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REPUBLIC OF BULGARIA
Ministry of Energy

**DRAFT INTEGRATED
ENERGY AND CLIMATE PLAN
OF THE REPUBLIC OF BULGARIA**

TABLE OF CONTENTS
PART 1
GENERAL FRAMEWORK

SECTION A: NATIONAL PLAN	5
1. OVERVIEW AND PROCESS FOR ESTABLISHING THE PLAN	5
1.1. Executive Summary	5
1.2. Overview of current policy situation	8
1.3. Consultations and involvement of national and Union entities and their outcome	21
1.4. Regional cooperation in preparing the Plan.....	22
2. NATIONAL OBJECTIVES AND TARGETS	23
2.1. Dimension decarbonisation	23
2.1.1. GHG emissions and removals	23
2.1.2. Renewable energy	24
2.2. Dimension energy efficiency	28
2.3. Dimension energy security	29
2.4. Dimension internal energy market	30
2.4.1. Electricity interconnectivity	30
2.4.2. Electricity and gas transmission infrastructure	33
2.4.3. Market integration	36
2.4.4. Energy Poverty	38
2.5. Dimension Research, innovation and competitiveness.....	39
3 POLICIES AND MEASURES	39
3.1. Dimension Decarbonisation	39
3.1.1. GHG emissions and removals	39
3.1.2. Renewable energy	54
3.1.3. Other elements of the dimension	67
3.2. Dimension energy efficiency	68
3.3. Dimension energy security	87
3.4. Dimension Internal energy market	93
3.4.1. Electricity infrastructure.....	93
3.4.2. Electricity and gas transmission infrastructure	94
3.4.3. Market integration	106

3.4.4.	Energy Poverty	110
3.5.	Dimension Research, innovation and competitiveness.....	111
SECTION B: ANALYTICAL BASIS		113
4.	CURRENT STATUS AND PROJECTIONS UNDER EXISTING POLICIES AND MEASURES	113
4.1.	Projected evolution of main exogenous factors influencing energy system and GHG emission developments	113
4.2.	Decarbonisation.....	113
4.2.1.	GHG emissions and removals	113
4.2.2.	Renewable energy	120
4.3.	Dimension Energy Efficiency.....	124
4.4.	Dimension Energy security.....	130
4.5.	Dimension Internal energy market	139
4.5.1.	Electricity interconnectivity	139
4.5.2.	Electricity and gas transmission infrastructure	140
4.5.3.	Electricity and gas markets, energy prices	143
4.6.	Dimension Research, innovation and competitiveness.....	146
5.	IMPACT ASSESSMENT OF PLANNED POLICIES AND MEASURES..	147
5.1.	Impacts of planned policies and measures described in section 3 on energy system and GHG emissions and removals, including comparison to projections with existing policies and measures (as described in section 4).	147
5.2.	Macroeconomic and, to the extent feasible, the health, environmental, employment and education, skills and social impacts, including just transition aspects (in terms of costs and benefits as well as cost-effectiveness) of the planned policies and measures described in section 3 at least until the last year of the period covered by the plan, including comparison to projections with existing policies and measures	147
5.3.	Overview of investment needs.....	148
5.4.	Impacts 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 to projections with existing policies and measures	148

Part 2

List of parameters and variables to be reported in Section B of National Plans

1.	GENERAL PARAMETERS AND VARIABLES	149
2.	ENERGY BALANCES AND INDICATORS	150
2.1.	Energy supply	150
2.2.	Electricity and heat	150
2.3.	Transformation sector	150
2.4.	Energy consumption.....	150
2.5.	Prices	151
2.6.	Investments.....	151
2.7.	Renewables.....	151
3.	GHG EMISSIONS AND REMOVALS RELATED INDICATORS	151

COURTESY TRANSLATION

PART 1

GENERAL FRAMEWORK

SECTION A: NATIONAL PLAN

1. OVERVIEW AND PROCESS FOR ESTABLISHING THE PLAN

1.1. Executive Summary

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

The 2030 Integrated National Energy and Climate Plan of the Republic of Bulgaria (INECP) was prepared in accordance with the requirements of the Regulation on the Governance of the Energy Union (REGULATION (EU) 2018/1999 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council) according to which the Member States of the European Union shall submit their draft INECs by 31 December 2018.

The INECP lays down the objectives, stages, means, actions and measures for the development of Bulgaria's national energy and climate policy in the context of EU law, principles and priorities for energy development.

The objectives set out in the Plan are:

- ✓ to promote low-carbon economic development;
- ✓ competitive and secure energy;
- ✓ to reduce energy import dependency;
- ✓ to give all consumers energy at affordable prices.

The national energy priorities can be summarised as follows:

- enhancing energy security through sustainable energy development;
- development of an integrated and competitive energy market;
- use and development of energy from renewable sources based on available resources, network capacity and country specifics;
- enhancing energy efficiency through development and implementation of new technologies with the aim to achieve modern and sustainable energy;

- consumer protection by ensuring fair, transparent and non-discriminatory conditions for use of energy services.

The Integrated National Plan of the Republic of Bulgaria complies with the main strategic documents at European and national level.

The following national strategic documents (and draft documents that are currently undergoing coordination procedures) were used in its preparation:

- ✓ Energy Strategy of the Republic of Bulgaria until 2020;
- ✓ National Strategy for the Development of the Mining Industry until 2030;
- ✓ Strategy for Bulgaria's Participation in the Fourth Industrial Revolution;
- ✓ Long-Term National Strategy for Renovation of Residential and Administrative Buildings (Private and Public);
- ✓ Innovation Strategy for Smart Specialisation;
- ✓ National Programme for Energy Efficiency of Multi-Family Residential Buildings;
- ✓ National Policy Framework for development of the market for alternative transport fuels and deployment of relevant infrastructure;
- ✓ National Action Plan for the Promotion of the Production and Accelerated Penetration of Environmentally-friendly Vehicles, Including Electric Mobility in Bulgaria for the period 2012—2014;
- ✓ National Renewable Energy Action Plan;
- ✓ National Energy Efficiency Action Plan 2014—2020;
- ✓ National Forest Biomass Energy Action Plan 2018—2027;
- ✓ National Climate Change Adaptation Strategy of the Republic of Bulgaria and Action Plan (draft);
- ✓ Third National Climate Change Action Plan (for the period 2013—2020);

ii. [Strategy relating to the five dimensions of the Energy Union](#)

The strategic energy and climate objectives and priorities of the Republic of Bulgaria laid down in the Integrated National Plan are as follows:

As regards the decarbonisation dimension: efforts to reduce greenhouse gas emissions, greenhouse gas removals and efforts to increase the share of renewable energy in gross final energy consumption;

As regards the energy efficiency dimension: to achieve energy savings in final consumption and in energy generation, transmission and distribution and to improve the energy performance of buildings;

As regards the energy security dimension: to enhance energy security by diversifying energy supply, efficient use of indigenous energy resources and energy infrastructure

development;

As regards the internal energy market dimension: to develop a competitive market through full market liberalisation and integration with regional and common European markets;

As regards the research, innovation and competitiveness dimension: to encourage the translation of scientific advancement into innovative energy technologies, including for clean energy production and efficient energy use in final consumption.

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

Dimension	Quantified objective for 2030
National objective for reducing GHG emissions pursuant to Regulation (EU) No 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 (the objective concerns the building stock, agriculture, waste management and transport sectors)	0 %
Contribution of the Republic of Bulgaria towards meeting the EU target to cut GHG emissions by 43 % in the emissions trading system (based on the 2030 EU Climate and Energy Policy Framework)	there is no individual target for each Member State as the target is to be achieved at EU level
National target for the share of renewable energy in gross final energy consumption	25 %
National energy efficiency target	27 %
National interconnection target	15 %

These key objectives, policies and measures for implementing the country's energy policy by 2030 are determined on the basis of the following factors:

- the need to ensure the energy security of the country and the region;
- the available indigenous energy resources and their use in existing production facilities and the investments made in modernisation which affect the competitiveness of the economy and the social policy of the country;
- the existing electricity system which is balanced and has sufficient facilities with a long-term horizon of operation;
- the fact that the balancing of the electricity system entails the use of condensing power plants to ensure fast and flexible reserve capacities given the small hour rate of utilisation of hydro power plants (VETs) and pumped-storage hydropower plants (PAVETs);
- the country's GDP compared to that of other EU Member States.

1.2. Overview of current policy situation

i. National and Union energy system and policy context of the national plan

The Republic of Bulgaria pursues a transparent energy policy to protect the national and public interest. The energy policy of the country aims at establishing the market principles in the energy sector, ensuring energy independence, sustainable energy development of the country, efficient use of energy and energy resources, meeting the public needs for electric power and heat, natural gas and fuels. It is targeted at:

- maintaining a secure, stable and reliable energy system;
- diversifying the sources and routes of natural gas supply;
- modernising and expanding the gas transmission network;
- eliminating the dependence on imported energy resources by using indigenous resources;
- modernising and extending the energy infrastructure;
- nuclear energy development in line with modern requirements for reliability, safety and cost-effectiveness;
- improving energy efficiency and increasing the share of energy from renewable sources in gross final energy consumption;
- active participation of Bulgaria in establishing a single and robust European energy market;
- developing a competitive energy market and a policy aimed at meeting the energy needs and protecting consumer interests;
- ensuring fair access of all consumers to the network under clear and non-discriminatory rules;
- achieving a balance between energy quantity, quality and price for end consumers.

In pursuing the energy policy, the country has adopted the core energy policy objectives of the European Union (the EU, the Union) of security of supply, competitiveness and sustainability. The policy is consistent with the five interrelated dimensions of the European Energy Union: energy security, solidarity and trust; a fully-integrated European energy market; energy efficiency contributing to moderation of demand; 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

These policies and measures are summarised in the National Climate Change Action Plan (NCCAP) 2013–2020. The sectorial policies and measures in the NCCAP are set out so as to meet the main goal of the plan: to reduce greenhouse gases in Bulgaria and to achieve compliance with the effective European climate change law. Priority axes for development of each sector are identified and relevant measures for each priority axis are set.

The measures are divided into two groups — measures with measurable impact on the reduction of greenhouse gases and measures with indirect impact which also contribute to emissions reduction but whose impact is more difficult to measure. For each measure, the plans proposes instruments necessary for its application. Said instruments can be: legislative changes, application of laws and by-laws, programmes, plans, schemes, etc., as well as implementation of incentive mechanisms, conducting information campaigns, training, etc. The target groups, the institutions responsible for implementation reporting, the beginning and the implementation period, the financial resources required and the sources of financing are indicated for each measure. A performance indicator which is directly or indirectly related to the calculation of the estimated effect is established and target values by years are set. Additional information regarding the measure is provided; it specifies the legal act or strategic document in which the measure is set out, the forecasts used to calculate emission reduction, the link between the measure, the instruments, the responsible institutions, etc.

As the Energy sector accounts for the highest share in total greenhouse gas emissions, it is of primary relevance to the implementation of the national targets for their reduction. Coal-fired generation of electricity and heat contributes to over 90 % of the GHGs in the sector; the main potential for emission reduction is concentrated here. The policies and measures in the Energy sector as laid down in the NCCAP are based on the policies and measures set out in Bulgaria's 2020 Energy Strategy and in the National Renewable Energy Action Plan. The measures are grouped in five priority axes:

- Priority Axis 1: Cleaner electricity production from existing coal-fired power plants;
- Priority Axis 2: Shift to a lower carbon electricity mix;
- Priority Axis 3: The district heating system as a tool for a low-carbon energy sector;
- Priority Axis 4: Decentralised energy production;
- Priority Axis 5: Development of low-carbon transmission and distribution networks for electricity and natural gas.

The implementation of the additional measures laid down for this sector will result in GHG emission reduction by 13.8 % compared to the baseline scenario¹ levels by 2020.

¹ baseline scenario (policy and measures before the reference year 2009): reducing emissions by 3.1 MtCO₂eq. or by 11.5 %

The Households and Services sector shows an upward trend in GHG emissions due to increased energy consumption by households. The measures in this sector are based on Bulgaria's 2020 Energy Strategy and the national Indicative Target referred to in Directive 2006/32/EC and are aimed at promoting energy efficiency and the use of renewable energy sources in gross final energy consumption. The projected emissions reduction in this sector in 2020 with implementation of the measures laid down in the NCCAP is 22 % compared to the emissions in the baseline scenario.

The Waste sector is critically important and holds an extremely high potential for emissions reduction. Reductions expected after implementing the NCCAP measures account for 36.4 % compared to the emissions in the baseline scenario. This sector appears to be one of the main sources of GHGs along three major lines: emissions from waste disposal, waste water treatment and waste incineration. The measures focus mainly on the Waste Disposal subsector which accounts for the highest share in emission levels. Most of the measures planned in this sector can be achieved by applying the existing legal framework without investing substantial financial resources. This makes them highly efficient. The importance of taking measures in the Transport sector is underpinned by the fact that this sector is one of the largest GHG emitters and is constantly growing but its impact on climate change has been largely overlooked until recently. To this end, the main measures in the sector aim at achieving an optimum balance in the utilisation of the potential of different modes of transport and are grouped in four priority axes:

- reducing transport emissions;
- reducing fuel consumption;
- transport diversification;
- consumer awareness and training.

The implementation of the additional measures laid down for this sector will result in GHG emissions reduction by 11.3 % compared to the baseline scenario levels laid down in the NCCAP. The overall impact of the proposed measures by sector expressed as estimated reduction in greenhouse gas emissions by 2020 is estimated at 44.832 MtCO₂eq.

Currently Bulgaria is pursuing a targeted policy for development of renewable energy. Different support schemes have been introduced over the years to ensure that renewable energy production and consumption will develop so as to substantially contribute to the security and diversity of energy supply, competitiveness, environmental and climate protection, regional development and deployment of new technologies.

A set of regulatory, administrative and financial measures were introduced to promote the production and consumption of renewable energy.

The Energy from Renewable Sources Act (ZEVI) is the main legal instrument that regulates the public relations in the field of renewable energy. The Act and its by-laws transpose the requirements of Directive 2009/28/EC on the promotion of the use of renewable energy.

The purchase of electricity generated under long-term contracts and at preferential prices was among the most attractive measures for the promotion of generation of renewable electricity according to the ZEVI.

According to Article 18(2) of the ZEVI, the achieving of the binding national target for 2020 serves as grounds for terminating some of the incentives with respect to energy units producing renewable energy that apply for connection after the date of the report of the Minister for Economy and Energy (27 December 2013) which states that the overall national target for a share of renewable energy in the gross final energy consumption (16 %) has been achieved.

For this reason and in view of the need to optimise the support schemes in line with the current status and development of the sector, the ZEVI was amended in 2015 in accordance with the Guidelines on State aid for environmental protection and energy 2014–2020 and Commission Regulation (EU) No 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market.

As a result of the legal amendments made, after 1 January 2016 the incentives relating to the purchase of renewable electricity at preferential prices and under long-term contracts are now granted only to small energy units (with an installed capacity of up to 30 kW) built on roof and facade structures of buildings connected to the electricity distribution network and in real estate adjacent to such buildings in urbanised areas.

The amendments to the ZEVI aimed to align the overall support mechanism with the electricity market liberalisation and to address some adverse impacts.

The Act Amending the Energy Act (ZID na ZE) adopted by the National Assembly in May 2018 changed the support scheme for renewable electricity generation.

The amendments made by the ZID na ZE aimed at restricting the support for renewable electricity generation through preferential prices; said support is to be provided only for electricity generated by units with a total installed capacity of less than 4 MW.

In addition, the ZEVI also sets out specific measures for stimulating the generation of energy for heating and cooling and of gas from renewable energy sources, including through supporting and implementation of projects for construction of heat transmission networks in settlements that meet the requirements for a designated area when the viability of renewable heat is proved; through supporting and implementation of projects for construction of small decentralised heating and/or cooling systems; through connecting units for generation of renewable heat to the heat transmission network and purchase by the heat transmission company of heat generated by another producer.

To achieve the compulsory 10 % share of renewable energy in transport, the ZEVI introduced an obligation for the persons that place petroleum-derived liquid fuels on the market to release said fuels for consumption blended with a biocomponent in a specific ratio.

In pursuance of the requirements of Directive (EU) 2015/1513 amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC, in April 2017 a national target for advanced biofuels was set and presented to the EC: 0.05 percentage points in energy content of the share of energy from renewable sources in all forms of transport to be met with said biofuels. This target is to be achieved by 2020.

In order to achieve this target, the adopted ZID na ZEVI (published in the State Gazette (SG) No 91 of 2.11.2018) laid down specific measures which will take effect on 1 April 2019. The amendment introduced an obligation on the persons that place on the market petroleum-derived liquid transport fuels to market fuels for diesel engines with a minimum biodiesel content of 6 volume fractions, with advanced biofuel being at least 1 volume fraction of the biodiesel. Such an obligation was also introduced for end distributors and for distributors of petroleum-derived liquid fuels.

2) Energy efficiency

The energy efficiency (EE) policy is an essential component of the national and European energy and climate change policies. Its implementation is instrumental in achieving the EU targets and priorities both by 2020 and by 2030, within the 2050 horizon, in accordance with the Paris agreement of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) and the 2030 framework for climate and energy policies of the EU.

The process of switching over to an energy system with low level of harmful emissions entails higher energy efficiency, greater use of energy from renewable sources in gross final energy consumption, improved energy management, development of the energy infrastructure and building the internal market, as well as designing various concepts and deployment of new technologies and services. In accordance with the EU priorities, energy efficiency is a first priority in the energy policy and is essential to meeting the targets for the period from 2020 to 2030.

The legal basis in the field of EE is aligned with European law; the primary document providing for the implementation of the relevant policy is the Energy Efficiency Act (ZEE). Pursuant to the requirements of the ZEE and in accordance with the provisions of Directive 2012/27/EU on energy efficiency and Directive 2010/31/EU on the energy performance of buildings, the following strategic documents were developed and are

being implemented:

- National Energy Efficiency Action Plan 2014—2020;
- National Plan for Nearly Zero-Energy Buildings 2015—2020;
- National plan for improving the energy performance of heated and/or cooled state-owned buildings occupied by the public administration;
- National Long-Term Programme to Promote Investments in the Implementation of Measures Improving the Energy Performance of Buildings of the Public and Private National Residential and Commercial Building Stock.

