PROJECT!

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REPUBLIC OF BULGARIA

Ministry of Energy

Ministry of Environment and Water

INTEGRATED PLAN IN THE FIELD OF ENERGY AND CLIMATE THE REPUBLIC OF BULGARIA

UPDATED 2024.

CONTENT

List of acronyms used:

NPP	Nuclear power station
AUER	Sustainable Energy Development Agency
NRA	Nuclear Regulatory Agency
GDP	Gross domestic product
WAS	Balancing energy
BGH	Balkan Gas Hall
BETT	Bulgarian Energy Trading Platform
BNB	Bulgarian National Bank
BNB	Bulgarian independent power exchange
BIFIEK	Bulgarian Federation of Industrial Energy Consumers
RES	Renewable energy sources
HYDROPOWER PLANTS	Hydroelectric power station
YOU	Renewables
Vic	Water and sanitation
Second power plant	Wind power plant
LCP	Large combustion plants
GIS	Geographical Information System
GCTS	Gas hub
SG	Official Journal
WHT	Supplier of last resort
EBRD	European Bank for Reconstruction and Development
EE	Energy efficiency
EUEB	Electricity system
EIB	European Investment Bank
EC	European Commission
EP	Power line
EV	Electric Vehicles
EU	European Union
LOW	Electricity system operator

ERDF	European Regional Development Fund
CC	Power plant
ECIH	European Digital Innovation Hub
BDA	Biological Diversity Act
HG	Forests Act
EA	Energy Act
ZEVI	Act on Energy from Renewable Sources
EEZ	Energy Efficiency Act
ACT AMENDING	amending Act
ZOKO	The climate change mitigation Act
ZOOS	Law on protection of the environment
GPP	Public Procurement Act
LULUCF	land use, land use change and forestry
ZPZP	Support for Farmers Act
TPP	Plant thermal power plants
CHAV	Clean Air Act
ICT	Information and communications technology
INECPS	Integrated national climate plan
IFSD	Industrial processes and solvent use
ESIS	Innovation Strategy for Smart Specialisation
ITS	Intelligent transport systems
AAQ	Air Quality
KEVR	Energy and Water Regulatory Commission
FEC	Final energy consumption
KPIS	Cogeneration of heat and power (CHP)
CC	Final supplier
CCSP	Construction Product Contact Point
CF	Cohesion Fund
LOS	Volatile organic compounds
MBT	Mechanical and biological treatment
ME	Ministry of Energy

MEF International Energy Forum

IPCC Intergovernmental Panel on Climate Change

MOEW Ministry of Environment and Water

MRDPW Ministry of Regional Development and Public Works

SMES Small and medium-sized enterprises

MLSP Ministry of Labour and Social policy

MOF Modernisation Fund

IFC Kozloduy International Fund

MFF Multiannual financial framework

NDF National Decarbonisation Fund

NEK National Electricity Company

R & D Research & development

NMVOC Non-methane volatile organic compounds

NEMOs nominated electricity market operators

NPPO National forestry accounting plan

NRRP National Recovery and Resilience Plan

NREAP National Renewable Energy Action Plan

NADEBB National Forest Biomass Energy Action Plan

NEPEMJS National programme for energy efficiency in multi-apartment buildings

NIPCD National Climate Change Action Plan

NSCI National roadmap for scientific infrastructure

NGOS Non-governmental organisation

NMA National waste management plan

NSI National Statistical Institute

NGCC National Agricultural Advisory Service

EIA Environmental impact assessment

UN United Nations

OPIC Operational programme 'Innovation and competitiveness'

Operational Programme "Science and Education for Smart Growth"

TSOs Transmission system operators

RUR Open distribution system

GSP	Common agricultural policy
BSEC	Organisation for the Black Sea Economic Cooperation
P/st	Substation
PUMPED	Hydro-cumulative hydroelectric power plant
GHG	Greenhouse gases
UGS	Underground gas storage
TAX RULINGS	Reference mass
PEP	Primary energy consumption

PIT Economic Transformation Programme

EIP Programme Competitiveness and Innovation in Enterprises

PCIS	Projects of common interest

RDP Regional Development Programme 2021-2027

CP	Industrial system

PTS Transport Connectivity Programme 2021-2027

PMR	The clean air package
PMBE	A clean air programme for Europe

PINGIT PRogram "Research, Innovation and Digitalisation for Smart Transformation"

HRF	Gross floor area
ROUKAV	Ambient air quality assessment and management area
SMR	Structure for Monitoring and Reporting
PRASG	Strategic Plan for Forest Sector Development
ETS	Emission trading scheme
TAR	Trans Adriatic Pipeline
MSW	Municipal solid waste
TPP	Thermal/hot power plant
THPP	District heating power plant
HPP	Photovoltaic power plant
PHI	Financial instruments
PM	Fine particulate matter

CCP Competence Centres

POS	Policy objective

CPU Centre of Excellence

CPRD Centralised market for bilateral contracts

CCP Competence Centres

CESEC High Level Group on Gas Interconnection in Central and South-Eastern Europe

IBSGas interconnector Greece-Serbia

IGB Greece-Bulgaria gas interconnector

Irena International Renewable EnergyAgency

ITO Independent transmission operator

LNG Liquefied natural gas

NTC Net transfer capacity

RBP Regional Capacity Reservation Platform

RDF Modified waste-derived fuels

Set plan European Strategic Energy Strategy Plan

It FOR 55 Fit for 55

CAFE Directive Directive 2008/50/EC on ambient air quality and cleaner air for Europe

PART 1

GENERAL FRAMEWORK

SECTION A: NATIONAL PLAN

1. REVIEW AND PLAN DETERMINATION PROCESS

1.1. Summary

i. Political, economic, environmental, and social context of the plan

The European Union has made climate change a central element of its external policy, with reducing carbon emissions as its long-term goal. European Union (EU) countries work together with global partners to strengthen international climate engagement and advance international efforts and initiatives.

The Union plays a central role in international climate policy agreements. In its bilateral relations with non-EU countries, the EU shares its expertise and encourages partners to take bold action against global warming, providing targeted support, where necessary, to those most affected, to assist the transformation of their economies.

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

The formulation of clear climate targets allows them to be translated into legislation and contribute to cleaner water, soil and air, modernisation of homes and lower energy bills, greener and more efficient transport, more beneficial food and better health for present and future generations. Businesses will also benefit from the opportunities that have emerged to develop the green economy and create jobs in sectors such as renewable energy production and improving the energy efficiency of buildings.

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

The current EU target by 2030 is a 55 % reduction in emissions. To achieve this, the European Union is renewing its legislation.

The legislative package known as 'Fit for 55' includes regulations on emissions trading, national emission reduction targets in some sectors, land use change, emissions in transport and other areas.

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

The Fit for 55 legislative package includes legislative proposals and amendments to existing EU legislation that will contribute to reducing the Union's net greenhouse gas emissions and decarbonising the economy to achieve climate neutrality in a fair, cost-effective and competitive manner.

To deliver on this commitment, the EU has set the following binding targets by 2030:

- Reducing net greenhouse gas (GHG) emissions by at least 55 % compared to 1990 by 2030;
- Reducing EU greenhouse gas emissions by 40 % by 2030 compared to 2005 levels in sectors not covered by the European Emissions Trading System;
- Reducing EU energy consumption by at least 11.7 % in 2030 compared to the projections of the 2020 EU Reference Scenario, so that the Union's final energy consumption does not exceed 763 Mtoe. Achieving at least a 42.5 % share of renewable energy in the EU's gross final energy consumption by 2030, aiming to reach 45 % in 2030;
- Achieve a level of at least 15 % of interconnectivity between the electricity systems of Member States.

Pursuant to Article 14 of Regulation (EU) 2018/1999, the Republic of Bulgaria is committed to submit to the European Commission a draft updated Integrated National Energy and Climate Plan (INECP), to be approved by the Commission services by 30 June 2024.

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

The updated INECPs define the ambitious objectives and measures related to:

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

Achieving the objectives set will reinforce Bulgaria's commitments to implement the Paris Climate Agreement and the European Green Deal. The implementation, through a set of measures and activities, of ambitious targets is fully in line with existing European legislation. Bulgaria has launched a legislative initiative to change the national legal framework to help achieve the objectives set out in the INECPs.

Achieving climate neutrality of Bulgarian energy by 2050 is a key objective requiring a deep transformation of the national energy balance towards low greenhouse gas emission sources. The high energy intensity of the economy is due to the specific profile of major industries in Bulgaria and should be targeted to

support their competitiveness. Slow progress in achieving the energy efficiency targets for the building sector requires focused policies and measures.

Bulgaria remains one of the energy-intensive economies and has a high percentage of greenhouse gas emissions in the EU. The high energy intensity of the economy and slow progress in achieving energy efficiency targets have a negative impact on its productivity and competitiveness.

There is scope for significant energy savings through targeted investments in some industrial applications, transport and housing sectors, as well as increasing investment in low-emission energy infrastructure. Hydrogen and renewable electricity and improving energy efficiency are essential elements of the ultimate goal of the European Union, which is also intensively pursued in Bulgaria, which will help build a climate-neutral energy system.

The energy sector is a structurally defining sector and underpins its future development is the efficient use of conventional and alternative energy resources, the development of the energy market and smart systems, the direct involvement of citizens and society in the energy transition, and the active participation of consumers in the electricity market. The main challenge in the upcoming energy transformation is the successful implementation of reforms in regions with a carbon-intensive energy sector. The transition of these areas requires complex horizontal measures, a high level of investment and, last but not least, an active social policy. A sustainable shift to low-carbon energy will be phased in, by smoothly replacing fossil fuels with new low-emission technologies in such a way that systemic adequacy is not compromised.

The main objectives set out in the INECPs are:

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

National energy and climate priorities can be summarised as follows:

Energy:

- Increasing energy security and diversifying the supply of energy resources;
- Developing an integrated and competitive energy market;
- Harnessing the potential of fuel switching from solid fuels to natural gas to reduce carbon emissions and increase energy efficiency;

- Accelerating the uptake of renewable energy production and consumption, promoting renewable self-consumption, developing renewable energy communities and developing related energy infrastructure for the transmission, distribution and storage of renewable energy, grid development;

  Increasing energy efficiency by developing and applying new technologies to achieve modern and sustainable energy;

- Protect consumers by ensuring fair, transparent and non-discriminatory conditions for the use of energy services.

Climate:

- Achieving climate neutrality by 2050;
- According to Regulation (EU) 2023/857 (Effort Sharing Regulation), Bulgaria must limit its greenhouse gas emissions, for sectors outside emissions trading, by -10 % compared to its emissions in 2005;
- Bulgaria must ensure that the sum of greenhouse gas emissions and removals in the LULUCF sector achieved in 2030 does not exceed removals, after applying the flexibility provided for in the Regulation, the target of – 9 718 kton$_{CO}$2-eq.

The following National Strategy Papers (and draft documents under conciliation) have been used to prepare the updated Integrated Energy and Climate Plan:

- A draft Sustainable Energy Development Strategy 2030, with a 2050 horizon;
- Bulgaria's Climate Neutrality Roadmap;
- National strategy for the development of the mining industry by 2030;
- Strategy for Bulgaria's participation in Industry 4.0;
- Long-term national strategy to support the renovation of the national stock of residential and non-residential buildings with an implementation horizon of 2050;
- Bulgaria's long-term climate change mitigation strategy until 2050;
- An innovation strategy for smart specialisation;
- National programme for energy efficiency in multi-apartment buildings;
- A national policy framework for the development of the market for alternative fuels in the transport sector and the deployment of relevant infrastructure;
- An integrated transport strategy in the period up to 2030;
- National Forest Biomass Energy Action Plan 2018-2027;
- Bulgaria's National Strategy on Adaptation to Climate Change and Action Plan;
- National Strategy for the Development of Research in the Republic of Bulgaria 2017-2030;

- Bulgaria's electricity transmission network development plan for the period 2023-2032;
- Bulgartransgaz EAD's ten-year network development plan for the period 2023-2032;
- A national roadmap to improve the conditions for unleashing the development potential of hydrogen technologies and hydrogen production and supply mechanisms.

The updated Integrated Plan has been developed on the basis of the following main assumptions and strategic objectives:

- Macroeconomic growth and sectoral added value designing the corresponding growth of energy demand and supply;
- A set of energy efficiency measures to achieve a declining energy intensity curve of the economy;
- An integrated approach to modelling energy use, economic and environmental development based on historical data and projections aimed at reflecting the most realistic development of the country's economy and society;
- Integrating applicable EU environmental policies and constraints into energy production modelling and planning;
- Development of the energy sector, in particular the electricity sector, with a focus on national and regional energy security;
- Integration of the internal market, development of interconnection with the electricity systems of Bulgaria's neighbouring countries and balancing the energy mix by ensuring different national and imported energy sources;
- Maintaining a sustainable level of external dependence on imports of energy resources below the EU average;
- Continue the liberalisation of energy markets, with commitment to manage possible social risks and negative impacts on vulnerable social groups;
- Sustainable development of renewable electricity generation on market bases;
- Setting energy efficiency targets in line with the EC agenda and recommendations;
- Inclusion of new nuclear power generation in the national energy mix after 2030;
- Developing hydrogen energy and promoting investments in hydrogen infrastructure.

ii. Strategy relating to the five dimensions of the Energy Union

Bulgaria's strategic energy and climate objectives and priorities cover the five dimensions of the Energy Union – *decarbonisation, energy efficiency, energy security, internal energy market and research, innovation and competitiveness*.

To meet the objectives, comprehensive and coordinated actions are carried out in all economic areas, with efforts aimed at developing and promoting the use of low-emission energy sources, as well as the deployment of new and innovative energy production technologies.

DECARBONISATION

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

The national target for the share of RES in gross final energy consumption by 2030 is 34.1 %.

For the electricity sector, a 42.2 % share of energy from renewable sources in gross final consumption of electricity is determined. This share is projected to be achieved by increasing the consumption of electricity from newly built capacities using renewable energy (mainly wind and solar) after 2020 by up to 4 778 MW.

In order to achieve the objective in the electricity sector, it is important to promote investment in the development of the country's electricity transmission and distribution networks, allowing for the technical connection and integration of electricity produced from renewable sources, while respecting the criteria of security of the electricity system. The envisaged introduction of energy storage systems will allow for the rapid deployment of new capacities using intermittent renewable energy sources and address the problems of grid congestion, balancing and market distortion.

It is also possible to auction additional renewable energy capacity, taking into account market conditions, if necessary to achieve the targets set after 2025.

The heating and cooling sector is key to accelerating the decarbonisation of the energy system. The future development of the country's district heating supply will take into account the need to improve energy efficiency and the use of renewable energy through the development of efficient district heating and cooling systems.

The use of biomass is projected to continue in the long term, with consumption aligned with sustainability criteria and greenhouse gas emissions saving criteria. In the coming years, environmental and geothermal energy use is expected to accelerate through the deployment of heat pumps, increasing the utilisation of still underused renewable energy in the country and improving efficiency in final energy consumption.

The envisaged changes in the transport sector concern the promotion and use of electric and hybrid vehicles in road transport and the creation of low-emission zones in major cities. Biofuels will continue to be used in the coming years, gradually increasing the share of

advanced biofuels. These measures will contribute to a significant reduction in greenhouse gas emissions in Bulgaria.

At the same time, the use of green hydrogen produced using electricity from renewable sources (wind and solar) is envisaged as innovation.

ENERGY EFFICIENCY

Bulgaria's priority is to bring the energy efficiency first principle, which means implementing the most energy efficient solution in all economic sectors.

Under the energy efficiency dimension, Bulgaria's efforts are aimed at achieving energy savings in final energy consumption by improving the energy performance of buildings and promoting the implementation of energy efficiency measures in energy production, transmission and distribution.

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

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

Bulgaria focuses on alternative policies and measures to promote energy efficiency. Financial incentives for the implementation of energy efficiency projects, performance contracts (ESCOs) and renovation of the existing building stock could be mentioned as such, with a view to increasing the number of nearly zero-energy buildings.

ENERGY SECURITY

Bulgaria's main priority for ensuring energy security is the diversification of natural gas supply sources and routes, increasing the capacities of UGS Chiren and interconnection points, participating in projects for new LNG terminals in the region, efficient use of local energy resources and developing energy infrastructure.

Bulgaria encourages oil and gas exploration launched in the Black Sea by means of a decision of the National Assembly entrusting the Minister for Energy to negotiate the terms and conditions under which Bulgarian Energy Holding EAD will acquire up to 20 % share in the consortium holding the contract for the prospection and exploration of oil and natural gas in 'Block 21-1 Han Asparuh'.

The gas transmission infrastructure in Bulgaria is well developed, but in synergy with the objectives of increasing energy security, diversification of natural gas supply sources and routes, as well as in response to the growing demand for natural gas from alternative sources in the country and the region, there is a need for further expansion to ensure increasing flows from south to north.

Efforts shall focus on developing, digitalising networks and ensuring flexibility of the electricity system, including the further development of the 400 kV and 110 kV electricity transmission grid.

INTERNAL ENERGY MARKET

Under the internal energy market dimension, Bulgaria is developing a competitive market by taking action to fully liberalise the market and integrate it into the regional and pan-European markets. A key element in the full liberalisation process is the protection of energy poor and vulnerable customers. In line with the EC recommendation on the development of competitive wholesale and retail markets, Bulgaria is phasing out regulated electricity prices and is projected to be completed by the end of 2025. Other policies and measures aimed at developing the internal energy market in line with the objectives of the Energy Union are demand response, stimulating the creation of renewable energy communities and stimulating a more active role for consumers.

RESEARCH, INNOVATION AND COMPETITIVENESS

On the research, innovation and competitiveness dimension, Bulgaria is committed to promoting scientific progress in innovative energy technologies, including for clean energy production. Important projects will be developed to promote business innovation and digitalisation. Bulgaria plans to participate in a number of programmes in this area.

iii. General table of key objectives, policies and measures of the plan

Bulgaria's contribution to achieving the European Union's 2030 targets is presented in the table below, which has been revised in line with the recommendations of the European Commission:

Table 1: *Bulgaria's 2030 targets*

Overview of the 2030 targets	
Renewable energy sources	
National target for the share of energy from renewable sources in gross final energy consumption by 2030	34.1 %
YOU – IS1	42.2 %
VI-TE and EC2	45.5 %
U – Transport3	29 %
Energy efficiency	
Reduction of primary energy consumption compared to Reference Scenario 2020	11.6 %

[1] Share of electricity from renewable sources in gross final consumption of electricity

[2] Share of heating and cooling from RES in gross final consumption of heating and cooling

[3] Share of energy from renewable sources in final energy consumption in the transport sector

Reduction of final energy consumption compared to Reference Scenario 2020	10.7 %
Primary energy consumption 4 "D	12 397 ktoe
Final energy consumption	8 423 ktoe
Emission of greenhouse gases	
National GHG emission reduction target for 2030 compared to 2005 for the non-ETS sectors (buildings, agriculture, waste and transport) pursuant to Regulation (EU) 2023/857 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030	— 10 %
National target in the land use, land use change and forestry sector under Regulation (EU) 2023/839	for the periods from 2021 to 2025, GHG emissions do not exceed removals, calculated as the sum of total emissions and total removals on its territory in all land accounting categories combined and a national annual target for net removals in the period from 2026 to 2030 of – 9 718 ktons of CO2eq.
Electricity interconnection level	15 %

1.2. Overview of current policy situation

i. The energy system at national and Union level and the policy context of the national plan

The Republic of Bulgaria has a transparent energy policy that protects the state and the public interest. The country's energy policy shall aim at promoting market principles in the energy sector, ensuring energy independence, sustainable energy development of the country, efficient use of energy and energy resources, meeting the needs of society for electricity, heat, natural gas and fuels, and aims to:

- Maintaining a secure, stable and reliable energy system;
- Diversification of natural gas supply sources and routes;
- Expansion of gas transmission infrastructure and increasing natural gas transmission and storage capacity;
- Establishing a fully-fledged, integrated and liberalised natural gas market;
- Creating conditions to improve access to liquefied natural gas;
- Decarbonising the electricity sector by changing the fuel base with less carbon-intensive fuels;
- Sustainable use of indigenous energy resources;
- Modernisation and expansion of energy infrastructure;

- Construction of transmission infrastructure for the transport of hydrogen;
- The development of nuclear energy in accordance with current requirements of reliability, safety and economy;
- Improving energy efficiency and increasing the use of renewable energy in gross final energy consumption;
- Active participation of the country in building a single and stable European energy market;
- Developing a competitive energy market and a policy aimed at securing energy needs and protecting consumers' interests;
- Ensuring equal access to the network for all users, under clear and non-discriminatory rules;
- Achieving a balance of quantity, quality and price of energy for final consumers.

The country's energy policy has taken on board the main objectives of the European Union's energy policy, namely security of supply, competitiveness and sustainability, taking into account the five interlinked dimensions of the European Energy Union: energy security, solidarity and trust; a fully integrated European energy market; energy efficiency; contributing to curtailment of consumption; decarbonisation of the economy and research, innovation and competitiveness.

ii. Current energy and climate policies and measures relating to the five dimensions of the Energy Union

1) **Decarbonisation**

The sectoral policies and measures presented in the INECPs are formulated in a way that is consistent with the main objective of the Plan – reducing GHG in Bulgaria and implementing existing European climate change legislation. Priority axes have been identified for the development of the sector concerned and the corresponding measures to each priority axis.

The measures are grouped into two strands, those with a measurable GHG reduction effect and measures with indirect effects that also deliver emission reductions but are harder to measure. For each measure, the tools are proposed which are necessary for its implementation. These can be legislative amendments, the application of laws, regulations, programmes, plans, schemes, etc., as well as the introduction of incentive mechanisms, information campaigns, training, etc. For each measure, the target groups, the responsible institutions for reporting on its implementation, the launch and timing of implementation, as well as the necessary financial resources and sources of funding are identified.

The largest share of total GHG emissions in Bulgaria is the energy sector, which also determines its paramount importance for meeting national reduction targets. Electricity and heat production from coal contributes to more than 90 % of GHG emissions in the sector, where the main potential for reducing emissions is also concentrated.

A particularly important sector with an extremely high emission reduction potential is the waste sector. The sector is one of the main sources of GHG in three main areas – emissions from landfilling, waste water treatment and waste incineration. The measures mainly focus on the waste disposal sub-sector, which accounts for the largest share of emission levels. Much of the measures envisaged in this sector can be achieved by implementing existing legislation without a particularly high level of financial resources, making them highly effective. The importance of taking measures in the transport sector is due to the fact that it is one of the largest GHG emitters, with steady growth, but largely neglected in terms of its impact on climate change. In this respect, the main measures in the sector aim at an optimal balance in exploiting the potential of the different modes of transport and are divided into four priority axes:

- reducing transport emissions;
- reducing fuel consumption;
- diversification of shipments;
- consumer information and training.

Bulgaria is currently pursuing a targeted policy for the development of the renewable energy sector. Different support schemes have been put in place over the years to ensure that the production and consumption of energy from renewable sources evolve to significantly contribute to the security and diversity of energy supply, competitiveness, environmental and climate protection, regional development and the use of new technologies.

A set of regulatory, administrative and financial measures have been put in place to promote the production and consumption of energy from renewable sources.

The Renewable Energy Act (ZEVI) is the main legal act governing public relations in the field of energy from renewable sources. This Act and its secondary legislation transpose the requirements of Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (Directive (EU) 2018/2001).

The Renewable Sources Act introduces measures aimed at promoting the production and consumption of electricity, heating and cooling from renewable sources, biogas and green hydrogen, renewable energy in transport, with the aim of enabling sustainable and competitive energy policy and economic growth through innovation, the deployment of new products and technologies and the raising of the living standards of the population through the cost-effective use of renewable energy.

Clear deadlines have been introduced with regard to the connection of energy plants for the production of electricity from renewable sources and measures to speed up connection procedures for the modernisation of renewable electricity generation sites.

It also creates the conditions for the development of self-consumers and renewable energy communities, raising interest and activating the participation of local populations to

produce and consume clean energy. This is expected to lead to increased investment activity, a positive uptake of renewable energy, greater consumer choice and greater involvement of citizens in the energy transition.

It is intended to develop a Plan for the identification of priority areas for the development of wind power generation sites. In priority areas, the administrative procedures for the construction, reconstruction and commissioning of energy sites will be carried out within a shorter timeframe.

To facilitate the investment process, dedicated administrative service centres have been set up for each municipality to provide guidance and information and organise the procedures related to the implementation of investment intentions for renewable energy production, including the reconstruction and modernisation of existing energy facilities and facilities for the production of energy from renewable sources.

The heating and cooling sector is also key to accelerating decarbonisation. The potential to decarbonise the supply industry is by increasing energy efficiency and the use of energy from renewable sources. Taking into account the fact that, for the period 2025-2021 and 2026-2030, the share of energy from renewable sources in the heating and cooling sector is to be increased by 1.3 percentage points per year on average over the relevant period, calculated on the basis of the share of energy from renewable sources in this sector achieved in 2020. This increase should be ensured by increasing the share of energy from renewable sources and from waste heat and cold in district heating and cooling by at least one percentage point on average per year. In this regard, it is possible for the heat transmission company to develop a plan for the development of the district heating or cooling system and its conversion into an efficient district heating or cooling system.

Adopting the principle that biofuels, bioliquids and biomass fuels should be produced sustainably, the Renewable Energy Sources Act requires these fuels to comply with sustainability and greenhouse gas saving criteria when they are included in the national target for the share of energy from renewable sources in gross final energy consumption, as well as sectoral targets. Compliance with these criteria is a mandatory requirement for the implementation of support schemes.

2) **energy efficiency**

Energy efficiency policy is a very essential element of national, European and climate change policy. The process of switching to low-emission energy requires increasing energy efficiency, increasing the use of renewable energy in gross final energy consumption, improving energy management, developing energy infrastructure and building the internal market, as well as the development of different concepts and the deployment of new technologies and services. In line with EU priorities, energy efficiency is the first priority in energy policy and central to meeting the 2030-2020 targets.

The regulatory framework for energy efficiency is aligned with European legislation, with the Energy Efficiency Act as the main document ensuring the implementation of energy efficiency policy.

Bulgaria's main energy efficiency policy priorities and objectives are as follows:

- Cumulative end-use energy savings for the period 2030-2021 equivalent to new annual savings of at least 0.8 % of final energy consumption;
- Taking measures to improve the energy performance of at least 5 % of the total floor area of all heated and/or cooled State-owned buildings used by the public administration;
- Increasing the number of nearly zero-energy buildings;
- Providing secure and affordable energy for all;
- Minimising the undesirable effects of energy use on human health and the environment;
- Raising the standard of living of the population;
- Improving the competitiveness of the Bulgarian economy.

The envisaged policies and measures ensure a correlation between existing and planned policies and measures within the decarbonisation dimension, as well as between existing and planned policies and measures under the other dimensions of the Energy Union up to 2030. Due to the specificity and interdependence of the effect and the expected results, renewable energy measures and policies are integrated with those of the energy efficiency dimension. Efforts have been made to achieve coordination of national climate and energy policies, also taking advantage of opportunities for regional cooperation with other Member States, so as to attract the investments needed to implement them.

Policies and measures build on the scope and substance of the current ones with a view to a wider deployment and better integration of renewable energy while achieving the core indicators of an affordable, safe, competitive, secure and sustainable energy system.

3) **energy security**

➢ *Security in the electricity sector*

The security policy of the country's electricity sector can be summarised in two priority axes:

- Efficient use of indigenous energy resources;
- Increasing interconnection.

Bulgaria makes the best use of the existing potential of indigenous coal while respecting environmental requirements to maintain the adequacy of the EU and ensure security of supply.

Bulgaria's electricity network comprises electricity lines with a total length of 15 964.93 km, including 400 kV – 3 031.73 km, 220 kV – 2 710.9 km, 110 kV – 10 177.17 km and 60 kV – 11.84 km and cables 400 kV – 0.3 km, 220 kV – 3.24 km and 110 kV – 29.75 km. The network also includes 299 electrical substations, including substations 400/220/110 kV – 8, 400/220/31.5 kV – 1, 400/20 kV – 1,

400/220/110/31.5/20/10 kV – 4, 400/220/110/31.5/20 kV – 1, 400/220/20/10 kV – 1, 400/110/31.5/20 – 3, 400/110/38.5/10.5 kV – 1, 400/110/31.5 kV – 2; 400/110/20 kV – 1, 220/110/20/10 kV – 9, 220/110/20 kV – 4, 220/110/10 kV – 1, 220/110/38 kV – 5, 220/110 kV – 1, 110/20/10 kV – 1, 110/20/6 kV – 22, 110/10 kV – 16, 110/20 kV – 9, 110/6 kV – 209.1 kV – 100.7 kV – 20, 20/110 kV – 1, 110/6/6 kV – 1, 110/35/10 kV – 1, kV – 1, kV – 110, kV –, kV –, kV –, kV –, and TPP 'Republic' kV.

To date, the country's EES has an energy mix of generating sources in which security and sustainability are provided only by conventional power plants with synchronous systemically important generators. The energy units of TPP Maritsa Iztok 2 EAD, TPP AES-ZS Maritsa Iztok 1 EOOD, TPP Kontur Global Maritsa Iztok 3 AD, TPP Varna EAD and TPP Bobov Dol EAD have a total installed gross base generation capacity of 3 848 MW and 2 686 MW are regulated in a diurnal cut and are used as base or sub-peak generation capacity, as well as for the implementation of the following essential and mandatory tasks performed by the generation capacity of an integrated electricity system to:

— Frequency primary control of the entire ENTSO-E synchronous pool;

— Participation in the secondary regulation of the frequency and exchange capacity of the Bulgarian European Union;

— Maintaining voltage levels in the main nodes of the European Union;

— Maintaining the EEU's resilience stock;

— Maintaining the common stock of the EES of the country;

— Participation in the EEU recovery plan.

The conclusions of the Extraordinary European Council of 30 and 31 May 2022 noted the importance of local energy sources for security of supply, within a short-term priority to further diversify supply sources and routes and secure energy supplies at affordable prices.

The conclusions of the Council of the EU on the European Court of Auditors' Special Report No 22/2022 on "EU support to coal regions – limited focus on socio-economic and energy transition", endorsed on 14 February 2023, shared the EC's view on the findings and recommendations of the Court's report, and in particular that, following Russia's invasion of Ukraine in February 2022, it is accepted in the short term that countries may need to increase the use of coal before switching to renewable energy sources, provided that the 2030 climate and energy targets are met.

Bulgaria relies heavily on lignite-fired electricity production during the energy transition period, before it is phased out by the end of 2 038.

A sustainable shift to low-carbon energy requires a phase and smooth replacement of coal plants with new low-emission technologies, so that systemic adequacy is not compromised. These processes should be carried out by maintaining sufficient operational capacity in thermal power plants and coal-mining areas, while at the same time accelerating the decline in mining activities.

The Maritsa Iztok complex is one of the most affected by the transition, linked to its structural role in electricity production and the economy of the regions of Stara Zagora, Haskovo, Sliven and Yambol. In this regard, the most important tasks to address during the energy transition in these regions are:

- The investments needed to develop energy infrastructure and the effect on security of supply;
- Exploiting the potential for economic diversification and corresponding development opportunities;
- Creating quality new jobs and providing upskilling opportunities;
- Implementation of projects to develop competitive and high value-added industries in clean technologies.

In addition to the above mentioned importance of the Maritsa East complex, important advantages such as:

- The large consolidated area of land;
- Highly developed electricity grids – 6/20/110/220/400 kV;
- The high technical skills of the workforce;
- Highly developed and diversified transport infrastructure;
- Highly valuable strategic location and others.

These assets must help the region become a carbon-neutral industrial hub, both in terms of net-zero processes and industries linked to future carbon neutrality.

The process of decontamination of extractive activities is linked to the new plan for the management of mining and related activities, such as:

- Reducing the angles of working and heap boards by about 0.50 m to 1.00 m, in order to ensure so-called "long term sustainability";
- Calculation of a new heap balance and the related expropriation of new areas for external heaps, once they have been upgraded;
- Swabbing of revelated coal layers with a minimum of 5 m of suitable clay material, with the required sealing characteristics;
- The pouring of the 'Troyanovo 1' and 'Troyanovo – North' pits;
- Infiltration of the areas of the first discovery and heap horizons of the three free-tipped mines in order to neutralise the effects of sulphur contained in the lignite layers of the black clays from which they are built.

The launch of this process will start in those areas, where work on the pad of coal steps will now be completed. Backfilling will affect the areas of the first discovery and heap horizons, as well as the swabbed anchors at + 10 m level.

The implementation of these activities will contribute to minimising environmental risks and pave the way for the development of new industrial activities.

The Kozloduy NPP, as a base plant, has a fundamental role to play in maintaining the resilience of the electricity system. It accounts for about 33 % of the country's electricity production and is a guarantor of Bulgaria's energy security.

The measures under the programme for the extension of the lifetime of Units 5 and 6 of the Kozloduy Nuclear Power Plant have been completed. The results of the implemented measures of the integrated long-term operation programme suggest that the two units can operate in compliance with the safety requirements by 2047 for Unit 5 and by 2051 for Unit 6.

In accordance with national legislation, the Nuclear Regulatory Agency has extended the operating licences for the two units, with a maximum ten-year period, for Unit 5 to 2027 and for Unit 6 by 2029 respectively.

As a result of the implementation of the Extension Project, a number of activities (measures) have been identified and planned and included in the scope of the Integrated Programmes of the Units. Integrated programmes bring together several groups of measures resulting from the implementation of:

— Periodic safety review of the unit concerned;

— Project for the long-term operation of the units;

— Bringing the state of the unit into line with the requirements of the Regulation on ensuring the safety of nuclear power plants of 2016;

— Recommendations from the "stress tests" carried out on nuclear facilities.

➢ *Increasing interconnection*

Bulgaria has a diverse electricity mix and well-developed energy infrastructure that ensures the security of electricity supply for the country and the region. Our country has an important balancing role for the electricity system of South-East Europe.

One of the priority issues for CESEC is the integration of electricity markets and in this area Bulgaria is implementing a number of projects to introduce market alliances with neighbouring countries, including Greece, Romania and the Republic of North Macedonia. More intensive work is also expected on the integration of wind farms, hydrogen and low-carbon gases.

In order to increase the existing electricity interconnection capacity, the following projects have been completed:

- **Interconnection air line (122 km on Bulgarian territory) Maritsa Iztok substation and Na Santa substation**

On 30.6.2023, the interconnector was connected and placed under voltage.

- **Internal air line (94 km) between Maritsa Iztok substation and Plovdiv substation**

All construction and installation works have been carried out and the site became operational on 1.11.2022.

- **Internal air line (13 km) between Maritsa Iztok substation and OUT at Maritsa Iztok 3 TPP**

The site was put into operation by Permit for Use No. TC-05-260/26.03.2021.

- **Internal air line between Maritsa Iztok substation and Burgas substation**

The site was put into operation by Permit for Use No. TC-05-256/26.03.2021.

- **The internal power line 400 kV connecting Varna and Burgas substations**

The site was put into operation in July 2021.

- **Bulgaria-Romania Capacity Enhancement Cluster ("Corridor Black Sea"), which includes 400 kV internal power line between Dobrudzha and Burgas**

The site was put into operation by Licence No CT-05 – 596/30.07.2021.

Hydropumped storage project in Bulgaria – Yadenitsa

The pre-investment activities were implemented with a grant from the Connecting Europe Facility. An EIA decision has entered into force on 21.12.2018 and a final draft was approved by the Minister of Regional Development and Public Works; the work project has been updated, with agreed procedures completed; financial analysis and risk assessment has been prepared. Measures have been taken in connection with the procedures for issuing building permits for the Yadenitsa project.

➢ *Security of supply of natural gas*

Bulgaria's gas system covers all activities related to the extraction, transmission, storage, distribution and supply of natural gas to meet customers' needs. It consists of sites and facilities for the production, transmission, storage and distribution of natural gas on the territory of the country, which are connected to each other, operating in a single gas transport system with a common operating mode. Bulgaria's gas system consists of a gas transmission network of a total length of 3 594 km, including 151 km of the IGB pipeline on Bulgarian territory, and an underground gas storage facility in Chiren (UGS Chiren), with interconnection points with all neighbouring countries – Romania (Negru Voda/Kardam and Ruse/Giurgiu), Greece (Kulata/Sidirokastro and Stara Zagora/Komotini), Republic of North Macedonia (Kyustendil/Židilovo), Serbia (Kiresevo/Zaichar and Kalotina/Dimitrovgrad) and Türkiye (Strandzha/Malkochlar and Strandzha 2/Малкочлар).

On the territory of the Republic of Bulgaria, licences for the activity 'transmission of natural gas' are owned by Bulgartransgaz EAD and Ai Xi Bi AD. Bulgartransgaz EAD's gas transmission network infrastructure consists of 3 443 km of gas pipelines and pipelines, as well as eleven compressor stations – KS Cardam-1, KS Cardam-2, Volchi Dol CC, Polski

Senovts Constitutional Court, Rasovo CC, Provadia CC; CC Nova Provadia, Lozenets CC, Strandzha CC, Ihtiman and Petrich CC, with an estimated total installed capacity of approximately 389 MW, electrochemical protection system, cleaning facilities, communication system, information system and other ancillary facilities.

The gas transmission infrastructure of Ai Xi Bi AD consists of 182.6 km of gas pipeline, including 151 km on Bulgarian territory, electrochemical protection system, cleaning facilities, communication system, information system and other ancillary facilities.

In the context of the challenges in the energy sector linked to the Russian invasion of Ukraine and thanks to its strategic location and good connectivity with neighbouring countries, Bulgaria plays an important role in gas security in South-East Europe. The country's efforts to expand and optimise gas infrastructure in the region have facilitated the realisation and full functioning of interconnections with all neighbouring countries.

Achieving a high level of security of supply of natural gas requires access to diverse and reliable sources on independent routes. The REPowerEU plan's drive to increase the share of liquefied natural gas (LNG) in the EU energy mix and the South East European countries' diversification ambitions stimulate the construction of new LNG terminals in the region. The available regasification capacity in the region, amounting to more than 35 billion m^3 per year and the planned new terminals, mainly in Greece, as well as the increase in flows from the Caspian region, will lead to a significant increase in gas flows from south to north through Bulgaria.

The increasing integration of markets and the increased role of spot trade in the region make it necessary to expand gas infrastructure to achieve sufficiently high transmission capacities, taking into account demand throughout the region.

Planning the new gas infrastructure as "future-proof" (hydrogen fit) will not lead to a carbon lock-in effect. At the same time, there is increasing demand and supply in the countries of the region for significant volumes of natural gas from reliable sources, which will ensure a high level of security and sustainability of supply in the long term.

The diversification of sources and routes as well as the provision of significant natural gas transmission capacity are key factors for the security of natural gas supply and energy security in the country. In order to ensure energy security, Bulgaria is implementing and planning a number of key gas projects and measures that are relevant not only for our country but also for the whole region:

- **Gas interconnector Greece-Bulgaria (IGB)**

The Greece-Bulgaria Gas Interconnector (IGB) is a key part of the Vertical Gas Corridor development project. On 1 October 2022, the commercial operation of IGB started. The gas connection is an important infrastructure that ensures diversification of natural gas supply sources and routes to Bulgaria and the region through access to LNG terminals near Alexandroupolis and the Southern Gas Corridor. The interconnection also helps to secure gas supplies from the LNG terminal to Alexandroupolis from LNG producers such as the USA, Qatar, Algeria, Nigeria, etc., and in the future from Israel, Egypt, etc.

- **Bulgaria-Serbia interconnection (IBS)**

Another project related to diversification of natural gas sources and routes is the Bulgaria-Serbia gas interconnector. The project provides additional access for Bulgaria to gas sources from Western Europe on a completely new route and Serbia to LNG terminals and other alternative sources from the region.

The technical capacity to transport natural gas is 1.8 billion m^3per year. IBS commercial operation started in December 2023.

- **LNG terminal project to Alexandroupolis**

The project for the construction of an LNG terminal at Alexandroupolis, in which Bulgaria contributes 20 % of the share capital of Gaztread S.A. through Bulgartransgaz EAD, is important for securing new quantities of natural gas from an alternative source to the Bulgarian and regional gas market. The project will ensure access for Bulgaria and the whole region to the global liquefied gas market. The terminal will have a regasification capacity of 5.5 billion $m^{3/}$ and a storage capacity of 153.5 thousand m^3. Bulgaria has expressed interest in participating in the new project for the construction of the Thrace LNG terminal and/or other LNG terminal projects in the region.

The floating LNG reception, storage and re-gasification terminal is planned to be commercially operational by March 2024.

- **Expansion of the capacity of UGS Chiren.**

The project to expand the Chiren gas storage facility, which will contribute to ensuring the security of natural gas supply in the country and the region, as well as improving competition and access to natural gas from alternative sources, is ongoing.

The project to expand the capacity of the underground gas deposit (UGS) Chiren includes a gradual increase in the capacity of the sole gas storage facility on the territory of Bulgaria, with the aim of achieving higher volumes of stored gas, increased pressures in the gas reservoir and higher average daily flow rates for extraction and injection. It is envisaged to increase the volume of working gas to 1 billion m^3 and an increase in the flow of extraction and injection to 8-10 mcm/day.

The implementation of all elements of the project has been commissioned by Bulgartransgaz EAD and is in the process of being implemented. It is expected that the construction of the new infrastructure will be completed by the end of 2024 and the sites will become operational.

- **Building a well-functioning, fully integrated and liberalised natural gas market**

In addition to the availability of infrastructure with a high level of interconnection, the establishment of a fully-fledged, integrated and liberalised natural gas market requires a commercial environment functioning in a transparent and standardised manner.

Bulgaria operates an authorised natural gas exchange market operating in full regulatory compliance, with sufficient experience in maintaining communication and interfaces with TSO systems offering a wide range of products and services in full compliance with the requirements of Regulation 1227/2011 on market transparency and data reporting.

Gas Hyb Balkan EAD is a licensed operator of a fully functional electronic platform offering both long-term and short-term products. The operator shall have the possibility of conducting special auctions and continuous trading. The activities of the Platform are fully in line with the European objectives of creating an interconnected and single pan-European gas market.

Bulgarian Energy Trading Platform AD (BETP) holds Licence No L-533-11 of 25.3.2021 to carry out the activity of 'organising a natural gas exchange market' for a period of 35 years. BETP AD is founded with the aim of creating, developing and operating a reliable and stable single regional gas market, contributing to increasing the transparency and liquidity of the natural gas market in the South East Europe region.

Increasing the level of certainty for the platform's market participants will reduce risks and further increase market liquidity.

An appropriate measure to achieve the strategic objective/sub-objective of achieving a fully integrated, reliable and well-functioning regional gas market includes the introduction of clearing services for trades executed on the platform, which will provide additional certainty and increase market liquidity.

4) **internal energy market**

Liberalisation of the electricity market

The electricity market in the Republic of Bulgaria is in the process of gradual liberalisation, which started already in 2004 and is still ongoing. It consists of two segments, a price-regulated segment and a freely negotiated segment or a so-called free market.

Regulated market

In the regulated segment, electricity prices are set by the Energy and Water Regulatory Commission (KEVR) and consumers are served by end suppliers (connected to electricity distribution system operators) distributed on a territorial basis. At present, this segment only includes household consumers (households). Since 1 October 2020, all non-household final customers entered a free market. Thus, only household customers remained on the regulated market. Household consumers have a choice on which market to participate – free or regulated. The main change when entering a free market is the customer's ability to choose his supplier (trader). In turn, it is responsible for the supply of electricity and can provide additional services such as choice of tariffs, different timeframes and payment methods, balancing services, energy advice, analysis, forecasting, etc. The following main changes are made to the Act amending the Energy Act (ZE), adopted on 17.11.2023:

(1) full liberalisation of the wholesale electricity market shall be implemented by 30 June 2024, while keeping household consumers on a regulated market until the beginning of 2026.

The proposed amendments remove the role of National Electric Company EAD (NEK) as a public supplier and consequently abolish the quotas allocated to producers for a regulated market. The draft law accepts that final suppliers of electricity are to be universal service providers and are obliged to supply household customers without changing supplier. In the transitional period (1 July 2024 – 31 December 2025), final suppliers will supply household final customers at regulated prices. The territoriality principle for the licensing of an end supplier has been removed. As a general rule, provision is made for a differentiated compensation of part of the costs of purchasing electricity at regulated prices, depending on the consumption of household customers by the end of 2025. Liberalisation of the regulated electricity market is fully aligned with a Decision of the National Assembly of 11.11.2022, according to which household final electricity customers remain on a regulated market until 31 December 2025, after which full retail price deregulation for households is gradually ensured, in parallel with the full possibility to switch supplier.

(2) new entrants to the electricity market are regulated – citizen energy communities, active customers and aggregators. Measures to protect consumers of energy services are also complemented by the possibility of concluding fixed term and fixed price contracts and dynamic electricity price contracts for customers with a smart meter installed.

(3) the relationship between NEK EAD, as a public supplier, with producers of electricity from coal-fired power plants after its function has ceased to exist, and the sale of electricity purchased under these contracts on the free market are regulated. It shall not be permissible to extend the duration of existing long-term contracts after their expiry in 2024 and 2026 respectively, and to conclude other long-term contracts with such producers.

(4) definitions and criteria have been introduced to define 'households in energy poverty' and 'vulnerable electricity customers' for the purpose of liberalising the electricity market and implementing measures to support households in energy poverty, including priority treatment when implementing programmes to improve the energy efficiency of residential buildings.

Free Market

In the free segment, customers can change their electricity supplier without their geographical location influencing this. Consumers continue to pay prices for transmission and access to the network to which they are connected (transmission or distribution). Energy for a free market is purchased by traders, final non-household customers and network operators (for technology costs) at freely negotiated prices and/or from the platforms of the Bulgarian Independent Energy Exchange (BEB). The KEVR has only the role of regulator controlling market participants. The Commission has the power to determine the Electricity Trading Rules (EEP), the level of network prices and the "Public

Obligations" price. With amendments to the Energy Act, all RES and RES producers with an installed capacity of 500 kW or more have to offer their electricity on an organised exchange market. These changes, as well as the 1.10.2020 obligation for all non-household customers to be part of the free market, have significantly changed the market model.

In line with the liberalisation process, the internal electricity market was built on the model of bilateral treaties and a balancing market. Consumers conclude contracts with traders for the supply of electricity, while traders purchase the necessary quantities for their customers from producers. When a discrepancy occurs between the requested quantities of energy and the actual consumption or production, the LoW as operator of the balancing market shall cover the unbalances, the differences between the pre-claimed and the actual quantities consumed/produced. The resulting costs shall be charged to the relevant market participants in the form of balancing energy prices.

In early 2016, a Bulgarian Independent Energy Exchange was launched. In the same year, the KEVR adopted an 'Instruction on the terms and conditions for switching electricity supplier for customers owning sites subject to standardised load profiles (SLP)' enabled household and non-household customers who do not have hourly metered meters to enter a free market.

Leaving the free market does not entail risks of additional charges or security of supply. As has been the case until now, the relevant distribution system operator will remain responsible for the maintenance of the infrastructure and the quality of electricity, regardless of who is the chosen free market supplier. Since 1 July 2021, customers who did not choose their electricity supplier have been supplied by an ex-officio geographically supplier, the so-called supplier of last resort ('WHT').

In a liberalised (free) market, prices are determined by the market – supply and demand. Different factors, as well as combinations thereof, may have different effects on the market. Some of the most significant conditions affecting the Bulgarian market relate to electricity prices on the regional market (Greece, Romania, Hungary). In turn, it is influenced by the levels of the markets in Western Europe. Thus, the price levels achieved in the developed Western European markets also have an impact on electricity prices on the free market in Bulgaria. Factors directly responsible for the evolution of electricity prices on world markets, which are also relevant for Bulgaria, are: changes in demand and supply, changes in the prices of major energy resources (oil, gas, coal, etc.), carbon prices, meteorological conditions, planned (repairs) and exceptional events (accidents, import/export bans, bankruptcies), energy policies, etc.

Liberalisation of the natural gas market

The distribution of gas on the territory of Bulgaria is carried out by private regional and local companies operating under the terms of licensing and price regulation for the distribution of activities. The companies with the largest market share in the country are Overgas Network AD, Sigas Bulgaria EAD and Aresgaz AD.

Bulgaria currently has two licensed gas exchanges in operation. The licences issued shall be for the maximum duration of 35 years. The two gas exchanges operate with the same trading platform, Trayport Global Vision Trading System, a product of Trayport Limited UK, which has developed the most common and globally applied software for transaction administration purposes.

The Balkan Gas Hub EAD (BGH EAD), established in 2019, constructs, operates and is responsible for the operation of the organised natural gas trading market of BGH EAD. The segment and bilateral e-commerce electronic platform offers modern physical products, including exchange change of ownership products at Virtual Trading Point (VTP) and some of the physical points of the networks. The platform ensures equal access, market-based prices, increased transparency as well as improved competition in the gas market in Bulgaria.

The short-term (spot) segment of the platform includes standardised day-ahead, day-ahead, time and local products for TSOs' network balancing needs. Trade shall take place on an anonymous basis in accordance with the provisions of Regulation (EU) No 312/2014.

The long-term segment of the trading platform offers products tradable on a medium and long term basis – weekly, monthly, quarterly and annual.

The Gas Release Program (Gas Release Program) segment at the end of 2022 came to an end with the adoption of § 10 of the Transitional and Final Provisions of the Act amending and supplementing the Corporate Income Tax Act (published in. SG No 99/2022), which repealed the provisions of Article 176a (1) (4) and (5) of the Energy Act, according to which the public supplier was obliged to offer certain quantities of natural gas on the organised exchange market in 2023 and 2024. Bulgargaz's long-term contract was not in force as of 31.12.2022, and its supplies ceased on 27.4.2022. Due to the discontinued supplies, Bulgargaz EAD needs to provide alternative sources, both for the provision of its activities as a public supplier and under its bilateral contracts and the quantities under the Programme. The resulting shortfall under the programme is compensated by alternative suppliers at market conditions. More than 90 traders entitled to trade in natural gas freely on the organised exchange market have been licensed. In this sense, Bulgargaz EAD competes on the market together and on an equal footing with them for the purchase of natural gas. At the same time, the prices under the Programme are regulated by the KEVR for the relevant period. Given the lack of predictability in terms of quantities and price levels and the impossibility of releasing such quantities on the organised exchange market under conditions other than those laid down in the Regulatory Agreement, conditions have been created for the formation of price deficits for Bulgargaz EAD and distortion of the market. Further negative effects on this process create supply disruptions on the pan-European market and increased demand for natural gas, which negatively affects the implementation of the Programme by the public supplier. As of December 2 023, Gazov Hyb Balkan EAD had over 90 registered companies, 40 % foreign and 60 % from Bulgaria, including the two operators Bulgartransgaz EAD, ICGB, and Nomagas JSC Skopje's gas transmission operator.

Priority shall be given to measures for the rehabilitation, modernisation and expansion of existing gas transmission infrastructure and the development of interconnections, providing additional opportunities to increase the use of natural gas in the country with corresponding economic, social and environmental benefits.

In view of the geopolitical developments of the last year, the halted supply of natural gas from Russia to Europe and the war in Ukraine, the Ministry of Energy and Bulgargaz EAD have taken serious action to ensure diversification of natural gas supplies to the country and fill the underground storage in Chiren to ensure the country's energy security. In accordance with Regulation (EU) No 347/2013, priority corridor: North-South gas interconnections in Central Eastern and South-Eastern Europe (NSI East Gas) by Bulgartransgaz EAD has drawn up a project to extend the Chiren underground gas storage facility. Its implementation provides for a staged increase in the capacity of the storage facility to achieve higher volumes of stored gas, including increased pressures in the gas reservoir, as well as higher average daily flow rates for extraction and injection.

Bulgartransgaz EAD complies with the requirements of the Third Energy Package by applying the Regional Capacity Reservation Platform (RBP) pursuant to Regulation (EU) No 984/2013 establishing a Network Code on Capacity Allocation Mechanisms in Gas Transmission Systems.

iii. Key issues of cross-border relevance

In implementing the European policy for the development of a common energy market, Bulgaria is implementing a number of projects of European and regional importance, as detailed in point 2.4.2. The main projects are to increase the country's energy interconnection with neighbouring countries in the region, as well as to the integration of energy markets. The aim is to increase the energy security of the country and the region, ensure security of supply and diversification of sources, routes and develop electricity and gas markets. This ensures the competitiveness of Bulgarian business and the development of the economy in the country and the region.

iv. Administrative structure of implementing national energy and climate policies

According to Articles 3 and 4 of the Energy Act, state energy policy is implemented through the National Assembly and the Council of Ministers and is conducted by the Minister for Energy. In accordance with Article 11 (1) of the Energy Efficiency Act, activities relating to the implementation of the State policy for improving energy efficiency are carried out by the Executive Director of the Agency for Sustainable Energy Development (SEDA). Under the Renewable Energy Act, the Executive Director of the AUER is responsible for the implementation of the State policy for the promotion of the production and consumption of electricity, heating and cooling from renewable sources, the production and consumption of biogas and green hydrogen, as well as the production and consumption of energy from renewable sources in transport, renewable liquid and gaseous transport fuels of non-

biological origin and recycled fuels in transport.

The Ministry of Environment and Water conducts state environmental policy, the main aspects of which relate to the implementation of sectoral climate policies.

The Ministry of Economy implements state policy to build a competitive low-carbon economy, promote and accelerate investment, innovation and competitiveness.

The Ministry of Transport, Information Technology and Communications conducts public policy in the fields of transport, development of road infrastructure and electronic communications and postal services.

The Ministry of Regional Development and Public Works is responsible for carrying out the reform of the country's regional development, spatial planning, construction of basic networks and facilities of technical infrastructure and implements the National Energy Efficiency Programme for multi-apartment buildings.

The Ministry of Agriculture and Food conducts state policy in the fields of agriculture, agriculture, forests and food.

The Ministry of Labour and Social Policy develops, coordinates and implements a policy in the field of social assistance. The Social Assistance Agency is active in the provision of social benefits, including targeted heating assistance.

The Ministry of Finance maintains sustainable and transparent public finances of the country, supporting the government in building an efficient public sector and creating the conditions for economic growth. Bulgarian Independent Energy Exchange EAD holds a ten-year licence for the activity of organising an electricity exchange market in the Republic of Bulgaria. Bulgarian Fund Borsa AD is the sole owner of the company's capital.

The Ministry of Foreign Affairs directs, coordinates and supervises the implementation of the state policy of the Republic of Bulgaria in its relations with other countries, ensuring the maintenance and development of foreign policy dialogue, security policy and bilateral, regional and multilateral cooperation. Carries out general coordination in the field of foreign policy and international action of the Republic of Bulgaria.

The Ministry of Education and Science implements state policy in the field of research.

The Ministry of Innovation and Growth is working to build a competitive economy that will ensure growth and development of regions in Bulgaria, promote and accelerate innovation and investment throughout the country and across all sectors of the economy. The Energy and Water Regulatory Commission is an independent specialised state body which carries out the regulation of energy activities in accordance with the provisions of the Energy Act and the Renewable Sources Act and monitors the electricity and natural gas market.

State regulation of the safe use of nuclear energy and ionising radiation and the safe management of radioactive waste and spent fuel is carried out by the Chairman of the Nuclear Regulatory Agency.

1.3. Consultations and involvement of national and Union entities and their outcome

i. Involvement of the national Parliament

State energy policy is implemented through the National Assembly and the Council of Ministers, in accordance with Article 3 of the Energy Act.

ii. Involvement of local and regional authorities

All relevant ministries were consulted and actively involved in the process of developing the update of the Plan.

The competent authority for public policy in the field of environment and climate – Ministry of Environment and Water has developed the objectives, policies and measures in the 'Decarbonisation' part and historical data on GHG emissions and assumed trends. The MoEW provided information on waste management, circular economy, air pollution and biodiversity and management of Natura 2000 sites.

The Ministry of Regional Development and Public Works provided information on energy efficiency in relation to the National Renovation Programme under the Energy Efficiency Directive. In order to ensure coordination and alignment between the different strategic documents, the modelling results for the purposes of this Plan should be taken into account in the National Renovation Programme, as this document precedes the programme.

The Ministry of Transport and Communications provided information on plans and policies for the transport sector. The main development guidelines and strategic objectives of the national transport system for the period up to 2030 were set out in the Integrated Transport Strategy up to 2030. The strategy was approved by Council of Ministers Decision No 336/23.06.2017. The national policy framework for the development of the market for alternative fuels in the transport sector and for the deployment of the relevant infrastructure was approved by Council of Ministers Decision No 87 of 26.1.2017 and amended by Council of Ministers Decision No 323 of 11.5.2018 covering the period up to 2020. The Ministry of Transport provided information on planned policies and measures in the transport sector with a horizon of 2030. The Minister for Transport and Communications shall approve the Annual Programme for the Construction, Maintenance, Repair, Development and Operation of Railway Infrastructure for 2020 and the Programme for the Development and Operation of Railway Infrastructure 2020-2024.

The Ministry of Agriculture and Food provided forecasts of the development of the sector and of the available strategic documents, policies and measures. As, to date, the only strategic document in the sector after 2020 is the National Action Plan for Forest Biomass Energy 2018-2027, the modelling exercise for the purposes of this Plan incorporates historical data from the National Plan and on this basis the projections have been made.

The Ministry of Labour and Social Policy develops, coordinates and implements a policy in the field of social assistance. The Social Assistance Agency is active in the provision of social benefits, including targeted heating assistance.

The Ministry of Innovation and Growth provided information on the Innovation Strategy for Smart Specialisation 2021-2027, as well as the National Roadmap to improve the conditions for unleashing the development potential of hydrogen technologies.

The Ministry of Finance provided information on macroeconomic indicators and trends as well as sources of funding in relation to the implementation of the policies and measures set out in this updated Plan.

iii. Consultations of stakeholders, including the social partners, and engagement of civil society and the general public

The institutions responsible for the preparation of the INECPs participated in various conferences, meetings, roundtables and stakeholder forums where topics related to the INECPs were discussed.

The draft INECP was published for preliminary public consultations on the official websites of the Ministry and the Ministry of the Environment and Water on 22.12.2023 and all interested parties had the opportunity to submit their comments and recommendations on it. Following the presentation of the draft INECP, ministries continued to receive additional opinions and recommendations from various stakeholders.

Written contributions to the draft INECP were received from various stakeholders, such as NGOs, private and state energy companies, industry associations, economic institutes, citizens, etc. Stakeholder comments refer to all sections of the draft INECP.

iv. Consultations with other Member States

v. Iterative process with the Commission

The EU Governance Regulation provides for a permanent consultation process with the EC consisting of an evaluation of the INECPs by the Commission, as well as an update of the plans and the preparation of progress reports by the Member States.

1.4. Regional cooperation in preparing the plan

i. Elements subject to joint or coordinated planning with other Member States

In line with the ambition of the European Green Deal for climate neutrality by 2050 and as a basis for the clean energy transition, the energy targets established under the Fit for 55 package have been established. These targets have been further enhanced by the EC's plan to reduce the EU's energy dependency in the context of the ongoing military conflict in Ukraine, with the aim of building a more independent EU energy system. It proposes additional actions to save energy, diversify fuel supply, rapidly replace fossil fuels by accelerating the clean energy transition by increasing renewable electricity generation, smart matching of investments and reforms. In parallel, existing coal capacities could also be used for longer than initially expected while respecting environmental requirements. Nuclear energy as a proven low-emission source also plays an important role.

International tensions in a geopolitical context and volatile levels of energy prices have increased the need to strengthen regional cooperation in the EU by establishing coherent policies and greater solidarity between Member States with regard to the energy security dimension, achieving a diversified energy supply as well as a more resilient Energy Union.

The development of regional cooperation is important to ensure consistent planning and addressing risks related to the security of energy supply, with a view to ensuring the construction of energy infrastructure and promoting market integration. Changes in energy policy demonstrate the need for regional cooperation to contribute to increasing the resilience and preparedness of the energy system and accelerating the clean energy transition.

Bulgaria is an active participant in flagship European energy initiatives such as the Central and South-Eastern Europe Energy Connectivity Initiative, the European Gas Purchase Platform, the Energy Community, the Union for the Mediterranean and the International Renewable Energy Agency, as well as international energy initiatives such as the Black Sea Economic Cooperation Organisation and the International Energy Forum. Bulgaria is a co-founder of the International Atomic Energy Agency and has been a full member since its creation.

The Central and South-Eastern Europe Energy Connectivity Initiative (CESEC)

Regional energy cooperation in South-East Europe is implemented through CESEC. The main reason was the creation of CESEC is the historical vulnerability of the South East European region to the security of energy supply, in particular natural gas.

CESEC shall contribute to strengthening the region in terms of security of supply by prioritising the implementation of new interconnection infrastructure projects. A number of infrastructure projects, which are central to Bulgaria, are identified in the CESEC Action Plan, namely the Trans Adriatic Pipeline, gas connections with Bulgaria's neighbouring countries, including Greece, Romania and Serbia, and the strengthening of Bulgaria's gas transmission network. In addition, CESEC also discusses operational topics related to reverse flows, cross-border tariffs and capacity allocation.

CESEC focuses on the operational and infrastructure side of regional gas cooperation. A number of market pool projects are being implemented as part of the CESEC Action Plan, which has been extended beyond natural gas. Bulgaria participates in the implementation of a day-ahead exchange market alliance with Greece and Italy; developing a methodology for calculating total capacity in the South-East European region with Romania and Greece; implementation of a day-ahead exchange market alliance with the Republic of North Macedonia, Croatia and Serbia.

A number of studies on the development of renewable energy in the South-East European region show untapped economic potential. This topic is part of CESEC's plan to assess the potential of renewable energy (until 2030 and 2050), as well as to promote the development of renewable energy financing instruments. CESEC considers energy

efficiency as a priority policy, including its role in combating energy poverty, in the framework of the exchange of information and best practices.

