS FROM LANDFILLED WASTE

Measure 1. Capture and burn biogas in all new and operating regional landfills***Description of the measure and implementation activities***

The requirement for the design and operation of waste landfills was introduced by Ordinance No. 8/2004. With the introduction of installations for capturing and burning biogas in all regional landfills for the period up to 2020, 360 million nm³ of methane were burned.

Measure 2. Biogas capture and burning in old municipal landfills that have been closed***Description of the measure and implementation activities***

Under the procedure "Reclamation of landfills, subject of a procedure for violation of EU law in case C-145/14", 54 contracts with a total value of grant provided of BGN 120.9 million were concluded with the municipalities: Nessebar, Byala (Ruse municipality), Dolni Dabnik, Ruen, Nevestino, Pavlikeni, Kovachevtsi, Elena, Devnya, Kula, Kostenets, Suvorovo, Zemen, Dolna Mitropolia, Stara Zagora, General Toshevo, Pordim, Chirpan, Malko Tarnovo, Galabovo, Vetrino (region Varna), Kavarna, Treklyano, Simitli, Pleven, Tryavna, Belogradchik, Gulyantsi, Blagoevgrad, Polski Trambesh, Tervel, Bratsigovo, Burgas, Koprivshitsa, Ruzhintsi, Velingrad, Pomorie, Breznik, Dimovo, Roman, Chelopech, Batak, Byala (region Varna), Bobov Dol, Pernik, Sapareva Banya, Rila, Trun, Nikopol, Kocherinovo, Pirdop, Dupnitsa, Boboshevo and Belovo.

Of the above, 14 are the completed projects of municipalities: Bobov Dol, Bratsigovo, Byala (region Ruse), General Toshevo, Kavarna, Kovachevtsi, Kostenets, Kula, Nessebar, Pavlikeni, Ruen, Ruzhintsi, Simitli and Tervel.

The remaining 40 projects are in different stages of implementation.

The technical reclamation of municipal solid waste landfills in the municipalities of Pazardzhik, V. Tarnovo, Samokov, Provadia, Radomir has been completed and was implemented with funds from EMEPA and the State Budget of the Republic of Bulgaria Law.

Evaluation of the effect

The effect of implementing the measure is calculated in Measure 1. Capture and burn biogas in all new and operating regional landfills.

Measure 1. (Measure with indirect effect) Investigating the energy potential of the biogas generated in landfills that are about to be closed

At the moment, there are no commissioned studies to investigate the energy potential of the biogas generated in landfills that are about to be closed.

Measure 2. (Measure with indirect effect) Measurement of the amount (flow rate) of biogas captured in combustion systems.

According to the NAPCC, the expected result is: regulation of the technical requirements for measuring biogas from landfills in 2015.

As a result, an amendment and supplement to Ordinance No. 6 on the conditions and requirements for the construction and operation of landfills and other facilities and installations for the recovery and disposal of waste was adopted (issued by the Minister of the Environment and Waters, promulgated, SG No. 80 of 13.09.2013, in force from 13.09.2013).

Priority axis 3: CAPTURE OF BIOGAS IN URBAN WASTEWATER TREATMENT PLANTS (UWWTP) AND ITS COMBUSTION

Measure 1. Introduction of anaerobic stabilization of sludge with capture and burning of biogas in the newly built and reconstructed stations in settlements with more than 20 thousand population equivalent

Description of the measure and implementation activities

Within the priority axis, 41 projects with a total grant value of BGN 2,221,132,992 have been agreed upon by the end of 2020. Of these, 31 are in the process of implementation, and 10 are completed projects.

The majority of the funded projects under the axis are aimed at achieving the objectives set in Directive 91/271/EEC on the treatment of waste water from settlements and Directive 98/83/EC on the quality of water intended for human consumption. The main result is the implementation of measures for the collection, removal and purification of waste water, also as a result of the investments in the rehabilitation of the existing infrastructure, the efficiency of the water supply networks is increased and water losses are reduced.

The performance of the main indicators on the priority axis at the end of the reporting period is as follows:

- for indicator “Water supply: Additional population served by improved water supply” 99,547 persons are reported.
- For indicator “Waste water treatment: Additional population served by improved waste water treatment” 292,542 population equivalent are reported.
- As of 31.12.2020, according to the indicator "Built/rehabilitated/reconstructed WWTPs", a total of 10 units were reported. WWTP (Radnevo, Bansko, Tervel, Vratsa, Shumen, Vidin, Asenovgrad, Aytos, Primorsko and Varna - resort “Golden Sands”). Put into operation are also the reconstructed and expanded WWTP in the city of Dobrich and the built WWTP in the town of Elhovo. With the implementation of the projects for which financing contracts have been concluded, a total of 28 WWTP are expected to be built/reconstructed/rehabilitated .
- As of 31.12.2020, the water supply networks of Bansko, Dolna Mitropolia, Trastenik, the village of Bukovlak and the village of Yasen, Elhovo, Yambol, Stage I of the WSS network of Vratsa, the newly built and reconstructed WSS networks of the municipalities of Asenovgrad and Dobrich were put into operation.

The measures on the priority axis have an impact on the fight against climate change, adaptation and resilience to disasters. This principle is applied to the projects within the framework of which it is envisaged to treat the sludge and/or capture, burn and/or utilize the biogas released in the methane-tanks of the WWTP.

Measure 1. (Measure with indirect effect) Introduction measurement of the amount (flow rate) of captured biogas in combustion systems.

In the adopted in 2014 National Strategic Plan for the management of sludge from urban waste water treatment plants on the territory of the Republic of Bulgaria, the activity "Providing financing for technologies for co-generation of biogas, electricity and heat" is set with implementation deadline 2016 - 2020.

5. AGRICULTURE SECTOR

Brief information on measures in the sector

Measures aimed at reducing GHG emissions in the Agriculture sector are grouped into six priority axes as follows:

- **Priority axis 1:** Reducing emissions from agricultural soils;
- **Priority axis 2:** Reduction of methane emissions from biological fermentation in animal husbandry;
- **Priority axis 3:** Improving manure management;
- **Priority axis 4:** Optimizing the use of plant residues in agriculture;
- **Priority axis 5:** Improving rice paddy management and rice production technology;
- **Priority axis 6:** Increasing the awareness and knowledge of agricultural producers and the administration regarding their actions and effects on climate change.

AGRICULTURE

Priority axis 1: REDUCTION OF EMISSIONS FROM AGRICULTURAL SOILS

Measure 1. Encourage the use of appropriate crop rotations, especially with nitrogen-fixing crops

Description of the measure and implementation activities

In the RDP 2014-2020, it is not planned to apply the direction "Introduction of crop rotation for soil and water protection", which during the program period 2007-2013 was part of measure 214 "Agro-ecological payments" of the RDP.

During the program period 2014-2020, organic production is stimulated by providing financial support under Measure 11 "Organic Agriculture" of the RDP. Payments under the direction "Organic crop production" continue even after the end of the 2014-2020 RDP period.

During the period 2015-2020, a Payment Scheme for agricultural practices that are favourable to the climate and the environment (green direct payments) was implemented in the scope of direct payments financed by the European Agricultural Guarantee Fund (EAGF).

Green Direct Payments are granted for eligible areas under the Single Area Payment Scheme (SAPS) provided that the green requirements are met on the holding, as far as applicable to its type and size. Farmers with arable land, perennial crops and permanently grassed areas are entitled to a green payment.

The green requirements are threefold:

- diversification of crops - for the arable land in the farm;
- preservation of permanently grassed areas;
- maintenance of 5% of the cultivated land as ecologically targeted areas (land left fallow; landscape features; strips of permissible areas at the edges of forests; areas with tree crops with a short rotation cycle; areas with catch crops or green cover; nitrogen fixing cultures).

Within the scope of scientific research projects from the Academy of Agriculture, the effect of the inoculation of leguminous crops with symbiotic nitrogen-fixing bacteria on the yield and export of nitrogen with the produce was tracked. The positive results for the complete cycle of nitrogen in the studied agro-ecosystem and the low emissions in the atmosphere are a basis for expanding the research. In model field trials, the efficiency, adaptability and plasticity of different crops and crop rotations are analysed annually.

149 contracts between AA and beneficiaries of the RDP with the subject of agrochemical research and consulting have been executed.

Evaluation of the effect

In 2014, under the RDP 2007 - 2013, the following areas were supported:

- for the introduction of crop rotation - 645,597 hectares;
- cultivated in a biological way - 33,899 hectares.

In 2015, the RDP 2007 - 2013 supported areas:

- for the introduction of crop rotation - 648,455 hectares;
- cultivated in a biological way - 29,849 hectares.

Under the direction "Introduction of crop rotation for soil and water protection" under the 2007-2013 RDP, the following have been stated:

2017 - 78,890.40 hectares

2018 - 74,391.64 hectares

2019 - 68,298.00 hectares

According to the direction "Biological plant breeding" from the RDP 2007-2013, the following have been declared:

2016 - 20,244.23 hectares

2017 - 14,213.21 hectares

According to the direction "Biological plant breeding" from the RDP 2014-2020, the following have been declared:

2016 - 91,490.65 hectares

2017 - 90,002.05 hectares

2018 - 83,672.65 hectares

2019 - 81,420.79 hectares

2020 - 73,623.16 hectares

The area eligible for support under the Climate and Environmentally Friendly Agricultural Practices Payment Scheme (Green Direct Payments) is as follows:

Campaign 2015 – 3,648,235 hectares

Campaign 2016 – 3,685,144 hectares

Campaign 2017 – 3,753,164 hectares

Campaign 2018 – 3,796,115 hectares

Campaign 2019 – 3,808,546 hectares

By the end of 2020, the target value for improved crop rotation has been exceeded. For the period 2015 - 2020, the areas on which practices favourable to the environment and the climate (including crop diversification) are carried out are within 3.6-3.8 million hectares per year. As of 2020, the target value for the areas cultivated in a biological way has been exceeded by 61,623.15 hectares.

The measure was exceeded, as the saved emissions for the period of implementation of the measure were 2,860,200 tons of CO₂ eq.

Measure 2. Management of degraded agricultural lands, through: 1 Biological reclamation with grass species characteristic of the area 2 Application of anti-erosion measures and tillage techniques

Description of the measure and implementation activities

For the period 2014-2016 for the implementation of practices aimed at controlling soil erosion for a total of BGN 13.168 million paid under the 2007-2013 RDP and 2014-2020 RDP, including:

- in 2014 - BGN 0.782 million;
- in 2015 - BGN 0.978 million;
- in 2016 - BGN 11.408 million.

The following funds are authorized under the "Soil Erosion Control" direction under the RDP:

2017 - BGN 11,962,533.27

2018 - BGN 10,784,893.92

2019 - BGN 10,548,566.19

For the period 2014-2016, under the 2007-2013 RDP and 2014-2020 RDP, activities aimed at controlling soil erosion on a total of 26,790 hectares were supported, including:

2014 - 1,554 hectares;

2015 - 1,196 hectares;

2016 - 24,040 hectares.

According to the "Soil Erosion Control" direction of the RDP 2007-2013, the following are stated:

2017 - 847,12 hectares

According to the "Soil Erosion Control" direction of the RDP 2014-2020, the following are stated:

2017 - 32,563.28 hectares

2018 - 31,718.59 hectares

2019 - 30,606.06 hectares

2020 - 15,605.50 hectares

In the RDP 2014-2020, under measure 10 "Agroecology and climate", the direction "Control of soil erosion" is provided. Activities related to the achievement of agro-ecological and climate goals are included in the direction, incl. aimed at limiting soil erosion.

Payments under the "Soil Erosion Control" direction continue even after the end of the 2014-2020 RDP period.

On an area of 2000 hectares, the Agricultural Academy conducts experiments to improve agrotechnical solutions for increasing soil fertility and adapting technologies to the new characteristics of natural resources (change in phenophases, increased calamity and erosional degradation, etc.), provoked by climate change.

Evaluation of the effect

As of 2020, anti-erosion activities were carried out on 13,105.5 hectares more than the target value. The measure was exceeded, as the saved emissions for the period of implementation of the measure were 339,164 tons of CO₂ eq.

Measure 1. (Measure with indirect effect) - Improving farmers' knowledge of humus conservation activities (fertilization - precision fertilization, green fertilization; liming, tillage, refraining from stubble burning, anti-erosion, etc.)

The reported values represent the number of persons consulted by the NAAS for the entire period, who received consultations on-site in the office and/or on-site in outsourced receptions and/or on-site in agricultural holdings. This number also includes farmers who were provided with advisory packages under measure 2 of the 2014-2020 RDP, which also contain information under the measure from the NAPCC. The reported values for the number of trained farmers from the NAAS were obtained as a result of the number of persons trained within courses of 30 and 150 study hours under Measure 111 "Professional training, information activities and dissemination of scientific knowledge" of the RDP in 2014 and those trained in short-term courses and training seminars, within the Center for Vocational Training (VTC) at the NAAS. The programs contain topics/study hours through which the farmers were trained under the specified measure.

During the period 2015-2016, according to measure 111 "Professional training, information activities and dissemination of scientific knowledge" of the RDP, the Agricultural Academy delivered 920 hours of lectures and trained 300 farmers from the Sofia, Pernik, Kyustendil and Vratsa regions.

Visual training seminars are held annually for farmers on 35 demonstration fields organized by the AA. Within more than 240 open days in the period 2014-2020, the newest varieties of plants and breeds of animals in Bulgaria were presented, including foreign, as

well as varieties with good adaptive potential, resistant to diseases and enemies, drought, high and low temperatures. During the reporting period 2014-2020, 192 scientific-practical conferences, seminars, symposiums, round tables were held. At these forums, innovations in agriculture, problems caused by climate change, sustainable use of natural resources, economics and marketing were discussed, including the opportunities and challenges related to the new CAP 2021-2027. The offices of applied science and research services at the Academy carry out studies of the needs of farmers and breeders, which are promptly transformed into training seminars, consultations and advice.

In total, for the period 2014 - 2020, reporting data indicate the following:
903 trained farmers (through the Vocational Training Center (VTC) of the National Agricultural Advisory Service (NAAS));
10,361 farmers consulted.

Compared to the set indicators, in total for the period 2014-2020:
4,097 farmers less than the target value were trained;
8,361 farmers more than the target value were consulted.

Measure 2. (Measure with indirect effect) Introduction of water-saving and energy-saving irrigation technologies.

With an amendment to the 2014-2020 RDP, in 2016 it was possible under Measure 4.1 "Investments in agricultural holdings" to support projects involving investment costs for water-saving technologies in agricultural holdings, as no separate budget for investments was foreseen to introduce energy-saving irrigation technologies. Such investments can be supported within the budget under Measure 4.1 "Investments in agricultural holdings".

The reported values of the indicator represent the number of persons trained by the NAAS under measure 111 of the RDP 2007-2013 and beyond, as well as the persons who received an A2B consulting package under sub-measure 2.1.1 "Consulting services for farmers and foresters" for young farmers or consulting packages under sub-measure 2.1.2 "Consulting services for small farms" under measure 2 "Consulting services, farm management services and farm replacement services" from the 2014-2020 RDP.

A reported value for the number of farmers consulted has been added, as consultations were provided in relation to the measure during the reporting period.

The number of projects supported by the end of 2020 under sub-measure 4.1 "Investments in agricultural holdings" with investments contributing to increasing the efficiency of water consumption in agriculture and to increasing the efficiency of energy consumption in agriculture and agrofood industry.

In the period 2017 - 2019, within the framework of scientific research carried out by the AA, simulation models were developed to support the making of informed decisions in the planning and management of irrigation canals; water-saving technologies (drip irrigation and mulching) are optimized for growing several crops in greenhouse and field conditions; the needs of water based on evapotranspiration and the influence of different moisture availability on the yield and the efficiency of using water for irrigation were estimated; research and analysis of energy costs in open and closed water distribution networks of irrigation systems have been carried out. The soil moisture, water reserve and elements of the water balance in the active soil volume were parametrized for different plantings in the period 2006-2020. Two-dimensional images of the distribution of root extraction in seven soil layers were prepared.

For the reporting period:
903 trained agricultural producers from the VTC of the NAAS;
9,503 farmers consulted;
11,994 consultations.

Supported projects with investments contributing to increasing the efficiency of water consumption in agriculture - 28.

Supported projects with investments contributing to increasing the efficiency of energy consumption in agriculture and the food industry - 117.

- Performance for the period 2014 - 2020:
- 703 more trained farmers compared to the target value;
 - 95 supported projects in excess of the target value.

Priority axis 2: REDUCTION OF METHANE EMISSIONS FROM BIOLOGICAL FERMENTATION IN LIVESTOCK

Measure 1. Promotion of extensive grazing of animals.

Description of the measure and implementation activities

In the 2014-2020 RDP, no separate budget has been determined for the implementation of investments for the construction of facilities for extensive grazing animal husbandry. Such investments can be supported within the budget under Measure 4.1 "Investments in agricultural holdings".

The measures to support consultations and trainings related to the measures of the NAPCC laid down in the 2007-2013 RDP and 2014-2020 RDP are not provided independently, but in most cases are part of a consulting package or are presented as priorities for training. For this reason, no separate budget has been provided for consulting and training of agricultural producers under NAPCC.

The 2014-2020 RDP does not include a special measure specifically regarding investment support for extensive grazing animal husbandry. Farmers can receive financial assistance for such investments within measure 4.1 "Investments in agricultural holdings" of the Program.

In the RDP 2014-2020, no separate financial assistance is provided for extensive maintenance of pastures. Such support, regardless of the way pastures are maintained, is provided under measure 10 "Agroecology and climate" and measure 11 "Organic agriculture."

The reporting values of the indicator for the number of trained livestock breeders represent the persons trained by the NAAS under measure 111 "Professional training, information activities and dissemination of scientific knowledge" from the 2007-2013 RDP and beyond, trained through the VTC of the NAAS.

The Agricultural Academy works to create new varieties of leguminous and grain forage crops with the aim of creating new seed-producing crops, enriching genetic resources, incl. with genotypes with increased nitrogen-fixing potential, improving the condition of pastures and their nutritional value. In order to reduce the carbon footprint of animal husbandry, the influence of different forages and silages on the release of carbon oxides is studied.

Evaluation of the effect

For the period 2014-2020, 903 livestock breeders were trained.

Priority axis 3: *IMPROVING MANURE MANAGEMENT*

Measure 1. Improving the storage and application of manure

Description of the measure and implementation activities

In the RDP 2014-2020, no separate budget has been determined for the realization of investments for the construction of manure storage facilities. Such investments can be supported within the budget under Measure 4.1 "Investments in agricultural holdings"

The measures to support consultations and trainings related to the measures of the NAPCC laid down in the 2007-2013 RDP and 2014-2020 RDP are not provided independently, but in most cases are part of a consulting package or are presented as priorities for training. For this reason, no separate budget has been provided for consulting and training of agricultural producers under NAPCC.

The funds agreed in 2014 under the RDP 2007-2013 for investments in the implementation of Council Directive 91/676/EEC regarding the protection of water from nitrate pollution from agricultural sources amount to BGN 29.3 million.

The 2014-2020 RDP does not include a special measure specifically regarding investment support for the construction of manure storage facilities. Farmers can receive financial assistance for such investments within measure 4.1 "Investments in agricultural holdings" of the Program.

The number of projects supported by the end of 2020 under sub-measure 4.1 with investments contributing to the stimulation of carbon storage and absorption in the agriculture and forestry sector is indicated.

The reporting values of the indicator for trained farmers represent the number of persons trained by NAAS under measure 111 "Professional training, information activities and dissemination of scientific knowledge" from the 2007-2013 RDP and beyond, as well as the persons who received an A2B consulting package under sub-measure 2.1.1 "Consultancy services for agricultural and forestry farmers" for young farmers or consultancy packages under sub-measure 2.1.2 "Consultancy services for small farms" under measure 2 "Consultancy services, farm management services and farm replacement services" from the RDP 2014-2020.

A reporting value for the number of persons consulted has been added, since during the reporting period the NAAS provided consultations in connection with the measure.

Evaluation of the effect

In 2014, 193 project proposals were approved under the 2007-2013 RDP for investments in implementation of Council Directive 91/676/EEC regarding the protection of water from nitrate pollution from agricultural sources.

Supported under the RDP 2014-2020 projects with investments contributing to the stimulation of carbon storage and absorption in the agriculture and forestry sector - 17.

7,831 farmers were consulted on the measure.

9,031 consultations were provided for the correct implementation of the measure.

The measure was exceeded, as the saved emissions for the period of implementation of the measure were 2,260 tons of CO₂ eq.

Measure 2. Introducing low-carbon manure processing practices, e.g. composting, processing into biogas in anaerobic conditions

Description of the measure and implementation activities

In the RDP 2014-2020, no separate budget has been determined for the implementation of investments for the construction of manure processing facilities. Such investments can be supported within the budget under Measure 4.1 "Investments in agricultural holdings"

The 2014-2020 RDP measures to support consultations and training related to the measures of the NAPCC are not provided independently, but in most cases are part of a consulting package or are presented as priorities for training. For this reason, no separate budget has been provided for consulting and training of agricultural producers under NAPCC.

The 2014-2020 RDP does not provide for a special measure specifically regarding investment support for the construction of manure processing facilities. Farmers can receive financial assistance for such investments within measure 4.1 "Investments in agricultural holdings" of the RDP.

The reporting values for the number of trained agricultural holdings from the NAAS were obtained as a result of the number of trained persons within courses of 30 and 150 study hours under measure 111 "Professional training, information activities and dissemination of scientific knowledge" from the RDP 2007-2013 in 2014 and those trained in short-term courses and training seminars, within the framework of the VTC of the NAAS. The programs contain topics/study hours, through which the agricultural holdings were trained under the specified measure.

Evaluation of the effect

Total for the period 2014-2020:
903 trained farmers under the measure during the reporting period, or the trained farmers are 703 more than the target value.

Measure 1. (Measure with indirect effect) Establishment of a resource centre for low-carbon manure processing practices.

According to the Third NAPCC, the creation of a Resource Center is foreseen.

The resource centre is an independent specialized unit of research institutes or NGOs that creates, collects and disseminates results of applied scientific research and publications, good practices and experience regarding low-carbon manure processing practices adapted to Bulgarian conditions and needs of farmers. The main topics and approaches for the training of agricultural producers should emerge from it, as well as recommendations regarding the measures to be developed and promoted.

Evaluation of the effect

For the reporting period, the measure was not implemented.

Priority axis 4: OPTIMIZING THE USE OF PLANT RESIDUES IN AGRICULTURE

Measure 1. Support for the technical provision of agricultural holdings for soil/stubble cultivation, with an expected total effect of 655 tons of CO₂ eq. total reduction by 2020***Description of the measure and implementation activities***

A Thematic sub-programme for the development of small farms has been developed for the RDP 2014-2020. It provides support to small agricultural holdings for investments in material assets (Submeasure 4.1.2. "Investments in agricultural holdings under the Thematic sub-programme for the development of small holdings" of the RDP 2014-2020).