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

- to achieve energy savings of 8.325 GWh by 2020;
- to realise annual energy savings of 1.5 % of the volume of energy sales;
- to take measures for improving the energy performance of at least 5 % of the total gross floor area of all heated and/or cooled state-owned buildings occupied by the public administration;
- to increase the number of nearly zero-energy buildings;
- to provide secure and affordable energy for everyone;
- to minimise the adverse effects of energy use on human health and the environment;
- to improve the population's living standards;
- to enhance the competitiveness of the Bulgarian economy.

The measures and policies envisaged for the period after 2020 ensure a link between the existing and the planned policies and measures within the Decarbonisation dimension, as well as a link between the existing and the planned policies and measures in the other dimensions of the Energy Union by 2030. In view of the specificity and the interdependence between effect and expected outcome, the measures and policies in the field of renewable energy are consistently combined with those in the energy efficiency dimension. Efforts are made to coordinate national climate and energy policies by using the opportunities for regional cooperation with other Member States to attract the investments required for their implementation.

The policies and measures build on the scope and substance of the existing ones in order to better deploy and integrate renewable energy in achieving the main indicators for a financially affordable, safe, competitive, secure and sustainable energy system.

We cannot report any progress with respect to the priority for development and extension of household gasification in the country set out in the Energy Strategy. The share of households using natural gas in Bulgaria is below 5 % compared to 55 % in Europe. Electricity use in final consumption results in three times higher costs for primary energy compared to the environmentally-friendly alternative of direct natural gas use.

Therefore replacing electricity with natural gas for heating and household purposes would contribute to a triple saving of primary energy and should be considered as one of the ways to increase energy efficiency.

To create incentives for increasing the share of household gasification in the country, the Ministry of Energy is implementing the project 'Energy efficiency measures at final consumers of natural gas' (DESIREE) with a grant of EUR 10.9 million from the Kozloduy International Decommissioning Support Funds (KIDSF). The objective of this project is to encourage household gasification by supporting the initial investment of about 10 000 households for being connected to the existing gas distribution network (fixed fee of 30 % of the eligible investment cost and 100 % of the connection fee, but not more than EUR 1 000 per household for systems with high-efficiency boilers and not more than EUR 1 200 per household for condensing boiler systems).

The implementation of the project will result in air pollution reductions by replacing fuels with high levels of harmful emissions in ambient air with natural gas.

3) Energy security

Security in the electricity sector

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

- efficient use of indigenous energy resources;
- increased interconnection.

- *efficient use of indigenous energy resources*

Bulgaria makes maximum use of the existing potential of indigenous coal in the country in compliance with environmental requirements. The coal would provide feedstocks for electricity generation over the next 60 years.

The use of indigenous coal reserves has the potential of a stabilising source of energy. The power plants using indigenous coal account for about 48 % of total electricity generation and guarantee Bulgaria's energy security and the competitiveness of the Bulgarian economy. These power plants are baseload electricity generating facilities for the Bulgarian electricity system and the main supplier of balancing services in the system. Therefore they are a key factor for the country's electricity security. This determines the role of indigenous coal as a strategic energy resource for the country's energy and national security.

Kozloduy Nuclear Power Plant, being a baseload plant, plays a prominent role in maintaining the sustainability of reserves in the electricity system. It ensures about 33 % of the electricity generation in the country and guarantees Bulgaria's energy security. The Energy Strategy of the Republic of Bulgaria until 2020, adopted by the National

Assembly on 1.06.2011, provides for extending the lifetime of units 5 and 6 of Kozloduy Nuclear Power Plant. The following actions were undertaken in this respect:

1. The project for extension of the lifetime of unit 5 was implemented in two stages between 2015 and 2016. As soon as the full scope of activities for the extension of the lifetime of the reactor was completed and performance audits were conducted, it was found that no restrictions existed for the safe operation of unit 5 in the period of long-term operation until 2047 (30 years). In compliance with the requirements of Articles 8 and 3 of the Regulation on the procedure for issuing licences and permits for safe use of nuclear energy, on 6.11.2017 the Nuclear Regulation Agency (NRA) issued a licence for the extension of the lifetime of unit 5 of Kozloduy Nuclear Power Plant for a period of 10 years (the maximum operational life according to the Bulgarian legislation).
2. To extend the lifetime of unit 6, 208 activities and measures under the programme for extension of the reactor's lifetime for a long-term 30-year operation were implemented by the end of 2018. In accordance with the requirements laid down in the Regulation on the procedure for issuing licences and permits for safe use of nuclear energy, on 8.09.2018 Kozloduy Nuclear Power Plant submitted to the NRA an application for the operation of unit 6 for a period of 10 years (the maximum legally prescribed period).

➤ *increasing interconnection*

The opportunity for electricity exchange with neighbouring countries is an important factor in increasing the security of the energy system in the country and in the region. To enhance the existing capacity for electricity interconnection, new interconnections are planned to be built. The main projects are as follows:

- The construction of an interconnection overhead power line between Bulgaria and Greece would have a considerable impact on the security of electricity supply in the region and would contribute to the flexibility of the electricity system, the transmission of renewable electricity, the interoperability and the secure operation of the system. The group of projects increases the net transmission capacity across the Bulgaria—Greece border, accelerates market integration and fosters competition. The project is included in the list of projects of common interest and is divided into the following sub-projects:
 - Electricity interconnection overhead line between Maritsa Iztok substation and Nea Santa substation
 - Internal power line between Maritsa Iztok substation and Plovdiv substation: feasibility works
 - Internal power line between Maritsa Iztok substation and the Open Power

Distribution Device (ORU) of Maritsa Iztok 3 Thermal Power Plant: feasibility works

- Internal power line between Maritsa Iztok substation and Burgas substation

The interconnection overhead line and the three internal power lines will have a transmission capacity of 1 500 MW each.

- Electricity interconnector between Bulgaria and Romania, including construction of a new 400 kV power line;
- Yadenitsa Dam Pumped Storage Plant is a project of common economic interest co-financed by the Connecting Europe Facility (CEF). The implementation of the Yadenitsa project has the aim to increase the volume of the lower reservoir of Chaira Pumped Storage Plant (PAVETs) by construction of Yadenitsa Dam and a reversible pressure tunnel connection with Chaira Dam. The Yadenitsa project covers construction of two basic facilities: Yadenitsa dam wall with water reservoir and Yadenitsa reversible pressure tunnel. The implementation of the investment project will ensure a balancing capacity in the country's electricity system and will allow further development of electricity generation from renewable energy sources according to the long-term strategies for energy development in Bulgaria and in the European Union.

➤ *security of natural gas supply*

Diversification of sources and routes for natural gas supply is important both for the country's national security and its energy independence and for the region as a whole. A number of projects of common interest for the EU and for the region are implemented in this regard:

- Gas Interconnector Greece—Bulgaria (IGB)
This project is included in the Union's list of projects of common interest. In 2015, a final investment decision was made and financing was provided for the implementation of the project. The gas interconnector is to be put into service in 2020. The implementation of the project will result in the following direct effects: real diversification of the sources of natural gas supply for Bulgaria will be achieved, an opportunity for natural gas supply from the Southern Gas Corridor and from LNG sources will be provided, Bulgaria and its gas transmission system will become a major part of the regional infrastructure for gas supply from alternative sources for the region of Central and South-Eastern Europe.
- Participation in the construction of the new liquefied natural gas (LNG) terminal in Alexandroupolis, Greece. This project is included in the Union's list of projects of common interest. The project is aimed at providing an alternative source of gas supply for markets in south-eastern Europe, price flexibility and higher

competition. The LNG terminal project involves the building of a floating platform for acceptance, storage and re-gasification of liquefied natural gas. A system of underwater and surface gas pipelines will be built for the project and will allow natural gas to be delivered to the Greek national gas transmission system (NNGTS) and from it to Greece, Bulgaria, Serbia, Macedonia, Turkey, Romania, Ukraine and Hungary. The project is important for Bulgaria not only because it can secure alternative gas sources, but also because it allows the country to transit natural gas to Central European countries.

- Gas infrastructure development in relation to the concept for building the Balkan Gas Distribution Hub (GRTs) in Bulgaria is a project of common interest in the EU. In the context of the European objectives for developing an interconnected and single European gas market, the implementation of the GRTs concept is in line with the projects for development of the Southern Gas Corridor and in full conformity with the plans for the development of the gas infrastructure in Europe and is aimed at improving the security of supply and diversifying the sources of natural gas supply. The project meets the needs of the region as identified by the Central and South Eastern Europe Energy Connectivity High Level Working Group (CESEC) and by the EU's Energy Union Strategy. By building the necessary gas transmission infrastructure, the GRTs aims to connect the natural gas markets of Member States in the region — Bulgaria, Greece, Romania, Hungary, Croatia, Slovenia, and through them — the Member States in Central and Western Europe and the contracting parties to the Energy Community like Serbia, Ukraine, Macedonia, Bosnia and Herzegovina and thus to contribute to the achievement of the main priorities of the European energy policy. At the same time, a natural gas trading platform (exchange) is organised where each market player will be able to effect transactions in natural gas on a market basis. In order to create a functional and liquid gas exchange, a draft Cooperation Agreement was prepared between Bulgartransgaz EAD and Central European Gas Hub AG (CEGH AG) which operates a gas exchange on the Austrian and Czech markets.

The Memorandum provides for the two companies to cooperate on five major aspects: training and sharing of good practices, trading issues, legal and regulatory matters, practical gas exchange implementation and interconnection to provide the infrastructure necessary for the execution of commercial transactions.

- The project for expansion of the capacity of the underground gas storage (UGS) Chiren is a project of common interest for the EU within the scope of Regulation (EU) No 347/2013. It provides for a progressive increase of the capacity of the only gas storage in Bulgaria in order to achieve higher volumes of gas storage, higher pressures in the gas reservoir and higher average 24-hour gas extraction

and pumping capacity. The scheduled project completion date is 2024.

- Gas Interconnector Turkey—Bulgaria (ITB)
The project is important in terms of ensuring gas supply diversification for Bulgaria and the countries in the region. It would allow for supply of natural gas from alternative sources in the Caspian region.
- Gas Interconnector Bulgaria—Serbia (IBS)
This project is included in the Union's list of projects of common interest. The gas interconnector Sofia—Dimitrovgrad (Serbia)—Nish (Serbia) is planned as a reversible connection to connect the national gas transmission networks of Bulgaria and Serbia.
- The project Eastring—Bulgaria—TRA—N—654 is a project for building a transport corridor across the territories of Slovakia, Hungary, Romania and Bulgaria that allows for two-way natural gas supplies from alternative sources. The Eastring concept provides for the project to be developed jointly and in coordination by the gas transmission operators of Slovakia, Hungary, Romania and Bulgaria. Eastring is planned to be implemented in two stages: the first stage is to be commissioned in 2023 and the second stage is to be commissioned in 2028.
- A project for building a gas pipeline(s) to increase the interconnection capacity of the Northern semi-ring of the national gas transmission network of Bulgartransgaz EAD and the gas transmission network of Transgaz S.A. Romania —a transmission corridor Bulgaria—Romania—Hungary—Austria.

At the end of 2016, the new gas interconnector Ruse—Giurgiu with Romania was commissioned and some of the compressor stations in the territory of Bulgaria underwent rehabilitation and modernisation.

4) *internal energy market*

Liberalisation of the electricity market

In pursuance of the objectives set out in the Energy Strategy of the Republic of Bulgaria until 2020 and in relation to the country's commitments arising from its EU membership, the Energy Act (ZE) was amended in 2012 to transpose Directive 2009/72/EC concerning the internal market in electricity. This legislative act and the adopted regulations created conditions for development of the energy sector and its market liberalisation in line with the requirements laid down in the EU's Third Energy Package.

The separation was legally stipulated and the electricity grid operator ESO EAD was then certified based on the Independent Transmission Operator model. The scope of end customers eligible to participate in the regulated market was limited to low-voltage

household and non-household customers. The legal basis for the activities of suppliers of last resort was provided and licences for said activities were granted. The required legal basis for the operation of the balancing energy market was prepared. On 19 January 2016 the 'day-ahead' exchange segment and the centralised market for bilateral contracts were launched and in April 2018 the 'intraday' exchange segment of the Independent Bulgarian Energy Exchange (BNEB) EAD started operation. The primary task of the BNEB is to create and operate an electricity exchange. The Bulgarian electricity exchange was also instrumental in implementing the European policy on integration of national markets and creating well-functioning regional markets and hence a common European market. As a result of the legislative amendments adopted in early 2018, the total electricity generated for the free market is being traded only on the BNEB platforms. After the Energy and Water Regulatory Commission (KEVR) adopted and introduced Standard Load Profiles on 1.04.2016, low-voltage household and non-household customers not only have the right but can also actually change their electricity supplier and enter into transactions at freely negotiated prices. Despite this, the market segment for trading at regulated prices is substantial, with a share of about 48 % of the net electricity generation. For this segment, electricity prices are regulated along the chain from generation to final consumption through the public provider NEK EAD which performs the function of a single buyer for this market segment.

With regard to transmission capacity (interconnector cross-sections in particular), ESO EAD conforms with the requirements of the Third Energy Package and has signed agreements with neighbouring operators on auction-based capacity allocation in accordance with Regulation (EU) No 714/2009 and the relevant Network Codes (including on capacity allocation and congestion management).

Liberalisation of the natural gas market

In pursuance of the objectives set out in the Energy Strategy of the Republic of Bulgaria until 2020 and in relation to the country's commitments arising from its EU membership, the Energy Act (ZE) was amended in 2012 to transpose Directive 2009/73/EC concerning the internal market in natural gas.

As an important step for natural gas market liberalisation in Bulgaria and with the aim to implement the priorities set out in the Energy Strategy of the Republic of Bulgaria until 2020, the KEVR adopted a set of rules establishing a new balancing regime for the natural gas transmission system. The rules aim at commercial balancing of the natural gas market. To develop a competitive natural gas market and in the context of the European objectives for developing an interconnected and single European gas market, actions were taken to implement a concept for building the Balkan Gas Hub on the territory of Bulgaria. The concept is in line with the projects for the development of the

Southern Gas Corridor and in full conformity with the plans for the development of the EU gas infrastructure. The aim is to improve the security of supply and diversify natural gas supply sources and routes. In order to secure the necessary market setup for the implementation of the Balkan Gas Hub, a subsidiary of Bulgartransgaz EAD was established as an operator of a gas exchange in Bulgaria.

With regard to transmission capacity (interconnector cross-sections in particular), Bulgartransgaz EAD conforms with the requirements of the Third Energy Package by applying the Regional Capacity Booking Platform (RBP) as required by Regulation (EU) No 984/2013 establishing a Network Code on Capacity Allocation Mechanisms in Gas Transmission Systems.

5) research, innovation and competitiveness

The Innovation Strategy for Smart Specialisation 2014–2020 lays down as a priority area the development of clean technologies with a focus on transport and energy (energy storage, saving and efficient allocation, electrical vehicles and eco-mobility, hydrogen-based models and technologies, waste-free technologies, technologies and methods that include by-products and materials from one production in other productions).

Energy and energy efficiency infrastructure projects are being financed under Operational Programme 'Innovation and Competitiveness' 2014–2020 (OPIC). To this end, a grant of BGN 76.2 million was awarded under OPIC for the 'Construction of Gas Interconnector Greece–Bulgaria'. The implementation of this project will enable the construction of gas transmission infrastructure for the Southern Gas Corridor and will ensure the security of gas supply for Bulgaria by enhancing the transit capacity to the countries in South-Eastern Europe. This will help achieve diversification of imported gas through additional sources of supply from the Caspian region, the Middle East and the Eastern Mediterranean.

In addition, the procedure for 'Enhancing the energy efficiency in large enterprises' is implemented under OPIC, whereby large enterprises receive grants to implement energy efficiency measures aimed at achieving sustainable growth and competitive economy.

iii. Key issues of cross-border relevance

In accordance with the European policy for developing a common energy market, Bulgaria is implementing a number of projects of European and regional significance. The main projects aim at increasing the country's energy interconnection with the neighbouring countries in the region and at integration of energy markets. The aim is to enhance the energy security in the country and the region, to ensure the security of supply and to diversify the sources and routes, and to develop the energy and gas markets. This ensures the competitiveness of the Bulgarian business and economic

development of the country and the region.

iv. Administrative structure of implementing national energy and climate policies

According to Article 3 of the Energy Act (ZE), the government policy in the energy sector is implemented through the National Assembly and the Council of Ministers. According to Article 4 of the ZE, the national energy policy of the country is implemented by the Minister for Energy. The Sustainable Energy Development Agency (AUER) is an administration under the Minister for Energy that implements the government policy for increasing the energy efficiency and promotes generation and consumption of renewable energy.

The state regulation of the safe use of nuclear energy and ionising radiation, as well as of the safe management of radioactive waste and spent fuel is carried out by the Chairperson of the Nuclear Regulatory Agency.

The Ministry of Environment and Water implements the government environmental policy whose main aspects involve the implementation of climate sectoral policies.

The Ministry of Economy implements the government policy on building a competitive low-carbon economy, promotion and acceleration of investment, innovations and competitiveness.

The Ministry of Transport, Information Technology and Communications implements the government policy on transport, development of road infrastructure, electronic communications and postal services.

The Ministry of Regional Development and Public Works is responsible for implementing the country's regional development reform, spatial development, building of the core networks and technical infrastructure facilities and implementing the National Programme for Energy Efficiency of Multi-Family Residential Buildings.

The Ministry of Agriculture, Food and Forests implements the state policy on agriculture, forests and food.