European Gas Purchase Platform

The platform was set up to coordinate work on diversifying EU gas supplies, through a voluntary mechanism for the purchase of gas and renewable hydrogen for the EU, making optimal use of the EU's collective political and market weight.

Council Regulation (EU) 2022/2576 enhancing solidarity by better coordinating gas purchases, exchanges of gas across borders and reliable price benchmarks, adopted on 19 December 2022, provides a legal framework for the EU Energy Platform to assist Member States in preparing for winter 2023/24 and in particular to fill their storage facilities.

Five regional groups have been set up to identify the needs and opportunities for common use of energy infrastructure and potential new suppliers. Joint purchases were launched in May 2023 through a process of aggregation of data on the required volumes of gas to be requested for purchase, meetings held with representatives of stakeholders, including industry.

South East Europe Regional Group, part of the European Gas Purchase Platform

The South East Europe Regional Group has identified the various problems of the various pillars in the region (consumption, electricity and gas interchangeability, infrastructure, interconnection agreements, supply, drawing up an action plan, financing). The Regional Group shall cooperate with the Energy Community Contracting Parties and the Energy Community Secretariat in their efforts to comprehensively enhance energy security in the South East Europe region.

Energy community

The Energy Community is an international organisation that brings together the European Union and its neighbours to create an integrated pan-European energy market. The organisation is founded by the Treaty establishing the Energy Community, signed in October 2 005 in Athens, Greece, in force since July 2006. The main objective of the Energy Community is to extend the rules and principles of the EU internal energy market to countries in South-East Europe, the Black Sea region and beyond on the basis of a legally binding framework.

Union for Mediterranean

The Union for the Mediterranean (UfM) is an intergovernmental organisation bringing together 43 countries to strengthen regional cooperation and dialogue through concrete projects and initiatives in the field of energy and climate, in order to address the challenges in these areas in the region, while supporting progress towards more secure and sustainable energy models.

International Renewable Energy Agency (IRENA)

IRENA is a leading global intergovernmental energy transformation agency serving as the main platform for international cooperation, supporting countries in their energy transitions and providing state-of-the-art data and analysis for technology, innovation, policy, finance and investment. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy in pursuit of sustainable development, access to energy and energy security, for economic and social sustainability and prosperity and a climate-resilient future.

The Black Sea Economic Cooperation Organisation (BSEC)

BSEC is a regional economic organisation for cooperation in the Black Sea region. The BSEC's main task is to serve as a model for a multilateral political and economic initiative that harmonises the actions of the Member States and ensures peace, security and development of the Black Sea region in the spirit of friendly relations. One of the primary areas of cooperation within the BSEC is the energy sector. Bulgaria is an active member of the BSEC, working actively under its four Presidencies both to develop sectoral cooperation and to strengthen the links of the Black Sea region with the European Union.

International Energy Forum (IEF)

The MEF provides one of the most important platforms for an open energy dialogue between 72 member governments, as well as a large number of interested international and national energy companies. The MEF facilitates dialogue between international organisations in order to deepen cooperation and strengthen global governance of energy markets. At the heart of this is the tripartite work programme between the MEF, the International Energy Agency (IEA) and the Organisation of Petroleum Exporting Countries (OPEC). In addition, the MEF has a broad mandate to address various energy issues related to oil and gas, renewable energy, sustainability and energy transition, new technologies and data transparency. An important focus of the organisation is also the issue of energy poverty.

International Atomic Energy Agency

The International Atomic Energy Agency is the main intergovernmental forum for scientific and technical cooperation in the nuclear field. The IAEA helps Parties to use nuclear science and technology to monitor emissions and environmental changes in the ocean and ecosystems, reduce greenhouse gas emissions from energy production and land use, and adapt to new climate realities, including food and water scarcity and ecosystem losses.

Tripartite Declaration between the Republic of Bulgaria, the Hellenic Republic and Romania on the development of renewable energy in the region

On 19.1.2024, a declaration was signed in Athens committing the three countries to cooperate in the preparation of joint cross-border projects in the field of offshore wind energy, renewable hydrogen and electric vehicle charging infrastructure. The document foresees that Bulgaria, Greece and Romania support and promote a common initiative to explore and develop the sustainable use of offshore wind potential in the Black and Aegean Seas. The three countries will jointly apply for cross-border RES status under the ongoing

call under the Connecting Europe Facility. Cooperation on a joint project under the call for cross-border renewable energy initiatives is also being considered.

The initiative will also help map offshore wind potential in South-East Europe and lay the basis for the development of a harmonised regulatory framework.

The creation of a regional cluster on renewable hydrogen, involving governments of the three countries, transmission system operators and industry, is also envisaged. Both cross-border status will be sought under the ongoing call under the Connecting Europe Facility and the possibility of a joint project between the three countries. The regional cluster will develop cross-border projects to boost renewable energy, including wind and solar, its integration into a low emission and renewable hydrogen production system for the energy, industrial and transport sectors, and the development of dedicated hydrogen infrastructure.

The Declaration provides that the Parties may extend cooperation to other areas by mutual agreement, as well as to intensify their dialogue and cooperation. The development of projects of regional and Community interest shall aim at achieving a just transition towards a decarbonised and climate-neutral economy.

ii. Explanation of how regional cooperation is considered in the plan

Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action establishes a flexible and robust system of transparent and mutually reinforcing cooperation between EU Member States and the European Commission. This helps ensure a consistent approach between energy and climate policies and coordinated action across Member States.

In this context, and in the implementation of the European policy towards a common energy market, a number of projects of European and regional importance are being implemented. The main projects are to increase energy interconnection with neighbouring countries in the region, as well as the integration of energy markets. The aim is to increase the energy security of the country and the region, ensure security of supply and diversify energy sources and routes.

Identifying and developing the potential of cooperation mechanisms on renewables and energy efficiency will speed up the process and contribute to the implementation of joint projects in order to provide "European added value".

In the context of the green transition, a smooth process of decarbonisation of the existing gas market and the gradual establishment of a competitive, cost-effective and transparent EU hydrogen market is essential. The envisaged promotion of the deployment of innovative technologies should provide opportunities for the modernisation of existing gas infrastructure as well as uptake of low-carbon gases, combined with a sufficient transition period.

It is essential to strengthen the potential of public-private partnerships focusing on initiatives to accelerate the development of new technologies to implement the green transition and energy storage.

Opportunities for effective regional energy cooperation are seized through activities for the preparation and implementation of memoranda and cooperation contracts to build regional, pan-European and international partnerships.

Actively participates in coordinating common messages and European initiatives with key partners to promote EU initiatives internationally, with actions to ensure a consistent position on regional and global energy issues in international energy fora and platforms.

2. NATIONAL OBJECTIVES AND TARGETS

2.1. Dimension "Decarbonisation"

2.1.1. GHG emissions and removals

i. The elements referred to in Article 4(a) (1)

The European Council adopted on 12 December 2019 a target to achieve the Union's climate neutrality by 2050. On 10 December 2020, an increase in the collective EU climate target by 2030 from 40 % to 'at least 55 %' was adopted.

The two climate objectives, as well as the need for all sectors to contribute, have been enshrined in Union legislation with the adoption on 5 May 2021 of the so-called European Climate Law Regulation, a framework act ensuring the participation of all sectors in achieving the targets. The Regulation sets a target of reducing the EU's emissions of 'at least 55 %' by 2030, limiting the role of sinks in achieving it, climate neutrality in the Union by 2050 and negative emissions thereafter, setting indicative carbon budgets and an additional European scientific body.

On 14 July 2021, the EC presented 15 pieces of legislation from the so-called Fit for 55 package, presenting the Commission's proposals to achieve the increased climate target of "at least 55 %", setting the path to climate neutrality by 2050 and taking into account the need for all sectors to contribute.

In order to counter climate change and its impact on the economy, Bulgaria prepared a National Strategy on Adaptation to Climate Change and its Action Plan, adopted by decision of the Council of Ministers in 2019.

The document outlines the strategic framework and priorities for adaptation to climate change by 2030. The aim is to reduce the country's vulnerability to the impacts of climate change and to improve the adaptive capacity of environmental, social and economic systems to the impacts of climate change.

The National Strategy on Adaptation to Climate Change covers nine sectors, which are: agriculture, Forests, Biodiversity and Ecosystems, Water, Energy, Transport, Urban Environment, Human Health and Tourism. It also includes an analysis of the macroeconomic effects of climate change and an assessment of the Disaster Risk Management sector.

The strategy fills a gap in Bulgaria's climate change policy by outlining the country's approach to adapting key sectors of the economy to a changing climate.

The Action Plan, which sets out objectives and priorities for improving adaptation capacity, is also part of the document. The plan sets out in detail actions for each of the sectors, including necessary financial resources, expected results, institutions responsible for their implementation.

The scope of adaptation options for sectors reflects the scope and complexity of climate change impacts. The main focus of the measures is to: strengthening the policy and legal framework for mainstreaming climate change adaptation; building adaptive capacity and developing financial, social and political risk management guidelines; improving knowledge management, research, education and communication with stakeholders.

The main category contributing to the elimination of greenhouse gases is the forestry sector. All other categories (arable land, settlements, water) are sources of CO_2 emissions. The main reason for the overall permanent performance of sinks is the decrease in removals by the forest sector and a slight increase in emissions from cropland, settlements and water areas.

In order to provide the necessary biomass, Bulgaria relies not only on forest biomass, according to the National Action Plan for Energy from Forest Biomass 2018-2027, but also uses the untapped potential of the biodegradable fraction of products, waste and residues of biological origin from agriculture, including vegetal and animal waste, from forestry and related industries, including fisheries and aquaculture, as well as the biodegradable fraction of waste, including industrial and municipal waste of biological origin, meeting the sustainability criteria set out in Article 29 of Directive (EU) 2018/2001 of 11 December 2018 on the promotion of the use of energy from renewable sources (RED II Directive).

For the supply of conventional biofuels, the land area needed to produce them will decrease between 2020 and 2030. The additional areas needed for the production of advanced biofuels, due to the introduction of additional measures incentivising the use of advanced biofuels from 2020, will be offset by the overall reduction in the area needed for conventional biofuels.

Power plants in coal regions produce a significant part of the country's electricity. These power plants use lignite and brown coal and do not have access to adequate high-pressure gas transmission infrastructure with sufficient capacity to allow fuel switching with less carbon-intensive fuels, such as natural gas and a transition fuel towards carbon neutrality. Action has been taken to build new high-pressure gas transmission infrastructure to transport natural gas to thermal power plants and other potential consumers in coal regions.

This will create market conditions for the modernisation of the combustion plants of thermal power plants and other energy users, the introduction of lower emission fuels in the energy mix, a significant reduction in greenhouse gas emissions from combustion processes, including from the production of electricity from solid fuels in these regions.

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

Additional economic, social and environmental benefits will be realised by increasing the efficiency of energy conversion, reducing the cost of greenhouse gas emission allowances and reducing emissions of harmful substances – sulphur and nitrogen oxides and fine particulate matter.

The development of GHG capture, processing and storage technologies, which are subject to separate requirements, will contribute to reducing emissions and, as such, need to be considered separately and, accordingly, separately modelled.

Following the adoption of the legislative proposal for a net-zero industry, these technologies (CO_2 – transport and carbon capture, absorption, and storage technologies) will have strategic status and the projects related to them will be treated favourably under shortened authorisation schemes. CO_2 storage projects are only economically viable when there is a business interest along the entire value chain, including transport.

In this context, it is important to explore the market potential of industrial options to eliminate greenhouse gases by capturing, storing or transforming them into high added value products.

ii. Where applicable, other national objectives and targets consistent with the Paris Agreement and the existing long-term strategies. If applicable with a view to contributing to the Union's overall greenhouse gas emission reduction commitment, other objectives and targets, including sectoral and climate change adaptation targets, if any

Not applicable

2.1.2. Energy from renewable sources[4]

i. The elements referred to in Article 4(a) (2)

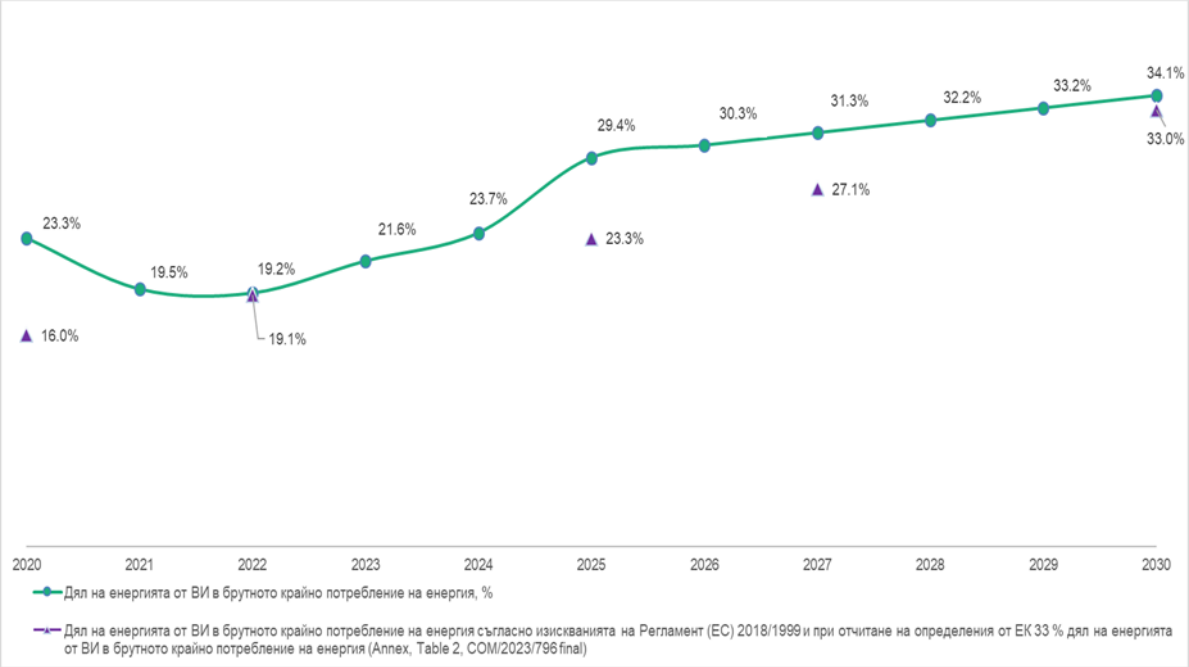
Bulgaria has set an ambitious national target of a 34.1 % share of renewable energy in gross final energy consumption in 2030, which is 1 percentage point higher than that set

[4] Findings from SHARES tool 2020, SHARES tool 2020, Eurostat were used for the period 2022-2022

[5] communication FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN Economic AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS EU wide assessment of the draft updated National Energy and Climate Plans An indicative step towards the more ambitious 2030 energy and climate objectives under the European Green Deal and Reű

in COM/2023/796final5 and 18.1 percentage points higher than the target set for 2020 under Annex I to Directive (EU) 2018/2001.

Figure 1 *Share of energy from renewable sources*



During the period of INECP, the development of renewable energy will comply with all requirements stemming from environmental legislation, including in relation to protected areas and Natura 2000.

ii. Estimated trajectories for the sectoral share of energy from renewable sources in gross final energy consumption from 2021 to 2 030 in the electricity, heating and cooling and transport sectors

To achieve the national target for the share of energy from renewable sources in gross final energy consumption by 2030 (34.1 %), the following sectoral breakdown is estimated:

→ A 42.2 % share of renewable energy in the electricity sector;

→ A 45.5 % share of energy from renewable sources in heating and cooling;

→ 15.2 % share of energy from renewable sources in the transport sector.

Between 2020 and 2030, electricity consumption from renewable sources is projected to grow due to an increase in electricity produced from solar, wind and biomass.

Table 2: *Indicative trajectory for the share of electricity from renewable sources in gross final consumption of electricity for the period 2020-2030 – Electricity sector6*

[6] For the period 2020-2022, findings from SHARES tool 2020, SHARES tool 2022, Eurostat were used.

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Дял на електрическата енергия от ВИ в брутното крайно потребление на електрическа енергия, %	23.6%	21.4%	20.2%	19.0%	17.8%	34.7%	36.2%	37.7%	39.2%	40.7%	42.2%

Source: E3-Modelling data

In the heating and cooling sector, the use of renewable energy is expected to increase, reaching a 45.5 % share of renewable energy in gross final consumption of heating and cooling in 2030.

Table 3: *Indicative trajectory for the share of heating and cooling from RES in gross final consumption of heating and cooling for the period 2020-2030 – heating and cooling7*

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Дял на топлинната енергия и енергията за охлаждане от ВИ в брутното крайно потребление на топлинна енергия и енергия за охлаждане, %	37.2%	30.0%	31.7%	33.4%	35.1%	40.7%	41.7%	42.6%	43.6%	44.5%	45.5%

The share of energy from renewable sources in the transport sector is expected to increase to 15.2 % between 2020 and 2030. This share will be adjusted and increased, with the mandatory minimum target for the share of energy from renewable sources in final energy consumption in transport planned to reach 29 % in 2030.

Table 4*: Indicative trajectory for the share of energy from renewable sources in final energy consumption 2020-2030 – Transport sector8*

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Дял на енергията от ВИ в крайното потребление на енергия в транспорта, %	9.1%	7.6%	7.7%	7.7%	7.8%	11.0%	11.8%	12.7%	13.5%	14.4%	15.2%

iii. Estimated trajectories by renewable energy technologies that a Member State envisages to use to achieve the overall and sectoral trajectories for renewable energy for the period 2020-2030, including the estimated total gross final energy consumption for each technology and sector in Mtoe, as well as total planned installed capacity (divided by new capacity and increase in capacity of existing installations) for each technology in MW

In order to achieve the targets in the heating and cooling sector, the following new requirements should be taken into account:

[7] For the period 2020-2022, findings from SHARES tool 2020, SHARES tool 2022, Eurostat were used.

[8] For the period 2020-2022, findings from SHARES tool 2020, SHARES tool 2022, Eurostat were used.

- → an increase in renewable energy (excluding waste heat and cold) in gross final energy consumption in the heating and cooling sector by 1.5 percentage points, calculated as an annual average over the period 2021-2030, starting from the share of renewable energy in heating and cooling in 2020;
- → increase the share of energy from renewable sources and from waste heat and cold in district heating and cooling by an indicative 2.2 percentage points as an annual average calculated for the period 2021 to 2030, starting from the share of energy from renewable sources and from waste heat and cold in district heating and cooling in 2020.

In order to achieve the target in the transport sector, the following requirements of Directive (EU) 2018/2001 should also be taken into account:

- → limiting the use of conventional biofuels to 7 % of final energy consumption in the transport sector in 2030;
- → the combined share of advanced biofuels and biogas produced from the feedstock listed in Part A of Annex IX and of renewable fuels of non-biological origin in final energy consumption in the transport sector shall be at least 1 % in 2025 and at least 5.5 % in 2030, of which the share of renewable fuels of non-biological origin shall be at least one percentage point in 2030;
- → limiting the use in the transport sector of biofuels and biogas produced from feedstock listed in Part B of Annex IX to Directive (EU) 2018/2001 (waste oil and animal fat) to a maximum of 1.7 %;
- → the share of biofuels and biogas produced from feedstock listed in Annex IX to Directive (EU) 2018/2001 and renewable fuels of non-biological origin shall be considered to be twice their energy content;
- → the share of electricity from renewable sources shall be considered to be four times its energy content when supplied to road vehicles and may be considered to be 1.5 times its energy content when supplied to rail transport;
- → the share of advanced biofuels and biogas produced from feedstocks listed in Part A of Annex IX consumed in the air and maritime transport sectors shall be considered to be 1.2 times their energy content and the share of renewable fuels of non-biological origin shall be considered to be 1.5 times their energy content.

iv. Estimated trajectories for biomass energy consumption, split between heat, electricity and transport, and trajectories for the provision of biomass from different feedstocks, with an indication of their origin (distinguishing between domestic production and imports). For forest biomass, an assessment of its origin as well as an assessment of the impact on LULUCF carbon sinks

v. If applicable, other national trajectories and objectives, including long-term or sectoral (e.g. share of renewable energy in district heating, renewable energy use, renewable energy produced by cities, energy communities and self-consumers, energy extracted from sewage sludge)

2.2. Dimension energy efficiency

i. The elements set out in Article 4(b)

Indicative national energy efficiency contribution

Total cumulative energy savings target for 2030-2 021 in accordance with Article 8 on energy savings obligations under Directive 2023/1791/EU

According to Article 8(1)(b) of Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2 023 on energy efficiency and amending Regulation (EU) 2023/955 (recast), Member States shall achieve cumulative end-use energy savings equal new savings each year from 1 January 2021 to 31 December 2030 of:

- → 0.8 % of annual final energy consumption from 1 January 2021 to 31 December 2023, averaged over the most recent three-year period preceding 1 January 2019;
- → 1.3 % of annual final energy consumption from 1 January 2024 to 31 December 2025, averaged over the most recent three-year period preceding 1 January 2019;
- → 1.5 % of annual final energy consumption from 1 January 2026 to 31 December 2027, averaged over the most recent three-year period preceding 1 January 2019;
- → 1.9 % of annual final energy consumption from 1 January 2028 to 31 December 2030, averaged over the most recent three-year period preceding 1 January 2019.

Based on the average annual final energy consumption for the period 2018-2016, the energy savings to be achieved between 2021 and 2030 and the cumulative energy savings target to be achieved by 31 December 2030 have been calculated. These figures are presented in the following table.

Table 5: *Annual energy savings in final energy consumption, ktoe*

Year	Annual energy savings in final consumption										Total
2021	78.58										78.58
2022	78.58	78.58									157.16
2023	78.58	78.58	78.58								235.74
2024	78.58	78.58	78.58	127.69							363.43
2025	78.58	78.58	78.58	127.69	127.69						491.12
2026	78.58	78.58	78.58	127.69	127.69	147.34					638.46
2027	78.58	78.58	78.58	127.69	127.69	147.34	147.34				785.79
2028	78.58	78.58	78.58	127.69	127.69	147.34	147.34	186.63			972.42
2029	78.58	78.58	78.58	127.69	127.69	147.34	147.34	186.63	186.63		1 159.04
2030	78.58	78.58	78.58	127.69	127.69	147.34	147.34	186.63	186.63	186.63	1 345.67
Total cumulative savings 2021-2030											6 227.39

ii. Indicative milestones for 2030, 2040 and 2050, nationally established measurable progress indicators and their contribution to the Union energy efficiency targets included in the roadmaps set out in the long-term renovation strategies for the national stock of residential and non-residential buildings (private and public), in accordance with Article 2a of Directive 2010/31/EU

Pursuant to Directive (EU) 2018/844 of the European Parliament and of the Council amending Directive 2010/31/EU on the energy performance of buildings adopted on 30 May 2018, Member States should develop a long-term renovation strategy to support the renovation of the national stock of residential and non-residential buildings, both public and private, to achieve a highly energy efficient and decarbonised building stock by 2050, facilitating the cost-effective transformation of existing buildings into nearly zero-energy buildings. In this context, a long-term national strategy to support the renovation of the national stock of residential and non-residential buildings by 2050 has been developed, setting out:

→ indicative intermediate targets for 2030, 2040 and 2050;

→ a description of the financial means to support the implementation of the strategy;

→ effective mechanisms to encourage investment in building renovation.

The following table provides information on indicative milestones for ten annual periods from 2021 to 2050.

***Table 6**: Indicative intermediate renovation targets for residential and non-residential building stock*

Indicator		**2021 – 2030**	**2031 – 2040**	**2041 – 2050**
Total energy savings	**GWh/y**	**2 917**	**6 502**	**7 329**
Residential buildings	GWh/y	2 477	5 694	6 294

Non-residential buildings	GWh/y	440	808	1 035
Renovated area	**m²**	**22 203 509**	**49 570 668**	**55 823 015**
Residential buildings	m²	19 026 656	43 735 175	48 343 297
Non-residential buildings	m²	3 176 852	5 835 493	7 479 718
Renovated area of the existing building stock for renovation	%	7.9 %	17.5 %	19.8 %
Saving CO2 emissions	**tone**	**1 306 435**	**2 891 610**	**3 274 453**
Residential buildings	tone	1 065 184	2 448 461	2 706 441
Non-residential buildings	tone	241 251	443 149	568 012

The objectives thus set in the building sector are expected to contribute to the fulfilment of the obligations under Article 7 of Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2 018 amending Directive 2012/27/EU on energy efficiency.

The analysis of available information from effectively certified buildings shows that in order to achieve the quantitative dimensions of the indicators, renovation policies need to focus as a priority on buildings with energy consumption classes E, F and G for all building categories.

iii. Where applicable, other national objectives, including long-term targets or strategies and sectoral targets, and national objectives in areas such as energy efficiency in the transport sector and with regard to heating and cooling

The achievement of the energy efficiency targets set is strategically linked to building stock renovation and priority will be given to energy efficiency combined with the use of renewable energy sources in the buildings sector.

Priority will be given to the uptake of high-efficiency cooling and heating systems, to the uptake of innovative technologies using geothermal, hydrothermal and solar energy, and to the use of waste heat and cold.

In addition, the use of efficient district heating and district cooling will be promoted. New district heating networks – and extensions to existing ones – are intended to meet the needs of public sector buildings and services not connected to district heating.

The energy efficiency potential of district heating and cooling infrastructure lies in the rehabilitation of heat transmission networks. It is envisaged to use the most efficient means of transporting a heat carrier through pre-insulated pipes and to increase the share of waste heat utilisation to reduce heat losses in networks. To increase the efficiency of heat transmission networks, it is envisaged to use advanced management strategies and monitoring solutions such as sensors and smart meters to optimise heat/cooling flow, including reducing the temperature of heat carriers and integrating more RES.

Investing in modernising existing convective district heating systems and gradually converting them into smart heat grids will make it possible to meet future energy needs,

characterised by increasing dependence on variable renewable energy sources. By promoting smart control and data sharing across the system, it is expected to optimise work in the short and medium term.

Adequate incentives for efficient district heating are foreseen through national policies and engagement of local authorities and stakeholders, as well as support for new investments through direct and indirect funding. Opportunities to integrate district heating planning into urban planning and the corresponding adjustment of building regulations and urban planning will be exploited to enable connections to district heating networks as well as to decentralised district heating systems.

Households are the second largest consumer of energy in Bulgaria. In recent years, the structure of the energy mix in the final consumption of the sector has maintained the share of electricity. Reduce the quantities of coal and briquettes used, while increasing the amount of wood (firewood) that is burnt poorly.

Gasification covers the construction of gas distribution networks, the retrofitting of combustion plants for the replacement of used solid, liquid and electricity and the supply of natural gas, as well as a set of measures and actions to improve the management of combustion plants at final customers.

Appropriate measures to tap into the potential for energy savings through the development of gasification include incentivising final customers to switch to natural gas, optimising the regulatory framework to facilitate the procedures necessary to build gas distribution infrastructure on a market-based basis, as well as encouraging and supporting the accelerated construction of forward-looking gas transmission infrastructure where necessary.

2.3. Dimension Energy security

i. The elements set out in Article 4(c)

A key EU priority in the energy sector is to diversify Europe's energy sources and ensure energy security through solidarity and cooperation between Member States, enhance the diversification of the EU's energy supply and the development and use of indigenous energy resources. The main objective is to ensure security of energy supply, which means ensuring a continuous and adequate supply of energy from all sources to all consumers.

The established Regional Group for South-East Europe identifies the different problems of the various pillars in the region (consumption, electricity and gas substitutability, infrastructure, interconnection agreements, supply, drawing up an action plan, financing under the REPowerEU plan, etc.). The Regional Group shall cooperate with the Energy Community Contracting Parties and the Energy Community Secretariat in their efforts to comprehensively enhance energy security in the region.

The first meeting of the Regional Task Force, part of the EU Energy Platform, took place in the framework of the Regional Ministerial Meeting on Energy Security, Diversification and

Green Transition, which took place in Sofia on 5 May 2022. On 1 June 2022, the South East Europe Regional Group agreed an action plan to guide the next steps for diversification and security of supply in the region following the gas supply disruption from Russia. The Action Plan foresees a joint effort between the region and the European Commission on three pillars:

1. Gas demand needs of the region, including electricity demand reduction potential;

2. Infrastructure options and resolution of outstanding issues;

3. Gas supply options.

Following the finalisation of the action plans of all regional groups, the main focus is to discuss the potential for joint purchasing in each region.

On 20 October 2022, the European Council endorsed the joint purchasing of gas, coordinating and prioritising negotiations with reliable partners to seek mutually beneficial partnerships by harnessing the Union's collective political and market weight and making full use of the EU Energy Platform, such as some of the measures to address the energy crisis in Europe.

Council Regulation (EU) 2022/2576 enhancing solidarity by better coordinating gas purchases, exchanges of gas across borders and reliable price benchmarks was adopted on 19 December 2022. The Regulation provides a legal framework for the EU Energy Platform to help Member States prepare for winter 2023/24 and in particular to fill their storage facilities.

The EU Energy Platform was initiated following a mandate from the European Council in response to the need to diversify gas supplies from Russia. Covers a number of actions on natural gas and liquefied natural gas (and, in the future, hydrogen) to support the EU's security of supply and access to energy at affordable prices, including international coverage, demand aggregation and efficient use of EU gas infrastructures.

The Platform aims to coordinate EU actions and negotiations with external gas suppliers to prevent mutual bidding between EU countries and to use the EU's weight – as one of the world's largest gas consumers – to achieve better conditions for all EU consumers.

Five regional groups have been set up to identify the needs and opportunities for common use of energy infrastructure and potential new suppliers. The process of aggregating data on the necessary volumes of gas to be requested for purchase has been launched. A number of meetings are held with representatives of stakeholders, including industry, with the aim of finalising the data aggregation process in April and launching joint purchases in May 2023.

Taking this into account, Bulgaria's energy security objectives relate to:

- Diversification of supply of energy resources;
- Developing the gas transmission network and expanding the capacity of UGS Chiren and interconnection points;

- Implementation of "future-proof gas transmission infrastructure" projects to increase entry and exit capacities at interconnection points with neighbouring countries, including projects to increase capacities in the Kulata/Sidirokastro IP and IP Negru Voda/Kardam, included in the Vertical Gas Corridor initiative;
- Participation in new LNG terminal projects in the region;
- Sustainable use of local energy resources, including the development of local natural gas extraction projects;
- Establishment of a strategic national natural gas reserve;
- Introducing minimum storage level and filling obligations for natural gas storage facilities;
- Increasing the flexibility of the national energy system;
- Addressing limited or interrupted supply from an energy source in order to improve the resilience of regional and national energy systems;
- Improving network and information security (cybersecurity).

ii. National objectives with regard to increasing: the diversification of energy sources and supply from third countries for the purpose of increasing the resilience of regional and national energy systems

Diversification of natural gas supply sources

To improve the diversification of natural gas supplies, Bulgaria aims at increasing natural gas transmission capacity at interconnection points with neighbouring countries, as well as additional supplies:

- From the Caspian region through the Southern Gas Corridor;
- Liquefied natural gas from the Mediterranean and other countries through LNG terminals.

The implementation of planned "future-proof gas infrastructure" projects (hydrogen fit) to increase entry and exit capacities at interconnection points with neighbouring countries that are part of the Vertical Gas Corridor initiative would contribute to the overall diversification. Further contribution to the diversification and security of supply of natural gas will be involved in other projects for the construction of LNG terminals in the region, as well as the development of local natural gas production through exploration for new oil and natural gas deposits, including in the deep Black Sea.

Diversification of nuclear fuel supplies

The objective of diversifying the supply of fresh nuclear fuel is to ensure the continued operation of nuclear capacity as well as the security and reliability of electricity generation.

iii. Where applicable, national objectives with regard to reducing energy import dependency from third countries, for the purpose of increasing the resilience of regional and national energy systems

Increasing the resilience of the national energy system is linked to the diversification of natural gas sources and routes. In this context, Bulgaria is implementing and planning a number of projects to expand the gas transmission network and increase natural gas transmission and storage capacities.

iv. National objectives with regard to increasing the flexibility of the national energy system, in particular by means of deploying domestic energy sources, demand response and energy storage

Objectives in terms of increasing the flexibility of the national energy system:

- Preserving the role of indigenous energy resources (coal) and their use, in accordance with the requirements of environmental legislation;
- Harnessing the potential of natural gas and a step-by-step change of the fuel base from solid fuels to natural gas;
- Increasing the capacity, extraction and injection of UGS Chiren;
- Participation in new LNG terminal projects in the region;
- Maintaining the role of nuclear energy, which is considered to be a local energy source;
- Maintaining and developing the transmission capacity of electricity and natural gas transmission networks;
- Demand response in the energy system through the development of energy markets;
- Increase electricity and gas storage capacity through the development of existing and construction of new storage facilities.

In the period from 2023 to 2030, measures related to the development and digitalisation of energy infrastructure, support for the integration of electricity produced from renewable sources into the electricity grids and the wider use of smart energy storage systems are foreseen. The implementation of such measures will lead to a more complete use of electricity produced from renewable sources thanks to its easier integration into the electricity system.

2.4. Dimension Internal energy market

2.4.1. Electricity interconnection

i. The level of electricity interconnectivity that the Member State aims for in 2 030 in consideration of the electricity interconnection target for 2030 of at least 15 %, with a strategy with the level from 2021 onwards defined in close cooperation with affected Member States, taking into account the 2020 interconnection target of 10 % and the following indicators of the urgency of action:

1) Price differential in the wholesale market exceeding an indicative threshold of EUR 2/MWh between Member States, regions or bidding zones;
2) Nominal transmission capacity of interconnectors below 30 % of peak load;
3) Nominal transmission capacity of interconnectors below 30 % of installed renewable generation.

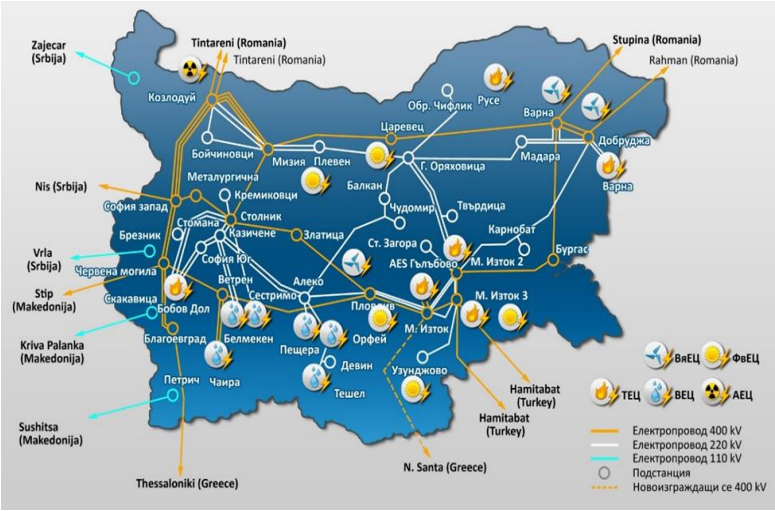
Any new interconnector shall be subject to a socio-economic and environmental cost-benefit analysis and shall only be realised if the potential benefits outweigh the costs.

According to European legislation, the level of electricity interconnection for each Member State must be at least 10 % by 2020 and at least 15 % by 2030, relative to installed capacity. The maximum level of capacity of interconnectors and network elements should be made available, respecting safety standards, for secure network operation, including in compliance with the standard of security in emergency situations. In line with the European recommendations, Bulgaria has set a target of at least 15 % electricity interconnection. This objective will be achieved through the implementation of projects of common interest and additional initiatives.

As required by Regulation (EU) No 1999/2018, three indicators of emergency action in this area should be taken into account in the Interconnection Strategy as a complement to the European interconnection target.

The nominal transmission capacity of the interconnectors shall be at least 30 % of the peak load.

***Figure 2**: Interconnection*



Source: ESO EAD

The nominal transmission capacity of interconnectors shall be at least 30 % of the installed production from renewable sources.

Preliminary estimates are as follows:

- 7 651 MW – estimated installed renewable energy production capacity for 2025;
- 12 320 MW – total nominal transmission capacity of interconnectors, which is 162 % compared to installed renewable energy production capacity.

It shall be borne in mind that the nominal transmission capacity of 400 kV with 2xACO500 conductors is 1 200 MW and in the case of wires 3xACO400 is 1 280 MW (taking into account the transfer capacity of all conductive elements of the line and an average power factor of 0.93).

The Bulgarian EES works in parallel with the EEU of the countries of continental Europe. The connectivity of our EEU with the united European EES takes place through four interconnectors with Romania, two with Türkiye and Greece, and one with Serbia and the Republic of North Macedonia, as follows:

- EP 400 kV NPP Kozloduy (BG) – p/st Zenzarenny (RO);
- EP 400 kV NPP Kozloduy (BG) – p/st Zenzarenny (RO);
- EP 400 kV p/st Varna (BG) – p/st Stupina (RO);
- EP 400 kV p/st Dobrudzha (BG) – p/st Rahman (RO);
- EP 400 kV TPP Maritsa Iztok 3 (BG) – p/st Hamitabat (TR);
- EP 400 kV TPP Maritsa Iztok 3 (BG) – p/st Hamitabat (TR).
- EP 400 kV p/st Sofia West (BG) – p/st Niš (RS);
- EP 400 kV p/st Red Mogila (BG) – p/st Stip (MK);
- EP 400 kV p/st Blagoevgrad (BG) – p/st Thessaloniki (GR).
- EP 400 kV Maritsa Iztok, Bulgaria – Nea Santa, Greece.

2.4.2. Energy infrastructure

i. The main electricity and gas transmission infrastructure projects and, where appropriate, modernisation projects necessary to achieve the objectives and targets under the five dimensions of the Energy Union Strategy

The main projects in electricity and gas transmission infrastructure and modernisation projects are:

1. *In the field of electricity transmission infrastructure*

Priority Corridor North-South electricity connection in Central, Eastern and Southern Europe ("NSI East Electricity").

- Cluster Bulgaria-Greece and the necessary construction of infrastructure on the territory of Bulgaria:
  - 400 kV interconnector between Maritsa Iztok substation and Na Santa substation (Greece);
  - Internal line 400 kV between Maritsa Iztok substation and Plovdiv substation;
  - Internal line 400 kV between Maritsa Iztok substation and TPP Maritsa Iztok 3;
  - Internal power line 400 kV between Maritsa Iztok substation and Burgas substation.

All new power lines built have a capacity of 1 280 MW each.

- Bulgaria-Romania Capacity Enhancement Cluster ('Corridor Black Sea'), which includes an internal power line of 400 kV between Varna substation and Burgas substation;
- A hydropumped storage project in Bulgaria – Yadenitsa.

The project aims to increase the volume of the lower equator of the pumped storage hydroelectric power plant 'Cchira' with the construction of the Yadenitsa dam and a reversible irrigation tunnel connecting to the Chaira dam.

- Batak hydro-pumped storage plant;
- Pumped storage hydroelectric power plant Dospat.

The projects provide for the construction of the Batak pumped storage plant and the Dospat hydro-pumped storage plant in the case of dams already built from the Batashki waterline cascade. Each of the two projects will add about 800 MW of new installed capacity in generator and pump storage mode through connection and use as the upper reservoir of the Greater Beglik and Shiroka Polyana dams and as a lower reservoir Batak dam.

The projects are under examination by the project promoter and are applying for inclusion of the project in ENTSO-E DPRM 2024, with the prospect of applying for inclusion in the next possible list of EU PCIs.

- "Carmen (BG, RO) aiming cross-border TSO-TSO cooperation and data sharing, enhance TSO-DSO cooperation, investments in grid extension and creation capacity for integration of new RES, image of grid stability, security and flexibility"

The Electricity System Operator (ESO) EAD is involved as an active partner in the Carmen 2 project: Carpathian Modernised Energy Network'.

The Carmen project is part of the 5th list of projects of common interest in the 'smart networks' category, with the participation of Delgaz Grid, the distribution system operator in the north-eastern region of Romania, in partnership with the Romanian transmission operator Transelectrica and the Hungarian transmission operator MAVIR.

ESO EAD's participation in the project consists of investments to increase the capacity of the Bulgarian electricity transmission system to exploit the identified high renewable energy potential (over 8 GW, including green hydrogen) at national and regional level, in the following main areas:

1. Comprehensive digitalisation and automation of the transmission network, including but not limited to: installing devices for monitoring, forecasting, modelling and optimisation of real-time transmission capacities (Dynamic Line Rating, DLR); deployment of flexible variable transmission solutions (FACTS); and enabling more efficient DSR in cooperation with national distribution system operators;

2. Modernising, strengthening and increasing the capacity of the transmission system in northern Bulgaria, with a view to making it ready to integrate and transmit significant amounts of renewable energy from large RES in northern Bulgaria to consumption centres both in Bulgaria and at regional level, along the North-South priority corridor, in particular to and through Romania. This planned extension is driven not only by the massive deployment of RES, but also by the expected development of electricity and hydrogen charging infrastructure throughout Bulgaria to accommodate and catalyse the transition to bezonal mobility.

Digitising, strengthening and increasing the capacity of the transmission system in Northern Bulgaria will enable the integration and transmission of significant amounts of renewable energy from large RES in northern Bulgaria to consumption centres in the country, but also at regional level along the North-South priority corridor, in particular to and through Romania. This planned expansion and grid intelligence is required not only by the massive deployment of RES, but also by the expected development of electric and hydrogen recharging infrastructure on the territory of Bulgaria, which will boost and catalyse the transition to emission-free mobility.

2. Major gas infrastructure projects

In accordance with the requirements of the Energy Act, Bulgartransgaz EAD draws up and publishes annually a 10-year plan for the development of gas transmission networks. The plans outline the development vision of the company as independent transmission operator and underground gas storage operator. It corresponds to the main European, regional and national priorities, namely enhancing security of gas supply, ensuring diversification of supply sources and routes, establishing a stable, liberalised and interconnected gas market on a sustainable basis and in line with Europe's climate and environmental policies.

The implementation of the Vertical Gas Corridor initiative involving the gas transmission system operators of Bulgaria, Greece, Romania, Hungary, Slovakia, Ukraine and Moldova will contribute to achieving these priorities. The initiative aims at maximising the use of existing gas transmission infrastructure and provides for specific targeted projects to increase natural gas transmission capacity from south to north, taking into account the increasing demand for LNG from existing and planned terminals in Greece. Of key importance for Bulgaria and the region are Bulgartransgaz EAD's projects to increase capacity in the Kulata/Sidirokastro IP and the Negru Voda/Kardam IP, as well as the Greece-Bulgaria Interconnector.

Figure 3: *Bulgartransgaz EAD*gas transmission infrastructure and extension projects

Source: Bulgartransgaz EAD

Bulgartransgaz EAD's projects aim to ensure the security of natural gas supply to the country by expanding the possibilities of transporting significant quantities of natural gas via independent routes and underground storage of natural gas. Another main objective is to provide more municipalities and final customers with access to natural gas, which will contribute to improving the environment, quality of life and improving energy efficiency. In this regard, it is envisaged to extend the existing gas transmission network to new regions of the country in order to enable new final customers or distribution networks to be connected to the gas transmission network. For the development of a regional gas market, it is essential to build and operate new infrastructure projects, to expand UGS Chiren and to increase transmission capacities at interconnection points.

- Gas interconnector Greece-Bulgaria (IGB)

The Greece-Bulgaria Gas Interconnector (IGB) is a key part of the Vertical Gas Corridor development project. On 1 October 2022, the commercial operation of IGB started. The

gas connection is an important infrastructure that ensures diversification of natural gas supply sources and routes to Bulgaria and the region through access to LNG terminals near Alexandroupolis and the Southern Gas Corridor.

The gas connection has a total length of 182 km, of which 151 km on Bulgarian territory and a natural gas transmission capacity of 3 bcm/m. If there is commercial interest, the capacity can be extended to 5 bcm/m. The IGB gas pipeline connects the transmission systems of DESFA and TAP in Komotini, Hellenic Republic, with the transmission system of Bulgartransgaz EAD in the village of Zagoré, Stara Zagora municipality.

The direct effects of the implementation of the project are: achieve real diversification of sources of natural gas supply to the Republic of Bulgaria and the region, enable natural gas supplies from the Southern Gas Corridor and from sources of liquefied natural gas (LNG).

The construction of the interconnector between Greece and Bulgaria was completed, the gas interconnector became operational on 1.10.2022.

- Bulgaria-Serbia interconnection (IBS)

The Bulgaria-Serbia gas interconnector (IBS) connects the gas transmission networks of the Republic of Bulgaria and the Republic of Serbia at a new interconnection point IP Kalotina/Dimitrovgrad. It has a total length of 170 km from Novi Iskar, Republic of Bulgaria to Niš, Serbia, of which 62.2 km on Bulgarian territory. The commercial exploitation of the project started in December 2023.

IBS provides additional access for Bulgaria to gas sources from Western Europe on a completely new route and Serbia to LNG terminals and other alternative sources from the region.

The technical capacity of the reverse gas pipeline for the transport of natural gas is 1.8 billion m^3per year, with the possibility, if there is a commercial interest, of increasing it to 3.2 billion m^3. To this end, phase 3 of Bulgartransgaz EAD's project for the modernisation, rehabilitation and extension of the gas transmission infrastructure, including the construction of a compressor station near Novi Iskar with a capacity of 20 MW and 19 km of new gas pipeline with a diameter DN700 in the Gorno-Bogrov – Novi Iskar section should be implemented.

The Bulgaria-Serbia interconnector is included in the fifth list of projects of common interest for the European Union under Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure adopted by the European Commission on 19.11.2021.

A grant of up to EUR 27 602 809 was awarded for the construction of the gas connection under the Connecting Europe Facility, representing 36 % of the estimated eligible costs for the construction of the interconnector.

The total cost of the project of common interest is EUR 81 million for the construction of the route on Bulgarian territory. The commercial operation of IBS started in December 2023.

- LNG terminal project to Alexandroupolis

The project for the construction of an LNG terminal at Alexandroupolis, in which Bulgaria contributes 20 % of the share capital of Gaztread S.A. is important for securing new quantities of natural gas from an alternative source to the Bulgarian and regional gas market. The project will ensure access for Bulgaria and the whole region to the global liquefied gas market. The terminal will have a regasification capacity of 5.5 billion $m^{3/}$and a storage capacity of 153.5 thousand m^3. Bulgaria has expressed interest in participating in the new project for the construction of the Thrace LNG terminal and/or other LNG terminal projects in the region.

The construction of the LNG terminal in Alexandropoulis, Greece, aims to provide new volumes of gas to supply Greek and regional markets in South-East Europe, while contributing to the diversification of gas supply sources and routes, promoting competition for the benefit of final customers and enhancing security of supply. Potential sources of supply include LNG producing countries such as Algeria, Qatar, the USA, etc.

The terminal will be located 17.6 km south-west of the port of Alexandroupolis and approximately 10 km from the coast. The facility will be connected to Greece's national natural gas transmission system and the Bulgarian gas transmission system through the existing IP Kulata/Sidirokastro and the Bulgaria-Greece Interconnector.

Pursuant to the Decision of the Council of Ministers of 8 January 2020, Bulgartransgaz EAD was included as a shareholder with a 20 % share in the construction of the LNG terminal at Alexandropulis.

The second phase of the market test was successfully completed in March 2020. Ten participants booked a total capacity of up to 2,6 bcm/. Successly switched to Bulgargaz EAD's participation in the legally binding capacity booking phase.

The final investment decision of the shareholders was taken on 27.1.2022.

The floating LNG reception, storage and re-gasification terminal is expected to be commercially operational in the first quarter of 2024.

The project was removed from the fifth list of projects of common interest for the European Union under Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure (adopted by the European Commission on 19.11.2021).

- New LNG terminal projects in the region

Given the increasing share of LNG in EU energy consumption and the lower storage and regasification capacity of LNG compared to other EU regions, it is promising and appropriate to involve Bulgaria through Bulgartransgaz EAD in new LNG terminal projects in the region.

- Capacity extension of UGS Chiren

The project to expand the Chiren gas storage facility, which will contribute to ensuring the security of natural gas supply in the country and the region, as well as improving competition and access to natural gas from alternative sources, is also being implemented.

The project to expand the capacity of the underground gas deposit (UGS) Chiren includes a gradual increase in the capacity of the sole gas storage facility on the territory of Bulgaria, with the aim of achieving higher volumes of stored gas, increased pressures in the gas reservoir and higher average daily flow rates for extraction and injection. It is envisaged to increase the volume of working gas to 1 billion m³ and an increase in the flow of extraction and injection to 8-10 mcm/day. These objectives will be achieved through the construction of new above-ground facilities, 10 new high-performance operating wells and 3 new observation wells, as well as the necessary new infrastructure connecting the storage facility to the company's gas network.

UGS Chiren is a crucial tool for ensuring the security of gas supply to both Bulgaria and the region. Achieving the new technical parameters of the underground gas storage will contribute to ensuring security of supply, by providing a significant reserve in the event of supply disruptions and by stimulating supply from alternative and reliable sources, including liquefied natural gas.

The project to expand the capacity of UGS Chiren is a project of common interest for the European Union included in the fifth PCI list adopted by the European Commission on 19.11.2021.

The investment needed to complete the construction of the project amounts to EUR 308 million. On 22 June 2022 Bulgartransgaz EAD signed a grant agreement under the Connecting Europe Facility for the construction of above-ground facilities and the launching of new drilling operations. The estimated grant for the construction of the above-ground installations and the drilling fund is EUR 77 910 017.

The pipeline connecting UGS Chiren to the existing gas transmission network of Bulgartransgaz EAD in the area of Bhutan village, as part of the gas storage capacity extension project, will be financed from the company's own resources.

The implementation of all elements of the project has been commissioned by Bulgartransgaz EAD and is in the process of being implemented. It is expected that the construction of the new infrastructure will be completed by the end of 2024 and the sites will become operational.

- Rehabilitation and modernisation of the national gas transmission system

The integrated project for the modernisation, rehabilitation and extension of the existing gas transmission infrastructure on the territory of Bulgaria is carried out in 3 phases and includes the following types of activities: modernisation and rehabilitation of compressor stations; inspections to ascertain and describe the condition of the pipelines; repairs to and replacement of sections of the pipeline following inspections; extension and modernisation of the existing gas transmission network; implementing systems to

optimise the management of the technical condition of the network. The project is included in the fifth list of projects of common interest adopted by the European Commission on 19.11.2021.

The investment needed to build the project amounts to EUR 339 million. The funding is channelled through own resources and grants under the Connecting Europe Facility.

In 2018, Phase 1 of the project activities was completed with the commissioning of the 20 km gas pipeline section on the section CC Lozenets – Nedalsko OS.

Within Phase 1 and Phase 2 of the project, and with Bulgartransgaz EAD's own resources, four compressor stations were upgraded – Lozenets CC, Ihtiman CC, Petrich CC, Strandzha, in which a total of 10 new gas turbo compressor units (GCCs) were installed.

The implementation of Phase 2 of the project is financed by two agreements concluded under the Connecting Europe Facility, with a total grant amount of up to EUR 1 032 000 for pre-investment activities and EUR 27 185 000 for works for the replacement of two sections with a total length of 81 km.

In January 2022, the transmission pipeline "Beglej" – Dermantsi DF – Batultsi DF – Kalugherovo DF (58 km) was put into operation.

With the completion in July 2022 of the works for the replacement of the section of the Vcei Dol District Executive Agency – Preselka LKV (23 km), the implementation of all the activities in Phase 2 of the project was completed.

Phase 3 of the project will allow to increase the capacity of the IBS project from the current 1.8 billion м3/г. to 3.2 billion m/^{d}. To this end, a new compressor station near Novi Iskar with a capacity of 20 MW and 19 km of new gas pipeline with a diameter DN700 in the Gorno-Bogrov – Novi Iskar section needs to be built.)

- Increase of technical transmission capacity from Greece to Bulgaria in IP Kulata/Sidirokastro

The project is part of the Vertical Corridor initiative and involves the construction of 47 km of Luping DN700 (Kulata – Kresna) and 50 km of new gas pipeline DN500 (Piprevo – Pernik). The new infrastructure will provide 35.4 GWh/d incremental capacity from Greece to Bulgaria, with a total technical capacity of 101.9 GWh/d.

The project will contribute to improving security of supply by improving interconnection between Bulgaria and Greece and by ensuring access to additional volumes of LNG and gas from alternative sources in Greece for Bulgaria and all neighbouring countries.

The estimated date for commissioning is 2027.

An extended version of the project is also being considered, including an additional 85 km of Luping DN700 (Kresna – Piperevo), the installation of an additional 9 MW compressor station Petrich, the replacement of 50 km of the DN700 (Ihtiman-G. Bogrov) gas pipeline, the reversal and reconstruction of connections and nodes in KS Ihtiman.

When implementing the extended version, the total technical capacity in IP Kulata/Sidirokastro will provide additional capacity from Greece to Bulgaria of 68 GWh/d above planned and the total capacity will reach 171 GWh/d from Greece to Bulgaria.

- Increase of technical transmission capacity from Bulgaria to Romania

The project is part of the Vertical Corridor initiative and includes the construction of 63 km of luping with diameter DN1200 (Rupcha – Vetrino) and the reversing activities of CC Cardam (no need for new compressors) and the extension of the capacity of its management system. The new infrastructure will provide additional capacity from Bulgaria to Romania of 137.2 GWh/d.

The project will contribute to improving security of supply by improving interconnection between Bulgaria and Romania and ensuring access to additional volumes of LNG and gas from alternative sources for countries in the region, including Ukraine and Moldova.

The estimated date for commissioning is 2028.

- New LNG terminal projects in the region

The role of LNG is crucial for the energy security of EU countries, including in South-East Europe, and its share of the energy mix is expected to continue to grow. The Bulgarian gas transmission operator Bulgartransgaz EAD analysed all options and plans to invest in a second liquefied gas terminal in Greece.

- "H2 Interconnection Bulgaria-Greece"

The Bulgaria-Greece hydrogen interconnector project organised by Bulgartransgaz EAD is part of the thematic area 'Hydrogen and electrolysers'.

The infrastructure on Bulgarian territory is linked to the Greek operator DESFA S.A. hydrogen network project on Greek territory in the H2 Interconnection Bulgaria-Greece group.

The project will make an important contribution to the realisation of the South East Priority Corridor, which will provide a green hydrogen transport route from South-East to Central Europe, from both domestic production and imports. Including it on the list of PCIs will allow it to use fast-track permitting procedures and apply for grants during all stages of implementation. The project is an example of Bulgaria's efforts to decarbonise the gas system and the uptake of low-carbon gases.

The project provides for the construction of infrastructure dedicated to the transport of 100 % hydrogen. It includes a pipeline with DN 1000 and a length of approximately 250 km and two compressor stations. The expected lifetime of the infrastructure is by the end of 2029.

Bulgartransgaz EAD's project represents the first phase in the realisation of the concept of the development of new infrastructure for the transport of clean hydrogen on the territory of the Republic of Bulgaria, including to the hinterland and connectivity with neighbouring countries. As a next step, it is envisaged to continue extending it both within Bulgaria and to cross-border interconnection points with neighbouring countries.

The implementation of the project will ensure bi-directional cross-border hydrogen transport capacity between Bulgaria and Greece at a new connection point in the Kulata/Sidirokastro area. The project is planned to subsequently develop in a northern and eastern direction and thus provide further cross-border connectivity to Romania and the countries of the region at a later stage.

The project represents an important milestone in the development of the H_2 networks in the region. The planned infrastructure is intended to stimulate the process of large-scale hydrogen deployment both in Bulgaria and in the South East European region.

Bulgartransgaz EAD is preparing project proposals for the subsequent extension of the hydrogen transmission infrastructure to ensure interconnection with Romania, which will be proposed to the European Commission for inclusion in the 2nd list of projects of common interest and projects of mutual interest. The options under consideration include a new hydrogen infrastructure to transport 100 % hydrogen from the Sofia area to the Bulgarian-Romanian border:

- in the area of Kozloduy with a length of 240 km DN 1000 and 2 compressor stations with a total capacity of 48 MW;
- in the Ruse region of 330 km DN 1000 and 3 compressor stations with a total capacity of 72 MW;
- in the Kardam region with a length of 480 km DN 1000 and 3 compressor stations with a total capacity of 72 MW.

Figure 4: *Hydrogen infrastructure of the Republic of Bulgaria*

Source: Bulgartransgaz EAD

The construction of hydrogen transmission infrastructure in Bulgaria will have a catalytic effect on massive investments, including in relation to projects set out in the National Roadmap for Improving the conditions for unleashing the development potential of hydrogen technologies and hydrogen production and supply mechanisms.

The planned H_2 infrastructure is expected to contribute to sustainable economic growth, decarbonisation of the economy and energy, employment and industrial competitiveness in Bulgaria and the region.

The project complies with all relevant technical, general and specific criteria for project proposals in the field of hydrogen transmission stemming from Regulation (EU) 2022/869 on trans-European energy infrastructure.

The inclusion of the project proposed by Bulgartransgaz EAD in the sixth list of Projects of Common Interest and is essential for its successful and timely implementation in an effective manner and for the realisation of the priority South East hydrogen corridor.

Development of hydrogen infrastructure by implementing the following projects:

Green hydrogen is a promising energy resource in line with decarbonisation objectives, the application of which is at the heart of the net-zero energy transition.

Appropriate measures to tap into the potential of hydrogen technologies include incentives for green hydrogen producers, support for projects to accelerate the construction of hydrogen transmission infrastructure, promote the use of hydrogen in industry and final energy consumers.

- Hydrogen transport infrastructure

Bulgartransgaz EAD initiated a project for the construction of a hydrogen transmission infrastructure with the aim of establishing a hydrogen transmission network in Bulgaria with the possibility of transport from/to Greece, with connections with a similar hydrogen infrastructure on Greek territory, with the operator DESFA S.A.

The planned hydrogen infrastructure is the first phase of the development in Bulgaria of the priority South-East hydrogen corridor to transport clean hydrogen to Central Europe. The project is included in the first European Union list of projects of common interest and projects of mutual interest published on 28.11.2023.

The availability of hydrogen transmission infrastructure is essential for the large-scale development of a national and regional hydrogen market.

The planned infrastructure is intended to stimulate the process of deployment of hydrogen production and consumption technologies, both in Bulgaria and Greece and in the rest of South East Europe through the subsequent development of the hydrogen network of Bulgartransgaz EAD and neighbouring countries.

Bulgartransgaz EAD Water Transmission Infrastructure in Bulgaria project is seen as an important step in the further development of the hydrogen network in the region and will make a significant contribution to the realisation of the priority corridor for the transport of green hydrogen from south-eastern to Central Europe. Thanks to the good geographical situation of Bulgaria, the new infrastructure will allow the transport of both hydrogen produced domestically and hydrogen from Greece from domestic production or imports via pipelines or terminals.

The indicative value of the investment amounts to EUR 860 million. The activities are expected to be completed by the end of 2029.

Bulgartransgaz EAD is developing Phase 2 of the hydrogen network project to ensure the continuation of the hydrogen infrastructure under the approved PCI project to a new H2 exit point towards Romania in the area of IP Negru Voda/Kardam. The planned infrastructure includes a pipeline of about 480 km and DN 1000, starting from the Sofia (Novi Iskar) area to IP Kardam/Negru Voda, 3 compressor stations are planned. The indicative implementation date of the project is by 2032.

A project for a separate hydrogen interconnector Bulgaria-Romania. is also being developed to the Bulgarian-Romanian border in the Kozloduy area. The planned infrastructure includes a pipeline with DN 1000 and a length of approximately 110 km, with one compressor station. The indicative implementation date of the project is by 2032.

These projects will be proposed for inclusion in the Second European Union List of Projects of Common Interest and Projects of Mutual Interest.

- Infrastructure for the transport of blends of hydrogen and natural gas in different proportions

Ensuring the compatibility of existing hydrogen-gas infrastructure in certain proportions has the potential to accelerate the uptake of hydrogen in the energy mix in an efficient way until sufficient production capacity and demand for clean hydrogen are available.

Bulgartransgaz EAD is developing a project to upgrade the existing gas transmission network, which will allow efficient deployment of renewable and low-carbon gaseous fuels, including up to 10 % hydrogen.

Planned activities include relevant feasibility studies, deployment of new facilities and installations, implementation of intelligent monitoring, control and management systems for the transport of renewable gas mixtures.

The project is currently in the study phase. The activities are planned to be phased out by the end of 2027.

ii. If applicable, main infrastructure projects envisaged other than Projects of Common Interest (PCIs)

- Construction of a new double electricity interconnector 400 kV between the Republic of Bulgaria and the Republic of Serbia”

The project is included as a new investment in ENTSO-E’s latest ten-year network development plan in Europe from 2018. The assessment of the need to build the second interconnection between Bulgaria and Serbia was carried out in the framework of market research carried out by the ENTSO-E regional group. The project will increase the interconnection capacity of the Bulgarian-Serbian border and accelerate trade flows between the western borders of Romania and Bulgaria with the Western Balkans region.

- Construction of a new 400 kV interconnector between Bulgaria and Türkiye;
- Construction of new 400 kV internal power lines between Vetren and Blagoevgrad junction station and between Plovdiv and Plovdiv;
- Modernisation and extension of elements of the internal grid and of management systems to increase efficiency, flexibility, security of supply;
- Connection of new low and bespoke electricity sources.

2.4.3. Market integration

i. National objectives related to other aspects of the internal energy market such as increasing system flexibility, in particular related to the promotion of competitively determined electricity prices in line with relevant sectoral law, market integration and coupling, aimed at increasing the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment, and real-time price signals, including a timeframe for when the objectives shall be met

Liberalisation of the electricity market

In recent years, a number of legislative changes have been introduced to liberalise the Bulgarian electricity market. Electricity producers are characterised by multiple market advantages resulting from the variety of products that they can deliver on the liberalised market, competitive prices and flexibility.