In the 2014-2020 RDP, no separate budget has been determined for the implementation of investments in facilities and equipment for soil/stubble processing. Small and medium-sized farms can receive financial support within the budget of the investment measures included in the Thematic sub-programme of the 2014-2020 RDP.

Under the 2014-2020 RDP, 790 farms were supported for the purchase of agricultural machinery.

Evaluation of the effect

In 2016, 130 farms were supported for the purchase of machinery;

In 2017 - 218;

In 2018 - 155;

In 2019 - 154;

In 2020 - 133.

Measure 1. (Measure with indirect effect) Improving the awareness and knowledge of farmers regarding the possibilities of using crop residues and the threats of stubble burning.

The 2014-2020 RDP measures to support consultations and training related to the measures of the NAPCC are not provided independently, but in most cases are part of a consulting package or are presented as priorities for training. For this reason, no separate budget has been provided for consulting and training of agricultural producers under NAPCC.

The reporting value of the indicator during the period for the number of information and training events organized by the National Agricultural Advisory Service with scientific institutes, applied science organizations and other institutions and experts to support the transfer of knowledge and technology to farmers.

During the period, the NAAS also provided consultations related to the measure.

The reported value for trained persons includes persons trained by the NAAS (under measure 111 of the RDP 2007-2013 and beyond, as well as persons who received an A2B consulting package under sub-measure 2.1.1. or consulting packages under sub-measure 2.1.2 under measure 2 of the RDP 2014-2020) on topics related to the measure.

Evaluation of the effect

Performance for the period 2014 - 2020: 6,925 farmers were consulted; 8,422 consultations were provided. 8 information materials have been prepared. The total number of information meetings is 298, with the participation of 4,964 farmers (an average of 708 participants/year).

An average of 42 information meetings/year were held, which significantly exceeds 1 campaign/year.

For the period, the total number of farmers who received consultation and information under this measure was 11,889, which is 1,389 more than what was planned for the entire period.

Priority axis 5: IMPROVING RICE FIELD MANAGEMENT AND RICE PRODUCTION TECHNOLOGY

Measure 1. Financial support for improving production techniques and technology

Description of the measure and implementation activities

In the RDP 2014-2020, no separate budget has been determined for the implementation of investments related to the improvement of rice production techniques and technology. Financial assistance for such investments can be provided within the budget of Measure 4.1 "Investments in agricultural holdings" of the Program.

In the 2014-2020 RDP, there is no special measure specifically related to rice production. To make investments, rice producers can take advantage of the financial support under measure 4.1 "Investments in agricultural holdings" of the Program.

Priority axis 6: INCREASE THE AWARENESS AND KNOWLEDGE OF AGRICULTURAL PRODUCERS AND THE ADMINISTRATION REGARDING THEIR ACTIONS AND EFFECTS ON CLIMATE CHANGE

Measure 1. (Measure with indirect effect) Creation of a specialized unit at the Ministry of Agriculture responsible for the implementation of the policy on mitigation of climate change and agriculture

The measure has not been implemented. A proposal was made to the MAFF to drop the measure, given the following:

In practice, climate mitigation policy is an intersection of several policies. The formulation and implementation of measures related to climate change fall under the competence of multiple units in the MAFF system. We believe that the current functional structure of the ministry allows for good coordination on issues requiring a complex approach and complementarity.

In the context of budget constraints, the creation of a new unit dedicated only to climate change issues would be ineffective and unjustified, given the need to commit additional public resources.

Measure 2. (Indirect measure) Creation and promotion of an online farm-level emission measurement mechanism/emission simulation model

For the reporting period, the measure was not implemented.

Measure 3. (Measure with an indirect effect) Trainings of the administration of the Ministry of Agriculture, Food and Forestry (MAFF) at national, regional and municipal level

The measure has not been implemented.

Measure 4. (Measure with an indirect effect) Training of farmers by sub-sectors in agriculture - animal husbandry and crop husbandry

The trainings related to the NAPCC measures are not provided independently, but in most cases are part of a consulting package, which is why a separate budget cannot be set for the training of farmers under the NAPCC.

Consultations and advice to farmers on the necessary measures and ways to overcome the consequences of climate change are also provided by the Agricultural Academy.

The reported value includes the persons trained and consulted by the NAAS (under measure 111 "Professional training, information activities and dissemination of scientific knowledge" from the RDP 2007-2013 and beyond, as well as persons who received an A2B

consulting package (Consulting package for young farmers) under measure 2 "Consulting services, farm management services and farm replacement services" from the 2014-2020 RDP) on topics related to the measure.

By the end of 2016, 1,144 farmers were trained under measure 111 of the 2007-2013 RDP and 205 outside of it.

A total of 7,237 people received advice from the NAAS under various consulting packages under sub-measure 2.1.2 "Consulting services for small farms" of the 2014-2020 RDP.

According to measure 10 "Agroecology and climate" and measure 11 "Organic agriculture" at the beginning of 2020, 642 documents for completed training have been provided.

By the end of 2020, 6,586 farmers have been trained in excess of the target value.

Measure 5. (Measure with an indirect effect) Trainings of the National Agriculture Advisory Service (NAAS) at national and regional level.

The trainings related to the NAPCC measures are not provided independently, but in most cases are part of a consulting package, which is why a separate budget cannot be set for the training of NAPCC experts. By the end of the period, 45 experts were trained.

6. SECTOR LAND USE, LAND USE CHANGE AND FORESTRY

Brief information on measures in the sector

Measures aimed at reducing GHG emissions in the "Land use, change in land use and forestry" sector are grouped into four priority axes as follows:

- **Priority axis 1:** Increasing the absorption of greenhouse gases;
- **Priority axis 2:** Storage of carbon stocks in forests;
- **Priority axis 3:** Increasing the carbon sequestration potential of forests;
- **Priority axis 4:** Long-term carbon sequestration in wood products.

SECTOR LAND USE, LAND USE CHANGE AND FORESTRY

Priority axis 1: INCREASING THE ABSORPTION OF GREENHOUSE GAS

Measure 1. Development of "non-forested areas for afforestation" in forest areas

Description of the measure and implementation activities

The increase in forest areas has an important role in offsetting greenhouse gas emissions in other sectors. With the utilization of unforested areas for afforestation in forest territories, in the long term, the capacity of forests as an absorber of greenhouse gases will also increase.

During the period 2013 – 2020, 12,713.10 hectares of non-forested areas for afforestation in state forest territories provided for the management of state enterprises under Art. 163 of the Forests Act (FA) were afforested. (Territorial Directorate - TD)

Used funds for afforestation in the forest territories - state property, provided for management to state enterprises (SEs) under Art. 163 of the Forests Act (FA), during the period 2013 - 2019 incl.: BGN 15,338 thousand.

The forested bare areas in the state forest territories provided for the management of the SEs, according to the inventories of forest crops carried out in the period 2013-2019, were reported. (Territorial Directorate - TD)

During the period 2013-2020 incl. the state-owned enterprises under Art. 163 of the FA have spent, invested their own funds from their economic activity in the amount of BGN 107 million for afforestation activities (production of saplings, soil preparation,

planting/sowing, fencing, replenishment, cultivation and inventory of crops, as well as to support natural regeneration).

Evaluation of the effect

As a result, the saved emissions for the period are 295,375 t CO₂ eq.

Measure 2. Afforestation of areas of abandoned agricultural land, bare, eroded and erosion-endangered territories outside the forest territories

Description of the measure and implementation activities

With the implementation of the measure, an increase in the absorption of greenhouse gases is achieved, mitigating the effects of climate change, as well as preserving biological diversity and protecting the soil from erosion.

The afforested areas of interested parties - owners of afforested agricultural lands are reported according to the "new afforestation on agricultural lands" indicator, according to the inventories of forest crops during the period 2013-2020.

Funds used in the period 2013-2016 - BGN 12,443,850.

Forested areas for the period 2013-2020 - 1675.4 hectares

Evaluation of the effect

Forested 275.4 hectares above the target value.

The saved emissions for the reporting period are 42,019 tons of CO₂ eq.

Measure 3. Increasing the areas of urban and suburban parks and green areas

Description of the measure and implementation activities

A proposal was made by the MRDPW to change the performance indicator "100 hectares of increased areas", so that it acquires the type "Improved park environment, landscaped areas and playgrounds (sq. m)".

For the period 2014-2016, the improved park environment, green areas and children's playgrounds with the support of the Operational Program "Regional Development" 2007-2013 amount to 4,726,757 million square meters, and the benefited from a renewed urban environment population is 4.4 million people.

According to the same measure, the instrument "General development plans" is implemented. Since 2015, based on the provision of § 123, para. 2 and para. 3 of the Transitional and Final Provisions to the Law on Amendments and Supplements to the Law on Territorial Planning (amend. SG, issue 98/2014), MRDPW financially supports the development of general development plans of municipalities (GPDM) on the territory of the Republic of Bulgaria by allocating the funds from the state budget, which are foreseen each year for the activity. There are currently 185 active agreements for financial support in the development of the GPDM, concluded between the MRDPW and the municipalities. The financial support will continue in the following 2018 and 2019. According to the information available in the MRDPW, 19 municipalities financially supported in this way have GPDM that have entered into force.

In the indicated reporting period - 2013 - 2017, 26 municipalities were financially supported in the same order by the closed Ministry of Investment Planning.

In addition, in accordance with the Law on the Organization of the Black Sea Coast, the Ministry has commissioned the development of GPD for five Black Sea municipalities, with three municipalities having effective GPDM. In 2017, two more municipalities are to be awarded the development of the GPD.

According to OPRD 2014-2020, 61 grant agreements (GA) worth BGN 380,805,596.27 were concluded for overall improvement of the quality of the urban environment - construction and restoration of parks, green areas, playgrounds, physical elements of the urban environment, etc. By the end of 2020, 29 projects have been implemented.

2,488,571.21 square meters of undeveloped areas in urban areas were created or rehabilitated.

Measure 4. Restoration and sustainable management of wetlands. Preservation and storage of wetlands in forest areas, peatlands, swamps

Description of the measure and implementation activities

Within the framework of the priority axis, a total of 68 projects have been agreed by the end of 2020 with a total value of BGN 109,171,621 grant. Of these, 66 are in the process of implementation, and 2 are completed projects. Efforts in this sector are aimed at establishing a new effective management structure for the Natura 2000 network; planning and carrying out information campaigns for the Natura 2000 network; implementation of priority measures in wetlands; measures to improve the nature protection status of birds, preparation/updating of plans for restorative, maintenance and other nature protection measures for target species from the Natura 2000 network. A significant financial resource under the axis is also provided through the Community-Led Local Development (CLLD) approach to improve the conservation status of species from the Natura 2000 network in the territory of various local initiative groups (LIG).

Regarding measure 4 "Restoration and sustainable management of wetlands. Preservation and conservation of wetlands in forest territories, peatlands, swamps" from the sector "Land use, change in land use and forestry" of the Third NAPCC, it should be noted that during the reporting period, within the framework of procedure BG16M1OP002-3.015 "Implementation of priority measures in wetlands" under priority axis 3 of the OPE 2014-2020, the following 4 projects are being implemented:

- "Management of succession processes and improvement of the quality of the habitats of protected water-loving species in the wet zone in the natural reserve "Srebarna". The aim of the project is to improve the nature conservation status of species and types of natural habitats on the territory of the Ramsar site of international importance - wetland "Srebarna", falling into the Natura 2000 network and maintained reserve "Srebarna", through: restoring the water regime in Lake Srebarna, limiting the inflow of biogens and successional processes (measure 22 of the National Priority Action Framework for Natura 2000 for the period 2014-2020), construction of a "western channel", ensuring water flow in the lake, removal of silt, debris, detritus and cutting of reeds; implementation of conservation measures from the action plans of the curly-headed pelican, the great water bull and the little cormorant (measure 109 of the NPRD); monitoring the state of the ecosystem and the target species. The project is implemented by RIEW Ruse and is in the amount of BGN 8,532,373.00.

- Improvement of the water regime and management of successional processes in wetlands of international importance "Ropotamo Complex", "Poda Locality" and "Vaya Lake". The purpose of the project proposal is to improve the nature conservation status of species and types of natural habitats on the territory of protected areas BG0001001 "Ropotamo", BG0002041 "Ropotamo Complex", BG0000271 "Dairy-Poda" and BG0000273 "Burgas Lake" from the Natura 2000 network, falling into wetland areas "Ropotamo Complex", "Poda Area" and "Vaya Lake", designated as wetlands of international importance (Ramsar sites). The implementation of measures from the National Plan for the protection of the most important wetlands in Bulgaria is planned, including restoration of the water regime, limitation of the inflow of biogens and limitation of successional processes. The project is implemented by RIEW Burgas and is worth BGN 8,427,161.88. grant.

- Implementation of priority measures in the Ramsar site "Belene Islands Complex", Nature Park "Persina". The project aims to improve the conservation status of species and types of natural habitats in the Ramsar site "Belene Islands Complex", falling within the boundaries of the Persina Nature Park. The project proposal envisages mowing reeds and supporting the processes of opening water mirrors in the "Kaikusha" swamp;

improving the conditions for control and management of incoming waters in the Persin Island wetland, by modernizing and automating the process of opening and closing the sluice gates, built under the project "Restoration of wetlands and reduction of pollution", financed by GEF, World Bank, executed by the MoEW; improving the conservation status of habitat 2340* - Pannonian intracontinental dunes, by limiting the spread of the invasive species *Amorpha fruticosa*. The project is implemented by the Persina Nature Park Directorate and is worth BGN 1,660,382.98.

- "Activities to improve the condition of Durankulak Lake and Shabla Lake wetlands". The implementation of the project proposal aims to contribute to: limiting the eutrophication processes, by reducing the amount of macrophyte vegetation of the "Durankulak Lake" and "Shabla Lake" protected areas; improvement of the condition and trends of the population of the red-breasted goose /*Branta ruficollis*/ and provision of optimal conditions for wintering in the "Durankulak Lake" and "Shabla Lake" protected areas; improving the state of water ecosystems on the territory of the two protected areas. The project is implemented by RIEW Varna and is in the amount of BGN 2,297,435.15. grant.

All four projects are expected to be completed in 2024.

Funds used until the end of 2016 under the LIFE+ program: BGN 777,409

Restored/preserved wetlands for the period 2013 - 2020 341.2 hectares.

The following projects were completed during the period:

- "Protection and restoration of 11 types of natural habitats near rivers and wetlands in 10 Natura 2000 sites in the Bulgarian forests" - model afforestations were made in 2 protected areas of Natura 2000 – Marten-Ryahovo and Reka Maritsa; 5 forest types were restored habitats by planting saplings of local species on an area of 80.6 hectares in 7 nature parks;

- "Restoration and conservation of alluvial forests of habitat *91E0 in protected areas under NATURA 2000 and model territories in Bulgaria";

- "Improving the nature protection status of priority natural habitat for conservation 91D0 - Swamp forests in protected area BG 0001030 "Western Rhodopes".

Projects in progress:

- "Implementation of priority measures in the Ramsar site "Belensky Islands Complex";

- "Conservation of the curly-headed pelican along the Black Sea-Mediterranean migration route";

- "Improving water management in the Persina and Kalimok swamps in Bulgaria";

- "Improving the environmental protection status of species and types of natural habitats on the territory of the Natura 2000 network, falling into the Golden Sands nature park - activities are being implemented to improve the environmental protection status of natural habitat types - 91F0 "Riverside mixed forests of *Quercus robur*, *Ulmus laevis* and *Fraxinus excelsior* or *Fraxinus angustifolia* along large rivers (*Ulmion minoris*)", 3140 "Hard oligotrophic to mesotrophic waters with benthic formations of the genus *Chara*" and 3150 :Natural eutrophic lakes with vegetation of the Magnopotamion or Hydrocharition type";

- "Improving the nature protection status of natural habitat 6430 "Hydrophilic communities of tall grasses in the plains and in the mountain to alpine belt" subject to protection within the boundaries of the protected area BG 0000496 "Rila Monastery", in the territorial scope of the "Rila Monastery" monument.

- "Restoration and maintenance of priority natural habitats and species on the territory of Vitosha Nature Park".

- In order to improve the environmental protection status of peatland complexes (natural habitat 7140 "Transitional marshes and floating mobile peatlands"), a model for restoring the water regime of a peatland area above the village of Chuipetlovo has been prepared and implemented.

- DNP "Vrachanski Balkan" carried out a study of the macrophyte component in wetlands Natura 2000 - habitats 3150 Natural eutrophic lakes with vegetation - places with high herpetological diversity.

- "Vitosha" DNP carries out activities to protect and support the deposits of the willow (*Salix pentandra* L.), the only surviving deposit of which in Bulgaria is located on the territory of the park. A model has been developed for the sustainable management of peatlands in the "Vitosha" nature park, including a pilot project for restoring the water regime of a specific peatland section in the city of Konyarnika. To restore riverside habitat 91 EO Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*, a total of 1200 container saplings of green, white and black alder and 400 container saplings of mountain ash were produced and planted along the Kurtova and Zheleznishka rivers.

- Development by BAS: *Strategies for Enhancing Coastal Resilience - Toolkit*: The scientists have conducted research in an area that is becoming particularly relevant with the start of funding for the RIA under the Green Deal of the EC. Future research may include ecosystem restoration for 'blue carbon' uptake and effects on coastal fortification (ecosystem services). As a result: 1) A system is developed for early warning of the consequences of sea storms; 2) Developed "green" solutions for coastal protection - underwater shafts

Evaluation of the effect

Restored/preserved wetlands for the period 2013 - 2020 – 141.2 hectares above the target value.

The emissions saved as a result of the implementation of the projects are 7,986 tons of CO₂ eq.

Measure 1. (Measure with indirect effect) Development of a financial mechanism to support the activities of creating new forests

With financing from the RDP - "Technical Assistance", a team of the Forestry University developed a "Methodology for determining the average standard prices for creating forests - afforestation and maintenance activities". The methodology is the basis of the financial mechanism for creating forests in the prepared sub-measures "8.1" and "8.3" of the RDP 2014-2020 and in the draft regulations establishing the procedure for their implementation.

Measure 2. (Measure with an indirect effect) Analysis of the effectiveness of the existing regulatory framework for regulating changes in the purpose of different types of land and preparation of recommendations for its improvement.

No activities were carried out under the measure. No such analysis has been prepared. During the period, the action is implemented by implementing effective control when changing the purpose of the forest territories, applying the existing legal framework.

Priority axis 2: CARBON STORAGE IN FORESTS

Measure 1. Restoring and maintaining the protective forest belts and carrying out new anti-erosion afforestation

Description of the measure and implementation activities

3,464.8 hectares of new anti-erosion afforestation were carried out, including 2013 – 436.1 hectares; 2014 – 542.1 hectares, 2015 – 454.4 hectares, 2016 – 579.9 hectares, 2017 – 520.8 hectares, 2018 – 487.4 hectares and 2019 – 444.1 hectares.

24.5 hectares of buffer forest belts have been restored. 5.4 hectares of new forest buffer forest belts were created. In order to maintain existing ones, cultivation cuttings were carried out on 10.2 hectares and sanitary cuttings on 15.7 hectares.

In 2014, EFA approved the document "Instructions for the management of the field protection belts". With the 2015 amendment to Art. 36, para. 3 of Ordinance No. 8 for felling in forests, restrictions have been introduced related to the maintenance of field protection belts.

During the period, no special program was developed for the restoration and creation of new field protection belts.

Funds used for the period 2013-2016 for anti-erosion afforestation - BGN 15,449,440.

By the end of 2019, 24.5 hectares of buffer forest belts were restored and 5.4 hectares of new belts were created.

For the period 2013-2019 incl. anti-erosion afforestation was carried out on 3,464.8 hectares.

Evaluation of the effect

The saved emissions for the reporting period are 82,759 tons of CO₂ eq.

Measure 1. (Measure with an indirect effect) Supporting the protection and maintenance of forests with high conservation value and an extensive approach to their use

In the state forest territories, a forest certification process is underway, within which the forests with high conservation value are determined and measures and activities are foreseen according to the certification standard for their determination and sustainable management.

A practical guide "Identification, management and monitoring of High Nature Value Forests (HNVF) in Bulgaria" (June 2016), prepared by WWF Danube-Carpathian Program Bulgaria, has been developed and is being implemented.

By orders from 2016 of the Minister of Agriculture and Food, approximately 109,000 hectares of state forests – 7% of the habitats in Natura 2000 areas – have been designated as forests in an old age phase.

As of 31.12.2019, forests in the old age (FOA) phase occupy an area of 109,300.3 hectares of state forest territories in NATURA 2000 in Bulgaria. This area is nearly twice as large as the area of declared reserves in the country. In the municipal forest territories, in NATURA 2000, FOA are currently declared on the territory of the municipalities of Botevgrad, Sevlievo, Kyustendil and Harmanli - a total of 579.8 hectares. There are currently no private forests designated as FOA.

In 2020, by order of the Minister of Agriculture, Food and Forestry, another 2,085 hectares of forest territories, managed by the state, were designated as old-age forests.

Measure 2. (Measure with indirect effect) Preservation and improvement of the state of urban and suburban parks

The amendment of the Regional Development Plan of March 2020 guarantees high quality of strategic documents for regional and spatial development. Requirements for the content of the strategic documents for regional and spatial development are set out in the RDP, which also aim at their compliance with the National Strategy and Action Plan for Adaptation to Climate Change of the Republic of Bulgaria, respectively, with the Third NAPCC.

According to Art. 8, paragraph 2 of the new RDP, the new document for strategic planning of regional and spatial development at the municipal level, is the integrated municipal development plan (IMDP). In the requirements for the structure and content of IMDP, listed in Art. 13, para. 3 of the RDP, it is expressly required that the plan contains measures to limit climate change and measures to adapt to climate change and to reduce the risk of disasters.

Observance of these measures in the implementation of IMDP will indirectly contribute to the preservation and improvement of the state of urban and suburban parks.

Measure 3. (Measure with indirect effect) Prevention of forest fires by introducing early warning systems

2 applied science topics were developed and implemented: "Development of a methodology for determining the risk of forest fires on the territory of the country" and "Development of a scheme for deploying means for monitoring and detecting fires in the forest territories of the country with a view to building a unified system for monitoring and automatic detection of fires" .

A Program for the Protection of Forests from Fires has been developed in implementation of the 2014-2023 Strategic Plan for the Development of the Forest Sector.

In 2015, 17 automated fire monitoring and detection systems were built in the SE and DNP, 14 of which were financed under the RDP 2007-2013 and 3 under the OPE 2007-2013.

Purchased equipment and carried out ongoing maintenance of road infrastructure with a total value of BGN 14,000,000.