The Ministry of Labour and Social Policy (MTSP), through the Executive Agency, implements the government policy on social assistance by administering target heating allowances.

The Ministry of Finance supports sound and transparent public finances in the country and supports the government in building an efficient public sector and creating conditions for economic growth.

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

i. Involvement of the national parliament

According to Article 3 of the Energy Act (ZE), the government policy in the energy sector

is implemented through the National Assembly and the Council of Ministers. In this regard, simultaneously with the launch of consultations with the EC on the draft INECP, parallel consultations will be held with the National Assembly to develop the final Integrated National Plan.

ii. Involvement of local and regional authorities

Simultaneously with the launch of consultations with the EC on the draft INECP, parallel consultations will be held with local and regional authorities for the preparation of the final Integrated National Plan.

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

Simultaneously with the launch of consultations with the EC, parallel consultations will be held with stakeholders, including the social partners, the civil society and the general public, for the preparation of the final Integrated National Plan.

iv. Consultations with other Member States

After the consultations with the EC are launched, in reference to the international projects being implemented by the country consultations will be held with other Member States for the preparation of the final Integrated National Plan.

v. Iterative process with the Commission

The Regulation on the governance of the European Union provides for ongoing consultations with the EC, comprising an evaluation of the INECP by the Commission and updates of the plans and preparation of progress reports by Member States.

1.4. Regional cooperation in preparing the Plan

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

The key elements subject to coordination with other Member States involve the implementation of energy interconnectors and integration of energy markets.

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

In accordance with the European policy for developing a common energy market, Bulgaria is implementing a number of projects of European and regional significance. The main projects aim at increasing the country's energy interconnection with the neighbouring countries in the region and at integration of energy markets. The aim is to enhance the energy security in the country and the region, to ensure the security of

supply and to diversify the sources and routes, and to develop the energy and gas markets. This ensures the competitiveness of the Bulgarian business and economic development of the country and the region.

2. NATIONAL OBJECTIVES AND TARGETS

2.1. Dimension decarbonisation

2.1.1. GHG emissions and removals

i. The elements set out in point (a)(1) of Article 4

In October 2014 the European Council agreed on the 2030 climate and energy policy framework and set out the Union commitment to the binding target to reduce greenhouse gas emissions by at least 40 % by 2030 compared to 1990. All sectors must contribute to achieving this emission reduction. The European Council confirmed that the target should be delivered collectively by the Union, with the reductions in the emissions trading system (ETS) and non-ETS sectors amounting to 43 % and 30 %, respectively, by 2030 compared to 2005.

The EU Emissions Trading System is at the core of the EU strategy for GHG emissions reduction from industry and the energy sector.

In 2015 the Commission adopted a proposal to revise the EU ETS for its fourth trading period (2021–2030), and in February 2018 the European Parliament and the Council formally supported the revision. 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 entered into force on 8 April 2018. Directive (EU) 2018/410 revises the ETS which is the main tool for achieving the EU binding target of at least 40 % reduction by 2030 compared to the 1990 levels; the ETS sectors shall reduce their emissions by 43 % compared to 2005.

Regulation (EU) No 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 sets out national targets for non-ETS sectors. Non-ETS sectors include buildings, agriculture, waste management and transport. According to the effort sharing regulation, the national target of Bulgaria for GHG emission reductions in these sectors by 2030 compared to 2005 is 0 %. Regulation (EU) No 2018/841 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU is part of the Union efforts to reduce GHG emissions by 40 % by 2030

compared to 1990. The Regulation requires from Member States to balance emissions and removals in the land use sector for two five-year periods between 2021 and 2030 by applying accounting rules and allowing for certain flexibility. Bulgaria is ready with the draft National Climate Change Adaptation Strategy and Action Plan.

The draft National Climate Change Adaptation Strategy and Action Plan was developed within a project financed from Priority Axis 2 'Effective and professional governance in partnership with the civil society and the business' of Operational Programme 'Good Governance' 2014–2020.

The contractor of the project is the Ministry of Environment and Water (MOSV) jointly with the International Bank for Reconstruction and Development and a Consultancy Agreement was signed to that end and ratified by the National Assembly.

The draft Strategy sets out goals and priorities to improve climate change adaptation capacity at national and sector levels by 2030. The Action Plan lays down measures for climate change adaptation by sector, a schedule of implementation of the measures, resources required and responsible institutions.

The framework document identifies the risks and vulnerabilities in different economic sectors, cross-sectoral relationships with regard to such risks and vulnerabilities and macroeconomic implications of climate change in general. The annexes to the Strategy include nine sectoral assessments (of the sectors of agriculture, biodiversity and ecosystems, energy, forestry, human health, tourism, transport, urban environment and water), an analysis of the macroeconomic implications of climate change and an assessment of the Disaster Risk Management sector.

ii. Where applicable, other national objectives and targets consistent with the Paris Agreement and the existing long-term strategies. Where applicable for the contribution to the overall Union commitment of reducing the GHG emissions, other objectives and targets, including sector targets and climate change adaptation goals, if available

Not applicable

2.1.2. Renewable energy

i. The elements set out in point (a)(2) of Article 4

Share of renewable energy in gross final energy consumption in the country for the period 2021–2030

	Measure	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Share of renewable energy in gross final energy consumption	%	16 %	20 %	20 %	21 %	21 %	22 %	23 %	23 %	24 %	25 %

In pursuance of the key goals, policies and measures of the plan, the following factors were established for the implementation of the energy policy by 2030: In accordance with Article 4(a)(2) of the governance regulation, Bulgaria's national contribution is set at a 25 % share of energy from renewable sources in gross final energy consumption by 2030.

When the above contribution was set, the following relevant circumstances according to Article 5(1)(e) of the governance regulation were taken into account:

- Economic conditions and potential, including GDP

According to the statistics, the gross domestic product per capita in Bulgaria is the lowest in the EU. On the one hand, this restricts the opportunities for investment in RES facilities or for provision of budget funds through renewable energy support schemes. On the other hand, the investments made or the funds already provided under long-term contracts for renewable energy support have a more serious impact on the country's economy and pose a higher financial burden than in the other Member States.

Therefore the national contribution to the Union target reflects the national specifics and justifies the level of national effort as the most ambitious one in the objective circumstances referred to Article 5(1)(e).

- Geographic, environmental and natural restrictions (Natura 2020 area)

Although Bulgaria has suitable weather conditions to develop the renewable energy sector, there are some objective restrictions in specific areas where no renewable energy facilities may be installed.

An example of this are the territories falling within the scope of Natura 2000 – a network of protection areas pursuant to the Directive on the conservation of natural habitats and the Directive on the conservation of wild birds. In these areas no energy facilities, including wind plants, photovoltaic facilities or water power plants, may be installed.

Bulgaria is one of the countries with the richest biological diversity in Europe. As a contribution to the European Ecological Network NATURA 2000, our country needs to protect over 80 habitats types and the most important habitats of 100 species of plants and 226 species of animals identified in the European directives. About 34 % of Bulgaria's territory, or protection areas with an area of more than 37 400 sq. km., fall within NATURA 2000 ecological network. The country holds one of the first places in Europe on this indicator.

- The intensive increase in the share of renewable energy in gross final

consumption in the period from 2012 to 2016 was combined with adverse effects for the energy system, including but not limited to problems with distribution and transmission network balancing, financial deficits arising from mandatory purchase of renewable energy at preferential prices by the public provider, increased costs to adapt the infrastructure to the specificities of renewable energy generation, etc. Therefore Bulgaria's early efforts for achieving the binding national target for 2020 were taken into account when the national contribution to the European target for 2030 was determined.

ii. Estimated trajectories for the sectoral share of renewable energy in gross final energy consumption from 2021 to 2030 in the electricity, heating and cooling, and transport sector

Estimated trajectory for the share of renewable energy in gross final energy consumption in the electricity sector for the period 2021–2030

	Measure	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Share of renewable energy in gross final energy consumption in the electricity sector	%	17 %	18 %	18 %	18 %	18 %	18 %	19 %	19 %	19 %	17 %

Estimated trajectory of the share of renewable energy in gross final energy consumption in the heating and cooling sector for the period 2021–2030

	Measure	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Share of renewable energy in gross final energy consumption in the heating and cooling sector	%	35 %	36 %	36 %	37 %	38 %	39 %	40 %	41 %	42 %	44 %

Estimated trajectory of the share of renewable energy in gross final energy consumption in the transport sector for the period 2021–2030

	Measure	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Share of renewable energy in gross final energy consumption in the transport sector	%	9 %	10 %	10 %	11 %	11 %	11 %	12 %	13 %	14 %	14 %

iii. Estimated trajectories by renewable energy technology that the Member State projects to use to achieve the overall and sectorial trajectories for renewable energy from 2020 to 2030, including expected total gross final energy consumption per technology and sector in Mtoe and total planned installed

capacity (divided by new capacity and repowering) per technology in MW

Estimated trajectory by renewable energy technology (gross renewable electricity generation), GWh											
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
VETs	4 294	4 294	4 294	4 294	4 294	4 382	4 294	4 294	4 294	4 294	4 294
VtETs	1 400	1 460	1 460	1 520	1 580	1 640	1 700	1 760	1 820	1 880	1 940
FETs	1 260	1 404	1 404	1 404	1 404	1 346	1 380	1 415	1 323	1 355	1 386
Biomass-powered power plants	290	350	364	378	384	391	398	405	412	419	426
Gross renewable electricity generation	7 244	7 508	7 522	7 596	7 663	7 759	7 772	7 874	7 849	7 948	8 046

Estimated trajectory by renewable energy technology (installed capacity of power plants using renewable energy), MW											
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
VETs	3 232	3 232	3 232	3 232	3 232	3 232	3 232	3 232	3 232	3 232	3 232
VtETs	700	730	730	760	790	820	850	880	910	940	970
FETs	1 050	1 170	1 170	1 170	1 170	1 170	1 200	1 230	1 260	1 290	1 320
Biomass-powered power plants	70	100	100	100	100	100	100	100	100	100	100
Installed capacity	5 052	5 232	5 232	5 262	5 292	5 322	5 382	5 442	5 502	5 562	5 622

iv. *Estimated trajectories on bioenergy demand, disaggregated between heat, electricity and transport, and on biomass supply by feedstock and origin (distinguishing between domestic production and imports). For forest biomass, an assessment of its source and an assessment of its impact on in the LULUCF sink*

v. *Where applicable, other national trajectories and objectives, including those that are long-term or sectorial (e.g. share of renewable energy in district heating, renewable energy produced by cities, energy communities and self-consumers, energy recovered from the sludge acquired through the treatment of wastewater)*

Not applicable

2.2. Dimension energy efficiency

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

Indicative national energy efficiency contribution

Indicator/Year	2016	2021	2024	2027	2030	2035	2040	2045	2050
Gross inland consumption, ktoe, including:	18 152	20 220	19 310	18 854	18 711	18 762	18 593	17 779	17 732
Energy intensity of gross inland consumption, toe/million BGN (2010)	220	200	170	160	150	130	120	110	100
Final consumption, ktoe	10 017	10 018	9 714	9 431	9 169	9 280	9 406	9 462	9 535
Energy intensity of final consumption, toe/million	99	100	90	80	70	60	60	50	50

Total cumulative target for energy savings over the period 2021–2030 under Article 7(1)(b) on the energy saving obligations pursuant to Directive 2012/27/EU, ktoe

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
76.11	152.21	228.32	304.42	380.53	456.63	532.74	608.84	684.95	761.06	3 185.81

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

According to Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU, each Member State shall establish a long-term renovation strategy to support the renovation of the national stock of residential and non-residential buildings, both public and private, into a highly energy efficient and decarbonised building stock by 2050, facilitating the cost-effective transformation of existing buildings into nearly zero-energy buildings. The provisions of the Directive shall be transposed in national law by 10 March 2020. To this end, a long-term strategy to support the renovation of the national stock of residential and non-residential buildings will be developed. It will include:

- indicative interim targets for 2030, 2040 and 2050;

- indicative description of financial resources to support the strategy implementation;
- effective mechanisms for promoting investments in building renovation.

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

Not applicable

2.3. Dimension energy security

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

A top EU priority in the energy sector is to diversify energy sources in Europe and to ensure energy security through solidarity and cooperation among Member States, enhanced diversification of EU energy supply and development and use of indigenous energy resources. The main goal is to ensure the security of energy supply or, in other words, to guarantee uninterrupted and adequate energy supply from all sources for all consumers.

The country's energy dependency is much lower than the average for the EU Member States. In this regard, Bulgaria has set energy security objectives with regard to:

- increasing the diversification of energy sources and supply from third countries, the purpose of which may be to reduce energy import dependency;
- increasing the flexibility of the national energy system; and
- addressing constrained or interrupted supply of an energy source, for the purpose of improving the resilience of regional and national energy systems, including a timeframe for when the objectives should be met.

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

Increasing the diversification of energy sources by using indigenous resources:

- development of local natural gas extraction through exploration of oil and natural gas deposits, including in the Black Sea shelf;
- utilising the potential of renewable energy sources as an indigenous resource that helps reduce import dependency, improves the security of energy supply and alleviates environmental protection obligations.

Increasing the diversification of the sources of natural gas supply through interconnectors with neighbouring countries and supplies:

- from the Caspian Region via the Southern Gas Corridor;
- of liquefied natural gas from the Mediterranean region and other countries through a liquefied natural gas terminal.

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

No major deposits of natural gas have been found in the Republic of Bulgaria so far and gas consumption in the country is provided mainly through imports from one main source: the Russian Federation. Natural gas reaches Bulgaria mainly along the route across the territories of Russia, Moldova, Ukraine and Romania. In this regard, the main goal for reducing natural gas import dependency is through diversification of the supply sources and routes and development of local extraction.

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 with regard to increasing the flexibility of the national energy system:

- to preserving the key role of indigenous energy resources (coal) and their use in the existing production facilities in line with the requirements of the environmental legislation;
- to preserve the role of nuclear energy which is considered a local energy source;
- to maintain and develop the transmission capacity of the electricity and gas transmission networks;
- to optimise consumption in the energy system through development of the energy markets;
- to increase the electricity and natural gas storage capacity by developing the existing storage facilities and by building new storage facilities.

2.4. Dimension internal energy market

2.4.1. Electricity interconnectivity

i. The level of electricity interconnectivity that the Member State aims for in 2030 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.

Each new interconnector shall be subject to a socioeconomic and environmental cost-benefit analysis and implemented only if the potential benefits outweigh the costs.

In accordance with European law, the transmission capacity shall be at least 10 % of the installed generation starting from 2020 and at least 15 % of the installed generation starting from 2030, taking into account the security, the (N-1) criterion and the reliability margin.

At present, the data are as follows:

- 12 000 MW total installed generating capacity in the Bulgarian electricity system (EES) and available capacity of 8 300 MW;
- 1 950 MW transfer capacity in exports (electricity interconnection of 16.2 % upon exports);
- 1 590 MW transfer capacity in imports (electricity interconnection of 13.2 % upon imports).

According to the calculations of ENTSO-E, after the new power lines of the electricity transmission infrastructure referred to in point 2.4.2 are constructed, the transfer capacity for electricity exchange will reach 22 %.

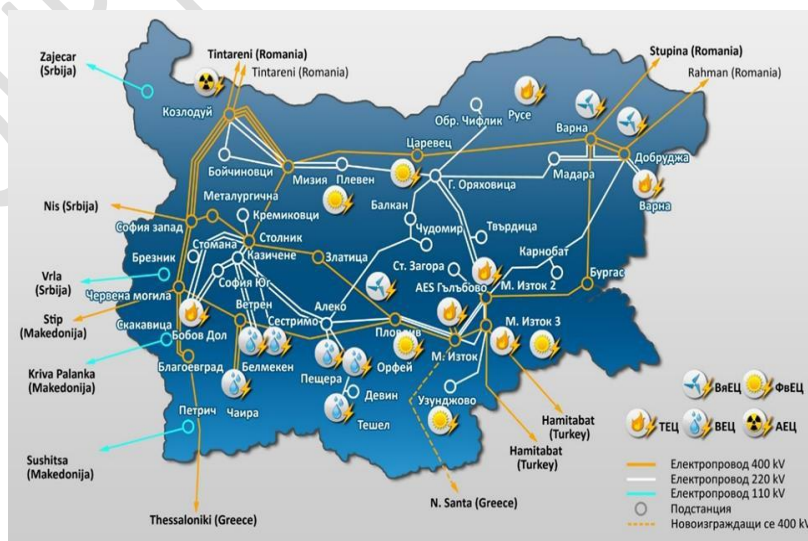


Figure 1. Interconnection based on ESO AD data

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

At present, the data are as follows:

- maximum load of the system reached: 7 690 MW;
- total thermal transmission capacity of electricity interconnectors: 11 700 MW, which is equal to 152 % of the peak load.

It should be noted that the thermal transmission capacity of a 400 kV power line is 1 200 MW with 2xACO500 conductors and 1 500 MW with 3xACO400 conductors. The nominal transmission capacity based on the thermal transmission capacity of the interconnectors shall be at least 30 % of the installed renewable generation.

At present, the data are as follows:

- installed renewable generation capacity: 4 162 MW;
- total thermal transmission capacity of electricity interconnectors: 11 700 MW, which is equal to 281 % of the installed renewable generation capacity.

The Bulgarian electricity system operates in parallel with the electricity systems of the countries in continental Europe. Our EES is interconnected with the united European EES through four interconnectors with Romania, two interconnectors with Turkey and one each with Serbia, Macedonia and Greece as follows:

- 400 kV interconnector from Kozloduy Nuclear Power Plant (BG) to Căncărești substation (RO);
- 400 kV interconnector from Kozloduy Nuclear Power Plant (BG) to Căncărești substation (RO);
- 400 kV interconnector from Varna substation (BG) to Stupina substation (RO);
- 400 kV interconnector from Dobruzha substation (BG) to Rahman substation (RO);
- 400 kV interconnector from TETs Maritsa Iztok 3 (BG) to Hamitabat substation (TR);
- 400 kV interconnector from TETs Maritsa Iztok 3 (BG) to Hamitabat substation (TR);
- 400 kV interconnector from Sofia zapad substation (BG) to Nish substation (RS);
- 400 kV interconnector from Chervena Mogila substation (BG) to Štip substation (MK);
- 400 kV interconnector from Blagoevgrad substation (BG) to Thessaloniki substation (GR).