The amendments to the Energy Act have significantly changed the conditions under which participants in the electricity market in the country, including the Public Electricity Provider, operate. The scope of the regulated market has significantly decreased at the expense of an increase in the relative share of the free market. All transactions for the purchase and sale of electricity are carried out through the platforms of the BNB EAD in order to maximise trade transparency.

In line with the Commission's Third Liberalisation Package, Bulgaria has taken steps towards full liberalisation of the electricity market. As a result of legal changes since the beginning of 2018, all electricity produced for the free market is only traded on the BNB's commercial platforms. The following main changes are made to the Act amending the Energy Act (ZE), adopted on 17.11.2023:

(1) full liberalisation of the wholesale electricity market shall be implemented by 30 June 2024, with household customers being kept on a regulated market until the end of 2025.

The amendments adopted remove the role of National Electricity Company EAD (NEK) as a public supplier and consequently abolish the quotas allocated to producers for a regulated

market. The law provides that final suppliers of energy, such as universal service providers, are obliged to supply household customers and that the latter are not obliged to switch supplier. In the transitional period (1 July 2024 – 31 December 2025), final suppliers will supply household final customers at regulated prices. The territoriality principle for the licensing of a final supplier has been removed. As a general rule, provision is made for the possibility of differentiated compensation, depending on consumption, of household customers for part of the cost of purchasing electricity at regulated prices in the period up to the end of 2025. Liberalisation of the regulated electricity market is fully aligned with a Decision of the National Assembly of 11.11.2022, according to which household final electricity customers remain on a regulated market until 31 December 2025, after which full retail price deregulation for households is gradually ensured, in parallel with the full possibility of switching supplier.

By abolishing NEK EAD's function as a public supplier, the change will have a positive impact on the company's operations in the second half of 2024 and the whole of 2025, as the projected quantities of electricity should be realised in the 'Bilateral Contracts' segment, which in turn implies a longer-term predictability of revenue levels from the sale of electricity.

The challenge ahead of NEK EAD by removing the licence as a public supplier is to participate much more actively in a free market with the quantities of electricity produced by the company as an operator of 31 hydropower plants and with the current contract with TPP AES Maritsa Iztok 1 OOD, which will end in May 2026. At the same time NEK EAD will continue to be the main provider of balancing energy to ensure the normal operation of the electricity system in Bulgaria.

(2) new entrants to the electricity market are regulated – citizen energy communities, active customers and aggregators. It also complements measures to protect consumers of energy services through the possibility to conclude fixed-term and fixed-price contracts and dynamic electricity price contracts for customers with a smart meter installed;

(3) the relationship between the long-term contracts for the purchase of electricity concluded between NEK EAD, in its capacity as a public supplier with producers of electricity from coal-fired power plants, following the disappearance of the public supplier, and the realisation of the electricity purchased under these contracts on the free market are regulated. It shall not be permissible to extend existing long-term contracts beyond their expiry in 2024 and 2026 respectively, and to conclude other long-term contracts with such producers;

(4) definitions and criteria have been introduced to define 'households in energy poverty' and 'vulnerable electricity customers' for the purpose of liberalising the electricity market and implementing measures to support households in energy poverty, including priority treatment when implementing programmes to improve the energy efficiency of residential buildings.

Introduction of an intraday market

An intraday market was launched in 2018, which is the link between long-term negotiation, the short-term day-ahead market and the real time market, the balancing market. Its introduction has built up the overall structure of the Bulgarian market, as it exists in most European markets, allowing participants to change their contractual positions, according to the forecast of production or consumption, as close as possible to the actual time of trade.

Participation in integration processes

ECO EAD, together with all TSOs in Europe, in line with the requirements of Regulation (EU) 2015/1222, signed in May 2018 the Agreement on coordinated implementation of the single intraday coupling function between TSOs and NEMOs (IDOA) and the TSO-TSO Cooperation Agreement (TCID), thus launching its participation, together with the BEBB, in the process of integrating a Bulgarian border with the common European market in the framework of the intra-day time horizon of the XBID project.

Bulgaria is part of the regional project LIP 15 and since November 2019 it has an operational, integrated intraday market via the border between Bulgaria and Romania. In this step, the Bulgarian-Romanian border is the first limit at which capacity will be allocated implicitly over an intraday time horizon within an integrated European region.

Nominated electricity market operators (NEMOs) and Transmission System Operators (TSOs) participating in the Intraday Market Grouping (formerly XBID) announced that 15 minutes of products are available on the Romanian/Bulgarian border as of 1 October 2022 (delivery day). Three years after Bulgaria and Romania joined SIDC as part of the second wave of accession and after Romania started offering 15-minute products on the intraday market in February 2021, an important step towards better market integration of RES was achieved. The introduction of products with a shorter delivery period for continuous trading at this border will provide Bulgarian market participants with access to the available liquidity of 15 minutes, allowing them to better adapt their trading position in this market. In this way, an offer for a 15-minute product will be compared with another offer for a 15-minute product in the already merged intraday markets in Austria, Germany, the Netherlands, Belgium, Hungary, Romania and Slovenia.

SIDC currently brings together the continuous intraday markets of 23 countries: Austria, Belgium, Bulgaria, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Lithuania, Luxembourg, Norway, the Netherlands, Poland, Portugal, Romania, Slovenia, Spain and Sweden.

For a day-ahead time horizon, a Bulgarian-Greek border market integration project was launched. ESO, BNB and Greek operators (IPTO, HEnEx) wrote to the regulators of the two countries to approve and include the Bulgarian-Greek border in a regional project IBWT-Italian Border Working Table. The day-ahead market alliance with Greece started in real work on 11.5.2021, with implicit allocation of transmission capacity taking place at this border.

Renewable energy balancing and balancing model

The balancing model in Bulgaria is transparent, provides for uniform conditions for balancing regardless of the production technology, the size of the facilities and whether they are supplied at regulated or freely negotiated prices.

The total installed capacity of renewable energy sources is relatively high compared to the available capacity in the country, and the presence of two large unit capacities at Kozloduy EAD, each of 1 000 MW, in a relatively small EEZ, is responsible for maintaining capacity in a cold reserve, as well as availability for the provision of additional services (primary and secondary regulation). The inclusion of consumers in the provision of a slow tertiary reserve by reducing demand in the event of a capacity deficit in the EEU has been achieved through the development of rules and the first auction held in October 2018. This increases the sources of balancing and the potential of dispatchable capacity available to the operator, thereby reducing balancing costs.

Implementing reform C4.R8: Liberalisation of the electricity market by the NRRPs has taken concrete actions to achieve a reform of the balancing energy market, meeting the following main objectives:

- The purchase of balancing capacity is market-based;
- The price of balancing energy shall be published within 30 minutes after intraday market closure;
- A single balancing price shall be introduced for periods without balancing energy activation;
- A 15-minute imbalance settlement period shall be introduced;
- No price caps for balancing electricity shall be set.

These objectives have been achieved through amendments to the Energy Act and amendments to secondary legislation (Electricity Trading Rules, Methodology for setting balancing energy prices, Instructions for the notification and validation of commercial and production schedules in the day-ahead and intraday market segment, etc.).

Aggregators for participation in the balancing market

The ESO launched a project under the EU structural reform programme to support the work on the development of requirements for registration of aggregators, technical connectivity with ESO EAD systems and electricity distribution system operators, communication between network operators, definition of the regulatory energy provided and payments.

Since the introduction of standardised load profiles in 2016, low-voltage household and non-household customers can switch their electricity supplier and enter into transactions at freely negotiated prices. However, at present, the segment of the market for trading at regulated prices is significant, with a share of around 40 % of net electricity production.

Phasing out regulated prices for all end-users and producer prices will increase competition between electricity suppliers. Full liberalisation of the electricity market will create the

conditions for increasing the flexibility of the system by providing conditions for achieving competitive prices and increasing the liquidity of the electricity exchange market.

Full liberalisation of the electricity market is a prerequisite for achieving the objective of full integration of the electricity market into the common European energy market.

Integration and integration of electricity markets

In order to achieve the interconnection targets, Bulgaria has taken concrete measures to increase the integration of the electricity market at regional level. The country is implementing connectivity projects with Romania, Greece and the Republic of North Macedonia, with varying degrees of implementation. The implementation of some of these projects depends on the development of electricity markets in the above-mentioned countries.

Table 7: *Electricity market integration*

Project	Status
Bulgaria-Republic of North Macedonia **Day-ahead market**	A prerequisite for market integration is the establishment of the exchange of an electricity exchange and a day-ahead operational market in the Republic of North Macedonia, which is expected to take place in 2024.
Tripartite market grouping between Bulgaria – Serbia – Croatia	Launch and participation in a project for the tripartite integration of the markets "Day ahead" of the bidding zones of the Republic of Bulgaria, the Republic of Serbia and the Republic of Croatia

Regulation (EU) 2019/943 on the internal market for electricity sets the minimum available capacity for cross-border trade at 70 % of electricity transmission capacity, respecting operational safety limits after contingency as of 2026. Moreover, Article 15 of the Regulation requires the development of a specific action plan to address the 70 % threshold.

In this context, the Bulgarian electricity transmission operator applies for a derogation under Article 16(9) of Regulation (EU) 2019/943. The granting of a derogation shall be subject to approval following regional consultations with the regulators of neighbouring countries. The derogation period shall be a maximum of 1 year.

Liberalisation of the natural gas market

The liberalisation of the natural gas market occupies an important place in European energy policy and is linked to the strategic objectives of improving security of supply and diversification of natural gas supply sources and routes, as well as building an interconnected and single pan-European gas market. By expanding gas interconnection, diversifying sources of supply of natural gas and creating a gas hub, real conditions will be created for the operation of a liquid gas trading exchange.

Bulgaria currently has two licensed gas exchanges in operation. The licences issued shall be for the maximum duration of 35 years. The two gas exchanges operate with the same trading platform, Trayport Global Vision Trading System, a product of TrayportLimited UK, which has developed the most common and globally applied software for transaction administration purposes.

The Balkan Gas Hub EAD (BGH EAD), established in 2019, constructs, operates and is responsible for the operation of the organised natural gas trading market of BGH EAD. The segment and bilateral e-commerce electronic platform offers modern physical products, including exchange change of ownership products at Virtual Trading Point (VTP) and some of the physical points of the networks. The platform ensures equal access, market-based prices, increased transparency as well as improved competition in the gas market in Bulgaria.

The short-term (spot) segment of the platform includes standardised day-ahead, day-ahead, time and local products for TSOs' network balancing needs. Trade shall take place on an anonymous basis in accordance with the provisions of Regulation (EU) No 312/2014.

The long-term segment of the trading platform offers products tradable on a medium and long term basis – weekly, monthly, quarterly and annual.

The Gas Release Program (Gas Release Program) segment at the end of 2022 came to an end with the adoption of § 10 of the Transitional and Final Provisions of the Act amending and supplementing the Corporate Income Tax Act (published in. SG No 99/2022), which repealed the provisions of Article 176a (1) (4) and (5) of the Energy Act, according to which the public supplier was obliged to offer certain quantities of natural gas on the organised exchange market in 2023 and 2024. Bulgargaz's long-term contract was not in force as of 31.12.2022, and its supplies ceased on 27.4.2022. Due to the discontinued supplies, Bulgargaz EAD needs to provide alternative sources, both for the provision of its activities as a public supplier and under its bilateral contracts and the quantities under the Programme. The resulting shortfall under the programme is compensated by alternative suppliers at market conditions. More than 90 traders entitled to trade in natural gas freely on the organised exchange market have been licensed. In this sense, Bulgargaz EAD competes on the market together and on an equal footing with them for the purchase of natural gas. At the same time, the prices under the Programme are regulated by the KEVR for the relevant period. Given the lack of predictability in terms of quantities and price levels and the impossibility of releasing such quantities on the organised exchange market under conditions other than those laid down in the Regulatory Agreement, conditions have been created for the formation of price deficits for Bulgargaz EAD and distortion of the market. Further negative effects on this process create supply disruptions on the pan-European market and increased demand for natural gas, which negatively affects the implementation of the Programme by the public supplier. As of December 2 023, Gazov Hyb Balkan EAD had over 90 registered companies, 40 % foreign and 60 % from Bulgaria, including the two operators Bulgartransgaz EAD, ICGB, and Nomagas JSC Skopje's gas transmission operator.

Bulgarian Energy Trading Platform AD (BETP) holds Licence No L-533-11 of 25.3.2021 to carry out the activity of 'organising a natural gas exchange market' for a period of 35 years. BETP AD is founded with the aim of creating, developing and operating a reliable and stable single regional gas market, contributing to increasing the transparency and liquidity of the natural gas market in the South East Europe region.

Priority shall be given to measures for the rehabilitation, modernisation and expansion of existing gas transmission infrastructure and the development of interconnections, providing additional opportunities to increase the use of natural gas in the country with corresponding economic, social and environmental benefits.

In view of the geopolitical developments of the last year, the suspended supplies of natural gas from Russia to Europe and the war in Ukraine, the Ministry of Energy and Bulgargaz EAD have taken serious action to ensure diversification of natural gas supplies to the country and fill the underground storage in Chiren to ensure the country's energy security.

ii. Where applicable, national objectives related to the non-discriminatory participation of renewable energy, demand response and storage, including via aggregation, in all energy markets, including a timeframe for when the objectives are to be met

As required by Regulation (EU) 2019/943 and Directive (EU) 2019/944 on the internal market for electricity, and with a view to the future full liberalisation of the electricity market, Bulgaria is pursuing efforts to promote the participation of final customers in demand response through aggregation, as well as to allow the participation of final customers, including those offering demand response by aggregating all electricity markets alongside generators.

iii. Where applicable, national objectives with a view to ensuring that consumers participate in the energy system and benefit from self-generation and new technologies, including smart meters

Bulgaria aims to progressively remove regulatory and commercial barriers for consumers to use, store and market the electricity they produce and to participate in the market by providing flexibility to the system through energy storage and demand response.

In order to encourage energy consumers to participate more actively and effectively in the market, further action will be taken (further elaborated in section 3.4). These measures include:

- Promoting local energy communities within the meaning of Directive (EU) 2019/944 and laying down rules for their establishment and functioning;
- Creating options such as dynamic electricity price contracts and aggregation, developing platforms to increase transparency of information, especially for the benefit of households and micro enterprises;
- Development of the regulatory framework for consumer promotion.

iv. National objectives with regard to ensuring electricity system adequacy, as well as for the flexibility of the energy system with regard to renewable energy production, including a timeframe for when the objectives are to be met

Full liberalisation of the electricity market will create the conditions for increasing the flexibility of the system by providing conditions for achieving competitive prices and increasing the liquidity of the electricity exchange market.

Increasing system flexibility shall be ensured through the development of balancing capacity, energy storage capacity and the capacity to manage it.

In order to alleviate internal congestion and increase interconnection capacity, an upgrade of grid transmission capacities is envisaged.

v. Where applicable, national objectives to protect energy consumers and improve the competitiveness of the retail energy sector

In line with the Commission's Third Liberalisation Package, Bulgaria has taken steps towards full liberalisation of the electricity market. Phasing out regulated prices for final consumers will lead to increased competition between electricity suppliers, but this may also expose consumers to greater price volatility. In this regard, Bulgaria's objective is to provide adequate protection for vulnerable household consumers of electricity.

2.4.4. Energy poverty

i. Where applicable, national objectives with regard to energy poverty, including a timeframe for when the objectives are to be met

The term 'energy poverty' has emerged in recent years as a knock-on effect in the ongoing global climate transformation, which requires the implementation of concrete commitments by EU Member States to achieve targets to reduce net greenhouse gas emissions by at least 55 % by 2030 compared to 1 990 levels. This also required the urgent transposition of Article 28 Vulnerable customers and Article 29 Energy poverty of Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2 019 on common rules for the internal market in electricity and amending Directive 2012/27/EU. These texts of the Directive set out the basic framework of obligations at EU level to protect vulnerable customers and households in energy poverty, while the adoption and implementation of appropriate measures is a commitment of individual Member States according to national circumstances.

Action was taken to this end, with the 49th National Assembly of the Republic of Bulgaria adopting the Act amending and supplementing the Energy Act (ZIDZE), readopted on 10.11.2023, published in State Gazette No 96 of 17.11.2023. The additional provisions of this Act introduced for the first time national definitions of 'household in energy poverty'

and 'vulnerable customer for the supply of electricity', which, together with the amendments provided for in Article 38e of the Act, are essential for the implementation of Reform C4.R3. Development of a definition and criteria for 'energy poverty' (Reform) of the National Recovery and Resilience Plan of the Republic of Bulgaria (NRRP). In view of the provisions of § 17 of the ZIDZE, the Council of Ministers was obliged to adopt this Regulation no later than three months after the promulgation of the Act (pursuant to § 50 of the Transitional and Final Provisions of the ZIDZE). The Act lays down an obligation to assess the number of households in energy poverty and to establish and maintain an information system on the number of households in energy poverty and vulnerable electricity customers, by the national responsible institution designated for the development of a National Social Climate Plan under Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 establishing a Social Climate Fund and amending Regulation (EU) 2021/1060 (OJ L 130/1 of 16 May 2023) or by another body designated by an act of the Council of Ministers.

In order to fully implement the reform of the NRRP, joint efforts have been made between the competent ministries identified in Article 38e of the ZIDZE as responsible for defining and implementing protection and financial support measures, namely: The Ministry of Labour and Social Policy, the Ministry of Regional Development and Public Works and the Ministry of Energy, the Regulation being dealt with within a short period, adopted by the Council of Ministers by Decree No 267 of 7 December 2023 and published in State Gazette No 103 of 12.12.2023. The Regulation lays down the criteria, conditions and procedures for determining the status of household in energy poverty and the status of vulnerable customer for the supply of electricity (Regulation), the procedure and mechanism for the operation of an information system for determining this status, as well as the conditions and procedures for assessing the number of households in energy poverty. The procedure and mechanism for the operation of the information system are laid down in an ordinance.

The Regulation provides:

- The definition of vulnerable customer for the supply of electricity is in line with the final provisions of the ZIDZE;
- For the average monthly income of a member of a household, account shall be taken of the available means less the cost of the typical energy consumption determined by reference to the energy performance of the dwelling. The disposable average monthly income is compared to the officially declared poverty line for the purpose of determining energy poor household status, as defined in the additional provisions of the ZIDZE;
- Criteria have been introduced to determine the status of vulnerable customer for the supply of electricity according to age, state of health, disposable average monthly income reduced by energy costs, the need for independent living aids and/or life-sustaining medical devices whose functioning depends on a source of electricity, the receipt of monthly social benefits;

- For the purposes of determining the disposable income of beneficiaries, it is proposed to take into account both non-taxable and taxable income under the Income Tax Act (ZDDFL), and it is proposed to introduce an exception for scholarships paid by schools and higher education institutions in favour of pupils and students.

At present, a measure to support the most vulnerable persons and families meeting the defined income and means-tested criteria is being implemented in Bulgaria by providing these persons and families with targeted heating assistance from the social assistance system during the heating season.

The Energy Act obliges the Council of Ministers to designate or establish a body (a department) to develop the National Social and Climate Plan and, at the same time, to establish and maintain an information system on the number of households in energy poverty and vulnerable customers for the supply of electricity.

The initiative has been proposed to be included as a reform under Reű. The implementation of the reform should be carried out jointly by the teams of the Ministry of Finance, the Ministry of Social Policy, the Ministry of Regional Development and the Ministry of Energy (responsible institutions for implementing appropriate support measures, in accordance with the provisions of Article 38e of the Energy Act) and supported by an international financial institution following the example of the implementation of other major reforms in the country (such as Reform C4.R1 "Establishment of a National Decarbonisation Fund" to the National Recovery and Resilience Plan, supported by DG Reforms of the European Commission and with the cooperation of the European Investment Bank; PrissuotorhausKoupers and Ecoris, to implement the project "Support for the establishment of a National Decarbonisation Fund (NDF)", as well as the Renovation Wave for Europe initiative, under the REACT-EU initiative, funded by Next Generation EU).

The proposed Observatory aims to be the platform to bring together a wide community of practitioners, officials and researchers working in this field in Bulgaria and beyond. The underlying reason for the establishment of the Observatory as a superior body within the Council of Ministers of the Republic of Bulgaria to coordinate specific policies and measures for their implementation is dictated by the need to set up a decision support centre dedicated to this issue in Bulgaria, a Member State where energy poverty rates are among the highest in Europe and where structural problems in the link between energy, low incomes and unrenovated housing are particularly pronounced.

This proposal includes the creation of a new Knowledge Centre which would not only serve as a comprehensive information resource for stakeholders on energy poverty levels in Bulgaria and measures to tackle it, but also to stimulate progress in state-of-the-art analytical research on the causes and consequences of the problem in the country. In addition, the Observatory will develop innovative policies and practices to tackle energy poverty and will also serve as a forum for stakeholder discussions and knowledge sharing on the topic. The financing of the reform is foreseen to take place through the Recovery and Resilience Facility. The maintenance of the Observatory after its establishment and the

implementation of other specific activities related to tackling energy poverty will be supported by the EU Social Climate Fund, other financial instruments with an EU funding source and the national budget.

2.5. Dimension Research, innovation and competitiveness

i. National objectives and funding targets for public and, where available, private research and innovation relating to the Energy Union, including, where appropriate, a timeframe for when the objectives are to be met

The need to deploy new energy technologies is undisputed. We aim to speed up this process in order to achieve a faster transition to clean and high-efficiency energy technologies. It is also one of the mechanisms for achieving secure, sustainable, environmentally friendly and high-efficiency energy. The deployment of new technologies will contribute to reducing technology losses on networks, expanding the energy market, helping to address decarbonisation challenges, reducing consumers' energy costs, reducing harmful emissions, thereby also increasing people's quality of life.

In this respect, the objectives pursued by the Bulgarian State in the field of research, innovation and competitiveness are:

- Achieving the targets set out in the 2030 Clean Energy for All package of the EU and developing a low-carbon economy in the long term;
- Achieving the Energy Union objectives of increasing security of energy supply and improving energy and resource efficiency in transport;
- Promoting the creation of innovation, their commercialisation and the technological renewal of enterprises;
- Supporting local industries in the adoption of low-carbon technologies and the public, administrative and household sectors in the use of new high-efficiency energy-saving technologies;
- Improving ambient air quality;
- Introduction of new energy-saving technologies to improve the quality of life and improve the working conditions of Bulgarian citizens;
- Introduction of new thermal insulation materials for glazed surfaces;
- Building smart grids for automated control of electricity systems, both on the supplier's side and on the consumer's side, in order to ensure the highest quality electricity supply to consumers and renewable energy utilisation to the maximum degree. The ultimate aim is to upgrade and automate existing electricity networks.
- Construction of energy storage facilities;
- Supporting research and innovation in the field of nuclear energy, research on the sustainable and safe management of radioactive waste;

- Enhancing the competitiveness and market position of the Bulgarian industry, as well as promoting the development of innovative, high-added-value industries;
- Maintaining the competitiveness of essential energy-intensive industries and limiting the risks of carbon leakage;
- Development of electric cars and hydrogen technologies;
- Upskilling and the creation of a skilled workforce to sustain the manufacturing of net-zero technologies, including the creation (or participation) of Net-Zero Academies;
- Establishment of industrial parks within the meaning of the Industrial Parks Act.

ii. Where available, national targets for 2050 related to the promotion of clean energy technologies and, if appropriate, national objectives, including long-term targets (2050) for the deployment of low-carbon technologies, including targets for the decarbonisation of the energy sector and energy and carbon-intensive industries, and, if applicable, targets for the relevant CO_2transport and storage infrastructure

There are no national targets in this area

iii. Where applicable, national objectives with regard to competitiveness

Not applicable

3. POLICIES AND MEASURES

3.1. Dimension "Decarbonisation"

3.1.1. GHG emissions and removals

i. Policies and measures to achieve the target set under Regulation (EU) 2018/842 as referred in point 2.1.1 and policies and measures to comply with Regulation (EU) 2018/841, covering all key emitting sectors and sectors for the enhancement of removals, with an outlook to the long-term vision and goal to become a low emission economy and achieving a balance between emissions and removals in accordance with the Paris Agreement

Measures existing and planned in the energy sector are a major contribution to decarbonisation, as this sector represents the main source of GHG. Existing decarbonisation measures will be extended to 2030, in addition to the measures envisaged for the transformation of the RES sector and the other dimensions of the Energy Union – energy efficiency, internal market and energy security, as further detailed in the relevant sections of the NECP. In addition, the existing strategic documents in Bulgaria for the

period after 2021 also include measures which, in addition to their main objective, could have a positive impact on GHG reduction targets such as the Integrated Transport Strategy for the period up to 2030 and the National Air Pollution Control Programme 2020-2 030. Additional information on planned policies and measures in the transport sector is also foreseen. The relevant sector-specific proposals for measures and policies are listed below.

Transport sector

The main policy objectives for reducing greenhouse gas emissions in the transport sector are:

- Promoting the production of electric and other green vehicles;
- Promoting the consumption of/demand for new eco-friendly vehicles;
- Accelerated deployment of charging infrastructure for electric and hybrid vehicles;
- Promoting research and development activities related to green vehicles;
- Organisation of awareness-raising campaigns, capacity building of stakeholders with regard to the development of sustainable mobility.

The priorities set for the **Transport Connectivity Programme 2021-2 027** are:

- Priority 1 "Development of railway infrastructure along the "core" and "comprehensive" trans-European transport network";
- Priority 2 "Development of road infrastructure on the "core TEN-T network" and road connections;
- Priority 3 "Improving intermodality, innovation, modernised traffic management systems, improving transport security and safety";
- Priority 4 "urban intermodality".

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

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

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

Investments for the development of railway infrastructure are concentrated mainly along the stretch of the Orient/East-Med Corridor, horizontally passing through the country's middle.

The following projects will be financed to implement the activities:

- Modernisation of the Sofia – Plovdiv railway line: railway section Elin Pelin-Kostenets, phase 2;
- Modernisation of the railway line Sofia – Dragoman – Srpska border: Wolujak – Dragoman railway section, phase 2;
- Modernisation of the railway line Sofia-Per-Radomir, Per-Radomir section;
- Building a railway link between Bulgaria and North Macedonia;
- Completion of the facilities on the Karnobatt-Sindel railway line;
- Modernisation of the railway line Sofia-Per-Radomir, Sofia – Pernik section;
- ERTMS level 2 deployment on railway lines, beyond the above.

Investments under Priority 2 are foreseen to remove bottlenecks on road infrastructure.

The following projects will be funded to implement the activities:

- Construction of the Ruse – Veliko Tarnovo motorway and the Schipka tunnel;
- A bypass of the town of Gabrovo, including a tunnel under the tip of Sipka;
- Construction of 'Ruse – Veliko Tarnovo' motorway;
- Construction of Lot 3.2 of Struma motorway.

Investments under priority 3 will contribute to the development and expansion of inland waterway and maritime public transport ports for multimodal operations, modernisation and development of combined transport terminals and port facilities, as well as those for the development of the railway nodes Gorna Oryahovitsa, Ruse and Varna. Further investments are foreseen to build alternative fuels infrastructure along the main strands of the Republican Road Network (RMP). Interventions are for road sections between some of the largest cities in the country where transport is identified as an air pollutant. In addition, the construction of alternative fuels recharging infrastructure will also be supported in public transport ports.

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

- **Intermodal Operators procedure, which** plans a grant scheme with an intensity of up to 50 % to support all intermodal operators for:
  - Purchase of equipment;
  - Construction/rehabilitation of railway/road infrastructure;
  - Cargo handling sites;
  - Implementation of IT systems and charging stations.

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

- **Alternative Fuels (Alternative Fuels**) procedure to finance the construction of alternative fuels infrastructure under the PMP (TEN-T) as well as in TEN-T public transport ports (maritime and inland waterway).

The procedure aims at setting up a national scheme to support the deployment of recharging infrastructure to enable the financing of the development of recharging infrastructure for light and heavy-duty electric vehicles as well as in public/maritime and inland waterway ports on the TEN-T. It will be launched in 2024.

All recharging infrastructure should be implemented as required by Regulation (EU) 2023/1804 of the European Parliament and of the Council of 13 September 2023 on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU.

In addition to investments under Priority 1, Priority 4 includes investments to build rail connections to Plovdiv Airport and Burgas Airport, which will improve intermodality and create better conditions for efficient use and combination of transport modes in urban settings.

Integrated Transport Strategy for the period up to 2030

The strategy sets out the main orientations for the development of the national transport system in the period up to 2030.

The document sets out 3 strategic objectives covering 9 strategic priorities, each containing a framework of specific objectives (targets). On this basis, measures have been identified that are best suited to achieving the respective objectives.

The strategic objectives of transport policy until 2 030 are to:

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

The strategic priorities for the development of transport are:

- Efficient maintenance, modernisation and development of transport infrastructure;
- Improving the management of the transport system;
- Development of intermodal transport;
- Improving the conditions for implementing the principles of liberalisation of the transport market;
- Reducing fuel consumption and increasing the energy efficiency of transport;
- Improving the connectivity of the Bulgarian transport system with the Single European Transport Area;
- Ensuring quality and accessible transport in all regions of the country;
- Limiting the negative impact of transport on the environment and human health;

- Enhancing the security and safety of the transport system.

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

Promoting sustainable urban mobility

The measures in the transport sector with direct effect are as follows:

- Rehabilitation and modernisation of existing road infrastructure to ensure optimal speed and optimum driving modes for motor vehicles;
- Introduction of intelligent transport systems on the national and urban road network;
- Increasing the share of public electric transport – rail, trolleybus, tram, metro;
- Development and construction of intermodal combined transport terminals;
- Increasing the share of biofuels.

Intelligent Transport Systems (ITS) cover a wide range of technical solutions designed to improve transport by improving mobility and increasing road safety. Telematics (a combination of telecommunications and informatics) uses advanced technologies to meet transport needs. Intelligent transport systems and telematics solutions help improve road safety, promote the efficiency of existing infrastructure used and contribute to reducing environmental pollution by controlling traffic and managing traffic volumes.

Intelligent transport systems in urban settings may include integrated management of public transport charges, enhanced customer relationship management, traffic forecasts, improved traffic management, passenger information and road charging. These systems apply modern technologies to collect more and better data, to perform accurate analysis of this data and to connect them through more efficient networks. The result: more effective and better targeted at citizens in urban traffic. The source of funding is the European funds with state and municipal co-financing and, in some cases, the climate and private investment programme. Under the Climate Investment Programme, the following schemes shall be implemented:

- Energy efficiency improvement scheme for buildings and other sites (Energy Efficiency Scheme – Energy Efficiency Scheme);
- Incentive scheme for the use of electric vehicles (Electric Vehicles Scheme – SEM).

Tolls

In 2019, the Road Infrastructure Agency introduced an electronic system for the collection of road tolls from road vehicles.

From 1 January 2019, road vehicles will have to purchase an electronic vignette for the use of road infrastructure – time charging.

New policies and measures, as well as a continuation of existing ones in the transport sector concerning the modernisation of the fleet, are set out in the National Air Pollution Control Programme 2020-2030:

- Potential additional measure that may be implemented after approval by the European Commission. The measure provides for the modernisation of the composition of the vehicle fleet by imposing restrictions on imports of second-hand vehicles with an environmental category below Euro 4, with the main objective of preventing the "discharge" of old diesel vehicles into the Bulgarian market;
- A potential additional measure for vehicles to withdraw the registration of vehicles that do not meet exhaust emission limits according to the standards approved for their respective environmental category, e.g. those with deactivated catalyst or diesel particulate filter;
- Subsidised acceptance of scrap from old diesel vehicles (in case of stricter controls on their imports);
- Legal provisions have been introduced to establish low-emission zones (LEZ) in cases where the type and extent of ambient air pollution significantly increases the risk to human health and/or the environment or failure to achieve the limit values for harmful substances (pollutants) in ambient air and limit values for deposition of harmful substances (pollutants), approved by regulations of the Minister for the Environment and Water and the Minister of Health. The relevant municipal council is to lay down, by decree, the terms and conditions for the establishment and introduction of low-emission zones in all or part of the municipality. The Regulation may restrict the circulation of motor vehicles or certain categories of motor vehicles and/or certain environmental groups of motor vehicles in the territory of the municipality concerned and/or in low-emission zones established and introduced.
- Promoting the use of hybrid and electric vehicles, in line with the Third National Climate Action Plan;

Under the Innovation Strategy for Smart Specialisation (RISS) 2027-2021, one of the priority areas is to develop and deploy technologies related to sustainable mobility (batteries and hydrogen) based on hydrogen and other alternative fuels, connected infrastructure and eco-mobility.

One of the centres designated as a specific beneficiary is the HITMOBILL Competence Centre – technologies and systems for the generation, storage and consumption of clean energy. The Centre focuses on research, experimental development and knowledge transfer in the field of "Clean energy generation, storage and consumption technologies and systems".

- Fiscal policy to stimulate the economy and curb the consumption of conventional fuels in line with the Third National Climate Action Plan 2013-2020 (the measure is to be extended until 2030);
- Promoting the development of combined transport.

The Ministry of Transport and Communications has developed a National Plan for the Development of Combined Transport in the Republic of Bulgaria until 2030 (approved by Council of Ministers Decision No 504 of 21.7.2022). It is a basic document for the implementation of the policy to support sustainable modes of transport. An implementation programme linked to the 2030 time horizon and potential sources of funding is also proposed. Three groups of measures have been identified: (1) organisational and administrative, (2) operating and supporting the service and (3) infrastructure. Their implementation is of great importance because it will increase the efficiency of the transport system by taking advantage of combined transport (lower emissions of harmful substances, increased road safety, noise reduction due to a reduction in road transport, reduced use of conventional fuels in transport) over road freight transport alone.

The plan will support projects to develop a network of modern intermodal terminals and set incentives for business to implement more efficient and environmentally friendly transport solutions and chains. By 2030, the construction of intermodal terminals in Sofia and Northern Bulgaria, as well as a study on the need to build a terminal in Vidin. The document includes measures to develop logistics centres in Bulgaria and to improve the infrastructure leading to existing port and rail-road terminals.

- Facilitate the informed choice of a transport vehicle to increase the number of lower-emission vehicles purchased (corresponding to Euro IV, V or VI).

Industry sector

Measures in the industrial sector shall focus on:

- Increased energy efficiency in industry and reduction of heat losses;
- Increasing the use of natural gas in industry through new gas infrastructure;
- Use of alternative fuels;
- Introducing incentives to encourage the private sector to invest in R & D and innovation of widely used production methods aimed at optimal resource efficiency;
- Promoting the exchange of good practices between companies with regard to the efficient use of raw materials in production;
- Monitoring systems for energy use in industry;
- Energy efficiency audits and implementation of prescribed measures;
- Develop incentives for companies that carry out industrial symbiosis, such as:
  — use of by-products from one plant as raw material to another;

— sharing utilities – energy, water or wastewater treatment, to reduce costs and improve resource productivity and environmental performance;
— sharing services such as logistics, joint marketing (e.g. shared call centres) and advice;

- Promoting with additional financial compensation the purchase of net-zero technology final products with a high contribution to economic resilience;
- Propose improved permitting procedures for the following strategic net zero technologies to enhance the investor's interest:
  — solar photovoltaic and solar thermal technologies;
  — land-based and offshore renewable technologies;
  — batteries and storage technologies;
  — heat pumps and geothermal energy;
  — electrolysers and fuel cells;
  — sustainably sourced biogas and biomethane;
  — carbon capture and storage;
  — network technologies;
- Improving the conditions for investments in net-zero technologies by:
  — improving awareness among stakeholders;
  — reducing the administrative burden of setting up projects in this area;
  — simplify and streamline permitting processes.

In addition, public authorities should take into account sustainability criteria for zero-net technologies in public procurement or tenders.

In addition to the European Emissions Trading System, European legislation on industrial emissions (integrated pollution prevention and control), reduction of fluorinated greenhouse gases and control of ozone depleting substances also contribute to reducing emissions of GHG and harmful substances into the air.

Agriculture sector

The Agricultural Producers Support Act (ZPZP) regulates state support for farmers, including farmers, as well as the implementation of the Strategic Plan for Agriculture and Rural Development of the Republic of Bulgaria for the period 2023-2027 and the implementation of the 'Sustainable Agriculture' component of the National Recovery and Resilience Plan of the Republic of Bulgaria.

The Strategic Plan for Agriculture and Rural Development 2027-2023 sets out 9 specific objectives (SP), among which three objectives with a direct and indirect effect on climate and climate change:

JU 4 – Contribution to climate change mitigation and adaptation, including by reducing greenhouse gas emissions and enhancing carbon sequestration, as well as promoting sustainable energy;

JU 5 – Promoting sustainable development and efficient management of natural resources such as water, soil and air, including by reducing chemical dependency;

JU 6 – Contribution to halting and reversing biodiversity loss, improving ecosystem services and preserving habitats and landscapes.

To achieve the specific objectives, interventions aimed at supporting farmers to undertake voluntary commitments in farm management related to adaptation and mitigation of climate change and the protection and restoration of biodiversity and agricultural ecosystems are planned.

Farmers are obliged to comply with basic standards in the fields of environment, climate change, public health, plant health and animal welfare. The basic standards cover certain statutory management requirements (SMRs) and standards for good agricultural and environmental condition of land (GAEC standards). These basic standards take better account of the environmental and climate challenges and the new environmental architecture of the Common Agricultural Policy, thus demonstrating higher environmental and climate ambition.

Standards for good agricultural and environmental condition of land include:

GAEC 1: Maintaining the ratio of permanent grassland to agricultural area at national and farm level;

GAEC 2: Protection of wetlands and peatlands;

GAEC 3: A ban on burning arable stubble;

GAEC 4: Construction (maintenance) of buffer strips along water bodies;

GAEC 5: Tillage management, reduction of the risk of soil degradation and erosion, including consideration of slope levels;

GAEC 6: Maintaining minimum soil cover during periods and areas that are most sensitive;

GAEC 7: Crop rotation on arable land, excluding crops under water;

GAEC 8: A minimum share of arable land devoted to non-productive needs and sites; the retention of landscape features and a ban on cutting hedges and trees during the breeding and rearing periods on the entire agricultural area;

GAEC 9: Prohibition of conversion or ploughing of permanent grassland identified as environmentally sensitive in NATURA 2000 areas. The national standards for maintaining good agricultural and environmental condition of land do not waive the obligations of owners or users of agricultural land under the Agricultural Land Protection Act, the Law on Ownership and Use of Agricultural Land and other regulations.

The State Fund for Agriculture – Paying Agency (DFZ-PA) is the controlling authority and makes payments in respect of applications submitted by farmers applying for support. The use of the areas declared for their intended purpose and their maintenance in good agricultural and environmental condition is established by checks by the Technical Inspectorate of the DFZ-PA. Non-compliance with the standards found during a check shall be penalised by a reduction in payments to the farmer.

The Minister for Agriculture and Food shall approve, by order, a methodology for the application of conditionality, as well as any changes thereto, and publish them on the Ministry's website. The methodology includes rules for setting administrative penalties (reductions or exclusion of the entire amount of payments) for non-compliance with the requirements of good agricultural and environmental condition and statutory management requirements.

The measures in the Third National Climate Action Plan with a 2030 horizon and the National Air Pollution Control Programme 2020-2030 aim at reducing emissions from the main sources in the sector. One of the main challenges facing the CAP is to address the increasingly deteriorated agricultural production conditions due to climate change and the need for farmers to reduce their share of greenhouse gases, to play an active role in mitigating climate change and providing renewable energy.

Based on the analysis of the main sources of emissions in agriculture, the following two main objectives are identified:

- Reducing and/or optimising emissions from the agricultural sector;
- Increase awareness and knowledge of both farmers and administrations regarding their actions and impacts on climate change.

These main objectives are addressed by the following priorities:

- Reducing emissions from agricultural land;
- Reducing methane emissions from organic fermentation in livestock farming;
- Improving manure management;
- Optimising the use of plant residues in agriculture;
- Improving the management of rice fields and rice production technologies;
- Improving farmers' and administration's knowledge of reducing emissions from the agricultural sector.

The measures set out in the Third National Climate Change Action Plan with a 2030 horizon and the National Air Pollution Control Programme 2020-2030 include:

- Incentivising the use of appropriate crop rotations, especially with nitrogen-fixing crops;
- Management of degraded agricultural land through:
  - biological recultivation with herbaceous species typical of the region and
  - application of erosion control measures and tillage methods;

- Introducing irrigation technologies and saving water and energy, promoting extensive farming;
- Measures to reduce methane emissions from organic fermentation in livestock farming;
- Improving manure management and use;
- Introduction of low-carbon manure treatment practices, e.g. composting, conversion of manure into biogas under anaerobic conditions;
- Improving farmers' awareness and knowledge of the possible use of plant residues and the threats posed by burning stubble;
- Application of Good Agricultural Practice Rules for the control of ammonia emissions from agricultural sources, based on the UNECE Framework Code for Good Agricultural Practice for Reducing Ammonia Emissions:
    - good practices for the application of low-emission fertilisers/manure and strengthening the implementation of the Nitrates Directive)
    - good manure management practices.

Environmental schemes for the climate, environment and animal welfare included in the Strategic Plan for Agriculture and Rural Development 2027-2023 contribute to achieving the objectives and priorities of the decarbonisation dimension with direct or indirect effects.

The following eco-schemes are designed to respond to the needs of reducing emissions from the agriculture sector and protecting and restoring biodiversity and soil and are available for implementation by farmers:

I.C.1 – Organic farming scheme (farmed animals);

I.C.2 – Eco scheme to maintain and improve biodiversity and environmental infrastructure;

I.C.3 – Eco scheme for maintaining and restoring soil potential – promotion of green and organic fertilisation;

I.C.4 – Eco scheme to reduce the use of pesticides;

I.C.5 – Eco scheme for the ecological maintenance of permanent crops;

I.C.6 – Eco scheme for extensive maintenance of permanent grassland;

I.C.7 – Eco scheme for maintaining and enhancing biodiversity in forest ecosystems;

I.C.8 – Eco scheme for crop diversification.

Part of the eco-schemes are consistent with the measures provided for in the Third National Climate Change Action Plan with a 2030 horizon and the National Air Pollution Control Programme 2020-2030, namely:

- Eco crop diversification scheme – Requirements in intervention provide for a higher number of farm-grown crops. The increased number of different crops contributes to minimising the risks to the farm due to climate change (adaptation and mitigation) through crop diversification. The aim of the intervention is to improve crop rotation, which increases the humus and

nutrient content of the soil and protects against erosion by ensuring the availability of permanent soil cover to avoid soil rinsing and compaction;

- Eco scheme to preserve and restore soil potential – promotion of green fertilisation and organic fertilisation – The intervention provides for two main approaches for the introduction of external organic matter into the soil: cultivation of suitable types of intermediate non-productive crops with subsequent green fertilisation and introduction of external organic matter subject to circular economy products (treated organic matter from biomass waste). The aim of the intervention is to reduce the use of fertilisers, replacing them with natural nutrients formed as a result of the introduction of external natural organic matter;
- Eco scheme to reduce the use of pesticides – Requirements in intervention ensure a reduction in the quantities of plant protection products (PPPs) used in crop production. Encouraging the use of science-based and respectful technologies to reduce the amount of PPP use;
- Eco scheme for extensive maintenance of permanent grassland – The intervention will prevent the loss of the pasture ecosystem by reducing the processes of sinking and erosion, ruderalisation and the development of atypical species, which significantly improves the capacity of pasture systems to absorb carbon and mitigate climate change.

To enhance farmers' knowledge and skills, the National Agricultural Advisory Service (NFAS) provides advice and individual advice to farmers on measures with an indirect and direct effect on greenhouse gas emission reductions for the following measures:

- Humus conservation activities (fertilisation – precision fertilisation, green fertilisation; liming; soft tillage, crop rotation, anti-erosion activities, etc.);
- Water-saving and energy-saving irrigated technologies;
- Extensive pastoral rearing of animals;
- Possibilities to use plant residues and threats from burning stubble.

Consultations on measures with a direct effect on greenhouse gas emission reductions shall cover the following areas:

- Improving manure storage and application;
- Low carbon manure processing practices (composting, anaerobic biogas processing, etc.).

In 2022, a total of 5 788 consultations were provided to 3 871 persons on these measures.

The NSPA specifically provides young farmers with an advisory package A2B (CP) covering the provision of advice and information on agricultural practices beneficial for the climate and the environment under Chapter 3 of Title III of Regulation (EU) No 1307/2013 of the European Parliament and of the Council of 17 December 2013 establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009.

Farmers with small farms are also provided with CPs with a dedicated module (Thematic sub-programme TA 2) – agricultural practices beneficial for the climate and the environment, water policy, as well as information and advice on climate change mitigation and adaptation measures, biodiversity and water protection – agricultural practices beneficial for the climate and the environment, implementation of measures related to water abstraction regulation and abstraction control, protection of water from pollution, efficient and sustainable water use, protection, restoration and sustainable use of water, advice related to mitigation of climate change.

The NGCC also provides specialised advice on:

- Rules on good agricultural practice, including conditions for application of nitrogen-containing fertilisers, conditions and requirements for collection and storage
- manure and waste water from animals, etc. associated with GHG;
- National standards for maintaining land in good agricultural and environmental condition;
- Statutory management requirements – including storage requirements for organic and mineral fertilisers, plant protection products, protection of water against pollution, etc.

In order to improve synergies in the "research – farm advisory – agricultural business" system, the NSPA organises and conducts joint information and training seminars with universities, research institutes, scientific applied organisations and other institutions, knowledge and technology transfer organisations from science to farmers. In 2022, 105 joint information and training seminars were held with universities, research institutes, scientific organisations and other institutions on topics related to the technological aspects of the production process of agricultural production, with around 20 % of the workshops on climate change topics, including promotion of greenhouse gas abatement and decarbonisation practices.

The trainings organised by the NSPA provide farmers with theoretical knowledge and practical skills in the field of agriculture, with climate and environmental topics also present in most of the training programmes.

Training topics are related to the presentation of good practices: to apply low-emission fertilisers/manure and strengthen the implementation of the Nitrates Directive), to manage animal manure, on the possible use of plant residues and possible threats; use of appropriate crop rotations, including the role of nitrogen – fixing crops, etc. Frequently, training is in the form of demonstrations – on farms during which activities favouring GHG reduction are presented, e.g. demonstrations of good practices for manure storage and application; introduction of low carbon manure treatment practices such as composting, etc.

For a wider dissemination of trainings, the NSPA uses its Facebook page as well as the You Tube channel of the NSPA. By the end of 2022, more than 139 videos had been uploaded, most of which were processed recordings of webinars and information meetings. Many of them are on climate and, to some extent, GHG issuance.

The NGCC also conducts training on an annual basis for experts from the service's capacity enhancement system, including on topics related to climate change, decarbonisation in the agriculture sector.
In early 2023, the implementation of the Strategic Plan for Agriculture and Rural Development of the Republic of Bulgaria 2027-2023 was launched. In this context, the NSPA actively launched consultation, information and training activities for farmers on the following topics:

- Stimulating crop diversification, catch/cover crops and green fertilisation;
- Promoting organic and integrated farming practices;
- Promoting conservation farming practices through reduced soil treatments – minimum or zero and direct sowing, burial of plant residues;
- Promoting crop selection adapted to climate change and encouraging the use of climate-resistant crops and varieties;
- Stimulate the improvement and maintenance of soil structure and quality and increase PME stocks through practices;
- Promoting the reduction of the use of plant protection products and fertilisers;
- Stimulating investments in environmental infrastructure aimed at protecting the environmental components;
- The application of agroforestry practices;
- Improve farmers' knowledge of how to implement and the benefits of implementing all measures and practices and their impact on climate change.

The NSPA provides advice and individual advice on:

- Reducing the use of pesticides;
- Use of climate-resilient varieties and breeds;
- Natura 2000;
- Transhumance.

Waste management sector

Waste prevention is the most efficient way to improve resource efficiency and to reduce the environmental impact of waste.

Promoting sustainability in production and consumption can make a significant contribution to waste prevention (VET).

The Waste Framework Directive 2008/98/EC introduces a waste management hierarchy. It is a cornerstone of waste legislation and policy. This sequence sets out the order of priority of what constitutes the best environmental option in waste legislation and policy. Compliance with the waste management hierarchy ensures the highest level of compliance with European documents on resource efficiency and circular economy and should therefore be promoted in all ways. The hierarchy sets out five possible ways for institutions, businesses and households to deal with waste and prioritises measures in the following order:

- Waste prevention;

- Preparation for re-use;
- Recycling;
- Other recovery, e.g. energy recovery;
- Disposal (controlled landfilling, incineration without energy recovery, etc.).

The measures of the Third National Climate Action Plan 2013-2020, which are planned to be continued and upgraded by 2030:

- Continue and increase separate collection of green waste in municipalities;
- Capture and incineration of biogas in all new and existing regional landfills;
- Capture and incineration of biogas in old municipal landfills;
- An assessment of the energy potential of biogas from landfills that are planned to be closed;
- Introduction of anaerobic stabilisation of sludge with biogas capture and incineration in new plants and installations undergoing reconstruction in settlements with more than 20000 population equivalents;
- Construction of municipal facilities for the recovery of biodegradable waste, with energy generation and compost;
- Introducing differentiated fees for waste generated.

New policies and measures in the waste sector

Measure 1: Completion/upgrading of regional municipal waste management systems

Instruments: A programme to reach the preparing for re-use and recycling targets for municipal waste.

Necessary financial resources: BGN 235 million

Sources of funding: Environment Programme 2021-2027

Performance indicator: share (%) of funds implemented; number of closed contracts; number of installations built.

Responsible institutions: MA of PIC, municipalities; THE WSFU.

Measure 2: Construction of municipal sites for the free delivery of separately collected household waste, including large waste, and other separately collected waste in all settlements with a population greater than 10 000 inhabitants

Instruments: A programme to reach the preparing for re-use and recycling targets for municipal waste.

Necessary financial resources: BGN 15 million

Sources of funding: Environment Programme 2021-2027, Municipal budgets.

Performance indicator: Number of sites built.

Responsible institutions: MA of PIC, municipalities; THE WSFU.

Measure 3: Provision to households of composters for green and other bio-waste free of charge

Instruments: Waste prevention programme with food waste prevention sub-programme.

Necessary financial resources: BGN 10 million

Sources of funding: municipal budget, PSR 2021-2027, PUDOOS.

Performance indicator: Number of household composters provided.

Responsible institutions: municipalities, households.

Measure 4: Reduce paper waste and other office supplies by implementing national and sectoral programming documents for "eGovernment"

Instruments: Waste prevention programme with food waste prevention sub-programme.

Necessary financial resources: BGN 50 million

Sources of funding: Technical assistance programme 2021-2027.

Performance indicator: E-Government projects implemented.

Responsible institutions: MA of SSTBs 2021-2027, state and municipal administrations.

Measure 5: Implementation of PE measures when issuing/updating integrated waste permits by the RIEW

Instruments: Waste prevention programme with food waste prevention sub-programme.

Necessary financial resources: BGN 0.176 million

Sources of funding: EEA.

Performance indicator: Number of permits in which a PO requirement is included.

Responsible institutions: EEA, Business Organisations in the scope of the CoR.

Measure 6: Construction of waste recycling facilities

Instruments: A programme to reach the preparing for re-use and recycling targets for municipal waste.

Necessary financial resources: BGN 40 million

Sources of funding: PUDOOS, Environment Programme 2027-2021, municipal budgets, private investment.

Performance indicator: Number of waste recycling plants built.

Responsible institutions: MOEW, municipalities, legal entities for profit.

Measure 7: Separate collection and recycling of construction waste, including in industrial areas where proven necessary

Instruments: The programme to reach the targets for recycling and recovery of construction and demolition waste.

Necessary financial resources: BGN 45.6 million

Sources of funding: InvestEU; municipal budgets.

Performance indicator: Number of projects implemented for separate collection and recycling of construction waste.

Responsible institutions: Municipalities, profit-making entities, MA of PIC.

● **National Waste Management Plan 2021-2028**[9]

Regulatory, environmental, economic measures; implementation: 2021 – 2028

It plays a key role in the effective and efficient management of waste in the country. The main objectives of the Plan include reducing the harmful impact of waste by preventing and promoting re-use, increasing the amount of recycled and recovered waste and reducing the quantities and risk of landfilled municipal and other waste.

Five programmes have been developed to achieve the objectives as part of the Plan, namely:

- Waste prevention programme with food waste prevention sub-programme;
- A programme to achieve the preparing for re-use and recycling targets for municipal waste;
- A programme to achieve the targets for recycling and recovery of construction and demolition waste;
- A programme for achieving the recycling and recovery targets for mass waste with a sub-programme for packaging waste management;
- A programme to reduce the quantities and risk of landfilled municipal and other waste.

The programmes contain both investment measures and non-investment measures – soft measures. Investment measures mainly include the construction of infrastructure. The investment measures for the different types of installations have been quantified on the basis of the capacity of the installations in accordance with the scenario chosen by the Ministry of the Environment and Water for the future development of waste management policy in the next programming period and average investments per tonne/capacity of the contracts concluded under OPE 2014-2020 for the establishment of regional waste management systems. Investment measures for vessels, means of transport, composters, etc. were valued on the basis of the number of vessels/means of transport, etc. identified

[9]https://www.moew.government.bg/static/media/ups/tiny/%D0%A3%D0%9E%D0%9E%D0%9F/%D0%9D%D0%9F%D0%A3%D0%9E-2021-2028/NPUO_2021-2028.pdf

as a result of analyses and forecasts and the corresponding average prices as a result of a market survey.

Soft measures include a diverse range of activities, including: regulatory changes; the appointment of officers; training of employees; preparation of calls for projects; project preparation; development of methodologies, instructions, etc. administrative acts; performance of control activities; conducting information campaigns; development and implementation of information systems and 46 others. Some of these have been monetised on the basis of information on the performance of similar activities and expert assumptions. The other part of soft measures is not quantified. These are measures falling within the scope of the activities carried out by the relevant institutions responsible for the implementation of the measure concerned, e.g. MoEW, RIEW, municipalities, etc., and are financed from the budget of the institution concerned.

The estimated value of the programmes valued under this approach is BGN 1 428.51 million.

Investment measures account for 78 % of planned expenditure in NMPs 2021-2028, while soft measures account for 22 %. The Programme to reduce the quantities and risk of municipal waste landfilled accounts for 51 % of the total planned investments in NMPs 2028-2021, followed by the Programme for meeting the preparing for re-use and recycling targets for municipal waste, with 27.4 % of the investments.

• Strategy and action plan for the transition to a circular economy 2022-2027

Regulatory, environmental, economic measures; implementation: 2022 – 2027

They aim to achieve resource efficiency by applying the waste hierarchy, preventing waste generation, promoting reuse and recovery through recycling, reducing landfills and limiting their harmful impact on the environment and human health. The strategy sets out three strategic objectives:

- Green and competitive economy;
- Less waste and more resources;
- An economy that benefits consumers.

institutions: Municipalities, profit-making entities, MA of PIC.

Energy sector

For the energy sector, most of the measures affecting decarbonisation are included in the sections on RES, energy efficiency, the internal market and energy security below, as overall changes in these dimensions lead to GHG emission reductions. In addition to the measures listed in these sections below, there are several other measures that have an indirect positive impact on GHG reduction. All of the listed measures of the Third National Climate Action Plan (2013-2020) have been extended until 2030 as follows:

- Upgrade of cogeneration plants and central heating boilers with natural gas turbines;
- Reducing losses from distribution and transmission networks;

- Reduction of losses in heat networks;
- Fuel switching from coal to natural gas;
- Increase of high-efficiency cogeneration;
- Increase of the share of energy for heating and cooling from renewable energy sources;
- Improving production efficiency in existing coal-fired power plants.

Enabling the transition from coal to low-carbon fuels by implementing the following projects:

It is appropriate to provide new enabling gas transmission infrastructure for transmission to thermal power plants and other potential users in coal regions in order to create market conditions for the modernisation of the combustion plants of thermal power plants and other energy users, to switch from coal to natural gas.

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

Bulgartransgaz EAD is developing a project for the construction of a high-pressure gas transmission infrastructure to power plants and other consumers in the East Marisch region.

The project covers a set of activities to provide a new leading high-pressure gas transmission infrastructure ("future-proof" – capable of transporting hydrogen) with sufficient capacity to transport thermal power plants and other potential users in the East Marisch coal region.

The planned activities include the design, supply, construction and commissioning of new enabling gas transmission infrastructure with a total length of approximately 73 km (45 km with DN700 and 28 km with DN500) and its associated technological facilities. The estimated date for commissioning is 2026.

Aggregated policies and measures for the domestic and public sector

- Gas supply to households;
- Installation of solar collectors;
- Refurbishment (renovation) of public and State-owned buildings (with a total area of more than 250 m²) up to a specified annual percentage following the entry into force of the Energy Efficiency Directive;
- Introduction of a mandatory energy efficiency scheme (lowering fuel and energy consumption in final energy consumption);
- Accelerating the date of entry into force of the Ecodesign Regulation 2015/1185; and introducing a mandatory, accelerated phase-out of traditional polluting heaters (stoves) in line with the National Air Pollution Control Programme 2020-2030;

- Introduction of a fuel quality standard for coal (nationwide), surrogate measures to reduce the moisture content of firewood used in municipalities that do not meet the air quality criteria PM10 and, possibly, a maximum moisture content standard for firewood, in line with the National Air Pollution Control Programme 2020-2030;
- Households affected by the mandatory shutdown of traditional stoves to switch to natural gas heating (re-connections and new connections), district heating (re-connection and new connections) or Ecodesign heating appliances), in line with the National Air Pollution Control Programme 2020-2030.

When using non-conventional fuels for primary energy production, the following measures shall also be implemented:

- Conducting and adopting a national analysis of the potential for sustainable biomass from all sectors (including but not limited to forestry and agriculture) and sustainability criteria, taking into account the sustainability criteria set out in Directive (EU) 2018/2001.

No such national analysis has been commissioned or prepared for the Gori sector. A similar analysis was developed in the National Action Plan for Forest Biomass Energy 2018-2027.

- Synchronisation between forest management and use strategic documents. When reviewing, updating and developing strategic documents, they need to be coherent with each other and with the INECPs. Such strategic documents to be revised, updated, aligned with the INECPs may include: Report on the forestry sector, Annex to the Action Plan of the National Strategy on Adaptation to Climate Change of the Republic of Bulgaria, National Strategy for the Development of the Forestry Sector, National Action Plan for Energy from Forestry Biomass, National Renewable Energy Action Plan;

An assessment was carried out of the implementation of the National Strategy for the Development of the Forestry Sector in the Republic of Bulgaria 2013-2020 (NSRGRB 2013-2020). Pursuant to Article 9 (1) (1) of the Forests Act, a Strategic Plan for the Development of the Forestry Sector 2023-2014 (RSPSG 2023-2014) was drawn up, setting out the specific actions to implement the strategic objectives, priorities and measures set out in the NSRGDR. In view of the expiry of the NPGRRB 2020-2013, a draft of the NPGRRB until 2022 was prepared in 2030 and is due to be approved by the Council of Ministers. The National Action Plan for Forest Biomass Energy 2027-2018 needs to be monitored and updated.

- Synchronisation between strategic documents in relation to the agricultural sector. When reviewing, updating and developing strategic documents, they need to be coherent with each other and with the INECPs. The strategy papers, which will be revised, updated and aligned with the INECPs, may include plans for the implementation of the Common Agricultural Policy post-2020;

- Synchronisation between waste sector strategy papers. When reviewing, updating and developing strategic documents, they need to be coherent with each other and with the INECPs. The strategy papers to be revised, updated and agreed with the INECPs may include: A waste management plan and relevant programmes such as the Programme to achieve biodegradable waste targets, including for bio-waste and the Programme to improve the hierarchy of management of other waste streams and reduce the environmental risk from landfills for the period after 2020.

The implementation of the above additional measures is considered to have a positive impact on both primary energy production and LULUCF sectors.

Land use, land use change and forestry sector

Forests Act

Forestry planning is carried out at three levels and includes a National Strategy for the Development of the Forestry Sector in the Republic of Bulgaria and a Strategic Plan for the Development of Forests, Regional Forestry Development Plans and Forestry Plans and Programmes.

Forest plans and programmes set out the eligible amount of forest resource use and guidelines for achieving forest land management objectives over a period of 10 years. The Forestry Act does not allow the reduction of the existing silence in the territory of the Republic of Bulgaria, as well as in the territory of municipalities with less than 10 % of the total percentage of forest land in Bulgaria. Land use change in forest areas is only possible in certain specific cases.

The National Action Plan for Forest Biomass Energy 2018-2027

National Strategy for the Development of the Forestry Sector in the Republic of Bulgaria for the period 2013-2020

A final monitoring of the implementation of the National Strategy for the Development of the Forestry Sector in the Republic of Bulgaria 2020-2013 was carried out by an inter-ministerial working group with the participation of the non-governmental sector.

The Council of Ministers is about to approve the National Strategy for the Development of the Forestry Sector in the Republic of Bulgaria for the period up to 2030.

A new Strategic Plan for Forest Sector Development will be drawn up on the basis of the approved document.

The process also includes the final monitoring of the implementation of the Strategic Plan for Forest Sector Development 2014-2023.

Strategic Plan for Forest Development 2014-2023 (RSPSG)

This plan was developed with the financial support of the European Social Fund under the project "Strategic planning in Bulgarian forests – guarantor of effective management and sustainable development" under the Operational Programme "Administrative Capacity".