Projects carried out during the period:

- Information campaign "Stop forest fires - learn how" -
- TGS Bulgaria - Serbia Project CB007.1.31.189 "Increasing the capacity for risk management in large forest fires in the cross-border region - coordination, training, monitoring, innovative methods and technologies" with an approved budget of BGN 617,401.18. - the utilized financial resources are BGN 586,705.85, incl. delivery of specialized pickup trucks for extinguishing forest fires - 2 pcs.; delivery of an aerial surveillance system - 1 minibus, 2 multicopters and 1 unmanned aircraft.
- TGS Bulgaria - Turkey Project CB005.1.11.005 "Increasing the operational capacity for forest fires and improving disaster prevention" with an approved budget of 595,086.21 - the utilized financial resources are BGN 563,572, incl. delivery of specialized pick-ups for extinguishing forest fires - 3 pcs.; delivery of personal protective equipment - 36 pcs.
- TGS Bulgaria - Turkey Project CB005.1.11.006 "Intelligent strategic transnational development for response in the event of large-scale natural and man-made hazards and disasters - IseC with an approved budget of BGN 526,544.21 - the utilized financial resources are BGN 484,225, including. delivery of an aerial surveillance system - 1 minibus, 2 multicopters and 2 unmanned aircrafts; delivery of a specialized vehicle for rapid intervention (pickup).

Priority axis 3: INCREASING THE POTENTIAL OF FORESTS FOR CARBON SEQUENCING

Measure 1. Increasing density in natural and artificial plantings

Description of the measure and implementation activities

The measure takes into account the afforestation in forest areas managed by the SEs - in rows and the replenishment of crops, according to the inventories of forest crops in the period 2013-2020, as well as the support for natural regeneration.

The measure has been over-implemented, as according to the data of the Ministry of Agriculture and Forestry for the period 2013-2020 - areas of plantations in forest territories - state property, provided for management of forested areas with increased density - 38,552.2 ha, of which - 3,241.7 hectares - by replenishing crops and 35,310.5 hectares - by supporting natural regeneration.

Evaluation of the effect

For the period 2013-2020, the area of plantations with increased density exceeded the target value by 36,552.2 hectares

The saved emissions for the reporting period are 191,335 tons of CO₂ eq.

Measure 1. (Measure with indirect effect) Introduction of appropriate forest management systems in the face of changing climate conditions, aiming to create highly productive and sustainable mixed forests

Regional forestry systems have been developed for the management of coppice oak forests for 4 state-owned enterprises (SEs) under Art. 163 of the Forestry Act. Guidelines for the management of coppice oak forests have been approved for the area of 3 SEs.

Corresponding regulatory and administrative changes have been made in Ordinance 8 on felling in forests, aimed at maintaining the mixed nature and age structure of forests with the preservation and tolerance of valuable and sustainable forms of local, rare and endangered tree species when carrying out plantation and regeneration felling. **Expected results:** increased vitality, productivity and sustainability in the uplands, increased share of natural plantations with different age and complex structure and preserved genetic fund, biological diversity of valuable tree species.

The funds used from the EFA budget are BGN 27,000.

Completed three applied science topics:

- "Transformation of coniferous crops created in the area of broad-leaved tree species, in plantations of natural seed origin";
- "Regional silvicultural systems for the management of coppice oak forests in the territorial scope of the NCSE";
- "Regional silvicultural systems for the management of coppice oak forests in the territorial scope of the NWSE, SWSE and SESE".

Measure 2. (Measure with indirect effect) Supporting the increase of the share of certified forests

By the end of 2019, the certified forest areas in Bulgaria have a certificate from the Forest Stewardship Council - FSC. According to the FSC annual bulletin (Facts & Figures, December 4, 2019), the area of certified forest areas as of December 2019 is 1,454,068 hectares, equal to 34% of the total forest area in the country, and the certified units are 25. The area of the certified state forest territories managed by the state enterprises under Art. 163 of the FA, is 1,438,694.9 hectares, equal to 50% of the total territory managed by them in the country, and the certified units are 25. For comparison - the total area of certified forests as of 31.12.2013 is 424,860 hectares, of which 422,930 hectares are state forest territories.

By the end of 2019, 67% of the target value set for 2020 had been achieved.

Measure 3. (Measure with indirect effect) Development of good practices for the establishment and management of intensive forest crops for biomass production and for setting standards for biomass residues after harvesting.

During the reporting period, work was carried out on several tasks related to establishing the possibilities for biomass extraction from forest crops:

- "Creation of an experimental culture of perspective clonal species of poplars (*Populus* sp.), with the aim of performing a complex assessment of their potential for biomass production" - implemented by the Institute of Forestry at the BAS;
- "Determination of the usable potential of forest wood biomass in Eastern Bulgaria and technologies for its extraction and processing. Forest wood biomass market" - implemented by the Testing Station for Oak Forests (TSOF) in Burgas;
- "Selection and propagation of local black, white, grey poplars" - implemented by the test station for fast-growing forest tree species (TSFGFTS) Svishtov;
- Project "Testing of poplar branches from EU member states for biomass production /fast-growing species/";
- In 2020, an applied science topic was adopted by the EFA Expert Council: "Functions and tables for the above-ground woody biomass of fast-growing deciduous species at an early age", developed by a scientific team of the Forest Institute at the BAS. The development allows, by measuring average values of diameter and height for a given crop or for individual trees, and comparing the corresponding values in the tables, to obtain the weight of the absolutely dry wood mass for both harvested and standing trees. The tables have been developed by differentiating by individual branches, depending on whether seed or shoot saplings are harvested and taking into account crop density. They also allow the calculation of stem biomass and branch biomass separately. With the application of the proposed tables in practice, the interest of landowners in creating intensive crops of fast-growing tree species can be increased.

For the period 2013-2020, 5 applied science developments were carried out and 7 experimental crops were created in different parts of the country.

Priority axis 4: LONG-TERM CARBON SECURITY IN WOOD PRODUCTS

Measure 1. (Measure with indirect effect) Development of a section in the new strategic documents for the forestry sector, including measures aimed at improving the role and contribution of forests to increase carbon sequestration

The National Strategy for the Development of the Forestry Sector in the Republic of Bulgaria NSDFSRB (2013-2020) and the Strategic Plan for the Development of the Forestry Sector in Bulgaria SPDFSB (2014-2023) have been prepared in sync with the NAPCC.

In 2020, monitoring was carried out and an evaluation of the results of the implementation of the 2013-2020 NSDFSRB was carried out.

Within the project: "Regional policies for sustainable bioenergy" - BIO4ECO, financed under the INTERREG Europe program of the EU, a National Action Plan for Energy from Forest Biomass 2018-2027 was developed and adopted, formulating 6 priorities with specific goals and activities for sustainable production and efficient use of forest biomass as a renewable energy source; reducing air pollution; strengthening the legal and political framework to ensure the sustainable development of energy from forest biomass strengthening scientific research.

Used financial resources for the period 2013-2016 - a total of BGN 132,000, including:

- Preparation of a Strategic Plan for the development of the forestry sector in the Republic of Bulgaria 2014-2023 - BGN 126,000.
- Publication of the brochure "National strategy for the development of the forestry sector in the Republic of Bulgaria 2013-2020" - BGN 6,000

The National Strategy for the Development of the Forestry Sector in the Republic of Bulgaria 2013-2020 (NSDFSRB) and the Strategic Plan for the Development of the Forestry Sector 2014-2023 (SPDFS) were developed.

Adopted "National Action Plan for Energy from Forest Biomass 2018-2027", supplementing the operational goals set in the Strategic Plan for the Development of the Forestry Sector.

Measure 2. (Measure with indirect effect) Expanding the use of wood products as a substitute for products from non-renewable, polluting and energy-intensive materials.

In the performance of the project: "Regional Policies for Sustainable Bioenergy" - BIO4ECO, funded by the EU's INTERREG Europe program and launched in 2016, is a campaign to increase awareness and engagement of society and business on the benefits of using wood and wood products to preserve CO₂, a presentation was prepared and published on the EFA website with an analysis of the possibilities of using biomass from forests in Bulgaria as RES and good practices in this area from several EU countries are presented. In the "Forests" sector, according to the adopted National Strategy and Action Plan for adaptation to climate change, a strategic goal "Improving the potential for sustainable use of forest resources" is foreseen, which aims to stimulate the long-term use of wood products and expand its use as a building material.

Conducted a campaign to increase awareness and engagement of society and business about the benefits arising from the increased use of wood products; a presentation published on the EFA website with an analysis of the possibilities of using forest biomass as RES and presented good international practices; held expert meetings with the World Bank team developing the National Strategy and the Action Plan for Adaptation to Climate Change, in order to discuss the possibilities for expanding the use of wood products.

7. TRANSPORT SECTOR

Main measures in the sector, divided by 4 priority axes as follows :

- **Priority axis 1:** Reducing emissions from transport
- **Priority axis 2:** Reduction of fuel consumption
- **Priority axis 3:** Diversification of transportation
- **Priority axis 4:** Informing and educating users

TRANSPORT SECTOR

Measure 1. Rehabilitation and modernization of existing road infrastructure to ensure optimal traffic speeds with optimal driving mode of car engines*Description of the measure and implementation activities*

According to OPRD 2007-2013, 1,224.4 km of roads were rehabilitated under 85 projects worth BGN 865,831,816.55. According to OPRR 2014-2020, 36 GA worth BGN 410,481,053.36 were concluded for the rehabilitation and modernization of existing road infrastructure. By the end of 2020, 18 projects were completed, which reconstructed or modernized 328.1 km of roads.

Evaluation of the effect

The measure was executed.

Measure 2. Introduction of intelligent transport systems on the national road network and in the urban environment*Description of the measure and implementation activities*

Intelligent transport systems (ITS) cover a wide range of technical solutions designed to improve transport by improving mobility and increasing safety in road traffic. Telematics (a combination of telecommunications and informatics) uses advanced technologies to meet transportation needs.

According to priority axis 1 "Sustainable and integrated urban development" of OP "Regional development 2007 - 2013", projects were implemented for the modernization of public transport in seven large cities of Bulgaria: Sofia, Burgas, Plovdiv, Varna, Stara Zagora, Ruse and Pleven. Their main goal is to ensure accessibility and convergence through efficient and sustainable urban transport systems, including the use of intelligent transport systems, as well as improving the ecological situation in cities. 7 intelligent transport systems have been introduced.

According to OPRD 2014-2020, 6 GA for urban transport have been concluded, which include the introduction of intelligent transport systems in the cities of Sofia, Ruse, Stara Zagora, Pernik, Kazanlak and Dupnitsa. By the end of 2020, the activities on the introduction of intelligent transport systems under 3 of the 6 projects have been completed.

Information about projects:

- Project "Integrated urban transport of Burgas" - ITS:

Indicator "Intelligent transport systems introduced" under the project "Integrated urban transport of Burgas", implemented until 2018. An integrated system for control and management of public transport was introduced, which allowed to achieve a high level of service and accuracy of the service. It includes the following elements:

- Integrated ticketing system;
- System for informing passengers in real time;
- Public transport management and control system;
- System for ensuring the priority of urban transport;
- Video surveillance system (CCTV).

The introduced systems contribute to the optimization of the city transport network by allowing passengers to use different bus lines with a unified electronic ticket. The electronic ticketing system offers opportunities for upgrading by integrating tickets used by different transport operators, introducing promotional fares and easily combining with other services in an urban environment such as bicycle rental, parking and others. The city's video surveillance system now includes more than 1,200 cameras for monitoring the urban environment, of which about 500 at transport locations, or in the buses of the urban transport of Burgas.

Another important step towards digitalization of services was the integration of mobility information in the Smart Burgas Integrated City Platform in 2019, as well as the implemented pilot project for the introduction of other mobile and web applications related to:

- Tracking of available spaces in the paid street parking zone "Blue Zone-Burgas";
- Offering additional options for paying for parking time via the Internet.

In recent years, the municipal transport scheme has been updated by introducing rapid bus lines and a rapid bus corridor. The network of bus and trolleybus lines of the urban transport scheme of the city of Burgas has a total length of 485 km. The backbone of the scheme are two fast bus lines connecting the residential quarter "Meden Rudnik" with residential quarter "Izgrev" and residential quarter "Slaveykov". The so-called "feeder" bus lines to serve the local part of the quarters more efficiently. In order to further reduce traffic jams, improve safety and transport service, the intercity bus lines have been removed from the central city and the route of the rapid bus lines. A system has been introduced to ensure the priority of public transport along the route of the fast lines in order to reduce the delays of public transport, as well as to reduce traffic jams.

A zone with a limit of up to 30 km has been introduced in the city with the scope of the central part of the city and part of the residential quarter "Vazrazhdane".

- Modernization of urban transport in the Municipality of Vratsa - integrated transport management system (for electronic billing and real-time passenger information):

Each vehicle will be equipped with a video surveillance system. Trolleybuses and electric buses will be equipped with information boards (VMS) providing information from the outside (electronic with the possibility of information in Bulgarian and English) - one information board on the front, on the sides and on the right, showing the name of the route and the number of the line (and one at the back – showing the line number). The information board will also be equipped with a suitable voice announcement system for the stops (loudspeakers at each door).

The new vehicles will introduce an integrated transport management system (for electronic billing and real-time passenger information) and collision avoidance systems based on artificial vision. 22 intelligent systems for electric buses and trolleybuses will be delivered and installed to avoid collisions and assist drivers when moving and manoeuvring in urban environments.

- Project "Integrated urban transport of Pernik" - ITS:

The implementation of the activity envisages delivery and introduction of remotely replaceable electronic information boards (EIB) at public transport stops. With the implementation of the EIB at the public transport stops, its attractiveness for citizens increases in synergy with the other investments foreseen under the project. The time saved by the implementation of the control system is directly proportional to the number of stops that are equipped with the information boards.

The system aims to offer better awareness and care to public urban transport passengers, making it more attractive and thus increasing its usability. It ensures the transmission of information from the Central Dispatch Center to all EIBs at the stops regarding the number of arriving buses, the scheduled arrival time, the time remaining until arrival, possible delays, as well as other information useful for passengers. EIBs display this information in a way accessible to passengers.

In the Dispatch Center, a standard end interface receives the information provided by the Urban Transport Control System and transmits it to the EIB end interfaces. The GSM communication medium is used for connection between the end interfaces. It provides the connection between the panel end interfaces on the one hand and the Dispatch Center end interface on the other.

The system consists of: 70 electronic boards for 70 stops that display useful traffic and other information in real time.

Evaluation of the effect

The measure was executed.

Measure 3. Increasing the share of biofuels

Description of the measure and implementation activities

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 plant oils. In Bulgaria, the most promising are projects for the production of bioethanol and biodiesel.

In 2013 and 2014, the quantities of biofuels consumed in the Transport sector, meeting the sustainability criteria, were respectively 104 ktoe and 111 ktoe, of which for 2013: biodiesel - 105,435 t (96 ktoe) and bioethanol - 12,568 t (8 ktoe) and for 2014: biodiesel - 106,321 t (96 ktoe) and bioethanol - 22,824 t (15 ktoe).

In 2015 and 2016, the quantities of biofuels consumed in the Transport sector, meeting the sustainability criteria, were respectively 166.1 ktoe and 186.5 ktoe, of which for 2015: biodiesel – 112.5 ktoe and bioethanol – 32.2 ktoe and for 2016: biodiesel – 130.3 ktoe and bioethanol – 32.9 ktoe.

In 2017 and 2018, the quantities of biofuels consumed in the Transport sector meeting the sustainability criteria were 172.4 ktoe and 151.1 ktoe, respectively.

The reported decrease is due to the introduced limitation regarding the consumption of conventional biofuels that can be counted for the purpose in the Transport sector, as well as the registered 18 ktoe of biofuels that do not meet the sustainability criteria. In 2018, 11.25 ktoe of new generation biofuels were consumed, which corresponds to 0.33% of the final energy consumption in the transport sector (3,372.2 ktoe).

In the transport sector, 2019 and 2020 saw an increase in the consumption of biofuels in the transport sector compared to 2018, leading to a reduction in GHG emissions from the use of renewable energy in transport. The share of electric energy from renewable energy has a slight growth, which is why the reductions in GHG emissions are close to the levels of 2018.

In 2019 and 2020, the total consumption of renewable energy in the transport sector was 158.0 ktoe and 171.1 ktoe. For the considered period, between 61 - 62% is the share of used conventional biofuels in the total consumption of renewable energy. After 2018, the use of new generation biofuels is observed, with 50.8 ktoe and 55.8 ktoe consumed in 2019 and 2020, respectively. The amount of electricity used in this sector in 2019 and 2020 is 9.6 ktoe and 11.5 ktoe.

Evaluation of the effect

In the transport sector, there is a sharp increase in the share of biofuels compared to previous years, which in turn leads to a significant reduction in greenhouse gas emissions from the use of energy from renewable sources in transport.

According to the National Reports on the progress of Bulgaria in the promotion and use of energy from renewable sources, the reductions in greenhouse gas emissions from the use of energy from renewable sources in transport are:

2013 149,243 tons of CO ₂ eq.;	2017 228,803 tons of CO ₂ eq.;
2014 162,155 tons of CO ₂ eq.;	2018 271,575 tons of CO ₂ eq.;
2015 202,315 tons of CO ₂ eq.;	2019 239,342 tons of CO ₂ eq.;
2016 227,853 tons of CO ₂ eq.;	2020 231,383 tons of CO ₂ eq.;

Measure 1. (Measure with an indirect effect) Development and stimulation of the use of "hybrid" and electric car transport.

- According to the JESSICA initiative under the OPRD 2007-2013 and within the framework of the support through financial instruments under the OPRD 2014-2020, by the end of 2020, 4 projects were implemented - 2 completed and 2 in the process of implementation, according to which 128 charging stations for electric cars were built. A total of 199 charging stations are planned to be built.

- Ordinance No. RD-02-20-2 of 2017 on planning and design of the communication and transport system of urbanized territories (Ordinance No. RD-02-20-2 of 2017) provides an estimate until 2030 for sizing of the degree of motorization of the big cities in Bulgaria. The communication and transport system of the cities shall be planned and designed in such a way as to give priority to the development of public transport for the carriage of passengers, the use of bicycles and electric mobility in the movement of personal vehicles. In 2019, a requirement was introduced to designate parking spaces for electric vehicles in public service buildings, in residential buildings and in mixed-use residential buildings, as well as a requirement to equip such buildings with charging points for electric vehicles. According to the regulation, charging points (dispensers) for electric vehicles are provided uniformly in the urban area without restrictions in compliance with Directive 2014/94/EU. At the next stage (in 2022), Regulation No. RD-02-20-2 of 2017 is planned to be adapted to the requirements of Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 for amendment of Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency regarding the introduction into national legislation of requirements for providing infrastructure for electromobility, provided for in the amendments to Directive 2010/31/EU.

- During the period 2018 - 2020, a new Regulation No. RD-02-20-2 of 28. 09 2020 was developed and promulgated for Bulgaria on the terms and conditions for the design, construction, commissioning and control of refuelling stations for cars powered by hydrogen fuel. The technical normative act is designed for the design and construction of an infrastructure for refuelling cars with hydrogen - the ecological fuel of the future. The specific regulation is a measure for the implementation of the National policy framework for the development of the market of alternative fuels in the transport sector and for the deployment of the relevant infrastructure, adopted by Decision No. 87 of the Council of Ministers (CM) of 26.01.2017, amended by Decision No. 323 of the CM of May 11, 2018. The Ordinance was issued under the joint competence of five ministries: Ministry of Transport, Information Technologies and Communications - in its capacity as the responsible department for transposing Directive 2014/94/EU of the European Parliament and of the Council on the deployment of infrastructure for alternative fuels (Directive 2014/94/EU), Ministry of internal affairs, the Ministry of Economy, the Ministry of Environment and Water.

- Development of the first National Report in fulfilment of the provisions of Art. 10, paragraph 1 of Directive 2014/94/EU – On 6 January 2020, after agreement within the European Affairs Council, the report was submitted to the European Commission.

- A pilot scheme to promote the use of electric and hybrid electric vehicles within the Climate Investment Program - National Framework was approved by Decision No. 87/26.01.2017 of the Council of Ministers and amended by Decision No. 323/11.05.2018 of The Council of Ministers. The national framework expresses the state's vision to actively support the development of alternative fuels in transport with a view to achieving the defined national goals in the field of energy, transport and the environment. The global objective of the framework is the creation of a sufficiently favourable environment for the wider application of alternative fuels and drives in the transport sector and the achievement of conditions comparable in the field to other developed EU countries. In the long-term horizon (after 2030), the aim is the deployment of electromobility, the wider use of natural gas as a standard fuel and the exit of hydrogen technology from the research/development phase. The key principle on which the national policy framework is built is the principle of technological neutrality in the sense of avoiding public sector support to only one type of

alternative fuel. It presents the current state of the infrastructure for individual types of alternative fuels used in road, water and air transport. On 6 January 2020, after agreement within the European Affairs Council, the report was presented to the European Commission. The main purpose of the regulation is to provide an opportunity to build infrastructure for refuelling cars with hydrogen fuel, thereby contributing to the development of the market for vehicles using alternative fuel.

- The scheme finances projects to promote the use of electric vehicles. Beneficiaries of these projects can be the central administration and its territorial subdivisions and municipal administrations. Currently, the funding for the projects to promote the use of electric cars is in the amount of:

- BGN 20,000 (twenty thousand) for all-electric vehicles category M1 (4+1) seats and N1;
- BGN 10,000 (ten thousand) for hybrid electric (plug-in) vehicles category M1 (4+1 seats) and N1.
- BGN 20,000 (twenty thousand) for all-electric vehicles category L7e.
- Up to 50%, but not more than BGN 3,000 (three thousand) for an additional upgrade. The additional upgrades (for cleaning, for watering, for transporting bulky objects, isothermal boxes, garbage containers, etc.) are intended for vehicles of category L7e. Various types of optional upgrades can be purchased for each L7e category all-electric vehicle purchased.
- BGN 30,000 (thirty thousand) for fully electric vehicles (vans 7+1; 6+1 seats), category M1 or N1
- BGN 40,000 (forty thousand) for all-electric vehicles category M2 and N2.

- Construction of infrastructure for charging and operation of electric vehicles - On the territory of the city of Burgas there are five municipal charging stations for electric vehicles, as well as several private ones. The main points are the municipal parking lot on "General Gurko" street No. 64, OZK Park Arena Burgas and Eldrive - Burgas Plaza, point next to the School of Motor Transport on "24-ti Primorski Polk" street, area next to the passenger seaport. A joint project of the Municipality of Burgas and the company "Eldrive" AD is underway for the phased introduction of a total of 50 electric charging stations for fast or slow charging within the whole city in the next 2 years. This aims to stimulate the use of private electric cars. For now, charging through municipal electric charging stations is free. The Municipality of Burgas increases the number of official electric vehicles every year. So far they are 9 – 2 electric cars, 3 electric vans, 4 electric scooters. The procedures for the delivery of 2 more electric vans are currently underway. A special sticker has been introduced through the Municipal Program "Transport" with which all electric cars are marked. Legislative measures have been adopted: in the Ordinance on determining the amount of local taxes and in the Ordinance on paid and free parking of motor vehicles on the territory of the Municipality of Burgas. Preferences are listed - all electric cars, mopeds and motorcycles are exempt from motor vehicle tax and park for free within the "blue and green zone" in Burgas.