2.4.2. Electricity and gas transmission infrastructure

- i. Key electricity and gas transmission infrastructure projects, and, where relevant, modernisation projects, that are necessary for the achievement of objectives and targets under the five dimensions of the Energy Union Strategy*

The key electricity and gas transmission infrastructure and modernisation projects are:

1. In the electricity transmission infrastructure
 1. Interconnection overhead power line between Bulgaria and Greece, including the following subprojects from the list of projects of common interest:
 - 1.1. Interconnection overhead power line between Maritsa Iztok substation and Nea Santa substation
The subproject envisages the construction of a 400 kV interconnector with a length of 122 km on Bulgarian territory and a capacity of 1 500 MW between Maritsa Iztok and Nea Santa. The pre-project activities are partially financed by the Connecting Europe Facility.
 - 1.2. Internal overhead power line between Maritsa Iztok substation and Plovdiv substation
The subproject envisages the construction of a new 400 kV power line with a length of 94 km and a capacity of 1 500 MW.
 - 1.3. Internal overhead power line between Maritsa Iztok substation and the Open Power Distribution Device (ORU) of Maritsa Iztok 3 Thermal Power Plant
The subproject envisages the construction of a new 400 kV power line with a length of 13 km and a capacity of 1 500 MW capacity between Maritsa Iztok and Maritsa Iztok 3.
 - 1.4. Internal overhead power line between Maritsa Iztok substation and Burgas substation
The subproject envisages the construction of a new 400 kV power line with a length of 150 km and a capacity of 1 500 MW between Maritsa Iztok and Burgas.
 2. Electricity interconnector between Bulgaria and Romania, including construction of a new 400 kV power line between Dobrudzha substation and Burgas substation
The objective of the project of common interest is the construction of a new 400 kV power line with a length of 110 km and a capacity of 1 500 MW to connect Dobrudzha and Burgas.
 3. 'Construction of a new dual 400 kV interconnector between the Republic of Bulgaria and the Republic of Serbia'
The project is included as a new investment in the latest ten-year Network

Development Plan in Europe prepared by ENTSO-E in 2016. The assessment of the need for constructing a second interconnector between the Republic of Bulgaria and the Republic of Serbia was carried out in the context of the market surveys conducted by the ENTSO-E regional group. The project will increase the interconnection capacity on the border between Bulgaria and Serbia and will accelerate trade flows between the western borders of Bulgaria and Romania and the Western Balkan region.

4. Bulgaria-Yadenitsa hydro-pumped storage project

Yadenitsa hydro power plant is key for the balancing of the system. The project is in the list of projects of common interest.

2. Key gas transmission infrastructure projects

- Gas interconnector Bulgaria—Greece (IGB)

The gas interconnector between Greece and Bulgaria (IGB) is of geostrategic importance for the diversification of supplies for Bulgaria, Macedonia and the region of South-Eastern and Central Europe. As part of the development of the South Gas Corridor, through the IGB Bulgaria and the neighbouring countries will get access to alternative supplies from the Caspian region and from existing or future LNG terminals. The IGB is of strategic importance for the implementation of the Vertical Gas Corridor. It will contribute to the development of the Balkan Gas Hub concept, its implementation will also create opportunities for transit transmission via the gas transmission system of Bulgartransgaz EAD to the other interconnections in Romania and Serbia. The project allows connectivity and creates synergies with other important future projects in the region: the LNG terminal at Alexandroupolis, Greece; EastMed for direct connection of resources from the Eastern Mediterranean with Greece through Cyprus and Crete and liquefied gas from Israel and Egypt.

The interconnector between Bulgaria and Greece (IGB) is included in the list of projects of common interest for the European Union.

- Construction of a gas interconnector between Bulgaria and Serbia (IBS)

The gas interconnector between Bulgaria and Serbia is planned as a reversible connection to connect the national gas transmission networks of Bulgaria and Serbia. The gas interconnector will allow a two-way gas transmission of 1 to 1.8 billion cubic metres a year from Bulgaria to Serbia and 0.15 billion cubic metres a year from Serbia to Bulgaria. The interconnector is included in the list of projects of common European interest.

- Alexandroupolis liquefied natural gas (LNG) terminal project.

The project announced by the Greek company Gastrade S.A. for the construction of a new LNG terminal in the Aegean Sea on Alexandroupolis is in strategic proximity to the

gas transmission network of DESFA S.A. and is ranked by the European Commission as a project of common interest. The natural gas quantities will make it possible to balance the needs of the local market and the needs of the Bulgarian, Romanian, Macedonian, Serbian and Hungarian markets. The project will ensure diversification of gas supplies to Bulgaria. A contract has already been concluded with Azerbaijan for 1 billion cubic metres of gas per year but after the construction of the interconnector between Bulgaria and Greece we will also be able to supply liquefied gas from the USA, Algeria or Qatar.

- **Project Eastring**

Eastring-Bulgaria is a subproject of the cluster project Eastring included in the ENTSOG's ten-year network development plan and is ranked by the European Commission as a project of common interest.

- **Gas interconnector Turkey—Bulgaria (ITB)**

The project involves an interconnection between the gas transmission networks of Bulgartransgaz EAD (Bulgaria) and Botas (Turkey) to ensure diversification of natural gas sources, supply partners and routes and thus increase the security of supply and the development of competition in the region. The ITB will contribute to the implementation of the priority Southern Gas Corridor that envisages infrastructure for transmission of gas from the Caspian Basin, Central Asia, the Middle East and the Eastern Mediterranean Basin to the Union in order to enhance the diversification of gas supply.

- **Balkan Gas Distribution Hub**

Bulgaria has developed, jointly with the European Commission, a concept for establishing the Balkan Gas Distribution Hub on the country's territory. The European Commission included the project in the list of projects of common interest. By building the necessary gas transmission infrastructure, the gas hub aims to connect the natural gas markets of Member States in the region — Bulgaria, Greece, Romania, Hungary, Croatia, Slovenia and through them — the Member States in Central and Western Europe and the contracting parties to the Energy Community like Serbia, Ukraine, Macedonia, Bosnia and Herzegovina and thus to contribute to the achievement of the main priorities of the European energy policy.

- **Expanding the capacity of Chiren Underground Gas Storage (UGS)**

The aim of the project of common interest is to achieve higher volumes of gas storage, higher pressures in the gas reservoir and higher average 24-hour gas extraction and compression capacity. Enhanced technical parameters will allow the storage facility to be used not only for the needs of the Bulgarian market, as is currently the case, but also to meet the peak consumption of the countries in the region.

- **Gas interconnector Bulgaria—Romania**

The project 'Gas interconnector between Bulgaria and Romania' (IBR) was implemented jointly by Bulgartransgaz EAD and Transgaz S.A. according to the Memorandum of

Understanding signed on 1.06.2009.

- A gas pipeline for increasing the interconnection capacity of the Northern Ring of the Bulgarian and Romanian gas transmission networks (BRUA)

The project for coordinated development of the gas transmission networks of Bulgaria, Romania and Hungary (the Bulgaria—Romania—Hungary—Austria— BRUA transmission corridor) is included in the ten-year network development plan of Bulgartransgaz EAD for the period 2018—2027. BRUA will ensure bi-directional transmission between the countries of natural gas from sources in the Southern Gas Corridor and from the Black Sea and transmission of Central European gas to South-Eastern Europe. Its capacity will be 1.75 billion m³ p.a. in the first stage and 4.4 billion m³ p.a. in the second stage; an option is envisaged for a further expansion of the project in the third stage if its economic viability is demonstrated.

- Rehabilitation and modernisation of the national gas transmission network
The Bulgarian gas transmission network will ensure not only transmission of natural gas to Bulgarian consumers, but also transmission of natural gas from Azerbaijan and LNG from IGB to IBR and IBS, i.e. to Romania and Serbia, and from there to Hungary and Central Europe. It is an important element of the North-South Corridor.

The project is ranked by the European Commission as a project of common interest.

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

- Gas interconnector Turkey—Bulgaria (ITB)

The project involves an interconnection between the gas transmission networks of Bulgartransgaz EAD (Bulgaria) and Botas (Turkey) to ensure diversification of natural gas sources, supply partners and routes and thus increase the security of supply and the development of competition in the region. The ITB will contribute to the implementation of the priority Southern Gas Corridor that envisages infrastructure for transmission of gas from the Caspian Basin, Central Asia, the Middle East and the Eastern

Mediterranean Basin to the Union in order to enhance the diversification of gas supply.

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 tradable 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

In line with Third Liberalisation Package of the EU, Bulgaria took steps towards full liberalisation of the electricity market. The phasing out of regulated prices for all end consumers and of prices for producers will boost competition among electricity suppliers. The full liberalisation of the electricity market will create conditions for enhanced system flexibility by securing conditions for achieving competitive prices and will increase the liquidity on the electricity exchange.

The full liberalisation of the electricity market is a precondition for achieving the objective for full liberalisation of the electricity market in the common European energy market.

The liberalisation of the natural gas market occupies an important place in the European energy policy and is associated with the strategic goals for improved security of supply and diversification of natural gas supply sources and routes and with the development of an interconnected and single European gas market. By expanding gas interconnections, diversification of natural gas supply sources and establishing a gas hub, conditions for operation of a liquid exchange for trade in natural gas will be created.

i. 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

Not applicable

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

Not applicable

iii. 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

Enhancing the flexibility of the system by developing balancing facilities, energy storage capacity and skills for energy management.

Creating appropriate conditions and increased participation of demand response, in individual or aggregated terms, both in the wholesale market and in the balancing market.

Upgrade of the transmission network to alleviate internal overloads and increased interconnection capacity.

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

In line with Third Liberalisation Package of the EU, Bulgaria took steps towards full liberalisation of the electricity market. The phasing out of regulated prices for all end consumers will boost competition among electricity suppliers while exposing consumers to greater price volatility. In this regard, Bulgaria sets the objective to provide adequate protection to 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

According to the definition of the International Energy Agency, 'energy poverty refers to a situation where a household has technically access to energy but cannot afford adequate energy services to meet basic needs'². Due to the great differences in the economic and social parameters in the Member States, energy poverty has not been defined at European level. At present, Bulgarian law does not have such a definition either. Currently Bulgaria is implementing a measure to support persons that meet the criteria for income-based and property-based poverty by granting target allowances to those persons through the social assistance system during the heating period.

The electricity market in Bulgaria is partly liberalised and its regulated share is 48 %. The retail electricity market in Bulgaria is partly liberalised. Since 2007, all end customers, including household consumers, can purchase electricity at agreed prices and choose freely their electricity supplier. Nevertheless, a certain category of end customers, including households, has the option to purchase electricity from an end supplier for the relevant territory at prices regulated by the Energy and Water Regulatory Commission (KEVR).

In line with Third Liberalisation Package of the EU, Bulgaria took steps towards full liberalisation of the electricity market. The phasing out of regulated prices for all end consumers will boost competition among electricity suppliers while exposing consumers to greater price volatility.

The objective of Bulgaria is to ensure, through the social assistance system:

- adequate protection to energy poor people by providing target heating allowances, and
- that a mechanism for the protection of vulnerable consumers is applied when the process of full liberalisation of electricity prices for end customers, including households, is launched.

² 'World Energy Outlook 2014', International Energy Agency

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 main objectives in the area of research, innovation and competitiveness are as follows:

- to achieve the EU targets of the 2030 Climate and Energy Package and for development of low-carbon economy in the long term;
- to achieve the Energy Union targets for increased security of energy supply and improved energy and resource efficiency in transport;
- to encourage the creation of innovations, their marketing and the technological upgrade of enterprises, giving priority to the thematic areas of the Innovation Strategy for Smart Specialisation;
- to enhance the competitiveness and market positions of the Bulgarian industry and promote the development of innovative high value added productions;
- to preserve the competitiveness of the basic energy-intensive industries and limit the risks of 'carbon leakages';
- to develop electric cars and hydrogen technologies;
- to improve ambient air quality.

ii. Where available, national 2050 objectives related to the promotion of clean energy technologies and, where appropriate, national objectives, including long-term targets (2050) for deployment of low-carbon technologies, including for decarbonising energy and carbon-intensive industrial sectors and, where applicable, for related carbon transport 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

Bulgarian national law

Climate Change Mitigation Act (ZOIK)

The administrative policy framework on climate change is laid down in the Climate Change Mitigation Act (SG No 22/2014, last amended in No 15/2018). This act regulates the social relations associated with the implementation of the EU emissions trading scheme and lays down the activities relating to the allocation of greenhouse gas emission allowances and issuing and amending greenhouse gas emissions permits. The Act regulates: the relations that include plans for monitoring and reporting of greenhouse gas emissions; the operation of the national register of emission allowances and the activities of the administrator of the national register; the issuing, transfer and cancellation of emission allowances; the conditions for closing stationary installations; and aviation allowances.

The subject of regulation by the ZOIK covers also reductions of GHG emissions from liquid fuels supplied in the transport sector and the implementation of the obligations under Decision 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.

The ZOIK consolidates many climate change related provisions included in different regulations. It governs the relationship between national law and the standards that form part of the EU regulatory framework. Furthermore, it lays down the mechanisms required for Bulgaria's compliance with its obligations under the Kyoto Protocol.

Third National Climate Change Action Plan (NCCAP)

The NCCAP outlines the climate change action framework for the period from 2013 to 2020 and is aimed at ensuring Bulgaria's implementation of the obligations under the United Nations Framework Convention on Climate Change, the Kyoto Protocol and the European Union climate and energy package.

The main objective of the NCCAP is to lay down the framework of action against climate change from 2013 to 2020 and to focus the country's efforts on actions capable of reducing the adverse impact of climate change and fulfilling the commitments undertaken.

The NCCAP sets out specific measures for GHG emission reductions for all sectors; these

measures are consistent with both the national climate change policy and the potential of the national economy for emissions reduction. The overall effect of the measures will ensure fulfilment of the commitments undertaken and achievement of the binding European objectives, namely:

- 20 % increase in energy efficiency
- 20 % reduction of greenhouse gas emissions compared to the 1990 levels;
- 20 % share of renewable energy in total energy consumption in the EU by 2020, including 10 % share of biofuels in transport.

The NCCAP presents an assessment of the status and trends in greenhouse gas emissions in Bulgaria by 2009 in different sectors and the scenarios and projections for emissions in these sectors until 2030 before and after the implementation of the measures.

Economic development

The main indicators of the trends in emissions in Bulgaria take account of the demographic development, the economic activity (including changes in the sectorial structure), the changes in energy use and transport models and the information on waste generation.

Bulgaria is a developing economy in the upper-income bracket and the private sector accounts for over 80 % of GDP.

The country has a currency board arrangement that pegs the national currency (lev) to the euro. The fixed exchange rate of the BNB is EUR 1 = BGN 1.95583. Bulgaria has an open market economy, an averagely developed private sector and a comparatively small domestic market.

After Bulgaria's accession to the EU, a steady process of income alignment with the Community was observed; it was seriously delayed in the years of the global economic crisis, but accelerated in the past three years. In 2016, the country's economic growth was 3.9 %.

Exports were the key driver of economic growth and surpassed the pre-crisis levels as early as in 2011. In 2016, the share of exports in GDP was 64 %. The 7.9 % real growth in exports of goods in 2016 was the third highest in the EU and occurred in the conditions of unstable external environment.

Immediately after Bulgaria's accession to the EU, the country reported historically low unemployment rates. The rate rose under the impact of the global economic crisis, but declined in recent years. In 2016, its figure was 7.6 %.

The low levels of corporate tax and personal income tax improve the business environment and foster investment.

Bulgaria's top economic priority is financial stability. The country accumulated budgetary

surpluses in the years before the global crisis thus forming fiscal buffers which offset the negative effects on the fiscal position. Bulgaria is one of the few Member States which retained some of the lowest government debt and deficit levels in the EU. Just several years after the crisis, Bulgaria managed to bring its budget deficit to steady levels and reduce it to zero in 2016.

In addition, the country’s economic development is directly associated with the successful implementation of infrastructure projects and expansion of the road network.

The road network in Bulgaria has greatly expanded over recent years. With the support of European Union funds, over 300 km new motorways and motorway sections were built, doubling the motorway network that existed before 2007. The overall construction of ‘Trakia’,

‘Maritsa’ and ‘Lyulin’ motorways was completed and 69 km of ‘Struma’ highway were built. Works on ‘Struma’ highway continue. The most complex section through Kresna Gorge will be completed by the end of the current programming period.

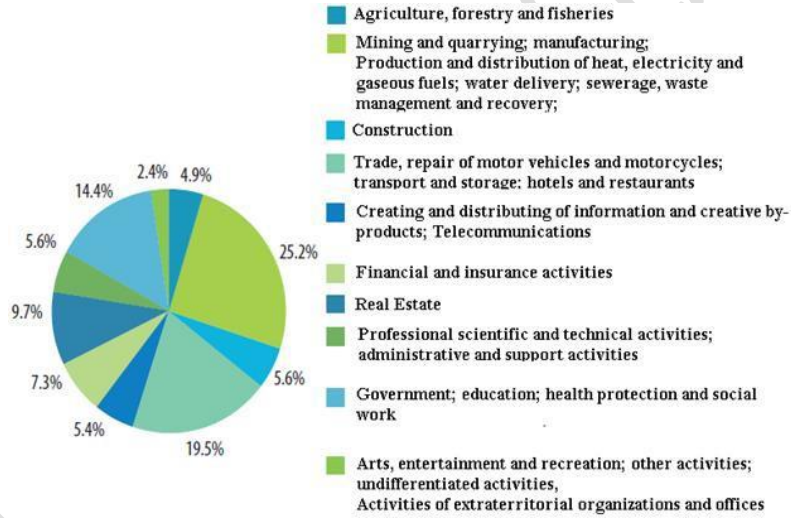


Figure 6

Policies and measures in the Energy sector

Depending on the nature of the impact on greenhouse gas emission levels, the measures are grouped in two types: measures with measurable/direct effect and measures with indirect effect. The measures with direct effect include those that lead to an overall reduction of greenhouse gas emissions from heat and electricity generation by 2030. Many measures included in the priority axis will not result in reduction of greenhouse gas emissions in the energy sector by 2030 but they are a step towards low carbon development in the sector and will create a multiplier effect in the next decades. These measures include:

- measures that lead to reduction of the carbon intensity of various electricity

- generations through additional generation of decarbonised electricity;
- measures that lead to reduction of the carbon intensity of the electricity supply by decreasing network losses and development of distributed energy generation.