The implementation of the operational objectives with the corresponding budget, timetable, expected results, performance indicators, responsible institutions and stakeholders is regulated in specific sub-activities in the RSPSG as follows:

Operational objective 1: 'Increasing forest area, woody stocks and carbon stocks in forest areas';

Operational objective 2: "Improving forest management and use";

Operational objective 3: "Increasing the effectiveness of preventing and combating forest fires and illegal activities in forests";

Operational objective 4: "Increasing resilience and adaptability of forest ecosystems to climate change".

The achievement of these objectives is also ensured by the implementation of the Programme of Measures for the Adaptation of Forests in the Republic of Bulgaria and the mitigation of the negative impact of climate change on them.

The existing provisions of the Law on the ownership and use of agricultural land provide that the municipal council's decision lays down the rules for the use of meadows and pastures each year. Their scope shall include:

- An action plan for grazing;
- Parts of grassland and pasture, mainly mowing;
- Measures to protect, maintain and improve pastures, such as cleaning of shrubs and other undesirable plant species, anti-erosion activities, fertilisation, temporary fencing;
- Parts of grassland and pasture for artificial pastures for planting with appropriate grasslands;
- Use, prohibitions and restrictions depending on landscape features, soil, climate and other natural conditions.

As regards arable land, Article 7 of the Agricultural Land Ownership and Use Act provides that eroded, contaminated, salty, acidic and underground agricultural land shall be restored and improved on the basis of a set of activities or technologies which operate on the basis of pre-designed, coordinated and approved technologies and projects approved by the Council of Experts.

Valleys, quarries and other areas with impaired soil profile, ashes, tailings ponds, dumps and other landfills, old watercourses, abandoned canals roads, roads, railways and construction sites after dismantling engineering equipment, linings and superstructures are subject to restoration. Recultivation is based on a pre-established, agreed and approved project, which is an integral part of the site construction project. The procedure for using

humus after removal, recultivation, land improvement and acceptance of reclaimed areas are laid down in Regulation No 26 on land recultivation, improvement of low-productivity land, removal and utilisation of the humus layer.
To date, the report on the second interim monitoring and evaluation of the implementation of the Strategic Plan for Forest Development 2014-2023 has been endorsed.
One of the main strategic documents containing land use, land use change and forestry measures is the NRCP 2013-2020, whose measures will continue to apply beyond 2030:

- Use of 'unforested areas for afforestation' in forest areas;
- Afforestation of abandoned agricultural land, bare and deforested land, eroded and eroded areas outside forest areas.

Sub-measure 8.1. 'Afforestation and maintenance' of measure M08 'Investments in forest area development and improvement of the viability of forests' of RDP 2014-2020 is being implemented. There is a need for changes in the forestry regulations governing the creation, management and use of timber on agricultural land. The NRSPZR 2023-2027 provides for the implementation of intervention II.D.10 – Salvation and Recovery.

- Increasing the area for urban and suburban parks and green zones;
- Restoration and sustainable management of wetlands. Protection and conservation of wetlands in forest areas, peatlands, marshes.

The NRSPZR 2023-2027 provides for an intervention for the construction or renovation of areas for general public use.

- Restoration and maintenance of protective forest belts and new anti-erosion afforestation.

A similar measure was not implemented under the RDP 2014-2020. In the NRSPZR 2023-2027, intervention II.D.10 – Salvation and Recovery was foreseen for implementation.

- Increase in density in listed natural and artificial plantations.
- Introduction of a new measure/activity related to the creation of crops of fast-growing tree species to produce wood for energy purposes (short rotation plantations).

ii. Where relevant, regional cooperation in this area

Regional cooperation in this area is not appropriate

iii. Without prejudice to the applicability of state aid rules, financing measures, including Union support and the use of Union funds, in this area at national level, where applicable

Not applicable

3.1.2. Energy from renewable sources

Existing and additional policies and measures will be implemented to achieve the national target of 34.1 % share of RES in gross final energy consumption by 2030.

The policies and measures take into account the priorities and guidelines of the new energy and climate policy of the EU and are in line with the experience and results of the policies and measures implemented in the area of RES energy production and consumption to date. The aim is to achieve cost-effective development of RES as an important part of the Union's decarbonisation policy by 2030.

In the period 2021-2030, the development of the electricity sector took into account the possibility of maximising the integration of the electricity produced from renewable sources into the electricity market, accounting for decentralised electricity production and providing electricity from renewable sources at the lowest possible price.

An enabling framework has been put in place to promote and facilitate the development of renewable self-consumption and the creation of renewable energy communities.

For the wider and year-on-year increasing consumption of renewable energy in the heating and cooling sector, priority shall be given to the use of high-efficiency heating and cooling systems, to the uptake of innovative technologies using geothermal, hydrothermal and solar energy, and to the use of waste heat and cold.

The use of biomass for district and local heat generation will increase subject to the requirements of Article 28 (7) to (2) and (10) of Directive (EU) 2018/2001.

To achieve a 15.2 % share of energy from renewable sources in final consumption in transport, the uptake of advanced biofuels, renewable liquid and gaseous transport fuels of non-biological origin, recycled carbon fuels and renewable electricity supplied to the road and rail transport sectors will be encouraged. The consumption of these fuels and energy should contribute to the policy objectives of energy diversification and decarbonisation of the transport sector. For the use of electricity from renewable sources in transport, efforts will be aimed at deploying electric mobility, developing and stimulating the use of public electric transport, as well as accelerating the integration of modern technologies in the rail sector.

i. Policies and measures to implement the national contribution to the binding 2030 target at Union level for renewable energy and trajectories referred to in Article 4(a) (2) and, if applicable or available, the elements presented in point 2.1.2, including sectorial and technology-specific measures

1) Schemes of support

Support in the form of preferential prices under contracts already concluded for the purchase of renewable electricity produced by plants with a total installed capacity of less than 2 035 kW will continue to be provided in the period up to 500. The granting of the aid will last until the expiry of the period specified in the purchase agreements.

The production of electricity from renewable sources from plants with a total installed capacity of 500 kW and above 500 kW for which long-term purchase contracts have been concluded at preferential prices will be incentivised by granting a premium to the quantities of electricity they produce up to the amount of their net specific electricity production, on

the basis of which their preferential price is determined. The granting of the aid will last until the expiry of the period specified in the purchase agreements.

New long-term contracts for the purchase of electricity at preferential prices are concluded only for sites with a total installed capacity of up to and including 30 kW, which are intended to be built on rooftop and facade structures of buildings connected to the electricity distribution network and on real estate to them in urbanised areas.

The residual budget for the aid for the production of electricity from renewable sources for the period from 1 January 2023 until the expiry of the time limits set out in the purchase contracts at preferential prices and bonus compensation amounts to EUR 2 925 486.10

The construction of new wind and solar power plants and biomass will take place on a market basis and without the provision of investment or operational financial support.

The annual implementation of the target for the share of energy from renewable sources in gross final energy consumption will be analysed in the biennial reports of the INECP and, in the event of non-compliance and the need for new energy facilities, a procedure for launching a support scheme through auctions may be initiated.

2) *Relaxation of administrative and connection procedures for the construction of energy facilities for the production of electricity from renewable sources*

Streamlining administrative procedures and speeding up connection procedures are a key factor in accelerating the use of renewable energy in all sectors, including industry and buildings. In this direction, action has been taken on amendments to the legislation governing the construction and connection of energy facilities using energy from renewable sources. Making changes to the regulatory framework to address the barriers identified in the assessments under Article 18a (5) and Article 18b (4) of the Renewable Energy Sources Act to the development of self-consumers and the renewable energy community.

In accordance with the requirements of Article 7 (2) (17) of the Renewable Energy Act, the Executive Director of the Agency for Sustainable Energy Development prepares an assessment of the existing unjustified barriers and of the potential for the development of self-consumers and renewable energy communities. The assessments prepared are submitted to the Minister for Energy for approval and contain proposals to remove unjustified regulatory and administrative barriers.

3) *Enabling offshore wind energy to develop*

Legislative changes are under development that will lay down the conditions for exploring the potential of the energy resource, the suitability of the areas selected for the realisation of investment projects and the construction of energy sites in maritime spaces, with a view to effectively exploiting wind potential and enabling future joint projects with other Member States.

[10] European Commission approved State aid SA.44840 (2016/NN) – Bulgaria Support for renewable energy production in Bulgaria

Cross-border cooperation initiatives have been taken with Romania and Greece to support and promote exploration and development of the sustainable use of offshore wind potential in the Black and Aegean Seas.

4) *Introduction of a planning process for priority areas for the accelerated development of wind power plants*

A Plan for the identification of priority areas for the development of wind energy generation sites is to be developed. The planning process will prioritise artificial built-up areas such as roofs of buildings, areas with existing transport infrastructure, parking areas, waste sites, industrial areas, industrial parks quarries, artificial water bodies and reservoirs, urbanised areas, degraded land, pastures, tailings ponds, landfills and degraded land that cannot be used in agriculture. Short deadlines will be introduced in priority areas for administrative permits for the construction, reconstruction and commissioning of energy facilities, as well as for carrying out an environmental impact assessment.

5) *Establishment of administrative service centres*

In order to facilitate the investment process, administrative service centres shall be set up within each municipality to provide instructions and information and organise the procedures for issuing building permits and/or permits to use or certification of the commissioning of energy and renewable energy facilities and facilities for their connection to the relevant grid, including the reconstruction and modernisation of existing energy and renewable energy production facilities.

(6) requirements for the use of energy from renewable sources in buildings

The Renewable Energy Act lays down requirements for the use of energy from renewable sources when constructing new or refurbishing, major renovation, major renovation or refurbishment of existing buildings, where technically possible and economically viable. At least 15 % of the total heating and cooling needed by the building to be produced from renewable sources is foreseen by introducing:

- Central heating using biomass or geothermal energy;
- Individual facilities for the incineration of biomass with a conversion efficiency of at least 85 per cent for residential and commercial buildings and 70 per cent for industrial buildings;
- Solar thermal installations;
- Heat pumps and geothermal systems.

In accordance with the requirements of Regulation No RD-02-20-3 of 9.11.2022 on technical requirements for the energy performance of buildings, as of 1 January 2024, all new buildings are designed to be nearly zero-energy, the "nearly zero-energy building" being a building that meets the following conditions at the same time:

- The building's energy consumption, designated as primary energy, corresponds to class A on the scale of energy consumption classes for the relevant type of buildings;

- At least 55 % of the energy consumed (supplied) for heating, cooling, ventilation, domestic hot water and lighting shall be renewable energy located on-site at building level or near the building.

7) *Enabling the issuance of guarantees of origin for energy from renewable sources,* biogas and green hydrogen

A new regulation is under development which will lay down the conditions and procedures for establishing and maintaining the system for issuing guarantees of origin, including the establishment and maintenance of a single electronic register of guarantees of origin. The Regulation will introduce the requirements of standard CEN-EN 16325 when issuing, transferring and cancelling guarantees of origin and will allow the issuance of a guarantee of origin for biogas and green hydrogen.

The SEDA's activities related to its full membership of the European Association of Issuing Bodies (AIB) are also planned. At present, SEDA has observer status.

(8) optimising the regulatory framework for implementing the enhanced requirements of Directive (EU) 2018/2001 with regard to sustainability criteria and GHG emissions reduction

The Renewable Sources Act has been amended to introduce the requirements of Directive (EU) 2018/2001 with regard to sustainability criteria and GHG emissions saving criteria.

Action has been taken to amend the regulatory framework of the Renewable Sources Act (ZEVI) in order to achieve full transposition of the requirements of Directive (EU) 2018/2001 with regard to sustainability and GHG emissions reduction criteria.

9) *Introducing obligations on fuel and electricity suppliers to meet the target in the transport sector*

In order to achieve the new more ambitious targets, specific obligations on fuel and energy suppliers will be regulated, which should market conventional biofuels, advanced biofuels, liquid and gaseous fuels of non-biological origin, electricity from renewable sources and recycled carbon fuels.

10) *Enabling the development and use of advanced biofuels, renewable liquid and gaseous fuels of non-biological origin and recycled carbon fuels*

Comprehensive measures related to both consumption and production will be necessary to provide the necessary quantities of advanced biofuels, renewable liquid and gaseous transport fuels of non-biological origin and recycled carbon fuels at affordable prices for the purposes of Directive (EU) 2018/2001.

In this underdeveloped and at the same time cutting-edge area, efforts will focus on applied research and wider demonstration activities related to the uptake of new energy sources and the deployment of technologies for their utilisation. There is a need to create an integrated research and innovation chain covering elements of applied research, from production to market uptake of the above fuels.

Local authorities will also develop and implement schemes to promote the use of energy from renewable sources, advanced biofuels, renewable liquid and gaseous transport fuels of non-biological origin and recycled carbon fuels, depending on the specific conditions in the municipality, in the framework of programmes to promote the use of energy from renewable sources and biofuels and in line with the priorities in national programmes and strategic documents for the promotion of the use of these fuels in transport.

(11*) stimulate the development and deployment of electric mobility and the use of renewable energy in transport*

In order to stimulate the development and deployment of electric mobility, responsibility for local authorities in the framework of their long-term programmes to introduce their own specific measures on their territory are laid down to increase the attractiveness of the use of this transport. Those programmes should provide for measures to promote the development and use by the population of urban and rail electric transport, through measures for the use of energy from renewable sources in municipal transport, as well as renewable liquid and gaseous transport fuels of non-biological origin and recycled fuels in transport, and support schemes for such projects.

12) *Introducing requirements for the integration of renewable energy at regional and local level when planning, designing, building and upgrading urban infrastructure, industrial, commercial or residential areas and transport and energy infrastructure, including district heating and cooling networks, gas networks as well as alternative fuels networks*

13) *Promoting the use of geothermal energy*

In order to exploit the potential of this type of renewable energy source, small-scale heat generation projects in centralised and local systems will be encouraged.

Various studies and national strategies show that Bulgaria is rich in geothermal deposits, of which over 840 water sources with a temperature of up to 103 degrees Celsius have been studied. Recorded mineral springs with different flow rates and temperatures between 20 and 101.4 degrees are 136 pieces. At the same time, only 18 % of the country's geothermal energy is used and the mineral sources detected are only 6 %.

Developments in technologies related to the recovery of energy stored in the form of heat in groundwater are evolving dynamically and require adequate and timely solutions, with a view to their efficient and cost-effective use, taking into account national circumstances.

To promote the use of geothermal energy by means of the Act amending the Renewable Energy Sources Act (published in State Gazette No 86/13.10.2023) amended and supplemented the ZEVI, the Underground Natural Resources Act, the Water Act and the Spatial Planning Act.

The Renewable Sources Act lays down shorter deadlines for issuing building permits for the installation of geothermal heat pumps for the production of heat and electricity, applying the conditions laid down in Article 7 of Council Regulation (EU) 2022/2577 of 22 December 2022 laying down a framework to accelerate the deployment of energy from

renewable sources. When permitting the installation of geothermal heat pumps with an installed capacity of less than 50 MW, the permit-granting process for the installation shall not exceed three months.

Priority will be given to connecting heat production sites from geothermal energy to the heat transmission network and purchasing geothermal energy produced by the heat transmission company.

More detailed definitions are introduced, according to the depth of the geothermal resource, providing legal certainty regarding the authorisation and regulatory regime applicable to the exploration and exploitation of geothermal resources.

The Underground Natural Resources Act regulates the procedure for granting authorisations for prospecting and exploration or for prospecting and granting concessions for the exploitation of deep geothermal resources, the granting of concessions for the exploitation of deep geothermal resources provides legal certainty regarding the regime applicable to exploration and exploitation of all underground resources. A way of exchanging information and documentation between competent institutions on the granting of geothermal resource rights has been defined, in order to introduce facilitations for potential applicants for rights to such resources.

The Water Act regulates the procedures for granting permits for water abstraction and water use for the exploitation of shallow and deep geothermal resources, as well as the necessary measures to ensure that there is no contamination of groundwater and water surfaces, both in geothermal energy studies and during the operation of the installation. The relevant authorisation for prospection and exploration or exploration or concession for the extraction of deep geothermal resources has been linked to the Underground Natural Resources Act.

The Spatial Planning Act introduces a simplified procedure for amendments to general spatial plans, regulates the documents required for the issue of building permits and cases where such permission is not necessary for the implementation of projects for the use of shallow geothermal resources.

With regard to the requirements of Directive (EU) 2023/2413 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, efforts will be made to introduce efficient infrastructure in district heating and cooling systems to promote heating and cooling production from geothermal energy, other geothermal energy technologies.

14) *Drawing up and making available for use a manual of procedures for the construction or reconstruction of energy facilities and facilities for the production of energy from renewable sources*

ZEVI introduces an obligation for the Executive Director of the Agency for Sustainable Energy Development to develop a manual of procedures for the construction or reconstruction of energy facilities and facilities for the production of energy from renewable sources and to publish it on the Agency's website. The handbook should be made available

to the mayors of the municipalities. The administrative centres set up for each municipality provide the manual for the use of interested parties in an appropriate manner.

15) *Implementation of investments under the National Recovery and Resilience Plan of the Republic of Bulgaria (NRRP) under component 2.B.1 'Low carbon economy' related to the promotion of the use of energy from renewable sources and energy storage systems*

→ Investment C4.I4: Digital transformation of the electricity grid

The investment includes a comprehensive programme for the overall digital transformation of systems and processes of the Electricity System Operator covering the automated management of substations, upgrade of the supervisory control and data acquisition system (SCADA) with the introduction of remote back-up, extension and upgrade of telecommunication network, including comprehensive cybersecurity system and upgrade of the electricity markets administration systems.

As a result of these actions, the conditions and requirements for the technical feasibility of the electricity transmission system need to be fulfilled in order to integrate into the electricity system a cumulative new capacity of 4 500 MW for the production of electricity from renewable sources by 31 March 2026. Moreover, a cumulative additional net interconnection capacity of 1 200 MW with Romania and Greece will be made available to the market by 30 June 2025 compared to the existing available capacity.

The total budget of the investment is BGN 611 million, of which BGN 370 million are funds under the Recovery and Resilience Facility and BGN 241 million is financing.

The activities foreseen in the investment are being implemented with a deadline of 31 March 2026 for the implementation of the investment.

→ Investment 6 (C4.I6): "Support for new renewable electricity generation and electricity storage capacity"

The main objective of the investment is to contribute to increasing the share of clean energy in Bulgaria's energy mix on the path to climate neutrality by providing support for the construction and integration into the electricity grid of an additional 1 425 MW of solar and wind power generation capacity together with 350 MW local electricity storage facilities. Financial support will only be granted to energy storage systems.

Support is envisaged for a wide range of energy storage systems, including energy storage facilities at the point of consumption without going to the grid or to which there is a self-generation and sales system, energy storage facilities to an electricity producer and energy storage facilities as a self-consumption and generation site.

The total budget of the investment is BGN 2 billion, of which the grant under the Recovery and Resilience Facility is BGN 663 432 375. The funds will be made available on the basis of tenders.

→ Investment 2 (C4.I2) 'Renewable energy support to households'

The investment is expected to support at least 10 000 households with inefficient solid fuel heat sources to install the best solar equipment for domestic hot water and photovoltaic systems up to 10 kWp, including electricity storage systems.

The total budget allocated to the investment is BGN 240.00 million, while BGN 140 million is the grant provided under the Recovery and Resilience Facility and BGN 100 million is the national public and private co-financing.

→ Investment 5: (C4.I5) "Support scheme for pilot projects for the production of green hydrogen and biogas"

The scheme provides for the construction of 55 MW of electrolysers, the production of 7 800 tonnes of green hydrogen per year, the construction of infrastructure capable of transporting hydrogen and low-carbon gaseous fuels. The total planned budget for the investment is BGN 136.9 million (BGN 68.5 million charged to the Recovery and Resilience Facility and BGN 68.5 million private co-financing) with an implementation period of 2022-2026.

ii. Where relevant, specific measures for regional cooperation, as well as, as an option, the estimated excess production of energy from renewable sources which could be transferred to other Member States in order to achieve the national contribution and trajectories referred to in point 2.1.2

The implementation of the ambitious national renewable energy target for 2030 implies the use of the cooperation mechanisms provided for in Directive (EU) 2018/2001. In this respect, in case of surplus or scarcity of energy from renewable sources, Bulgaria will benefit from the statistical transfer mechanism.

Bulgaria considers as an opportunity to meet its national target for the share of energy from renewable sources in gross final energy consumption to be included in initiatives related to the implementation of joint projects with other Member States and/or third countries.

iii. Specific measures on financial support, where applicable, including Union support and the use of Union funds, for the promotion of the production and use of energy from renewable sources in electricity, heating and cooling, and transport

In order to stimulate a wider deployment of renewable energy, Union funds for the promotion and use of renewable energy for heating and cooling will be used.

The Renewable Energy, Energy Efficiency and Energy Security Programme, financed by the Financial Mechanism of the European Economic Area and having a total budget of nearly EUR 33 million will finance projects relating to the improvement of energy efficiency and the use of energy from renewable sources.

As a result of the implementation of these measures, projects for the production of electricity, heating and cooling from renewable sources are estimated at 46 000 MWh/year and annual CO2 emission$_{\text{reductions}}$ of 54 280 TCO 2.

In the period 2021-2030, Bulgaria will benefit from the investment support to be provided under the Modernisation Fund, considering the possibility of financing projects related to the production of electricity from renewable sources, improving energy efficiency, energy storage and modernising energy networks. The Fund will be established on the basis of Article 10d of Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, and Decision (EU) 2015/1814. In the period 2021-2030, 2 % of the total quantity of EU allowances will be auctioned and contributed to the Modernisation Fund pursuant to Article 10(1) of Directive (EU) 2018/410 of the European Parliament and of the Council amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, and Decision (EU) 2015/1814.

iv. Where applicable, an assessment of the support for electricity from renewable sources to be carried out by Member States pursuant to Article 6(4) of Directive (EU) 2018/2001

Not applicable

v. Specific measures to introduceone or more contact points, streamline administrative procedures, provide information and training, and facilitate the uptake of power purchase agreements

Summary of policies and measures under the enabling framework to be put in place by Member States in accordance with Article 21(6) and Article 22(5) of Directive (EU) 2018/2001 to promote and facilitate the development of self-sustaining renewable energy sources and renewable energy communities

The amendments adopted to the Renewable Sources Act provide for municipalities to act as contact points, with a deadline of up to 4 months from the entry into force of the Act (13 October 2023) for the mayors of municipalities to organise the activities of the administrative service centres.

To support the activities of the centres, SEDA will draw up a manual of procedures for the construction or reconstruction of energy facilities and facilities for the production of energy from renewable sources, in compliance with the requirements of the Spatial Planning Act, the Energy Act, this Act, the Environmental Protection Act, the Biological Diversity Act and their implementing regulations.

Ensuring the necessary information and adequate training is an important factor in promoting a wider penetration of renewable energy.

Support shall be given to regional development measures in these areas which encourage the exchange of best practices in renewable energy production between local and regional development initiatives, training programmes to strengthen regulatory, technical and financial expertise and to improve knowledge of available funding opportunities.

In order to achieve effective results in this direction, stakeholders and potential participants in the process of disseminating adequate information and conducting training procedures

have been identified. The relevant institutions and local authorities are particularly involved in these processes to carry out comprehensive initiatives on information campaigns, forums, awareness-raising programmes and training programmes for citizens on the benefits and opportunities of using energy from renewable sources. Information campaigns are addressed to citizens and allow them to learn about practical issues in the development and use of energy from renewable sources.

Information on the possibilities for the use of renewable energy sources is disseminated in the framework of the activities carried out by the relevant ministries and their executive agencies, including on implemented projects funded under international and European programmes.

In order to increase public awareness and interest in the use of energy from renewable sources, information shall be provided by equipment and system suppliers, by the competent authorities, on the net profit, cost and energy efficiency of equipment and systems for the use of electricity, heating and cooling from renewable sources. The information will be provided in an effective and easily accessible manner.

In application of Directive 2018/2001/EC on qualification for the installation and maintenance of biomass, solar photovoltaic, solar thermal, heat pumps and shallow geothermal systems and the publicity of related information, qualification schemes are carried out for installers of small-scale boilers and biomass equipment, solar photovoltaic and solar heating systems, low-depth geothermal systems and heat pumps.

The provision of public information on persons qualified to carry out the installation and maintenance activities of such facilities is organised.

vi. Assessment of the need to build new infrastructure for district heating and cooling derived from renewable sources

The assessment of the potential for using high-efficiency cogeneration from conventional fuels and renewable energy sources is based on the current annual heat consumption. The introduction of highly efficient technologies would be socially and economically justified over the next 10 years if the current heating systems were to be replaced, where technically and commercially possible. New district heating networks – and extensions to existing ones – are intended to meet the needs of public sector buildings and services not connected to district heating. This is expected to save 52 000 t CB_2 per year. One option is to exploit the potential of high-efficiency solutions such as gas-fired engines, small to large open or closed-loop gas turbines, biomass steam turbines, heat pumps, etc. The potential to increase the share of renewable energy in district heating and cooling systems offers the recovery of biomass with a focus on biomass from waste and residues from industrial and household plants, as well as geothermal energy. The energy efficiency potential of district heating and cooling infrastructure lies in the rehabilitation of heat transmission networks and the replacement of outdated direct district heating stations with modern high-efficiency automated indirect stations, which will reduce heat transmission and distribution losses and reduce CO_2 emissions.

The application of best practice solutions involving the use of pre-insulated pipes for district heating systems achieves heat loss reductions of up to 3 %. A similar level of loss [reduction] can be achieved for high-density power systems. In the context of prevailing conditions in Bulgaria, it is assumed that the average power density of district heating systems will allow heat loss reductions of up to 10 % to be achieved through the use of best available technology. The development of electricity production from high-efficiency cogeneration contributes to a decrease in the fuel used, the achievement of higher efficiency of electricity generation and better protection of the environment.

vii. If applicable, specific measures on the promotion of the use of energy from biomass, especially for new biomass mobilisation taking into account:

- *the availability of biomass resources, including sustainable biomass: both domestic potential and imports from third countries*
- *other uses of biomass in other sectors (agriculture and forestry sectors); as well as measures for the sustainability of biomass production and use*

Solid biomass is the most widely used renewable energy in the country, which is mainly used in the heating and cooling sector. The consumption of other biomass, including waste, remains negligible.

Combustion wood is the main type of biomass consumed in the country, with an increase in the use of wood waste and plant waste. The positive trend towards improving waste management practices is maintained, achieving national targets for municipal waste recycling, recovery and recycling of packaging waste and, last but not least, achieving the recycling targets for widespread waste. Biogas production from anaerobic fermentation of biomass and sewage sludge is not yet significant. Biogas is used for the production of electricity and heat, in agriculture and in the other sector.

In this context, the use of biomass for energy purposes has a wide potential for development. Efforts are focused on wider recovery of waste (municipal solid waste, sewage sludge, etc.) and residues from industrial plants, without having a negative impact on the health and quality of life of the population in the areas where biomass energy installations are located.

To be counted towards the targets to increase the share of energy from renewable sources, forest biomass, biofuels, bioliquids and biomass fuels are regulated requirements to minimise the risk of using biomass derived from unsustainable production. Regulatory requirements are also regulated for the sustainable production and consumption of biomass fuels when used for electricity and heat production from biomass with a total rated thermal input equal to or greater than 20 MW for solid biomass fuels and with a total rated thermal input equal to or greater than 2 MW for biomass fuels.

This ensures the use of wood meeting certain quality requirements. Regulation No 6 of 7.10.2019 of the Minister for Agriculture, Food and Forestry on the requirements and

control of wood used for domestic heating has been developed and adopted (published in State Gazette No 81/15.10.2019, in force since 15.10.2019).

3.1.3. Other elements of the dimension

i. Where applicable, national policies and measures affecting the EU ETS sector and assessment of the complementarity and impacts on the EU ETS

Bulgaria will make use of the possibility of allocating greenhouse gas emission allowances free of charge to installations for electricity production in the period 2021-2030 for the modernisation of the energy sector in accordance with Article 10c of Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments and Decision (EU) 2015/1814.

Envisages the development of:

- Selection criteria for projects with a total planned investment of less than EUR 12.5 million, on the basis of which a list of investments financed through free allocation of GHG emission allowances in the period 2030-2021 will be established.
- Rules for competitive bidding for the selection of projects with a total planned investment above EUR 12.5 million to be financed through free allocation of greenhouse gas emission allowances in the period 2021-2030.
- Changes to the Energy Act.

ii. Policies and measures to achieve other national targets, where applicable

Not applicable

iii. Policies and measures to achieve low-emission mobility (including electrification of transport)

One of the main priorities of national transport policy is the development of rail transport. It is one of the most sustainable and safe modes of transport. By 2030, the construction and modernisation of railway infrastructure will continue, railway connections with airports, development of nodes, reconstruction of key station complexes as well as intermodal terminals. The deployment of the European Rail Traffic Management System (ERTMS) on railways will continue.

The National Recovery and Resilience Plan (NRRP) provides for the supply and maintenance of railway rolling stock (35 single-storey electric multiple units, 7 double-deck electric multiple units, 20 'push – pull' single-storey electric trains and 18 electric shunting locomotives); supply of on-board equipment for 108 electric locomotives and multiple units; construction of an Intermodal Terminal in Ruse and deployment of ERTMS Level 2 in the Ruse – Kaspichan section.

The extension of the Sofia Metro will also continue.

iv. Where applicable, national policies, timelines and measures planned to phase out energy subsidies, in particular for fossil fuels

Not applicable

3.2. Dimension energy efficiency

Planned policies, measures and programmes to achieve the indicative national energy efficiency target for 2030 as well as other objectives presented in 2.2, including planned measures and instruments (also of financial nature) to promote the energy performance of buildings, in particular as regards the following:

i. EE obligation schemes and alternative measures under Articles 7a and 7b of Directive 2012/27/EU [version amended in accordance with proposal COM (2016) 761] (to be drawn up in accordance with Annex II))

1) Setting the overall cumulative target by 2030

In order to support the achievement of the national energy efficiency target and to meet the requirements of Articles 8, 9 and 10 of Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2 023 on energy efficiency and amending Regulation (EU) 2023/955 (recast), Bulgaria introduced:

- Energy savings obligation scheme and
- Alternative measures,

to ensure the achievement of the overall cumulative energy end-use energy savings target by 31 December 2030.

The overall cumulative target for the period from 2021 to 2030 was set in compliance with the requirements of Directive 2023/1791 and amounted to 6 227.39 ktoe. Data on average energy sales to final consumers for the period 2016-2 018 are presented in the following table.

Table 8: Average final energy consumption 2016-2018, ktoe

	2016	2017	2018
Final energy consumption	9 649.4	9 896.5	9 921.3
Average consumption 2016-2018	9 822.4		

The distribution of the total cumulative target per year for the period from 2021 to 2030 complies with the requirement of Article 8. 1 (b) the cumulative end-use energy savings shall be at least equal to:

- 0.8 % of annual final energy consumption from 1 January 2021 to 31 December 2023, averaged over the most recent three-year period preceding 1 January 2019;
- 1.3 % of annual final energy consumption from 1 January 2024 to 31 December 2025, averaged over the most recent three-year period preceding 1 January 2019;
- 1.5 % of annual final energy consumption from 1 January 2026 to 31 December 2027, averaged over the most recent three-year period preceding 1 January 2019;
- 1.9 % of annual final energy consumption from 1 January 2028 to 31 December 2030, averaged over the most recent three-year period preceding 1 January 2019.

Table 9: Breakdown of the total cumulative target by year 2021-2030, ktoe

Year	Annual energy savings in final consumption										Total
2021	78.58										78.58
2022	78.58	78.58									157.16
2023	78.58	78.58	78.58								235.74
2024	78.58	78.58	78.58	127.69							363.43
2025	78.58	78.58	78.58	127.69	127.69						491.12
2026	78.58	78.58	78.58	127.69	127.69	147.34					638.46
2027	78.58	78.58	78.58	127.69	127.69	147.34	147.34				785.79
2028	78.58	78.58	78.58	127.69	127.69	147.34	147.34	186.63			972.42

2029	78.58	78.58	78.58	127.69	127.69	147.34	147.34	186.63	186.63		1 159.04
2030	78.58	78.58	78.58	127.69	127.69	147.34	147.34	186.63	186.63	186.63	1 345.67
Total cumulative savings 2021-2030											6 227.39

Energy efficiency obligation scheme up to 2030

To support the achievement of the national energy efficiency target by 31 December 2030, an energy savings obligation scheme and alternative measures are in place to ensure the achievement of an overall cumulative final energy consumption energy savings target for the period from 1 January 2021 to 31 December 2030.

The difference between the total cumulative target and the estimated energy savings from the application of the alternative measures shall be divided as individual energy savings targets between the following taxable persons operating on the territory of the Republic of Bulgaria:

1. End suppliers, suppliers of last resort, traders with a license for trading in electricity which sell more than 20 GWh of electricity per year to final customers;
2. Heat transmission companies and heat suppliers which sell more than 20 GWh of heat per year to final customers;
3. End suppliers and natural gas traders which sell more than 1 million cubic metres per year;
4. Liquid fuel traders which sell more than 2 000 tonnes of liquid fuel per year to final customers;
5. Liquid fuel traders which sell more than 13 tonnes of solid fuels per year to final customers.

The expected new annual energy savings in final energy consumption achieved through the obligation scheme broken down by year are:

11.85 ktoe/year (2023-2024)

20.43 ktoe/year for 2025

23.57 ktoe/year (2026-2027)

29.86 ktoe/year (2028-2030)

Alternative measures

1) Alternative measure 1

Funds for energy efficiency and renewable measures under programmes (Environment Programme 2021-2027, Competitiveness and Innovation in Enterprise Programme 2021-2027, Regional Development Programme 2021-2027 and Transport Connectivity Programme)

1.1 environment Programme 2021-2027

The Managing Authority for the Environment Programme 2021-2027 (PIC) is the Directorate-General for the Operational Programme Environment of the Ministry of Environment and Water.

The programme shall promote the alignment of interventions that will be supported with the objectives of the European Green Deal and the transition to climate neutrality and, in particular, the transition to a circular and resource-efficient economy. One of the priorities with a direct energy saving effect is 'For cleaner air', which supports the transition to green heating of households by replacing inefficient heating appliances with efficient ones.

1.2 competitiveness and Innovation in Enterprises Programme 2027-2021 Managing Authority of the Competitiveness and Innovation in Enterprises Programme 2027-2021 (EIP) is the Directorate-General for European Funds for Competitiveness of the Ministry of Innovation and Growth.

The programme foresees support for activities aimed at implementing energy efficiency measures in enterprises based on recommendations from an energy audit (energy audit): introduction and certification of energy management systems and introduction of systems for monitoring and control of energy consumption.

1.3 regional Development Programme 2021-2027

Managing Authority for the Regional Development Programme 2027-2021 (RDP) – Directorate-General for Strategic Planning and Programmes for Regional Development at the Ministry of Regional Development and Public Works. The programme provides support for energy efficiency improvement measures in residential and public buildings, including student and student hostels: awareness-raising campaigns and all types of energy efficiency measures in buildings, including structural (and seismic) reinforcements, heating and air conditioning systems, integrated on-site renewable energy installations, electric vehicle charging equipment, digitalisation of buildings, green infrastructure, etc. The improved energy efficiency of the building stock will lead to lower energy consumption, which also contributes to reducing air pollutant emissions. To improve housing conditions and the energy performance of buildings, the PRD will support the renovation of the building stock in line with the Long-term National Strategy to support the renovation of the national stock of residential and non-residential buildings by 2050 by providing more than 3 % of the total financial resources needed for the renovation of the building stock and energy efficiency investments, which is expected to achieve 10 % of the targets set for reducing annual energy consumption by 2030 under the INECP.

1.4 transport Connectivity Programme

The Managing Authority of the Transport Connectivity Programme 2021-2027 (PTS) is the Coordination of Programmes and Projects Directorate of the Ministry of Transport and Communications.

The PTS include measures for intermodality in urban environments and the construction of charging stations for electric vehicles on the national road network. The Transport Connectivity Programme provides funds of BGN 92 million for recharging infrastructure for alternative fuels on the national road network and in ports. The aim is to encourage the phase-out of high-emission cars and their replacement by electric cars.

Measures are also foreseen to increase the energy efficiency of public spaces, the introduction of smart modern systems for the management of passive and active heating, air conditioning, lighting, information, etc.

Table 10:

Type of policy measure	**Financial instrument**
Short description of the political measure	The operational programmes are co-financed by the European Union through the European Regional Development Fund and the state budget of the Republic of Bulgaria. The grant intensity is between 50 and 100 %.
Planned or estimated budget	The estimated budget for the two programmes for the period 2021-2030 is BGN 1 398.579 million.
Expected cumulative savings in final consumption	712.32 ktoe
Expected new annual energy savings in final energy consumption	11.31 ktoe/year (2021-2022) 12.12 ktoe/year (2023-2024) 15.03 ktoe/year (2025-2030)
Implementation of public authorities, parties involved or entrusted and their responsibilities for implementing the policy measure	Managing Authority of the Environment Programme – General Directorate for the Operational Programme Environment at the Ministry of Environment and Water Managing Authority of the Competitiveness and Innovation in Enterprises Programme – Directorate-General for European Funds for Competitiveness under the Ministry of Innovation and Growth Managing Authority of the Regional Development Programme 2021-2027 – Directorate-General for Strategic Planning and Regional Development Programmes at the Ministry of Regional Development and Public Works Managing authority of the Transport Connectivity Programme 2021-2027 – Coordination of Programmes and Projects Directorate of the Ministry of Transport and Communications
Sectors targeted	Households, Industry, Services.

(2) alternative measure 2

Introduction of a National Energy Efficiency Financing Mechanism – National Decarbonisation Fund

Table 11:

Type of policy measure	**National decarbonisation fund (NDF)**
Short description of the political measure	The creation of a National Decarbonisation Fund (NDF) is envisaged as the main financial scheme to support the renovation of the building stock in Bulgaria. The Fund will adapt financial instruments or structure additional ones when identified as necessary, referring to the same possible sources and appropriate funding schemes in order to dynamically address barriers to energy efficiency improvement. The establishment of the NDF is also included as one of the main reforms in the Green Bulgaria part of the National Recovery and Resilience Plan of the Republic of Bulgaria – C4.R1: "Establishment of a National Decarbonisation Fund". For the successful implementation of Reform C4.R1: "Establishment of a National Decarbonisation Fund" by Protocol Decision No 52 of 14.12.2022 of the Council of Ministers agreed to take the necessary action in relation to the transformation of the Energy Efficiency and Renewable Sources Fund into a National Decarbonisation Fund through an amendment to the Energy Efficiency Act. The objectives of the Facility correspond to the objectives of European financial institutions to increase access to competitive finance by: • Supporting the process of mobilising private finance, and • Support the effective use of grants. The national mechanism provides for funding through various mechanisms and financial instruments, including credit lines, guarantees or a combination thereof, etc. The NEFF also provides for technical assistance to energy efficiency projects. It is envisaged that both comprehensive measures will be financed and appropriate instruments will be developed to finance single energy efficiency measures. Support will be targeted at different sectors, such as: • Energy efficiency in industry; • Energy efficiency in Transport and Infrastructure; • Energy efficiency in the public sector • Energy efficiency of residential and non-residential buildings. The necessary financial resources are foreseen to come from different sources, including the European Structural and Investment Funds, the European Investment Bank, the European Bank for Reconstruction and Development, the InvestEU Just Transition Fund, etc. The involvement of local banks and international financial institutions in this financial initiative is a key component for success in the implementation of the Facility, as their involvement can significantly simplify the lending process.
Planned or estimated budget	The estimated budget of the measure for the period 2021-2030 is BGN 7 800 million.
Expected cumulative energy savings in final energy consumption	2 948.02 ktoe
Expected new annual energy savings in final energy consumption	46.8 ktoe/year (2021-2022) 50.1 ktoe/year (2023-2024)

	62.3 ktoe/year (2025-2030)
Sectors targeted	Households, Industry, Services, Transport

(3) alternative measure 3

National Recovery and Resilience Plan of the Republic of Bulgaria (RRP)

Investment 3: Energy efficient municipal outdoor artificial lighting systems

The objective of the investment is to increase energy efficiency, reduce energy costs for outdoor artificial lighting and improve living conditions for the population in the country through technological renewal and modernisation of outdoor artificial lighting systems. The total amount of aid granted to the final recipients is foreseen to amount to 50 % of the project value, with the remaining 50 % being provided to the project in the form of an interest-free loan to be repaid over a 5-year period of contributions to the National Decarbonisation Fund, after its institutionalisation. The total planned resource is BGN 180.0 million, of which BGN 149.0 million from the Recovery and Resilience Facility and BGN 31 million in national co-financing in the form of VAT expenditure, with an implementation period of 2025-2022.

The expected cumulative energy savings for the period 2021-2 030 are 71.11 ktoe. The distribution of the new annual savings is as follows: 5.13 ktoe/year for 2024 and 5.87 ktoe/year for 2025

4) Alternative measure 4

National Recovery and Resilience Plan of the Republic of Bulgaria

Investment 1: Energy efficiency of building stock

The measure provides for the implementation of three energy efficiency components. A mandatory requirement after the implementation of the measures under all components is to achieve primary energy savings of 30 % for each site and the energy parameters achieved are assessed on the basis of an energy audit report.

Under the first component, energy efficiency improvement measures in the country's residential building stock are foreseen to be financed.

The Recovery and Resilience Plan of the Republic of Bulgaria, approved by Council Implementing Decision ST 8091/22 of 4.5.2022, provides for funding for the renovation of multi-apartment buildings through the sub-measure 'Support for sustainable energy renovation of the residential building stock' under investment C4.I1 'Support for renovation of the building stock'. In order to implement the investment, it is envisaged to introduce a degressive financial aid model for the renovation of multi-apartment buildings in co-ownership, divided into two application stages. For phase 1 of application – submission of a 'proposal to implement the investment' by 31 May 2023, a grant rate of 100 % is foreseen

for all eligible activities. For phase 2, the application period runs from June 2023 to January 2024, with a grant of 80 % for the renovation activities and 20 % participation of associations.

The focus of the investment sub-measure is on multi-apartment buildings throughout the country. Following the objective set out in the Long-term national strategy to support the renovation of the national stock of residential and non-residential buildings (with a 2050 horizon) of renovating more than 19 million m² of residential space by 2030, the investment supports a cost-effective renovation of buildings that achieves a minimum energy class B and at least 30 % primary energy savings for renovated buildings. The following results are expected to be achieved from the implementation of the sub-measure:

- 3 688 900 m² of improved floor area in multi-apartment buildings;
- 405 GWh/year reduction in primary energy consumption;
- 79 ktCO_2/reduction of greenhouse gas emissions (kilotonnes of $CO_{2\text{-eq}}$);
- Achieving a minimum of 30 % primary energy savings for each building while respecting the 'do no significant harm' principle (2021/C58/01 within the meaning of Article 17 of Regulation (EU) 2020/852);
- Reaching energy consumption class B or a higher class for each building subject to intervention following the implementation of energy-saving measures;
- Contribution to the objectives of the Long-term national strategy to support the renovation of the national stock of residential and non-residential buildings by 2050, by 2030;
- Ensuring better air quality, living conditions and working environments in line with sustainable development criteria;
- Improve performance to extend the lifespan of buildings.

The activities under the sub-measure are carried out throughout the country, in 28 districts and 265 municipalities. The allocation of funds is based on a selection procedure for proposals for the implementation of the investment, the evaluation criteria being related to the amount of primary energy and carbon savings, the number of self-contained sites in the applicant building, the efficiency of the energy efficiency investment, the level of commitment of the members of the condominium, etc.

The financing agreed for the implementation of the sub-measure 'Support for sustainable energy renovation of residential building stock' is up to a maximum of BGN 1 189 503 129.00 under the Recovery and Resilience Facility under the National Recovery and Resilience Plan of the Republic of Bulgaria and up to BGN 236 226 509.00 of national public funding for non-recoverable tax under the Value Added Tax Act, due for the implementation of the activities under the sub-measure.

To date, project proposals BG-RRP-4.023 'Support for sustainable energy renovation of residential building stock – phase I' and BG-RRP-4.024 'Support for sustainable energy renovation of the residential building stock – phase II' have been announced. The

evaluation of the project proposals has not been completed and no grant agreements have been concluded. Once the grant agreements have been concluded, it will be possible to provide information on the expected savings of primary non-renewable energy and greenhouse gas emission reductions.

The second and third components provide for financing the energy renovation of non-residential buildings, including public buildings and buildings in the areas of manufacturing, commerce and services, as well as buildings from the tourism sector. The eligible beneficiaries under the third component cover micro/small, medium and large enterprises throughout the country, with a maximum grant intensity of 50 %. The planned resource is 617.7 million at the expense of the RRF, complemented by national and private co-financing.

Application procedures have been announced with project proposals:

— BG-RRP-4.020 Support for sustainable energy renovation of public buildings for administrative services, culture and sport. Covers energy renovation measures for state and municipal administrative services, cultural and artistic public service buildings and sports buildings. The procedure is under assessment;

— BG-RRP-4.021 – Support for energy renovation of buildings in the production, trade and services- measures for the energy renovation of buildings in manufacturing, trade and services, including buildings belonging to the tourism sector. The procedure is in the process of applying with project proposals;

— BG-RRP-4.022 Enhancing energy efficiency in public buildings of the Bulgarian Academy of Sciences. Energy renovation of part of the building stock owned by the Bulgarian Academy of Sciences. The procedure is in the process of applying with project proposals;

The expected cumulative energy savings for the period 2021-2 030 are 243.68 ktoe. The distribution of the new annual savings is as follows: 7.10 ktoe/year for 2023 and 10.38 ktoe/year for the period 2024-2026

5) Alternative measure 5

National programme for energy efficiency in multi-apartment buildings

In 2015, the Bulgarian government adopted a National Programme for Energy Efficiency in Multifamily Residential Buildings (NPEEZhS) aimed at renovating multi-apartment buildings through the implementation of energy efficiency measures.

The main objective of the Programme is to ensure, by implementing energy efficiency measures, better living conditions for citizens in multi-apartment buildings, thermal comfort and a higher quality of living environment. The Programme provides financial and organisational support to owners' associations registered under the Condominium Management Act in multi-apartment buildings to improve the energy efficiency of the buildings in which they live.

Aid and support shall be granted to owners' associations whose buildings comply with the defined eligibility criteria. Owners' associations apply to the municipality for financial support. The selection criteria shall provide that all eligible applicants receive 100 % grants and organisational support for the implementation of renewal until the financial resources allocated under the Programme are exhausted.

Municipalities receive documents for application, evaluation, approval, monitoring of the implementation of energy efficiency measures in buildings. The mayor of each municipality is responsible for carrying out the entire process of renovating residential buildings on its territory and for selecting contractors under the Public Procurement Act to carry out the individual building activities.

All 265 municipalities on the territory of the Republic of Bulgaria are eligible for participation under the Programme, and activities are carried out within 143 municipalities.

The programme is implemented with a financial resource of BGN 2 billion – national funds, part of which was obtained from loans from the Bulgarian Development Bank with state guarantees. Subject to additional resources, the financial resources of the Programme may be increased.

In addition, nearly BGN 92 million will be available for the completion of 52 buildings whose completion has not reached a resource under the budget of the MRDPW.

Following the implementation of the renovation measures for all buildings under the NREMJS, the following results are expected:

Table 12:

PERFORMANCE INDICATORS *(classification code and name of the budget programme)*	**Target value**			
Performance indicators	**Measurement unit**	***Project 2024***	***Forecast 2025***	***Forecast 2026***
1. Buildings put into service following implementation of NEPEMJS measures (*)	**number**	1970		Completion of the implementation of the NEEMJS
2. Buildings commissioned following the implementation of measures financed by budgetary transfer to municipalities (* *)	**number**		52	
3. Improved housing infrastructure for 1970 NEPMJS buildings (*)	**m² of PHR**	11 151 384		
4. Improved housing infrastructure following implementation of measures financed by budgetary transfer to municipalities (* *)	**m² of PHR**		389 891	

6. Estimated energy savings from renovated residential buildings – per year for 2022 buildings, NEPJS (* * *)	**MWh/y**		975 226	
7. Estimated annual greenhouse gas emissions savings (CO_2 and equivalent) – 2022 NEEAG buildings (* * *)	**$ktCO_2/y$**		327	

ii. Long-term renovation strategy to support the renovation of the national stock of residential and non-residential buildings, both public and private, including policies, measures and actions to stimulate cost-effective deep renovation and policies and actions to target the worst performing segments of the national building stock, in accordance with Article 2a of Directive 2010/31/EU

To achieve a highly energy efficient and decarbonised building stock, a long-term national strategy has been developed to support the renovation of the national stock of residential and non-residential buildings by 2050 (the Strategy). The Strategy aims to substantially contribute to the achievement of an energy-efficient and decarbonised building sector by 2050 by renovating the national stock of residential and non-residential buildings and supporting the modernisation of all buildings with smart technologies.

The strategy foresees the renovation of 60 % of the residential building stock and close to 17 % of the non-residential building stock by 7 329, leading to energy savings of 2 050 GWh/. Energy savings are expected to reduce greenhouse gas emissions by 3 274 453 tonnes of CO 2. In addition to saving energy and reducing CO_2 emissions, the implementation of the Strategy will lead to the creation and maintenance of 17 600 new jobs and an additional annual GDP growth of BGN 557 million by 2030 for the period 2021-2030.

The strategy envisages measures to build new buildings and transform existing buildings into nearly zero-energy buildings, improve the energy performance of residential and non-residential buildings and promote the introduction of smart technologies in the building sector.

The creation of a national decarbonisation fund is envisaged as the main financial scheme in support of the Strategy. The Fund is intended to consist of three separate sub-funds, according to the type of final beneficiaries: A public sector sub-fund, a commercial sub-fund and a sub-fund of residential buildings.

The Strategy sets out a roadmap setting out the milestones of the renovation process of the Republic of Bulgaria's building stock for the following periods: 2021-2030, 2031-2040 and 2041-2050

Table 13

Indicator		2021-2030	2031-2040	2041-2050

Total energy savings	**GWh/y**	**2 917**	**6 502**	**7 329**
Residential buildings	GWh/y	2477	5694	6294
Non-residential buildings	GWh/y	440	808	1035
Renovated area	**m²**	**22 203 509**	**49 570 668**	**55 823 015**
Residential buildings	m²	19 026 656	43 735 175	48 343 297
Non-residential buildings	m²	3 176 852	5 835 493	7 479 718
Renovated area of existing housing stock	%	8 %	18 %	20 %
Saving CO2 emissions	**tone**	**1 306 435**	**2 891 610**	**3 274 453**
Residential buildings	tone	1 065 184	2 448 461	2 706 441
Non-residential buildings	tone	241 251	443 149	568 012

iii. Description of the policy and measures to promote energy services in the public sector and measures to remove regulatory and non-regulatory barriers that hinder the uptake of energy performance contracting and other energy efficiency service models

Theprovision of energy efficient services is regulated by the Energy Efficiency Act. According to the Energy Efficiency Act, energy-efficient services aim at combining the supply of energy with energy-efficient technology and/or with an action that covers the operation, maintenance and management necessary to provide the service and lead to verifiable, measurable or estimable energy efficiency gains and/or primary energy resource savings. Energy efficient services shall be provided on the basis of written contracts concluded with final energy consumers. The Energy Efficiency Act also defines persons who may provide energy-efficient services – natural or legal persons – traders within the meaning of the Commerce Act or within the meaning of the legislation of a Member State of the European Union or of another State party to the Agreement on the European Economic Area.

The implementation of performance contracts (ESCOs) has an essential role to play in stimulating the energy efficient services market. Under these contracts, the reimbursement of the investments made and the payment of the remuneration due to suppliers (ESCOs) are carried out at the expense of the energy savings achieved. They provide a guarantee of their performance or the savings that will be made after the implementation of the project.

Bulgaria has adopted the European Code of Professional for Performance Contracts. The Code was established as part of the project "Enhancing the transparency of energy services markets (Transparense)", funded by the EC under the Intelligent Energy for Europe Programme. It is a set of values and principles necessary for the successful preparation and implementation of ESCO-contract projects in European countries and sets out the

principles of conduct of contract providers in particular. The two European ESCO associations (eu.ESCO and EFIEES) have formally approved the Code and support its implementation. The documents relating to the Code can be found on the website of the National Administrator of the Code.

A project funded under the Operational Programme "Innovation and Competitiveness" 2020-2014 developed a standard ESCO contract for the industry sector, guidelines for the preparation of ESCO contracts in order to facilitate the contracting parties to an ESCO contract with a minimum set of standard clauses. The model contract was accompanied by a model contract, together with a methodology for assessing the energy saved under the ESCO contract, an indicative bill of quantities and a repayment schedule. All the documents produced are published on the SEDA website.

In order to promote energy-efficient services with changes to the Energy Efficiency Act, the possibility of collecting and reimbursing the cost of energy efficient services provided to final customers through the energy or natural gas supplier is regulated.

iv. Other planned policies, measures and programmes to achieve the indicative national energy efficiency contributions for 2030 as well as the other targets referred to in point 2.2 (such as measures to encourage public buildings to lead by example in energy-efficient public procurement, measures to promote energy audits and energy management systems, consumer information and training measures and other measures to promote energy efficiency)

Under Component 8 'Sustainable Transport' of the NRRP, Investment C8.I7 'Green mobility – pilot scheme to support sustainable urban mobility', procedure BG-RRP-8.013 'Green mobility' – Measures to support sustainable urban mobility by developing environmentally friendly, safe, functional and energy-efficient transport systems; creating less energy-consuming public transport, which will save public resources; effective urban-rural connectivity, through partnerships with projects/priorities identified in Integrated Municipal Development Plans (IPDPs) and in the Integrated Territorial Development Strategies for NUTS 2 regions, as well as compliance with Sustainable Urban Mobility Plans (integrated in PEAR or updated in line with PEAR). The procedure is in the process of applying for project proposals.

To date (2023), the procedures closed for applications are subject to an evaluation of the project proposals received. Contracts are to be concluded and implemented in accordance with the ex ante conditionalities of the procedures. The aim is to achieve the indicators and results underlying investments and the contribution of their implementation to the objectives of the NRRPs.

To achieve the national 2030 energy efficiency targets, existing as well as additional policies and measures will be implemented:

- **Encouraging public buildings to lead by example**

According to the provisions of Directive 2010/31/EU and Directive 2012/27/EU, public authorities at national, regional and local level should lead by example with regard to energy efficiency. In this connection, the Republic of Bulgaria has set a more ambitious objective for the renovation of buildings owned and occupied by the central administration, as the legal requirement laid down in Article 23 (1) of the Energy Efficiency Act is that all heated and/or cooled State-owned buildings used by the public administration must take measures to improve the energy performance of at least 5 % of the total PRR on an annual basis. The rationale for imposing a more ambitious target is not only the need to reduce energy consumption in buildings due to its long-term impact, but also the stimulating role of buildings owned by public authorities, as they represent a significant share of the building stock and have a high degree of visibility in public life.

In addition, the following measures will be taken to support the objectives of achieving a highly efficient and decarbonised building stock:

- Periodic review of minimum energy performance requirements for buildings using cost-optimal use and harmonisation of technical requirements for the design, construction and operation of stable, healthy, high-tech and energy-efficient buildings complying with European standards and legislation in this field. Improvement of the lifecycle of buildings for the period 2015-2030;
- Research on energy efficiency in buildings, through applied research to provide a scientific basis for building energy efficiency standards, for the period 2015-2030;
- Improving the conditions for inclusion in construction activities of products ensuring the fulfilment of the essential requirements under Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2 011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC Text with EEA relevance and Regulation (EU) 2019/515 of the European Parliament and of the Council of 19 March 2 019 on the mutual recognition of goods lawfully marketed in another Member State, and repealing Regulation (EC) No 764/2008. Development of national requirements for construction products harmonised with European technical legislation, including energy saving and heat storage, sustainable use of natural resources, recycling and reuse of construction products, for the period 2015-2030;
- Improving the functionality of the Construction Product Contact Point (CCCP) under Regulation (EU) No 305/2011 and Regulation (EU) 2019/515 and improving the conditions for the free movement of construction products by upgrading and maintaining the CCSP information platform, in the period 2030-2015;
- Launch and implement the digital reform of the Bulgarian construction sector, in the period 2021-2030:

- Implementation of the National Strategy for the Digitalisation of the Construction Sector with a horizon of 2030 and a roadmap for its implementation, approved by Council of Ministers Decision No 270 of 6.4.2023. The vision of the National Strategy and its roadmap is linked to achieving the transformation of the construction sector through a new generation of digital technologies into a resource-efficient economic sector and enabling digitalisation and management of the built environment to achieve European and national environmental protection and climate neutrality objectives;
- Introduction of building information modelling or BIM at national level. BIM is a methodology that includes new and technological ways of designing, constructing, operating and managing buildings, software products, coordination between actors involved in the construction process, data exchange and building information management. It is a methodology that contributes to achieving a digital transformation for the construction sector and provides the necessary information and digital environment to manage the built environment, as a prerequisite for achieving European and national climate targets;
- Implementation of Investment C10.I6 "Support for a pilot phase for the introduction of Building Information Modelling (BIM) in investment design and construction as a basis for digital reform of the construction sector in Bulgaria" under the National Recovery and Resilience Plan. The investment is a pilot phase aimed at increasing preparedness for the introduction of BIM in investment design and construction in Bulgaria, creating regulatory conditions and ~~IT~~ infrastructure for the implementation of BIM when designing, approving, implementing, controlling and operating construction works. The investment will contribute to modernising the construction sector in line with European priorities, enabling long-term and sustainable development through the deployment of means to automate approval and control processes using BIM capabilities. Optimising the design process will have the long-term effect of increasing the quality of construction, reducing the cost of construction products, reducing energy consumption, protecting the environment and increasing quality of life. The implementation of the investment will also contribute to improving the efficiency of government and the quality of public services in the construction sector, as well as preparing the administration at central and regional level to implement the reform of the construction sector, increasing the capacity of design and construction actors.

- Renovation of the existing building stock to the level of optimised energy consumption with a view to reaching the nearly zero-energy building standards for the period 2021-2030;

- Implement the optional common Union scheme to determine the smart readiness of buildings for energy efficiency and adapt the methodology established by the EC for its calculation, taking into account national specificities, including an assessment of existing national certification schemes for the energy performance of buildings, in the period 2021-2030;
- Increasing the capacity and expanding the operation of the National Council of Experts to promote and coordinate the increase in the number of nearly zero-energy buildings in an efficient manner, in the period 2030-2021.

- **Energy-efficient public procurement**

Under Article 30a of the Energy Efficiency Act, when conducting public procurement procedures, public contracting entities purchase only products, services and buildings with high energy efficiency performance, including:

1. Products meeting the criterion of belonging to the highest possible energy efficiency class;
2. Office equipment designated and complying with Annex B of the Agreement between the Government of the United States of America and the European Union on the coordination of energy-efficiency labelling programmes for office equipment (OJ L 63/7 of 6 March 2013);
3. Tyres that meet the criterion of the highest fuel energy efficiency class as defined in Regulation (EC) No 1222/2009 of the European Parliament and of the Council of 25 November 2009 on the labelling of tyres with respect to fuel efficiency and other essential parameters (OJ L 342/46 of 22 December 2009), hereinafter referred to as 'Regulation (EC) No 1222/2009';
4. Buildings that comply with minimum energy performance requirements attested by an energy performance certificate.

- **Energy audits and management systems**

The following enterprises shall be subject to the mandatory energy audit:

- Production enterprises which are not small and medium-sized within the meaning of Art. 3 of the Small and Medium-Sized Enterprises Act;
- Enterprises, which provide services which are not small and medium-sized within the meaning of Art. 3 of the Small and Medium-Sized Enterprises Act;
- Industrial Systems (IP) with an annual energy consumption of more than 3 000 MWh;
- Outdoor artificial lighting systems located in a settlements with a population exceeding 20 000 inhabitants.

The survey shall be carried out at least once every 4 years.

Undertakings and vehicle owners that implement an energy or environmental management system subject to certification by an independent body of compliance with European or international standards shall be exempted from mandatory energy audits, provided that the management system they operate includes an energy audit of the undertaking or industrial system concerned.

The implementation of an energy or environmental management system and evidence that the management system they have implemented meets the minimum requirements for energy audits shall be provided to the SEDA within one month of obtaining the certificate.

Business owners, vehicle and outdoor artificial lighting systems are obliged to perform energy efficiency management. Energy efficiency management is carried out by maintaining databases on monthly production and consumption by type of energy, producing analyses of energy consumption on an annual basis, as well as implementing other measures that lead to energy savings. For energy efficiency management, obligated parties shall draw up annual reports using a template prepared by the SEDA, which shall be submitted to the Agency no later than 1 March of the year following the reporting year.

Bulgaria has put in place a system for energy audits and certification of buildings in operation with a total floor area above 250 m^2, implementing the provisions of Directive 2010/31/EU. The energy performance certificate of a building in operation shall be updated when the following activities are carried out, leading to a change in the energy performance of the building:

- Conversion;
- Reconstruction, major renovation or major renovation where more than 25 % of the surface area of the envelope and building elements is covered.

Owners of buildings above 250 m^2 shall comply with the measures to reach the minimum required energy consumption class prescribed by the first audit within three years of the date of adoption of the results of the audit.

Owners of public service buildings – state and municipal administrations – are obliged to carry out energy efficiency management. Management is carried out through the implementation of programmes, activities and measures to increase energy efficiency and the annual preparation of analyses of energy consumption. In order to manage energy efficiency, building owners, like business owners, also prepare and send annual reports to the SEDA according to a template.

- **Reporting and invoicing**

Electricity accounting

According to the provisions of the Energy Act, electricity supplied to final customers is measured using commercial metering devices owned by the electricity transmission system operator or the operator of the respective distribution system, located up to or at the border of the customer's property. Electricity users do not pay a charge for commercial metering.