Priority axis 2: *REDUCTION OF FUEL CONSUMPTION*

Measure 1. Reducing the relative share of trips with personal motor vehicles by improving and developing public urban transport and by developing non-motorized transport.

The Program for the construction and reconstruction of the transport infrastructure on the territory of the Stolichna Municipality for the period 2013 - 2016, adopted by the Stolichna Municipal Council with Decision No. 108 under Protocol 35/28.02.2013, is being implemented. The Program emphasizes the development of a single sustainable transport - a communication system based on a well-developed and quality infrastructure, guaranteeing a high level of mobility, a quality urban environment and the satisfaction of citizens and businesses. The program includes major objects of the transport infrastructure to be built or rehabilitated within the period with various sources of funding.

A long-term program of the Stolichna Municipality for the development of bicycle transport has been developed and is being implemented, including the construction of bicycle routes and accompanying infrastructure and improving the attractiveness and convenience of cycling, as a real alternative to the private car for all types of travel, while at the same time better integration of cycling with other modes of transport. For the period 2014-2016, bicycle paths were designed, rehabilitated and built in different parts of Sofia.

The Metropolitan Municipality plans to introduce the "public bicycle" service mainly in the central part of the city. This service will be an electronic system for parking in designated parking lots and renting out public bicycles.

During the construction, major repairs and rehabilitation of the main city arteries, bicycle routes are laid - if possible.

According to priority axis 1 "Sustainable and integrated urban development" of OP "Regional development "2007 - 2013", projects were implemented for the modernization of public transport in seven large cities of Bulgaria: Sofia, Burgas, Plovdiv, Varna, Stara Zagora, Ruse and Pleven. With their implementation for the purchase of 64 trolleybuses and 192 buses, 19,162 tons of CO₂ eq./year are saved.

According to OPRD 2014-2020, 9 contracts for urban transport were concluded, which include the purchase of new vehicles — 13 trams, 14 trolleybuses and 85 buses (24 electric buses, 15 natural gas buses and 46 diesel buses) in the cities of Sofia, Varna, Pleven, V. Tarnovo, Sliven, Gabrovo, Pernik, Kazanlak and Dupnitsa. By the end of 2020, the vehicle delivery activities for 7 of the 9 projects have been completed. 13 trams, 14 trolleybuses and 61 buses were delivered.

Evaluation of the effect

For the period 2012 - 2016, the realized saved emissions are 541,215 tons of CO₂ eq.

Measure 2. Development and stimulation of cycling.

Description of the measure and implementation activities

Stimulation of bicycle traffic is ensured by the following legal acts, which are within the competence of the Ministry of Transport and Tourism:

Ordinance No. RD-02-20-2 of 2018 on road design (SG, No. 79 of 2018) sets technical requirements, norms and standards for the design of republican and local roads outside the boundaries of urbanized territories, called "roads" for short. Section II lists the elements of the roadway, including pedestrian and bicycle lanes. There are requirements for dynamic dimensions for pedestrian and bicycle lanes, and for a shared lane they are separated by marking strips. When designing pedestrian and bicycle paths, it is legally required to analyse the intensity of car traffic (MVs/24 h) and the peak hourly intensity of pedestrian and bicycle traffic.

Ordinance No. RD-02-20-2 of 2017 on planning and design of the communication and transport system of urbanized territories (SG, issue 7 of 2018) defined the principles, criteria, norms and rules for planning and designing the communication and transport systems (CTS) in the urbanized territories. The Ordinance stipulates that, wherever appropriate and possible, cycle routes are provided as separate cycle lanes, physically separated from vehicle traffic. Separate bicycle lanes are also designed in places where bicycle routes do not coincide with the direction of the street network, such as parks and gardens. The Ordinance requires municipalities to develop a Bicycle Transport Development Plan, which can be part of the Sustainable Urban Mobility Plan (SUMP) or be developed independently. With regard to bicycle traffic, on the basis of the same ordinance, the municipalities also develop a Program for the Development of Bicycle Transport.

The instruments for implementing the measure are:

- Design and implementation of new cycling infrastructure;
- Development of systems for the use of municipal bicycles;
- Trainings and campaigns;

For the implementation of the measure and the development and stimulation of bicycle traffic, for the reporting period, pedestrian zones, bicycle lanes and sidewalks with an area of 1,773,548 square meters were built/rehabilitated with the support of OP "Regional Development" 2007-2013.

A long-term program of the Stolichna Municipality for the development of bicycle transport has been developed and is being implemented, including the construction of bicycle routes and accompanying infrastructure and improving the attractiveness and convenience of cycling, as a real alternative to the private car for all types of travel. When choosing the routes, the aspiration is to create a complete, relatively continuous bicycle network in an urban environment, linking bicycle routes with metro stops, as well as taking into account the possibilities for combining pedestrian and bicycle traffic.

During the construction, major repairs and rehabilitation of the main city arteries, bicycle routes are laid - if possible.

Encouraging citizens to use bicycles is carried out through the implemented measures to expand the built network of bicycle lanes, linking them to public transport stops; building the automatic ordering system through subscription electronic cards or voucher cards.

In the system for shared bicycles "Velo Burgas" 30 electric bicycles have been introduced and are being used.

Evaluation of the effect

As a result of the implementation of the measure during the reporting period, 381,442 tons of CO₂ eq. were saved.

Measure 1. (Measure with indirect effect) Fiscal policy to stimulate savings and limit the consumption of conventional fuels through:

- ***tax reliefs for manufacturers and users of electric vehicles;***
- ***a more complete application of the "polluter pays" and "consumer pays" principles.***

During the period 2013-2014, a number of reliefs related to the environmental characteristics of vehicles were adopted. With the adoption of the LAS of the LLTF (State Gazette no. 102 of 2012, in force from 01.01.2013) electric cars are exempt from annual tax. With the next LAS of the LLTF (State Gazette No. 101 of 2013, in force from 01.01.2014) the preference is preserved for owners of vehicles with active catalytic converters, with additional reliefs being provided for owners whose vehicles comply with environmental categories Euro 3, Euro 4, Euro 5 and Euro 6. With the adoption of an addition in Art. 58, para. 2 of the LLTF (SG, no. 105 of 2014) from January 1, 2015, in addition to electric cars, electric motorcycles and mopeds are also exempt from annual tax, thus expanding the range of tax-exempt electric vehicles and overcoming the created inequality in the taxation of four-wheel and two-wheel electric vehicles.

The changes in the LLTF (SG, no. 97 of 2017) expand the range of tax-exempt vehicles, such as electric vehicles categories L5e, L6e and L7e, defined in Art. 4 of Regulation (EU) No. 168/2013 of the European Parliament and of the Council of January 15, 2013 on the approval and supervision of the market of two-, three- and four-wheeled vehicles, which are exempt from tax. With the change made, a reduction of harmful emissions in the atmosphere is achieved indirectly and the tax policy regarding electric vehicles is continued.

In 2018 (SG, no. 98 of 2018, effective from January 1, 2019) a new concept for determining the tax on vehicles for passenger cars and trucks with a technically permissible maximum mass of no more than 3.5 tons has been adopted, namely the tax to be determined by a formula that includes two components: property and environmental. The property component takes into account the power and the year of manufacture of the car, and the ecological component takes into account the ecological category of the car, respectively the pollution caused by the respective car.

The ecological component is related to the ecological characteristics of the car and is a correction factor that reflects the ecological category of the car, which is related to the European standards for exhaust gases (also known as Euro 1, 2, 3, 4, 5 and 6). The environmental component provides relief for owners of cars complying with environmental standards "Euro 4" and higher and aggravation for owners of cars that do not comply with an environmental category or correspond to an environmental category lower than "Euro 4".

Also, in connection with the proposed new method of taxation, it has been accepted that the relief for vehicles with an active catalytic device will not apply.

The new concept provides an opportunity for all motor vehicle owners to enjoy tax preferences in case they own motor vehicles meeting higher environmental standards.

The changes adopted in 2017 and 2018 are aimed at achieving compliance with European directives related to air cleanliness and dealing with the exceeding of the maximum permissible values for concentrations of pollutants in the ambient air.

Measure 2. (Measure with indirect effect) Reduction by half (50%) of vehicles using conventional fuels in urban transport

To reduce the number of motor vehicles (MVs) using conventional fuels in urban transport, the following projects were implemented during the reporting period:

- Project "Implementation of activities to improve the quality of atmospheric air through the purchase and delivery of buses", financed through OP "Environment" 2007 - 2013, budget of the Stolichna Municipality and funds of "Stolichen Avtotransport" EAD. 126 new gas articulated buses and specialized equipment for them were delivered under the project. The utilized financial resources under the project are BGN 66,992,306.37.

Under the Measure "Reduction of vehicles using conventional fuels in urban transport by 2020" are:

- 40 trolleybuses on greener fuel for the municipality of Pleven were purchased and put into operation. The financial resources for the project are BGN 37,347,075 and are provided by OP "Environment" 2007-2013.
- Purchased and put into operation for the municipality of Burgas:
 - 28 new SOLARIS URBINO buses, 18 diesel buses
 - 39 new buses SOLARIS URBINO, 12 on methane fuel
 - 22 new SOLARIS trolleybuses - optimized engine, with recuperation
 - 6 new Karsan minibuses, diesel
 - 7 new buses SOLARIS METROPOLIS, 18 diesel.

As of 2016, 100% of the fleet serving the urban transport scheme of the municipality of Burgas has been replaced with vehicles with more environmentally friendly fuel. A general reduction of motor vehicles using conventional fuels in urban transport has been achieved (60% of the fleet serving the urban transport scheme). The funds utilized for the project are BGN 55,610,608.63 and are provided by OP "Environment" 2007-2013, municipal budget and with funds of the municipal transport company.

Measure "Introduction of a higher "Euro standard" for public transport buses". (Program for environmental protection on the territory of Plovdiv Municipality 2014 - 2020).

In 2013, Euro 0-4 buses represented 84.7% of the total fleet serving public transport in Plovdiv. In 2016, their share fell to 16.7%. The share of buses with a higher engine environmental standard (Euro 5.6 and EEV) increased from 15.3% to 83.3%. In addition to expanding the network, 50 of the newly introduced buses (Euro5,6 and EEV) have replaced 45 with Euro 0 and 5 with Euro 4. As of 31.12.2016, the total number of buses serving the transport scheme of the Municipality of Plovdiv is 300, distributed by type of fuel as follows: diesel - 258 units, gas - 38 units, natural gas - 4 units, methane - 0 units, biofuel - 0 units. The financial means are provided by the transport companies that have concluded contracts with the Municipality of Plovdiv for servicing the bus lines of the municipal transport scheme.

- Project "Introduction of an intelligent transport system in the city of Stara Zagora":

The project activities include the construction of 1 intelligent transport system and electronic information boards providing information in real time at 119 public transport stops. The time benefits for public transport users amount to an average of 1.52 million euros/year as of 2016. The project is worth BGN 5,730,895.50 including VAT and was financed by the OP "Regional Development" 2007-2013.

- Project "Development and stimulation of the use of "hybrid" and electric car transport - Stara Zagora municipality"
8 hybrid trolleybuses, 14 new low-floor trolleybuses, 55 new buses – Euro 6 were purchased under the project. It is estimated that the project will achieve a reduction in CO₂ emissions from transport - 188.25 t/year on average, as well as an increase in the share of urban transport (including people with disabilities) - 0.48%. The municipality expects an increase in public transport trips - 393,829 average trips/year. The project is worth BGN

47,715,975.75 including VAT and was financed by the Regional Development OP 2007-2013 and the Environment OP 2007-2013.

- Project "Development and stimulation of cycling - Stara Zagora municipality."

By the end of 2016, bicycle lanes with a total length of 7,924 km were built under the project. The value of the project is BGN 1,858,523.00 including VAT with the financial support of the OP "Regional Development" 2007-2013.

- Project "Rehabilitation of the trolleybus infrastructure - poles and contact network under the project "Integrated urban transport system of the city of Ruse".

The total cost of the project is: BGN 29,256,115.47, the financing of which was provided by the OP "Regional Development" 2007-2013.

- 13 trams in Sofia, 14 trolleybuses in Pleven and 7 electric buses in Kazanlak have been delivered under urban transport projects under the OPRD 2014-2020.

Additional information on projects is presented in [Annex I](#) to this report.

Priority axis 3: *TRANSPORTATION DIVERSIFICATION*

Measure 1. Increasing the share of public electric transport - railway, trolleybus, tram, metro

In connection with increasing the share of public transport, the implementation of the projects was supported with funds from the state budget, such as for the construction and extension of the metro and for the production, delivery, renovation and modernization of metro trains, for the period 2003-2012 were approved and granted additional funds from the central budget under the budget of the Stolichna Municipality, in the amount of BGN 197.2 million, and for the considered period of the Third National Action Plan on Climate Change 2013 - 2020 - BGN 110.0 million.

The state budget also plans funds for subsidies and compensation for free and reduced-price transportation for certain categories of citizens, public passenger transportation on intra-city transport and inter-city road transport.

To increase the share of public transport, the implemented projects are presented in [Annex I](#) of this report.

Funds for subsidies for "BDZ-Passenger Transport" EOOD are provided through the budget of the Ministry of Transport, Information Technologies and Communications.

Every year in the state budget of the Republic of Bulgaria funds are planned for capital transfers for non-financial enterprises in the railway sector, which are provided for the maintenance, development and construction of the railway infrastructure and for the purchase of new rolling stock.

For the reporting period, the following projects related to the rehabilitation of railway infrastructure were carried out:

Table 4. Rehabilitation of railway infrastructure

Name of the measure	Used financial resource		Indicator of implementation of the measure	Reported value at the end of 2020.	Difference between targeted and reported	Note
	Amount	Source of funding				

	BGN				value	
Rehabilitation of the railway infrastructure in sections of the railway line Plovdiv - Burgas	Total project cost: BGN 470,652,350.23	Operational Programme Transport 2007 - 2013	Rehabilitation of railway 21 km (position 1)	21	0	Position 1: - Issued Permission for use outgoing No ST-05-566/14.04.2014 - A permit was issued for the commissioning of the "Energy" subsystem on 21.5.2019. - A permit was issued for the commissioning of the "Infrastructure" subsystem on 20.12.2019.
	Funds paid as of 31.12.2020 – BGN 456,195,487.71		Rehabilitation of railway 120 km (position 2)	120	0	Position 2: - Permit for use 6T-05-1865/13.12.2016 was issued for stages 1 to 11 (Stara Zagora station - Kermen station). - Permit for use ST-05-53/24.01.2017 was issued for stages 12 to 18 (Kermen station - Zimnitsa station). - A permit was issued for the commissioning of the "Energy" subsystem on 14.9.2018 - A permit was issued for the commissioning of the "Infrastructure" subsystem on 08.01.2019.
			Rehabilitation of railway 150 km (position 3)	150	0	Position 3: - Permit for use ST-05-129/02.03.2017 was issued. - A permit was issued for the commissioning of the "Energy" subsystem on 13.12.2018. - A permit was issued for the commissioning of the "Infrastructure" subsystem on 09.01.2019.
			Modernization of TPS Nova Zagora, TPS Stara Zagora and construction of SCADA (item 4)	2 TPS and SCADA	0	Position 4: - Permit for use No. ST – 09 – 1105/05.07.2016 was issued for stage I - TPS Nova Zagora. - Permit for use No. ST-05-1757/07.12.2016 was issued for stage III - TPS Stara Zagora. - Permit for use No. ST-05-1756/07.12.2016 was issued for stage II - Central Dispatch Center. - A permit was issued for the commissioning of the "Energy" subsystem on 14.9.2018
Rehabilitation of the railway infrastructure along the sections of the railway line Plovdiv - Burgas - restoration, repair and modernization of traction	Total project cost: BGN 21,339,147.60 Funds paid as of 31.12.2020 – BGN 21,328,680.38	Operational program "Transport and transport infrastructure " 2014 - 2020.	Modernization of traction substations Burgas, Karnobat and Yambol	3 TPS	0	- A use permit No.ST-05-971/09.08.2018 was issued for the Yambol railway station. - Use permit No. ST-05-450/19.04.2018 was issued for Burgas TPS. - A use permit No. ST-05-970/09.08.018 was issued for Karnobat TPS. - A permit was issued for the commissioning of the "Energy" subsystem on 27.03.2020.

substations Burgas, Karnobat and Yambol						
Rehabilitation of the railway line Plovdiv - Burgas, Phase 2	Total project cost: BGN 810,018,562.65	Operational program "Transport and transport infrastructure" 2014 - 2020.	rehabilitation of 75 km of railway lines	28 km	0	<p>Skutare-Orizovo section is completed. Permission for use No. ST-05-166/05.03.2020 was issued.</p> <p>Straldzha - Tserkovski section is completed. A use permit No. ST-05-653/31.05.2018 and a permit for commissioning the "Infrastructure" subsystem was issued on 23.10.2020.</p> <p>The following components of the project are currently being designed:</p> <ul style="list-style-type: none"> - Modernization of the railway section Orizovo - Mihailovo; - The reconstruction of the shuttle development at the Zimnitsa station and the rehabilitation of the contact network at the Zimnitsa and Straldzha stations; - Design and construction of signalling and telecommunications systems on the railway line Plovdiv - Burgas; - Modernization of TPS Chirpan; - Design and construction of 2 new road overpasses at km. 127+805 and km.134+350 in the Khan Asparuh-Nova Zagora interstation; - Design and construction of 2 new road overpasses at km. 253+520 and km. 260+921 in the section Chernograd – Balgarovo; - Design and construction of 2 new road overpasses at km. 244+619 and at km. 248+202 in the Chernograd-Aytos interstation.
	Funds paid as of 31.12.2020 – BGN 175,070,037.52		construction of 36 km of railway lines	0	0	
			construction of 2 bridges	0	0	
			construction of 1 tunnel	0	0	
			rehabilitation of 87 km of existing CN	32 km	0	
			construction of 37,000 m of new CN	0	0	
			modernization of 1 TPS	0	0	
			Removal of 39 railway crossings	0	0	
			construction of 34 overpasses	0	0	
			construction of 4 underpasses	0	0	
			construction of 586,000 m of optical cable line	0	0	
			construction of 33 GSM-R base stations	0	0	
			renewal of signalling in 24 stations	0	0	
Modernization of the railway line Sofia - Plovdiv in the Septemvri - Plovdiv section	Total project cost: 312261927.78 BGN	Operational Programme Transport 2007 - 2013	Built railway lines	122.118 km	0	<ol style="list-style-type: none"> 1. Permission for use No. ST-05-1144/15.07.2016 for Modernization of the railway section Stamboliyski-Plovdiv; 2. Permission for use No. ST-05-614/25.04.2016 for TPS Proslav; 3. Permission for use No. ST-05-1329/04.12.2017 for signalling systems in the Septemvri - Plovdiv section and telecommunications Sofia - Plovdiv; 4. Permission for use No. ST-05-365/29.03.2017 for signalling systems in the Septemvri - Plovdiv section and telecommunications Sofia - Plovdiv; 5. Permission for use No. ST-05-609/31.05.2017 for Modernization of
	Funds disbursed at the end of December 2020: BGN 257,755,763.00		Modernized track development in stations	5	0	
			Repair and modernization of bridges	23	0	

						the Septemvri - Pazardzhik railway section; Permission for use No. ST-05-705/20.06.2017 for Modernization of the railway section Pazardzhik - Stamboliyski
Modernization of the railway section Sofia-Elin Pelin	Total project cost: BGN 132,966,320 Funds disbursed at the end of December 2020: BGN 79,465,848.18	Connecting Europe Facility; Agreement INEA/CEF/T RAN/M2014 /1048809	Built railway lines	11,400 km	38,397 km	The project is in the process of implementation and is expected to be completed by 12.2022.
	Modernized track development in stations		1	2		
	Repair and modernization of bridges		4	13		
"Reconstruction and electrification of the railway line Plovdiv - Svilengrad along corridors IV and IX, phase 2: section Parvomay-Svilengrad"	Total cost of the project according to approved application form is: BGN 663,316,861.61 The actual disbursed funds under the project are: BGN 444,932,486.68	Operational Programme Transport 2007 - 2013	<ul style="list-style-type: none"> ➤ 70,475 m of laid single-track railway, including: rehabilitated railway with a length of 4337 m. ➤ The contact network was built - 73,666 m ➤ New reception buildings were built - 3 units. ➤ Rehabilitated reception buildings - 2 units ➤ New stops built – 5. ➤ Stations with renewed signalling - 7. ➤ Stations with renewed track development - 6. ➤ Level crossings removed – 28. ➤ railway bridges – 28. ➤ Pedestrian overpasses – 7. ➤ Road overpasses and underpasses – 17. ➤ Drains and pipes - 127. ➤ Disinfection frame at 	100% fulfilled	100% fulfilled	<p>The project has been completed. The site has been accepted for operation with Permits for use:</p> <p>For Phase 1 , 5 usage permits have been issued - ST-05-852 dated 02.06.2014; ST-05-1217 of 19.08.2014; ST-05-725 dated 12.05.2016; ST-05-1584 dated 24.10.2016 and ST-05-1747 dated 07.12.2016.</p> <p>For Phase 2, 3 usage permits have been issued - ST-05-2308 of 12.12.2015; ST-05-726 dated 12.05.2016 and ST-05-1145 dated 15.07.2016.</p> <p>For Phase 3, 3 usage permits have been issued - ST-05-1270 dated 11.08.2016; ST-05-366 dated 29.03.2017 and ST-05-1131 dated 02.10.2017.</p> <p>For Phase “Systems” - ST-05-540 of 05.05.2017</p>

			<p>Svilengrad station – 1. ➤ New traction substations were built - 2. Extension of an existing traction substation - 1.</p>			
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Evaluation of the effect

For the period of the report, the measure was implemented, and the emissions saved were 944,335 tons of CO₂ eq.

Measure 2. Development and construction of intermodal terminals for combined transport

Description of the measure and implementation activities

The measure aims to achieve a two-sided effect, expressed on the one hand in increasing the degree of usability of more ecological modes of transport and, on the other - in creating suitable conditions for increasing the added value of transport activity, with a general reduction of transport costs per unit GDP.

For the period 2014 - 2016, the project "Construction of an intermodal terminal in the South Central Planning Region of Bulgaria - Plovdiv" was implemented. Terminal design activities have been completed. The terminal was built and on 28.10.2016 it was handed over by the contractor NC "Railway Infrastructure". The total value of the project is BGN 11,873,910.00, financed by OP "Transport" 2007-2013.