Summary of the policies and measures in the Energy sector

Measure	Target and/or activities concerned	Greenhouse gases	Calculated reduction effect (per year, in Gg CO ₂ eq)		
			2020	2025	2030
Reconstruction of district heating cogeneration installations and boilers with natural gas turbines	Low-emission electricity generation	CO ₂	950	950	950
Reducing the losses of distribution and transmission networks	To reduce electricity losses	CO ₂	1 100	1 000	1 000
Reducing the losses of heat transmission networks	To reduce heat losses	CO ₂	1 000	1 000	1 000
Biomass for generation of electricity and heat	Renewable electricity	CO ₂	600	600	600
Improving the generation efficiency of the existing coal power plants	To increase energy efficiency	CO ₂	466	585	585
Fuel replacement — from coal to natural gas	Emission reductions through fuel replacement	CO ₂	2 700	2 700	2 700
Institutional support for investments in emission-free electricity generation facilities: nuclear power	Low-emission electricity generation	CO ₂	-	-	-
Increasing high efficiency cogeneration	More efficient electricity generation	CO ₂	200	200	200
Increasing the share of renewable heating and cooling	To encourage production of renewable energy	CO ₂	61	66	70

Summary of the policies and measures in the household sector and the public sector

Measure	Target and/or activities concerned	Greenhouse gases	Calculated reduction effect (per year, in Gg CO ₂ eq)		
			2020	2025	2030
Household gasification	Households and public buildings	CO ₂	2 500	2 500	2 500
Installation of solar collectors	Households and public buildings	CO ₂	20	25	40

Development and staged implementation of the '1 000 solar roofs' national programme	To promote renewable energy sources	CO ₂	17	14	14
Implementation of the measures of the Accelerated Gasification Programme (PAG) in Bulgaria	To reduce the energy intensity of final consumption	CO ₂	370	310	310
Renovation up to the annual percentage set with respect to public and state-owned buildings (with a total floor area exceeding 250 square metres) after the entry into force of an energy efficiency directive	To improve the energy efficiency of municipal housing	CO ₂	25	26	26
Introducing a binding energy efficiency scheme (reducing fuel and energy consumption in final energy consumption)	To improve energy efficiency	CO ₂	18	18	18
Replacing obsolete and inefficient energy generation equipment with new equipment	To improve energy efficiency	CO ₂	9	9	9

Industrial processes

The measures for higher energy efficiency in the industrial sector are targeted at:

- higher energy efficiency in industry;
- use of alternative fuels such as biodegradable waste;
- creating a technological park by introducing incentives to encourage the private sector to invest in research and development and in innovation in widely used production methods aimed at optimum resource efficiency;
- promoting the exchange of good practices between enterprises in reference to efficient use of inputs in production.

Direct measures include technologies used in industry and will thereby create preconditions for higher production competitiveness by reducing energy intensity in the sector and in final consumption.

Other measures are aimed at use of alternative fuels such as biodegradable waste and will thereby increase the efficiency of resources, reduce dependency on imported fuels and meet the requirements on prohibition of biodegradable waste disposal.

Summary of the policies and measures in the Industry sector

Measure	Target and/or activities concerned	Greenhouse gases	Calculated reduction effect (per year, in Gg CO ₂ eq)		
			2020	2025	2030
Reducing heat losses in industry	Industrial plants	CO ₂	140	140	140
Increased use of natural gas in industry through new gas infrastructure	Gas distribution networks	CO ₂	90	90	100
Systems for monitoring of energy use in industry	Industrial plants	CO ₂	120	120	120
Energy efficiency audits and implementation of the measures prescribed	Industrial systems with annual energy consumption exceeding 3 000 MWh	CO ₂	119	119	119
Use of biomass in the combustion boilers of the systems	To reduce the use of fossil fuels and increase the share of alternative fuels	CO ₂ , CH ₄ , N ₂ O	554	554	554

Transport

The main targets of the GHG reduction policy in the Transport sector are as follows:

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

Road charges

The Road Infrastructure Agency will introduce an electronic toll system for motor vehicles in 2019.

From 1 January 2019, motor vehicles up to 3.5 tonnes will have to buy an e-vignette to use the road infrastructure on a time-based charging.

From August 2019, a toll charge will be introduced for motor vehicles over 3.5 tonnes on a distance-based charging.

Integrated Transport Strategy by 2030

The Strategy outlines the main directions for the development of the national transport system in the period until 2030.

The document defines three strategic objectives that include 9 strategic priorities

covering a framework of targets (tasks). Based on this, it identifies the most appropriate measures to achieve the objectives concerned.

The strategic objectives of the transport policy by 2030 are as follows:

- to increase the efficiency and competitiveness of the transport sector;
- to improve transport connectivity and accessibility (both internal and external);
- to reduce the adverse effects of transport sector development. The strategic priorities in transport development are as follows:
- effective maintenance, modernisation and development of transport infrastructure;
- improved management of the transport system;
- development of intermodal transport;
- improved conditions for application of the principles of transport market liberalisation;
- reduced fuel consumption and increased energy efficiency in transport;
- improved 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 environment and human health;
- strengthening the security and safety of the transport system.

A National Transport Model developed for passenger and freight transport and applicable to individual modes of transport in the country, international transport and transit transport was prepared as part of the strategy.

Promoting sustainable urban mobility

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

- rehabilitation and modernisation of the existing road infrastructure to ensure optimum speed and optimum mode of operation of car engines;
- implementing smart transport systems in the national and urban road networks;
- increasing the share of public electric transport: rail, trolleybus, tram, and underground;
- development and construction of intermodal terminals for combined transport;
- increasing the share of biofuels.

Intelligent transport systems (ITS) cover a wide range of technical solutions intended to improve transport by improving mobility and increasing traffic safety. Telematics (a combination of telecommunications and informatics) uses state-of-the-art technologies to meet transport needs. Intelligent transport systems and telematic solutions help improve road safety, boost the efficiency of the existing infrastructure and contribute to reducing pollution by means of traffic control and traffic flow management.

Intelligent transport systems in urban conditions can include integrated management of public transport charges, advanced management of customer relations, traffic forecasts, improved traffic management, information on passengers and collection of road tolls. These systems apply modern technologies for gathering more and better data, for analysing said data and for connection through more efficient networks. The outcome is more efficient, more effective and more customer focused traffic. The source of financing are European funds with state and municipal co-financing and in some cases the green investment scheme and private investments.

Summary of the policies and measures in the Transport sector

Measure	Target and/or activities concerned	Greenhouse gases	Calculated reduction effect (per year, in Gg CO ₂ eq)		
			2020	2025	2030
Transport freight dispatching system	Traffic reduction	CO ₂	30	30	30
Transport rail dispatching system	To reduce electricity losses	CO ₂	90	90	90
Rail transport rehabilitation and modernisation	Electricity and diesel consumption	CO ₂	60	60	60
Improving public transport, reducing traffic flows in the cities and rollover of the car fleet	City traffic	CO ₂	NE	301	678
Design and construction of a new road infrastructure and rehabilitation and modernisation of the existing road infrastructure to ensure optimum speed and optimum mode of operation of car engines	Road infrastructure	CO ₂	80	60	70
Implementing smart transport systems in the national and urban road networks	Better traffic control and traffic volume management	CO ₂	170	170	170
Increasing the share of public electric transport: rail, trolleybus, tram, and underground	Public transport	CO ₂	127	127	127
Development and promotion of cycling transport	Cycling transport	CO ₂			

Development and construction of intermodal terminals for combined transport	To increase the degree of use of more environmentally-friendly modes of transport and create favourable conditions for increasing the value added of transport by overall reduction of transport costs per unit of GDP	CO ₂	58	58	58
Increasing the share of biofuels	To diversify the energy mix and reduce fossil fuel dependency	CO ₂	101	101	101
Reducing the share of travel in private motor vehicles by improving and developing urban public transport and by developing non-motorised means of transport	Public transport	CO ₂	75	75	75

Waste sector

National Waste Management Plan 2014–2020

The National Waste Management Plan 2014–2020 (NPUO) was adopted in December 2014. The NPUO plays a key role in achieving an efficient use of resources and sustainable waste management. The analysis of the current situation in Bulgaria shows that the country has a serious potential to improve waste prevention and management, achieve better use of resources, develop new markets and new jobs while reducing the harmful effects of waste on the environment.

The successful implementation of the plan will help prevent and reduce the harmful effects of waste on the environment and human health and will reduce the use of primary natural resources. The Plan supports the central and local authorities to focus limited financial resources from national and European sources on priority waste management projects.

National Waste Management Programme

Municipal mayors draw up and implement waste management programmes for the territory of the municipality concerned.

As regards waste disposal, the main efforts are focused on prevention of waste generation in order to reduce the quantity of waste for disposal and on building waste treatment infrastructure. Waste disposal will also be prevented by providing market

incentives to households. The amount of waste charges must be linked to the quantity of generated waste, thereby encouraging households to reduce the volume of waste, use different waste collection schemes and recover household waste. Standards for recycled materials and compost must be introduced to allow marketing of these materials, reduce transaction costs and increase cost-effectiveness. Separate collection of 'green waste' will be introduced in all municipalities by updating their waste management regulations and programmes.

Deposited waste also has high potential to be used as energy and resources. Measures for biogas capture and use in new and existing landfills and waste deposits until completion will be applied and will improve the efficiency of resources, reduce dependence on imported energy resources and create value added which is being lost now because such facilities are not available.

Measures are being taken in the urban wastewater treatment plants to capture or remove (for smaller ones) biogas in order to reduce CO₂ emissions and allow some of the facilities to meet their own energy needs and improve their profitability and efficiency.

The measures in this sector will: lead to increased resource efficiency and better management of resources throughout their life cycle; increase value added; reduce dependence on imported energy resources thereby reducing the costs of households and businesses; and increase the competitiveness of the economy.

Summary of the policies and measures in the Waste sector

Measure	Target and/or activities concerned	Greenhouse gases	Calculated reduction effect (per year, in Gg CO ₂ eq)		
			2020	2025	2030
Biogas capture and incineration in all new and existing regional landfills	Methane from waste and electricity generation	CH ₄ , CO ₂	634	634	634
Building mechanical and biological treatment (MBT) plants and installations for treatment and recovery of compost and biogas	Waste management	CH ₄	728	728	728
Introducing anaerobic sludge stabilisation through biogas capture and incineration in new installations and installations undergoing reconstruction in agglomerations of more than 20 000 population equivalent	Waste management	CH ₄ , CO ₂	128	128	128

Agriculture sector

Common Agricultural Policy (CAP)

On 16 December 2013 the Council of EU Agriculture Ministers formally adopted the four basic regulations for a reformed CAP and the transition rules for 2014. Farmers should be rewarded for the services they provide to the general public, such as landscaping, biological diversity of farm land and stability, although said services have no market value. In the context of the second pillar of CAP regarding the development of the rural areas, Member States can take steps for climate change mitigation and adaptation and are required to do so.

The CAP has different impacts on agriculture, forestry and the environment in about 70 % of the EU territory and on the quality of life of 50 % of the EU population. The CAP should contribute to achieving the cohesion policy objectives by promoting a balanced territorial development while ensuring food safety and quality in the single market.

The Agricultural Producers Support Act (ZPZP) governs the state support for agricultural producers as regards the measures included in the National Plan for Development of Agriculture and Rural Areas. The support is provided to agricultural producers operating and registered in disadvantaged areas or areas covered by the Natura 2000 network.

The ZPZP lays down some of the activities through which the measures intended for the agriculture sector and the activities related to the production of biofuels can be implemented. The ZPZP is the act that establishes the main financial mechanism for management of agricultural activities. Most of the proposals, regardless of whether they relate to the introduction of best practices for rice production or for promotion of crop rotation, especially with nitrogen-fixing crops, for restoration of damaged farm areas or for the introduction of water-saving irrigation technologies, can be implemented through the financial mechanisms established by the ZPZP.

The Farm Land Protection Act allows farm land [use] to be changed only in specific cases.

The burning of stubble and other crop residues in agricultural land is prohibited. The tenants of farmland are responsible for the burning of stubble and other crop residues in agricultural land and must participate in putting out the fires.

The owners and tenants of farmland are entitled to tax and credit reliefs when they fulfil mandatory restriction of farmland use and implement projects for restoration and improvement of farmland fertility.

The Act contains a legal framework that covers some of the activities intended for the agriculture sector, such as tackling the burning of stubble and crop residues and promotion of agricultural practices aimed at reducing greenhouse gas emissions.

The proposed measures are aimed at reducing emissions from the main sources in the sector. The measures are in line with the situation in the sector and the top CAP priorities for the period from 2014 to 2020. One of the major challenges facing the CAP is to find a solution to the increasingly deteriorating production conditions in agriculture due to climate change and the need for the farmers to reduce their share of greenhouse gases and play an active role in climate change mitigation, and to supply energy from renewable sources. In this regard, it is possible to encourage the application of many measures aimed at climate change mitigation and related to direct payments, support for the market and rural development.

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

- i. to reduce and/or optimise the emissions in the agriculture sector;
- ii. to raise the awareness of both farmers and administration regarding actions and their impact on climate change.

The following priorities relate to these main objectives:

1. Reducing farmland emissions.
2. Reducing methane emissions from biological fermentation in livestock breeding.
3. Improving manure management.
4. Optimising the use of plant residues in agriculture.
5. Improving the management of rice fields and rice production technologies.
6. Improving the knowledge of farmers and the administration of the methods for emissions reduction in the agriculture sector.

Summary of the policies and measures in the Agriculture sector

Measure	Target and/or activities concerned	Greenhouse gases	Calculated reduction effect (per year, in Gg CO ₂ eq)		
			2020	2025	2030
Improving manure use and management	Livestock holdings	CH ₄	0.146	0.146	0.146
Improved insemination and irrigation	Farms	CH ₄ , N ₂ O	170	170	170
Encouraging the use of appropriate crop rotation, particularly for nitrogen-fixing crops	To prevent soil erosion and preserve organic carbon (carbon capture)	CH ₄	1	1	1
Management of damaged farmland	To prevent soil degradation and biodiversity loss	CH ₄	2.5	2.5	2.5

Technical assistance to farmers for soil/stubble treatment	Efficient waste recovery will reduce the need of stubble burning	CH ₄	0.094	0.094	0.094
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Land use, land use change and forestry sector

Forestry Act (ZG)

Forest activities are subject to planning. Forest planning is implemented on three levels and includes a National Strategy for Development of the Forestry Sector, a strategic plan for the development of the forest sector and regional plans for forest development and forest plans and programmes.

The forest management plans and programmes define a maximum permitted level of use of forest resources to achieve the forest management objectives over a period of 10 years. The ZG prohibits any reduction in the total percentage of forest land in the country. Land use change in forest areas is possible only in limited specific cases.

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

The strategic document is based on the European and national policies and strategic documents relating to forests and forestry in Bulgaria, the main principles and analyses of the forest sector in Bulgaria from 2006 to 2011, the vision, mission and objectives, the priorities and measures, the sources of financing to achieve the objectives of the strategy and the monitoring of its implementation.

Strategic Plan for the Development of the Forestry Sector (SPRGS) 2014–2023

The plan was developed with the financial support of the European Social Fund for the 'Strategic planning in the Bulgarian forests – a guarantee for effective management and sustainable development' project under Operational programme 'Administrative Capacity'.

The implementation of the operational objectives within the relevant budget, the timetable, the expected results, the performance indicators, the responsible institutions and the stakeholders are laid down in the following specific sub-activities of the SPRGS:

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

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

Operational objective 3: 'Enhancing the efficiency of preventing and combating forest fires and illegal activities in forests';

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

These operational objectives and activities are expected to have a direct and sometimes

indirect positive effect on the adaption of forest ecosystems to climate change and on reducing the adverse impact of climate change, including by increasing the absorption of greenhouse gases from the atmosphere.

The existing provisions of the Agricultural Land Ownership and Use Act provide that every year the municipal council shall adopt a decision on the rules for use of meadows and grasslands. These provisions cover:

- ✓ a prospective pasture action plan;
- ✓ parts of grasslands and pastures mainly intended for mowing;
- ✓ measures to preserve, maintain and improve grasslands, including clearing bushes and other undesired plant species, anti-erosion activities, spreading of fertilisers, temporary fencing;
- ✓ parts of grasslands and pastures intended for artificial lawns for sowing appropriate grass mixtures;
- ✓ manner of use, prohibitions and restrictions depending on the landscape, soil, climate and other environmental conditions.

As regards arable land, Article 7 of the Agricultural Land Ownership and Use Act stipulates that agricultural land which is eroded, polluted, salinated, with high acid content or with excess moisture in the surface layer shall be recovered and improved through a set of activities or technologies, acting in line with pre-designed, coordinated and approved technologies and projects approved by an Expert Council.

Planes, quarries and other areas with disturbed soil profile, tailing ponds, landfills and other waste disposal sites, old river beds, routes of abandoned canals, roads, railways and construction sites after removal of engineering equipment, claddings and superstructures are subject to revegetation. Revegetation shall be done on the basis of an agreed and approved project which is an integral part of the design for the development of the site.