The design of the electricity market and the conditions for participation in the electricity market are laid down in the Electricity Trading Rules issued bythe KEVR.

Heat accounting

One of the main means of accounting for heat consumed by households is the thermal accounting system introduced in Bulgaria in 1 999 in the Energy Act, as one of the energy efficiency measures laid down in the conditions for Bulgaria's accession to the EU. Thanks to allocators (allocators, water meters, apartment heat meters), the total energy for the heating and heating of water may be shared between individual properties. The share distribution of thermal energy in a building in co-ownership is carried out in accordance with the methodology set out in Annex to Regulation No E-RD-04-1 of 12.3.2020 on heat supply. Our substations are equipped with heat meters, which are recorded at the end of each month. The reported heat is allocated to customers on the basis of the consumption of each property from the previous heating season, and the district heating company sends the customers invoices showing these data each month. After reading the meter readings at the end of the heating season, the heat accountant shall draw up a regularisation account. It is calculated on the basis of actual consumption for each individual property.

As a result of the introduction of this measure, individual heat distributors and appliances have been installed to practically all heating units.

With regard to the availability of a common heating system and a domestic hot water system in most buildings, legislation provides, in addition to transparency and accuracy of individual consumption accounting, transparent rules for the allocation of heat and hot water consumption costs in multi-apartment buildings supplied from a central heating source.

Customers are connected to the heat transmission network by means of a connecting heating main and a subscriber sub-station. When a new building is connected to each individual property in the building, a competitively priced individual heat meter is installed. When an existing building is connected, after major renovation and processing of building heating systems from vertical to horizontal distribution, a competitively priced individual heat meter shall be installed in each individual property in the building.

Article 9c(1) of Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2 018 amending Directive 2012/27/EU on energy efficiency (Directive 2018/2002) provides that meters or heat cost allocators installed after 25 October 2 020 are remotely readable devices.

Article 9c(2) of Directive 2018/2002 provides that, by 1 January 2027, meters and heat cost allocators already installed but not remotely readable must either be refurbished so that they can be remotely readable or replaced by remotely readable devices, unless the Member State concerned demonstrates that this is not cost-effective.

The Directive has been transposed into the Act amending the Energy Efficiency Act (published in SG No 21/12.03.2021) by introducing in Section 75 of the Transitional and Final Provisions of the Transitional and Final Provisions of the Act a provision according to

which, until 1 January 2027, the installed means referred to in Article 140 (1) of the Energy Act (individual heat meters, individual water meters, individual allocators), which are not remotely readable, shall be converted to allow remote reading or replaced by remotely readable means.

Accounting of energy from natural gas

The accounting of the quantities of natural gas transported through the transmission network shall be carried out at the metering points owned by the transmission undertaking, located on the gas transmission network in accordance with the regulatory requirements for its design, construction and operation.

The quantities of natural gas transported through the distribution network shall be measured on the meter upstream of the consumer but owned by the distribution undertaking. Operation of the means of commercial measurement of the transmission and distribution network is the responsibility of the operator of the network concerned, in accordance with the regulations on commercial metering: Act on Metering and Rules on the Trade in Natural Gas

Invoicing

The ways and conditions for billing end-users are laid down in the Energy Act. Energy companies are obliged to provide their energy service users with information on:

- Methods of payment, charges for suspension or recovery of supply, maintenance service charges and other prices of services related to the licensed activity;
- The procedure for switching suppliers and the information that energy service users are not liable for additional charges in the event of switching suppliers;
- The quantities actually consumed and the costs incurred without any obligation to pay for that service;
- The drawing up of a final settlement account for each change of supplier;
- The share of each energy source in the total energy supplied by the supplier in the previous calendar year, in a comprehensible and clearly comparable manner;
- Existing sources of publicly available information on the environmental impact, as regards at least emissions of carbon dioxide and radioactive waste resulting from electricity generation from different energy sources, in the total energy supplied by the supplier in the previous year;
- The means of dispute settlement.

This information shall be provided on the invoices or together with them in information material and on the websites of energy undertakings. Under this procedure, energy and gas suppliers provide energy service users with a checklist adopted by the European Commission containing practical information on their rights.

In addition, the Energy Act obliges the final supplier to inform the customer, together with the invoice for the last month of each semester, where the reported electricity or natural

gas consumption of final customers for that semester is more than 50 % higher than the reported consumption for the relevant semester of the previous calendar year.

In addition, a large majority of energy suppliers maintain detailed information on the content of bills to the end user on their websites, and some of them also take further action, such as sending letters (in electronic and paper format) to their customers explaining the content of the energy bill.

- **Increasing energy efficiency in the transport sector**

The main measures through which Bulgaria aims to improve energy efficiency in the sector can be summarised as follows:

a) Increasing the share of public electric transport

The measure shall include:

- Improvement of railway infrastructure;
- Renewal of the rolling stock of electric rail transport.

b) Driver training for economical driving

The Ministry of Transport and Communications will encourage and facilitate specific trainings for drivers to improve economical driving. Such courses will include a driving unit which, based on safety requirements, includes topics to increase the ability to optimise fuel consumption through better use of vehicle design and efficient driving.

c) Increasing the share of electric and hybrid vehicles and deploying charging infrastructure for electric and hybrid vehicles in urban areas

Electric vehicle charging infrastructure is mainly run by private investors.

The charging infrastructure sector in Bulgaria is developing rapidly and the total number of recharging points installed in Bulgaria crossed the border of 1 000 at the beginning of 2023. At the beginning of December 2023, there were 1 586 charging stations in 1 126 locations.

Bulgaria operates 15 networks with charging stations from different operators: Fines Charging, Eldrive, eCars/Vsichkotok, AutoBOX/VoltSpot, KIA Hypercharge/ELBUL, EVPoint, Pro Credit Bank, Kaufland, Varna Charging, Gigacharger, Travel By Electric, Wink Charging, GPStation, Bullcharge, EVN.

Appropriate financial incentives and administrative means as well as support schemes for the installation of charging infrastructure need to be put in place.
In Bulgaria, shared mobility services are increasingly distributed. The development of these services can completely change the model of vehicle ownership and use, from having a product (car) to using a service (mobility).

Since 2017, a service has been offered to share fully electric SPARK cars in Sofia and since 2 021 in Plovdiv.

Spark is a new generation service that offers flexible rental of electric cars through a mobile application. Consumers can rent a car as needed. In the app, consumers can see both the areas in which a car can be rented and freed up, and all those free to rent around 1 000 electric cars of 14 different models.

Bicycle and e-scooter sharing services are also being developed in Bulgaria, which address a number of problems in large urbanised areas.

Since 2016, a pilot scheme has been launched to promote the purchase of electric and hybrid vehicles in the state administration of the National Trust EcoFund by granting a subsidy.

For the period 2016-2022, a subsidy of BGN 1 391 146 was paid for the supply of a total of 72 electric and hybrid vehicles.

Table 14:

2016		2017		2018		2019		2020		2021		2022	
B. CP	Amount	SG No	Amount	B. CP	Amount	B. CP	Amount	B. CP	Amount	B. CP	Amount	B. CP	Amount
5	90 000	14	250 000	6	120 000	8	134 004	6	130 000	22	435 159	11	231 983

The National Policy Framework for the development of the market for alternative fuels in the transport sector and the deployment of relevant infrastructure foresees a number of potential measures to promote the uptake of electric vehicles:

- Setting standards for energy consumption in circulation (applicable not only for initial registration but also for subsequent sale/registration of vehicles);
- Setting emission standards for road vehicles (applicable not only for first registration but also for subsequent sale/registration of vehicles);
- Introduction of access areas (especially in central urban areas) with only energy-efficient and low-emission vehicles;
- Applying progressive taxation promoting the use of energy-efficient and low-emission vehicles;
- Providing direct subsidies for the purchase of new zero-emission vehicles (valid for a limited number/time, until a minimum number of such vehicles is reached);
- Granting tax credits for the purchase and use of zero-emission vehicles (valid for a limited number/time, until a minimum number of such vehicles is reached);
- Ensuring access to bus lanes for zero-emission vehicles (valid for a limited number/time until a minimum number of such vehicles is reached);
- Use of electric vehicles for the needs of public administration and local authorities;
- Promoting the uptake of zero-emission vehicles for shared use;

- Stimulate the transition of taxi companies and public carriers to the use of zero-emission vehicles.

Year-on-year on 1 December 2023, the number of electric vehicles increased by 65 % from 8 791 to 14 517 and hybrid vehicles by 52 % from 30 774 to 46 779.

Municipalities must develop their investment programmes for electric transport.

Increasing the share of hydrogen fuel cell vehicles and deploying hydrogen recharging infrastructure

The availability of recharging infrastructure is a critical need to start hydrogen transport in Bulgaria. The most economically justified construction of the charging station ecosystem and incentives for the purchase of hydrogen vehicles is the most economically justified.

Two approaches to introducing hydrogen electro-mobility in Bulgaria are outlined: through the direct purchase of hydrogen means of transport and charging infrastructure, and by reto-phyxing (conversion).

Currently, Bulgaria does not have centralised hydrogen production or infrastructure for hydrogen recharging stations, so the forecasted planning of hydrogen recharging stations, both by location and by type and capacity, will be subject to changes in order to increase efficiency and reduce costs. The first charging stations are foreseen to produce hydrogen on-site through renewable electrolysis.

The first National Hydrogen Demonstration Project, funded by the MOH, is connected to the transport of a trolleybus with a range extension device.

The introduction of hydrogen electro-transport is planned to start from urban bus transport, for which municipalities are responsible. This approach is more cost-effective due to the possibility of scaling up with a large number of means of transport and charging infrastructure with a high percentage of regulated usability. For the time being, in Bulgaria, 4 municipalities are interested in introducing hydrogen bus transport: Sofia, Stara Zagora, Burgas and Ruse.

Another niche for hydrogen transport, which will grow strongly, is international freight transport, where Bulgaria has a strong position. This will require the provision of the relevant national infrastructure and the construction of charging stations on motorways. For Bulgaria, and in particular for municipalities along the Danube, another promising niche for retre-phyxing – waterborne transport – is emerging.

- **Consumer information and training programmes**

The measure aims to ensure that consumers are more aware of their use of electricity, heat and natural gas and the benefits of implementing energy efficiency measures. Energy traders publish on their pages information on how to save energy and keep an online record of electronic invoices. Companies have energy efficiency advisors to help customers reduce their energy consumption without costly investments and complex repairs.

In addition to the fact that the measure is implemented by energy traders in the country as part of their information campaigns and initiatives, its implementation is further

supported by regional and municipal administrations in the country. Various initiatives to raise consumer awareness are included in the energy efficiency improvement programmes of regional and local authorities, drawn up in fulfilment of their obligations under Article 12 of the Energy Efficiency Act. Initiatives include the creation of consumer councils, the organisation of a consumer day, as well as numerous campaigns in regional and municipal centres where customers can learn about how to save energy.

Information campaigns and the implementation of various behavioural measures are included as eligible measures in Regulation No E-RD-3-04 of 4 May 2016 on eligible measures for delivering energy savings in final consumption, the means of demonstrating the energy savings achieved, the requirements for the methodologies for assessing them and the means of confirming them.

To support the implementation of the measure, specialised methodologies for assessing energy savings are developed following the implementation of various behavioural measures in accordance with Regulation No E-RD-3-04 of 4 May 2016. The methods are drawn up in accordance with the model approved in the Regulation and are discussed by expert groups specifically set up by the AUER, again in accordance with the same Regulation.

- **Availability of qualification, accreditation and certification schemes**

The conditions and procedures for obtaining and recognising qualifications for carrying out energy audits of buildings and industrial systems and the certification of buildings are laid down in the Energy Efficiency Act. The activities of energy audits, the certification of buildings, the preparation of conformity assessment of investment projects and the preparation of energy savings assessments are carried out by persons registered in public registers maintained by the SEDA. The Energy Efficiency Act lays down the requirements to be met by the persons concerned, which are detailed at the regulatory level in Regulation No E-RD-1-04 of 3.1.2018 on the circumstances to be entered in the registers under the Energy Efficiency Act, the registration and receipt of information from these registers, the conditions and procedures for obtaining qualifications by energy efficiency consultants.

Persons registered in the SEDA's public register shall hold a certificate attesting success in an advanced examination for carrying out the activities of auditing and certifying buildings and energy audits of industrial systems.

- **Mandatory phase-out of solid fuel heating appliances that do not comply with Ecodesign Regulations (EU) 2015/1185 and (EU) 2015/1189 and their replacement by other means of heating;**

The National Programme for the Improvement of Ambient Air Quality 2020-2018 includes a measure in the field of domestic heating – a mandatory phase-out of solid fuel stoves and boilers that do not meet the requirements of the Ecodesign Regulations and the introduction of alternative heating measures to contribute to the expected reduction in PM10 emissions from the domestic heating sector. The ultimate objective of the measure is to phase out inefficient solid fuel appliances.

v. *Where applicable, a description of policies and measures to promote the role of local energy communities in contributing to the implementation of policies and measures in points i, ii, iii and iv*

Some of the recent amendments to the Energy Act focus on the development of citizen energy communities, which are key to reducing fossil fuels (coal and wood) in the wall, promoting local economies, as well as revitalising local communities. It provides for the removal of unjustified regulatory and administrative barriers, the application of regulatory requirements for the sale of energy and other energy services and the provision of cooperation with the relevant distribution network operator and/or heat transmission company for the transmission of energy to the community.

The policy and measures in this area shall provide for fair, proportionate and transparent administrative procedures to ensure that all users apply regulated prices for network services, the application of non-discriminatory treatment to communities as regards their activities, rights and obligations as end-users, the accessibility of all consumers to participate in communities, including a household in energy poverty or vulnerable customers. Facilitating access to finance and information, providing regulatory and capacity building assistance to public authorities in facilitating the establishment of energy communities and facilitating their direct participation, as well as introducing rules to ensure equal and non-discriminatory treatment of consumers participating in the citizen energy community.

vi. *Description of measures to develop measures to utilise energy efficiency potentials of gas and electricity infrastructure*

The Energy Act lays down requirements for the efficient use of energy in production, transmission and distribution, which the KEVR takes into account when setting the prices of electricity, heat and natural gas. In exercising its powers under this Act, the KEVR shall:

- Set maximum amounts of technology costs for the production, transmission and distribution of electricity, for the production and transmission of heat and for the transmission, distribution and storage of natural gas, which may be recognised in price setting, in accordance with a methodology or instructions adopted by the Commission;
- Calls on electricity and gas network operators to assess the energy efficiency potential of the networks concerned by reducing technological costs, including an analysis of transmission, distribution, load management, efficient operation of networks and possibilities for the connection of decentralised energy generation installations;
- There is an obligation for network operators, when developing network development plans, to include measures and plan relevant investments to improve energy efficiency in gas and electricity networks and a timetable for their implementation.

It is also within the remit of the KEVR to assess the cost-effectiveness of introducing smart metering systems proposed by network operators. Where implementation is economically justified, the KEVR shall draw up timetables for their implementation, ensuring the interoperability of smart metering systems, taking into account appropriate standards, best practices and their importance for the development of the internal market in electricity and natural gas.

In addition, the Energy Act provides that, in the exercise of its regulatory powers in the field of energy efficiency, the KEVR is guided by the following general principles:

- Promoting increased energy efficiency in the production, transmission, distribution and final consumption of energy and natural gas, and;
- The creation of incentives for transmission and distribution system operators to provide system services to final customers enabling energy efficiency improvement measures to be implemented with the deployment of smart grids, taking into account the costs and benefits of each measure while ensuring system security.

With regard to price regulation, the KEVR aims to ensure that electricity transmission and distribution prices do not limit energy efficiency gains in the generation, transmission and distribution of energy and the inclusion of demand response in balancing markets and the provision of ancillary services, as well as the reflection in network tariffs of network cost reductions achieved by consumers, demand response, decentralisation of generation, lowering supply costs or network investment costs and optimisation of network operation.

With regard to demand response, the KEVR is guided by the principle that electricity transmission and distribution prices should allow for increased participation of final customers in improving the efficiency of the electricity system through demand response. It shall also seek to encourage transmission and distribution system operators to offer system services for electricity demand response, demand management and decentralised generation in organised electricity markets and to improve efficiency in the design and operation of networks, in particular:

- Shifting the load from peak to unladen hours by final customers, taking into account the availability of energy from renewable sources, cogeneration and decentralised generation;
- Energy savings by demand response from decentralised sources of production through a combination of supply of energy efficiency services and participation in the balancing electricity market;
- Demand reduction through energy efficiency measures undertaken by providers of energy efficiency services;
- Connection and dispatchability of energy facilities for the production of electricity of medium and low voltage levels;
- Connection of energy facilities for the production of electricity located closer to

consumption;

- Providing grid access to energy storage facilities.

Another objective is to introduce dynamic pricing for demand response measures by final customers by:

- Prices recording the period of consumption;
- Critical peak pricing;
- Real-time pricing;
- Discounts on reduced consumption during peak periods.

Measures in the case of gas distributors

The energy efficiency measures implemented by gas distributors are the following:

1. Measures related to the control and diagnosis of the technical state of the networks:
   - Grouping pipelines by age from the start of operation, with a shorter monitoring period for spin-off and natural gas leakage demand in older sections;
   - Grouping pipelines by frequency of leaks and leaks; Performance of an analysis of the balance of entry to the distribution network;
2. Locating natural gas leakage.
3. Measures relating to the prevention of damage caused by third parties: analysis and prevention of actions by third parties relating to network integrity resulting in natural gas leakage – restriction of access and security of sites.
4. Measures during the construction and filling of gas distribution networks – use of certified materials and contractors.
5. Operational measures:
   - Pressure management;
   - Odorisation of natural gas;
   - Regular scan of the gas distribution network;
   - Setting up a system for remote monitoring of the electrochemical protection values of metallic gas pipelines;
   - New subscribers will be included, by pressure cutting, in order to reduce technological losses;
   - Deployment of smart metering systems in gas distribution networks.

Measures in electricity distribution companies

With regard to measures to reduce the technological costs of transmission and distribution of electricity through the electricity distribution system, the following shall be carried out by system operators:

1. Reducing technical losses in electricity transmission and distribution by:
    - Increasing the section of conductors at medium and low voltage level in cable and air networks;
    - The construction of new transformer stations, reducing lessons for low-voltage grids and/or redistributing electric loads;
    - Replacement of installed power transformers with new, lower idle and short circuit energy losses;
    - Thermo-vision testing of transformers, medium voltage and low voltage systems to detect problems characterised by elevated temperatures.
2. Increasing reliability in measuring the quantities of electricity entering or leaving the electricity distribution network and limiting the possibility of its unauthorised use by:
    - Replacement of commercial measuring instruments;
    - Securing and removing commercial measuring instruments at the property boundary;
    - Building SMART GRID-networks.

Measures for district heating companies

The energy efficiency potential of district heating and cooling infrastructure lies in the rehabilitation of heat transmission networks and the replacement of outdated direct district heating stations with modern high-efficiency automated indirect stations, which will reduce heat transmission and distribution losses and reduce GHG emissions. The application of best practice solutions involving the use of pre-insulated pipes for district heating systems achieves heat loss reductions of up to 3 %. A similar level of loss [reduction] can be achieved for high-density power systems. In the context of prevailing conditions in Bulgaria, it is assumed that the average power density of district heating systems will allow heat loss reductions of up to 10 % to be achieved through the use of best available technology.

In order to reduce losses to 10 % (with current average losses of 23.7 %), district heating networks need to be upgraded to reduce annual losses from 2.77 TJ/km to 1.17 TJ/km. As the length of the heat transmission network (1 898 km) is closely linked to the value of transmission losses, it can be assumed that the requirement to reduce losses per kilometre from the network to 1.17 TJ/km should apply to all district heating systems in the country. The potential resulting from improved energy efficiency of district heating systems is estimated at 1.6 TJ, representing 30.3 % of the heat currently lost during the transport of the heat carrier.

vii. Regional cooperation in this field, if applicable

Not applicable

viii. Financial measures, including EU support and use of EU funds at national level

The envisaged changes to the EEOS will require the development of schemes and mechanisms to promote energy efficiency in buildings to take into account estimated or achieved energy savings, taking into account one or more of the following criteria:

1. The energy performance of the equipment or materials used in the implementation of energy efficiency measures in the building, installation of the equipment or materials by persons having the necessary professional qualifications to do so, obtained under the conditions and procedure of the Vocational Education and Training Act;

2. The standard values for calculating energy savings in buildings;

3. Comparative analysis of energy performance certificates issued before and after the improvement of the energy performance of the building.

4. The results of the energy efficiency audit or any other appropriate, transparent and proportionate method that shows an improvement in energy performance.

The implementation of the policies and measures in the INECP will be ensured within the budgets of the relevant ministries, departments and other government structures for the year in question. Measures to increase energy efficiency will be supported by well-designed and effective financial instruments, and cooperation between public and private stakeholders to develop large-scale investment programmes and funding schemes will also be encouraged. Union funds and other financing schemes for energy efficiency improvement measures will be used for this purpose:

1. Structural Funds 2021-2027

For the next Multiannual Financial Framework 2027-2021, Bulgaria intends to use the Structural Funds to finance energy efficiency improvement measures.

In this respect, the following investment priorities have been identified:

- Supporting energy efficiency improvements in public, industrial and residential buildings through full renovation;
- Support for the implementation of energy efficiency improvement measures for small and medium-sized enterprises, large enterprises and local authorities.

2. The Invest EU programme;

3. The Modernisation Fund;

4. The Energy Efficiency and Renewable Sources Fund;

5. National programme for energy efficiency in multi-apartment buildings;

6. National Trust EcoFund – Climate Investment Programme;

7. Renewable Energy, Energy Efficiency, Energy Security Programme, financed by the Financial Mechanism of the European Economic Area 2014-2021

8. National Recovery and Resilience Plan of the Republic of Bulgaria.

3.3 energy security dimension

i. Policies and measures related to the elements referred to in points 2.3 and 2.4

Security policies and measures in the energy sector of the country can be summarised in the following priority axes: diversification of natural gas supply sources and routes, efficient use of indigenous energy resources, increasing interconnection and increasing flexibility of the national energy system, energy storage and network and information security.

Diversification of natural gas supply sources and routes by implementing the following projects:

- LNG terminal project to Alexandroupolis;
- Expansion of the capacity of UGS Chiren;
- Rehabilitation, modernisation and extension of the Bulgarian gas transmission system – Phase 3;
- Increase of technical capacity for transmission from Greece to Bulgaria in IP Kulata/Sidirokastro;
- Increase of technical capacity for transmission from Bulgaria to Romania in IP Negru Voda/Kardam;
- New LNG terminal projects in the region.

List of projects of common interest adopted by the European Commission on 25.11.2023

The first list of projects of common interest and projects of mutual interest under the revised TEN-E Regulation (Regulation (EU) 2022/869 of the European Parliament and of the Council on guidelines for trans-European energy infrastructure) includes two projects with Bulgarian participation: to build a hydrogen interconnector Bulgaria – Greece and Carmen (Bulgaria, Romania) – Carpathian upgraded energy network.

- "H2 Interconnection Bulgaria-Greece"

The Bulgaria-Greece hydrogen interconnector project organised by Bulgartransgaz EAD is part of the thematic area 'Hydrogen and electrolysers'.

The infrastructure on Bulgarian territory is linked to the Greek operator DESFA S.A. hydrogen network project on Greek territory in the H2 Interconnection Bulgaria-Greece group.

The project will make an important contribution to the realisation of the South East Priority Corridor, which will provide a green hydrogen transport route from South-East to Central Europe, from both domestic production and imports. Including it on the list of PCIs will allow it to use fast-track permitting procedures and apply for grants during all stages of

implementation. The project is an example of Bulgaria's efforts to decarbonise the gas system and the uptake of low-carbon gases.

The project provides for the construction of infrastructure dedicated to the transport of 100 % hydrogen. It includes a pipeline with DN 1000 and a length of approximately 250 km and two compressor stations. The expected lifetime of the infrastructure is by the end of 2029.

Bulgartransgaz EAD's project represents the first phase in the realisation of the concept of the development of new infrastructure for the transport of clean hydrogen on the territory of the Republic of Bulgaria, including to the hinterland and connectivity with neighbouring countries. As a next step, it is envisaged to continue extending it both within Bulgaria and to cross-border interconnection points with neighbouring countries.

The implementation of the project will ensure bi-directional cross-border hydrogen transport capacity between Bulgaria and Greece at a new connection point in the Kulata/Sidirokastro area. The project is planned to subsequently develop in a northern and eastern direction and thus provide further cross-border connectivity to Romania and the countries of the region at a later stage.

The project represents an important milestone in the development of the H2 network in the region. The planned infrastructure is intended to stimulate the process of large-scale hydrogen deployment both in Bulgaria and in the South East European region.

The construction of hydrogen transmission infrastructure in Bulgaria will have a catalytic effect on massive investments, including in relation to projects set out in the National Roadmap for Improving the conditions for unleashing the development potential of hydrogen technologies and hydrogen production and supply mechanisms.

The planned H2 infrastructure is expected to contribute to sustainable economic growth, decarbonisation of the economy and energy, employment and industrial competitiveness in Bulgaria and the region.

The project complies with all relevant technical, general and specific criteria for project proposals in the field of hydrogen transmission stemming from Regulation (EU) 2022/869 on trans-European energy infrastructure.

The inclusion of the project proposed by Bulgartransgaz EAD on the list is essential for its successful and timely implementation in an effective manner and for the realisation of the priority South East Hydrogen Corridor.

- "Carmen (BG, RO) aiming cross-border TSO-TSO cooperation and data sharing, enhance TSO-DSO cooperation, investments in grid extension and creation capacity for integration of new RES, image of grid stability, security and flexibility"

The Electricity System Operator (ESO) EAD is involved as an active partner in the Carmen 2 project: Carpathian Modernised Energy Network'.

The Carmen project is part of the 5th list of projects of common interest in the 'smart networks' category, with the participation of Delgaz Grid, the distribution system operator in the north-eastern region of Romania, in partnership with the Romanian transmission operator Transelectrica and the Hungarian transmission operator MAVIR.

ESO EAD's participation in the project consists of investments to increase the capacity of the Bulgarian electricity transmission system to exploit the identified high renewable energy potential (over 8 GW, including green hydrogen) at national and regional level, in the following main areas:

1. Comprehensive digitalisation and automation of the transmission network, including but not limited to: installing devices for monitoring, forecasting, modelling and optimisation of real-time transmission capacities (Dynamic Line Rating, DLR); deployment of flexible variable transmission solutions (FACTS); and enabling more efficient DSR in cooperation with national distribution system operators;

2. Modernising, strengthening and increasing the capacity of the transmission system in northern Bulgaria, with a view to making it ready to integrate and transmit significant amounts of renewable energy from large RES in northern Bulgaria to consumption centres both in Bulgaria and at regional level, along the North-South priority corridor, in particular to and through Romania. This planned extension is driven not only by the massive deployment of RES, but also by the expected development of electricity and hydrogen charging infrastructure throughout Bulgaria to accommodate and catalyse the transition to bezonal mobility.

Digitising, strengthening and increasing the capacity of the transmission system in Northern Bulgaria will enable the integration and transmission of significant amounts of renewable energy from large RES in northern Bulgaria to consumption centres in the country, but also at regional level along the North-South priority corridor, in particular to and through Romania. This planned expansion and grid intelligence is required not only by the massive deployment of RES, but also by the expected development of electric and hydrogen recharging infrastructure on the territory of Bulgaria, which will boost and catalyse the transition to emission-free mobility.

Efficient use of indigenous energy resources

There are prerequisites for domestic production of natural gas, allowing the country to reduce the risk of increasing its energy dependence on imported energy resources for the first phase of the strategic horizon of 2050 under consideration.

The country has registered gas fields with a total geological or commercial potential of 45 bcm from the time of granting authorisations for the extraction of natural gas to a real one, a period of 12 to 18 months is needed, so that local natural gas resources can play an important role in the medium term horizon of sustainable development.

The development of local extraction on the land territory of the Republic of Bulgaria will provide the necessary local resource for the transition to a carbon-neutral economy. It will

stimulate an even faster development of gas infrastructure that will meet the need to transport green hydrogen in a clean state or in a blend with biogas after 2035.

Diversification of supply of virgin nuclear fuel

Nuclear energy is currently part of the energy mix for many EU Member States, including Bulgaria.

Nuclear power plants provide baseload capacity that guarantees a reliable supply of electricity and plays an important role in energy security.

An important aspect for the development of nuclear energy is following the Euratom policy to diversify the supply of fresh nuclear fuel, based on the European Energy Security Strategy adopted on 28.5.2014, which requires a fully diversified supply portfolio of fresh nuclear fuel. This policy is based on the following four pillars:

1) Diversification in the purchase of natural uranium, its conversion and enrichment;
2) Diversification of nuclear fuel producers (fuel assemblies);
3) Maintaining sufficient fuel reserves at NPP sites;
4) Conclusion of long-term contracts for the supply of fresh nuclear fuel.

In implementation of this European policy and in order to reduce the dependence of Bulgarian energy on a single supplier, a procedure is underway to diversify the supply of fresh nuclear fuel to Kozloduy EAD and to future new nuclear capacity, with the highest level of nuclear safety being the highest priority. In implementing diversification policy, better financial and economic conditions will be important advantages.

At the end of 2022, NPP Kozloduy EAD signed a 10-year contract with Westinghaus Elektrick Sweden AB for the supply of fresh nuclear fuel to Unit 5. The first delivery is scheduled for April 2024 and once the licensing process for the new fuel has been successfully completed, it is expected to be loaded in May 2024.

At the same time, in March 2023 NPP Kozloduy EAD also concluded a contract with Famatom for the supply of fresh nuclear fuel to Unit 6 of a power station. According to its terms, the first delivery of fuel assemblies is expected in November 2025.

By implementing these key activities, Bulgaria has taken an important step towards achieving the priorities and objectives of its nuclear fuel diversification programme by establishing two new independent and competing SNF suppliers.

Extension of the lifetime of Units 5 and 6 of NPP Kozloduy EAD

Kozloduy EAD, as a base plant, has a fundamental role to play in maintaining the resilience of the electricity system. It accounts for about 33 % of the country’s electricity production and is a guarantor of Bulgaria’s energy security.

Units 5 and 6 of the Kozloduy NPP with VVER-1000 reactors, model B-320, were commissioned in 1987 and 1991 respectively.

In the period 2014-2018, measures under the programme for the extension of the lifetime of Units 5 and 6 of the Kozloduy Nuclear Power Plant were successfully implemented, the results of which show that the two units can operate in compliance with the safety requirements, until 2047 for Unit 5 and by 2051 for Unit 6.

In accordance with national legislation, the Nuclear Regulatory Agency has extended the operating licences for the two units for Unit 5 to 2027 and Unit 6 by 2029 respectively. The priority is currently to prepare for the re-evaluation of Unit 5 and Unit 6 by developing a programme that reflects the current commercial and technological aspects of their operation.

Priority is also provided for the construction of new nuclear capacity at the Kozloduy NPP site, amounting to 2 400 MW. To this end, the process of adapting the Westinguz Ar1000 project to the Kozloduy NPP site for the implementation of Unit 7 and Unit 8 is under way.

Exploiting the potential of indigenous coal in the country while respecting environmental requirements

Bulgaria uses the existing potential of domestic coal in Bulgaria in compliance with environmental requirements.

The use of indigenous coal reserves has a future as a stabilising source of energy. Indigenous coal-fired power plants are a major provider of electricity system balancing services, which is why they are a major contributor to a country's electricity security. This defines the role of indigenous coal as a strategic energy resource, in terms of the country's energy and national security.

Domestic production of natural gas

According to various estimates, Bulgaria has significant extracted natural gas reserves both on land and in the waters of the Black Sea. New gas fields are being developed on a market basis in neighbouring countries. There are prerequisites for the effective development of natural gas extraction projects in Bulgaria, including in the form of a partnership between the State or public undertakings with international companies.

Appropriate measures include updating the available legal framework in the area to speed up and stimulate market-based implementation of natural gas extraction projects, in compliance with applicable environmental, biodiversity and human health requirements.

Developing the grid and increasing the flexibility of the electricity system

In order to increase the flexibility of the electricity system by means of demand response, Bulgaria envisages to create the right conditions, through legislative measures, for the creation of active customers, opportunities for aggregation through aggregators or energy communities, as well as their active participation such as demand response in different market segments.

During the period under review, Bulgaria envisages the introduction of intermediate measures to enable the following reforms to be carried out:

- Introducing price limits in the balancing market that allow fair price signals to be given to investors. A maximum and minimum price adapted to the day-ahead and intraday timeframes and in accordance with the provisions of the Balancing Regulation;
- Creating the right conditions and enhancing the participation of demand response, presented individually or through aggregators, in the wholesale electricity market as well as in the balancing market;
- Upgrading the transmission network to alleviate internal congestion and increase interconnection capacity;
- Given the new EU energy and climate targets to ensure system adequacy and the necessary level of security of supply, a capacity mechanism in the electricity market is envisaged for a period of 10 years.

The guiding principles for the development of an electricity grid development plan stem directly from the European Union's energy policy objectives, namely:

- Security of supply to consumers;
- Integration of internal and external electricity markets;
- Reducing harmful environmental impacts through the development of the renewable energy sector;
- Increasing the efficiency of the electricity transmission network.

The Bulgarian electricity grid is part of the integrated transmission network of the countries of continental Europe and its development is closely linked to the development of neighbouring countries' networks.

The results of market calculations based on the forecast of each electricity system operator for the development of electricity generation and consumption show significant differences from the previous regional plan. For the first time, the development of the plan takes into account Türkiye's influence on the region. The Turkish operator predicts a high growth of new generation sources (over 140 GW of installed capacity by 2040), with low electricity costs and year-round export opportunities. At the same time, investments in new large-scale 24-hour electricity sources that do not emit greenhouse gases are foreseen in the Bulgarian EU. This will increase electricity transit flows through our East-West transmission network and could make the Bulgarian-Turkish and Bulgarian-Serbian border bottlenecks that would limit free trade. The transit of electricity through our country will become even greater with the possible closure of generation capacity in the Maritsa East complex.

The construction of a new 400 kV interconnector between the Republic of Bulgaria and the Republic of Serbia is expected to take place after 2030.

A concept has been adopted that the 220 kV transmission network should no longer be developed for general system purposes, at the expense of 400 kV and 110 kV networks, with the exception of the construction of a second district power supply for the city of Ruse.

The development of the 110 kV grid is mostly local and is defined by:

- Improving consumer security of power supply;
- Improving the exchange of electricity with distribution networks;
- Connection of customers with high consumption and assurance category;
- Connection of generating modules above 20 MW.

Energy storage

Bulgaria plans to develop several electricity storage projects in order to ensure balance and flexibility of the system, strengthen Bulgaria's position as an exporter and ensure cross-border flexibility of the system. These projects will also facilitate the further development of renewable energy sources and their integration into the national energy system, given the variability of such energy sources. In this respect, the following projects are envisaged:

- Increase the operational potential of the CHP through the construction of the Yadenitsa dam, which will allow optimisation of the generation structure. Investment needs are estimated at around EUR 220 million;
- Construction of the Batak and Dospat hydro-pumped storage power plants in the Bataak and Dospat dams already built by the Batashki waterline cascade, each of which will add about 800 MW of new installed capacity in generator and pumping storage mode through connection and use as the upper reservoir of the Greater Beglik and Shiroka Polyana dams and as a lower reservoir of the Batak dam.
- Ensuring a long-term sustainable energy solution and improving energy system balancing capabilities allowing flexible 24-hour and weekly management, rapid emergency capacity replacement and additional balancing services by building a pumped storage hydropower plant Dospat Batak
- Approximately EUR 200 million of investments in frequency control batteries with a total capacity of around 180 MW;
- Around EUR 200 million of investments to promote the combination of new RES with local electricity storage facilities, depending on the appropriate technological solution for the projects concerned (around 200 MW in total).

Prospection and exploration of oil and natural gas production in the deep Black Sea

With regard to oil and gas exploration permits granted by the Ministry of Energy, there are expectations to increase the share of domestic production and reduce the country's dependence on imports of natural gas.

As of 1.2.2023, there was one authorisation in force for prospection and exploration for oil and natural gas in Bulgaria's exclusive economic zone in the Black Sea – Block 21-1 Han Asparuh. The holder of the authorisation is TotalEnergiis E § P Bulgaria B.C and OMC Ofshor Bulgaria GambH.

By Decision No 578 of 25 August 2023, the Council of Ministers opened a procedure for granting authorisation for the prospection and exploration of oil and natural gas – underground resources under Article 2 (1) (3) of the ZPB in a new area 'Block 26-1 Han Tervel' located in the exclusive economic zone of the Republic of Bulgaria in the Black Sea. The decision was published in State Gazette No 75 of 25 August 2023.

Network and information security (cybersecurity)

Network and information security of the energy system is the security of electronic communications networks and information systems for managing the energy system. It is an essential element of national security. The management of energy networks to ensure a constant match between energy consumption and production requires an ever-increasing degree of digitalisation. This is also linked to new risks, as digitalisation increasingly exposes the energy system to cyber-attacks and incidents that may endanger the security of energy supply.

The Republic of Bulgaria will continue its efforts to enhance the network and information security of the energy system through strategic cooperation and information exchange with the other Member States. Under Directive (EU) 2016/1148 concerning measures for a high common level of security of network and information systems across the Union, transposed into national law by the Cybersecurity Act, energy undertakings for electricity and natural gas and digital service providers have an obligation to implement measures to ensure a level of network and information security and measures to prevent and mitigate the impact of incidents affecting their network and information security. In this regard, on the basis of the Cybersecurity Act, a Decision of the Council of Ministers of April 2019 designates the Minister for Energy as an administrative body to which a national competent authority for network and information security for the energy sector is established. The national competent authority is responsible for the organisation, coordination and control of network and information security activities and measures for the Ministry of Energy and the designated operators of essential services in the energy sector resulting from the Cybersecurity Act.

Given the crucial importance of cybersecurity for the management and functioning of the energy sector, it is envisaged to further implement the necessary high-tech solutions at the level of licensed hardware and software for monitoring and active cyber protection of network and information systems to manage and operate the energy system, as well as to accelerate the process of periodic staff training and the provision of the necessary human resources.

ii. Regional cooperation in this area

As an EU Member State, the country is actively working to build a resilient Energy Union and increase the potential of regional cooperation. The Bulgarian state has traditionally maintained good relations with the other countries of the region, both bilaterally and within the EU and various international initiatives such as: The South-East Europe Cooperation Process, the Stability Pact and its successor to the Regional Cooperation Council, the Central and South-Eastern Europe Gas Interconnection High Level Group (CESEC).

For the long-term and mutually beneficial development of energy relations between the countries of the region, with high priority, a common regulatory framework in the field of EU energy legislation is also in place.

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

Funds from the European financial "Connecting Europe Facility", the new financing mechanisms for low-carbon innovation and modernisation of the energy sector foreseen in phase 4 of the EU greenhouse gas emissions trading scheme, as well as other programmes with EU and national funding, are foreseen to finance key electricity transmission infrastructure projects.

The financing of key gas infrastructure projects shall be partly implemented through: The European Energy Programme for Recovery, Operational Programme "Innovation and Competitiveness" 2014-2020, OP "Development of the Competitiveness of the Bulgarian Economy", "Connecting Europe Facility" programme.

More detailed information on financial measures can be found in point 5.3.

3.4 dimension Internal Energy Market11

3.4.1 electricity infrastructure

i. Policies and measures to achieve the target level of interconnection referred to in Article 4 (d)

In accordance with Article 16 (1) 8 of Regulation (EU) 2019/943 on the internal market in electricity provides that transmission system operators shall not limit the volume of interconnection capacity that must be available to market participants as a means of coping with congestion in their own bidding zone or as a means of managing flows resulting from transactions that are intrinsic to bidding zones. This requirement is met when a minimum threshold of 70 % of transmission capacity between commercial areas is reached, respecting safety standards for secure network operation, including in compliance with the emergency security standard (N-1). To date, Greece, Bulgaria and Romania have direct obligations under this Regulation, which have taken appropriate technical and organisational measures to implement it. However, there is a lack of clarity with non-EU

[11] Policies and measures must reflect the principle of energy efficiency first

third countries with whom it is necessary to conclude the relevant supplementary contracts for the implementation of Article 16 (1). 8 from Regulation (EU) 2019/943.

Please refer to the project information included in Parts 2.4.1 and 4.5.1.

ii. Regional cooperation in this area

Bulgaria fully recognises the role of projects of common interest under Regulation 347/2013 on trans-European energy infrastructure in completing the European internal energy market and achieving the EU energy policy objectives in order to ensure the security of electricity supply for the country and the region of South-East Europe.

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

Financing of key projects for the modernisation and extension of Bulgaria's electricity transmission infrastructure:

Funds from the European financial "Connecting Europe Facility", the new financing mechanisms for low-carbon innovation and modernisation of the energy sector provided for in Phase 4 of the EU greenhouse gas emissions trading system, as well as other programmes with EU and national funding, are intended to finance key electricity transmission infrastructure projects.

Please refer to the information in Part 5.3.

3.4.2 energy infrastructure

i. Policies and measures related to the elements set out in point 2.4.2, including, where applicable, specific measures to enable the delivery of Projects of Common Interest (PCIs) and other key infrastructure projects

The Bulgarian electricity grid is part of the integrated transmission network of the countries of continental Europe and its development is closely linked to the development of neighbouring countries' networks.

In the context of the European objectives of building an interconnected and single pan-European gas market, the development of infrastructure in the Republic of Bulgaria is directly linked to the positioning of Bulgaria as one of the gas hubs in Eastern Europe, in line with the Southern Gas Corridor development projects and in line with gas infrastructure development plans in the region and Europe. The strategic objectives of improving security of supply and diversification of natural gas supply sources also feature prominently in European energy policy.

In order to achieve these objectives, a number of measures are envisaged for the effective implementation of major projects for the development of electricity and gas transmission infrastructures.

Please see information in Parts 2.4.2 and 4.5.2.

ii. Regional cooperation in this area12

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

For the next Multiannual Financial Framework 2021-2027, Bulgaria intends to make use of the Structural Funds to finance investment needs to decarbonise the energy sector, ensuring climate adaptation and a just transition. According to Annex D to the Bulgaria Country Report, priority investment needs are identified to promote energy efficiency measures, improve resource efficiency and waste management and promote the transition to a circular economy.

Please refer to the information in point 5.3.

3.4.3 market integration

i. Policies and measures related to the elements set out in point 2.4.3

In order to implement the provisions of Directive 2019/944 on the electricity market, legislative amendments have been made to the Energy Act and its regulatory framework. These changes also regulate the process of full liberalisation of the electricity market. This process started in 1.7.2024. A progressive deregulation of prices for household consumers is planned, with the liberalisation process taking 2 years.

Policies and measures will focus on:

- Promoting local energy communities in order to incentivise energy consumers to participate more actively and effectively in the market and to enable an easy transition of active customers to an open and fully liberalised electricity market;
- Granting the right to conclude a dynamic electricity price contract and an aggregation contract for demand optimisation, in order to encourage energy consumers to participate more actively and efficiently in the market, as well as to enable an easy transition of active customers to an open and fully liberalised electricity market;
- Provide access to tools to compare suppliers' offers to support the active participation of consumers in the market, choice of aggregation contracts and transparency of relations in citizen energy communities.
- Joining an initiative to manually activate a pool reserve (MARI) on the Bulgarian electricity market;
- Joining the International Coordination Initiative for Automated Frequency Recovery and Strengthened System Operation (Picasso) to connect the balancing market;

[12] *Other than the PCI Regional Groups established under Regulation (EU) No 347/2013.*

- Coordinated Unbalance Management (IGCC) – the electricity transmission operator is a full member of this platform and takes action to actively participate in it;

In order to integrate the electricity market into the common European energy market, there have been stock market combinations in the country with the stock markets of neighbouring EU Member States.

- An alliance of markets between Bulgaria and North Macedonia in the day-ahead time segment, by joining the Single European Market "Day Forward" SDAC – Bulgaria and North Macedonia – launched a local market integration project in the day-ahead time segment. The launch of this project in real work is the launch of an operational local day-ahead market, which is expected to happen in 2024, and the introduction of a package of European regulations in North Macedonia.

The integration project has been frozen until the launch of a local market and the introduction of the necessary European legislation in North Macedonia.

Expected start in 2024

- Bringing together markets between Bulgaria and Serbia in the day-ahead time segment by joining the Single European Market "Day Forward" SDAC – Negotiations for a tripartite alliance between Bulgaria, Serbia and Croatia were launched in 2018. In 2019, the Parties developed an analysis of the preconditions and feasibility of the project. The project activities are ongoing and as part of the necessary follow-up steps are related to legislative changes in Serbia's legal framework to ensure market organisation in accordance with Regulation 2015/1222. In June 2022, the Government of the Republic of Serbia officially designated SEEPEX as Serbian nominated electricity market operator (NEMO). Serbia already has a functioning local day-ahead market. A prerequisite for the successful implementation of the project is the implementation of a reciprocal legislative framework to the European one adopted in December 2022.

For the effective functioning of a single internal market in Europe, it is necessary that the organisation and functioning of the day-ahead and intraday markets of MS and Energy Community countries take place under the same market rules and organisation. Bulgaria, which also borders non-EU countries, is interested in establishing common rules to contribute to the effective integration of markets.

Intraday market

To date, there is one intraday market integration project in Europe, XBID.

A market integration of intraday markets is carried out by means of local implementation project (LIP).

The electricity transmission operator and the market operator participated in the local LIP 15 project, which was part of the second wave of the intraday market alliance, which covered two local projects LIP 15 and LIP 16. It involved the exchange operators and

transmission system operators of Bulgaria, Romania, Hungary, Croatia, Slovenia, Czechia, Poland, Austria, Germany.

Since the launch of the second wave of 19.11.2019, Bulgaria is now part of the Single Intraday Coupling (SIDC) market via a Bulgarian-Romanian border.

Bulgaria is part of the regional LIP 14 project aimed at joining the Italian borders and the Bulgaria-Greece border to SIDC as part of the third wave of accession to SIDC. The integration project was successfully completed on 29.11.2022.

Demand response

Bulgaria created, with the amendments to the Energy Act of 17.11.2023, the right conditions for the creation of active consumers, opportunities for aggregation through aggregators or energy communities, as well as their active participation such as demand response in different market segments.

ii. Measures to increase the flexibility of the energy system with regard to renewable energy production such as smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment, real-time price signals, including the roll-out of intraday market coupling and cross-border balancing markets

- The introduction of smart metering to encourage electricity consumers to participate more actively and effectively in the market;
- Pursuing the modernisation of the energy sector in Bulgaria and in accordance with Article 10c of Directive (EU) 2018/410 in order to enhance cost-effective emission reductions and low-carbon investments and Decision (EU) 2015/1814, Bulgaria will also make use of the possibility of free allocation of greenhouse gas emission allowances to electricity generating installations during the fourth phase of the EU ETS for the transitional period from 2021 to 2030. To this end, the National Investment Framework for the period 2030-2021 is envisaged, allowing operators to receive free emission allowances for their investments in the modernisation of the energy sector.

During the period under review, Bulgaria envisages the introduction of intermediate measures to enable the following reforms to be carried out:

- Introducing price limits in the balancing market that allow fair price signals to be given to investors. A maximum and minimum price adapted to the day-ahead and intraday timeframes and in accordance with the provisions of the Balancing Regulation;
- Creating the right conditions and enhancing the participation of demand response, presented individually or through aggregators, in the wholesale electricity market as well as in the balancing market;

- Upgrading the transmission network to alleviate internal congestion. Increase interconnection capacity.

The implementation of the Jadenitsa project to increase the volume of the lower equilibrium of PAVPP Chaira and a reverse irrigation tunnel for connection to the Chaira dam provides balancing capacity in the country's electricity system and will allow for further development of electricity generation from renewable energy sources in line with the long-term energy development strategies in Bulgaria and the European Union. Projects are being developed for the construction of two new PAECs-a.

iii. Where applicable, measures to ensure non-discriminatory participation of renewable energy, demand response and storage, including through bundling, in all energy markets

Develop a regulatory framework to ensure that consumers have the right to consume self-generated electricity from renewable sources. The framework should ensure that consumers of that electricity, individually or through aggregators, are entitled to produce renewable energy, including for self-consumption, to store and sell their surplus of that renewable electricity, including through renewable power purchase agreements, electricity suppliers and commercial agreements between partners, without being subject to any assessment of upcoming or disproportionate procedures and charges.

iv. Policies and measures to protect consumers, especially vulnerable and, where applicable, energy poor consumers, and to improve the competitiveness and contestability of the retail energy market

The term 'energy poverty' has emerged in recent years as a knock-on effect in the ongoing global climate transformation, which requires the implementation of concrete commitments by EU Member States to achieve targets to reduce net greenhouse gas emissions by at least 55 % by 2030 compared to 1 990 levels. This also required the urgent transposition of Article 28 Vulnerable customers and Article 29 Energy poverty of Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2 019 on common rules for the internal market in electricity and amending Directive 2012/27/EU. These texts of the Directive set out the basic framework of obligations at EU level to protect vulnerable customers and households in energy poverty, while the adoption and implementation of appropriate measures is a commitment of individual Member States according to national circumstances.

Action was taken to this end, with the 49th National Assembly of the Republic of Bulgaria adopting the Act amending and supplementing the Energy Act (ZIDZE), readopted on 10.11.2023, published in State Gazette No 96 of 17.11.2023. The additional provisions of this Act introduced for the first time national definitions of 'household in energy poverty' and 'vulnerable customer for the supply of electricity', which, together with the amendments provided for in Article 38e of the Act, are essential for the implementation of Reform C4.R3. Development of a definition and criteria for 'energy poverty' (Reform) of the National Recovery and Resilience Plan of the Republic of Bulgaria (NRRP). In view of

the provisions of § 17 of the ZIDZE, the Council of Ministers was obliged to adopt this Regulation no later than three months after the promulgation of the Act (pursuant to § 50 of the Transitional and Final Provisions of the ZIDZE). The Act lays down an obligation to assess the number of households in energy poverty and to establish and maintain an information system on the number of households in energy poverty and vulnerable electricity customers, by the national responsible institution designated for the development of a National Social Climate Plan under Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 establishing a Social Climate Fund and amending Regulation (EU) 2021/1060 (OJ L 130/1 of 16 May 2023) or by another body designated by an act of the Council of Ministers.

To date, a measure is in place to support the most vulnerable persons and families meeting the defined income and means-tested criteria. Under the Social Assistance Act and Regulation No RD-07-5 of 16.5.2008 on the conditions and procedure for granting targeted heating aid, targeted heating aid is granted to socially vulnerable groups during the heating season. The scope of the targeted assistance covers persons and families who meet the statutory conditions and requirements. 5 risk groups are defined, with different sizes of differentiated minimum heating income depending on the level of risk and the priorities set. To date, around 320 000 individuals and families benefit from this assistance.

Bulgaria's electricity market is partially liberalised, with a regulated share of 40 %. In line with the Commission's Third Liberalisation Package, Bulgaria has taken steps towards full liberalisation of the electricity market. Phasing out regulated prices for final consumers will increase competition between electricity suppliers, but also exposes consumers to greater price volatility. Bulgaria aims to ensure adequate protection for vulnerable household consumers of electricity. In this regard, policies and measures have been developed on the basis of a detailed analysis to ensure a smooth and gradual transition for household consumers to a liberalised retail electricity market. This transition will take place by partially adjusting the price for household customers at the outset until the regulated component of this price is completely removed. Prior to the start of the process of full liberalisation of the electricity market, a mechanism for the protection of vulnerable electricity customers will be put in place, including criteria for the identification of such customers, as well as financial and non-financial measures to protect them. This support mechanism for vulnerable electricity consumers aims to ensure that minimum electricity needs are met all year round, beyond heating needs.

The Energy Act obliges the Council of Ministers to designate or establish a body (a department) to develop the National Social and Climate Plan and, at the same time, to establish and maintain an information system on the number of households in energy poverty and vulnerable customers for the supply of electricity.

The initiative has been proposed to be included as a reform under Reű. The implementation of the reform should be carried out jointly by the teams of the Ministry of Finance, the Ministry of Regional Development, the Ministry of Regional Development and the Ministry of Energy (responsible institutions for implementing appropriate support measures, in accordance with the provisions of Article 38e of the Energy Act) and supported by an

international financial institution following the example of the implementation of other major reforms in the country (such as Reform C4.R1 "Establishment of a National Decarbonisation Fund" to the National Plan for Resilience and Development, supported by DG Reforms of the European Commission and with the cooperation of the European Investment Bank; PrissuotorhausKoupers and Ecoris, to implement the project "Support for the establishment of a National Decarbonisation Fund (NDF)", as well as the Renovation Wave for Europe initiative, under the REACT-EU initiative, funded by Next Generation EU).

The proposed Observatory aims to be the platform to bring together a wide community of practitioners, officials and researchers working in this field in Bulgaria and beyond. The underlying reason for the establishment of the Observatory as a superior body within the Council of Ministers of the Republic of Bulgaria to coordinate specific policies and measures for their implementation is dictated by the need to set up a decision support centre dedicated to this issue in Bulgaria, a Member State where energy poverty rates are among the highest in Europe and where structural problems in the link between energy, low incomes and unrenovated housing are particularly pronounced.

This proposal includes the creation of a new Knowledge Centre which would not only serve as a comprehensive information resource for stakeholders on energy poverty levels in Bulgaria and measures to tackle it, but also to stimulate progress in state-of-the-art analytical research on the causes and consequences of the problem in the country. In addition, the Observatory will develop innovative policies and practices to tackle energy poverty and will also serve as a forum for stakeholder discussions and knowledge sharing on the topic. The financing of the reform is foreseen to take place through the Recovery and Resilience Facility. The maintenance of the Observatory after its establishment and the implementation of other specific activities related to tackling energy poverty will be supported by the EU Social Climate Fund, other financial instruments with an EU funding source and the national budget.

In addition to these short-term measures, long-term measures are also sought that relate to investments in energy efficiency or to reduce the need and amount of energy needed for heating and cooling the home. Energy efficiency measures will reduce the number of consumers included in the definition of 'energy poor'. Improving energy efficiency has several positive effects, including helping to alleviate energy poverty. In the long term, the EU building stock needs to be (deep) renovated, transformed into nearly zero-energy buildings, and national renovation strategies need to facilitate cost-effective transformation, taking into account that some households are in energy poverty. National action plans or other appropriate frameworks to address energy poverty need to be developed and Member States must ensure the necessary energy supply for vulnerable customers by adopting social policies or energy efficiency improvements in housing.

v. Description of measures to enable and develop demand response, including those addressing tariffs to support dynamic pricing13

The 'enter-exit' method has been introduced to set tariffs for the transport of natural gas under European regulation, which makes it possible to set tariffs.

3.4.4 energy poverty

i. Where applicable, policies and measures to achieve the objectives set out in point 2.4.4

Policies and measures to achieve national energy poverty targets:

- Ensuring adequate protection for energy poor persons under their competence, including by providing targeted heating aid for those who meet the conditions of the Regulation laying down the criteria, conditions and procedures for determining the status of a household in a situation of energy poverty and the status of vulnerable customer for the supply of electricity;
- Implement a mechanism to protect vulnerable customers when launching the process towards full liberalisation of electricity prices for final customers, including domestic ones;
- Renovation of the building stock;
- Increasing energy efficiency by introducing to the national target referred to in Article 8 of Directive (EU) 2023/1791 the requirement to implement energy efficiency improvement measures as a priority among vulnerable customers, including households affected by energy poverty, and, where appropriate, in social housing.

In addition to measures to promote the active participation of consumers in the electricity market, protection measures will also apply. In this regard, the policy of full liberalisation of the electricity market includes measures to ensure a smooth and gradual transition of household customers. With this smooth transition, retail electricity market prices will gradually shift from regulated prices to partial regulation until their regulation is completely phased out.

In the long term, in addition to the above mentioned measures, measures will also be implemented to improve the energy efficiency of homes of energy-poor consumers in order to reduce their energy costs and increase their living comfort.

Measures and programmes to protect energy poor and vulnerable customers will be further developed and implemented through the National Social Climate Plan.

Since 2008, a measure has been implemented to support the most vulnerable persons and families meeting the defined income and means-tested criteria. Under the Social Assistance Act and Regulation No RD-07-5 of 16.5.2008 on the conditions and procedure for granting

[13] In accordance with Article 15(8) of Directive 2012/27/EU.

targeted heating aid, targeted heating aid is granted to the most vulnerable persons and families during the heating season.

To date, a measure is in place to support the most vulnerable persons and families meeting the defined income and means-tested criteria. Under the Social Assistance Act and Regulation No RD-07-5 of 16.5.2008 on the conditions and procedure for granting targeted heating aid, targeted heating aid is granted to socially vulnerable groups during the heating season. The scope of the targeted assistance covers persons and families who meet the statutory conditions and requirements. 5 risk groups are defined, with different sizes of differentiated minimum heating income depending on the level of risk and the priorities set. To date, around 320 000 individuals and families benefit from this assistance.

The support mechanism is as follows: The aid is for the relevant heating season (1 November – 31 March), i.e. for 5 months, and the amount of the aid is determined by order of the Minister of Labour and Social Policy before the start of the season, in accordance with the electricity price per household consumer set by the KEVR on the basis of 500 kWh of electricity, including 300 kWh of daily and 200 kWh overnight (amount of energy needed to heat a room). Targeted heating aid is granted for the purchase of – heat, electricity, natural gas or solid fuel. This assistance will continue to be implemented as a measure to support the most vulnerable individuals and families.

The aim of the Programme "Provide targeted social protection for heating the low-income population" is to provide financial means for low-income people to provide heating during the winter period.

- The conditions and procedure for granting targeted aid for heating to persons and families during the heating season are laid down in Regulation No RD 5/16.05.2008 (the Ordinance).

In accordance with the conditions laid down in the Regulation, persons and families whose average monthly income for the preceding six months preceding the month in which the application is submitted is less than or equal to differentiated heating income (DDA) are entitled to targeted heating aid. Such persons and families should also fulfil the conditions of Articles 10 and 11 of the Rules for the Implementation of the Social Assistance Act.

Applications for targeted heating aid for the respective heating season shall be submitted to the Social Assistance Directorate at its current address in the period from 01 to 31 October 2022. An order of the Minister of Labour and Social Policy shall fix a monthly amount of targeted heating aid for the respective heating season.

The targeted heating aid provided shall be for a period of 5 months during the relevant heating season, and persons and families must state the type of heating used – heat, electricity, solid fuel or natural gas – in the declaration requested.

3.5 dimension Research, Innovation and Competitiveness

i. Policies and measures related to the elements set out in point 2.5

The national objectives and funding targets for public and, where available, private research and innovation related to the Energy Union, including, where appropriate, a timetable for achieving the objectives:

- The Innovation Strategy for Smart Specialisation of the Republic of Bulgaria 2021-2027
- Upskilling and the creation of a skilled workforce to sustain the manufacturing of net-zero technologies, including the creation (or participation) of Net-Zero Academies;
- Establishment of industrial parks within the meaning of the Industrial Parks Act.

Over the last decade, research and innovation have become a top priority of European policy. Bulgaria therefore sees research and innovation as a real opportunity to improve the competitiveness of the economy, which generates economic growth and jobs. With regard to research, innovation and competitiveness, the Bulgarian State's policy is aimed at:

- Deployment of high-efficiency energy technologies;
- Smart grids and energy storage;
- Nuclear energy research;
- Explore the deployment of electrochemical energy sources such as batteries, hydrogen technologies and fuel cells.

The following measures will be taken to implement innovation policies:

- Achieving the objectives of the Clean Energy for All Europeans package of the EU by 2030, as well as developing a low-carbon economy in the long term;
- Increasing the number of innovative firms (innovation roll-out and development) in high-tech and intensive sectors, in line with the Smart Specialisation Strategy;
- Increasing the competitiveness and efficiency of the research system by focusing on results and creating incentives (such as improved working conditions, international cooperation and mobility, cooperation with business) in order to attract qualified research teams;
- Develop skills in universities and research institutions to increase the commercial viability and market relevance of their research projects and the ability to participate in research consortia;
- Support for cooperation between research and business, technology transfer and application of research results;

- Promoting business investment in research and in the uptake of industrial and household innovation.

It is envisaged to develop a pilot project for hydrogen with a total installed capacity of 20 MW. On the basis of this project, the further development of hydrogen capacity after 2030 will be analysed.

The following areas of research and development are also planned:

- Crossbow – Cross-border management of renewable energy sources and energy storage installations, which will allow greater flexibility for the energy system to produce renewable energy;
- FLEXITRANSTORE – An integrated platform for increased flexibility in smart data grids with renewable energy storage sites, which will increase the flexibility of the internal energy market system;
- INTERRFACE – User interface architecture to provide innovative network services for a more efficient energy system, which will increase the flexibility of the internal energy market system;
- SDN-microSENSE – SDN – microgrid flexibility in the electricity system. This will increase the security of the internal energy market system;
- Advanced cybersecurity simulation platform for aviation, maritime and energy preparedness training to enhance the security of the internal market system;
- X-FLEX – Integrated energy solutions and new market mechanisms for extended flexibility of the European network to increase the flexibility of the internal energy market system;
- FARCROSS – Facilitating cross-border electricity transmission through innovation, increasing IEM system flexibility, increasing regional cooperation, increasing system security;
- Trinity – Increasing the transport capacity at regional borders through smart market technologies, increasing the flexibility of the IEM system to increase regional cooperation;
- A financial compensation mechanism to support the competitiveness of industries at risk in order to reduce their harmful emissions;
- National scientific programmes of the Ministry of Education and Science – "Low carbon energy for transport and life – EPLUS" and "Environmental protection and risk reduction of adverse events and natural disasters" to create expertise with a focus on the storage and transformation of renewable energy, hydrogen – technologies and eco-mobility, basic and applied research. The programmes will be implemented over a period of 3 to 5 years.