For the reporting period, the construction of an intermodal terminal (IMT) in the North Central Planning Region of Bulgaria - Ruse is also planned. Due to a change in the policies of the Ministry of Transport, Information Technologies and Communications (Managing Authority of OP "Transport and Transport Infrastructure"), at the moment the priority for construction of IMT Ruse is in the process of revision, and the funding is being reassessed. The total value of the project is BGN 4,195,300, and as of 31.12.2016, the following funds have been paid - BGN 3,914,424.60, provided by OP "Transport" 2007-2013.

Evaluation of the effect

For the period of the report, the measure was implemented, and the emissions saved were 81,374.4 tons of CO₂ eq.

Measure 1. (Measure with indirect effect) Reduction of loads in road transport over 300 km by switching to other greener modes of transport, for example rail

During the period 2014 - 2016, the following transports were carried out by means of rail transport and at a distance of 300 km:

- Transit rail transportation of car trailers from Turkey to Germany and back, resulting in 80,764,016 gross tonkm Ruse - Svilengrad and back - 521 km;
- Transit rail transportation of car trailers from Turkey to Liechtenstein and back, resulting in 9,532,962 gross tonkm Svilengrad - Dragoman and back - 387 km.

The measure was executed successfully

Measure 2. (Measure with indirect effect) Connecting the central network airports - Sofia, Varna, Burgas, Plovdiv and G. Oryahovitsa with railway lines

Art. 41, para. 3 of Regulation 1315/2013 introduces an obligation for the member states to connect the airports in their territory, indicated as main in part 2 of Annex II to the Regulation, with the rail and road infrastructure of the Transeuropean transport network, by 31.12.2050 at the latest, and where possible to integrate with a high-speed rail network. The appendix defines the status of Bulgarian airports, namely: Sofia Airport is part of the main Transeuropean transport network, and the airports in Burgas, Varna, Plovdiv and Gorna Oryahovitsa are part of the wide-range Transeuropean transport network. The airports that are subject to connection with the railway network have also been determined - a total of 37 airports in the member states, which do not include the Bulgarian ones. In this sense, our country has no commitment to build a railway connection to Sofia airport, and the MTITC has no such plans in the medium term (for airports falling on the wide-range network there is no such requirement). **Since 04/02/2015**, Sofia Airport has been connected to the central part of

the city and Sofia Central Station by a metro line and has become a modern multimodal transport centre.

The measure was executed successfully.

Priority axis 4: CONSUMER INFORMATION AND EDUCATION

Measure 1. (Indirect effect measure) Sustainable transport statistics

It has not yet been specified which institution will initiate this process, whether an Interdepartmental Working Group will be formed, and what types of data will be reported to the National Statistical Institute (NSI).

The Ministry of Transport, Information Technologies and Communications (MTITC) is not a statistical authority under the Statistics Act and does not provide data to NSI. EA "Maritime Administration" and General Directorate "Civil Aviation Administration", secondary allocators of budget credits to MTITC, are statistical authorities and provide specific data to NSI. In this regard, it is necessary to take into account that a methodology for the requested statistical data should be developed before the regulation included in the measure is drawn up.

Measure 2. (Indirect effect measure) Informed choice of vehicle

EA "Automotive Administration" at MTITC works actively to harmonize Bulgarian legislation with the legislation of the European Union in the field of road transport with the aim of reducing noise and environmental pollution as a result of harmful emissions from exhaust gases from cars, increasing the purity of the atmospheric air.

Measure 3. (Indirect effect measure) Economic driving training.

According to the data of the responsible institution - the Ministry of Transport, Information Technologies and Communications (EA "Automotive Administration"), the number of trained drivers and driver qualification cards issued is as follows:

2013– 34,482	2017– 43,223
2014– 27,300	2018– 38,026
2015– 26,893	2019– 25,462
2016– 36,125	2020– 28,855

For the period 2013 - 2020, a total of 260,366 qualification cards were issued.

8. MEASURES IN THE FIELD OF EDUCATION AND SCIENCE

Brief information on measures in the sector

The measures in the "Education and Science" sector are grouped into two priority axes as follows:

- **Priority axis 1:** Affirmation of the topic of climate change and the reduction of greenhouse gas emissions in the educational process;
- **Priority axis 2:** Concentration of research activity on the topic of reducing greenhouse emissions and its sectoral aspects.

Priority axis 1: AFFIRMATION OF THE TOPIC OF CLIMATE CHANGE AND THE REDUCTION OF GREENHOUSE GAS EMISSIONS IN THE EDUCATIONAL PROCESS

Measure 1. Creation and implementation of state requirements/educational standards for primary, secondary and higher education

Emphasis on preschool and school education is priority axis 1: "Affirmation of the topic of climate change and the reduction of greenhouse gas emissions in the educational process". The topic of climate change (or the reduction of the greenhouse effect) is related to the formation of knowledge, skills and attitudes in key competence 9.

Skills to support sustainable development and a healthy lifestyle, laid down in Art. 77, para. 1 of the Preschool and School Education Act.

It is present in separate lesson units or their elements of general education subjects of every level of education such as geography and economics, man and nature, biology and health education, chemistry and environmental protection, physics and astronomy, philosophy.

In the second stage of the high school level of education, students deepen their knowledge, skills and attitudes related to the climate, its change and protection in the general educational preparation in the subject of civic education, as well as in the profiling preparation in the subjects: geography and economics (module "Natural Resource Potential. Sustainable Development"), Biology and Health Education, Chemistry and Environmental Protection, Physics and Astronomy, Philosophy.

Bulgarian Academy of Sciences:

1.1.1 Educational project "Climate box - scientists, teachers and students together for climate, atmosphere and waters"

1.1.2 My Green City Academy

1.1.3 Educational project "Innovative laboratory for studying natural disasters and environmental catastrophes from space"

1.1.4. Improving transnational legislation in the field of marine litter" - MELTEMI

1.1.5. Raising public awareness and reducing marine litter to protect the Black Sea ecosystem" – LitOUTer

1.1.6. Guidance by scientists of IICAV-BAS in the development of the following doctoral theses in the field of climate, its changes and the relevant influencing factors (incl. greenhouse gases and pollution/purification of the atmosphere), for obtaining the scientific degree "Doctor":

- "Global and regional climate variability - driving factors" (doctoral student from NIGGG-BAS)

- "Acidity of precipitation in Bulgaria - spatial distribution, assessment of its impact on the natural environment, economy and human health and relationship with meteorological conditions and air pollution" (PhD student from NIMH)

- "Atmospheric boundary layer in an urban environment according to data from aerial tests and systems for remote sensing of the atmosphere"; (PhD student from NIMH)

- "Meso-meteorological modelling of the atmospheric boundary layer (ABL) and comparison with experimental data over different bedding surfaces" (PhD student from NIMH)

- "Functional dependence of plant productivity on specific climatic factors" (PhD student from NIGGG-BAS)

1.1.7. Guide by scientists of NIGGG-BAS of doctoral dissertations in the field of climate, its changes and relevant influencing factors (incl. greenhouse gases and pollution/purification of the atmosphere), for obtaining the scientific degree "Doctor":

- "Global and regional climate variability - driving factors" (NIGGG-BAS)

1.1.8. Guidance by scientists of ICIT-BAS in the development of the following doctoral theses in the field of climate, its changes and the relevant influencing factors (incl.

greenhouse gases and pollution/purification of the atmosphere), for obtaining the scientific degree "Doctor":

- "Using remote methods in performing intermediate ecological monitoring of natural sites" (PhD student from ICIT-BAS)

1.1.9. In 2020, 1 scientist from IICAV carried out 3 lecture hours for postgraduate training in the field of specific meteorological conditions and air pollution in port areas, as part of the European project ECOPORTIL.

In 2019, 3 scientists conducted training for 30 students in a round table on the topic "Climatic features and atmospheric air quality", organized by IICAV-BAN in cooperation with RIEW-Plovdiv

1.1.10. In 2020, 1 scientist from NIGGG-BAS conducted 6 lecture hours for training related to the impact of climate change on ecosystems and the provision of ecosystem services, as part of a BA lecture course in Landscape Science and Environmental Protection at the University of Veliko Tarnovo

1.1.11. In 2019 and 2020, 1 scientist from ICIT conducted 90 lecture hours on ecology in the Technical Center of the BAS.

In 2019, 3 scientists conducted training for 30 students in a round table on the topic "Innovative laboratory for the study of natural disasters and environmental catastrophes from space", organized by ICIT-BAS together with RCIC-Sofia

1.1.12. Guidance by scientists of IO-BAS in the development of the following doctoral theses in the field of climate, its changes and the relevant influencing factors, for obtaining the scientific degree "Doctor": "The role of scientific foundations and application of the ecosystem approach for sustainable management of fisheries in the Black Sea" (PhD student from IO-BAS)

Higher education:

THRACIAN UNIVERSITY STARA ZAGORA:

Developed programs and educational modules (or their separate units and elements) introduced in the bachelor's, master's, qualification and doctoral programs, affecting the sectoral aspects of greenhouse pollution and ways to reduce it from 2013 until now. The following study programs have been developed at Thracian University:

Educational Degree "Bachelor":

- Environmental construction and territorial planning
- Environmental aspects of agricultural and transport equipment
- Economy of the environment

Educational Degree "Master":

- Wind and solar energy;
- Technology for growing energy crops;
- Regenerative systems in agricultural production;
- Solar thermal systems;
- Physic and chemical methods of analysis
- Energy efficiency of agricultural buildings
- Technology for the processing of plant oils and biofuels
- Technical and technological systems for biogas production
- Ecological urban planning
- Energy biotechnologies
- Energy management
- Energy efficiency of buildings (with project)
- Energy efficiency of industrial systems (with project)
- Bioeconomy and eco-entrepreneurship

Diploma theses related to RES:

- Topic "Assessment of the possibilities for functional integration of recuperators and renewable energy sources in a common storage system".

- Topic "Effect of overcooling of fresh milk on the performance characteristics of a milk tank.
- Topic "Influence of frequency parameters on the time components of pulsation systems in milking machines for cows".
- Topic "Project for renovation and reconstruction of a sheep farm into a meat-cattle farm".
- Topic "Study of the possibilities of obtaining photovoltaic electricity from solar installations on the roof of a livestock building type K200".
- Topic: "Development and research of a wind engine for driving a reciprocating water pump".
- Topic: "Energy analysis of a combined hot water extraction system in a cow farm in the village of Momino selo".
- Topic: "Effect of milk receiver volume on some energy performance parameters of refrigerated tanks".
- Topic: "Air conditioning of a mushroom house for the production of cultivated mushroom".
- Topic: "Designing a solar hot water system for the filter of a pig farm in the village of Khan Asparuhovo".
- Topic: "Investigation of the energy efficiency of sow buildings with straw panel enclosing walls".
- Topic: "Energy analysis of biomass of different composition for biogas production".
- Topic: "Possibilities for reducing heat energy consumption in the production of wood pellets"
- Topic "Influence of biomass composition on the energy efficiency of a biogas plant with a trigenerative mode of operation".

"ANGEL KANCHEV" UNIVERSITY OF RUSE:

In accordance with the requirements of Measure 1, the "Angel Kanchev" University of Ruse has developed, approved and periodically updates curricula in a number of disciplines related to the protection of environmental components, both for bachelor's and master's courses, as well as for doctoral programs.

Areas of work are related to highly efficient conversion and use of energy (energy saving) and increasing energy efficiency (of buildings, systems and facilities); development of technologies for optimal utilization of alternative and/or renewable energy sources; management of waste flows and utilization of the biodegradable fraction in their composition; development of hybrid, electric and hydrogen-powered vehicles, traffic optimization, etc. problems caused by the growth of greenhouse gas emissions.

2 dissertations were defended with the following topics:

- "Investigating the effect of using exhaust gas impacting technologies to reduce harmful emissions from stationary diesel engines"
- "Analysis of the environmental characteristics of the means of transport in operation"

2 diploma theses were developed and successfully defended on the following topics:

- "Modeling and application of hydrogen fuel cells";
- "Development of a graphical interface for modelling hybrid powered vehicles".

UNIVERSITY OF MINING AND GEOLOGY "ST. IVAN RILSKI":

An educational thematic module has been developed to the existing study programs for bachelors, masters and doctoral students with thematic units - Energy-saving, Low-carbon and Innovative technologies in the field of waste management.

TECHNICAL UNIVERSITY GABROVO:

Developed study plans and curricula of "Bachelor" and "Master" specialities from the qualification degree, related to the following topics:

- Educational Degree "Bachelor" - number of study plans - 6; number of study programs – 21. Disciplines such as: Ecological energy technologies; Technologies and equipment for air purification; Renewable energy sources, etc.
- Educational Degree "Master" - number of study plans - 1; number of study programs – 6. Disciplines: Energy efficiency; Energy resources.
- Developed specialized disciplines in doctoral programs: number of disciplines – 7: Renewable energy sources; Technical and economic evaluation of electrical engineering projects; Energy efficiency of lighting systems; Technical and economic evaluation of electrical engineering projects; Energy efficiency of electric drives; Energy efficiency of buildings; Model study of buildings
- Number of doctoral programs – 4: Power supply and electrical equipment, Lighting equipment and light sources, Electromechanics, Industrial heat engineering. Developed and defended theses related to the topic: 157

UNIVERSITY OF ARCHITECTURE, CONSTRUCTION AND GEODESY:

The subject matter of the individual lecture modules is in accordance with the objectives of the Third NAPCC, the priority axis and the interdisciplinary nature of the problem.

In 2017, the speciality "Engineering Ecology" was created in the bachelor's and master's degrees of study at the Faculty of Hydrotechnical Engineering with included topics and lecture modules on climate change, renewable energy sources, small-scale energy production, energy-efficient design, construction and spatial planning, economic aspects of climate change.

In 2017, the Master's Program "Energy Efficiency in Construction" was established.

Extracurricular activities:

- UACG participates as a partner in the European project "Innovative training schemes for retrofitting to nZEB-levels - Fit to nZEB", (agreement 754059), financed under the "Horizon-2020" program of the EC from June 2017 to June 2019, dedicated to training pupils, students, specialists and teachers in the ways of energy efficient renovation of buildings up to the nZEB level;
- Trainings were held with a lecturer from the UACG for professionals from the "Construction" sector and representatives of municipal administrations;
- An Energy Efficiency Laboratory was established on the 1st floor of the UACG, in cooperation with EnEffect, in 2017 under the Train-to-nZEB European project (contract 649810), financed under the Horizon-2020 program of the EC. It hosts numerous courses on energy efficiency projects;
- Participation of professors - experts from UACG in the National Expert Council for coordinating the implementation of a national plan for buildings with close to zero energy consumption;
- Annual participation of AF students in the international student competition Multi Comfort 2020/2021, which is aimed at the sustainable development of the urban environment and increasing the energy efficiency of residential buildings.

UNIVERSITY OF FOOD TECHNOLOGIES - PLOVDIV:

In the Faculty of Engineering, curricula have been developed according to study plans for majors in educational degrees "Bachelor" and "Master", in which climate changes and reducing emissions of carbon dioxide released into the environment are affected. The Department of Electrical Engineering and Electronics offers a Master's course in "Electrical Efficiency", which includes curricula for the disciplines "TPP and co-generation systems", "Energy efficiency of electrical, electronic and thermal equipment", "Electricity from renewable energy sources", "Energy efficiency of power electronic devices", "Alternative energy sources and technologies".

In the "Industrial Heat Engineering" department, diploma projects are developed on topics related to the survey of buildings and industrial enterprises with the aim of determining the saved carbon dioxide emissions with a view to environmental protection, as well as the use of RES in the design of heating and cooling of a given building or enterprise.

TECHNICAL UNIVERSITY VARNA:

Creation and updating of curricula and programs in specialities related to energy efficiency and climate change, by including specialized disciplines:

- Educational Degree "Bachelor": "Engineering ecology", "Renewable energy sources", "Heat engineering and investment design", "Electricity supply and electrical equipment", "Electroenergetics", "Ship machines and mechanisms", "Electric equipment of the ship" and others.
- Educational Degree "Master": "Engineering ecology", "Renewable energy sources", "Heat engineering and investment design", "Production of electric energy from renewable energy sources", "Energy management" "Electricity supply and electric equipment of industry", "Electricity supply and electric equipment of water transport", "Electric energy systems", "Ship engines and mechanisms", etc.

TECHNICAL UNIVERSITY SOFIA:

New and updated curricula of majors:

- Educational Degree "Bachelor": "Renewable energy technologies and fluid engineering", "Energy conversion technologies and energy efficiency in buildings and industrial sites", "Automotive electronics"
- Educational Degree "Master": "Systems for energy efficient management", "Electricity from renewable energy sources", "Technologies for utilization of renewable energy sources", "Engineering ecology", "Electricity from renewable energy sources".

The Bachelor's degree "Heat Power Engineering and Nuclear Energy" and the Master's degree "Nuclear Energy" are included in the list of priority and protected specialities in the context of emission-free production of electricity and thermal energy from NPPs, according to the Paris Agreement and the convention signed in 2016.

AGRICULTURAL ACADEMY:

The Agricultural Academy (AA) develops doctoral dissertations, most of which are on topics related to the global problem of mitigating the impact of climate change on the quality and productivity of ecosystems, which includes research on their adaptive potential, genetic-selection research, increasing shares of green and biotechnology in agriculture, etc. At the same time, emphasis is also placed on the reverse process - the impact of agriculture on the climate and control of greenhouse gas emissions by creating various new technologies and improving elements of the production process.

The following topics have been developed:

- Study of innovative methods for utilization of emissions from greenhouse and other harmful gases from animal husbandry;
- Investigation of the effectiveness of nitrogen fertilizers with controlled release of the active substance in soil differences representative of the country;
- Variation of reused reserves of biomass and nitrogen in wheat types and genotypes;
- Information base for modelling components of soil water balance and assessment of agro-ecological risks;
- Research and analysis of cold resistance in some crosses of durum wheat (*Triticum durum* Desf.);
- Thermal properties and thermal regime of some soils in Bulgaria;
- Assessment of the risk of drought in agriculture and remedial regimes to mitigate its consequences;
- Water-production dependencies at different levels of water supply through drip irrigation of raspberries;

- Research on the parameters of watering during rain;
- Agrochemical and microbiological aspects of family composting;
- Evaluation of the ameliorative impacts on the water and heat regime of soybean and wheat crops;
- Application of nitrogen-fixing and other soil microorganisms when growing chickpeas;
- Assessment of tolerance to salinity in species of the Cucurbitaceae family;
- Studying the influence of different tillage systems, when growing cereals on sloping terrains, on the export of soil, organic matter and greenhouse gases;
- Contamination of soils and plants in Bulgaria with man-made gamma emitters after the Chernobyl NPP accident and their migration into the soil-plant system;
- Study of living mulch and the effect of pre-planting preparation in plum orchards on sloping terrain.

Measure 2. Increasing the knowledge and qualification of the teaching staff on issues related to climate change.

Bulgarian Academy of Sciences:

1.2.1 Educational project "Climate box - scientists, teachers and students together for climate, atmosphere and waters";

1.2.2 The scientific supervisors of doctoral students from IICAV-BAS have taken part in various scientific forums (conferences, seminars, workshops, scientific networks, expert bodies, scientific unions, associations, societies, etc.) related to the issues of climate change - see Measure 3

1.2.3 The scientific supervisors of doctoral students from NIGGG-BAN have taken part in various scientific forums (conferences, seminars, workshops, scientific networks, expert bodies, scientific unions, associations, societies, etc.) related to climate change issues - see Measure 3

1.2.4 The scientific supervisors of doctoral students from ICIT-BAN have taken part in various scientific forums (conferences, seminars, workshops, scientific networks, expert bodies, scientific unions, associations, societies, etc.) related to climate change issues.

During the reporting period of the "Third National Action Plan for Climate Change", the project "Energy efficiency and better quality of milk in Bulgarian dairy farms" was developed **at the Thracian University Stara Zagora**.

The same was implemented through the financial support of Norway grants, Innovation Norway (the Government of Norway through the Norwegian Financial Mechanism 2009-2014) within the framework of Program Area BG 10 - "Innovations in the green industry".

On the Bulgarian side, the leading responsible institution is the "Bioselena" Foundation for Organic Agriculture, and its partners are the non-governmental organization Norges vel - Norway and Thracian University - Stara Zagora, Faculty of Agriculture. A contract KNRIN-2013/104377 was concluded between the institutions with a term of execution - 01.01.2014 - 01.01.2016. The utilized financial resources are slightly over 220,000 Euro.

In fulfilment of the objectives of the project, 2 systems for extracting heat from renewable energy sources were designed and developed:

- Integrated 2-module hybrid installation including:
Solar thermal boilers (solar collectors);
Boiler for burning wood pellets.

- Integrated 3-module hybrid installation including:
Module for extracting the heat from the milk;
Solar thermal boilers (solar collectors)
Boiler for burning wood pellets.

The systems have been implemented in three pilot farms:
Cow farm "Georgi Matanski", Momino village - 85 cows;
Cow farm "Ivan Danchev" village Dobrodan - 110 cows;

Buffalo farm "Yotkovi", town Tsar Kaloyan - 74 buffaloes.

Technological effect of the project:

Production of heat from RES with parameters covering full washing of milking equipment and milk cooling equipment. Promotion of RES among farmers, milk processors, students and specialists working in the field of agricultural production, animal husbandry and processing industry.

Social effect of the project:

Provision of sufficient domestic hot water for the staff and suitable ergonomic conditions, both during work and during breaks in the work shift; Provision of heating of the domestic premises to the farm; Acquisition of general technical knowledge and skills related to the exploitation of RES.

Training seminars and conferences related to the project:

First national training seminar on the project "Energy efficiency and better quality of milk in Bulgarian dairy farms" under the patronage of the Deputy Minister of Agriculture and Food Tsvetan Dimitrov - 142 participants, of which 82 were students (with received certificates).

Second national training seminar "Application of RES in animal husbandry", with the participation of partners from Norway - 112 participants, of which 93 students (with received certificates).

Agra, 2016 - Conference on "Innovations in Agriculture" - 207 participants, of which 46 students (with received certificates).

Bata Agro, 2016 - Presentation of project results with the participation of 5 students of "Agrarian Engineering" - 84 participants, of which 39 students (with received certificates).

The **University of Ruse** "Angel Kanchev" is included in the National Scientific Program "Low Carbon Energy for Transport and Life" (EPLUS).

The current program emphasizes a key moment in the updated European strategy – accelerated development and commercialization of technologies for storage and regeneration of energy from RES and capture and utilization of CO₂. It is in synergy with the work programs of the Joint Undertakings in Horizon 2020 such as "Fuel Cells and Hydrogen", as well as with the leading thematic direction "Secure, clean and efficient energy".