The procedure for use of humus after its removal, the procedures for revegetation, land improvement and acceptance of restored areas are laid down in Regulation No 26 on land revegetation, improvement of low productivity land, humus layer removal and recovery.

One of the key strategic documents that contains measures for land use, land use change and forestry is the NCCAP.

*Summary of the policies and measures in the Land use,
land use change and forestry sector*

Measure	Target and/or activities concerned	Greenhouse gases	Calculated reduction effect (per year, in Gg CO ₂ eq)		
			2020	2025	2030
Use of 'non-afforested areas intended for afforestation' in forest territories	To increase forest areas	CO ₂	1.7	1.6	1.6
Afforestation of abandoned agricultural lands, barren and deforested areas, eroded and threatened by erosion areas outside forest territories	To create new forests outside afforested areas	CO ₂	4	4.8	4.8
Increasing the area for urban and suburban parks and green areas	To increase the area of urban and suburban parks and green areas	CO ₂	0.3	0.3	0.3
Recovery and sustainable management of wetlands Protection and conservation of wetlands in forest territories, peat bogs, swamps	To enhance the efficiency in carbon storage	CO ₂	0.5	0.7	0.7
Recovery and maintenance of protective woodland belts and new anti-erosion afforestation	Absorption of carbon by new forest in these areas	CO ₂	0.8	1.2	1.5
Increasing the density of the natural and artificial plantations listed above	To increase carbon absorption by new forests in these areas	CO ₂	1	2.5	4

i. Where relevant, regional cooperation in this area

Regional cooperation in this area is not relevant

ii. 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. Renewable energy

To achieve the national target of a 25 % share of renewable energy in gross final energy consumption by 2030, both the existing and additional policies and measures will be implemented.

The policies and measures take account of the priorities and guidelines in the new

European energy and climate policy and are in line with the experience gained and results achieved from hitherto pursued policies and measures in the area of generation and consumption of energy from renewable sources. The aim is to achieve a cost-effective development of renewable energy as an important part of the EU decarbonisation policy by 2030.

Between 2021 and 2030, the development of the electricity sector takes account of the capacity for maximum integration of the generated renewable energy in the energy market, the distributed electricity generation and the provision of renewable electricity to consumers at the lowest possible price. An enabling framework was developed to promote and facilitate the development of renewables self-consumption and establish renewable communities.

To ensure wider and annually increasing penetration of renewables in the heating and cooling sector, priority will be given to the commissioning of highly efficient heating and cooling installations, the deployment of innovative technologies using geothermal, hydrothermal and solar energy and the use of waste heat and cold.

To achieve a 14 % share of energy from renewable sources, the transport sector will encourage the penetration of advanced biofuels, renewable liquid and gaseous transport fuels of non-biological origin, recycled carbon fuels and renewable energy supplied to the road and rail transport. Consumption of these fuels and energy should contribute to achieving the targets of the policy of energy diversification and decarbonisation of the transport sector. In order to use renewable energy in transport, integration of modern technologies in the innovative rail sector needs to be accelerated.

i. Policies and measures to achieve the national contribution to the binding 2030 Union target for renewable energy and trajectories as referred to in point (a)(2) of Article 4, and, where applicable or available, the elements referred to in point 2.1.2, including sector- and technology-specific measures

1) *Support schemes*

From 2021 to 2030, support will continue to be provided in the form of preferential prices under contracts already concluded for the purchase of renewable electricity generated by power plants with a total installed capacity of less than 4 MW. During that period, granting preferential prices and purchase of electricity under long-term contracts are envisaged only in cases of putting into service of new facilities with a total installed capacity of up to and including 30 kW intended to be mounted on roof and facade structures of buildings connected to the electricity distribution grid and in real estate adjacent to such building in urbanised areas.

Renewable electricity generation by power plants with a total installed capacity of 4 MW

and above 4 MW for which long-term contracts for purchase at preferential prices have been concluded will be encouraged by a premium for the quantity of electricity sold on the exchange. The support will be provided until the expiration of the time limit set in the contracts for the purchase of electricity.

The option for holding auctions to provide capacity for renewable electricity generation and the provision of a premium to the market price of electricity sold on the electricity market are considered to be appropriate forms of support.

The above support schemes will be in line with the requirements of the applicable European state aid rules and guidelines.

The annual progress towards achieving the target for a share of energy from renewable sources in gross final energy consumption will be subject to analyses in the biennial reports of the INECP; if it is found that the target is not met and a need of new energy facilities exists, a procedure for starting a support scheme through auctions may be launched.

2) Development of electricity transmission and distribution infrastructure, of smart networks, of storage facilities and interconnectors

The need to support the integration of renewable electricity into the transmission and distribution networks, the need for a more extensive use of smart networks and use of energy storage systems was identified and will be among the primary and important measures from 2021 to 2030. In this period, the pace of building new power plants generating renewable energy is expected to slow down compared to 2010–2014. In turn, this entails better and timely planning and building of the infrastructure required to ensure smooth connection and transmission of the renewable electricity generated. The Electricity System Operator and the operators of distribution networks envisage in their development plans measures and investments required to ensure a secure and reliable operation of the electricity system in the country while taking account of the increased number of power plants generating renewable energy, including wind and solar power.

3) Review of and legislative changes to administrative procedures for the construction of power plants for generation of renewable energy and to administrative procedures which apply to installations for biomass conversion into biofuels, solid, liquid and gaseous fuels from biomass; renewable liquid and gaseous transport fuels of non-biological origin.

Building renewable energy plants and implementation of productions for efficient use of biomass and renewable liquid and gaseous fuels of non-biological origin require permits and other documents necessary for the implementation of the investment proposal. When the new directive is transposed, a review will be carried out and relevant legislative changes will be introduced to take account of the specificities of the technologies used to generate renewable energy, the time limits for granting permits will be optimised and the

possibility for introducing simplified and less burdensome procedures for distributed production and storage of renewable energy will be considered.

Existing measures

The Energy from Renewable Sources Act provides for a simplified administrative procedure for connecting to the electricity distribution networks of small installations with a total installed capacity of up to 30 kW on roof and facade structures of buildings connected to the electricity distribution grid and in real estate adjacent to such buildings in urbanised areas. The conditions for the connection of such facilities must be stipulated in a statement of opinion issued within 30 days of receipt of the request. In these cases a preliminary contract for connection is not required; such a contract is to be concluded under the conditions laid down in the statement of opinion and if a building permit has been issued.

The Spatial Development Act provides that no approval of investment projects for issuance of building permits shall be required for the installation of units for generation of renewable electricity, heating and/or cooling energy with a total installed capacity of up to and including 30 kW on existing buildings in urbanised areas, including on roof and facade structures of any such buildings and in the land plots in which said buildings are developed.

4) Requirements for use of renewable energy in buildings

The ZEVI contains the requirement for use of renewable energy, where this is technically feasible and economically viable, when new buildings are built or existing buildings are reconstructed, undergo major renovation, overhaul or refurbishing. It requires at least 15 per cent of the total heating and cooling energy needed for the building to be produced from renewable sources by installing:

- district heating fuelled by biomass or geothermal energy;
- individual facilities for burning 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 near-surface geothermal systems.

The Energy from Renewable Sources Act requires analyses of the possibilities of using renewable energy to be carried out when part 'Energy Efficiency' of investment designs for new buildings or for reconstruction, major renovation, overhaul or refurbishing of existing buildings is prepared and when the energy efficiency of existing buildings is audited. The analysis of the possibilities for using renewable energy is part of the evaluation indicators of annual energy consumption in the building.

When projects for modernisation of production processes in small and medium-sized

enterprises are implemented, the energy efficiency measures need to be combined with commissioning of plants for production of heating and cooling from renewable sources to meet the technological needs of the enterprise.

5) Strengthening the role of central and local authorities to enable a higher penetration of renewable energy

The contribution of the local authorities to a higher penetration of renewable energy and to the creation of conditions for renewables self-consumption and consumption of renewable energy by separate 'renewable energy communities' at local level is essential for the cost-effective development of renewable energy in the country. Directive 2009/28/EC and the new directive require that opportunities for use of renewable energy be considered when planning, designing, building and renovating urban infrastructure, including industrial, commercial and residential areas, and energy infrastructure, with a special focus on the use of heating and cooling from renewable energy sources.

In this regard, the ZEVI lays down the obligation of state and local self-government authorities to take measures to ensure that, effective from 1 January 2012, the new public service buildings, as well as the existing public service buildings undergoing reconstruction, major renovation, overhaul or refurbishment play the role of models for achieving the objectives of the Act. This obligation can be implemented by meeting the standards for housing buildings with zero consumption of energy or by ensuring the use of the roofs of such buildings or multi-purpose buildings, including public service buildings, by third parties for installing units for generation of energy from renewable sources.

6) Introducing a simplified procedure for grid connections when installations of renewables self-consumers and demonstration projects that use renewable energy with an electrical capacity of 10.8 kW or less are to be connected to electricity distribution networks

The new directive requires that a simplified procedure be introduced when renewables self-consumers and demonstration projects that use renewable energy with an electrical capacity of 10.8 kW or less are to be connected to electricity distribution networks. This requirement will be considered and the existing statutory requirements will be streamlined.

At present the ZEVI provides for a simplified procedure for connection of installations with a total installed capacity of up to and including 30 kW, envisaged to be mounted on roof and facade structures of buildings connected to the electricity distribution grid and in real estate adjacent to such buildings in urbanised areas.

7) Assessment of the potential energy from renewable sources and the potential use of waste heating and cooling in the heating and cooling sector

This assessment will be part of the second comprehensive assessment in accordance with

Article 14(1) of Directive 2012/27/EU to be developed by 31 December 2020.

8) Access to and operation of grids

Article 18(2) and (3) of the ZEVI provides for incentives for the development of gas generation from renewable sources and generation of renewable heating and cooling in the country. The incentives will continue to apply after 2020 and relevant changes will be discussed and, where appropriate, implemented in the process of transposing the new directive.

9) Creating conditions for renewables self-consumers and renewables communities

The interest of Bulgarian consumers in generating renewable electricity for self-consumption is low and this method of electricity consumption is not developed in Bulgaria. The ZEVI provides for the opportunity to build small units that use renewable sources for joint electricity production, consumption and sale.

The ZEVI currently in force provides the producer with the opportunity to declare that the generated renewable electricity will be used for self-consumption when filing an application to the operator of the electricity network for exploring the conditions and manner of connection. Also, shorter time limits for connection are envisaged and no building and use permits are required for small installations with an installed capacity of up to 30 kW (Article 24(1) of the ZEVI). The quantity of electricity that is not used for self-consumption shall be purchased by the respective end supplier at a price set by the KEVR according to the conditions and the procedure laid down in the respective regulation referred to in Article 36(3) of the Energy Act.

With a view to putting in place an enabling framework to promote and facilitate the development of renewables self-consumption, legislative changes are planned in order to streamline the effective legal basis and better regulate the rights of these consumers. Opportunities will be sought in the 2021–2030 period to fund projects, and measures will be undertaken to provide access to consumption of energy from renewable sources for low-income consumers or vulnerable households through the social assistance system.

10) Creating conditions for final consumers and household consumers in particular to be entitled to participate in 'renewable energy communities' which can produce, consume, store or sell energy from renewable sources

As a measure for promoting distributed renewable energy production, a legal basis will be developed that will lay down the rights and responsibilities of final consumers when they participate in 'renewable energy communities' which can produce, consume, store or sell energy from renewable sources.

The support will be provided by granting access to operation in the energy system, facilitating market integration, establishing administrative requirements in line with the specificities of the renewable energy communities, etc.

11) Promoting the use of heating and cooling energy produced from renewable sources

The ZEVI promotes the production of heating and cooling energy from renewable sources through:

- support for and implementation of projects for construction of heat transmission networks in settlements that meet the requirements for a designated area when the economic viability of consumption of heat from renewable sources is proved and a preliminary investment design has been submitted for the heat production;
- support for and implementation of projects for construction of small decentralised heating and/or cooling systems;
- connecting of units for generation of renewable heat to the heat transmission network and purchase by the heat transmission company of the heat generated by another heat producer, where this is technically feasible and economically viable.

The above measures will continue to apply after 2020 and opportunities will be sought for developing high efficiency cogeneration, efficient district heating plants and local installations in buildings in order to fulfil the annual increase of the use of heating and cooling energy provided for in the new directive. Opportunities will be sought for replacing conventional fuels with energy from renewable sources if this could lead to efficient and economically feasible production and consumption of heating and cooling energy.

12) Providing to final consumers information about the energy performance and the share of renewable energy in heating and cooling systems

When the legislation relating to the use of renewable energy is amended, requirements for the provision of information about the energy performance of the renewable source used in the generation of heating and cooling energy will be introduced for cogeneration plants and district heating plants.

13) Introducing legal requirements for issuance of guarantees of origin for energy from renewable sources

The requirements of Directive 2009/28/EC on the promotion of the use of energy from renewable sources are transposed in the ZEVI and in Regulation No RD-16-1117 of 14.10.2011 on the terms and procedure for issuance of guarantees of origin for energy from renewable sources. The guarantee of origin is to be issued in order to certify the origin of the electricity and the heating and cooling energy generated from renewable sources. The new directive requires Member States to ensure the issuance of guarantees of origin for gas, including hydrogen. In this regard, the legal framework will be streamlined and supplemented with the new requirements of the new directive.

14) Streamlining the legal framework for application of the stricter requirements

under the new directive as regards the sustainability criteria and the GHG emission reductions when using biofuels and liquid, gaseous and solid fuels from biomass

The existing legal framework which transposes in national law the requirements of Directives 2009/28/EC and 2015/1513/EC with regard to the sustainability criteria for biofuels and liquid transport fuels from biomass has served as a basis for establishing the sustainability criteria and the GHG emission reductions in the use of biofuels, liquid, gaseous and solid fuels from biomass in installations producing electricity and heating and cooling energy or fuels.

The sustainable use of existing wood and agricultural resources and the development of new production systems in forestry and agriculture are encouraged in the production and use of renewable energy, provided that the criteria for sustainability and GHG reduction are met. Biofuels, non-transport liquid fuels from biomass and gaseous and solid fuels from biomass used to achieve the national target and such biofuels benefitting support schemes must meet the criteria for sustainability and GHG emission reduction.

Aligning these criteria for biofuels and for non-transport liquid fuels from biomass is essential to the achievement of the national and European energy policy objectives.

15) Introducing an obligation on fuel suppliers to ensure the fulfilment of the target for a minimum 14 % share of renewable energy in the transport sector

In order to achieve the new, more ambitious objectives, specific obligations will be legally imposed on fuel and energy suppliers which release on the market conventional biofuels, advanced biofuels, liquid and gaseous transport fuels of non-biological origin, renewable electricity and recycled carbon fuels.

At present, consumption of the quantities of biofuels required to achieve the national binding target for 2020 is ensured through an obligation on the persons that place on the market petroleum-derived liquid transport fuels to market petroleum-derived fuels with a biocomponent the percentage of which is set forth in the ZEVI, including advanced biofuels. Such an obligation was also introduced for end distributors and for distributors of petroleum-derived liquid fuels.

In view of the requirements of the new directive, the adopted approach towards achieving the target for the transport sector could be changed by introducing quotas for each supplier of renewable energy.

16) Promoting the use of renewable energy in public transport

To fulfil the target for the transport sector, local authorities will develop and implement schemes to promote the use of renewable energy, including alternative renewable fuels, advanced biofuels and recycled carbon fuels depending on the specific conditions in each municipality.

17) Creating conditions for development and use of advanced biofuels, renewable liquid and gaseous biofuels of non-biological origin and recycled carbon fuels

To ensure the quantities of advanced biofuels, renewable liquid and gaseous biofuels of non-biological origin and recycled carbon fuels required for the purposes of the new directive at affordable prices, integrated measures relating with both the consumption and the production of such fuels will be needed.

Efforts in this less developed but advanced area will focus on applied research and larger-scale demonstration activities relating to utilisation of new energy sources and implementation of technologies for their use. It is necessary to create an integrated research and innovation chain to cover elements from applied research through generation before release to market penetration of these fuels.

Local authorities will develop and apply schemes to promote the use of renewable energy, alternative renewable fuels, advanced biofuels and recycled carbon fuels depending on the specific conditions in each municipality.

An important factor in promoting the use of these fuels is to make them popular and overcome the initial scepticism of consumers and households. To this end, measures for organising information campaigns among the population of the respective municipalities should be implemented to encourage the use of these fuels in transport.

18) Promotion and deployment of electric mobility in transport, including by building road transport infrastructure and introducing new technologies in innovative railways

To promote and deploy electric mobility, obligations will be imposed on local authorities to introduce as part of their short- and long-term programmes their own specific measures on their territory in order to increase the attractiveness of the use of such transport. The programmes should also include measures to promote the development and use by the population of urban public and rail transport.

The actions undertaken by individual municipalities will be promoted as good practices in order to be widely disseminated, for instance: tax reliefs, simplified access to and provision of a minimum number of parking places, etc. when electric vehicles are used.

19) Creating appropriate financial incentives to ensure the achievement of the target in the transport sector

In line with the requirements of the Guidelines on state aid for environmental protection and energy, possibilities will be considered where relevant for introducing financial incentives (through tax reliefs, support schemes etc.) for the consumption of alternative renewable fuels and advanced biofuels and for electric mobility deployment.

20) Replacement of stoves and boilers burning solid fuel (coal and briquettes) for heating with biomass boilers and stoves

The draft National Programme for Improving the Ambient Air Quality 2018—2020 includes a measure relating to household heating: mandatory phasing out of solid fuel stoves and boilers and their replacement with biomass stoves and boilers between 2020 and 2024.

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 fulfilment of the ambitious national target for renewable energy for 2030 entails relying on the cooperation mechanisms envisaged in the new directive. In this regard, in case of a surplus or a deficit of renewable energy Bulgaria will make use of the statistical transfer mechanism.