The PINIDIT provides support for the development of the European Digital Innovation Hubs (EDIH) in the form of synergistic funding under Priority 1 'Sustainable Development of the

Bulgarian Research and Innovation Ecosystem', Priority Strand 4 'Synergy with Horizon Europe and Digital Europe' programmes.

Under the synergistic funding, the following procedures are foreseen under PINIDIT:

- A direct award procedure "Complementary funding to European Digital Innovation Hubs selected by the EC", aiming to provide complementary funding for the establishment of a national ECIC network and to develop the capacity of the selected national digital and innovation hubs to provide digital and green technology services to small and medium-sized enterprises and to public organisations for their non-economic activities. This procedure was open for application until 8 November 2023. The indicative budget for the procedure is BGN 13 586 742,33, broken down by each ECIH floor;
- Direct award procedure "Financing of ECIC awarded Seal of Excellence", The procedure will be open for application at the beginning of 2024.

Direct award procedure "Participation of Bulgarian organisations in institutionalised European Partnerships". This procedure will provide funding for the participation of Bulgarian consortia in the European (institutionalised) partnerships under Horizon Europe, covering the priority strands of the Innovation Strategy for Smart Specialisation 2027-2021 (IISS).

Priority strand 3 'Transfer of technology and knowledge' of Priority 1 of PINDIT includes support for the following measures:

- Innovative grants (voucher scheme) for SMEs to promote cooperation with CCCs, CCPs, NSIIP sites, Laboratory Complex of UTPs and other research organisations and laboratories. The main objective is to encourage business to make greater use of the capacities of scientific organisations in the processes of introducing innovative solutions, solving various technological problems of the enterprise, digitalisation, introducing new business models, prototyping, etc.;
- The Smart Bulgaria scheme, which will support joint projects between companies and a team of a scientific organisation or higher education institution that can protect significant potential to gain market share, generate economic impact and export through ideas for an entirely new product, service or process, or a new use of existing ones, which significantly expands the company's capabilities;
- Cooperation programmes for innovation and knowledge and technology transfer in the areas of European value chains. Joint programmes between industry, SMEs and scientific organisations and higher education institutions to build long-term cooperation and make significant progress and contribution to the regional economy, such as in the field of hydrogen valleys. The programmes can be of two types – focus in specific priority areas and horizontal, and are ambitious plans for cooperation between all actors in the innovation ecosystem for deep transformation in smart specialisation sectors with potential for systemic change;

- Mobility programmes between industry, research organisations and higher education institutions to further develop the practical capacity and develop the innovation and technological potential of the enterprise concerned. The programmes will promote intersectoral mobility of scientists in enterprises; returning scientists from abroad and attracting them to businesses.

Development of innovation clusters. The intervention focuses mainly on already built innovation clusters operating in the thematic areas of ISIS 2021-2027.

In pursuit of the policy objective "A more competitive and smarter Europe by promoting innovative and smart economic transformation and regional ICT connectivity", PINIDIT supports the development of skills for smart specialisation, industrial transition and entrepreneurship. The main objective of this support is the development of human capital and such knowledge, skills and competences in enterprises, the lack of which would result in the loss of staff due to the digital and green transformation of the economy.

The Framework of Priority 1, Priority Strand 1 "Sustainable Development of National Research and Innovation Capacity" provides for a direct award procedure "Sustainable development of Centres of Excellence and Competence Centres, including specific infrastructures or their groupings of NIIPs", to support the sustainable development of CCCs and CCPs, which are being built under OPERP, to move them into an operational phase, stimulate their cooperation with business through technology transfer, fully integrate them into the country's research and innovation ecosystem and increase their contribution to smart economic transformation.

All innovation measures implemented under the OPIC and foreseen to be implemented under the NRRP and under the PPP 2027-2 021 are in line with the Innovation Strategy for Smart Specialisation.

In the coming years, the country's efforts will focus on the deployment of new energy-saving technologies that make a significant contribution to reducing carbon emissions in the atmosphere, reducing the greenhouse effect and overheating of buildings. The use of modern innovative technologies that significantly reduce the penetration of ultraviolet and infrared radiation harmful to human health through glazed surfaces in buildings will be stimulated. The aim is to achieve better living and working conditions for Bulgarian citizens through a tangible reduction in energy costs, with a relatively fast return on the investments invested.

The low-carbon economy is an essential factor that will contribute to the objective of reducing harmful substances released into the atmosphere. In this context, action will be taken to reduce toxic emissions from transport, agriculture and industry. To this end, innovative suction and purification systems meeting the highest European requirements for capturing more than 90 % of harmful gases, vapours and particulate matter emitted in energy production, metallurgy production and processing processes, in the extraction and processing of aggregates (cement), lime, asphalt, marble etc., pharmaceutical industry, chemical industry (acid gases, hydrogen sulphide, hydrogen cyanide, hydrochloric acid etc.), food/nitrous oxide, carbon monoxide, formaldecide, etc. Technologies and innovative

products can also be applied, ranging from individual industrial portable systems for temporary aspiration of pollutants to centralised systems of large sectors and industries. The Bulgarian State will support the deployment in a real working environment of innovation contributing to energy saving and reducing harmful solid emissions (dust particles) into the atmosphere in order to ensure healthier and safer working and living conditions for people. Explore the deployment and use of electrochemical energy sources such as batteries, hydrogen energy and fuel cells.

ii. Where applicable, cooperation with other Member States in this area, including, where appropriate, information on how the SET Plan objectives and policies are being translated to a national context

Given the importance of innovation for the future development of clean and high-efficiency energy, Bulgaria's attention and efforts are focused on the possible implementation of energy innovation projects, which will be based on the European Strategic Energy Technology Plan. Changes to the overall energy model are being discussed, namely the uptake of smart grids, energy storage, the deployment of highly efficient energy technologies and systems in the economy and household, in order to reduce energy costs for consumers. Passive design of a green living environment will require a new holistic approach, which will include striking a balance between building orientation, glazing, ventilation, as well as providing high-performance insulation technologies, systems and materials. The deployment of new high-efficiency energy technologies and systems for buildings and glazed surfaces will significantly reduce energy costs by final customers, address decarbonisation challenges and improve people's quality of life and working conditions. In order to stimulate the cost-effective development of low-carbon technologies in Bulgaria, the Bulgarian State will also benefit from the SET plan being developed at European level, which promotes innovation cooperation across sectors and the European Innovation Fund.

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

With regard to investment "Programme for public support for the development of industrial areas, parks and similar territories and for attracting investment (AttractInvestBG)", the Ministry of Innovation and Growth announced the procedure by selecting proposals for the implementation of investments by final recipients BG-RRP-3.007. By Order No RD-14-403/20.09.23 of the Minister for Innovation and Growth, DG EFC was designated as the Monitoring and Reporting Structure for the implementation of Investment C3.I1: "Public support programme for the development of industrial areas, parks and similar territories and for attracting investment (AttractInvestBG)". Within the deadline for applying for the procedure, 20 proposals for the implementation of investments were submitted for a total amount of BGN 383 915 652.11. Grants will support the construction of technical, green and innovative infrastructure. With regard to the construction of 'Environmental infrastructure', it is envisaged (in case of need of the park/area) to finance activities for the construction and connection of newly built charging points, as well as the purchase,

supply and installation of charging stations of solar batteries for electric cars (with a total budget: BGN 1 500 000 or EUR 766 938).

With regard to investment Economic Transformation Programme of Component 3 "Intelligent Industry", a procedure was announced in 2023 to provide funds to final recipients BG-RRP-3.006 "Construction of new RES for own consumption in combination with local energy storage facilities in enterprises". The aim of the procedure is to award grants for the construction of renewable energy sources (RES) for self-consumption by enterprises combined with local energy storage facilities, thereby encouraging the transition of the private sector towards green activity. The measure focuses solely on solar photovoltaic energy and has as a mandatory element the acquisition of battery storage technologies and facilities, which contributes to the balance of power output and helps to overcome one of the disadvantages of renewable sources, namely intermittent production. The initial budget of the procedure was BGN 200 000 000 (EUR 102 258 376,24) and was subsequently amended to BGN 120 000 000 (EUR 61 355 025,74). Taking into account the maximum duration of implementation of a project (18 months), it is expected that the actual implementation of the investments will be completed in 2024 and 2025. The implementation of the procedure will result in a minimum of 54 096 kW operational capacity of the installed storage facilities.
Under Component 6 'Sustainable Agriculture', investment C6.I1 'Fund to promote the technological and environmental transition of agriculture of the RRP', four strands are envisaged for implementation:

1. "Investments in technological and environmental modernisation";
2. 'Centres for preparation for marketing and storage of fruit and vegetables';
3. "Investments related to water efficiency on agricultural holdings";
4. 'Investments in the construction and equipment of establishments for the rearing and appraisal of male breeding animals'.

An Operational Agreement for the implementation of Investment C26.09.2023.I6. under the RRP was signed between the Ministry of Agriculture and Food and the Ministry of Finance on 1.

Following two public consultations, a first investment procedure with reference BG-RRP-6.004 under the "Investments in technological and environmental modernisation" strand was announced on 28.9.2023, with a deadline for applications of 20.12.2023.

The procedure aims to provide timely support to Bulgarian farmers, in the form of grants, to quickly recover from the effects of the COVID-19 pandemic, address problems that hamper the competitiveness and sustainability of the agricultural sector and accelerate its adaptation to climate change, greening production, digital transformation, improving genetic resources.

The Fund to promote the technological and green transition shall provide support to farmers for targeted investments, for the purchase of tangible and intangible assets for the implementation of activities ensuring the protection of environmental components and

the mitigation of climate change, introducing innovative production, digital, production and organisation technologies in agriculture, for automation of work processes.

On 24.10.2023, a second investment procedure with reference BG-RRP-6.006 was announced under the heading 'Centres for preparation for marketing and storage of fruit and vegetables'. The deadline for applying for the procedure is 22.12.2023.

The main objective of the procedure is to support the marketing process of agricultural products falling within the scope of the fruit and vegetables sector by financing investments contributing to the supply of products whose quality, condition and type meet the needs of the final consumer. In this way, the support will provide an opportunity to increase the competitiveness of producers of agricultural products in the fruit and vegetables sector, including in particular those farms affected by the effects of the SARS-CoV-2 pandemic. The creation of short supply chains, the modernisation and automation of collection processes, market preparation and storage of fresh fruit and vegetables will be stimulated.

To date, the implementation of the "Investments related to water efficiency on agricultural holdings" strand has not started. The specific strand has a total public resource of BGN 119.7 million, including BGN 99.7 million from the Recovery and Resilience Facility and BGN 20 million for non-recoverable VAT from the State budget. A discussion with the EC services on part of the regulatory framework relating to its implementation is still ongoing under this strand.

With regard to the fourth strand 'Investments for the construction and equipment of livestock establishments for the breeding and evaluation of male breeding animals', the Ministry of Agriculture and Food has prepared and sent to the Ministry of Finance, respectively, a reasoned request to the European Commission for the abolition of its implementation and the exemption of the corresponding budget of up to BGN 4.6 million from the Recovery and Resilience Facility and up to BGN 0.9 million of national public funding for non-recoverable tax under the Value Added Tax Act (ZDDS). To date, the amendments submitted have been approved by the EC and are expected to be formally approved in November following a Council decision.

According to the Indicative Annual Work Programme 2023 of the Competitiveness and Innovation in Enterprises Programme 2027-2021 (EIP), two R & D and innovation procedures are planned: the "Development of innovation in enterprises" procedure and the "Introduction of innovation in enterprises" procedure. The first procedure is aimed at supporting in-house development/innovation and the second (which was announced for application on 2.11.2023) for innovation by SMEs, and activities under both procedures should be implemented in the thematic areas of the Innovation Strategy for Smart Specialisation 2027-2021 (IISS). One of the areas of the ISIS is 'Clean technology, circular and low-carbon economy' and a total of BGN 146 687 250 has been earmarked under the two procedures for implementing activities in this area.

The Indicative Annual Work Programme 2024 of the Research, Innovation and Digitalisation for Smart Transformation Programme 2027-2021 (PINIDIT) plans a complementary funding procedure to support Bulgaria's participation in the Clean

Hydrogen European Partnership for a hydrogen Valley project approved by the European Commission. The procedure aims at implementing a synergistic approach with Horizon Europe and supporting innovative technologies for regional transformation towards a green and digital economy, as well as building a long-term partnership between business, science and all stakeholders at regional level. The total amount of the project's budget by PINIDIT is BGN 16 000 000.

Under the REACT-EU instrument under Priority Axis 6 SME Recovery under OPIC 2020-2014, grant procedure BG16RFOP6.002-002 "Recovery of SMEs through energy efficiency improvement", announced in April 2022. The procedure provided support to SMEs to recover from the economic consequences of the COVID-19 pandemic by improving their energy efficiency. The purpose of the procedure is to provide focused support to Bulgarian SMEs to recover from the economic consequences of the COVID-19 pandemic by improving their energy efficiency. Under the procedure, 842 contracts were concluded, with a total grant value of BGN 83 586 313.55, out of which 16 contracts were successfully completed by February 2023, with a total grant value of BGN 1 426 176.69. The scope of the activities supported included various types of energy-efficient equipment such as boilers, burners, radiation heating, heat pumps, solar systems, recuperators, chillers, pumps, energy-efficient insulation systems in buildings, automated systems for monitoring energy consumption, etc.

As regards the construction of additional possibilities to connect our national gas transmission network with those of other countries, a project has been implemented which connects directly the national gas transmission networks of the Hellenic Republic and the Republic of Bulgaria. Under OPIC 2020-2014, project No BG16RFOP002-4.002-0001-C01 'Construction of gas interconnector Greece – Bulgaria' was implemented with the beneficiary: Ai Xi Bi AD. The total budget of the project is BGN 559 292 262.64, of which BGN 76 277 370 (EUR 39 000 000). The project was completed on 21.12.2022 and, as a result of its implementation, a gas pipeline was built with an entry point into the area of the city of Komotini (Greece) and an exit point in the area of Stara Zagora (Bulgaria). The total length is 182 km, of which 31.6 km are located on the territory of Greece and 150.9 km in the territory of Bulgaria. 29.6 km of the gas pipeline on the territory of Bulgaria were built using funds from OPIC 2014-2020. The interconnector has been put into commercial operation.

The strategy paper, which creates the baseline for the use of funds under European programmes in the field of research, innovation and competitiveness, is the Innovation Strategy for Smart Specialisation 2021-2027 (ISIS 2021-2027). The strategy is the thematic enabling condition for specific objectives for innovation and skills under Policy Objective 1 "A more competitive and smarter Europe by promoting innovative and smart economic transformation and regional ICT connectivity" for the European Regional Development Fund, the European Social Fund and the Cohesion Fund for the 2027-2021 programming period. The strategy adequately reflects the deployment of hydrogen technologies and acts as a basic programming document for defining the whole set of measures to finance innovation in the 2021-2027 programming period.

The Innovation Strategy for Smart Specialisation of the Republic of Bulgaria is a strategic framework for sustainable development based on research and innovation, on the territorial capacity and ambitions of the regions and on the broad involvement of stakeholders. The strategy is at the forefront of strengthening regional innovation ecosystems so that they can sustain and stimulate economic growth. ISIS 2021-2027 defines five thematic areas where Bulgaria has a competitive advantage and capacity for smart specialisation and should focus its efforts on their accelerated development.

The thematic areas of ISIS 2021-2 027 are:

1. *Thematic area Informatics and ICT;*
2. *Thematic area "Mechanics and Microelectronics";*
3. *Thematic area "Healthy Life Industries, Bioeconomy and Biotechnology";*
4. *Thematic area "New technologies in creative and recreational industries";*
5. *Thematic area Clean Technologies, Circular and Low Carbon Economy.*

The national roadmap to improve the conditions for unleashing the development potential of hydrogen technologies and hydrogen production and supply mechanisms sets out the pathway for building a hydrogen industry. The aim of the Roadmap is to create the basis for a coherent framework for the efficient, smooth and consistent introduction of hydrogen production, transport and use technologies in industry, energy, transport and household, to foster innovation and investment. Sectors and milestones will be identified to maximise the impact on commitments for a climate-neutral economy, to create new hydrogen value chains, to strengthen partnership at national, regional and European level. The Roadmap examines the amendments to the legislative provisions that have been undertaken, planned or should be prepared by the competent institutions to remove key barriers to the development of hydrogen technologies. The document includes the implementation of measures necessary for the development of the entire green hydrogen value chain.

In ISIS 2021-2027, under the thematic area 'Clean technologies, circular and low-carbon economy', the following sub-areas are prioritised:

- ✓ Innovation in the production, storage, saving, efficient distribution and consumption of energy, including from various renewable energy sources;
- ✓ Establishment of modern information complexes for autonomous energy systems;
- ✓ Hydrogen – technology based: hydrogen production with a focus on green hydrogen, storage, transport and use of hydrogen in industry, energy, transport and household;
- ✓ Development and deployment of technologies related to sustainable mobility (batteries and hydrogen) based on hydrogen and other alternative fuels, connected infrastructure and eco-mobility;
- ✓ Technologies for resource efficiency, for reducing the content of hazardous substances, for the use of alternative raw materials and materials, for extending the lifetime of products and their use in other industries;

- ✓ Non-waste technologies and methods for incorporating waste products and materials from production into other industries;
- ✓ Capture and utilisation of CO_2 from the atmosphere;
- ✓ Developing digital solutions for circular economy approaches.

Thematic area Clean Technology, Circular and Low Carbon Economy will be a priority area of smart specialisation in all 28 NUTs III domains of the country.

Under Priority Strand 3 'Transfers of Technology and Knowledge' of Priority 1 'Sustainable Development of the Bulgarian Research and Innovation Ecosystem', a 'Complementary funding procedure to support Bulgaria's participation in the Clean Hydrogen European Partnership for the construction of a hydrogen valley' in the municipality of Stara Zagora under the project proposal Zagora Sustainable Hydrogen Region (ZAHYR) is foreseen. The project aims to build a long-term partnership between business and science, as well as with all regional stakeholders.

Under the same strand, a measure for the development of Green and Digital Partnerships for Smart Transformation is foreseen. The measure focuses on strategic projects addressing a specific problem of a business partner or transferring knowledge and experience to a business partner, enabling sustainable solutions by providing green and/or digital services, creating a market advantage through the introduction/development of green and digital solutions and eco-innovation.

Under the Economic Transformation Programme (ETP) of the National Recovery and Resilience Plan (NRRP), a grant procedure BG-RRP-3.004 'Technological modernisation' is being implemented. The procedure envisages the acquisition of new technologies with a focus on the digitalisation of production processes with a view to expanding production capacity and/or diversifying the products/services offered by enterprises.

Under the NRRP, the NRRP provides for the implementation of equity financial instruments (FIs) for innovation, which aims to increase the innovation capacity of businesses, accelerate their productivity improvements and the transition to a knowledge economy, thereby improving Bulgaria's current position as a modest innovator in the EU (European Innovation Scoreboard 2020). The IF is currently being structured.

The Competitiveness and Innovation in Enterprises Programme 2027-2021 (CIP) provides support measures for the development and uptake of business innovation in the thematic areas of ISIS 2027-2021, including in the field of Clean Technologies, Circular and Low Carbon Economy. At the end of 2023, the second procedure for granting grants in the field, or for the deployment of innovation in enterprises, was announced. Support through financial instruments for venture capital investments is also foreseen to create new and develop innovative enterprises, with priority supporting enterprises with a core activity in high-tech or medium-high technology manufacturing sectors and knowledge-intensive services not related to technology transfer.

Under Priority Axis 6 Recovery of SMEs under OPIC 2020-2014, grant procedure BG16RFOP6.002-002 'Recovery of SMEs through energy efficiency improvement',

announced in April 2022. The procedure provided support to SMEs to recover from the economic consequences of the COVID-19 pandemic by improving their energy efficiency.

In the framework of the ITP, the NRRP announced a grant procedure BG-RRP-3.008 "Support for the transition to a circular economy in enterprises", which aims to contribute to accelerating the transition to a circular economy by providing grants to enterprises in the manufacturing sector to introduce circular resource use models and deploy climate-neutral methods and technologies for the production and consumption of their products.

Under the same programme under the NRRP, a guarantee FI for energy efficiency and renewable energy, which aims to respond to Bulgaria's challenges in providing support for investments in energy efficiency and renewable energy, is in the process of being structured. The guarantee instrument shall target SMEs, small mid-cap companies and individuals.

Under the EIP, Priority 2 Circular Economy, SO 2.1 Promotion of energy efficiency and reduction of greenhouse gas emissions, support is provided for activities aimed at energy efficiency measures in enterprises, including the introduction and certification of energy management systems, as well as energy monitoring and control systems. Companies will be incentivised to use electricity, heating and cooling from renewable sources for their own consumption.

Support will be implemented through combined financing between debt FIs and grants.

Within the same priority of the IPC, SO 2.6 Fostering the transition to a circular and resource-efficient economy supports the introduction of greener manufacturing practices, promoting activities in the areas of product design, production processes and waste management. The creation of business-to-business partnerships to achieve industrial symbiosis and the creation of industry platforms for the exchange of good practices will be encouraged.

In the framework of the PIT in implementation of the NRRP in February 2023, grant procedure BG-RRP-3.006 "Construction of new RES for self-consumption combined with local energy storage facilities in enterprises" was announced. The aim of the procedure is to award grants for the construction of renewable energy sources (RES) for self-consumption combined with local energy storage facilities (batteries), thereby encouraging the transition of the private sector to green.

Within Priority 1 "Sustainable Development of the Bulgarian Research and Innovation Ecosystem", Specific objective: 1.1. Developing and enhancing research and innovation capacities and the deployment of advanced technologies, Priority Strand H: The 'technology and knowledge transfer' of PINIDIT foresees the use of financial instruments to increase the amount of investment by implementing new funding models in the area of research and innovation. Although support is not targeted towards innovative high-added-value industries, FI support is envisaged for knowledge and technology transfer, active commercialisation of research results, intellectual property and its management as the main tool for knowledge transfer and revenue generation. The Technology Transfer Fund will provide support to spin-offs, high-tech start-ups and knowledge-based companies as

part of industrial start-up systems, turning scientific developments into marketable products and technologies, commercialisation and intellectual property management. It will also stimulate the process of deployment and internationalisation of start-ups around developed industries and clusters, for highly effective sharing of benefits in the field of research innovation and for the economic development of the sector and regions in the country.

EIP 2021-2027, Priority 1 "Innovation and Growth", SO 1.3 Enhancing sustainable growth and competitiveness of SMEs and job creation in SMEs, including through productive investment, provides support to promote entrepreneurial activity through equity FIs, the so-called Entrepreneurship Funds family. The Funds shall provide investments for start-ups and existing businesses at all stages of their development, depending on their growth potential and according to market needs and funding gaps.

A new Law on Promotion of Research and Innovation is currently being developed together with the Ministry of Education and Science. In the context of the implementation of innovation development policy, the Ministry of Innovation and Growth, in partnership with the Ministry of Education and Science, is preparing a new Law on Promotion of Research and Innovation, which will reward the existing legislative framework with aspects of public-law relations between actors in the research and innovation ecosystem in the country so as to enable them to realise their full potential and increase the economic and social impact of investment in research and innovation. The law will define the authorities and procedures for shaping the national policy to promote research and innovation, regulate the role of each of the institutions involved in the process of policy design, implementation, monitoring and evaluation, specify how the policy is financed. As regards technology transfer policy, the law will define the principles and rules governing the financing of technology transfer, the role of the institutions involved in the process of drafting, implementing, monitoring and evaluating technology transfer policy. The law will set out the principles and rules that will govern the financing of technology transfer, the role of institutions involved in the preparation, implementation, monitoring and evaluation of technology transfer policy. The preparation of the new RISE is in line with the efforts to improve innovation policy initiated with the newly established Ministry of Innovation and Growth (MEG) as the institutional policy manager.

According to the functions allocated to the departments, the MER is responsible for preparing the draft Act on the Promotion of Electric Mobility, which is milestone No 178 of the Annex to the Council Implementing Decision on the approval of the assessment of the Recovery and Resilience Plan for Bulgaria. The aim is to develop a new legal framework to promote the deployment of recharging infrastructure and zero-emission vehicles and to limit the use of the most polluting vehicles. This includes: simplifying the procedures for the construction and connection of charging stations to the electricity grid; regulatory obligation for municipalities to provide places for chargers; a regulatory incentive for electric utilities to provide easy access to the power grid; introduction of preferential financial instruments for small and medium-sized enterprises investing in the construction and management of recharging infrastructure, etc. The law must introduce incentives for

the market uptake of electric vehicles (EVs) and comply with the polluter pays principle, including specific measures: subsidies for zero-emission vehicles; differentiation of registration/property taxes according to the level of emissions and scrapping schemes for the most polluting vehicles.

Unlocking the potential of hydrogen technologies and hydrogen production and supply is a key prerequisite for meeting the objectives of the Green Deal and decarbonising the economy, given the potential of hydrogen to replace fossil energy sources in the economy of the future. In connection with the implementation of the above-mentioned reform, the MEM has taken steps to prepare a draft National Roadmap for the Development of Hydrogen Technologies, developed in the framework of a working group set up by order of the Minister for Innovation and Growth. The aim of the Roadmap is to create the basis for a coherent framework for the efficient, smooth and consistent introduction of hydrogen production, transport and use technologies in industry, energy, transport and household, to foster innovation and investment. Sectors and milestones will be identified to maximise the impact on commitments to a climate-neutral economy, create new hydrogen value chains and strengthen partnership at national, regional and European level. The Roadmap will set out legislative and regulatory amendments to be prepared by the competent institutions in order to remove the key barriers identified in the Roadmap for the development of green hydrogen technology.

SECTION B: ANALYTICAL BASIS

4. STATE OF PLAY AND PROJECTIONS OF EXISTING POLICIES AND MEASURES

4.1 projected evolution of the main externalities affecting the development of the energy system and greenhouse gas emissions

i. Macroeconomic projections (GDP and population growth)

Table 15 *GDP (in 000 MEUR15)*

2020	2025	2030	2035	2040	2045	2050
49.8	58.3	62.3	66.3	70.5	74.6	78.4

Table 16 *Population (million inhabitants)*

2020	2025	2030	2035	2040	2045	2050

7.0	6.8	6.4	6.2	6.0	5.8	5.6

ii. Sectoral changes expected to impact the energy system and GHG emissions

iii. Global energy trends, international fossil fuel prices, EU ETS carbon price

Table 17: *International fossil fuel prices (EUR '15 per barrel of oil equivalent)*

	2020	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Liquid fuels	35.2	66.9	83.0	83.0	87.8	95.2	106.3
Natural Gas	16.0	72.1	60.9	60.9	60.9	60.9	63.7
Coal	8.3	16.5	16.7	16.9	18.0	18.9	19.7

iv. Technology cost developments

4.2 decarbonisation

4.2.1 greenhouse gas emissions and sinks

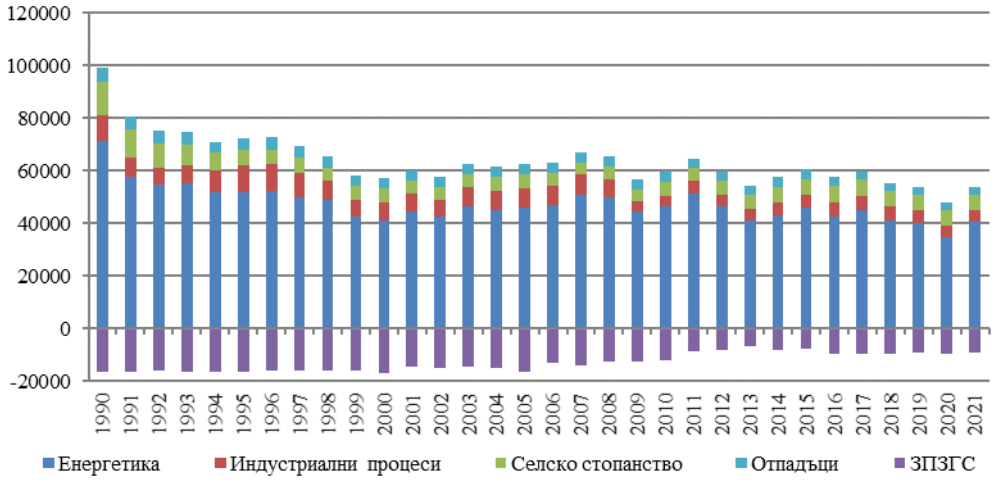
i. The current share of energy from renewable sources in gross final energy consumption as well as in different sectors (heating and cooling, electricity and transport), as well as for each technology in each sector

In 2021, Bulgaria's greenhouse gas emissions amounted to 53 917 Gg CO_2, excluding the LULUCF sector. Emissions decreased by 52.55 % compared to the base year (1988) and by 12.36 % compared to emissions from the previous year 2020.

The main reasons for reducing greenhouse gas emissions in Bulgaria are:

- Structural reforms in the economy due to a transition from a planned to a market economy;
- Reducing electricity production from thermal power plants (and increasing hydropower and nuclear shares);
- Structural changes in industry (including a decline in the production of energy-intensive businesses and improvements in energy efficiency);
- Introduction of energy efficiency measures in the residential sector;
- Switching from solid and liquid fuels to natural gas in energy consumption;
- the decline in cattle and sheep populations and fertiliser use.

Figure 5: *Total Bulgarian sectoral emissions 1988-2021, Gg CO_2 eq.*



Source: National Greenhouse Gas Inventory Report

The energy sector (GHG emissions from fuel combustion) accounted for the largest share of total GHG emissions in 2021, at 75.0 %. The agriculture sector ranks second with 11.3 %, the industrial processes and solvent use sector ranks third with 8.4 % and the waste sector with 5.3 %.

Emissions in the Emissions Trading System accounted for 53.5 % of total GHG emissions in 2021, while the share of non-ETS emissions was 46.5 %.

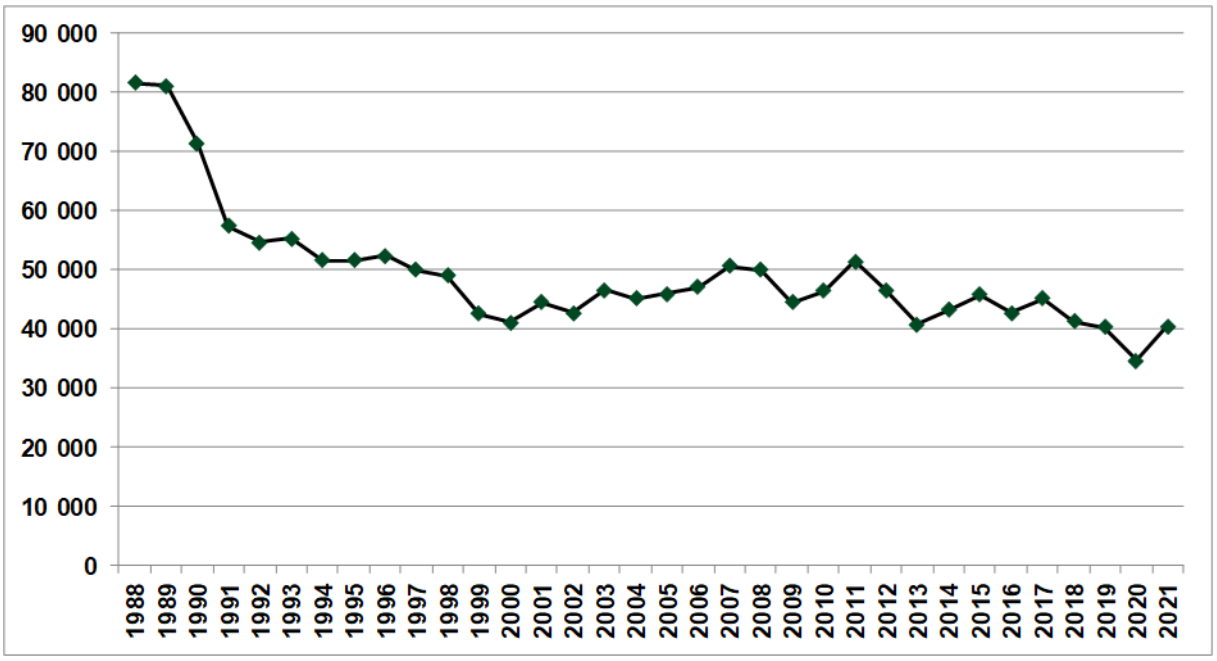
Energy sector

In 2021, emissions from the Energy sector decreased by 50.41 % compared to the base year (40 444 Gg CO_2eq in 2021 compared to 81 562 Gg CO_2eq in 1988). Compared to the previous year, emissions in 2021 decreased by 16.6 %, mainly due to a decrease in electricity generation from fossil fuels.

The main source of emissions in the sector is the combustion of solid fuels, which accounted for 41.0 % of the sector's emissions in 2021, followed by liquid and gaseous fuels with 48.2 %.

GHG emissions between 1988 and 2 021 are driven by significant reductions in emissions from the combustion of fuels in energy sectors (47.6 %) and energy use in manufacturing and construction (73.9 %) and in other sectors (commercial, residential, forestry) at 69.7 %, as well as a clear increase in greenhouse gas emissions from transport by 40.4 %).

Figure 6: *GHG emissions from Energy 2021-1989, Gg CO2eq*



Source: National Greenhouse Gas Inventory Report

Energy industries

The fuel consumption of the following sub-sections is included in this section:

- Electricity generation and transmission, including cogeneration;
- Production and transmission of heat for public purposes;
- Natural gas transmission (pressure maintenance at compressor stations).

For 2021, the overall trend in category 1.A.1 is a 47.6 % reduction in emissions compared to the base year and the 23.6 % reduction compared to last year.

Table 18: *Emission trend in the energy industry sub-sector, Gg CO2 eq.*

Year	1988	1990	2021
Aggregated emissions, Gg CO_2 eq	42 167	36 526	22 101

Manufacturing or construction

The subsector Manufacturing and construction includes the following groups*:*

- Iron and steel;
- Non-ferrous metals;
- Chemicals;
- Pulp, paper and printing services;
- Food, beverage and tobacco processing;
- Minerals, not containing metals;
- Other.

Following the restructuring of the industrial sector in the country, the overall trend in this category shows a 73.9 % reduction in emissions compared to the base year and a slight increase of 13.9 % compared to last year. Virtually all subcategories in the industry

decreased steadily until 2009, keeping the same level since then, although there has been a slight increase since 2014.

Table 19: *Emissions trend in manufacturing and construction sub-sector, Gg CO2 eq*

Year	1988	1990	2021
Aggregated emissions, Gg CO_2 eq	17 495	17 757	4 573

Transport

Between 1988 and 1991, fuel consumption in the transport sector decreased by 49 % due to the collapse of the economy. Since 1991, fuel consumption (diesel) has steadily increased, mainly due to road transport. Although there was a decline in 2013, the use of fuels (diesel) for road transport started to increase again since 2014.

Table 20: *Emissions trend in transport sub-sector, Gg CO2 eq*

Year	1988	1990	2021
Aggregated emissions, Gg CO_2 eq	7 066	6 516	9 921

Other sectors

Other sectors include the following categories:

- services and public buildings;
- residential;
- agriculture, forestry and fishing.

Table 21: *Emission trend in other sectors, Gg CO2 eq*

Year	1988	1990	2021
Aggregated emissions, Gg CO_2 eq	6 934	8 146	2 098

Industrial Processes and Solvent Use Sector (IPSD)

A steady downward trend in this sector has been observed since 1988. Emissions in 2021 decreased by 65.69 % compared to the base year 1988.

In 2021, the IPSD sector accounted for 8.41 % of total national greenhouse gas emissions (excluding LULUCF), compared to 11.5 % in base year 1988. In 2021, the GHG emissions from the IPSD were 4 534 Gg CO2 compared to 13 177 Gg CO2 in the base year 1988.

In 2021, the most important category was mineral products (mainly clinker and lime production), which accounted for 51.8 % of total IPSD emissions. The second category is the chemical industry (ammonia and nitric acid production) with 27.35 %, followed by the use of products used as substitutes for ozone-depleting substances with a share of 16.33 % and finally with 2.93 % metal production (steel).

GHG emissions from the IPSD sector fluctuate over time and reached the lowest level in 2009. The reduction in 2021 for the whole sector was 65.6 % of the base year, while the largest decrease was observed in the metal manufacturing sector at 96.7 %.

This was mainly due to the economic crisis and in particular to the global economic crisis in 2009. After 1996, a privatisation process started, leading to a reduction in the production of enterprises. This process is followed by a restructuring and modernisation of production, while at the same time some of the companies cease to operate.

The overall reduction in emissions over the years has also been influenced by the introduction of better technologies at company level.

Table 22: *Emission trend in the industrial processes and solvent use sector, Gg CO_2 eq*

Year	1988	1990	2021
Aggregated emissions, Gg CO_2 eq	13 177	9 814	4 534

Agriculture sector

The overall reduction in emissions in the sector has been 55.1 % since 1988. In 2021, agriculture contributed 11.30 % to Bulgaria's total GHG emissions (excluding LULUCF).

The reduction in emissions by 2000 is mainly due to the systematic reduction in agricultural land area due to the abandonment of arable land and a decrease in the livestock population. Another driver to reduce emissions is the reduction of fertiliser use.

Table 23: *Emissions trend in agriculture, Gg CO_2 eq*

Year	1988	1990	2021
106	13 599	12 326	6 106

Land Use, Land Use Change and Forestry (LULUCF) sector

The LULUCF sector acts as a GHG sink for Bulgaria through the two categories "Forests" and "Pasides", which absorb CO_2. All other categories (arable land, Population, Water areas) are sources of CO_2 emissions. The net removal of CO_2 from LULUCF decreases by 43 % compared to the baseline year 1988. The main reason for the overall reduction of LULUCF CO_2 removals is the reduction of the Gory category removals and the slight increase in emissions from the categories cultivated land, Population sites, Water areas.

The main reason for the decrease in forest uptake is the observed decline in forest growth rates, as the average age of forests increased steadily over the reporting period. Despite a decrease, the share of removals in total GHG emissions (in CO_2ek) is still significant. This is because emissions in other sectors have also decreased significantly. The share of base year removals was 14.2 % of total CO_2emissions, while in 2021 the share was 17 %.

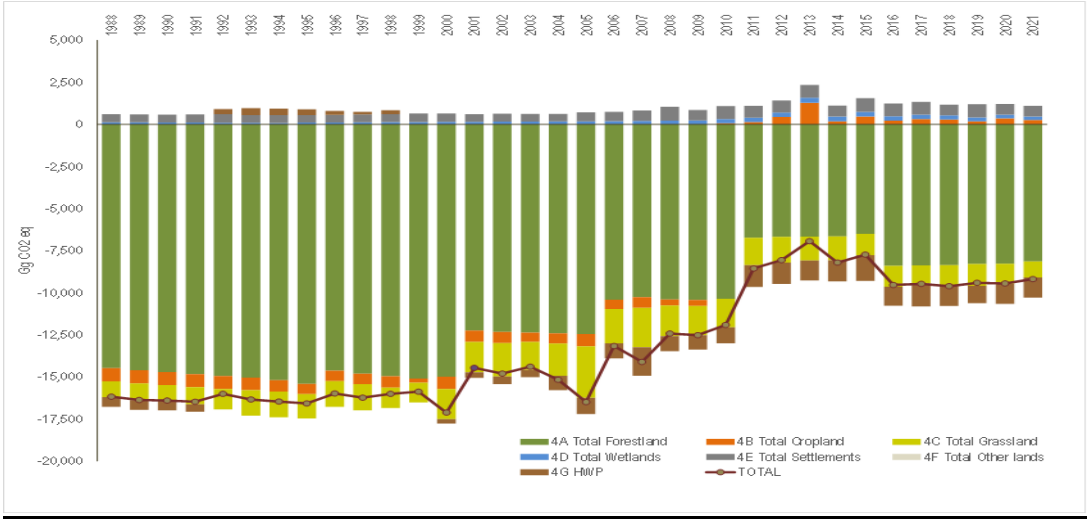
Compared to the base year, there has been an increase in emissions in cropland, settlements and wetlands. Total emissions from arable land fluctuate throughout the period. Emissions from settlements have increased over the last few years due to changes from other land uses to settlements in line with increased infrastructure works since Bulgaria's accession to the EU.

Arable farmland is decreasing compared to the base year. The total arable area is 15.40 % lower than in the base year and ranges from 4 363 kha in 1988 to 3 691 kha in 2021. Non-annual crops account for 95 % of the total area of arable land, while the remaining 5 % relates to permanent crops. As there is a change in the entire time series in the Land Representation calculations for the submission of information for 2020 concerning some of the issues related to methodological changes in agricultural statistics (between, before and after 2000) and there are some differences in definitions interpolated between data in 1988 (before the land reform that started in 1991) and 1998 (which is the first year of the new BANCIK statistics), the current presentation and insights for arable areas only includes utilised (managed) arable land, with all secondary grassland and marginal cropland recorded in another category.

A major problem in the presentation of the land use model is limited information on land-use change between certain categories. Activity data providers shall identify the total area for each individual land use category, but do not provide detailed information on the area changes between each category. Thus, a combination of approaches according to the 2006 IPCC Guidelines was used for the calculations. Where data are not available to fill in the information, information from available statistical data as well as probabilistic assumptions for the known land-use change pattern are possible.

The estimation of emissions/removals from the cropland category is based on estimates of carbon stock changes in living biomass and soil. Changes in biomass stocks are only assessed for permanent crops. For annual crops, the increase in biomass stocks in one year is assumed to be equal to biomass losses from harvests and mortality in that year – therefore there is no net accumulation of biomass carbon stock. The area with immature perennial crops accumulates carbon at a rate of approximately 0.43 t C/ha/Y. for orchards and 0.28 t C/ha/Y. for vineyards.

Figure 7: *Emissions and sinks in LULUCF 1989-2016, Gg CO_2 eq.*



Source: National Greenhouse Gas Inventory Report

Waste sector

The GHG emissions generated by the waste sector are CO_2,CH_4 and N_2O. The main share of CH_4 in the sector is due to the landfilling of municipal solid waste. N_2O is separated by waste water treatment and treatment and biological treatment and waste incineration. Co_2 is separated by waste incineration.

Trends shall take into account the current state of waste management in line with existing legislation aiming at reducing landfilling of waste and following the waste management hierarchy.

The measures implemented to reduce GHG emissions in the sector are mostly related to the management of municipal solid waste.

The basic principle of waste management, which is included in Bulgarian waste management policies, is compliance with the waste hierarchy:

Prevention – > Preparation for re-use – > Recycling – > Other use – > Deposition

Sound waste management reduces the pressure associated with the 'disposal' of waste, especially the consequences of landfilling. The EEA assesses that improved waste management significantly reduces annual net GHG emissions, a significant part of which has been achieved since 2000. The main contributing factors are reducing methane emissions from landfills and avoiding emissions through recycling. As an additional tool to increase recycling practices, it is the fact that recycled materials meet a significant part of the demand for some materials. Waste represents a loss of material resources (through metals and other recyclable materials) and at the same time has potential as sources of energy. The challenges in waste management are high. The implementation of waste treatment activities such as reuse and recycling are environmental, leading to the diversion of waste from landfills.

Emissions from the waste sector decreased by 46.39 % in 2021 (4 081.82 Gg_{CO} 2-eq. in 2021 compared to 5 284 Gg_{CO} 2-eq. in 1988) compared to the base year.

Table 24: *Emission trend in the waste sector, Gg CO2 eq*

Year	1988	1990	2021
Summarised, Gg CO_2 eq	5 284	5 258	2 833

Summary of historical trends in GHG emissions

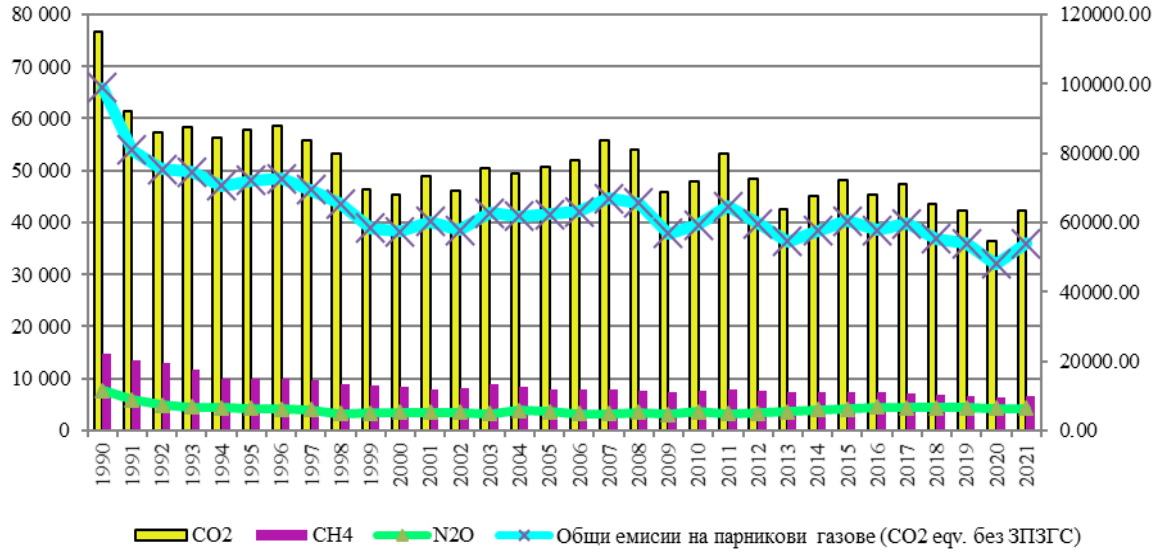
The country's total GHG emissions reduction from base year until 2021 is 52.55 %.

Table 25: *Emissions and sinks of Bulgaria by sector, Gg CO_2eq*

Sectors	1988	1990	1995	2000	2005	2010	2021	Change 1988/2016 %
Energy	81562,45	71512,07	51664,40	41081,59	45990,93	46370,94	40444,13	— 50,41
IFSD	13176,76	9813,72	10270,42	7068,26	7508,22	4088,91	4533,86	— 65,59
Agriculture	13598,73	12326,28	5790,41	5043,34	4982,79	5191,00	6106,34	— 55,10
LULUCF	— 16112,02	— 16344,26	— 16528,10	— 17083,34	— 16460,11	— 11876,88	— 9144,09	— 43,25
Waste	5284,33	5258,26	4443,13	4194,27	3882,38	3732,32	2832,94	— 46,39
Total (excluding LULUCF)	113622,28	98910,34	72168,36	57387,46	62364,32	59383,17	53917,27	— 52,55

By 2021, more than 70 % of GHG emissions came from the energy sector, the transition of this sector plays a major role in reducing GHG as a whole.

Figure 8: *Total GHG emissions, 1988-2021 CO_2eq*



Source: National Greenhouse Gas Inventory Report

ii. Sectoral projections for existing national and EU policies and measures up to 2040 (including 2030)

Projections of greenhouse gas emissions in the energy sector

The greenhouse gas emission projections for the energy sector are based on an analysis of the change in the country's energy balance until 2030, based on the existing measures planned by Bulgaria and provided as underlying assumptions.

The projections shall take into account all existing greenhouse gas emission reduction measures and existing measures to achieve the RES and energy efficiency targets provided in detail in the relevant sections of this Plan.

The energy industries sub-sector covers the following activities:

- Electricity generation and transmission, including cogeneration;
- Production and transmission of heat for public purposes;
- Natural gas transmission (pressure maintenance at compressor stations).

The energy industries sector consists of power and heat generation facilities on a large scale. This is the sector responsible for the highest amount of GHG emissions. This sector is projected to continue to emit the largest share of emissions.

<u>Subsector Manufacturing and construction</u>

The projections for this sub-sector are based on economic development expectations and forecasts, the share of individual sub-sectors, fuel consumption projections and the overall projections for the use of some of the main energy sources.

Transport sector

The forecast for the development of the transport sub-sector has been prepared in line with the forecast for the use of fuels in the sector.

Projections for CO2 emissions from$_{the}$ transport sub-sector shall be calculated on the basis of energy consumption projections in the transport sector. The transport sector is divided into four sub-sectors: road traffic, air traffic, rail traffic and shipping.

Projections of greenhouse gas emissions and sinks in the LULUCF sector

The main category contributing to the uptake of GHG is the Gori category. All other land categories (arable land, Population, Water areas) are sources of CO_2 emissions. The main reason for the overall reduction in removals of CO_2 emissions from LULUCF is the decrease in the forest category removals and the slight increase in emissions from the cropland, Population, Water Land categories.

The decline in forest category removals is due to the observed decline in forest growth rates and the average age of forests.

The increase in biomass use is expected not to affect land use and hence the LULUCF sector, as land dedicated to energy crops is not expected to increase significantly. For biomass production, Bulgaria is supposed to exploit the unused biomass potential, which includes the biodegradable fractions of products, waste and residues of biological origin from agriculture (including vegetal and animal substances), forestry and related industries, including fisheries and aquaculture, as well as biodegradable fractions of waste, including industrial and municipal waste of biological origin, meeting the sustainability criteria set out in Article 29 of Directive (EU) 2018/2001.

Overall, land use is not projected to undergo significant changes over the next 10 years.

Forest ecosystems contribute the most to GHG absorption by all ecosystems.

Estimates of greenhouse gas emissions in the Waste sector

The main GHG emissions emitted by the waste sector are CO_2,$_{CH4}$ and N_2O. The main share of $PM4_{in}$ the sector is due to the landfilling of municipal solid waste. N_2O is separated by waste water treatment and treatment and biological treatment and waste incineration. The projections shall take into account the current state of waste management in accordance with the legislation in force.

For the INECPs, the relevant measures from the National Waste Management Plan and the Third National Action Plan on Climate Change are scheduled to continue to be updated until 2030 and build on the progress of their implementation.

NMPs play a key role in achieving resource efficiency and sustainable waste management, as the current situation shows that there is significant potential in Bulgaria to improve waste prevention and management, better use of resources, create new markets and create new jobs, while reducing the harmful impacts of waste on the environment.

The fourth NMP is a plan for the transition from waste management to efficient use of waste as a resource and sustainable development by preventing its generation as far as possible. The successful implementation of the plan is foreseen to prevent and reduce the harmful impact of waste on the environment and human health and to reduce the use of primary natural resources.

Continued implementation of the measures of the National Waste Management Plan as well as the Third National Climate Change Action Plan will reduce greenhouse gases.

Projected emissions in the sector imply the implementation of the programme to reduce the amount of biodegradable waste for landfilling, as well as the capture and incineration of methane in landfills. But good practices can also ensure that about 50 % of the gas generated is captured and incinerated.

4.2.2 renewable energy

i. The current share of renewable energy in total final energy consumption as well as in different sectors (heating and cooling, electricity and transport), as well as for each technology in these sectors[14]

The use of renewable energy in the country is becoming increasingly important in all sectors: electricity, heating and cooling and transport.

The following table presents the energy consumption of renewable energy for the period 2018-2022, with calculations for 2018, 2019 and 2020 using the methodology of Directive 2009/28/EC and for 2021 according to the methodology of Directive (EU) 2018/2001.

Directive (EU) 2018/2001 introduced requirements for sustainability criteria and greenhouse gas emission criteria for consumption of solid and gaseous biomass fuels. The later introduction of the requirements of European legislation in this area has led to a failure to take into account some of the biomass fuels used in the sectors: electricity and heating and cooling. In this respect, a lower share of renewable energy in the country's gross final energy consumption of 19.45 % and 19.1 % was achieved in 2021 and 2022.

***Table 26**: Gross final consumption of energy from renewable sources in heating and cooling, ktoe*

[14]Based on SHARES tool 2018.

	2017	2018	2019	2020	2021	2022
Брутно крайно потребление на енергия от ВИ	**2 038.20**	**2 237.05**	**2 321.73**	**2 430.73**	**2 176.62**	**2 090.05**
Брутно производство на електрическа енергия	635.89	736.54	759.30	736.01	700.28	656.54
Крайно потребление на топлинна енергия и енергия за охлаждане	1 229.65	1 349.22	1 404.39	1 523.64	1 300.24	1 263.22
Крайно потребление на транспорта	172.66	151.29	158.03	171.08	176.10	170.30
Брутно потребление на енергия в страната	**10 902.56**	**10 869.52**	**10 775.93**	**10 423.76**	**11 192.68**	**10 945.38**
Дял на енергията от ВИ в брутното крайно потребление на енергия	**18.69%**	**20.58%**	**21.55%**	**23.32%**	**19.45%**	**19.10%**

Source: Shares tool 2020 and SHARES tool 2022, Eurostat

The distribution of energy from renewable sources by sector is as follows:

- electricity sector

In 2022, the gross final consumption of electricity from renewable sources was 665.94 ktoe (7 743.54 GWh), achieving a 20.24 % share of renewable energy in the country's gross final consumption of electricity. Electricity production from photovoltaic plants increased by 30 % in 2022 compared to 2021. In fact, the amount of electricity produced from renewable sources in 2021 and 2022 was higher, but as a result of the untimely introduction of the sustainability criteria and the greenhouse gas emission criteria, part of electricity produced from biomass was not taken into account. The quantities of electricity not reported in 2021 amounted to 1 435 GWh (123 ktoe) and in 2022 to 2 116 GWh (182 ktoe).

Table 27: *Total actual contribution (expressed in terms of installed capacity and gross electricity production) of each technology for the production of electricity from renewable sources in the Republic of Bulgaria to achieve the 2021 and 2022 targets of the indicative trajectory for the shares of energy from renewable sources in the electricity sector, ktoe*

	2017	2018	2019	2020	2021	2022
ВЕЦ	368.07	373.09	367.37	352.47	349.09	353.55
ВтЕЦ	122.76	121.14	120.96	121.59	135.16	121.38
ФЕЦ	120.63	115.46	124.03	127.33	126.10	180.04
ЕЦ на биомаса	34.05	135.25	156.56	146.12	99.26	10.98
Брутно крайно потребление на електрическа енергия от ВИ	**645.52**	**744.94**	**768.92**	**747.51**	**709.62**	**665.94**
Брутно крайно потребление на електрическа енергия	**3 393.60**	**3 332.26**	**3 270.71**	**3 169.27**	**3 314.00**	**3 291.03**
ВИ-Е, %	**19.02%**	**22.36%**	**23.51%**	**23.59%**	**21.41%**	**20.24%**

- heating and cooling sector

The gross final consumption of renewable energy achieved in 2022 was 1 263 ktoe (14 686.05 GWh), reaching a 31.67 % share in the country's gross final consumption of heating and cooling.

Solid biomass is the largest contributor to the final energy consumption structure of renewable energy in this sector, with the largest contribution of 78.3 %. Between 2017 and 2022, there was a steady increase in energy consumption by heat pumps (aerothermal and hydrothermal) in final heating and cooling consumption, which increased by 43 % in 2022 compared to 2017, due to a change in the sustainability criteria and greenhouse gas emission criteria of 214 ktoe for 2021 and 174 ktoe in 2022.

Table 28: *Gross final consumption of energy from renewable sources in heating and cooling, ktoe*

	2017	2018	2019	2020	2021	2022
геотермална енергия	34.63	34.63	35.11	35.71	36.10	36.59
слънчева енергия	23.47	24.93	26.08	27.40	29.18	32.02
биомаса	1 054.53	1 160.94	1 189.22	1 307.39	1 061.59	998.30
твърда биомаса	1 043.39	1 148.02	1 176.67	1 296.17	1 049.91	988.79
газообразна биомаса	11.14	12.92	12.55	11.22	11.68	9.51
термопомпи	87.41	92.40	105.54	111.60	130.89	153.86
аеротермални	67.96	71.29	84.18	89.99		
хидротермални	19.45	21.10	21.36	21.61		
Възобновяеми отпадъци	29.61	36.31	48.45	41.53	42.48	42.44
Брутно крайно на топлинна енергия от ВИ	**1 229.65**	**1 349.22**	**1 404.39**	**1 523.64**	**1 300.24**	**1 263.22**
Брутно крайно потребление на топлинна енергия	**4 118.82**	**4 057.75**	**3 964.59**	**4 098.19**	**4 330.62**	**3 988.93**
ВИ-ТЕ ЕО, %	**29.85%**	**33.25%**	**35.42%**	**37.18%**	**30.02%**	**31.67%**

- transport sector

In 2022, the final energy consumption of renewable energy in the transport sector was 192.46 ktoe, reaching a 7.67 % share of final energy consumption in this sector. The target was 2.25 percentage points below the 9.92 % planned in the INECP. The slower growth in the consumption of advanced biofuels and the still low use of electricity from renewable sources in road and rail transport, combined with the increase in energy consumption in this sector, are major reasons for not achieving the target.

Table 29: *Final consumption of energy from renewable sources in the transport sector, ktoe*

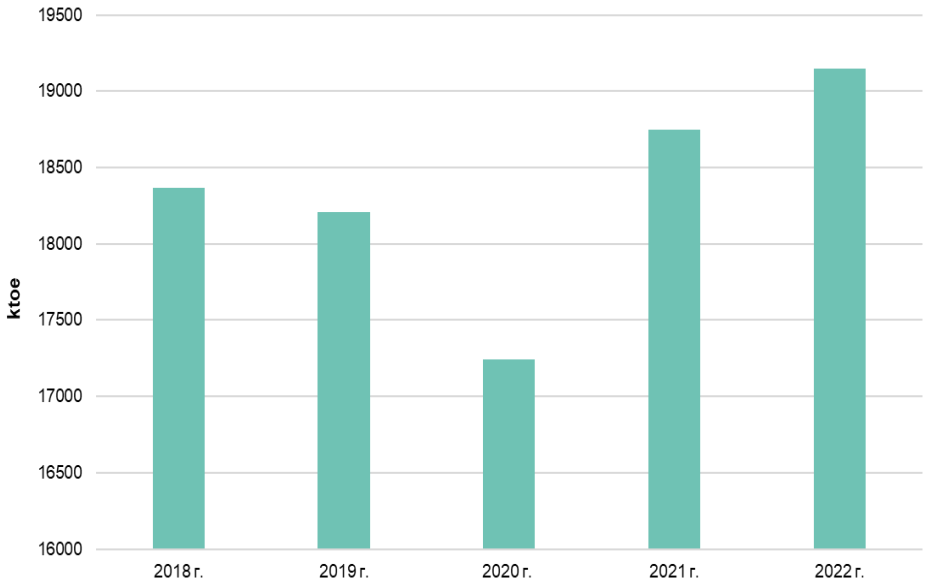
	2017	2018	2019	2020	2021	2022
биоетанол	**26.65**	**28.59**	**31.82**	**26.51**	**20.75**	**20.90**
биодизел (FAME)	**136.38**	**60.79**	**65.78**	**77.25**	**74.67**	**95.27**
биогорива от ново поление - Анекс IX, част А		**11.25**	**5.97**	**16.63**	**9.09**	**9.55**
биогорива от ново поление - Анекс IX, част Б		**42.26**	**44.85**	**39.20**	**62.25**	**57.34**
Електрическа енергия от ВИ	**9.63**	**8.40**	**9.61**	**11.50**	**9.34**	**9.41**
потребена в автомобилен транспорт	1.34	0.93	0.95	1.01	0.82	0.95
потребена в железопътния транспорт	7.76	7.03	8.33	10.19	8.28	8.20
потребена в други транспортни сектори	0.52	0.44	0.33	0.30	0.24	0.26
Крайно потребление на енергия от ВИ в траспорта	**172.66**	**151.29**	**158.03**	**171.08**	**176.10**	**192.46**
Крайно потребление на енергия от ВИ в траспорта, с прилагане на коефициенти за биогорива от ново поколение и електрическа енергия	**189.67**	**219.05**	**225.16**	**246.22**	**234.09**	**232.44**
Крайно потребление на енергия в траспорта	**2 607.95**	**2 712.54**	**2 852.57**	**2 705.59**	**3 075.12**	**3 029.24**
ВИ-Т, %	**7.27%**	**8.08%**	**7.89%**	**9.10%**	**7.61%**	**7.67%**

ii. Indicative projections of developments under existing policies for 2030 (forecast up to 2040)

4.3 energy efficiency dimension

i. Current primary and final energy consumption in the economy and by sector (including industry, residential, services and transport)

Figure 9: *Primary energy consumption 2018-2022, ktoe*



Source – based on NSI data

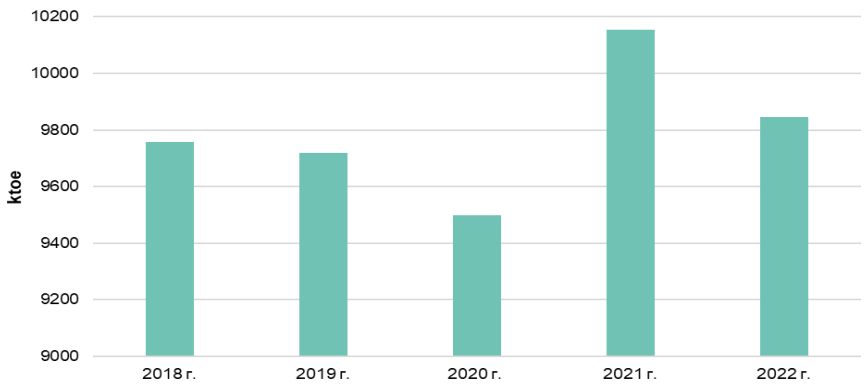
Between 2018 and 2022, primary energy consumption (PEC) was uneven and reflected the impact of Covid pandemic in the country. The lowest PEC was recorded in 2020 (17 243.44 ktoe), which was due to a decrease in coal consumption of 917.3 ktoe compared to 2019 and oil and petroleum products by 439.7 ktoe.