In 2020, the university participated in the organization and hosted several seminars and conferences related to the topic of climate change and reducing greenhouse gas emissions, such as: Scientific conference "Electric vehicles", organized on the initiative of the University of Ruse "Angel Kanchev" with the support of the industrial cluster of the same name and aimed at exchanging experience and good practices of scientists and specialists from practice in areas such as: electric cars, designs and features; rechargeable batteries; charging stations; use of renewable energy sources; ecology and efficiency of the use of electric vehicles.

Gabrovo Technical University participates in the following specializations and experience exchange meetings:

- number of realized mobilities under the ERASMUS+ program - 3
- number of business and work meetings – 3

Participation in competitions for academic positions:

- number of contests -2

Development of research and educational projects:

- number of international projects - 4
- number of national projects – 7
- number of projects financed specifically from the state budget - 20
- number of projects with external companies – 4.

The lecturers from the "Industrial Heat Engineering" department at the **University of Food Technology Plovdiv** regularly participated in the period 2014-2020 at conferences on climate change and energy efficiency: TE-RE-RD Romania and "Ecology, self-esteem, environment", TU-Sofia, Sozopol). In 2020, lecturers from the Department of "Engineering Ecology" and the Department of "Industrial Business and Entrepreneurship" took part in the international scientific conference ENVIRORISKs 2020, Sofia.

At the **Technical University Varna**, specializations abroad under the Erasmus+ program and exchange of knowledge and experience with other universities in the field of environmental impact and energy efficiency, as well as courses in energy efficiency for the certification of auditors, have been carried out.

Sofia Technical University participates in BG05M2OP001-2.009-0033-C01 - Stimulation of modern scientific research by creating a scientific and innovative environment for the promotion of young researchers of a new generation at Technical University Sofia and National Railway Infrastructure Company in the field of engineering technical sciences and technological development.

The University of Chemical Technology and Metallurgy participates in numerous projects - national, under European programs and jointly with private companies, related to the management of atmospheric air quality, the reduction of harmful emissions, the reduction of the spread of pollutants emitted by industrial enterprises, etc.

For the period 2013 - 2019, members of the academic staff of the "Engineering Ecology" department at the university took part in a large number of national and international scientific forums. They have also participated in a number of university scientific conferences, in the preparation of textbooks and teaching aids and have numerous scientific publications related to climate change.

Agricultural Academy:

The academic supervisors and advisers of the PhD students from the AA have increased their qualifications through specializations under the Erasmus+ program - 40 scientists in the period 2013-2020.

The scientific supervisors and consultants of the doctoral students from the AA organized and participated in various scientific events related to the exchange of knowledge about climate change (conferences, seminars, round tables, scientific networks, expert commissions, scientific unions, associations, etc.) - 120 scientists .

Priority axis 2: CONCENTRATION OF SCIENTIFIC-RESEARCH ACTIVITY ON THE SUBJECT OF REDUCTION OF GREENHOUSE EMISSIONS AND ITS SECTORAL ASPECTS

Measure 1. Practical and applied scientific research

In school education, the topic of climate change and anthropogenic factors causing it is also developed in extracurricular activities. Organized activities based on interests in the fields of "Environment", "Biological Sciences" and "Physical, Chemical and Earth Sciences" cover about 26,023 students. The "Support for Success" project under the Operational Program "Science and Education for Intelligent Growth" (OP SEIG) 2014 - 2020, in the category "Environmental Education and Healthy Lifestyle" covers 2,701 students.

Bulgarian Academy of Sciences:

2.1.1. Project "Water balance and water resources of the country"

2.1.2. Project "Local climate classification of the city of Sofia based on geospatial information about the urban landscape"

2.1.3. "Climate" section of "Assessment of climatic conditions on the territory of the municipality of Veliko Tarnovo" as part of "Update of the program for reducing emissions and reaching the established norms for fine dust particles in the atmospheric air in the municipality of Veliko Tarnovo"

2.1.4. Project "Study of changes in atmospheric air quality for the last 8 - 10 years in large cities in Bulgaria"

2.1.5. "Climate" section of the "Sustainable Energy and Climate Plan of the Stolichna Municipality for 2021-2030"

2.1.6. Project "Vertical Structure of the Atmosphere in the Black Sea Coastal Zone Using Remote Sensing Measurements and Mesometric Modeling"

2.1.7. Project

"Investigation of the influence of the characteristics of the air environment on the quality of life and human health"

2.1.8. Project

No D01-230/06.12.2018

ABR: DSD-4/25.02.2019

2.1.9. Project "Development of an innovative VEGA wind generator - product innovation"

2.1.10. Project "Systematic analysis of geomagnetic observatory data to detect phenomena and correlations with various environmental parameters (climatic, geological, geophysical)

2.1.11. Project

"A Concept for Integrating the Ecosystem Approach in Spatial Urban Planning Policies and Tools"

2.1.12. Project

"Assessment of wind-solar renewable energy resources in representative regions of Bulgaria"

2.1.13. Project "Satellite information downscaled to urban air quality in Bulgaria - "SIDUAQ"

2.1.14. Project "Application of Remote sensing and GIS for Assessment of Ecological Sustainability and Functioning of Selected Agro-ecosystems in Changing Environmental Conditions"

2.1.15 Project: "Developing Support For Monitoring And Reporting Of GHG Emissions And Removals From Land Use, Land Use Change And Forestry (LULUCF)"

2.1.16 Project: "Copernicus" program/National database "KORINE land cover 2018

2.1.17 NNP EPLUS – Low-carbon energy for transport and household

2.1.18. Processes, quality of the marine environment, ecosystem functions and services in the coastal zone and the Bulgarian Black Sea Economic Zone. (RP.I.4.)

2.1.19. Epilithic diatoms from the Southern Gulf of Livingstone Island (Antarctica): opportunities for bioindication with colonization of new substrates in conditions of climate change.

2.1.20. IICAV, in cooperation with a specialized company financed under a European project, installed (free of charge for the beneficiaries) 3 meteorological stations in Primorsko and Varna, the readings of which are already actively used by local institutions.

2.1.21. According to the ICAMOS project "Information complex for aerospace environmental monitoring", financed under OP "Development of the competitiveness of the Bulgarian economy", procedure BG161PO003-1.2.04 "Development of applied research in research organizations in Bulgaria", the laboratory base of ICIT-BAS was improved.

At **Thracian University Stara Zagora**, 6 projects related to energy-efficient design and construction have been implemented. With own funding, under the operational program "Regional Development" and together with the National Trust Ecofund, the educational infrastructure at the university has been improved, a suitable and cost-effective infrastructure has been provided in Dormitory 1 through a complex of energy efficiency measures.

In 2020, afforestation of 250 trees was carried out on the territory of Thracian University, Student Town, Stara Zagora - sycamores and lindens.

The University of Ruse is actively working on the National Scientific Program "Low-Carbon Energy for Transport and Home Affairs", which was approved by Decision No. 577 of the Council of Ministers from 2018 and is financed by the Ministry of Education and Science. The program focuses on 4 main components:

1 Storage and conversion of renewable energy (Component 1)

2 Electric vehicles and hydrogen mobility (Component 2)

3 Effective methods for CO₂ capture and utilization (Component 3)

4 Project management, communications and dissemination of results (Component 4)

Together with the Municipality of Ruse, BAS and the University of Ruse, a concept project for a river cruise ship with a special purpose was developed. The project was developed under a public call by the Fuel Cells and Hydrogen Joint Undertaking (FCH JU).

A prototype of a city car powered by hydrogen fuel was created at the University of Ruse and is part of the success of the student team that participated in the Shell Eco Marathon

2019 competition. The basis of the construction of the laboratory created at the University of Ruse is the National Program "Low Carbon Energy for Transport and Household", financed by the Ministry of Education and Culture.

For the first six-month period of implementation of the NNP EPLUS, 7 scientific works were published in journals with an impact factor.

At the **University of Mining and Geology "St. Ivan Rilski"**, scientific studies were conducted, aimed at the "Waste" sector: Contract No. KP-06-H27/4 "Integrated bioelectrochemical elements in bioenergy production systems".

4 specialized teaching and research laboratories have been built at **Gabrovo Technical University**. Development of research and educational projects related to the subject:

- number of international projects - 4
- number of national projects – 7
- number of projects specifically financed from the state budget - 20
- number of projects with external companies – 4.

Participation in scientific projects on the problems of climate change, tailored to the specifics of training **at the UACG:**

1. Participation in international projects - 4
2. Scientific projects with national funding - 14

Participation in scientific projects of an international scale is part of the activity of UACG. To support the research staff in the development of scientific projects with national budget funding, the Center for Scientific Research and Design was established.

UACG participates as a partner in the project "Project BG05M2OP001-1.002-0019: "Clean technologies for a sustainable environment - water, waste, energy for a circular economy" (Clean&Circle) for the construction and development of a Competence Center is financed under the Operational Program "Science and Education for Smart Growth", co-financed by the European Union through the European Structural and investment funds. The Competence Center concept is based on three vertical and four horizontal modules. The vertical modules are "Water", "Solid waste" and "Transfer". In the modules "Water" and "Waste" work is carried out in the directions "Monitoring, assessment and identification of problems" and "Creation of clean technologies". In both modules, activities on the circular economy and the achievement of energy and resource efficiency are included as horizontal priorities.

In the "Industrial Heat Engineering" department, 5 projects have been developed under the Science fund at the **UFT** for surveying the energy efficiency of the educational buildings and student dormitories "Maritsa" of the UFT.

Practical-applied scientific research through the High-tech Park - **TU-Varna EOOD**. Contracts with contractors Solvay Sodi AD, Bulyard Shipbuilding Industry EAD, MTG Delfin, Lukoil Neftohim Burgas, Kozloduy NPP, AFER EOOD, Municipality of Varna, Dietsmann Energoremont Holding, Siemens, etc.

Participation in the creation of a National Center for Mechatronics and Clean Technologies through two laboratories: L4S4 "Energy Efficient Electric Transport" and L11S3 "Marine Robotics"

Participation in Competence Centers with a laboratory "Intelligent mechatronic, eco-and energy-saving systems and technologies".

Implemented projects BG16RFOP002-1.0005-0017, Ekobioproduct EOOD. 2 BG16RFOP002-1.005-0020, Smartsoft OOD, 3. BG16RFOP002-1.005-0164, Mostconsult OOD, 4.BG16RFOP002-1.005-0283, Pinconsult OOD, 5.BG16RFOP002-1.005-0165-C01, Mitra Translation OOD.

At the **Technical University Sofia**, supported by the BAS, the following were carried out:

- 1 DO1-205 – NPP "Low-carbon energy for household and transport (EPLUS)"
- 2 KP-06-FRACNOPHONIA/3 - Improving the energy efficiency of cars by optimizing the engine-turbocharger joint operation

3 DN17/15 – Virtual and experimental validation of the acoustic emissions of a rolling railway composition for ecological transport - ViVaEco

4 KP-06-N37/25 – Optimal design and management of electrical energy storage systems

5 KP-06-N37/30 – Harnessing the energy of sea waves through a hybrid system

6 KP 06 FRANCOPHONIA /2 – Intelligent system for the utilization of thermal energy from waste water.

The **Agricultural Academy** develops projects for organizing and optimizing organic, ecological and climate-neutral agriculture.

Specifically:

- Development of energy-saving, water-saving and environmentally friendly techniques and technologies for the production of plant and animal food safe for human health - 2 projects;

- Development of effective technologies and technical solutions for sustainable agriculture in conditions of a changing climate - 16 projects;

- New technological solutions in meadow farming to improve natural grass stands and carbon sequestration - 2 projects;

- Modern biotechnological approaches to preserve biodiversity and improve the economic qualities of agricultural crops and animals. Implementation of selected valuable forms of flora and fauna for the purposes of selection - 3 projects;

- Creation of new varieties and hybrids with increased productivity and resistance to stressful biotic factors: development of selection and reproduction methods - 6 projects;

- Biological, technological, ecological and economic aspects of micro-irrigation and chemization in fruit growing;

- Possibilities for reducing individual emissions of greenhouse gases /CH₄ and CO₂/ from ruminants in different production systems: innovations in nutrition and efficient use of feed - 3 projects;

- Technological models for economically expedient use of biogenic waste raw materials from animal husbandry;

- Greening and increasing the efficiency of special industries (beekeeping, animal husbandry, industrial game, etc.) – 3 projects;

- Resistance and tolerance of some agricultural crops to water deficit and extreme temperature effects of the environment;

- Agrobiological and technological research of some southern crops (actinidia, persimmon, pomegranate) with the aim of diversification;

- Plant pest risk analysis. Development of new and improvement of elements for integrated management of enemies in agroecosystems. Innovative solutions for plant health protection - 3 projects;

- Optimizing farming systems and defining good agricultural practices to mitigate climate change. Optimization of basic units of the technologies to ensure sustainable crop production of carbonate chernozem with a disturbed water regime under changing climatic conditions.

Measure 2. Fundamental research related to the reduction of greenhouse gas emissions

Bulgarian Academy of Sciences:

2.2.1. Project "Extreme phenomena and wind profile in a coastal area"

2.2.2. Project "Natural and anthropogenic factors of climate change - analysis of global and local periodic components and long-term projections"

2.2.3. Project "Influence of climate, atmosphere and waters on the environment, the parameters of the orientation of the Earth, the gravitational field and the movements of the observation stations"

2.2.4. Project "Assessment and analysis of climate changes on regional/local scales and some of their consequences"

2.2.5. Project "Joint Study of Atmospheric Dynamics and Three-Dimensional Structure of Atmospheric Pollution Fields"

- 2.2.6. Project "Bioclimatic Characteristics at Regional and Local/Urban Scales"
- 2.2.7. Project No. D01-230/06.12.2018 DSD-4 (RPI.1) DSD-4/25.02.2019 Work package I.1, Regional/local characteristics of the country's climate
- 2.2.8 Project "Bioclimatic parameterization of Bulgaria"
- 2.2.9. Project "Influence of aerosol and gas pollution on air quality above a populated place in a mountain valley"
- 2.2.10 NNP EPLUS – Low-carbon energy for transport and household
- 2.2.11. MASRI project - Infrastructure for sustainable development in the field of marine research, also tied to the participation of Bulgaria in the EURO-ARGO European infrastructure
- 2.2.12 Project “National Science Program”, RP.I.4. Processes, quality of the marine environment, ecosystem functions and services in the coastal zone and the Bulgarian economic zone of the Black Sea, RP I.4.2-1: Assessment of multi-year changes in the hydrophysical factors of the marine environment and their impact on individual components of the ecosystem
- 2.2.13 CMEMS BS-MFC-2 Project, Copernicus Marine Environmental Monitoring System - Black Sea Monitoring and Forecasting Center - Phase 2
- 2.2.14 CMEMS-INSTAC Project Copernicus Marine Environmental Monitoring System - Provision of in situ products - Phase 2
- 2.2.15 Project “Organization of an online training seminar for Copernicus Maritime Services dedicated to the Black Sea”, Lot 1

Through the Internal University Fund "Scientific Research" of the **University of Ruse "Angel Kanchev"**, the implementation of 7 projects related to the reduction of the amount of emitted greenhouse gases was financed:

Projects under national research programs - 7

Projects under programs financed by the European Union - 4

Projects financed by the "Ruse - City of the Free Spirit" Foundation and the "Econt" Foundation, as well as a project financed by the Udex company - "Improving the energy efficiency of the company "UDEX" EOOD" were implemented.

A project financed by the Student Council at Ruse University was also implemented: “Design and implementation of a system to study the dynamic properties of a prototype for the Shell Eco-marathon competition”.

University of Mining and Geology "St. Ivan Rilski": Scientific research aimed at the "Waste" sector: Project-KP-06-PM 47/5, "Optimization of the biomethanization process using microbial electrolysis cells" - funded through the 2020 Competition for Funding Fundamental Scientific Research of Young Scientists and Postdoctoral Students.

The topic of climate change is represented in the research and scientific activity of the academic staff of the UACG, and the topics of the developments are given in the full text of the report.

1. Scientific publications:

In international peer-reviewed scientific journals with an impact factor of 33

In international scientific publications - 18

In Bulgarian scientific publications - 28

2 Monographs – 5

3 Participation in conferences:

International conferences abroad - 14

International conferences in Bulgaria - 40

4 Doctoral studies - 22

5 Developed software products – 7

TU Varna "Investigation of the stability of the electric power system and frequency management with a predominant share of production from renewable energy", "Investigation of power consumption modes in electric supply systems for urban electric transport with two-way power transmission".

MES: Participation in the national scientific program Low-carbon energy for transport and household (EPLUS).

TU Gabrovo: BG05M2OP001-1.002-0023: Competence centre "Intelligent mechatronic, eco- and energy-saving systems and technologies".

TU Varna: KP-06-PN-37/52 "Investigation of the influence of malfunctions in the fuel supply system of gasoline engines with an additionally installed gas fuel injection system on the environmental indicators of the car"

TECHNICAL UNIVERSITY OF SOFIA; UNIVERSITY OF CYPRUS; EUROPEAN DYNAMICS BELGIUM:

1 DM17/6 – Closed cycle for environmental protection in thermal power plants by conversion of fly ash into zeolites and their application as carbon dioxide adsorbents;

2 DN17/18 – Synthesis of zeolites from coal ashes for adsorption, catalytic destruction and detection of atmospheric pollutants;

3 BG05M2OP001-1.002-0023-C01 – Competence Center "Intelligent mechatronic, eco- and energy-saving systems and technologies";

4 01/2 – Conceptual and simulation modelling of ecosystems;

5 BG05M2OP001-1.001-0008-C01 – National Center for Mechatronics and Clean Technologies;

6 BG05M2OP001-1.002-0011 – Competence Center MIRACLE - Mechatronics, Innovation, Robotics, Automation, Clean Technologies;

7 D01-230 – NNP "Protection of the environment and reduction of the risk of adverse phenomena and natural disasters";

8 SMARTCITY – An Innovative Approach for a Master's Program in Technologies for Smart Cities;

9 H2020-EU.3.3.4 – Pan European Technology Energy Research Approach (PANTERA);

10 H2020-EU.3.3.4 – An Integrated Platform for Increased FLEXibility in smart TRANSMission grids with STORAge Entities and large penetration of Renewable Energy Sources (FLEXITRANSTORE).

Table 5. Projects related to the protection of the environment, water and climate, financed by FNI in the period 2013 - 2020:

Contract	Topic:	Main organization	Head	Amount (in BGN)
DFNI E 02/16 of 12.12.2014	Effective use of waste biomass for energy and environmental purposes: potential of bioethanol as a feedstock fuel	Institute of Catalysis at BAS	Prof. Dr. Sonya Damyanova Ivanova	240000.00
DFNI E 02/19 of 12.12.2014	Influence of aerosol and gas pollution on air quality above a populated place in a mountain valley	University of Mining and Geology "St. Iv. Rilski"	Prof. Dr. Plamen Borisov Savov	100000.00
DFNI T02/2 of 12.12.2014	Development of a complex system for bioremediation of water contaminated with heavy metals and co-generation of energy based on microbial metabolism	University of Mining and Geology "St. Ivan Rilski"	Associate Professor Dr. Irena Ilieva Spasova	165000.00

Contract	Topic:	Main organization	Head	Amount (in BGN)
DN 07/7 of 15.12.2016	Investigation of Chemical, Electrochemical and Biological Processes in Microbial Fuel Cells in Mining Wastewater Treatment	Mining and Geology University "St. Ivan Rilski" - Sofia	Assoc. Dr. Anatolii Tsankov Angelov	120000.00
DN 07/12 of 15.12.2016	Research on environmentally compatible processes for the extraction and fractionation of valuable functional substances from waste biomass	Institute of Engineering Chemistry - BAS	Prof. Dr. Eng. G. Angelov	118600.00
DN 04/1 of 13.12.2016	A study of the combined effects of the natural radioactive background, UV radiation, climate change and cosmic rays on model groups of plant and animal organisms in mountain ecosystems	Institute for Nuclear Research and Nuclear Energy (INRNE) at BAS	Assoc. Dr. Hristo Angelov	120000.00
DN 04/3 of 17.12.2016	Arsenic migration in riparian zones: relation of river and groundwater dynamics to arsenic mobilization in polluted river terraces	National Institute of Geophysics, Geodesy and Geography - BAS	Associate Professor Dr. Tsvetan Kostadinov Kotsev	120000.00
DN 04/4 of 15.12.2016	Study of processes of transfer and deposition of atmospheric pollutants in Bulgaria	National Institute of Meteorology and Hydrology, BAS	Associate Professor Dr. Emilia Venkova Georgieva	119996.00
DN17/12 of 12.12.2017	Man as a physiological source of deterioration of air quality and comfort conditions in inhabited non-industrial indoor environments	Technical University Sofia	Prof. Dr. Petar Stankov	120000.00
DN17/20 of 12.12.2017	Functional composite nanomaterials derived from natural sources for environmental protection	University of Mining and Geology "St. Ivan Rilski"	Ch. Assistant Professor Gospodinka Dinkova Gicheva,	120000.00

Contract	Topic:	Main organization	Head	Amount (in BGN)
DN17/25 of 20.12.2017	Preparation, purification and immobilization of lipase in solid-phase cultivation of <i>Rhizopus arrhizus</i> as a tool for the development of eco and "green" technologies	University of Food Technology, Plovdiv	Prof. Dr. Georgi Todorov Dobrev	120000.00
DM17/2 of 12.12.2017	Integration of Plant-Sediment Microbial Fuel Cells in Engineered Wetlands for the Treatment of Oil-Contaminated Water	University of Mining and Geology "St. Ivan Rilski"	Assoc. prof. eng. Rosen Valeriev Ivanov	20000.00
DM17/6 of 12.12.2017	Closed cycle for environmental protection in thermal power plants by conversion of fly ash into zeolites and their application as carbon dioxide adsorbents	Technical University Sofia	Assoc. prof. eng. Denitsa Zgureva	19300.00
DN14/3 of 13.12.2017	Assessment and analysis of climate changes on regional/local scales and some of their consequences	National Institute of Geophysics, Geodesy and Geography, BAS	Member-Correspondent, Prof. D.Sc. Kostadin Ganchev Ganev	120000.00
DN14/6 of 13.12.2017	The natural environment in the Pirin Mountains under conditions of climate change	SU "St. Kliment Ohridski"	Prof. Dr. Georgi Donchev Rachev	113570.00
DN14/7 of 13.12.2017	Chemical forms and behaviour of transition metals in polluted natural waters and soils and their influence on the ecosystem vegetation - small mammals - endoparasites. Experimental study and thermodynamic modelling	Institute of General and Inorganic Chemistry, BAS	Prof. Dr. Diana Todorova Rabadzhieva	120000.00