Bulgaria will join the European Union renewable development platform (the Platform) which will provide opportunities for trading in units of renewable energy. Annual data on the national contribution of Member States to the binding Union target, including expected surpluses and deficits of renewable energy and the cost of transfer of surpluses of renewable energy from or to another Member State, will be published in the Platform. As an option to fulfil its national target for a share of renewable energy in gross final consumption, Bulgaria considers to participate in initiatives for 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 allow for a wider deployment of renewable energy in the sector, Union funds will be used to promote and use heating and cooling energy from renewable sources.

Projects for enhancing the energy efficiency and increasing the use of renewable energy will be funded under the Renewable Energy, Energy Efficiency and Energy Security Programme financed through the European Economic Area Financial Mechanism with a total budget of about EUR 33 million. With reference to the increased use of renewable energy, projects under the following measures will be funded:

- Efficient use of the hydropower potential: development of Bulgaria's hydropower potential by building small hydropower plants, with municipalities and companies as beneficiaries;
- Use of geothermal energy (heating/cooling) in buildings and industrial sites;
- Use of waste heat in industrial processes;
- Support to carry out monitoring of energy consumption in municipal buildings;
- Training/building capacity for utilisation of renewable energy, energy efficiency and energy management in municipalities and industry.

From 2021 to 2030, Bulgaria will benefit from the investment support to be provided from the Modernisation Fund and the option for funding projects related to renewable

energy production, improvement of energy efficiency, energy storage and upgrade of the energy networks will be considered. The Fund will be established pursuant to 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.

iv. Where applicable, the assessment of the support for electricity from renewable sources that Member States are to carry out pursuant to Article 6(4) of Directive (EU) 2018/2001

The support to be provided under the support schemes will be assessed in the first progress report in accordance with the Regulation on the governance of the Energy Union.

v. Specific measures to introduce one or more contact points, streamline administrative procedures, provide information and training, and facilitate the uptake of power purchase agreements

Summary of the policies and measures under the enabling framework Member States have to put in place pursuant to Article 21(6) and Article 22(5) of Directive (EU) 2018/2001 to promote and facilitate the development of self-consumption and renewable energy communities

In view of the requirement of the new directive on the promotion of the use of energy from renewable sources, legislative initiatives will be undertaken to establish one or more contact points to support investors (applicants) in the process of issuing permits by competent authorities. The responsibilities of the contact points and the time limits for issuing permits will be consistent with the requirements set in the new directive.

Municipal authorities are obliged to issue some of the permits for building plants for renewable electricity generation. In addition, their role in planning and expanding the use of renewable energy on the territory of the municipality involves their greater commitment to the process of implementation of investment proposals. In this regard, it is appropriate to designate municipalities as contact points.

Securing the necessary information and adequate training are key to promoting the wider use of renewable energy.

Regional measures for development in the areas that promote the exchange of best practices in the production of renewable energy between local and regional development initiatives, programmes for training to strengthen the regulatory, technical and financial expertise and for better knowledge of available financing opportunities are supported.

To achieve efficient results in this area, stakeholders and potential participants in the

process of dissemination of appropriate information and conducting training procedures are identified. The relevant institutions and local authorities are particularly active participants in these processes and they will carry out combined information campaign initiatives, fora, awareness raising programmes and training programmes for citizens on the benefits of and opportunities for using renewable energy. Information campaigns are addressed to citizens and provide information on practical issues relating to the development and use of renewable energy. Information on the opportunities for use of renewable energy is disseminated in the framework of the activities performed by relevant ministries and their executive agencies, including in connection with completed projects financed by international and European programmes.

In order to raise citizens' awareness of and interest in using renewable energy, suppliers of equipment and systems and the competent bodies provide information regarding the net profit, costs and energy efficiency of the equipment and systems for use of renewable electricity, heating and cooling energy. The information will be provided in an efficient and easily accessible manner.

Qualification schemes for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps are provided based on the actions carried out to date in accordance with Directive 2009/28/EC in relation to the acquisition of qualification for installation and maintenance of biomass installations, solar photovoltaic installations, solar thermal installations, heat pumps and shallow geothermal installations and based on the related information.

Public information regarding the persons who have acquired qualification for installation and maintenance of such facilities is made available. The already concluded long-term contracts for purchase of electricity will continue to be in force and a preferential price or a premium will be paid to the producers of renewable electricity for the quantity of electricity sold on the exchange market corresponding to the net specific production.

vi. Assessment of the necessity to build new infrastructure for districting heating and cooling energy produced from renewable sources

The assessment of the potential for use of high efficiency cogeneration of heat from conventional fuels and renewable energy is based on the current annual consumption of heat. Introducing highly efficient technologies would be socially and economically viable over the next 10 years if the existing heating systems are replaced where technical and market developments allow. There are plans to meet the needs of the buildings in the public sector and the services sector which are not connected to district heating through new district heating networks – local networks and extensions of the existing ones. This is expected to result in saving 52 000 tonnes of CO₂ per year. One possibility is to use the potential of highly efficient solutions such as gas-fuelled engines, small to large open-

or closed-cycle gas turbines, biomass fuelled steam turbines, heat pumps, etc. The use of biomass with a focus on biomass from waste and industrial and household waste and the use of geothermal energy offer a potential to increase the share of renewable energy in district heating and cooling systems. The potential for energy efficiency of the central heating and cooling infrastructure can be achieved by rehabilitation of heat transmission networks and replacing the obsolete direct subscriber district heating stations with modern highly efficient automated indirect stations which would reduce heat transmission and distribution losses and would result in reduction of CO₂ emissions.

The best practices associated with the use of pre-insulated pipes in district heating systems help reduce losses to 3 %. A similar loss level can be achieved for high power density systems. In the context of the national conditions in the Republic of Bulgaria, it is assumed that the average power density of district heating systems will make it possible to reduce heat losses to 10 % by using the best available technology. The development of high efficiency cogeneration of electricity contributes to fuel use reduction, higher electricity generation productivity and better environmental protection.

vii. Where applicable, specific measures on the promotion of the use of energy from biomass, especially for new biomass mobilisation, taking into account:

- *biomass availability, including sustainable biomass: both domestic potential and imports from third countries*
- *other biomass uses by other sectors (agriculture and forest-based sectors); as well as measures for the sustainability of biomass production and use*

Solid biomass is the renewable energy source most widely used in the country. It is mainly used in the heating and cooling sector. Consumption of other types of biomass, including waste, is still insignificant.

Firewood is the main type of biomass used in the country and the use of wood waste and plant waste is growing. The positive trend towards improving the waste management practices continues and the national targets for household waste recycling, reuse and recycling of packaging waste and, last but not least, recycling of ordinary waste have been achieved. Biogas production from anaerobic fermentation of biomass and from sewage sludge is still negligible. Biogas is used in electricity and heat generation, in the Agriculture sector and in the Other services activities sector.

In this regard, use of biomass for energy purposes has wide potential for development. The efforts are focused on the wider use of waste (municipal solid waste, sludges from waste water treatment plants, etc.) and industrial by-products, without affecting the health and quality of life of the population in the regions where the biomass fuelled energy installations are located.

In order to report biofuels generated from forest biomass, non-transport liquid fuels from

biomass and gaseous and solid fuels from biomass for the purposes of the directive, requirements will be laid down to minimise the risk of using biomass derived from unsustainable production. Regulatory requirements will be defined for sustainable production and consumption of gaseous and solid fuels from biomass when said fuels are used in the generation of electricity and heat in biomass fuelled installations with a total nominal heat power equal to or higher than 20 MW for solid fuels from biomass and with a total nominal heat power equal to or higher than 2 MW for gaseous fuels from biomass. The amended Clean Ambient Air Act (SG No 98 of 27.11.2018, in force as from 27.11.2018) provides for the development of a regulation laying down the requirements for wood used in household heating.

This ensures the use of wood that meets specific quality criteria. The regulation will be developed by the Minister for Agriculture, Food and Forestry.

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 avail of the option for free allocation of greenhouse gas emission allowances for power plants from 2021 to 2030 in order to modernise its 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.

The following is envisaged to be developed:

- project selection criteria for projects involving a total amount of investment of up to EUR 12.5 million on the basis of which a List of the investments to be financed with free allocation of GHG emission allowances in the 2021–2030 period will be prepared;
- rules for conducting a competitive bidding process for the selection of the projects involving a total amount of investment exceeding EUR 12.5 million which will be financed through free of charge allocation of emission allowances between 2021 and 2030;
- changes in 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)

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 referred to in point 2.2, including planned measures and instruments (also of a financial nature) to promote the energy performance of buildings, in particular with regard to the following:

- i. Energy efficiency 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 developed in accordance with Annex II)*

In furtherance of the national target for energy efficiency and in order to comply with the requirements of Article 7 of Directive 2012/27/EU, Bulgaria has introduced:

- an energy saving obligation scheme and
- alternative measures

to ensure that the overall cumulative target for energy savings in final energy consumption will be achieved by 31 December 2020.

The overall cumulative target for energy savings is the annual accumulation of new end-use energy savings for the 2014–2020 period may not be lower than 1.5 % per annum of the average annual value of the total energy sales, including sales of fuels, to final customers in the country's territory in 2010, 2011 and 2012, excluding volumes sold in the Transport sector under Eurostat Code B_101900. The sales of energy used in industrial activities listed in Annex 1 to the Climate Change Mitigation Act are also excluded from the target.

The overall cumulative energy saving target from 1 January 2021 to 31 December 2030 may not be lower than annual new savings of 0.8 % of the average annual value of the total energy sales, including sales of fuels, to final customers in the country's territory in 2016, 2017 and 2018, excluding volumes sold in the Transport sector under Eurostat Code B_101900.

1) Setting the overall cumulative target by 2020

Average energy sales to end users for the 2010–2012 period, ktoe

<i>Indicator</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>Annual average final energy consumption (FEC) for the 2010–2012 period</i>
FEC, excluding transport	5 990	6 337	6 173	6 167

Bulgaria has made full use of the 25 % reduction permitted by Article 7(2) of Directive 2012/27/EU by combining the assumptions referred to in Article 7(2)(a), (b) and (d).

Overall cumulative energy savings target by 2020

<i>Average annual FEC for the 2010–2012 period</i>	<i>Obligations excluding transport and making full use of the 25 % reduction permitted by Article 7(2)</i>	
<i>ktoe</i>	<i>% of FEC</i>	<i>Ktoe</i>
6 167	31.5	1 942.7

Annual breakdown of the overall cumulative energy savings target for the 2014–2020 period, ktoe

Year	2014	2015	2016	2017	2018	2019	2020
2014	61.7	61.7	61.7	61.7	61.7	61.7	61.7
2015		61.7	61.7	61.7	61.7	61.7	61.7
2016			75.2	75.2	75.2	75.2	75.2
2017				75.2	75.2	75.2	75.2
2018					77.1	77.1	77.1
2019						77.1	77.1
2020							78.3

2) Setting the overall cumulative target by 2030

Average energy sales to end users for the 2016–2018 period, ktoe

2016	2017	2018	<i>Average annual value for the 2016–2018 period</i>
9 517	9 513.2	9 509.4	9 513

* Currently statistical data are available only for 2016. Data regarding 2017 and 2018 are projections from the survey 'Projected total energy balance of the Republic of Bulgaria for the 2021–2030 period and *with a horizon by 2050*'.

<i>Energy savings, ktoe</i>										<i>Total</i>
2021	76.11									76.11
2022	76.11	76.11								152.21
2023	76.11	76.11	76.11							228.32
2024	76.11	76.11	76.11	76.11						304.42
2025	76.11	76.11	76.11	76.11	76.11					380.53
2026	76.11	76.11	76.11	76.11	76.11	76.11				456.63
2027	76.11	76.11	76.11	76.11	76.11	76.11	76.11			532.74

2028	76.11	76.11	76.11	76.11	76.11	76.11	76.11	76.11			608.84
2029	76.11	76.11	76.11	76.11	76.11	76.11	76.11	76.11	76.11		684.95
2030	76.11	76.11	76.11	76.11	76.11	76.11	76.11	76.11	76.11	76.11	761.06
<i>Cumulative savings for the 2021–2030 period, ktoe</i>											4 185.81

Annual breakdown of the overall cumulative energy savings target for the 2021–2030 period, ktoe

ENERGY EFFICIENCY OBLIGATION SCHEMES

Individual energy saving targets are the annual end-user energy savings in the period from 1 January 2014 to 31 December 2030. Individual targets are determined by allocating the difference between the calculated annual cumulative target and the estimate of energy savings from alternative measures in proportion to the amounts of energy sold by each obligated party in the previous year, among the following obligated parties:

1. end suppliers, suppliers of last resort, traders licensed for the business of trade in electricity which sell electricity in amounts exceeding 20 GWh p.a. to final customers;
2. heat transmission companies and heat power suppliers which sell heat energy in amounts exceeding 20 GWh p.a. to final customers;
3. end suppliers and traders of natural gas which sell natural gas in amounts exceeding 1 million m³ p.a. to final customers;
4. traders of liquid fuels which sell liquid fuels (excluding transport fuels) in amounts exceeding 6.5 kt p.a. to final customers;
5. traders of solid fuels which sell solid fuels in amounts exceeding 13 kt p.a. to final customers.

The annual individual targets of obligated parties are established by the AUER based on declarations of the quantities of fuels and energy sold to customers in final energy consumption during the previous calendar year. The declarations must be submitted to the AUER by 1 March of every year. The list of obligated parties and their individual annual targets are updated annually to take into account the change in the volume of sales by the obligated party concerned vis-a-vis the total volume of sales by all obligated parties for the previous year. The list is updated by the AUER in the Annual Reports on the implementation of the National Energy Efficiency Action Plan.

ALTERNATIVE MEASURES

Pursuant to the law currently in force, the following alternative measures are eligible:

- energy taxes or CO₂ taxes the effect of which is to reduce final energy

- consumption;
- financing schemes and instruments or fiscal incentives that lead to the application of energy-efficient technologies or techniques and have the effect of reducing final energy consumption;
- regulations and voluntary agreements which lead to the application of energy-efficient technologies or techniques and have the effect of reducing final energy consumption;
- standards and norms aimed at improving the energy efficiency of products and services, including buildings and vehicles, except where these are mandatory and applicable in Member States in accordance with Union law;
- energy efficiency labelling schemes, with the exception of the schemes which are mandatory and applicable in accordance with Union law;
- education and training — including advisory programmes in the energy sector — that lead to the application of energy-efficient technologies and have the effect of reducing final energy consumption.

The possible approach for achieving the cumulative targets for the obligations scheme from 2014 to 2020 in Bulgaria by applying alternative measures was assessed based on the following assumptions:

- The minimum cumulative target for the 2014–2020 period at FEC level after making full use of a 25 % reduction is 1 943 ktoe.
- According to a preliminary survey, traders in fuels and energy covered by the obligations scheme are expected to account for not more than 60 % of the FEC.
- From 2010 to 2016 Bulgaria applied a scheme of individual targets for annual energy savings which covered more obligated parties.
- The individual targets mentioned above are excluded from the new obligation scheme for the 2016–2020 period which was planned to replace the previous obligation scheme and according to which the only category of obligated parties will be energy traders. Only the old obligation scheme applied between 2014 and 2016 due to the late adoption of the amendments to the ZEE and the related implementing regulations, including the regulation on determining the new individual targets for energy traders.
- Industrial system owners and owners of state and municipal buildings are not obligated parties during the 2016–2020 period.

Alternative measure 1: Individual energy savings targets for owners of industrial systems and of state and municipal buildings

According to the ZEE, in the period from 2014 to 2016, individual energy saving targets were set for the following two groups of obligated parties in addition to traders in fuels

and energy:

- owners of state and municipal buildings;
- owners of industrial systems consuming energy in excess of 3 000 MWh per annum.

The period of validity of these targets was from 2010 to 2016 but only savings made in the last three-year period from 2014 to 2016 were taken into account for the purposes of the alternative approach to the implementation of the obligations scheme.

The list of obligated parties and the values of individual targets for energy savings were adopted by the Council of Ministers and their breakdown is as follows:

Values of energy savings targets for owners of buildings and owners of industrial systems

Obligated parties	Energy savings target for the 2010–2016 period		Energy savings target within the alternative approach for the 2014–2016 period	
	<i>GWh p.a.</i>	<i>ktoe p.a.</i>	<i>GWh p.a.</i>	<i>ktoe p.a.</i>
Owners of state and municipal buildings	521	44.8	260.5	22.4
Owners of industrial systems with energy consumption exceeding 3 000 MWh p.a.	819	70.4	409.5	35.2
Total	<i>1 340</i>	<i>115.2</i>	<i>670</i>	<i>57.6</i>

Allocation of responsibilities: participants and actors

- Obligated parties: implement and report to the AUER on an annual basis the progress on the implementation of the measure.
- Energy efficiency consultants registered in the AUER public register: carry out energy efficiency audits before and after measures are implemented or make assessments of the energy savings achieved using specialised methods laid down in Regulation No E-RF-04-3 of 4.05.2016; draft a report containing an assessment of the savings achieved.
- The AUER: monitors the implementation of the measure by summarising, analysing and assessing its overall implementation based on the reports submitted by the obligated parties; exercises control over the qualification and activities of energy efficiency consultants, the application of the specialised methods and the reports containing assessments of the savings achieved; verifies the energy savings achieved by the obligated parties and issues certificates; keeps databases on the implementation of the measure.

Alternative measure 2: National Programme for Energy Efficiency of Multi-Family Residential Buildings

Description of the measure

In 2015 Bulgaria adopted a National Programme for Energy Efficiency of Multi-Family Residential Buildings aimed at renovation of multi-family residential buildings by implementing energy efficiency measures.