The amount of electricity exported also decreased from 917 ktoe to 862 ktoe. RES increased by 80 ktoe (an increase of 50.5 % compared to 2012).

With the exception of 2016, when the SMP decreased due to a decrease in coal consumption, the SMP increased to 2018 ktoe in 18 450. Compared to 2012, the SMP increased by 3.2 % in 2018.

Final energy consumption (FEC) followed the evolution of PEC also for the period 2022-2018. The lowest FEC was recorded in 2020 (9 499.66 ktoe), due mainly to a decrease in consumption of petroleum products by 319 ktoe (a decrease of 11 % compared to 2012), heat by 78 ktoe (a decrease of 8 % compared to 2012) and coal and coal fuels by 46 ktoe (a decrease of 11 % compared to 2012). Renewable energy increased by 47 ktoe in that year (an increase of 4 % compared to 2012).

Figure 10: *Final energy consumption 2018-2022, ktoe*

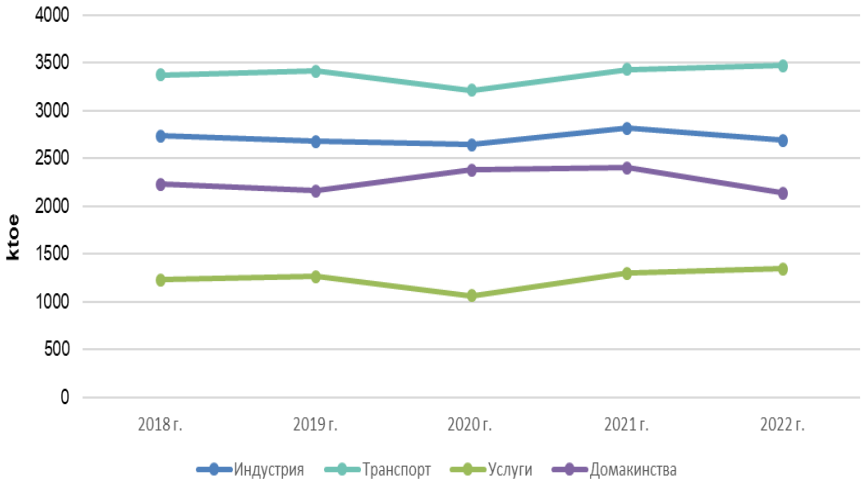


Source – based on NSI data

Final energy consumption by sector

The distribution of final energy consumption by sector is presented in the following figure.

Figure 11: *Final energy consumption by sector 2018-2022, ktoe*



Source – based on NSI data

ii. Current potential for the application of high-efficiency cogeneration and efficient district heating and cooling

Based on the highest net present value, as well as the area in which it should be located (usually a condition for access to different fuels), the corresponding technology is also chosen.

The quantities of heat generated by the new facilities should therefore be connected to new local district heating networks. Additional high-efficiency gas-fired capacity will be built in locations with existing cogeneration, with the difference to peak load being covered

by boilers. Where there is no existing cogeneration, gas boilers shall be built.

The total potential for high-efficiency combined heat and power generation in district heating by 2025 is 355 MW, of which 235 MW are new capacities and 120 MW replacement capacity.

The potential for heat generation in new CHP plants can mainly be realised by:

- A shift from separate heat generation to high-efficiency cogeneration;
- Transition from Renkin steam to combined gas/steam cycle;
- Potential for the use of waste.

iii. Projections under existing energy efficiency policies, measures and programmes as described in point 1.2 (ii) for primary and final energy consumption for each sector at least until 2040 (including 2030).

iv. Cost-optimal minimum energy performance levels resulting from national calculations in accordance with Article 5 of Directive 2010/31/EU

Pursuant to Article 5 (2) of Directive 2010/31/EU on the energy performance of buildings and Article 6 of Commission Delegated Regulation (EU) No 244 supplementing Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings by establishing a comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements, a report has been drawn up to calculate cost-optimal levels of minimum energy performance requirements for buildings in the Republic of Bulgaria. The report identifies reference buildings for different categories of existing buildings. Bulgarian legislation defines the types of public service buildings in Regulation No 1 of 2003 of the MRDPW on the nomenclature for types of construction works. Public service buildings are grouped into nine groups of buildings:

1. For education and science;
2. In the field of health and veterinary medicine;
3. In the field of social services;
4. In the field of culture and the arts;
5. In the field of religion;
6. For administrative support; buildings in the areas of commerce, catering, services and gambling;
7. In the field of transport and electronic communications and sports buildings and facilities.

The group of administrative service buildings includes administrative buildings, banking and non-banking financial institutes serving buildings at production sites, representative

buildings, post offices, central and territorial administration buildings, government buildings, conference centres and congresses, court buildings, public prosecutor's office, etc.

Directive 2010/31/EU, Article 4 (1) allows Member States to assess whether to distinguish between new and existing buildings and between different categories of buildings. This distinction has not been made in Bulgaria. Reference buildings for new buildings are also not defined, as required by Delegated Regulation (EU) No 244/2012 and its instructions. The reason for this is that, according to national legislation, the only difference between new and existing buildings is the energy class that the buildings have to meet. The criteria defined for the selection of each reference building are: type of construction system, floor, age of buildings and type of heating system. The approach used to define reference buildings is by combining a virtual model with representative parameters of existing buildings of the given category.

Energy efficiency measures are defined for reference buildings. Packages of measures have been proposed applying a combined methodology based on a matrix model of possible measures for a given reference building.

The primary energy demand resulting from the application of measures and/or packages of measures for the reference buildings has been calculated. The report states that the method applied in Bulgaria for calculating the energy performance of buildings is based on a European model introduced as a Bulgarian standard and has been supplemented by models that also take into account moisture, since the European system deals only with apparent heat, which does not make it possible to assess the energy required for cooling when there is air exchange in the cooled area. For the purpose of calculating the cost-optimal energy performance of buildings and for the development of a national definition of nearly zero-energy buildings in Bulgaria, the 1999 technical standards have been set as baseline. The results of the calculation of the energy needs of the reference buildings are presented in an annex to the report.

The report presents global cost calculations based on a life-cycle cost analysis for each reference building only at financial level. The input parameters used to calculate global costs and the types of costs involved (initial investment costs, operating costs and waste disposal costs) are defined. Optimal energy performance levels have been calculated for all defined reference buildings following a system level approach, in this case on the basis of an analysis of the impact of heat pass-through the building envelope and elements on the energy demand.

In order to assess the robustness of the key input parameters, a sensitivity analysis of the net present value of real interest factors, an escalation of product prices and energy prices has been carried out.

The definition of minimum requirements for energy consumption in buildings with aggregate scales with numerical values for energy consumption classes was introduced into national legislation in 2016 by Regulation No E-RD-04-2 of 22.1.2016 on energy consumption indicators and the energy performance of buildings. The Regulation lays down

the conditions for defining and the uniform methodology for determining energy consumption and energy performance indicators of buildings, the parameters of a scale of energy consumption classes for different building categories and the numerical limit values of the integrated energy indicator 'annual specific primary energy consumption' in kWh/m² determined by the scale of energy classes for different intended use categories of buildings.

Based on the continuity of national energy efficiency legislation dating back to 2004, an update of the national methodology for calculating the energy performance of buildings and a review of technical standards was carried out in 2023-2 021 in line with the update of the "Common Framework for the calculation of the energy performance of buildings" set out in Annex I of Directive 2010/31/EU, as amended by Directive (EU) 2018/844.

In application of Article 5 (2) of Directive 2010/31/EU on the energy performance of buildings and Article 6 of Commission Delegated Regulation (EU) No 244 supplementing Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings by establishing a comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements in 2022, a second scientific national review of technical standards for energy in buildings was presented to the European Commission and the report LYFE CYCLE Costing/ANALYSIS on the calculation of cost-optimal minimum energy performance requirements for buildings in Bulgaria was presented to the European Commission. The report shall include research, analysis and assessment of the impact of the calculation algorithms of the new EPB-standards package for calculating the energy performance of buildings, developed under CEN Mandate M/480, on the results of existing national calculation rules and standards, as well as updating the boundaries of the energy consumption classes of ten building categories and developing a new energy consumption scale for single-family residential buildings as a sub-category of residential buildings. Based on the results of the second scientific national review of cost-optimal minimum energy performance requirements for buildings prepared by the Technical University Sofia, the Ministry of Regional Development and Public Works has developed and published a new Regulation No RD-02-3-20 of 9.11.2022 on the technical requirements for the energy performance of buildings (published. SG No 92 of 18 November 2022). The Regulation introduces the requirements of Articles 3, 4 and 9 and Annex I of Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (OJ L 153/13 of 18 June 2010). The main contribution of the Regulation to national energy efficiency legislation is the National Methodology for calculating the energy performance of buildings in accordance with European standards EN ISO 1-52000, EN ISO 1-52003, EN ISO 1-52010, EN ISO 1-52016 and EN ISO 1-52018, which are part of a series of standards aimed at the international harmonisation of the methodology for assessing the energy performance of buildings. Regulation No RD-02-20-3 of 9.11.2022 on technical requirements for the energy performance of buildings is a key piece of legislation which contributes to the regulatory assurance of the implementation of energy efficiency programmes and projects supported by various European and national sources of financing in accordance with the objectives set at European and national level by 2030,

including the implementation of projects under the National Recovery and Resilience Plan of the Republic of Bulgaria and the Long-term National Strategy for supporting the renovation of the national stock of residential and non-residential buildings by 2 050 in accordance with the objectives set, the target values of progress indicators and the achievement of cost-benefit investments.

On the basis of the technical standards for the energy performance of buildings renewed in 2022, the model energy performance certificate for new and existing buildings was also updated, as laid down in a new Regulation No E-RD-04-2 of 16 December 2022 on energy audits, certification and assessment of energy savings of buildings (published in SG No 102 of 23 December 2022).

National calculations in line with the requirements of Article 5 of Directive 2010/31/EU in the 2030 horizon will aim to harmonise technical requirements for the energy performance of buildings in line with the revised EPBD within the framework of the 'Fit for 55' European legislative package. Key challenges for national energy performance standards in the period up to 2030 will be:

— Phasing out the use of fossil fuel boilers in buildings;

— Transposition of the requirement to introduce minimum European energy performance standards (MEPS) including for zero-emission buildings CO_2;

— The introduction of national requirements for the use of solar energy in new public and existing buildings (pursuant to Article 9a of the EPBD);

— Introduce mortgage portfolio standards.

In addressing these and other challenges to national standards for the energy performance of buildings, Bulgaria will adhere to the stated position to maintain the possibility of exempting individual buildings (under certain conditions), reasonable timeframes taking into account national socio-economic circumstances, taking into account the principles of technical, economic and functional feasibility and the principle of technological neutrality.

4.4 energy security dimension

I. Current energy mix, domestic energy resources, import dependency, including relevant risks

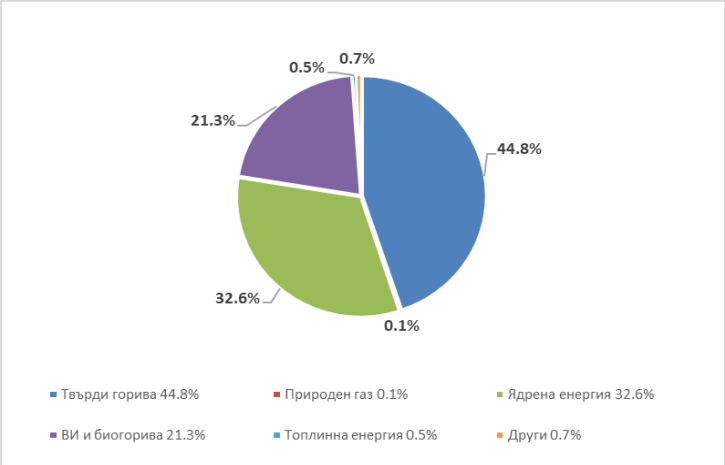
- **Current energy mix**

According to data from the National Statistical Institute for 2022 (published in December 2023), the country's primary energy production in 2022 amounted to 13 154.9 ktoe, accounting for 67 % of gross inland consumption, with a relatively constant structure in recent years and developments stemming from domestic energy consumption.

In the structure of primary energy production by fuel type and energy, solid fuels account for 44.8 % and nuclear energy for 32.6 %. The remaining fuels and energy shall be distributed as follows: energy from renewable sources – 21.3 %, heat – 0.5 %, natural gas

– 0.1 % and others (bituminous shale/sands, oil and petroleum products and non-renewable waste) – 0.7 %.

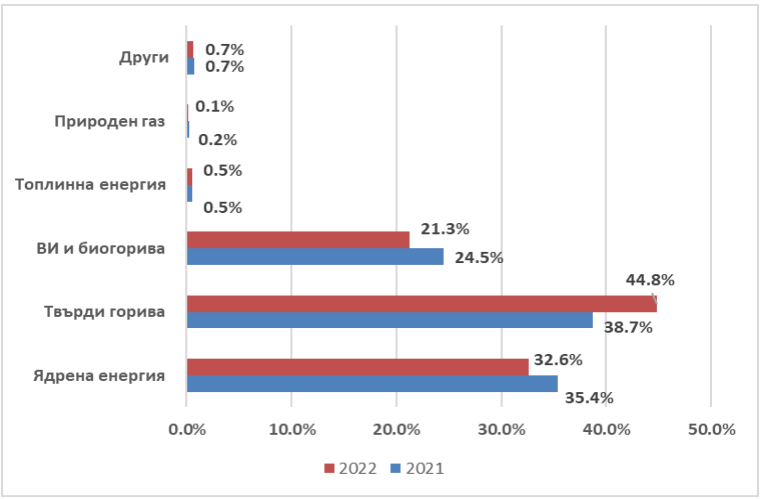
Figure 12: *Primary energy production structure,%*



Source – according to data from the NSI for 2022.

In 2022, primary energy production increased by 12 % compared to 2021. Solid fuels increased by 26 %, renewable energy and biofuels 15 % and others 12 %. The remaining fuels are in decline, respectively: natural gas 45 %, heat 5 % and nuclear 1 %.

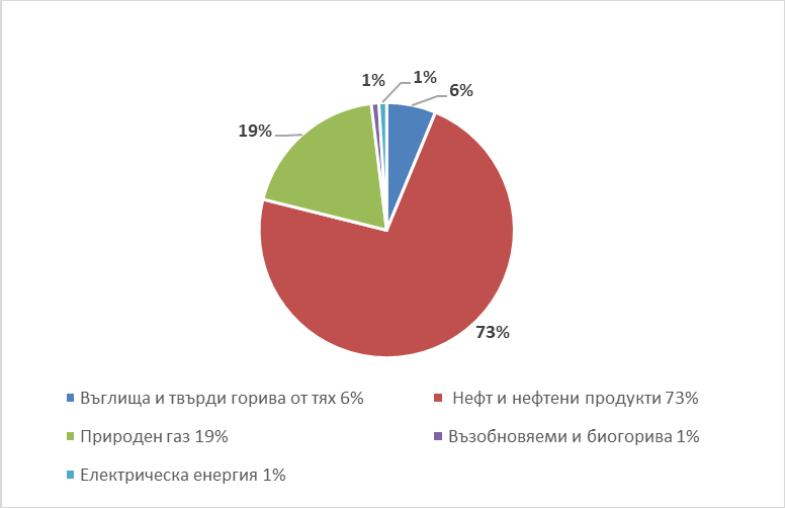
Figure 13: *Structure of primary energy production in 2022 compared to 2021,%*



Source – according to data from the NSI for 2022.

In 2022, fuel and energy imports amounted to 12 876 ktoe. Oil and petroleum products accounted for the highest share at 73 %, followed by natural gas at 19 %. The remaining fuels and energy shall be distributed as follows: solid fuels 6 %, electricity 1 % and renewable energy 1 %.

Figure 14: *Fuel and energy imports,%*

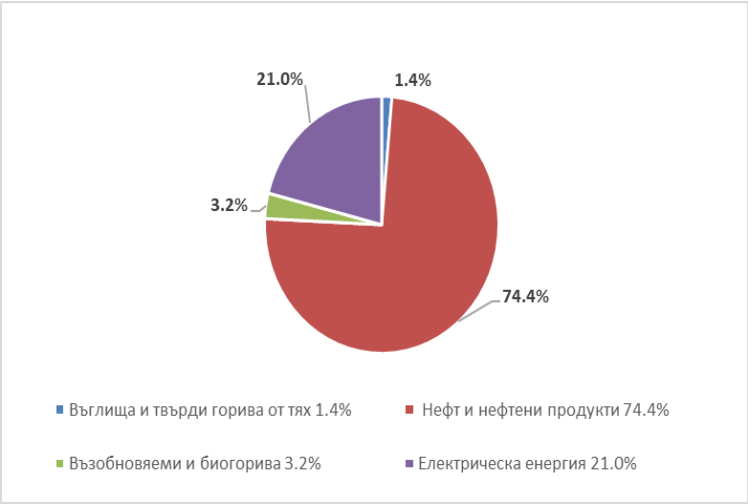


Source – according to data from the NSI for 2022.

In 2022, imports increased by 27 % compared to the previous year 2021. Coal and solid fuels increased by 46 %, oil and petroleum products by 43 % and renewable and biofuels by 2 %. Cut electricity imports by 21 % and natural gas by 10 %.

Exports of fuel and energy in 2021 amounted to 5 587 ktoe in the country. The largest shares are liquid fuels – 74.4 % and electricity – 21.0 %. The remaining fuels shall be distributed as follows: renewable and biofuels 3.2 % and solid fuels 1.4 %.

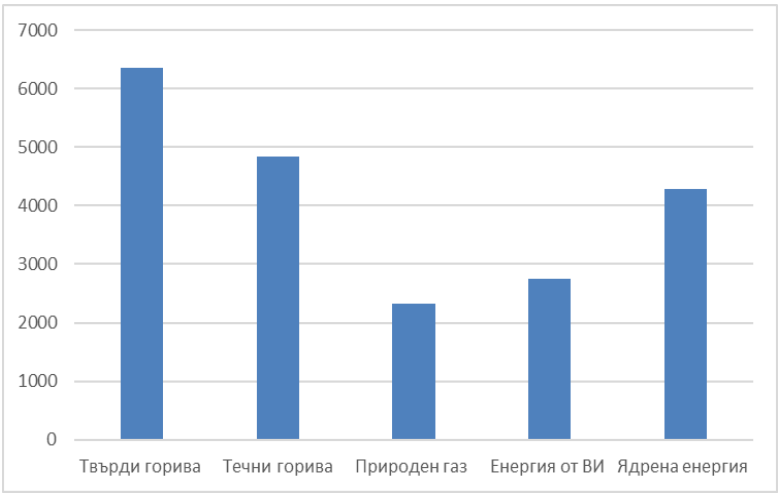
Figure 15: *Exports of fuels and energy,%*



Source – according to data from the NSI for 2022.

The country's gross domestic consumption of fuels and energy in 2022 amounted to 19 555 ktoe. Solid fuels account for 31 %, followed by liquid fuels at 24 %. The remaining fuels and energies shall be distributed as follows: nuclear energy 21 %, renewable energy 13 %, natural gas 11 %.

Figure 16: *Gross inland consumption by fuel and energy*

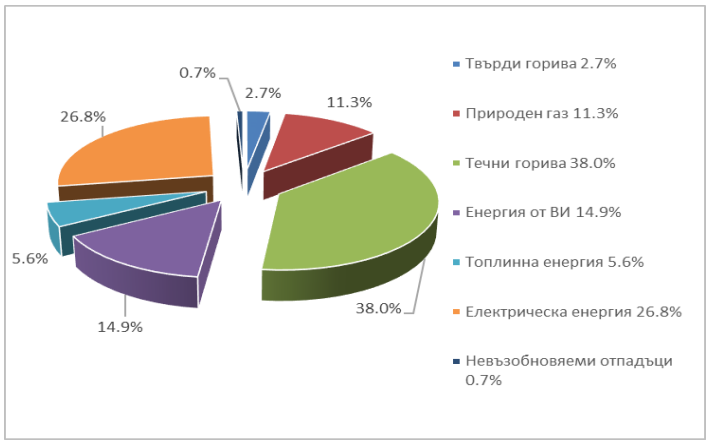


Source – according to data from the NSI for 2022.

Gross inland consumption increased by 1.3 % in 2022 compared to 2021. Electricity consumption increased by 38.9 %, solid fuels by 18.3 %, heat by 6.0 %, liquid fuels with 5.7 % and non-renewable waste 4.5 %. Natural gas decreased by 18.1 %, renewable energy by 5.8 % and nuclear energy by 0.1 %.

In 2022, final energy consumption amounted to 9 845 ktoe. The largest share of the structure is liquid fuels – 38.0 %, followed by electricity – 26.8 %. The remaining fuels and energy shall be distributed as follows: renewable energy 14.9 %, natural gas 11.3 %, heat 5.6 %, solid fuels 2.7 % and non-renewable waste 0.7 %.

Figure 17: *Final energy consumption structure,%*

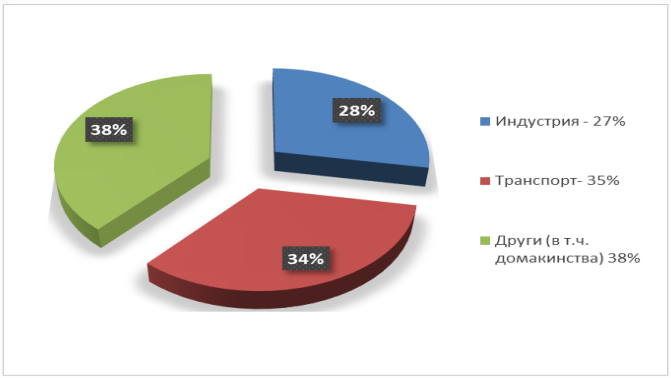


Source – according to data from the NSI for 2022.

Sectors of the economy have seen growth in final energy consumption. In 2022, the transport sector accounted for 35 % of final energy consumption, maintaining its leading position in final energy consumption over the last ten years.

The industry sector accounts for 27 % and is the second most important sector. The share of final energy consumption in the rest of the households, services and agriculture sectors was 38 % respectively. The structure of final energy consumption by sector in 2022 is identical to that in recent years.

Figure 18: *Structure of final energy consumption by sector,%*

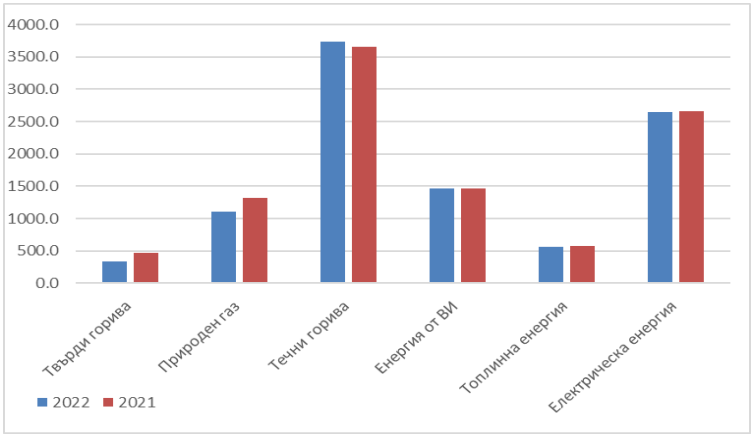


Source – according to data from the NSI for 2022.

With a share of 38.0 % in 2022, liquid fuels mainly consumed in road transport (96 %) were the most used energy carrier in final energy consumption. In 2022, electricity consumption was 2 641 ktoe, with a share of 26.8 % in final energy consumption. In 2022, the use of energy from renewable sources was reduced by 0.2 %. The main renewable source used in Bulgaria is biomass, which is mainly used in the heating and cooling sector.

In 2022, final consumption also decreased for solid fuels by 28.3 %, natural gas by 15.8 %, electricity by 0.8 % and heat by 3.4 %. Liquid fuels have an increase of 2.1 %.

Figure 19: *Final energy consumption in 2022 compared to 2021*



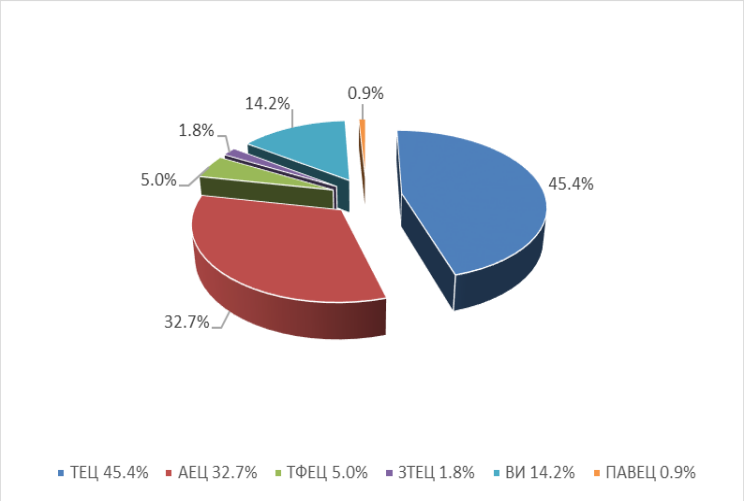
Source – based on NSI data

Bulgaria has a diverse electricity mix, including nuclear, thermal and renewable energy plants (hydro, wind, solar and biomass).

According to data from the Ministry of Energy, in 2022 gross electricity production was 50.3 TWh, 5.8 % more than in 2021.

The largest share of electricity generation in 2022 was thermal power plants (45.4 %), followed by NPPs with 32.7 %, renewable energy (14.2 %), thermal power plants (5.0 %), TPPs (1.8 %) and CHP (0.9 %).

Figure 20: Gross electricity generation*structure, by type of plant,% based on GWh*



Source – 2022 data from ME

The share of domestic energy inputs for electricity generation is 96 % and the share of imported energy is 4 % (nuclear energy is reported as a local energy carrier).

- own energy sources

Bulgaria uses the existing potential of local resources while respecting environmental requirements. The main energy carriers for energy production are solid fuels and nuclear energy.

Plants using indigenous coal produce a significant part of the electricity and provide valuable services necessary for the reliable operation of the electricity system and thus contribute to Bulgaria's energy security. Nuclear energy is an important energy carrier that guarantees basic power generation at predictable and competitive prices. NPP Kozloduy EAD accounts for more than 30 % of the electricity production in Bulgaria and is a guarantor of Bulgaria's energy security.

The use of energy from renewable sources is the third most important local energy resource, which has accelerated in recent years. The main contribution to this is the increased consumption of biomass, as well as the use of solar and wind power to produce electricity.

- import dependence

In 2022, according to NSI data, the country's fuel and energy dependency was 37.1 %, compared to the EU average significantly lower. This is due to the methodology adopted by Eurostat, according to which nuclear energy is reported as a local energy source.

- relevant risks

In the field of gas, the most significant risk is related to the voilty nature of the natural gas market on European exchanges. In this regard, Bulgaria has taken measures to diversify natural gas supply sources and routes.

II. Projections of development with existing policies and measures at least until 2040 (including for the year 2030)

The projections in this point are prepared with existing national and European policies and measures.

Bulgaria will decarbonise its electricity system through the continued development and construction of renewable energy installations combined with new shunting low carbon capacities (hydropower and nuclear units).

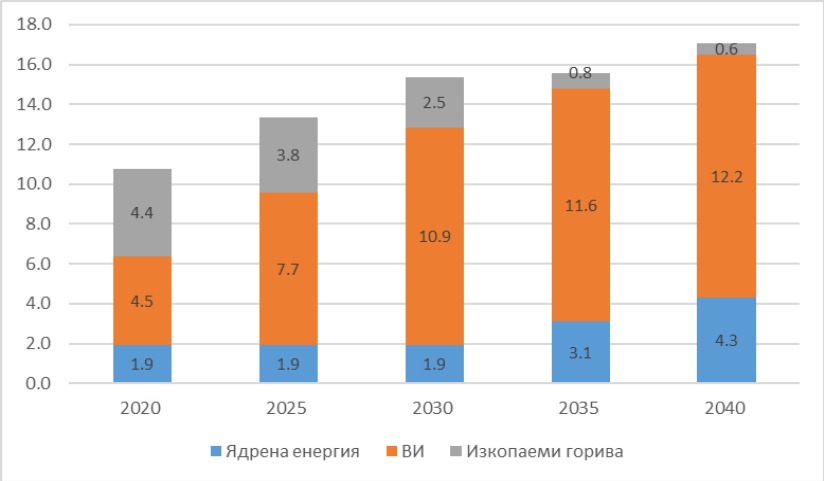
The key indicators used in the modelling shall be the installed capacity of the technologies for energy production, electricity generation, system flexibility, greenhouse gas emissions, necessary investments and costs, setting out the relevant investment and transition framework to support the decarbonisation objective.

The projections for the development of Bulgarian energy are based on input data received from transmission system operators, regulatory authorities and market participants covering electricity consumption and production, prices of key raw materials (natural gas, emission allowances, etc.) and connectivity of European electricity markets. New forms of final electricity consumption shall be taken into account with their ability to provide additional steering manoeuvrability.

The projections predict growth of low carbon production, allowing Bulgaria to keep its net export balance positive throughout the time horizon under consideration. No net imports of electricity are foreseen to satisfy consumption in Bulgaria.

In the modelling process, lignite-fired power plants are gradually replaced by RES after 2025 and, in the longer term, by PAHPs and new nuclear capacities. In order to balance the system, the increase in renewable energy production was accompanied by an increase in nuclear capacity between 2030 and 2040.

Figure 21: *Net installed capacity per type of plant during the period 2020 – 2040, GW*

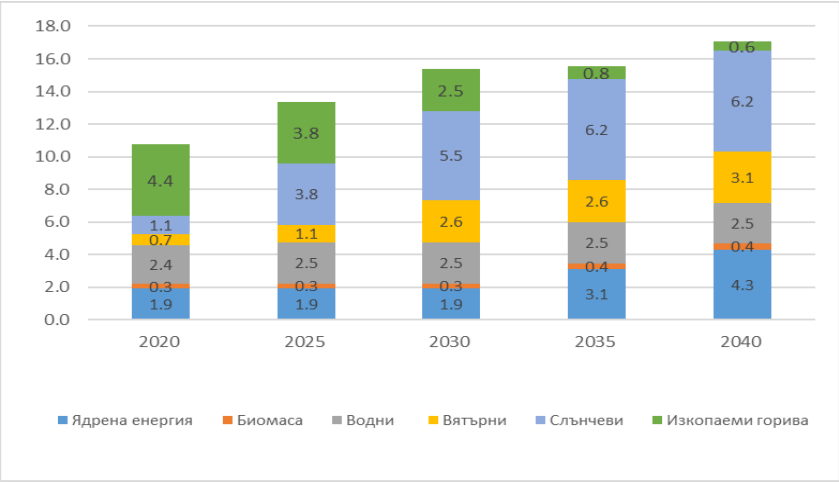


Source: E3 Modeling

In line with the country's policy towards the decarbonisation of energy, installed renewable energy capacity is set to increase, expecting this capacity to reach up to 2 040 GW in 12,2. The same policy is also implemented by the projected 87 % reduction in fossil energy generation capacity, which from 4.4 GW in 2020 is expected to reach 0.6 GW in 2040.

The country's nuclear capacity is projected to increase over the period under review and is expected to reach 2 040 GW by 4,3.

Figure 22: *Net installed capacity by energy carrier in 2020-2040, GW*

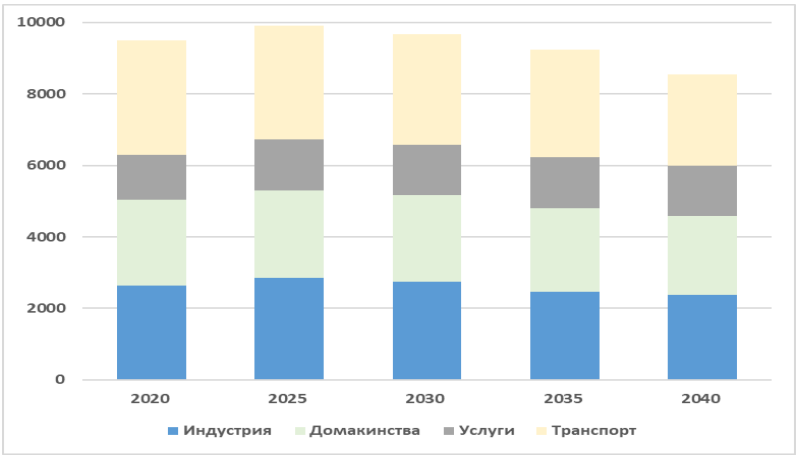


Source: E3 Modeling

Aiming to meet the targets set for the use of nature-friendly resources, Bulgaria relies on an increase in its energy capacity using biomass and water resources by 29 % and 6 % respectively at the end of the period compared to 2020.

The highest sun capacity growth is expected, with strong growth projected to reach 6.2 GW at the end of the period. A similar situation is the situation for wind power generation, with an expected increase and reaching 3.1 GW in 2040.

Figure 23: *Final energy consumption by sector in the period 2020 – 2040, ktoe*



Source: E3 Modeling

In the first half of the period, final energy consumption in the Industry sector is expected to increase by 4 % and then revert to 2 377 ktoe in 2020, with a decrease of 10 % compared to 2040.

In the transport sector, final consumption is expected to decrease throughout the period, reaching 2040 ktoe by 2 544, which is 21 % lower than in 2020.

For the remaining sectors, an overall increase in final energy consumption is projected. An increase of 12 % is expected in the services sector, from 1 261 ktoe in 2020 to 1 411 ktoe

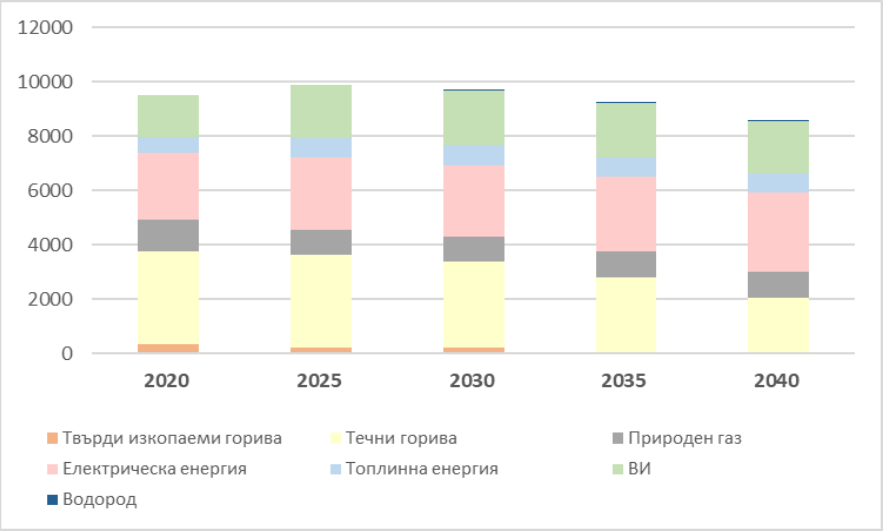
at the end of the period, while final energy consumption in the household sector is projected to reach 2040 ktoe in 2 211, down by 7 % compared to 2020.

Table 30: *Final energy consumption by sector in the period 2020 – 2040,%*

Sectors	2020	2025	2030	2035	2040
Industry	28 %	29 %	28 %	27 %	28 %
Households	25 %	25 %	25 %	25 %	26 %
Services	13 %	14 %	15 %	16 %	16 %
Transport	34 %	32 %	32 %	32 %	30 %

The above table shows that no significant change in the final energy consumption structure per sector is expected.

Figure 24: *Final energy consumption by source in the period 2020 – 2040, ktoe*



Source: E3 Modeling

Final consumption of energy produced from fossil fuels, liquid fuels and natural gas is expected to decrease over the period considered. The projected reduction in fossil energy consumption is the most pronounced, from 351 ktoe in 2020 to 42 ktoe in 2040, or by 88 %.

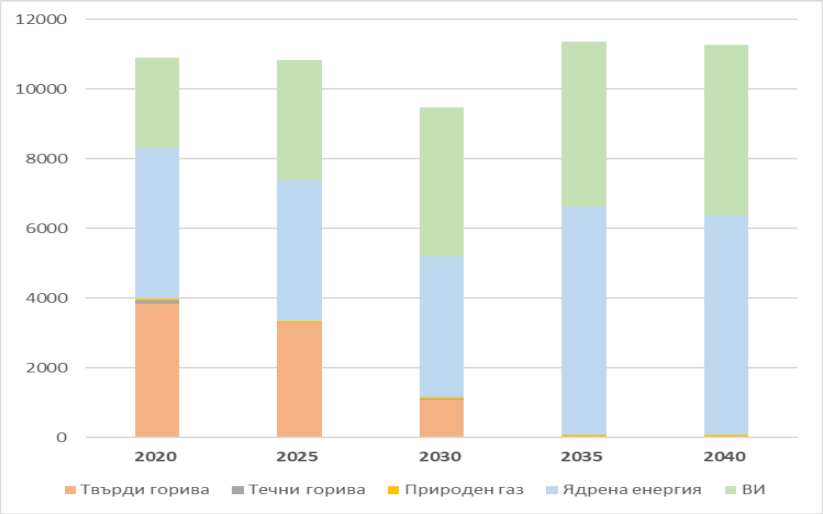
The final energy consumption of energy from liquid fuels in 2020 was 3 425 ktoe, with an expectation of 2 017 ktoe at the end of the period, meaning a 41 % reduction. For natural gas, a reduction of 17 % is projected at the end of the period, reaching 1 162 ktoe in 2020 to 963 ktoe in 2040.

Final consumption of electricity, heat and renewable energy is expected to increase throughout the period considered. The most severe increase is projected for the use of

heat, with an estimated consumption of 30 % more than in 2020. For electricity and renewable energy, consumption is expected to increase by 18 % and 22 % respectively.

A typical feature of the period is that in 2030 the country's energy mix is also expected to include around 1 000 toe of hydrogen for energy purposes, while by 2040 the final consumption of hydrogen energy will amount to 9 000 toe.

Figure 25: *Production of primary energy by fuel during the period 2020 – 2040, ktoe*

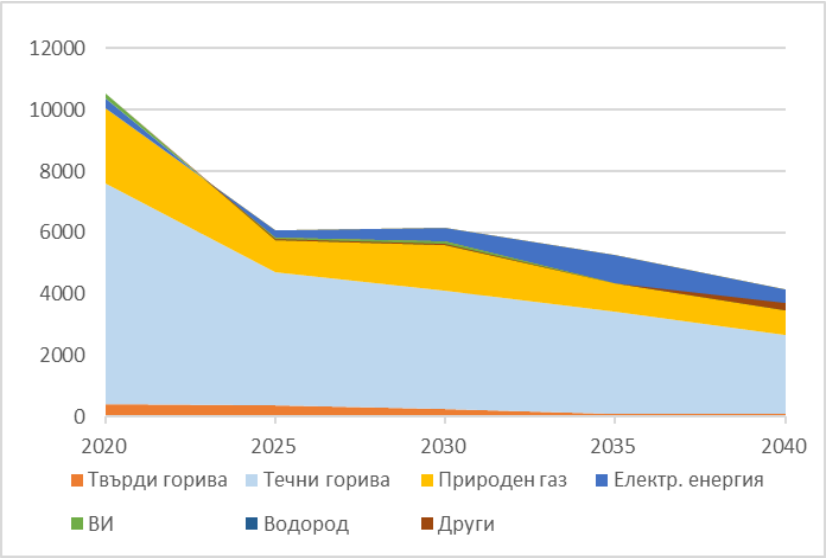


Source: E3 Modeling

A significant reduction in primary energy production from solid and liquid fuels is expected in 2040-2020. In 2020, the energy produced from solid fuels was 3 848 ktoe and 81 ktoe from liquid fuels, with expected reductions to 2040 and 2 ktoe in 11.

Primary energy production from other fuels is projected to increase, with the most notable renewable energy growth of 98 % at the end of the period compared to 2020. For nuclear and natural gas energy, projected output increases in 2 040 are 32 % and 26 % respectively compared to 2020.

Figure 26: *Net energy imports by fuel in the period 2020 – 2040, ktoe*

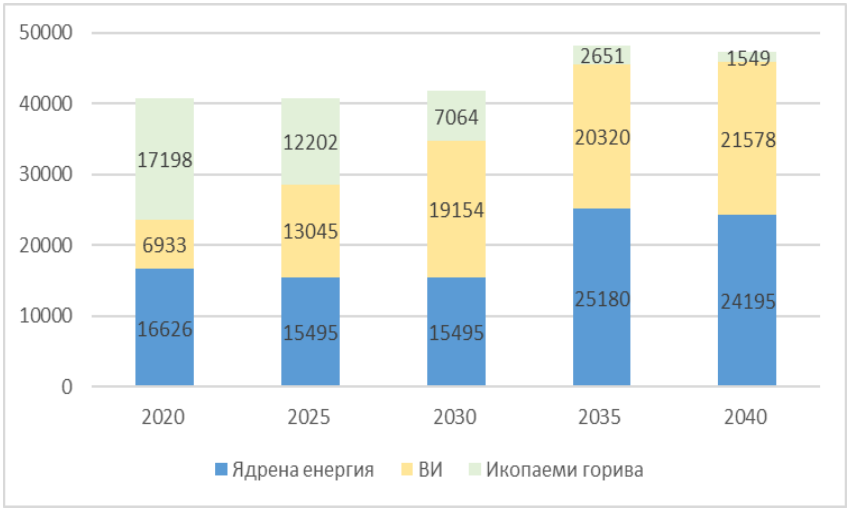


Source: E3 Modeling

The overall trend over the period considered is the decrease in energy imports into the country, most notably expected for energy from solid fuels, a decrease of almost 80 % in 2040 compared to 2020.

Imports of energy produced from liquid fuels are projected to decrease from 7 204 ktoe in 2020 to 2 574 ktoe at the end of the period, which is 64 % less, while for natural gas energy, imports are expected to decrease by 38 % at the end of the period considered, reaching 1 501 ktoe.

Figure 27: *Gross energy production by plant during the period 2020-2040, GWh*



Source: E3 Modeling

In line with the country's climate neutrality targets, a significant increase in the share of energy produced from renewable sources is projected. Production is expected to reach 21 578 GWh at the end of the period, which is 14 644 GWh higher than in 2020.

In this respect, the expected reduction in gross fossil energy production is also expected to reach 17 198 GWh from 2 020 GWh in 1 549, implying a reduction of 91 %.

Nuclear energy is also projected to increase to 24 195 GWh in 2040, or 46 % compared to the start of the period.

The transformation of the electricity sub-sector implies significant investment in new capacity and modernisation of the overall infrastructure. In addition to the necessary investments, investments in modernising electricity transmission and distribution systems to integrate a higher share of intermittent RES capacity are added.

The electricity sector has become increasingly capital-intensive over time. Investments in low-carbon capacities are increasing compared to today's levels in relation to decarbonising the electricity system. Projections for investment costs in existing and new plants shall be determined by further calculating transmission and distribution costs, which include costs of constructing or upgrading transmission and distribution networks, together with annual capital and operating costs.

In the short term, market liberalisation policies and the development of an appropriate regulatory framework to promote renewable energy communities and prosumers of electricity, heating and cooling are to be developed.

Priorities in this short term period are:

1. Enable the conclusion of long-term contracts for the supply of electricity and heat from low-emission sources, with the possibility of aggregating electricity from various low-emission fuels into a single contract, including stored energy of this origin.

2. Commissioning of new renewable electricity generation capacity.

3. Develop and adopt the necessary regulations for clear and effective procedures for the production, storage, transport and use of hydrogen and hydrogen products in transport, industry and household.

4. Development of efficient district heating, cooling and local heating systems using high-efficiency cogeneration, low-carbon sources and/or renewable energy, and with the possibility of short-term energy storage.

The implementation and activities of the priorities set will contribute to the successful implementation of the planned policies by 2030, which are by nature a strong demand for a significant change in the energy sector towards low-emission technologies, renewable energy and innovation. The main focus is on:

1. Implementing investment measures to promote energy independence of households, with a focus on energy communities and implementing various forms of support for energy-poor households.

2. Implementation of new nuclear capacity projects, including the preparation of small modular reactors (SMR) projects for the cogeneration of electricity balancing on the one hand and hydrogen, district heating, chemical products and high potential heat for industry on the other.

3. Installation of renewable energy generation capacity, including offshore VaPP, implementation of new PAHPs projects.

4. Implementation of energy efficiency measures and decentralised electricity and heat production, as well as implementation of energy efficiency measures and self-consumption production in industry.

5. Implementation of remediation measures in coal mines and development of functioning industrial zones in coal regions.

In the longer term, the promotion of new RES capacities and energy storage systems will continue to be promoted by 2035. Efforts will be to continue the implementation of mine remediation measures and measures for electrification of industry, transport and households. Other equally important policies and activities planned are related to:

1. Developing elements of the hydrogen economy on a market-based basis and discontinuing support for investments in natural gas, whereby investments already implemented and commissioned natural gas facilities can be operated and maintained until their design lifecycle is exhausted.

2. Implementation of projects to increase cross-border connectivity.

3. Implementation of district heating projects close to the resources of low-potential geothermal energy and municipal waste.

As a follow-up to the energy transformation and transition process, a number of energy efficiency and decentralised electricity generation measures are envisaged by 2040, supporting renewable energy communities and energy independence of households and small and medium-sized enterprises.

4.5 dimension Internal Energy Market

4.5.1. Electricity interconnectivity

i. Current interconnection level and main interconnectors

The Bulgarian electricity system (EES) works in parallel with the EES of the countries of continental Europe. The connectivity of our EEU with the united European EES takes place through the following interconnectors:

- EP 400 kV NPP Kozloduy (BG) – p/st Zenzarenny (RO);
- EP 400 kV Kozloduy (BG) – p/st Zenzareni (RO);
- EP 400 kV p/st Varna (BG) – p/st Stupina (RO);
- EP 400 kV p/st Dobrudzha (BG) – p/st Rahman (RO);
- EP 400 kV p/st Sofia West (BG) – p/st Niš (RS);
- EP 400 kV p/st Red Mogila (BG) – p/st Stip (MK);
- EP 400 kV p/st Blagoevgrad (BG) – p/st Thessaloniki (GR);

- EP 400 kV p/st Radnevo (BG) – P/st Nea Santa (GR);
- EP 400 kV TPP MI3 (BG) – p/st Hamitabat (TR);
- EP 400 kV TPP MI3 (BG) – p/st Hamitabat (TR).

The current level of electricity interconnection is:

— 21.7 % of the capacity, taking into account security criteria for imports;

— 22.6 % of the capacity, taking into account the reliability criteria for exports;

— 144 % of nominal transmission capacity, relative to peak load;

— 265 % of the total rated transmission capacity, relative to the installed RES production capacity.

ii. Projections of interconnector expansion requirements (including for the year 2030)

Prospects for the development of electricity connectivity by 2030:

Planning for the development of the transmission networks and interconnections of the countries of the south-east of continental Europe shall be defined in the regional investment plan and shall be established every two years in the Europe-wide ten-year plan of ENTSO-E, the long-term horizon of which currently runs until 2040.

There is a tripartite Bulgaria-Greece-Türkiye project to assess the feasibility of building a third interconnection between Bulgaria and Türkiye, whose work has not yet been completed.

4.5.2 electricity and gas transmission infrastructure

i. Main characteristics of existing electricity and gas transmission infrastructure

Bulgaria's electricity transmission infrastructure is owned by ESO EAD, which is an independent transmission operator certified by the European Commission. The Bulgarian electricity system operates in parallel with the EES of the countries of continental Europe. The connectivity of our EEU with the united European EEU takes place through four interconnectors with Romania, two with Türkiye and Greece, and one with Serbia and the Republic of North Macedonia each.

Figure 28: *Map of transmission infrastructure HV*

Source: ESO EAD

Existing electricity transmission infrastructure covers: 2 571 km of power lines 400 kV, 2 837 km of power lines 220 kV, 9 960 km of power lines 110 kV, 34 system substations and 263 lowering substations.

Overhead lines of the national grid:

- 400 kV with a total length of 2 519 km;
- 220 kV with a total length of 2 812 km;
- 110 kV with a total length of 9 990 km;

Transformer substations:

- 32 system substations with a total transformer power of 15 888 MVA;
- 259 lowering stations with a total transformer power of 15 383 MVA;

Hub stations:

- One 400 kV node station;
- One 110 kV node station;

Optical network:

- With a total length of 3 118 km;

Article 16 (8) of Regulation (EU) 2019/943 of 5 June 2 019 on the internal market in electricity provides that transmission system operators are not to limit the volume of interconnection capacity that must be available to market participants as a means of addressing congestion in their own bidding zone or as a means of managing flows resulting from transactions that are internal to bidding zones. This requirement is met when a minimum threshold of 70 % of transmission capacity between commercial areas is reached, respecting safety standards for secure network operation, including in compliance with the emergency security standard (N-1). ESO EAD submitted to the KEVR a reasoned request for a derogation from the requirements of Article 16 (8) for a period of one year,

with the possibility of extending the period for another, up to the maximum period of two years, in accordance with Article 16 (9) of Regulation (EU) 2019/943.

Structure of natural gas transmission and storage infrastructure:

Two independent transmission operators, Bulgartransgaz EAD and Ai Xi Bi AD, are certified and operated on the territory of the Republic of Bulgaria.

Bulgartransgaz EAD's gas transmission network infrastructure consists of 3 443 km, an underground gas storage facility in Chiren (UGS), highway pipelines and high-pressure pipelines, eleven compressor stations, an electrochemical protection system, cleaning facilities, communication system, information system and other ancillary facilities. Natural gas is transported through the gas transmission network to exit points in the country, as well as transports to cross-border points with neighbouring countries – Greece, Romania, Serbia and North Macedonia.

Bulgartransgaz EAD's gas transmission infrastructure has 11 compressor stations – KS Cardam-1, Vchi Dol CC, Polski Senovets CC, Cardam-2, Provadia CC, Nova Provadia CC, Nova Provadia CC, Lozenetz CC, Strandzha CC, Ihtiman CC, Petrich and Rasovo CC, with a total installed capacity of approximately 374 MW. The main entry and exit points of the operator's gas transmission network are:

- Interconnection point (IP) Negru Water/Kardam – interconnection between Bulgartransgaz EAD's gas transmission network and the gas transmission system operated by Transgaz S.A. (Romania) at the Bulgarian-Romanian border in the area of the village of Kardam, General Toshevo Municipality;
- Interconnection point (IP) Kulata/Sidirokastro – interconnection between Bulgartransgaz EAD's gas transmission network and the gas transmission system operated by DESFA S.A. (Greece), located on the Bulgarian-Greek border in the area of Kulata village, Petrich Municipality;
- Interconnection point (IP) Strandzha/Malkochlar (IP) – interconnection between the gas transmission network of Bulgartransgaz EAD and the gas transmission system operated by botas (Türkiye) located on the Bulgarian-Turkish border in the area of the village of Strandzha, municipality of Bolyarovo;
- Interconnection point (IP) Strandzha 2/Малкочлар – connection between Bulgartransgaz EAD's gas transmission network and the gas transmission system operated by TAGTAS (Türkiye), located on the Bulgarian-Turkish border, in the area of the village of Strandzha, municipality of Bolyarovo;
- Interconnection point (IP) Kyustendil/Zidilovo – exit point, connection between the gas transmission network of Bulgartransgaz EAD and the gas transmission system operated by Nomagas (Republic of North Macedonia) located at the Bulgarian-Macedonian border in the area of the village of Gyueshevo, Kyustendil Municipality;

- Interconnection point (IP) Ruse/Giurgiu – interconnection between Bulgartransgaz EAD's gas transmission network and the gas transmission system operated by Transgaz S.A. (Romania), located on the Bulgarian-Romanian border in the area of the village of Maarten, municipality of Ruse;
- Interconnection point (IP) Kiresevo/Zaichar – connection between the gas transmission network of Bulgartransgaz EAD and the gas transmission system operated by Gaztrans (Serbia), located at the Bulgarian-Serbian border in the area of the village of Kireevo, Makress municipality;
- Interconnection point (IP) Kalotina/Dimitrovgrad – interconnection between the gas transmission network of Bulgartransgaz EAD and the gas transmission system operated by Transportgaz Srbija (Serbia), located at the Bulgarian-Serbian border in the region of Kalotina, Dragoman municipality;
- Interconnection point (IP) Stara Zagora – connection between the gas transmission network of Bulgartransgaz EAD and the gas pipeline (IGB) operated by Ai Xi Bi AD (Bulgaria), located in the area of the village of Zagoré, Stara Zagora municipality;
- GIS Galata – an entry point from local natural gas production;
- GIS Dolni Dabnik – entry point from domestic natural gas production;
- Entry and exit point GIS Chiren – connection between the gas transmission network and UGS Chiren.

The Chiren underground gas storage facility was built in the village of Chiren on the basis of the already depleted one gas condensate deposit. The storage is equipped with the necessary underground and ground equipment for the injection and withdrawal of natural gas and preservation of the quality of gas in storage. UGS Chiren has 24 operating wells and a compressor station with a total installed capacity of 9 MW. The current storage capacity can provide storage of 550 million m² of³ natural gas. The capacity for withdrawal and injection is directly dependent on the pressure exerted by injected layers of gas and the total amount of gas in storage. The minimum production capacity is 0.5 million m^3per day and the maximum is 4.7 million m^3 perday in the case of an emergency production regime. However, this emergency regime can only take place with a full gas storage facility and up to a maximum of 30 days. UGS Chiren is used to cover the seasonal uneven consumption of the Republic of Bulgaria and to provide an emergency reserve in the event of unforeseen and force majeure situations. Furthermore, UGS Chiren plays an increasingly important role as a commercial storage facility in developing competition and increasing benefits for natural gas consumers in an interconnected and single pan-European gas market. A gas storage expansion project is underway, aiming at increasing active gas to 1 billion m³ and increasing daily extraction and injection capacities to 10-8 млн.м3/ден. The increased capacities will ensure security of natural gas supply and contribute to improving competition and access to natural gas from alternative sources, thus helping to increase liquidity in the gas markets in Bulgaria and the region.

Ai Xi Bi AD, which is the owner and operator of the IGB gas pipeline with a length of 182 km, of which 151 km on Bulgarian territory.

ii. *Projections of network expansion requirements at least until 2040 (including for the year 2030)*

Electricity transmission infrastructure:

The following new internal power lines of 400 kV have been constructed:

- EP 400 kV p/st Plovdiv – p/st Maritsa Iztok;
- EP 400 kV p/st Maritsa Iztok – TPP ME3;
- EP 400 kV p/st Maritsa Iztok – P/st Burgas;
- EP 400 kV/st Burgas – P/st Varna.

The above-mentioned internal new power lines are projects of common European interest (PCI).

These are followed by the importance of the new 400 kV power lines in the North-South (Vetren – Blagoevgrad and Tsarevets – Plovdiv). A substantial part of the 110 kV network is also planned. A number of substations will be upgraded and expanded, with the replacement of equipment and relays, telecommunication equipment and control mode. Static compensating devices will be delivered to control high tensions in minimum regimes in the Marischia Basin and Dobrudzha region. New communication routes will be built.

A positive decision to build new nuclear power foresees further grid development along the north-south direction and reinforcement of the northern part of the 400 kV ring.

Gas transmission infrastructure:

Bulgartransgaz EAD's planned activities are aimed at expanding the gas transmission network and capacity of UGS Chiren, as well as increasing the technical transmission capacity at interconnection points, in order to meet the growing demand for natural gas from south to north and to enable increased flows of gas from reliable and alternative sources to Bulgaria and the region.

The main projects to expand Bulgartransgaz's infrastructure include:

- Extension of UGS Chiren;
- Construction of the LNG floating terminal near Alexandroupolis, in which Bulgartransgaz contributes 20 %;
- Participation in a second LNG terminal in Greece;
- Increase of transmission capacity from Greece to Bulgaria in IP Kulata/Sidirokastro;
- Increase of transmission capacity from Bulgaria to Romania in IP Negru Voda/Kardam;

- Construction of an enabling gas transmission infrastructure with high pressure and sufficient capacity to coal regions in Bulgaria;
- Development of hydrogen transmission infrastructure.

iii. Indicative projections of developments under existing policies for 2030 (forecast up to 2040)

According to European legislation, transmission capacity must be at least 10 % from 2020 and at least 15 % from 2030, relative to installed generation, taking into account security, the N-1 criterion and the reliability margin.

In order to achieve this objective and to diversify natural gas supply sources and routes, Bulgaria has implemented the projects detailed in point 2.4.4.

4.5.3 gas and electricity markets, energy prices

i. Current situation of electricity and gas markets, including energy prices

Electricity

With regard to the restructuring of activities related to the production, transmission and management of the energy system, in accordance with Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2 009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC (Directive 2009/72/EC), Bulgaria has chosen the 'independent transmission operator' model whereby the transmission operator and network assets are separated into a separate legal entity within a vertically integrated undertaking which performs generation and supply functions.

In compliance with the requirements of Directive 2009/72/EC, after completion of the procedure for the separation of ESO EAD by NEK EAD in 2014, ESO EAD is the owner and operator of the entire electricity transmission network in Bulgaria.

ESO EAD was certified as an independent transmission operator by a decision of the KEVR of 2015, fulfilling the requirements of Articles 10 and 11 of Directive 2009/72/EC and Article 3 of Regulation (EC) No 714/2009.

The distribution of electricity is carried out by the operators of electricity distribution networks in separate territories: 'Zapad Electricity Distribution' EAD, 'Electricity Distribution North' AD, Electricity Distribution Yug EAD and 'Electricity Distribution Zlatni Sands' AD.

In accordance with Directive 2009/72/EC and in accordance with the Energy Act, the electricity market in Bulgaria has been liberalised since 1.7.2007, with the liberalisation process being staged and trade in electricity in Bulgaria taking place in two market segments, more freely negotiated prices and regulated prices.

The electricity market in the Republic of Bulgaria is characterised as national. Its structure and organisation are governed by the Electricity Trading Rules. The electricity market consists of an electricity market through bilateral contracts concluded on the platform of the exchange operator, exchange market, balancing energy market, reserve market and ancillary services, market for the provision of interconnection capacity.

Commercial players are electricity producers, electricity traders, balancing group coordinators, final customers, public electricity supplier, final electricity suppliers, independent transmission operator, exchange market operator, distribution system operators, last resort suppliers and the distribution company of traction electricity.

The electricity exchange market is organised by BNB EAD, which is the holder of a licence for this activity. The BNB carries out the administration of all transactions in the day-ahead, intraday and centralised market for the purchase and sale of electricity by means of bilateral contracts.

An amendment to the Energy Act, which entered into force in 2018, also includes transactions relating to the compensation for the transmission costs of transmission and distribution of electricity transmission operators and distribution systems. Article 100 (4) of the Energy Act provides that these transactions take place on an organised electricity exchange market.

With the amendments to the Energy Act, all RES and RES producers with an installed capacity of 500 kW or more have to offer their electricity on the exchange. These changes, as well as the obligation from 1.7.2021 for all business users to be part of the free market, have significantly changed the market model.

Four electricity distribution system operators are active on the retail market and are licensed to distribute electricity to customers connected to the low and medium voltage distribution system in the respective distinct territories.

On the supply side, the retail market consists of three groups of suppliers:

- Supplier of last resort (WHT), a provider that guarantees the provision of universal service as a last resort, in accordance with a licence received from the KEVR, has an obligation to supply electricity to customers who are connected to the distribution network and have not selected an electricity trader or where the trader they choose does not supply for reasons beyond the control of the customer. The final sales prices of WHT are determined in accordance with the KEVR's methodology for determining the electricity prices of a supplier of last resort;
- Final electricity supplier (KS) – supplies electricity at regulated prices set by the KEVR, facilities of household and non-household final customers connected to the electricity distribution network at low voltage level;
- Free market supplier – trader supplying electricity to household and non-household customers at prices determined on the basis of supply and demand.

Natural gas

The operation of Bulgaria's national gas system is directly linked to the activities of the two gas transmission companies in Bulgaria, Bulgartransgaz EAD (which also owns the underground gas storage facility UGS Chiren) and Ai Xi Bi AD, as well as the national public natural gas supplier Bulgargaz EAD.

Bulgartransgaz EAD is certified as an independent transmission operator (ITO) carrying out licensing activities for the transmission and storage of natural gas on the territory of Bulgaria. Domestic consumption of natural gas in Bulgaria is mainly met by imports via the gas transmission system of Bulgartransgaz EAD and the IGB pipeline.

Data from the total energy balance of the NSIs for 2022 show that the share of natural gas in primary energy consumption was 11.88 % and 11.25 % in final fuel and energy consumption.

In 2022, the country's consumption of natural gas amounted to 28 203 GWh. The quantities transported through Bulgartransgaz EAD's gas transmission network to cross-border points with neighbouring countries amounted to 135.4 TWh, with a significant increase of around 33 % year-on-year since 2021. The trend was that demand for natural gas from alternative sources and LNG terminals continued to grow. With the implementation of major new infrastructure and regasification terminals projects in the region, additional quantities of natural gas will be provided to the regional gas market.

In order to ensure the security of supply of natural gas at prices acceptable to consumers in Bulgaria, a natural gas trading exchange has been operating in Bulgaria since 2 January 2020, which provides the conditions for a competitive environment for natural gas traders and consumers. As of 2 January 2020, the BALKAN gas hub trading platform launched multilateral trading on the organised exchange market, including a short-term segment (spot), a long-term segment and a brokering service. Thus, the state monopoly in the sector has largely been abolished.