Contract	Topic:	Main organization	Head	Amount (in BGN)
DM14/1 of 11.12.2017	Modern trends in the regime and characteristics of the snow cover in Bulgaria	National Institute of Meteorology and Hydrology - Bulgarian Academy of Sciences (NIMH - BAS)	Assoc. prof. Dimitar Nikolov	20000.00
DM14/2 of 20.12.2017	Geological and ecological risks related to the study of deep and shallow aquifers from the region of Central Northern Bulgaria	MGU "St. Ivan Rilski"	Ch. Assistant Professor Nikolay Krasimirov Hristov,	20000.00
KP-06-N24/2 of 08.12.2018	Relationship of the spatial distribution of heavy metals in soil to the morphology of polluted floodplain terraces	National Institute of Geophysics, Geodesy and Geography, BAS	Prof. Dr. Georgi Zhelezov Georgiev	120000.00
KP-06-OPR03/3 of 14.12.2018	Profiles of spatial differentiation of river water quality in basins with heterogeneous anthropogenic impact	National Institute of Geophysics, Geodesy and Geography, BAS	Assoc. Dr. Marian Stoyanov Varbanov	120000.00
KP-06-N37/5 of 06.12.2019	Sustainable resource supply chains in terms of environmental, economic and social criteria	Institute of Engineering Chemistry, BAS	Prof. Dr. Elisaveta Georgieva Kirilova	120000.00
KP-06-N37/27 of 18.12.2019	Smart textile materials with ecological and biomedical applications	Chemical Technology and Metallurgy University - Sofia	Assoc. prof. eng. Desislava Staneva Grabcheva	120000.00
KP-06-M37/3 of 06.12.2019	Utilization of RDF fuel waste to obtain innovative nanoporous carbon materials for environmental protection	Institute of Organic Chemistry with Phytochemistry Center, BAS	Assoc. prof. eng. Ivanka Georgieva Stoycheva	30000.00
KP-06-N34/9 of 19.12.2019	A study of carbon and some significant hydrocarbons in atmospheric aerosol in an	National Institute of Meteorology and Hydrology	Assoc. Dr. Elena Hristova	119790.00

Contract	Topic:	Main organization	Head	Amount (in BGN)
	urban environment			
KP-06-M34/1 of 09.12.2019	Extraction of heavy metals from wastewater	Institute of Mineralogy and Crystallography, BAS	Assoc. prof. Lilya Tsvetanova	30000.00
KP-06-PN44/1 of 26.11.2020	Complex radioecological study of natural water resources	Institute for Nuclear Research and Nuclear Energy - BAS	Prof. Dr. Dimitar Tonev	170000.00
KP-06-M47/2 of 26.11.2020	Discovery of geometric characteristics and classification of tree species in Bulgaria for the purpose of environmental protection, part of NATURA 2000	Technical University Sofia	Assoc. prof. eng. Nikol Veselinova Hristova	30000.00
DN01/17 of 22.12.2016	Expansion of the pine beetle THAUMETOPOEA PITYOCAMPA (DENIS & SCHIFFERMULLER, 1775) (LEPIDOPTERA, THAUMETOPOEIDAE) in Bulgaria - a dangerous allergen and economically significant pest in pine ecosystems	Forestry Institute, BAS	Member-Correspondent Dr of Sc Plamen Borisov Mirchev	BGN 110,000.00
DN11/4 of 14.12.2017	The soil microbiome as an indicator of biodiversity and evolution of microbial communities under persistent heavy metal contamination	Institute of Molecular Biology, BAS	Assoc. Prof. Galina Radeva	BGN 120,000.00
DN11/13 of 18.12.2017	Biodiversity of the families Eulophidae and Pteromalidae (Hymenoptera: Chalcidoidea) in mountain habitats. Barcoding and distinguishing morphologically related	Institute of Biodiversity and Ecosystem Studies - BAS	Assoc. Prof. Dragan Chobanov, PhD	BGN 70,108.68

Contract	Topic:	Main organization	Head	Amount (in BGN)
	species.			
DN11/14 of 18.12.2017	Phylogeographic pathways and barriers between the Balkans, the Carpathians and Asia Minor: a combined evolutionary-ecological study on a model group of insects (Insecta: Orthoptera: Barbitistini)	Institute of Molecular Biology, BAS	Assoc. Georgi Angelov Miloshev, prof.	BGN 119,992.00
DM11/2 of 15.12.2017	Influence of the ecological condition of the Varna and Burgas bays on the population-biological parameters of the mullet fish species (Mugil cephalus, Liza aurata and Liza saliens)	Institute of Oceanology - BAS	Prof. Radoslava Ivanova Bekova	BGN 20,000.00
KP-06-N21/1 of 17.12.2018	Cybertaxonomic approach in phylogenetic studies on model genera of invertebrates (Invertebrata, Arachnida, Insecta) to clarify problems of the origin, formation and conservation of the invertebrate fauna of the Balkan Peninsula	NPM-BAN	Prof. Dr. Pavel Stoev 897802524	BGN 119,904.39
KP-06-N21/2 of 18.12.2018	The Thracian mounds – hotspots of biodiversity and islands for the protection of natural flora and vegetation	IBEI - BAS	Prof. Dr. Iva Apostolova	BGN 119,660.00
KP-06-N21/7 of 18.12.2018	Study of ecological pressure in the Bulgarian Black Sea water area by means of integrated microbiological, biochemical and genetic markers in the Black Sea mussel Mytilus	"Episkop Konstantin Preslavski" University of Shumen	Prof. Dr. Tsveteslava Ignatova-Ivanova	BGN 120,000.00

Contract	Topic:	Main organization	Head	Amount (in BGN)
	galloprovincialis Lam.			
KP-06-N21/8 of 18.12.2018	Mechanisms of recovery from drought induced water and low temperature stress: survival strategies of the resurgent plant <i>Haberlea rhodopensis</i>	IFRG, BAS	Prof. Dr. Katya Georgieva	BGN 120,000.00
KP-06-N21/11 of 18.12.2018	A study of pheromone communication in the viper (<i>Vipera ammodytes</i>) and its role in the behaviour of the species.	IBEI - BAS and IOHCF-partners	Assoc. Dr. Borislav Naumov	BGN 120,000.00
KP-06-H21/16 of 12.12.2019	The diversity of alpine plants in Bulgaria under the influence of climate change: installation of GLORIA sites for long-term monitoring and assessment of the risk of biodiversity loss (GLORIA – Bulgaria)	IBEI, BAS	Assoc. Dr. Anna Ganeva	BGN 120,000.00
KP-06-M21/1 of 12.12.2019	Extremophilic algae flora in thermo-mineral springs in South-West Bulgaria: changes in composition, conservation and assessment of new, threatened and invasive species	SU "St. Kliment Ohridski"	Assoc. Prof. Petya Draganova	BGN 20,000.00
KP-06-M21/2 of 12.12.2018	Study of faunal diversity, assessment of status and ecosystem services in different types of model ecosystems in Sarnena Sredna Gora	IBEI - BAS	Assoc. Professor Teodora Teofilova	BGN 19,993.60

Contract	Topic:	Main organization	Head	Amount (in BGN)
KP-06-N-31/3 of 10.12.2019	Interaction between forests and avalanches in Pirin, Bulgaria	IEMPAM, BAN	Assoc. Prof. Ekaterina Pavlova	BGN 101,400.00
KP-06-N-31/6 of 11.12.2019	Complex ecotoxicological study of psammophilic mussel species from sublittoral habitats of the Bulgarian Black Sea water area	Institute of Neurobiology - BAS	Assoc. Dr. Albena Aleksandrova	BGN 120,000.00
KP-06-N-31/9 of 11.12.2019	Marine benthic diatoms as a tool for assessing anthropogenic pressure along the Black Sea coast	Institute of Oceanology - BAS	Dr. Ralitsa Petrova Zidarova	BGN 120,000.00
KP-06-N-31/12 of 11.12.2019	Forest Management Scenarios for the Conservation of Plant and Fungal Diversity under Climate Change (MFORDIV)	Institute of Biodiversity and Ecosystem Studies, Bulgarian Academy of Sciences	Prof. Dr. Tsvetan Mladenov Zlatanov	BGN 120,000.00
KP-06-M-31/3 of 24.9.2019	Study of the distribution and impact of the invasive alien species <i>Impatiens glandulifera</i> Royale on the natural habitats in the gorge of the river Iskar between Plana and Lozenska mountain	Paisii Hilendarski University of Plovdiv	Assoc. Prof. Plamen Stankov Glogov	BGN 30,000.00
KP-06-M-31/4 of 26.09.2019	Assessment of the Bulgarian Fauna of Fulgoromorpha (Insecta: Hemiptera) and preparation of a regional red list of rare, endemic and endangered species,	Sofia University "St. Kliment Ohridski"	Assoc. Prof. Iliya Gyonov	BGN 30,000.00
KP-06-N-41/7 of 30.11.2020	An ecosystem approach to assess the biodiversity and population status of key fish species from the Bulgarian Black Sea coast	Institute of Oceanology "Prof. Fridtjof Nansen" - Varna, PARTNERS - Institute of Neurobiology	Assoc. Prof. Albena Aleksandrova	164,416.00 with DMA, 119,800.00 without DMA

Contract	Topic:	Main organization	Head	Amount (in BGN)
KP-06-M-41/2 of 27.11.2020	Influence of changing climatic conditions and increasing anthropogenic pressure on ichthyofauna in brackish (transitional) waters along the Bulgarian Black Sea coast	Institute of Oceanology "Prof. Fridtjof Nansen" - Varna	Assoc. Prof. Radoslava Bekova	BGN 30,000.00
KP-06-M-41/3 of 27.11.2020	Structure and function of fungal communities: adaptability of key fungal species to heavy metal-contaminated soils	Institute of Molecular Biology "Acad. Rumen Tsanev"	Dr. Michaela Alexova	BGN 30,000.00
KP-06-N23/1 of 17.12.2018	Building Radon Health Risk Assessment Models in Public Access Buildings for Long-Term Social Benefits	NCRRP	Associate Professor Kremena Ivanova	BGN 120,000.00
KP-06-OPR 03/12 of 18.12.2018	A model for sustainable management of urban soils by building buffer green areas around transport arteries in order to improve the quality of life	Paisii Hilendarski University of Plovdiv	Prof. Dr. Katya Georgieva	BGN 120,000.00
DFNI I02/15 of 12.12.2014	Information system for integrated risk assessment of natural disasters	University of National and World Economy	Prof. Dr. Dimitar Velev	222750
DFNI B02/4 of 12.12.2014	Environmentally friendly methods and means for controlling viral and bacterial diseases on vegetable crops from Solanaceae family to produce quality produce	Institute of Vegetable Crops "Maritsa" - Plovdiv	Prof. Dr. Stoyka Masheva	210000
DFNI B02/8 of 12.12.2014	Biogenic volatile organic compounds, global climate change and the ability of plants to adapt to a changing environment	Institute of Plant Physiology and Genetics - BAS	Prof. Dr. Violeta Velikova	135000

Contract	Topic:	Main organization	Head	Amount (in BGN)
DFNI E02/7 of 12.12.2014	Statistical modelling of environmental and human risk of soil contamination with heavy metals	Sofia University "St. Kliment Ohridski"	Prof. Dr. Stefan Tsakovski	184000
DFNI E02/13 of 12.12.2014	New eco-technologies for biodegradation of organic waste with production of hydrogen and methane	"Stefan Angelov" Institute of Microbiology - BAS	Assoc. Prof. Ivan Simeonov	240000
DN 06/1 of 14.12.2016	Organic molecular markers and contaminants in hydrophobic soils	Institute of Soil Science, Agrotechnology and Plant Protection "N. Pushkarov", AA	Prof. Dr. of Sc. Irena Dimitrova Atanasova	120000
DN 16/4 of 11.12.2017	An integrated approach to modelling wildfire spread	Forestry Institute - BAS	Prof. Dr. of Sc. Hristo Ivanov Tsakov	120000
DM 16/5 of 20.12.2017	Integrated analysis of the capacity of forest ecosystems from Sredna Stara Planina to reduce the influence of toxic elements: condition, dispersion, degradation and impact	Forestry Institute - BAS	Assoc. Prof. Rositsa Yaneva	20000
KP-06-N 26/11 of 18.12.2018	Role of carotenoids in the efficiency and resistance of the photosynthetic apparatus of higher plants to environmental changes	Institute of Biophysics and Biomedical Engineering - BAS	Prof. Dr. Antoaneta Vidolova Popova	120000
KP-06-M 26/3 of 30.11.2018	Application of integrated biomarkers in an assessment model of aquatic ecosystems contaminated with priority organic substances	Paisii Hilendarski University of Plovdiv	Assoc. Prof. Vesela Yancheva	20000
KP-06-OPR 03/7 of 17.12.2018	Assessment of the ecosystem service "water" provided by water conservation forest	Forestry University	Assoc. Prof. Nevena Vasileva Shuleva	120000

Contract	Topic:	Main organization	Head	Amount (in BGN)
	areas in Bulgaria			
KP-06-OPR 03/6 of 17.12.2018	Assessment and mapping of ecosystem services in high mountain areas in Rila and Pirin for sustainable management of natural resources	Forestry Institute - BAS	Prof. Dr. Maria Hristova Glushkova	120000
KP-06 N 36/11 of 13.12.2019	"Socio-economic efficiency of using WWTP sludge in agriculture"	Institute of Agrarian Economics	Assoc. Prof. Bozhidar Ivanov	118800
KP-06 N 36/13 of 17.12.2019	Structural-functional characteristics and prospects for the use of endemic relict conifer communities in Bulgaria in the conditions of a changing climate	Institute of Biodiversity and Ecosystem Studies (IBEI) - BAS;	Prof. Dr. Tsvetomir Denchev	120000
KP-06 M 36/4 of 17.12.2019	Increasing the upper limit of the forest in Tsarichina Reserve as an example of a positive response of forest ecosystems to climate change and land use change	Forestry Institute - BAS	Chief Assist. Dimitar Dimitrov	30000
KP-06 N 46/1 of 27.11.2020	Effectiveness of anti-erosion agrotechnologies to improve soil quality and hydrological regime and limit greenhouse gas emissions	Institute of Soil Science, Agrotechnology and Plant Protection "N. Pushkarov" - Sofia	Assoc. Prof. Viktor Kolchakov	118400
KP-06 M 46/1 of 27.11.2020	Biodiversity of forest ecosystems of the middle old mountain under conditions of change	Forestry Institute	Assoc. Prof. Rositsa Yaneva	30000
KP-06 M 46/3 of 27.11.2020	Effect of drought on maize and sorghum photosynthesis	Institute of Biophysics and Biomedical Engineering	Assoc. Prof. Martin Stefanov	30000

The **Agricultural Academy** carries out a variety of fundamental researches, financed by the "Scientific Research" Fund:

- KP-06-N26/7: Using biocoal for sustainable agriculture;
- KP-06-PN-36/3: Innovative method for optimal fertilization of agricultural crops;
- KP-06-PN-36/6: Innovative solutions for protecting plant health and obtaining quality and healthy fruits;
- KP-06-PN-36/14: Opportunities to improve productivity and reduce methane production in ruminants through algae extracts;
- DN 06/12: Study of adaptive mechanisms of drought tolerance in Bulgarian winter wheat varieties;
- KP 06 IP – China/1: Unravelling the mechanisms that predetermine or trigger the reprogramming of drought tolerance in native resurgent plants, with the aim of improving the stress response of crop plants;
- DN16/9: Functional and bioinformatic analyses of grass- transcription factors related to the response to abiotic and biotic stress in annual (*Medicago truncatula*) and perennial (*Medicago sativa*) alfalfa;
- KP-06-N36/11: Socio-economic efficiency of the use of the sludge from the WWTP in agriculture (AGRORING);
- KP-06-N37/21: An integrated approach for complex utilization of waste products from the oil industry: sunflower and rapeseed meal;
- KP-06 N 46/6: Use of biostimulants in organic cultivation of agricultural crops - assessment of contributions to the bioeconomy;
- KP-06-PN-36/5: Current phytopathological problems in fruit species in Bulgaria: unexplored and invasive alien phytopathogens with a potential risk to biodiversity and biosecurity;
- DN 14/9: Identification, distribution and functions of pyrogenic carbon in soils from mining and energy regions in the country;
- KP-06 PN 36/7: Optimizing the composition and action of plant hydrolysates to maintain soil fertility in the conditions of sustainable agriculture;
- KP-06-N46/1: Effectiveness of anti-erosion agrotechnologies to improve soil quality and hydrological regime and limit greenhouse gas emissions;
- KP-06-N 26/12: Identification of pea source material with increased content of essential micronutrients, basis for biofortification and increased symbiotic nitrogen-fixing potential.
- KP 06-N26/1: Use of insects as alternative sources of protein in bird nutrition and their impact on environment, health and livelihoods.

Within the framework of the National Scientific Program "Protection of the Environment and Reduction of the Risk of Adverse Phenomena and Natural Disasters", financed by the Ministry of Education and Science, the Agricultural Academy provides data for the development of up-to-date maps and predictive models for the state and change of the aqua- and agro-ecosystems with intensive use and the ecosystem services they provide, and creates a genetic database that will serve to develop measures to protect populations in the studied marine and terrestrial ecosystems.

Measure 3. Increasing the knowledge and qualification of research staff on climate change issues.

Bulgarian Academy of Sciences:

2.3.1. Participation of scientists from IICAV-BAS in qualification trainings related to improving research capacity on climate change issues:

-Four scientists from IICAV-BAS are included in a training group on the use of high-tech generated climate data from the database of the "COPERNICUS" / EU program

- several people have been trained in the use of specific software for determining WEAP water balances;

- 1 has completed a qualification course on ecosystem services and environmental protection on the Black Sea coast.

- In 2019-2020, an assistant majoring in "Hydrogeology" prepared a master's degree in "Ecology and Environmental Protection" at MGU - Sofia. In 2020, one specialist started training in the Master's program "Ecology and Ecosystem Protection" at Plovdiv University "Paisii Hilendarski" and one specialist started Master's in Meteorology at Sofia University "St. Kliment Ohridski".

2.3.2. Participation of scientists in seminars and conferences dedicated to climate, atmospheric phenomena and water:

- 2 scientific conferences "Climate, atmosphere and water resources under conditions of climate change", organized by IICAV-BAS in 2019 and 2020.

- Conference on Climate Change Adaptation and Mitigation: "Towards farms with zero carbon-, waste- and water-footprint. Roadmap for sustainable management strategies for the Balkan agricultural sector", Greece, 2020

-Climate needs action: webinar on achieving low carbon transport in cities, UK, 2020;

- EMS Annual meeting on Applied Meteorology and Climatology, Slovakia, 2020;

-20th International Scientific GeoConference SGEM, Bulgaria, 2020;

-9th International Symposium on Atmospheric Sciences ATMOS, Turkey, 2019;

- Eleventh Workshop Solar Influences on the Magnetosphere, Ionosphere and Atmosphere, Bulgaria, 2019;

- 2019 EMS Annual Meeting: European Conference for Applied Meteorology and Climatology, Denmark;

- ITM 2019 – 37th International Technical Meeting on Air Pollution Modeling and its Application, Germany;

- XXIII All-Russian Annual Conference "Solar and Solar-Terrestrial Physics-2019", Russia

2.3.3. Participation of scientists from IICAV-BAS in the work of national councils, commissions and other expert bodies, scientific and specialized councils, international scientific organizations, non-governmental associations, scientific juries, etc., such as: Climate Change Coordination Council at the Ministry of Education, International Panel for Earth Rotation and Climate Changes, Higher Advisory Council on Water at the MoEW, Working Group for Formulation of the "Environment" Program for the period 2021-2027 at the MoEW, Basin Council at the Basin Directorate (BD) "Eastern White Sea Region", Working Group 35 of the Council for European Affairs (CEA), Programme Committee of Horizon2020-SC5 "Climate Action, Environment, Resource Efficiency and Raw Materials", Commission of Climate and Tourism, Commission of Climate and Health at ISB, International Association on Urban Climatology, Bulgarian Meteorological Society, European Meteorological Society, European Geosciences Union, World Meteorological Organization, American Meteorological Society, Danish Meteorological Society, Bulgarian Water Association, etc.

2.3.4. Scientists from IICAV-BAS participate in international cooperation and scientific networks for the exchange of knowledge and experience:

- International Network to Encourage the Use of Monitoring and Forecasting Dust Products (28 countries)

- Profiling the atmospheric Boundary layer at European scale (28 countries)

- BIOMETNET

-Influence of climate, atmosphere and water on environment, Earth orientation parameters, gravity, and observation station movements (2 countries)

-Climate and flora changes in coastal areas – a parallel between the Bulgarian Black Sea and Azerbaijan Caspian coasts (2 countries)

- From the study of meteorological situations related to episodes of air pollution in coastal areas in Italy and Bulgaria to the analysis of multi-year data (2 countries)

2.3.5. Participation of scientists from NIGGG-BAS in seminars and conferences dedicated to climate, atmospheric phenomena and water:

- One scientific conference "1st International conference on ENVIRONMENTAL protection and disaster RISKS", organized by NIGGG-BAN in 2020.

- The Second Scientific Conference "Climate, atmosphere and water resources in the face of climate change" - 15.10.2020 - 16.10.2020 Sofia, Bulgaria
 - Conference on Climate Change Adaptation and Mitigation: "Towards farms with zero carbon-, waste- and water-footprint. Roadmap for sustainable management strategies for Balkan agricultural sector" - 12.02.2020 - 14.02.2020 Thessaloniki, Greece
 - 2nd European Workshop of LIFE ASTI titled "Urban Heat Island and Heat Resilience: Networking for Future Strategy - 14.10.2020 - 14.10.2020 Thessaloniki, Greece
 - International video-workshop, International video-workshop "Visualization of information on climate and climate change" - 14.05.2020 - 14.05.2020
- 2.3.6. Participation of scientists from ICIT-BAS in qualification trainings related to improving research capacity on climate change issues:
- Three scientists from ICIT-BAS are included in a training group on the use of high-tech generated climate data from the database of the "COPERNICUS" program of the European Union
 - several people have been trained in the use of specialized software for the processing of satellite images for the purposes of remote sensing of the Earth;
 - 2 have organized a qualification course for UAV management with the aim of ecosystem services and environmental protection on the Black Sea coast.
- 2.3.7. Participation of scientists in seminars and conferences dedicated to climate, atmospheric phenomena and water:
- 2 scientific conferences "Space, Ecology, Security" organized by ICIT-BAN in 2019 and 2020.
 - Eleventh Workshop Solar Influences on the Magnetosphere, Ionosphere and Atmosphere, Bulgaria, 2019;
 - Twelfth Workshop Solar Influences on the Magnetosphere, Ionosphere and Atmosphere, Bulgaria, 2020
 - All-Russian Open Conference "Contemporary Problems of Remote Sensing of the Earth through Space", Moscow, Russia in 2019 and 2020
 - XXIII All-Russian Annual Conference "Solar and Solar-Terrestrial Physics-2019", Russia
- 2.3.8. Participation of scientists from ICIT-BAS in the work of national councils, commissions and other expert bodies, scientific and specialized councils, international scientific organizations, non-governmental associations, scientific juries, etc., such as: Coordination Council on Climate Change and Land Cover at the MoEW, Working Group 35 at the Council for European Affairs, European Geosciences Union, etc.
- 2.3.9. Scientists from ICIT-BAS participate in international cooperation and scientific networks for the exchange of knowledge and experience:
- Innovative optical tools for proximal sensing of ecophysiological processes (OPTIMISE)
- 2.3.10. Participation of scientists in seminars and conferences dedicated to climate, atmospheric phenomena and water:
- 7th Euro-Argo Science Meeting, 22-23 October 2019 in Athens, Greece
 - 1st International conference on ENVIRONMENTAL protection and disaster RISKS, 29 September - 01 October 2020, Sofia, Bulgaria
 - Copernicus Marine Service online training workshop for the Black Sea Region, 19 May 2020
 - International Conference on Zoology and Zoonoses, 22-23 October 2019, Hissar, Bulgaria,
 - Fifteenth International Conference on Marine Sciences and Technologies Black Sea 2020, Varna Scientific and Technical Unions, 2020
- 2.3.11. Participation of scientists from IO-BAS in the work of national councils, commissions and other expert bodies, scientific and specialized councils, international scientific organizations, non-governmental associations, scientific juries, etc., such as:
- Operations Committee of EOOS (European Ocean Observing System)
 - Working group on management, exchange and quality of oceanographic data DATAMEQ (Data Management, Exchange and Quality) at EuroGOOS (European Global Ocean Observing System)
 - National interdepartmental working group for invasive alien species at the MoEW,

- Basin Council of the Basin Directorate (BD) "Black Sea Region",
- National Biodiversity Council,
- Advisory Council on Environmental Protection,
- Advisory and coordination council for environmental protection in the marine waters of the Black Sea, etc.

2.3.12. Scientists from IO-BAS participate in international cooperation and scientific networks for the exchange of knowledge and experience:

- The National Center for Oceanographic Data (NCOD) is included in the system of national centres of the Committee on International Oceanographic Data Exchange (IODE) of the Intergovernmental Oceanographic Commission.
- The National Oceanographic Data Center (NODC) is a partner in the Black Sea Network for the Exchange of Oceanographic Data and Information (ODINBLACKSEA) of the Committee for the Exchange of Oceanographic Data (IODE) of the Intergovernmental Oceanographic Commission (IOC).
- IO-BAS represents Bulgaria in the European scientific infrastructure for ocean observation EURO-Argo ERIC. In 2018, Bulgaria joined the consortium of European scientific infrastructure for ocean observation EURO-Argo ERIC. Euro-Argo includes the participation of 13 countries: 11 members and 2 observers. In 2014, Euro Argo acquired the status of a European Scientific Research Consortium (ESRC).
- SeaDataNet – Pan-European network for the management of
- oceanographic data
- LTER - Network for Long-Term Environmental Research
- EMODNet - European Maritime Observation and Data Network

Technical University Sofia:

1 Participation of academic staff in scientific seminars to increase knowledge and qualification

1.1. Scientific workshop on "CO2 Transportation Risk Assessment", Bucharest, Romania

1.2. Scientific workshop on "Environmental Engineering and Earth's Climate Change" in Songdal, Norway

1.3. Scientific workshop on "Environmental Protection" in Tianjin, China

1.4. Scientific workshop on "RES and environment" in Genoa, Italy

2 Scientific exchange lasting no less than two weeks

2.1. Under COST Action 087/14, COST Action CM 1404, 03/2015-03/2019, on "Chemistry of Smart Energy Carriers and Technologies (SMARTCATS)"

2.2. COST Action CA15102 CRM-Extreme "Solutions for critical raw materials under extreme conditions"

3 Scientific exchange under the ERASMUS program in scientific research laboratories in partner universities on topics from the field of climate change research.

UACG: Educator training on climate change is an integral part of continuing academic learning.

1. Participation of teachers in international training - 8

2. Participation of teachers in international educational projects - 5

IV. Summary assessment of implemented measures

The overall assessment of the achieved and expected reductions in greenhouse gas emissions from the implemented measures was carried out after processing the information received by the Ministry of Environment and Water from all interested institutions and organizations.

The concept and implementation of the measures of the Third NAPCC lays down the conservation, rational and responsible use of resources as a key prerequisite not only for the improvement and protection of the environment, but also for achieving sustainable economic growth and increasing the competitiveness of the Bulgarian economy. The introduction of low-carbon, energy-efficient and waste-free technologies, as well as the utilization and recycling of a greater amount of waste, contributes not only to the overall reduction of greenhouse gas emissions, but also to the increase of productivity and resource efficiency.

Opportunities are created for the discovery of new sources of growth and jobs through cost savings, market realization of innovations and better management of resources throughout their life cycle.

The presented policies and measures by sector contribute to the reduction of greenhouse gas emissions in Bulgaria. The overall effect of their implementation guarantees the achievement of the legally binding goals for our country under the "Climate and Energy" package, as well as the energy efficiency goals.

The main sources of funding for the implementation of the measures are: the structural and cohesion funds of the EU; The European Agricultural Fund for Rural Development; donor funds of international financial institutions such as the EBRD and the World Bank; The EU Emissions Trading Scheme; the National Green Investment Scheme; The National Fund for Energy Efficiency; Kozloduy fund; PUDOOS and others.

Distribution of expected and saved emissions by sector:

- **Sector "Energy"** - The expected effect of implementing the measures of the action plan is 2,638,286 tons of CO₂ eq./year of saved emissions. The emissions actually saved are estimated at 3,584,730 tons of CO₂ eq./year, taking into account that one of the measures with a direct effect is not implemented.
- **"Household and services" sector** - 605,945 t CO₂ eq./year were saved from an expected 423,617 t CO₂ eq./year.
- **Sector "Industry"** - According to the measures set in the sector and the expected effect of their implementation - 808,286 t CO₂ eq./year, 715,869 t CO₂ eq./year have been saved. In the calculations, it was also taken into account that one measure with a direct effect was not implemented.
- **"Waste" sector** - From the implemented measures in the sector, 1,124,992 t CO₂ eq./year were saved from an expected 1,702,782 t CO₂ eq./year. All measures set out in the plan are being implemented.
- **Sector "Agriculture"** - The measures laid down in the document in the sector have been exceeded and as a result the saved emissions are 457,375 t CO₂ eq./year from an expected 4,135 t CO₂ eq./year.
- **Sector "Land use, land use change and forestry" (LUCLUF)** - in this sector, the measures set were exceeded and 88,496 t CO₂ eq./year were saved from the expected 11,537 t CO₂ eq./year.
- **"Transport" sector** - According to the measures set for implementation in the sector, it is planned to reduce emissions by 745,932 t CO₂ eq./year. The data for the sector show that the measures are implemented successfully and the emissions saved are 1,485,466 t CO₂ eq./year.

The total effect of the measures in all sectors, expressed in saved greenhouse gas emissions, amounts to 8,062,874 t CO₂ eq./year, which is 1,728,299 t CO₂ eq./year more than the expected effect of implementing the measures (6 334 575 t CO₂ eq./year).

V. ANNEX I

Name of the measure	Responsible institutions		Deadline		Used financial resource		Indicator of implementation of the measure	Target value	Reporting value	Difference between targeted and reported value	Effect – total reduction in tons of CO ₂ eq. by 2020	Note
	Leading	Supporting	Beginning	End	Amount (BGN)	Source of funding						
1	2	3	4	5	6	7	8	9	10	11	12	13
Priority axis 2 Reduction of fuel consumption												
Measure 2 "Reduction of motor vehicles using conventional fuels in urban transport by 2020."												
Project "Implementation of activities to improve the quality of ambient air through the purchase and delivery of buses"	Stolichna Municipality	"Stolichen Avtotransport" EAD	2013	2015	BGN 66.5 million.	OP Environment 2007 - 2020 20% own, 80% grant from EU	Delivered EURO 6 natural gas articulated buses to replace old EURO 0 diesel buses	126 EURO 6 natural gas articulated buses				In the considered component of the project, there is no set indicator of a total reduction in tons of CO ₂
Implementation of activities to improve the quality of atmospheric air in Stolichna Municipality by supplying 52 new electric buses and specialized equipment for them	Stolichna Municipality	"Stolichen Avtotransport" EAD	2019	2022	BGN 36.3 million.	OP Environment 2014 - 2020 15% own, 85% grant from EU	Delivered new electric buses and specialized equipment for them for import transport	52 pcs. new electric buses and specialized equipment for them for connecting transport				In the considered component of the project, there is no set indicator of a total reduction in tons of CO ₂

Decision No. 488 of the Sofia Municipal Council	Stolichna Municipality		2014	2016	BGN 33.3 million.	Stolichna Municipality	New single diesel EURO 6 buses delivered	110 new single diesel EURO 6 buses				In the considered component of the project, there is no set indicator of a total reduction in tons of CO ₂
Decision No. 272 of the Sofia Municipal Council of 14.04.2016 on the program for the development of bus transport in the territory of Stolichna Municipality 2016-2018.	Stolichna Municipality		2016	2018	BGN 8.1 million.	Stolichna Municipality	New natural gas single buses delivered	22 new single buses on natural gas				In the considered component of the project, there is no set indicator of a total reduction in tons of CO ₂
Decision No. 272 of the Sofia Municipal Council of 14.04.2016 on the program for the development of bus transport in the territory of Stolichna Municipality 2016-2018.	"Stolichen Avtotransport" EAD		2016	2018	BGN 4.7 million.	"Stolichen Avtotransport" EAD	New electric buses delivered on lease	20 new single 100% electric buses				In the considered component of the project, there is no set indicator of a total reduction in tons of CO ₂
Decision No. 272 of the Sofia Municipal Council of 14.04.2016 on the program for the development of bus transport in the territory of Stolichna Municipality 2016-2018.	"Stolichen Avtotransport" EAD		2016	2018	BGN 4.2 million.	"Stolichen Avtotransport" EAD	New single buses on natural gas delivered on lease	60 new single buses on natural gas				In the considered component of the project, there is no set indicator of a total reduction in tons of CO ₂
Decision No. 272 of the Sofia	"Stolichen		2016	2019	BGN 7.7 million.	"Stolichen Avtotransport"	New articulated natural gas buses	60 new articulated				In the considered component of the project,

Municipal Council of 14.04.2016 on the program for the development of bus transport in the territory of Stolichna Municipality 2016-2018.	Avtotransport" EAD					EAD	delivered on lease	natural gas buses				there is no set indicator of a total reduction in tons of CO ₂
Project "Improving the quality of atmospheric air in the Municipality of Burgas through the modernization of public transport"	Burgas Municipality		2019	2023		OP Environment 2014 - 2020	Delivered vehicles on greener fuel and installed charging stations	56 fully electric buses for public transport, 2 charging stations				Within the framework of the OPE project for the delivery of 56 fully electric buses for public transport 2 charging stations will also be built - on the turning point of the trolley in the "M. Rudnik" and at the base of "Burgasbus" EOOD. It is planned to purchase 3 electric light trucks by 2023, and a total of 96 electric buses and 17 light trucks by 2030. In addition, studies will be carried out on the possibility of using vehicles using green hydrogen both in public transport and for securing the municipal fleet.
Modernization of urban transport in the Municipality of Vratsa	Vratsa Municipality	"Troleibusen Transport - Vratsa" EOOD	05/11/2019	05/10/2022		OP Environment 2014 - 2020 Grant	Delivered environmentally friendly electric vehicles for public transport and installed charging stations	13 new electric buses; 13 slow charging stations; quick charge station.	26000000	32,027,089.53	6,027,089.53	
Modernization of urban transport in	Vratsa Municipality	"Troleibusen Transport -	02/08/2019	30/11/2019	2854474	OTP leasing	Delivered buses to serve the transport	14 Isuzu diesel	2854474	3,425,368.80	570894	

the Municipality of Vratsa – phase 1	ality	Vratsa" EOOD					scheme of the Municipality of Vratsa	buses					
Project "Development of sustainable urban transport of the city of Gabrovo"	Gabrovo Municipality	-	17/07/2017	17/07/2021	8364000	BGN 5,088,000 from OP "Growing Regions" 2014 - 2020 and BGN 3,276,000 of own financing	Delivered environmentally friendly vehicles for public transport	11 12 m. CNG buses and 3 12 m. electric buses		0		956 tons of CO ₂ eq.	
Project "Improving the quality of atmospheric air through the introduction of environmentally friendly public electric transport in the city of Pernik"	Pernik Municipality	"Gradski Transport - Pernik" EOOD	07/05/2020	07/10/2022	7,184,970.00 – total amount of the project. No funds have been spent at this time.	OP Environment 2014 - 2020, CF and cofinancing	Delivered environmentally friendly electric vehicles for public transport	5 electric buses	-	-	-		
Integrated urban transport of the city of Pernik	Pernik Municipality	"Gradski Transport - Pernik" EOOD	15/05/2018	15/12/2021	3,790,886.00	OP "Regions in growth" 2014 - 2020, ERDF, national financing and co-financing	Delivered environmentally friendly vehicles for public transport	13 CNG buses					
"Approval of environmentally friendly public electric transport in Pleven" project	Pleven Municipality	"Troleibusen Transport" EOOD Pleven	December 2019	September 2023	BGN 16,380,000, VAT inclusive	OPE 2014-2020 procedure "Measures to address transport as a source of ambient air pollution"	Delivered environmentally friendly electric vehicles to public transport	14 new electric buses "Solo" and 14 slow charging stations for them	0	14	0		Implementation of the project and delivery of 14 electric buses in early 2022.
Introduction of a higher Euro standard for public transport buses under the Environmental	Plovdiv Municipality	OP "Organization and control of transport", Municipality of Plovdiv	2014	2020	-	The transport companies that have concluded contracts with the Municipality of	Annual number of newly introduced buses in urban transport, meeting a higher Euro standard,	As of 31.12.2012, there are 255 buses serving the municipal	As of 31.12.2020, the municipal transport scheme is	the number of buses with the environmental	Amount of fuel consumed for the period 2016 –		In 2013, Euro 0-4 buses represented 84.71% of the total fleet serving public transport in Plovdiv. The share of buses with Euro 5 engine standard is

Protection Program on the territory of the Municipality of Plovdiv 2014-2020.						Plovdiv for servicing the bus lines of the municipal transport scheme	compared to previous years (Euro 5, Euro 6 and EEV)	city network, distributed according to the environmental standard of the engine, as follows: - 216 from Euro 0 to Euro 4; - 39 are Euro 5.	served by 285 units, distributed according to the environmental standard of the engine as follows: - 73 from Euro 0 to Euro 5; - 212 of type EEV and Euro 6.	standard of the Euro 6 engine for the period 2013 - 2020 increased 5.44 times, with their number in 2020 being 212, compared to 2013, when their number was only 39.	2020. 2016: Diesel: 4,502,421.59 Methane : 1083885.63 2019: Diesel: 4,995,153.90 Methane : 588476.49 2020: Diesel: 5409283.71 Methane : 432667.02	smaller – 15.29%. During the period 2016-2020, 173 buses with EEV and Euro 6 engine environmental standard were purchased. During the period 2013 - 2020, the share of buses with the ecological standard of the Euro 0 - Euro 5 engine decreased by 66%, and in 2020 they represented 25.61% of the total number of buses. The share of buses with ecological standard Euro 6 is 74.39%. Currently, the number of buses running on the city's transport scheme in Plovdiv is 285. Some use diesel fuel, others use methane.
Project "Integrated urban transport, city of Sliven	Municipality of Sliven	"Patnicheski Transport" EOOD	13/01/2017	13.1.2021 (with extension)	12,503,432	OP "Growing Regions" 2014 - 2020	Delivered environmentally friendly vehicles for public transport	27 new Euro 6 diesel buses				
Project "Measures to address transport as a source of ambient air pollution at the Municipality of Sliven"	Municipality of Sliven	"Patnicheski Transport" EOOD	17/12/2019	17/08/2023	76566.75	OP Environment 2014 - 2020, Procedure "Measures to address transport as a source of ambient air pollution"	Delivered ecological vehicles for public transport and installed charging stations	4 electric buses, 4 slow charging stations and 1 fast charging station				Under the project, 4 electric buses, 4 slow charging stations and 1 fast charging station are planned and will be delivered

Project "Improvement of the ambient air quality in the city of Haskovo through the supply and operation of electric buses for the needs of public transport"	Haskovo Municipality	"Troleibusen Transport" EOOD Haskovo	30/12/2019	28/02/2023		OPE 2014-2020 procedure "Measures to address transport as a source of ambient air pollution"	Delivered environmentally friendly electric vehicles to public transport	5 electric buses				The delivery of environmentally friendly electric vehicles for public transport is expected to be completed by the end of 2021.
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Priority axis 3: Diversification of transportation

Measure 1 with direct effect "Increasing the share of public electric transport - railway, trolleybus, tram, metro"

Sofia Metro Extension Project Stage III, Lot 1 "Tsarigradsko Shose - Sofia Airport" and Lot 2 "Zh.K. Mladost 1 – Business Park in Mladost 4"	MF	MTITC "Metropolitan" EAD Stolichna Municipality	2013	2015	BGN 233,681,905.67	European funds with national co-financing (OP "Transport" 2007 - 2013) and others (municipal budget and funds of "Metropolitan" EAD	Implementation of a tunnel metro section – 7.47 km and of 7 new metro stations		Lot 1 – put into operation on 25.04.2015. Lot 2 – put into operation 31.08.2015		2,900 t.	
Delivery of 10 metro trains with a train length of 81m.±3m for the needs of "Metropolitan"	MF	MoEW Stolichna Municipality "Metropolitan" EAD	06/12/2012	30/06/2014	BGN 80,173,250.15	European Funds (OP "Environment" 2007 - 2013), Stolichna Municipality,	Delivery of 10 metro trains with included equipment, according to the contract					The project was implemented as part of the Second Phase of the "Project for Integrated Urban Transport" with the beneficiary Stolichna

EAD, together with the included relevant equipment, in accordance with the technical requirements of the Contracting Authority						"Metropolitan" EAD						Municipality
Sofia metro extension project, second metro diameter, section from MS "James Boucher" to MS "Vitosha" (Phase 1 and Phase 2)	MF	MTITC "Metropolitan" EAD Stolichna Municipality	2016	2019	BGN 42,339,209.31	European Funds (OP "Transport and Transport Infrastructure" 2014 - 2020), Stolichna Municipality, "Metropolitan" EAD	Implementation of a tunnel metro section – 1.3 km. and of 1 new metro station	Commissioned Phase 1 and Phase 2 on 20.07.2016.			223 t.	Funding of Phase 1 under OPT 2007-2013 and Phase 2 under OPTTI 2014-2020.
Sofia metro extension project, Line 3 Stage I, section Blvd. "Vladimir Vazov" - City Center - str. "Zhitnitsa"	MF	MTITC "Metropolitan" EAD Stolichna Municipality	2016	2020	Total project cost, stage I: BGN 935,500,600.04, VAT inclusive	European Funds with national cofinancing (OP "Transport and Transport Infrastructure" 2014 - 2020), Stolichna Municipality, "Metropolitan" EAD	Implementation of a tunnel metro section - 7.8 km.; of 8 new metro stations; 1 depot for metro trains and delivery of 20 metro trains				5300 t.	Commissioned on 26.08.2020
Sofia metro extension project, Line 3, stage II, section street "Zhitnitsa" – zh.k. "Ovcha Kupel" - Ring road	MF	MTITC "Metropolitan" EAD Stolichna Municipality	2017	2021	Total cost of the project, Phase II: BGN 242,199,009.35 VAT inclusive	European Funds with national cofinancing (OP "Transport and Transport Infrastructure" 2014 - 2020), Stolichna Municipality, "Metropolitan" EAD	Construction of a tunnel metro section – 3.8 km and 4 new metro stations				2,600 t.	Expected commissioning in the first quarter of 2021.

Project No. BG161PO001-1.5.02-0001-C0001 "Project for integrated metropolitan urban transport" (Component 5 includes the delivery of 50 new articulated low-floor trolleybuses)	Stolichna Municipality	"Stolichen Elektrotransport" EAD	2013	2014	BGN 53.7 million, VAT excluded	OPRD 2007 - 2013	Supplied trolleybuses:	50 trolleybuses				In the considered component of the project, there is no set indicator of a total reduction in tons of CO ₂
Project No. DIR-51315001-4-198 for "Implementation of activities to improve the quality of atmospheric air through the purchase and delivery of tram locomotives"	Stolichna Municipality	"Stolichen Elektrotransport" EAD	2013	2015	BGN 66.1 million, VAT excluded	OPE 2007 - 2013	Tram trains delivered	20 tram trains				In the considered component of the project, there is no set indicator of a total reduction in tons of CO ₂
Project No. 214-0319 "Project for renovation of means of transport in the city of Sofia"	Stolichna Municipality	"Stolichen Elektrotransport" EAD	2016	2016	BGN 16.6 million, VAT excluded	EIB loan	Delivered tram trains	5 tram trains				In the considered component of the project, there is no set indicator of a total reduction in tons of CO ₂
Project No. 164 "Modernized trams for the city of Sofia"	"Stolichen Elektrotransport" EAD Stolichna Municipality		2015	2019	BGN 5.3 million.	Bulgarian-Swiss cooperation program	Delivered trams from the city of Basel, Switzerland and development of a Sustainable Urban Mobility Plan of the Stolichna Municipality	28 trams				In the considered component of the project, there is no set indicator of a total reduction in tons of CO ₂
Modernization of urban transport in the Municipality	Vratsa Municipality	"Troleibusen Transport - Vratsa"	05/11/2019	05/10/2022	26,000,000	Grant	Supplied new trolleybuses	9 new trolleybuses	32,027,089.53	6,027,089.53		

of Vratsa		EOOD										
Project "Development of integrated urban transport - city of Pleven", financed under procedure BG16RFOP001-1.001-039	Pleven Municipality	"Troleibusen Transport" EOOD Pleven	April 2017	May 2021	BGN 10,706,049.20, VAT excluded	OP "Growing Regions" 2014 - 2020	Tons of CO ₂ eq. saved; Total length of new or improved public transport lines – 14 km. Public city transport journeys on new or improved lines	14 trolleybuses				Saved tons of CO ₂ eq. – 379.6; the reporting period is as of 2021.
Procedure "Measures to address transport as a source of ambient air pollution at the Municipality of Sliven"	Municipality of Sliven	"Patnicheski Transport" EOOD	17/12/2019	17/08/2023	76566.75	OP Environment 2014 - 2020						According to the project, 6 trolleybuses are planned and are to be delivered.