The main players in the gas market are the following:

- Bulgartransgaz EAD – a combined gas operator licensed to carry out natural gas transmission and storage activities;
- Balkan Gas Hub EAD and Bulgarian Energy Trading Platform AD – trading platform operators providing a trading environment for an organised exchange market for natural gas trading on a bilateral basis;
- Gas distribution companies – supply both natural gas from the final gas supplier and natural gas distribution activities, supplying natural gas to customers connected to their networks. It is their responsibility to build and develop the gas distribution networks in accordance with the long-term business plans and conditions of the KEVR;

- Bulgargaz EAD, a public supplier of natural gas in Bulgaria, responsible for ensuring the supply of natural gas at prices and conditions approved by the KEVR;
- Natural gas traders – carry out a natural gas supply transaction with the public supplier, final suppliers, customers, other natural gas traders, production companies, natural gas storage companies and the combined operator;
- Natural gas customers who are not households connected to the gas transmission networks;
- Non-household and household natural gas customers connected to the gas distribution networks.

The total length of distribution networks is 5 587 km and covers 173 municipalities. The total number of gas distributors' customers as at 31.12.2022 was 152 383, of which 8 253 non-household customers and 144 130 household customers. There is significant potential for increasing the number of consumers, both through existing gas distribution infrastructure and its expansion, which will also lead to an increase in natural gas consumption.

Ai Xi Bi AD is the operator of the Interconnector Greece-Bulgaria IGB. It became commercially operational on 1 October 2022. IGB connects a Greek gas transmission network close to the city of Komotini with the Bulgarian gas transmission network in the city of Stara Zagora. IGB is also linked to the Transatlantic Pipeline (TAP). The company operates 'transmission of natural gas' on the basis of licence No L-06-576 of 4.11.2021 issued by the Energy and Water Regulatory Commission.

Bulgargaz EAD is a single-member joint stock company within the structure of Bulgarian Energy Holding EAD. The company carries out the activities of 'public supply of natural gas' for the territory of the Republic of Bulgaria and 'trade in natural gas' on the basis of licence No 14/29.11.2006, for the activity of 'public supply', which has a duration of 35 years and licence No 15/16.06.2021 from the KEVR for the activity of 'trading' for a period of 10 years. Bulgargaz EAD has registered on the organised exchange market on the platform of Gazov Hyb Balkan EAD, Bulgarian Energy Commercial Platform AD, the Gas Exchange in Greece (ENEX) and a trade registration in Slovakia and Serbia. The registration procedure for Bulgargaz EAD on Hungarian and Romanian gas exchanges is currently ongoing.

Bulgargaz EAD carries out the following activities:

- Enters into transactions with production undertakings and traders in natural gas for the purchase of natural gas in quantities necessary to cover the consumption of customers directly connected to the gas transmission network and the quantities contracted for the operation of the public suppliers;
- Enters into transactions for the sale of natural gas with customers;
- Conclude natural gas storage transactions with storage operators;

- Carries out other necessary activities related to the public supply of natural gas;
- Ensure a continuous and high-quality supply of natural gas;
- Shall not refuse to conclude a contract for the sale of natural gas to a customer who is directly connected to the gas transmission network or to a public supplier, in accordance with the legislation in force.

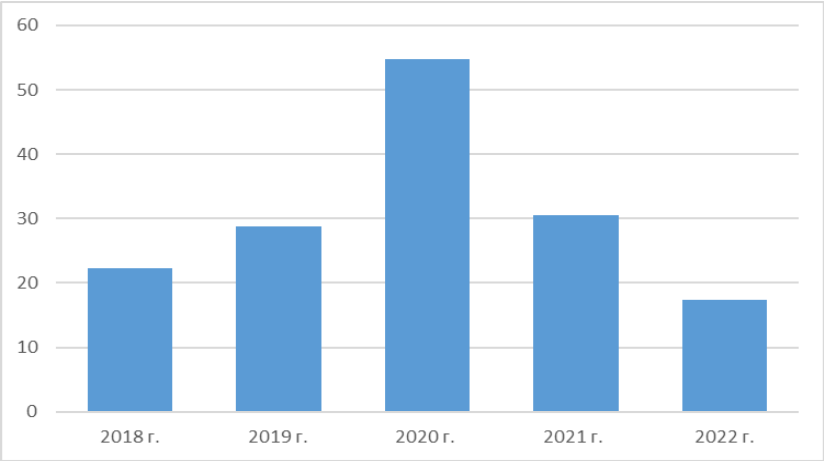
The complex gas market situation in Europe following Russia's military invasion of Ukraine and the subsequent actions of Gazprom Export OCS caused a shortage of natural gas in 2022. In order to safeguard the needs of all European consumers, the European Parliament and the Council adopted (in force since 1.7.2023) Regulation EU 2022/1032 amending Regulation 2017/1038 on safeguarding security of supply of natural gas (the Regulation). It establishes obligations for Member States for minimum refillability of underground gas storage facilities (at least 80 % of their operational capacity) for the autumn and winter period of 2022/2023. The Regulation obliged Member States to take the necessary measures, giving priority to market measures, including allowing for the introduction of financial incentives or compensation to fill existing gas storages. The 2023/2024 targets set out in the Regulation are even more ambitious than those for 2022 and provide for the capacity of all gas storage facilities in Europe to be filled to 90 % of their operational capacity by the end of October 2023.

The hostilities in Ukraine in early 2022 and the increased demand for natural gas in the European gas market during the 2022 injection season led to record high prices of stored natural gas. Subsequently, the stabilisation of the gas market in Europe, as well as reduced demand for natural gas at the beginning of 2023, due to the unusually high average temperatures on the continent, led to a situation where:

- European gas storage facilities, including Bulgaria, stored quantities of natural gas at a higher price than their market value at the time of extraction during the winter period of 2022-2023;
- The inability to harvest these quantities within the original schedule during the winter period of 2022-2023.

Natural gas extraction takes place on the territory of the country, but the quantities are very limited, which is also illustrated by the graph.

Figure 29: *Natural gas extraction in Bulgaria, million cubic metres*



Source: ME

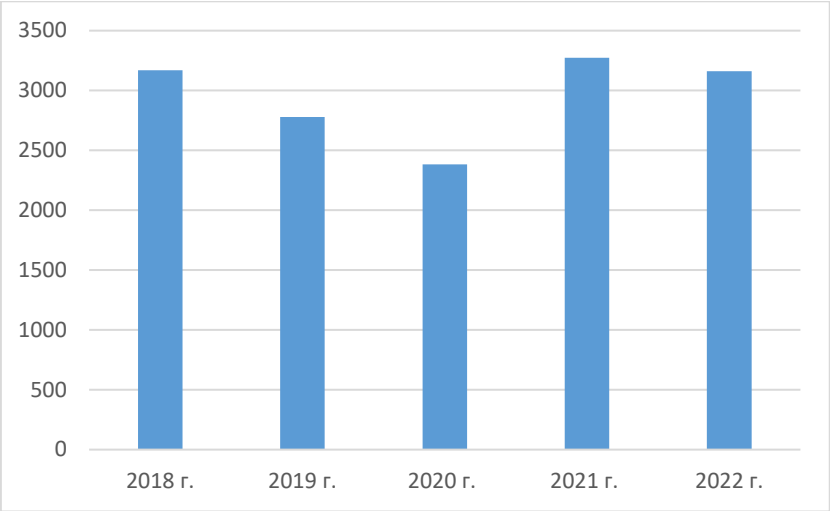
The Chiren underground gas storage facility has a total volume of 1300 mcm and the storage capacity (active gas) is 550 mcm active gas. The remaining capacity of 750 mcm is reserved for buffer gas storage. The quantities of natural gas extracted and injected between 2018 and 2 022 are presented in the following table.

Table 31: *Quantities of natural gas extracted and injected*

Natural gas at UGS Chiren	**2018**	**2019**	**2020**	**2021**	**2022**
	billiumm^3	billiumm^3	billiumm^3	billiumm^3	billiumm^3
Injected quantity	0.319	0.410	0,362	0,37279	0,42656
Quantity obtained	0.324	0.358	0,41295	0,47021	0,24055
Average daily yield 1 month	0.00191	0.00212	0,00208	0,00243	0,00174
Minimum average daily yield per 1 month	0.00154	0.00107	0,00126	0,00178	0,00084
Maximum average daily yield per 1 month	0.00242	0.00281	0,00261	0,00284	0,00255

The quantities of natural gas supplied to the country between 2018 and 2 022 are shown in the following graph:

Figure 30: *Imports of natural gas, mcm*



Source: ME

The graph shows the significant decline in imported quantities of natural gas in 2020. There was also a record low in consumption in the same year.

Natural gas consumption in Bulgaria

Bulgaria's consumption of natural gas in recent years has been in the range of 30-35 000 GWh/y (3-3.5 billion $m^{3\ per}$ year). A significant proportion of district heating plants use natural gas as fuel, their consumption is seasonal in nature and increasing significantly during the winter season. Given the trends to promote decarbonisation and the use of low-carbon fuels, natural gas has the potential for significant and sustainable growth in industry, energy and domestic consumption. It also recognises its role as a transitional fuel in the decarbonisation process and the drive towards a low-carbon economy.

Achieving higher levels of consumption and thus enabling it to be met is an essential process of creating a sustainable environment conducive to the development of industry and the economy.

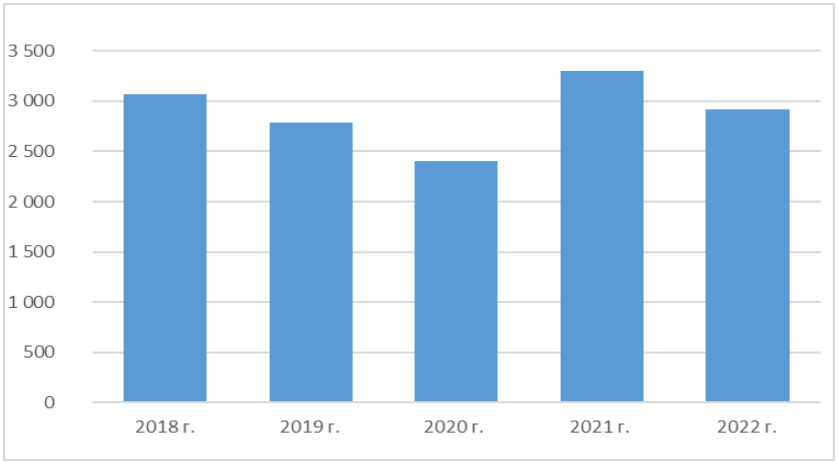
In addition to supporting the economy, increased consumption, in line with the expansion of the gas network, in new regions is directly linked to the development of the regions concerned – in business and social terms. Providing access to a sustainable and environmentally friendly energy source such as natural gas makes it possible to gasify new settlements, increase the competitiveness of economic actors and consequently reduce emissions of greenhouse gases and harmful substances by replacing traditionally used solid and liquid fuels.

Non-household natural gas customers and distribution networks are connected to the gas transmission network of Bulgartransgaz EAD. The non-household customers connected to the gas transmission network at the end of 2022 were 228. The largest part of the gas distribution networks in the country was also connected to the gas transmission network. Three gas distribution networks are connected to natural gas production facilities in the country and receive natural gas from local production, while two of those networks also receive alternative supplies. The main supplier of non-household customers connected to

the gas transmission network is Bulgargaz EAD (191 customers at the end of 2022). Supplies to relevant customers are also made by natural gas traders.

The country's annual consumption of natural gas for the period from 2022 to 2018 by year is presented in the following figure:

Figure 31: *Natural gas consumption in Bulgaria, million cubic metres*



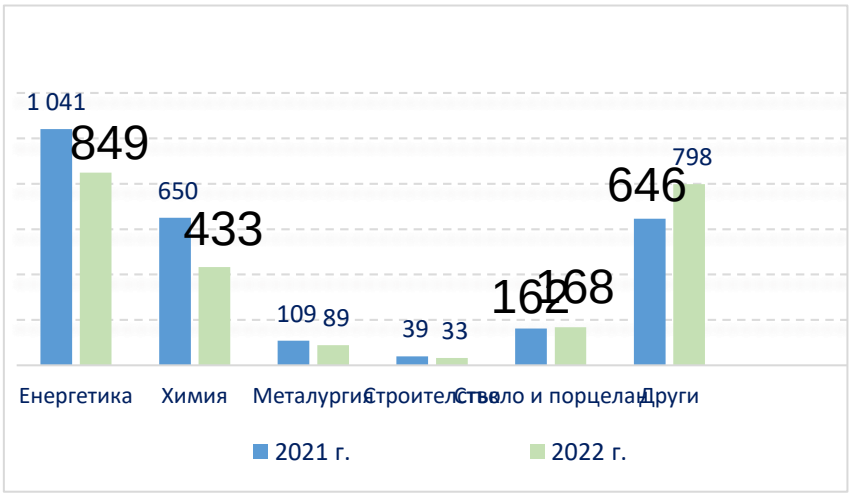
Source: ME

The main consumers of natural gas in Bulgaria are commercial companies in the energy and chemical sectors.

State of the gas sector 2021 г./2022

The country's consumption of natural gas in 2022, compared to 2021 consumption, is shown in the graph below, including the quantities of natural gas for the chemical sector (1 517 thousand m 3)purchased from PSMG.

Figure 32: *Consumption of natural gas by the economy in the country, million cubic metres*

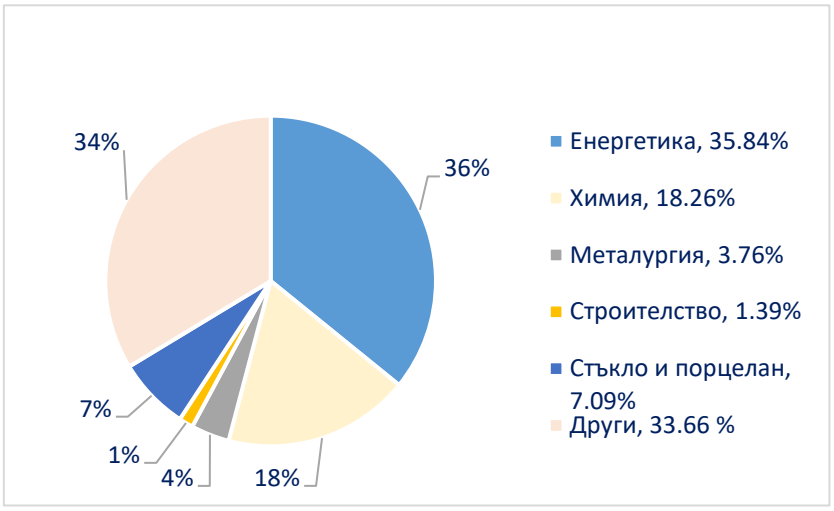


Source: ME

The graph shows that the consumption of natural gas in 2022 by the sectors of the economy in the country as a whole was reduced, excluding glass and porcelain producers.

The structure of consumption by industry is presented in the following figure:

Figure 33: *Structure of natural gas consumption by the economy in the country in 2022, million cubic metres*

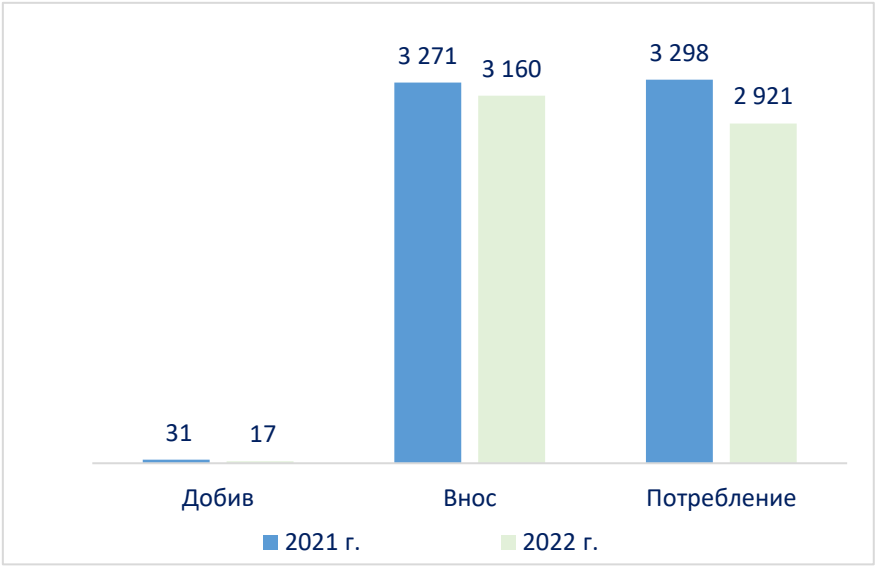


Source: ME

Energy is clearly still the largest consumer of natural gas in the country, followed directly by the chemical industry. The two sectors consume 54.10 % of the total natural gas consumed by the economy in the country.

The quantities of natural gas imported, consumed and extracted in Bulgaria are shown in graphic form, with a comparison between 2022 and 2021.

Figure 34: *Production, import and consumption of natural gas in the country in 2022 compared to 2021, million cubic metres.*



Source: ME

In 2022, imports and consumption of natural gas in the country were slightly reduced. It should be noted that in 2022 a real diversification of both sources and suppliers of natural gas to consumers in the country took place for the first time.

At the same time, the production of natural gas in Bulgaria is almost exhausted. As already mentioned, for the last 10 years it has been reduced by more than 22 times or by 389 454 thousand m^3 in 2012, for the reporting year 2022 the country's yield was only 17 379 thousand m 3.

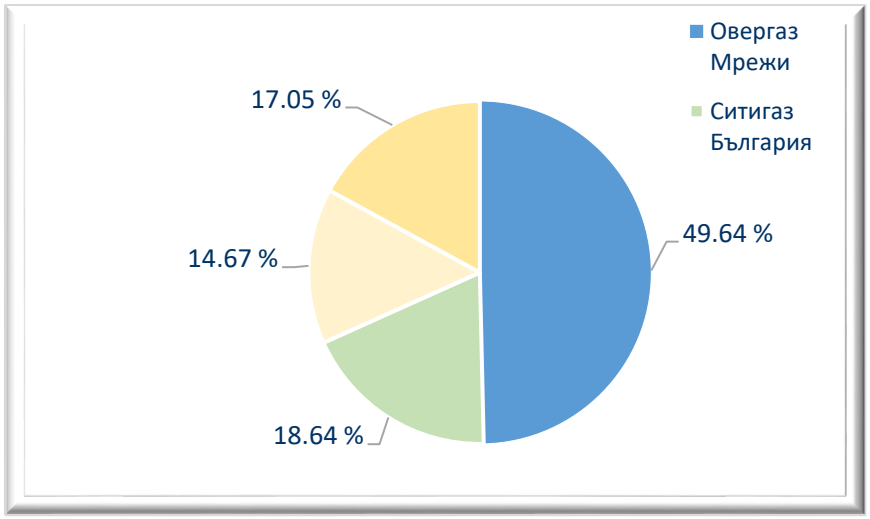
In 2022, gas distributors purchased: (1) 347 437 thousand m^3 natural gas from Bulgargaz EAD, which is 4.6 % lower than in 2021, (2) 1 767 thousand m 3 of^{the} CNG, representing a decrease of 36 % compared to 2021 and (3) 120 392 thousand m^3 from other sources of supply.

The total quantity of natural gas distributed by them in Bulgaria in 2022 was 469 596 thousand m^3. This is 19 % lower than in 2021.

The gas distribution companies with the largest market share in the country and in 2022 were Overgas Networks AD, Citigas Bulgaria EAD and Aresgaz AD. Their market share in% for 2022 is shown in the graph below:

Figure 35: *Market share of gas distributors in 2022,*

million cubic metres



Source: ME

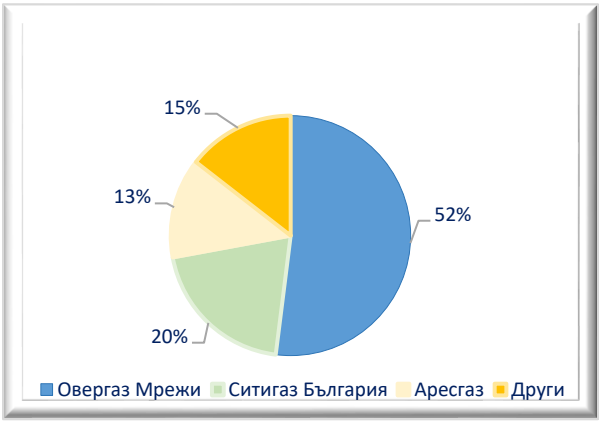
In 2022, with the largest market share of 49.6 % or 233 113 thousand m^3, the majority owned companies 'Overgas Mordi' AD. This quantity is 23 % lower than the quantity allocated by Overgas Networks AD in 2021. Furthermore, the quantity of natural gas distributed in Bulgaria is Sithiga-Bulgaria EAD. The company has a market share of 18.6 %, which, in terms of the quantity of natural gas distributed to final consumers, represents 87 527 thousand m^3. Compared with the quantities delivered in 2021, Syriga-Bulgaria EAD has a reduction of 25 % for the accounting year.

Aresgaz AD has a market share of 14.67 %. The company distributed 68 885 thousand m^3 natural gas, which is 12 % lower than in 2021. The remaining licensees account for a total

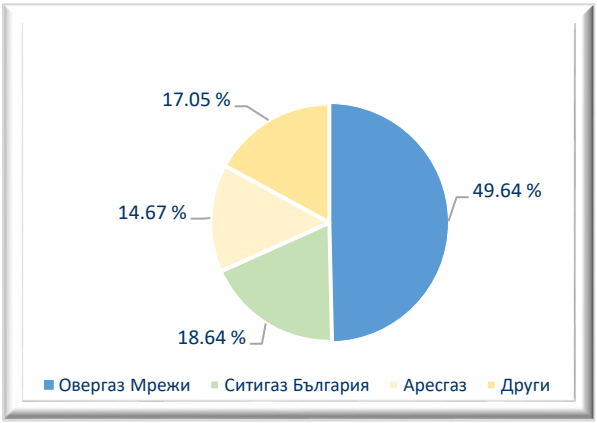
share of 17.05 %. In structural terms, sales by customer type in 2021 and 2 022 are presented graphically:

Figures 36 and 37: *Market share of gas distributors in 2021 and 2022,%*

2021



2022



Source: ME

At the end of 2022, in Bulgaria, 24 gas distribution companies (GDPs) licensed for the activities 'distribution of natural gas' and 'supply of natural gas by final suppliers' operated in 35 licence territories, covering 173 municipalities representing 65 % of all municipalities in Bulgaria. Non-household and household natural gas customers are connected to the gas distribution networks of those companies. Nine of the companies supply natural gas through the supply of compressed natural gas to customers in municipalities with no connection to the gas transmission network.

In Bulgaria, natural gas is predominantly used for electricity production by combined heat and electricity (cogeneration) plants. The largest cogeneration plants are:

Toplofikatsia Sofia EAD – TPP Sofia and Sofia Iztok – a total of 277.349 MWe (3 337.4 MWt);

— EVN Bulgaria Toplofikatsia EAD – a total of 80 MWe (392 MWt);

— Weolia Energy Varna EAD – 11.18 MWe (47.169 MWt) in total;

Toplofikatsiya Burgas EAD – a total of 17.82 MWe (74.45 MWt);

Toplofikatsia Pleven EAD – a total of 95.19 MWe (349.85 MWt);

— Toplofikatsia Vratsa EAD – a total of 8.24 MWe (85.15 MWt);

Toplofikatsiya Razgrad EAD – 3.014 MWe (29 MWt);

— Toplofikatsia Veliko Tarnovo AD – 2.81 MWe (111.75 MWt).

The above cogeneration plants produce heat and electricity using exclusively natural gas.

— Toplofikatsiya Pernik AD has two steam generators, which mainly use coal fuel and a number of steam generators which operate natural gas. When natural gas is used, the unit capacity can reach up to 15 MWe;

— Biovet AD Peshtera – 18.5 MWe (99 MWt).

Electricity generation from natural gas in Bulgaria can also take place at the Varna thermal power plant, a condensation plant with a total installed electricity capacity of 630 MWe, which has not been operating in recent years.

The quantity of natural gas for electricity and heat production in Bulgaria for the period 2019-2022, in billion m 3/year is shown in the following table:

Table 32: *Quantities of natural gas for electricity and heat production in the country in 2019-2022*

Type of production	**2019**	**2020**	**2021**	**2022**
	billion^{3}per year	billion^{3}per year	billion^{3}per year	billion^{3}per year
Natural gas for electricity generation	0.362	0.402	0.615	0.344
Natural gas for heat generation	0.721	0.727	0.793	0.655
Total:	1.083	1.129	1.408	0.999

The generating capacity of gas-fired electricity plants in Bulgaria as compared to total generating capacity in the electricity sector in the country is small expressed as a percentage but essential for the national energy balance. The likely effects of a disruption of the supply of natural gas in the electricity sector will not have a significant impact on the internal electricity market, given the low percentage of natural gas generation capacity.

ii. Projections for the evolution of existing policies and measures at least until 2040 (including 2030)

4.6 dimension Research, Innovation and Competitiveness

i. Current situation of the low-carbon-technologies sector and, to the extent possible, its position on the global market (that analysis is to be carried out at Union or global level)

As a result of the efforts of academic and technical communities in Bulgaria, energy-saving technologies, which lead to significant reductions in energy costs, more comfort and better quality of life, are rapidly developing. Innovation in the energy sector contributes both to achieving overall energy cost reductions and to imposing new energy efficiency standards and moving towards lower and more sustainable energy consumption. The Innovation

Strategy for Smart Specialisation of the Republic of Bulgaria 2020-2014 identifies as a priority area the development of clean technologies with a focus on transport and energy (energy storage, saving and efficient distribution, electric vehicles and eco-mobility, hydrogen-based models and technologies without waste, technologies and methods that incorporate by-products and materials from one output into other industries). The Ministry of Economy has started the process of preparing the Innovative Smart Specialisation Strategy 2021-2027 and the Action Plan.

ii. Current level of public and, where available, private research and innovation spending on low-carbon-technologies, current number of patents, and current number of researchers

iii. Breakdown by current price elements, which make up the three main price components (energy, network, taxes/charges)

iv. Description of energy subsidies, including for fossil fuels

Bulgaria does not provide subsidies, including for fossil fuels.

In order to achieve the targets for the share of energy from renewable sources in gross final energy consumption and to incentivise high-efficiency cogeneration in accordance with Directive 2009/28/EC on the promotion of the use of energy from renewable sources and Directive 2012/27/EU on energy efficiency with Bulgarian legislation and in accordance with the Guidelines on State aid for environmental protection and energy 2020-2014, support shall be granted under the following schemes:

RES scheme

SA.44840 – Support scheme for the production of energy from renewable energy sources under the Renewable Energy Act;

The scheme relates to the operating aid granted to producers of electricity from renewable sources in the form of preferential purchase prices for the electricity they produce, in accordance with the Energy Sources Act.

In Decision No C (2016) 5205 final of 4.8.2016 on support for the production of energy from renewable sources in Bulgaria – SA.44840 (2016/NN), the European Commission concluded that the measure constituted State aid within the meaning of the Treaty on the Functioning of the European Union.

The Commission concludes that the aid is compatible with the internal market under Article 107 (3) (c) TFEU under certain conditions. In order to fulfil the conditions laid down in Commission Decision No C (2016) 5205 final of 4.8.2016, amendments were made to the ZEVI (State Gazette No 91 of 2 November 2018).

Support scheme for electricity produced from high-efficiency cogeneration – SA.56326

In 2019, amendments were made to the Energy Act in order to bring it into line with the requirements of Articles 30 and 110 of the Treaty on the Functioning of the EU (TFEU) and

the Guidelines on State aid for environmental protection and energy 2020-2014. In this connection, an aid scheme for the production of electricity produced by high-efficiency cogeneration was notified to the European Commission under number SA.56326. The scheme provides feed-in prices/premiums for electricity produced from high-efficiency cogeneration registered with a certificate of origin issued by the Energy and Water Regulatory Commission.

5. IMPACT ASSESSMENT OF PLANNED POLICIES AND MEASURES

5.1 impact of planned policies and measures described in section 3 on the energy system and greenhouse gas emissions and removals, including comparison with projections based on existing policies and measures (referred to in Section 4)

i. *Projections of the development of the energy system and GHG emissions and removals as well as, where relevant of emissions of air pollutants in accordance with Directive (EU) 2016/2284 under the planned policies and measures at least until ten years after the period covered by the plan (including for the last year of the period covered by the plan), including relevant Union policies and measures.*

ii. *Assessment of the interplay between policies (between existing policies and measures and planned policies and measures in a given policy dimension and between existing policies and measures and planned policies and measures of different dimensions) until at least the last year of the period covered by the plan, in particular to develop a reliable picture of the impact of energy efficiency/energy savings policies on the scale of the energy system and to reduce the risk of stranded investments in energy supply*

For the most part, the planned (additional) policies and measures set out in this Plan are complementary to existing policies and measures and aim at raising Bulgaria's ambition across all five dimensions of the Energy Union, contributing to the achievement of the EU's objectives. In this sense, existing and planned (additional) policies and measures interact, as the latter mostly broaden the scope of the former or further develop them, increasing their impact.

iii. Assessment of interactions between existing policies and measures and planned policies and measures, and between those policies and measures and Union climate and energy policy measures

Both existing and planned policies and measures interact with Union energy and climate policy measures. In addition, all existing and planned policies and measures implemented within all five dimensions of the Energy Union are consistent with EU legislation or/and contribute to the EU's overall energy and climate objectives.

5.2 impacts of planned policies and measures described in section 3 at the macro economic level and, to the extent possible, health, environment, employment and education, skills and social impacts, including just transition aspects (in terms of costs and benefits and cost-effectiveness), at least until the last year of the period covered by the plan, including comparison with projections based on existing policies and measures

An important aspect will be to improve the knowledge and skills of human resources in the country in the digital field, helping to make widespread use of information and communication technologies and services based on them and to achieve digital growth.

Environmental impact

The environmental impact of this Plan will be assessed in accordance with national legislation.

Impacts of RES development on Natura 2000 areas, biodiversity and natural resources, including waste.

The restrictions on the Natura 2000 network to the development of renewable energy sources (non-biomass RES) stem from the conditions of the Opinion on the Environmental Assessment (EC) of the NREAP, the EC Report and the Compatibility Assessment Report (AA) with the object and objectives of the NREAP protected areas, as well as prohibitions in the RBMP, the orders for designation of protected areas.

For the purposes of the INECPs, the impacts assessed in the NREAP were reviewed, revised and updated. Only impacts with potential for long-lasting and significant negative effects are discussed below. The analysis set out below is not a full environmental assessment. It has been carried out in the framework of the project to inform decision-makers about the potential impacts, constraints and barriers to the development of certain RES sources and to provide insight into how these barriers can be overcome, minimised, mitigated and

managed at governmental level. The relevant NREAP recommendations have also been updated and upgraded where it was found appropriate for the purposes of the INECPs.

In terms of long-lasting effects, during planning and operation, there are potential mitigating measures that can be implemented or restrictive measures. The important impacts that could have lasting negative effects on Natura 2000 sites, protected areas, biodiversity and natural resources during the RES exploitation period are mainly as follows:

With regard to wind energy:

- Mortality of specimens, especially birds and bats (in collisions) – for rare and protected species (all bats are protected) at national and European level and for species protected in Natura 2000 sites;
- Concern for species, including species protected in Natura 2000 sites;
- Impacts on the integrity and structure of Natura 2000 sites;
- Loss and deterioration of protected natural habitats.

The areas with proven wind potential along the Northern Black Sea overlap with the Via Pontica migration route. The same is the case for the Via Aristovelis migration route and others. These circumstances must be taken into account when analysing the potential of RES as limitations.

With regard to hydropower:

- A change in the hydromorphological regime and water flow of the water body, which may result in loss of reservoirs or loss of natural habitats, habitats of water-dependent species and species;
- Habitat degradation;
- Loss or deterioration of protected natural habitats in or along the river bed;
- Alteration and destruction of river habitats, aquatic and coastal fauna; habitat destruction and fragmentation; barrier effect of river species; effects on fauna due to non-permanent river flow; concerns during the operation of the hydropower plant;
- A change in hydromorphology is a factor in changing the ecological status of the surface of water and associated ecosystems due to the effect of water abstraction and barriers in rivers without constructed or well-functioning fish passages.

The HEDs are vulnerable both to the availability of water resources due to climate change and to its events – drought – and to the integrated use of water for other purposes – water supply, irrigation, etc., in accordance with the priorities set out in Article 50 of the Water Act.

The impact on water and compliance with the requirements of Directive 2000/60/EC on good status for surface waters, groundwater and water protection areas (which include a

large proportion of Natura 2000 sites but not limited to, for example, protected areas of water used for drinking) should also be taken into account.

As regards solar energy:

- Fragmentation of natural habitats and habitats of species;
- Deterioration of natural habitats and habitats of species;
- Loss of fauna and flora species;
- Changing the use of land on a permanent basis in large areas;
- Loss of natural habitats and habitats of species.

The identified impacts refer to industrial solar installations outside urban regions, and for solar roofs there are no identified impacts. Outside Natura 2000 sites, there are many sites with low-productivity farmland and stony, unfertile soils that are suitable for the realisation of photovoltaic projects without environmental restrictions and with real potential for producing positive regenerative effects.

For biomass:

- Loss of natural habitats and habitats of species;
- Altering hydromorphology and feeding of rivers from watercourses due to deforestation of catchment areas;
- Degradation of forest ecosystems due to deforestation;
- Degradation and fertility of soils due to monocultures;
- Soil erosion due to deforestation and loss of forest residues;
- Change of ecological status of forest habitats: loss/deterioration of protected habitats and habitats of protected species;
- Depletion and degradation of soils by unsustainable energy crops, as well as soil contamination due to the use of fertilisers and pesticides;
- Destruction of natural habitats and habitats of plants and animals for cleaning up pastures;
- Reducing biodiversity and transforming biodiversity important habitats (grasslands, meadows, wetlands) into energy crops;
- Entry of non-native species;
- Deforestation of catchment areas leads to changes in the availability of water resources (and good forest status is an important factor in climate conditions), as well as problems related to floods and changes in water quality due to erosion processes in the catchment;
- Water is also vulnerable to climate change, through droughts and floods, and the possible impacts of forest use can exacerbate this effect;

- The use of the water surface for drinking and household water supply from dams and river reservoirs is in the mountainous areas of the country and the catchment areas of these facilities are mainly forests that need to be protected.

The NREAP, in force until 2020, sets the following biomass targets:

- Increasing logging to 7 million dense metres^3 per year by 2020;
- Recovery of up to 50 % straw not used by 2008, recovery of up to 90 % sunflower flakes, waste from vegetable oil production;
- Aggregation of livestock farms over the next 3-5 years, allowing the construction of profitable biogas plants;
- Increase the production of briquettes and pellets from wood waste, allowing automation of the management of combustion processes;
- Gradual replacement of conventional heating stoves with fuel chambers using briquettes and pellets, as their efficiency is increasing.

Currently, there is only one plan at national level assessing the biomass potential after 2020, the National Action Plan for Forest Biomass Energy (NEBP) 2018-2027.

Effect on health

As air pollution poses a global health risk, the analysis of air quality and emissions projected in the INECP based on the measures and policies put in place and compliance with EU environmental legislation is used here as a tool for health impact assessment.

Air pollution is also recognised as the fifth leading risk factor for chronic diseases. Air pollution is the greatest environmental risk to the health of Europeans. Once released, pollutants pass through various physical and chemical processes (such as transport, reactions, absorption and deposition on vegetation or rainwater) affecting ambient air quality, which can be analysed by measuring pollutant concentrations. Air pollution affects human health mainly with particulate matter, nitrogen dioxide (NO_2) and ground-level ozone. PM emissions are the main cause of premature death as a result of pollution causing problems in respiratory (lung cancer), cardiovascular or brain (ischaemic attacks) systems. As regards O_3, although usually associated with damage to farming systems, it also has a significant impact on health associated with respiratory diseases.

Energy efficiency measures such as thermal insulation, heating (heating control), ventilation, humidity, fuel use, area and glazing orientation are key factors contributing to reducing excess cold or heat, air pollution and related health risks. Improvements in heating and insulation will bring the greatest economic and social benefits of building renovation.

Adaptation to climate change

The impact of climate change in Bulgaria and adaptation opportunities were analysed as part of the National Strategy on Adaptation to Climate Change and the 2030 Action Plan.

The macroeconomic analysis has been developed on the basis of two climate scenarios, a temperature change of 2 °C (optimistic) and 4 °C (pessimistic) by 2050. Each climate scenario has also been tested for high and low vulnerability assumptions in each sector (in terms of sensitivity to climate change and adaptability). Climate change may directly (or indirectly) affect the cost and availability of materials and production in the economy, which affects the level and structure of the overall economic activity. The loss in real GDP growth in 2050 compared to the baseline is estimated at around 1 % in the optimistic climate scenario and 3.5 % in the pessimistic climate scenario. This would mean that the estimated annual GDP growth of around 1.7 per cent by 2050 would be fully reversed if Bulgaria were to face the full impact of a temperature increase of 2 °C by 2050.

Taking into account the impact of climate change scenarios in Bulgaria for the whole sector up to 2050, the economic analysis concludes that:

- Climate change has a direct negative effect on productivity in the agricultural sector (represented by crop production) and thus a decline in output in all scenarios. The production of wheat, cereals and other crops suffered the greatest negative impact in the four river basin management regions in Bulgaria. The Danube basin, where agricultural productivity is highest, is the sub-region that suffers most from climate change.
- In all scenarios considered, there will be a decline in the production of the energy sector. This is explained by reduced demand from the market economy, reflected as reduced output.
- The transport sector is also negative, with the overall decline in economic activity (negative changes in GDP) causing the decline in demand for output for these sectors.
- Energy-intensive sectors, including the chemical, iron and non-ferrous metals, cement and ceramics industries, are positive for output driven by the positive conditions of trade changes, helping to increase export demand, helping to mitigate declining domestic demand.

The general conclusions for other macroeconomic and social parameters are as follows:

- Following the impact of climate change in Bulgaria, jobs will move away from those sectors that are negatively affected.
- Climate change will change Bulgaria’s overall trade structure. Thus, there will be an increase in imports of goods whose domestic production is strongly influenced by climate change.
- In all the climate impact scenarios considered, there would be an increase in the level of prices across the economy. In addition, rising commodity prices can lead to a significant decrease in real income and an increase in poverty, as households spend a large share of their income on goods whose prices increase significantly (including food goods).

- Overall, revenues from skilled and unskilled labour will decrease in all scenarios. Thus, in combination with rising prices and falling labour revenues, more people are expected to fall below the poverty threshold. In these climate scenarios, it is very likely that there will be more poor people living in Bulgaria until 2050. Moreover, it is widely accepted that the impacts of climate change, including from extreme weather events, disproportionately affect lower incomes and vulnerable groups, reinforcing the impact on these groups of price increases and falling revenues.

The messages emerging from the climate change adaptation analysis are summarised as follows:

- There can potentially be major benefits from adaptation, especially with higher levels of climate change.
- External resources, such as structural funds from the European Union or their successors, or other bi- or multilateral mechanisms focused on climate finance, may also be used for adaptation, in addition to internal resources.
- As regards the allocation of adaptation funding, the analysis concludes that focusing adaptation resources in sectors (and not only on the most vulnerable sectors) has more benefits for the Bulgarian economy and citizens, as it increases the availability of capital in the productive sectors, with an expansion of production and added value, partly exceeding the negative impacts of climate change.

5.3 overview of investment needs

i. Existing investment flows and forward investment assumptions with regards to the planned policies and measures

This section presents investment needs for the national energy system as a whole and by specific sectors or areas of investment.

Overview of sources of funding

Below is a non-exhaustive list of potential sources of funding.

For the next Multiannual Financial Framework 2021-2027, Bulgaria intends to make use of the Structural Funds to finance investment needs to decarbonise the energy sector, ensuring climate adaptation and a just transition. According to Annex D to the Bulgaria Country Report, priority investment needs are identified to promote energy efficiency measures, improve resource efficiency and waste management and promote the transition to a circular economy. Bulgaria intends to access ERDF and Cohesion Fund funds:

I. Structural Funds: European Regional Development Fund and Cohesion Fund

The new MFF 2021-2027 provides EUR 273 billion for ERDF and CF. The new MFF will have a thematic focus, from which policy objective 2: greener Europe and Policy Objective (PO) 3: a more connected Europe is the closest to the investment need.

For the energy sector, PO 2 is the most appropriate. This DS promotes a greener, low-carbon Europe by promoting the transition to clean and fair energy, green investment, the circular economy, climate adaptation and risk prevention and management. Within this PO, the specific objectives of the ERDF/CF are:

Promoting energy efficiency and reducing greenhouse gas emissions

In this respect, the following investment priorities have been identified:

- Support measures to improve energy efficiency for green investments and low carbon emissions from the whole economy and the entire energy chain;
- Supporting the energy efficiency of public, industrial and residential buildings through renovation, including by joining the seismic risk consolidation component;
- Support for energy efficiency for SMEs, large enterprises and local authorities.

Promotion of renewable energy

In this respect, the following investment priorities have been identified: developing and modernising energy storage and backup systems, supporting decentralised distribution, adapting transmission and distribution, increasing grid adequacy.

Development of smart energy systems, grids and storage outside TEN-E

In this respect, the following investment priorities have been identified:

- Digitalisation of the national energy system in the transport, distribution and consumption segments and roll-out of smart management systems and measures to support the implementation of the smart city concept by step.
- Development of transmission and distribution capacity of electricity networks in order to provide the necessary technical parameters for good interconnection with trans-European energy infrastructure for electricity.

For the **environment sector**, PO 2 is most relevant. The ERDF/CF pursues the following specific objectives for this sector:

Promoting climate change adaptation, risk prevention and disaster resilience

In this respect, the following investment priorities have been identified:

- Adaptation to climate change measures, prevention or management of climate risks, floods and landslides, fires, storms, etc.;
- Risk prevention and management of non-climatic natural hazards (e.g. earthquakes) and risks related to human activities (e.g. technological accidents), including awareness-raising systems, infrastructure, civil protection and disaster management.

Promoting the transition to a circular economy

In this respect, the following investment priorities have been identified:

- Municipal waste management: prevention, minimisation, sorting, recycling measures;
- Municipal waste management: treatment of residual waste;
- Management of commercial, industrial or hazardous waste;
- Promoting the use of recycled materials as raw materials;
- Improving the protection of nature and biodiversity, green infrastructure, especially in urban areas and reducing pollution.

For the **transport sector**, PO 3 is the most appropriate. This DS will support the following investments:

- Developing a sustainable TEN-T network adapted to climate change, secure and intermodal;
- Developing and strengthening sustainable, flexible and intermodal national, regional and local mobility, including improving access to the TEN-T network and cross-border mobility.

II. InvestEU

The InvestEU programme under the new MFF provides an EU budget guarantee of EUR 38 billion. The fund will be invested through financial partners, the main one being the EIB Group. Eligible investments are organised in several policy windows, of which the following are most closely linked to the INECPs:

- **Sustainable infrastructure**

This area aims at developing the energy sector, developing sustainable transport infrastructure, innovative equipment and technologies, protecting the environment and resources, developing digital connectivity of infrastructure. Eligible investments include in particular:

- The production, supply or use of clean, sustainable and safe energy from renewable resources and other near zero or low emission energy sources, including natural gas as a transitional fuel;
- Energy efficiency and energy savings;
- Development and modernisation of sustainable energy infrastructure at transport and distribution level, storage, smart grids;
- Developing innovative low- or zero-emission heating and cogeneration systems;
- Production and supply of synthetic fuels derived from renewable or carbon-neutral energy sources;

- Infrastructure for carbon capture and storage systems;
- Alternative fuels infrastructure: electricity, hydrogen and liquefied gases and other low- and zero-emission technologies;
- Projects aimed at combating or adapting to climate change.

- **Research, innovation and digitalisation**

This area aims to stimulate the digital transformation of European companies, markets and EU Member States. It aims to achieve scientific, technological, economic and societal impact by strengthening the EU's scientific and technological base, with the ultimate aim of meeting the EU's strategic priorities and supporting the modernisation of innovative companies and bringing technologies to the market.

- **Small and medium-sized enterprises**

This area aims to promote the competitiveness of SMEs across the EU at every stage of their development.

- **Social investment**

This area aims to: reducing inequalities, increasing inclusion, social enterprises and the social economy, social inclusion, improving citizens' health, general well-being and quality of life that stimulates education outcomes by supporting a just transition to a low-carbon economy.

Sources of funding outside the MFF 2021-2027:

III. Modernisation Fund

In the period 2021-2030, 2 % of the EU total quantity of allowances will be auctioned and the funds will accrue to the MoF, in accordance with Article 10 (1) of Directive (EU) 2018/410 of the European Parliament and of the Council amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, and Decision (EU) 2015/1814. The budget of the Modernisation Fund (MF) is made up of revenues equivalent to the indicated 2 % of the total allowances, which will benefit 10 Member States, including Bulgaria.

On 26 January 2023, by Decision No 67 of the Council of Ministers of the Republic of Bulgaria, the 'Programme laying down the conditions and procedure for the selection of projects for activities financed from the Modernisation Fund' was adopted.

In this regard, an analysis of the state of the electricity system in the country and the need to take urgent measures to ensure the continuity of electricity supply to final customers has been prepared by the Ministry of Energy. The investments supported shall be consistent with the objectives of Directive 2003/87/EC of the European Parliament and of the Council in relation to the operation of the Modernisation Fund as well as the objectives set out in the Union's 2030 climate and energy policy framework and the long-term objectives set out in the Paris Agreement. They lead to the integration of renewable energy sources and make it possible to increase the activity of consumers as "active

consumers/producers". These are key factors for the implementation of the energy sector reforms set out in Bulgaria's Recovery and Resilience Plan.

The priority areas where 80 % of the financial allocation will be allocated are:

- Production and use of electricity produced by renewable energy sources;
- Improving energy efficiency (including in transport, buildings, agriculture and waste), except for the production of energy from solid fossil fuels;
- Energy storage;
- High-pressure gas transmission infrastructure;
- Hydrogen transport infrastructure;
- Modernisation of energy networks, including pipelines in urban district heating systems, electricity and gas transmission networks, increased interconnection between Member States;
- A just transition of carbon-dependent regions to support the development and hire of new human resources positions in the regions concerned.

The remaining 20 % will be used to finance non-priority investments, and these investment proposals will be evaluated by the Investment Committee in the first semi-annual disbursement cycle of the calendar year.

No support will be provided to projects based on solid fossil fuels, with the exception of Romania and Bulgaria for thermal power plants.

Inaccordance with the Programme adopted by the Council of Ministers, the Minister for Energy organises the management of the funds from the Modernisation Fund allocated to the Republic of Bulgaria, carries out ongoing and ex-post monitoring of the implementation of projects financed from the Modernisation Fund and assesses the compliance of the investments with the requirements of the Ministry of Finance and the progress of their implementation.

Separately, the European Investment Bank, as a member of the Investment Committee, which also includes: a representative from each beneficiary Member State, a representative of the European Commission and three representatives chosen by the other Member States for a period of five years will assess the eligibility of projects, the management of assets, the securing of revenue from allowances.

IV. European Investment Bank loans

- Investments in energy efficiency, taking into account the EU target of 32.5 % by 2030, especially for residential buildings, and a new energy efficiency instrument is expected to be introduced, a European Building Renovation Initiative, which will also focus on the energy efficiency of SMEs;
- Decarbonising energy supply, taking into account the EU-wide target of reducing GHG emissions by at least 40 % compared to 1990 (in this regard, the EIB will

commit to supporting the integration of energy projects for renewable energy sources and better regional cooperation);

- Supporting investments in innovative technologies and new types of energy infrastructure;
- Security related to energy infrastructure (EIB continues to support projects of common interest that do not concern the use of fossil fuels).

From 2022 onwards, the EIB will no longer finance investments related to fossil fuels, including natural gas, with emissions of 250 gCO2/kWh or less.

The EIB will also cooperate with the EC in the design of the Just Transition Fund to support regions that are struggling to transition to a carbon-neutral economy. The EIB will finance up to 75 % of eligible costs. Projects will benefit from EIB financial support and advisory services.

V. Private investment

It should be borne in mind that information on the sources of financing from EU funds is currently temporary and subject to change, as the MFF 2021-2027 has not yet been formally finalised at the time of the INECPs.

ii. Sector or market risk factors or barriers in the national or regional context

The main potential sources of risk that could hamper Bulgaria in achieving the objectives and ambitions are limited to the timely and adequate implementation of the planned policies and measures. Bulgaria has significant investment needs in the field of energy and climate change, which are closely linked to the achievement of the objectives.

With regard to the development of electricity produced from renewable sources, Bulgaria plans to invest more in HPP and HPP as well as to increase the use of biomass for electricity production, and in this respect Bulgaria will need to ensure a sustainable supply.

The transport sector will also play an important role in the period 2021-2 030 in terms of decarbonisation and use of renewable energy. In the transport sector, there will be a shift towards alternative fuels and new technologies, such as hybrid and electric cars. Such technologies are currently still expensive, but their economic viability is expected to improve in the future. Accordingly, the growing demand for travel needs to be met and investment decisions in this area must therefore not delay or hinder the development of the transport network and infrastructure. As the switch to alternatively fuelled vehicles entails significant infrastructure changes, it is of great importance that Bulgaria develops infrastructure planning measures for publicly accessible charging stations for electric vehicles, natural gas refuelling stations and hydrogen refuelling infrastructure.

iii. Analysis of additional support with public finances or resources to address the shortcomings identified in point

A number of EU funding mechanisms are available to support the development of sustainable mobility in Europe, including the Connecting Europe Facility. Financial measures to stimulate private investment, especially in the area of energy efficiency, will also be encouraged. The financing of projects of common interest and EIB loans are also important sources of financing.

5.4 impact of planned policies and measures described in section 3 on other Member States and regional cooperation at least until the last year of the period covered by the plan, including comparison with projections based on existing policies and measures

i. Impacts on the energy system in neighbouring and other Member States in the region to the extent possible

ii. Where appropriate, impact on regional cooperation

Electricity markets

Regulation No 2009/714 and the accompanying guidelines and network codes provide that a market-based and non-discriminatory process for allocating cross-border transmission capacities must be coordinated at regional level. The Joint Allocation Office is the service company supporting cross-border transmission capacity markets, becoming the Single Allocation Platform-SAP (Single Allocation Platform-SAP) for all European Transmission System Operators (TSOs), in accordance with Article 59 of Regulation (EC) No 2016/1719. JAO is owned by twenty-five Transmission System Operators (TSOs) from 22 countries.

ESO EAD has owned part of JAO's capital since the end of 2019, using the services of the company to allocate long-term capacities at the borders with Romania, Greece and Serbia. In terms of short-term capacity allocation, the ESO uses JAO services for the borders with Greece and Serbia. The allocation of capacities in the day-ahead time-frame at the border with Romania is carried out by the Romanian transmission operator, which will change following the introduction of the market federation between the two bidding zones at the end of 2020. At the border with North Macedonia, both long-term and short-term capacities are allocated by the Macedonian and Bulgarian transmission operators respectively. As regards the border with Türkiye, the allocation of capacities shall be carried out by each operator for 50 % of the contracted capacity.

Daily explicit auctions at the Bulgarian-Serbian border have been put in place since January 2019 and carried out by the Serbian transmission operator and, at the border with Romania, following the launch of the market grouping in the intraday timeframe of 19.11.2019, daily capacities are implicitly allocated.

The Bulgarian independent power exchange administers short-term day-ahead and intraday market segments. The abolition of the electricity export tariff in 2019 was an important step towards the realisation of the upcoming market alliances on the national market with neighbouring ones.

Natural gas markets

Bulgaria has a strategic geographical location, well-developed gas infrastructure and, with the implementation of the new projects already implemented and planned, it has the potential to develop its role as an important factor in ensuring energy security and diversifying natural gas supply sources and routes for the countries of the region. Natural gas is at the heart of the EU's 2030 greenhouse emissions reduction policy. Gas infrastructure will play a key role in decarbonising and achieving carbon neutrality by 2050.

EU policy focuses on coal phase-out and scaling up the use of alternative green energy carriers such as hydrogen. Despite a relatively low share of final energy consumption, gas is a significant natural resource with the potential to increase its share of the country's total energy consumption in the coming years. At present, the share of domestic gas supply in Bulgaria remains low compared to other EU Member States. The promotion of gasification, the expansion of distribution companies' networks and trends in reducing the consumption of solid and liquid fuels over natural gas also suggest an increase in the use of natural gas in the household sector.

With the construction of the planned new gas infrastructure projects in the country (increase of transmission capacities, expansion of UGS Chiren, implementation of the LNG terminal in Alexandroupolis and other new terminals), significant increases in the quantities of natural gas from alternative sources are expected, and energy security, diversification and access to diverse sources of gas at competitive prices are expected for both Bulgaria and the countries of the region.

The well-developed gas transmission infrastructure available is a prerequisite for the successful and accelerated roll-out of hydrogen in the country's energy mix, and plans to build new hydrogen transmission infrastructure will ensure the large-scale development of the energy sector in the country.

Since 1.10.2022, the IGB interconnector of the second operator for natural gas transmission, ICGB, issued by the Energy and Water Regulatory Commission (KEVR), entered into operation in Bulgaria with Licence No L-576-06 of 4.11.2021 for a period of 35 years. The IGB gas interconnector provides a real diversification of both routes and sources of natural gas to Bulgaria and the whole region. As part of the development of the Southern Gas Corridor, through IGB, Bulgaria and its neighbouring countries have direct access to alternative supplies from the Caspian region, as well as from existing or planned LNG terminals.

The distribution of gas on the territory of Bulgaria is carried out by private regional and local companies operating under the terms of licensing and price regulation for the distribution of activities. The companies with the largest market share in the country are Overgas Network AD, Sigas Bulgaria EAD and Aresgaz AD.

Bulgaria currently has two licensed gas exchanges in operation. The licences issued shall be for the maximum duration of 35 years. The two gas exchanges operate with the same trading platform, Trayport Global Vision Trading System, a product of TrayportLimited UK, which has developed the most common and globally applied software for transaction administration purposes.

The Balkan Gas Hub EAD (BGH EAD), established in 2019, constructs, operates and is responsible for the operation of the organised natural gas trading market of BGH EAD. The segment and bilateral e-commerce electronic platform offers modern physical and financial products, including exchange change of ownership at Virtual Trading Point (VTP) and some of the physical points of the networks provided through the pan-European PEGAS platform.

The short-term (spot) segment of the platform includes standardised day-ahead, day-ahead, time and local products for TSOs' network balancing needs. Trade shall take place on an anonymous basis in accordance with the provisions of Regulation (EU) No 312/2014.

The long-term segment of the trading platform offers products tradable on a medium and long term basis – weekly, monthly, quarterly and annual.

The Gas Release Program (Gas Release Program) segment at the end of 2022 came to an end with the adoption of § 10 of the Transitional and Final Provisions of the Act amending and supplementing the Corporate Income Tax Act (published in. SG No 99/2022), which repealed the provisions of Article 176a (1) (4) and (5) of the Energy Act, according to which the public supplier was obliged to offer certain quantities of natural gas on the organised exchange market in 2023 and 2024. Bulgargaz's long-term contract was not in force as of 31.12.2022, and its supplies ceased on 27.4.2022. Due to the discontinued supplies, Bulgargaz EAD needs to provide alternative sources, both for the provision of its activities as a public supplier and under its bilateral contracts and the quantities under the Programme. The resulting shortfall under the programme is compensated by alternative suppliers at market conditions. More than 70 traders entitled to trade in natural gas freely on the organised exchange market have been licensed. In this sense, Bulgargaz EAD competes on the market together and on an equal footing with them for the purchase of natural gas.

PART 2

List of parameters and variables to be reported in Section B of the national plans[15][16][17][18]

The following parameters, variables, energy balances and indicators are to be reported in Section B 'Analytical Basis' of the National Plans, if used:

1. COMMON PARAMETERS AND VARIABLES

(1) Population, [million]

(2) GDP [euro million]

(3) Sectorial gross value added (including main industrial, construction, services, and agriculture sectors) [euro million]

(4) Number of households [thousands]

(5) Household size [inhabitants/households]

(6) Disposable income of households [euro]

(7) Number of passenger-kilometres: all modes, i.e. split between road (cars and buses separated if possible), rail, aviation and domestic navigation (when relevant) [million pkm]

(8) Freight transport in tonne-kilometres: all modes excluding international maritime, i.e. split between road, rail, aviation, domestic navigation (inland waterways and national maritime) [million tkm]

(9) International oil, gas and coal fuel import prices [euro/GJ or euro/toe] based on the Commission's recommendations

(10) EU-ETS carbon price [EUR/EUA] based on the Commission's recommendations

(11) Exchange rates to EUR and to USD (where applicable) assumptions [euro/currency and USD/currency]

(12) Number of Heating Degree Days (HDD)

(13) Number of Cooling Degree Days (CDD)

(14) Technology cost assumptions used in modelling for main relevant technologies

2. ENERGY BALANCES AND INDICATORS

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15 For the plan covering the period 2021-2030: for each parameter/variable in the list, trends over the years 4-5 (2040-2005 where appropriate) including for the year 2 005 in five year intervals shall be reported both in section 2030 and 2050. Parameter based on exogenous assumptions v modelling output shall be indicated.

16 As far as possible, reported data and projections shall build on and be consistent with Eurostat data and methodology used for reporting European statistics in the relevant sectoral law, as European statistics are the primary source of statistical data used for reporting and monitoring, in accordance with Regulation (EC) No 223/2009 on European statistics.

17 Note: all projections are to be performed on the basis of constant prices (2016 prices used as base year)

18 The Commission will provide recommendations for key parameters for projections, at least covering oil, gas, and coal import prices as well as EU ETS carbon prices.

2.1. Energy supply

(1) Domestic production by fuel type (all fuels and energies produced in significant quantities), [ktoe]

(2) Net imports by fuel type (including electricity and split into intra- and extra EU net imports) [ktoe]

(3) Import dependency from third countries [%]

(4) Main import sources (countries) for main energy carriers (including gas and electricity)

(5) Gross inland consumption of fuels by source type (including solid fuels, all fuels and energies: coal, crude oil and petroleum products, natural gas, nuclear, electricity, heat, renewables, waste) [ktoe]

2.2. Electricity and heat

(1) Gross electricity generation [GWh]

(2) Gross electricity production by fuel type (all fuels and energies) [GWh]

(3) Share of combined heat and power generation in total electricity and heat generation [%]

(4) Capacity electricity generation by source, including retirements and new investment [MW]

(5) Heat generation from thermal power generation

(6) Heat generation from cogeneration plants, including industrial waste heat

(7) Cross-border interconnection capacity for gas and electricity transmission [definition of electricity in line with the outcome of ongoing discussions on the basis of a 15 % interconnection target] and estimated utilisation rates for this capacity.

2.3. Energy transformation sector

(1) Fuel input into thermal power plants (including solid, liquid and gaseous fuels), [ktoe]

(2) Fuel input into other conversion processes, [ktoe]

2.4. Energy consumption

(1) Primary and final energy consumption [ktoe]

(2) Final energy consumption by sector (including industry, residential, services and transport (with disaggregated data for passenger and freight transport, where available)), [ktoe]

(3) Final energy consumption by fuel (all energy products) [ktoe]

(4) Final non-energy consumption, [ktoe]

(5) Primary energy intensity of the overall economy (primary energy consumption per GDP [toe/euro]

(6) Final energy intensity by sector (including industry, residential, tertiary and transport (including split between passenger and freight transport, when available))

2.5. Prices

(1) Electricity prices by type of using sector (residential, industry, tertiary)

(2) National retail fuel prices (including taxes, per source and sector) [euro/ktoe]

2.6. Investments

Investment costs in energy transformation, supply, transmission and distribution sectors

2.7. Renewable energies

(1) Gross final consumption of energy from renewable sources and share of renewable energy in gross final consumption of energy, including by sector (electricity, heating and cooling, transport) and by technology

(2) Electricity and heat generation from renewable energy in buildings; this includes, where available, separate data on energy produced, consumed and fed into the grid by solar photovoltaic systems, solar thermal systems, biomass, heat pumps, geothermal systems and other decentralised renewable sources)

(3) Where applicable, other national trajectories, including long-term or sectoral (the share of food-based biofuels and advanced biofuels, the share of renewable energy in district heating, as well as renewable energy produced by cities and energy communities as defined in Article 22 of Directive (EU) 2018/2001.

3. GHG EMISSIONS AND REMOVALS RELATED INDICATORS

(1) Greenhouse gas emissions by policy sector (EU ETS, Effort Sharing Regulation and LULUCF)

(2) Greenhouse gas emissions determined in accordance with the Intergovernmental Panel on Climate Change (IPCC) methodology, by sector and by gas (data to be reported separately for the EU ETS and effort sharing sectors as appropriate) [TCO_2eq]

(3) Carbon intensity of the economy as a whole [$_{TCO\ 2}$eq/GDP]

(4) CO2 emissions$_{performance}$

(a) $_{Intensitigenemitenaparovia Otherproduction}$electricitaritaritarity taitaemitarycomule

(b) GHG intensity of final energy consumption by sector [TCO_2eq/toe]

(5) Parameters related to emissions other than CO_2

(a) Livestock: dairy cattle [1 000 heads], non-dairy cattle [1 000 heads], sheep [1 000 heads], pig [1 000 heads], poultry [1 000 heads]

(b) Nitrogen input from application of synthetic fertilisers [kt nitrogen]

(c) Nitrogen input from application of manure [kt nitrogen]

D) Nitrogen fixed by N-fixing crops [kt nitrogen]

(e) Nitrogen in crop residues returned to soils [kt nitrogen]

(f) Area of cultivated organic soils [hectares]

(g) Municipal solid waste (MSW) generation

(h) Municipal solid waste (MSW) going to landfills

(I) Share of CH_4 caught in total CH4 generated$_{in}$ landfills [%]