Comparison between the individual targets of obligated parties using the baseline approach and the combined approach to achieve compliance with Article 7 of Directive 2012/27/EU, ktoe/year

Year	Obligation scheme, baseline approach	Existing obligation scheme³	National Programme for Energy Efficiency of Multi-Family Residential Buildings⁴	Balance of obligated persons
2014	61.7	29.1	-	32.6
2015	61.7	20.8	-	30.9
2016	75.2	20	7.6	47.6
2017	75.2	-	23.44	51.76
2018	77.1	-	16.5	60.6
2019	77.1	-	16.5	60.6
2020	78.3	-	16.5	61.8
Total 2014–2020	506.3			355.86
Cumulative value 2014–2020	1 942.7			1 283.44

The national energy efficiency programme for multi-family residential buildings is aimed at renovation of multi-family residential buildings by implementing energy efficiency measures to ensure better living conditions for citizens in multi-family residential buildings, heat comfort and higher quality of the living environment. The programme provides financial and organisational support to associations of owners in multi-family residential buildings registered in accordance with the procedure laid down in the Condominium Ownership Management Act to improve energy efficiency in the buildings in which they live.

Support and assistance is provided to associations of owners whose buildings meet the eligibility criteria. The associations of owners file applications to the municipality and according to the selection criteria all eligible associations of owners receive a grant that

³ The values are based on the annual reports on the implementation of the National Energy Efficiency Action Plan for 2014–2016.

⁴ The values are based on savings reported by the Managing Authority and on an engineering evaluation against investments planned under the programme. Source: MRRB

covers 100 % of the costs and organisational support for the implementation of renovation, based on the order of filing and approval of their applications, until the financial resources allocated to the Programme are depleted.

Municipalities accept applications and documents relating to the assessment, approval and monitoring of the implementation of energy efficiency measures for the buildings. The mayor of each municipality is responsible for the implementation of the overall process of renovation of residential buildings and for the selection of contractors for the implementation of the activities on the buildings in accordance with the procedure laid down in the Public Procurement Act (ZOP).

✓ *Territorial scope of the Programme*

All 265 municipalities in Bulgaria are eligible to participate in the Programme. Actions have been implemented in 143 municipalities.

The following are subject to mandatory energy efficiency audits:

1. all enterprises in the manufacturing sector other than small and medium-sized enterprises within the meaning of Article 3 of the Small and Medium-Sized Enterprises Act;
2. all enterprises in the services sector that are not small and medium-sized enterprises within the meaning of Article 3 of the Small and Medium-Sized Enterprises Act;
3. all industrial systems with annual energy consumption exceeding 3 000 MWh;
4. all outdoor artificial lighting systems located in settlements with population exceeding 20 000 inhabitants;
5. all operational public service buildings with a total gross floor area exceeding 250 m² and all operational buildings except those provided for in Article 38(1) of the ZEE.

✓ *Financial resources*

The Programme is implemented with financial resources of BGN 2 billion. The financial resources of the Programme may increase if additional funds are provided. The Programme is implemented with national financial resources of BGN 2 billion part of which are received as loans from the Bulgarian Development Bank (BBR) guaranteed by the state (a EUR 100 million loan from KfW and a EUR 150 million loan from the Council of Europe Development Bank). Currently, the BBR has disbursed the funds under these loans in full.

✓ *Eligibility criteria for buildings under the Programme*

All multi-family residential buildings built under the industrial engineering method: EPZhS (large-panel residential construction); PPP (package-lifted slabs); EPK (large-scale shuttering); climbing formwork and their versions, with at least 36 separate residential

properties, are eligible.

The following buildings are also eligible starting from 2016:

- multi-family residential buildings built under the industrial engineering method: EPZhS (large-panel residential construction); PPP (package-lifted slabs); EPK (large-scale shuttering); climbing formwork and their versions, on three and more floors, with between 6 (six) and 36 separate residential properties;
 - multi-family residential buildings (solid buildings), designed before
 - 26 April 1999, on three and more floors, with 6 (six) or more separate residential properties.
 - The buildings listed above are eligible for financing only in the cases where they fall outside the scope of the project proposals of municipalities under PA 1 and PA 2 of Operational Programme 'Regions in Growth' (OPRG) 2014–2020.
- ✓ *Financial assistance*

Buildings with approved applications will receive grants covering up to 100 % of the costs. Associations of owners which carry out economic activities are recipients of de minimis aid according to the de minimis aid scheme and pay the relevant part of costs.

- i. 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*
- ii. Description of policy and measures to promote energy services in the public sector and measures to remove regulatory and non-regulatory barriers that impede the uptake of energy performance contracting and other energy efficiency service models*

The provision of energy efficient services is regulated in the Energy Efficiency Act (ZEE). According to the ZEE, energy services aim to combine energy supply with an energy efficient technology and/or an action encompassing the operation, maintenance and management required for the delivery of the service and lead to energy efficiency improvement and/or saving of primary energy resources that can be verified, measured or estimated. Energy efficiency services are provided on the basis of written contracts concluded with final energy consumers. The ZEE also identifies the persons entitled to carry out energy efficiency services: natural or legal persons which are merchants within the meaning of the Commerce Act or within the meaning of the law of another Member State of the European Union or of another State which is a contracting party to the Agreement on the European Economic Area.

The execution of energy performance contracts plays an essential role in fostering the

market for energy efficient services. Under this type of contract, investments are recovered and the fees payable to the energy service companies (ESCOs) are paid from energy savings achieved. ESCOs provide a performance guarantee which also guarantees the energy savings to be achieved as a result of the project implementation.

Buildings owned by the state or municipalities and subject to energy performance contracting must comply with the special Regulation No RD-16-347 of 2 April 2009 on the terms and procedure for determining the amount and payment of planned funds under energy performance contracts leading to energy savings in buildings owned by the state and/or municipalities. The AUER participates in the examination and approval of funds for the execution of energy performance contracts in buildings owned by the state and/or municipalities, sends reasoned proposals to the Ministry of Finance for funding and payment of the funds and certifies that no certificate has been issued for the respective building as a result of activities completed under other programmes.

The AUER is the national administrator of the European Code of Conduct for EPC. The Code was developed under the 'Increasing transparency of energy service markets (Transparence)' project financed by the EC under the Intelligent Energy Europe programme. The Code combines values and principles that are necessary for the successful preparation and implementation of EPC projects in European countries and governs the principles of conduct of the EPC suppliers in particular. Documents related to the Code are available on the AUER website.

iii. Other planned policies, measures and programmes to achieve the indicative national energy efficiency contributions for 2030 as well as other objectives referred to in point 2.2 (for example measures to promote the exemplary role of public buildings and 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)

To achieve the national target of a 27 % share of renewable energy in gross final energy consumption by 2030, both existing and additional policies and measures will be implemented:

- **Promote the exemplary role of public buildings**

Pursuant to the provisions of Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency, public bodies at national, regional and local level should fulfil an exemplary role as regards energy efficiency. In this regard, the Republic of Bulgaria has set itself a more ambitious target for renovation of buildings owned and used by the central administration, setting out in Article 23(1) of the ZEE a legal requirement that measures shall be taken on an annual basis to improve

the energy performance of at least 5 % of the total gross floor area of all heated and cooled state-owned buildings used by the public administration. The reasons to impose a more ambitious target include both the need to reduce energy consumption in the buildings due to its long-term impact and the fact that the buildings owned by the public authorities serve as an incentive because they account for a large share of the building stock and have high visibility in public life.

- **Energy-efficient public procurement**

According to Article 30a of the ZEE, in the case of award of public procurement contracts public contracting entities must purchase only products, services and buildings with high energy efficiency indicators, including:

1. products that meet the criterion of belonging to the highest energy efficiency class;
2. office equipment that is included in and meets the requirements of Appendix C of the Agreement between the Government of the United States of America and the European Community on the coordination of energy-efficiency labelling programmes for office equipment (OJ L 63/7 of 6.3.2013);
3. tyres that meet the criterion of belonging to the highest fuel efficiency class, as stipulated 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 22.12.2009), hereinafter referred to as 'Regulation (EC) No 1222/2009';
4. buildings meeting the minimum requirements for energy performance, as attested by an energy performance certificate.

- **Energy audits and management systems**

The following are subject to mandatory energy efficiency audits:

1. all enterprises in the manufacturing sector other than small and medium-sized enterprises within the meaning of Article 3 of the Small and Medium-Sized Enterprises Act;
2. all enterprises in the services sector that are not small and medium-sized enterprises within the meaning of Article 3 of the Small and Medium-Sized Enterprises Act;
3. industrial systems with annual energy consumption in excess of 3 000 MWh;
4. all outdoor artificial lighting systems located in settlements with population exceeding 20 000 inhabitants.

Energy audits shall be performed at least once in every 4 years.

The enterprises and the owners of industrial systems which implement an energy management system or an environmental management system subject to certification by

an independent body for conformity with European or international standards are exempted from the requirements for mandatory energy efficiency audit, provided that the management system implemented thereby includes an energy audit of the enterprise or the industrial system concerned.

Within one month of acquiring the certificate, said enterprises and owners of industrial systems must notify the AUER that they apply an energy or environmental management system and provide evidence that the management system implemented meets the minimum energy audit requirements.

The owners of enterprises, industrial systems and systems for outdoor artificial lighting have obligations for energy efficiency management. Energy efficiency is managed by maintaining databases of the monthly energy generation and consumption by type of energy, carrying out annual analyses of energy consumption and implementation of other energy efficiency improvement measures. For the purposes of energy efficiency management, the obligated parties are required to prepare annual reports according to a standard form approved by the AUER and present said reports to the Agency not later than 1 March of the year following the reporting year.

In compliance with Directive 2010/31/EU, Bulgaria has put in place a system for energy efficiency audit and certification of buildings with a total gross floor area exceeding 250 m². The energy performance certificate of a building in use shall be updated when any of the following activities are performed and result in altering the energy performance of the building:

1. refurbishment;
2. reconstruction, major renovation or overhaul when more than 25 per cent of the building envelope are covered. The owners of buildings with a total gross floor area exceeding 250 m² must implement the measures for achieving the minimum required energy consumption class prescribed by the first audit within three years from the date of accepting the results of the audit.

State and municipal administrations that own public buildings in the tertiary sector are obliged to manage energy efficiency. The management is carried out by implementing programmes, activities and measures for energy efficiency improvement and carrying out annual energy consumption analyses. For the purposes of energy efficiency management, the owners of buildings, like the owners of industrial enterprises, shall prepare annual reports according to a standard form approved by the AUER and present said reports to the Agency not later than 1 March of the year following the reporting year.

The national law also provides for energy efficiency audits and performance optimisation of hot-water boilers and air conditioning systems in public buildings. Depending on the installed capacity and the type of energy used, heating systems with hot-water boilers

are subject to mandatory periodic energy efficiency audits once in:

1. every 6 years: for heating systems with hot-water boilers fired by natural gas with unit rated output from 20 kW to and including 100 kW;
2. every 4 years: for heating systems with hot-water boilers fired by liquid or solid fuel with unit rated output from 20 kW to and including 100 kW and fired by natural gas with a unit rated output of more than 100 kW;
3. every two years: for heating systems with hot-water boilers fired by liquid or solid fuel with unit rated output of more than 100 kW.

Air conditioning installations in buildings with rated electrical output exceeding 12 kW are subject to mandatory periodic energy efficiency audits once in every 4 years.

A completed energy efficiency audit or applying a certified energy management or environmental management system is one of the criteria to be met by the enterprises when applying for aid under Regulation No E-RD-04-06 of 28.09.2016 on reducing the burden related to renewable energy costs (the Regulation). Enterprises that apply for such aid are also required to manage their energy efficiency and submit to the Sustainable Energy Development Agency a report on their energy efficiency management activities. The Regulation was issued pursuant to Article 4(2)(21) of the Energy Act, in line with the Guidelines on State aid for environmental protection and energy. It lays down the terms and procedure for granting aid to enterprises in sectors exposed to risk as a result of the costs arising from funding the support for renewable energy in order to safeguard the competitiveness of such enterprises.

- **Metering and billing**

- **Electricity metering**

Pursuant to the provisions of the Energy Act, the electricity provided to end customers must be metered by means of commercial metering devices owned by the operator of the electricity transmission network or the operator of the respective electricity distribution network and located next to or on the boundary of the customer's property. The electricity customers shall not pay a fee for the commercial metering devices.

The electricity market structure and the conditions for participation in the electricity market are laid down in the Rules for Trade in Electricity issued by the Energy and Water Regulatory Commission.

- **Heat metering**

One of the main methods used to measure the heat used by households is 'heat accounting'. The system was introduced in Bulgaria in 1999 with the adoption of the ZE as one of the energy efficiency measures Bulgaria was required to implement as a condition for its accession to the EU. Heating cost share allocation devices (heat allocation devices, water meters and apartment heat meters) allow the total space- and water-heating energy to be allocated among individual properties. Heat allocation in

buildings with residents' associations is based on the methodology set out in an annex to Regulation No 16-334 on heat supply. Substations in Bulgaria are equipped with heat metering devices from which readings are taken on a monthly basis. On the basis of the readings, the energy used for heating is allocated among the customers according to the energy consumption of each property for the previous heating season. The heat distribution utility bills consumers on a monthly basis and issues invoices indicating these data. After the readings are taken from the meters at the end of the heating season, the heat accountant draws up a balancing invoice. Calculations are made on the basis of the actual consumption by each property.

Following the implementation of this measure, individual heat distribution devices and appliances that allow heat supply to be regulated were installed on practically all heating fixtures.

In regard to the fact that common heating systems and household hot water systems exist in most of the buildings, the legal framework provides for both transparency and accuracy of accounting for individual consumption and transparent rules on the allocation of the costs for consumption of heat energy and hot water in multi-functional buildings supplied from a district heating source.

The building supply systems of customers are connected to the heat transmission network by means of a connecting heating pipeline and a subscriber substation. Where a new building is connected, a competitively priced individual heat meter is installed in each separate property in the building. Where an existing building is connected after major renovation and remodelling of the building heat-supply systems from vertical to horizontal distribution, a competitively priced individual heat meter is installed in each separate property in the building.

Natural gas metering

The natural gas transmitted via a gas distribution network is measured in the gas metering points owned by the gas distribution company. These points are located along the gas distribution network in line with the regulatory requirements for network design, construction and operation.

The natural gas transmitted via a gas distribution network is metered by gas meters owned by the gas distribution company and installed before the gas pipeline reaches the customer's premises. The operator of the network is responsible for servicing the commercial measuring devices along the gas transmission and gas distribution networks in accordance with the legal framework for commercial measuring: Measurements Act and Rules for trade in natural gas.

Billing

The methods and requirements for billing end users are stipulated in the ZE. The energy companies must provide to their users of energy services information about:

1. the payment, the prices of stopping or resuming supply, the prices of services for carrying out maintenance and the prices of other services related to the licensed activity;
2. the procedure for change of supplier and information that users of energy services do not owe additional payments when changing their supplier;
3. the actually consumed quantities and expenses incurred without obligation for additional payment for this service;
4. the preparation of a final balancing bill each time when the supplier is changed;
5. the share of each energy source in the total energy supplied during the previous calendar year in an understandable and clearly comparable manner;
6. the existing sources of publicly accessible information about the environmental impact in relation at least to emissions of carbon dioxide and radioactive wastes resulting from production of electricity from various energy sources in the total energy supplied by the provider during the previous year;
7. the dispute settlement mechanisms available.

The information must be presented in the invoices or in information materials accompanying them and on the websites of the energy companies. In accordance with this procedure, the suppliers of energy and natural gas shall also provide to the users of energy services a checklist adopted by the EC, containing practical information about their rights.

The ZE also requires from the end supplier to inform the customer, together with the invoice for the last month of each 6-month period, when the metered consumption of electricity or natural gas of the end customer for this 6-month period exceeds by over 50 per cent the consumption metered for the respective 6-month period of the previous calendar year.

In addition, many energy suppliers provide on their websites detailed information on the content of invoices they issue to end users. Some launch additional initiatives such as e-mailing or mailing their clients explanations about the content of energy consumption invoices.

- **Consumer information and training programmes**

The measure aims to raise consumer awareness on electricity and heat energy and natural gas used and on the benefits of implementing energy efficiency measures. Energy traders publish on their websites energy saving tips and maintain online archives of e-invoices. The companies have consultants on energy efficiency to help customers reduce their energy consumption without expensive investments and complex repairs.

In addition to being applied by energy traders across the country as part of their awareness campaigns and initiatives, the measure is supported by regional and local governments countrywide. Different initiatives to raise consumer awareness are included

in the energy efficiency enhancement programmes of regional and local authorities drawn up in fulfilment of the obligations referred to in Article 12 of the ZEE. The initiatives envisage the establishment of consumer councils, organising a consumer day and many campaigns in regional and municipal centres where customers can learn how to save energy.

Information campaigns and implementation of behavioural measures are listed as eligible measures in Regulation No E-RD-04-3 of 4 May 2016 on the eligible energy saving measures at FEC level, the methods to prove achieved energy savings and the requirements to the methodologies and methods to assess and verify the savings.

To support the implementation of the measure, specialised methodologies were developed for assessing energy savings after the application of different behavioural measures pursuant to Regulation No E-RD-04-3 of 4 May 2016. The methodologies are developed according to a standard form approved in the Regulation and are subject to discussion by expert groups set up by AUER in line with the same Regulation.

- **Availability of qualification, accreditation and certification schemes**

The conditions and procedure for acquisition and recognition of qualifications for energy efficiency audits of buildings and industrial systems and certification of buildings are laid down in the ZEE. Energy efficiency audits, certification of buildings, conformity assessments of investment projects and energy saving assessments are carried out by persons registered in public registers maintained by the AUER. The ZEE sets out the requirements to be met by the persons concerned and detailed requirements are set out in Regulation No RD-16-301 of 10 March 2014 on the information subject to registration in the registers of persons performing audits and certification of buildings and energy efficiency audits of industrial systems, the procedure for obtaining information from the registers, the terms and procedure for acquiring qualification and the technical devices required for the performance of audit and certification activities.

The persons registered in the public register of AUER hold a certificate of successfully passed examinations for upgrading their qualifications to perform audits and certification of buildings and energy efficiency audits of industrial systems.

- Mandatory phasing out of solid-fuel heating devices that do not meet the requirements of Ecodesign Regulations (EU) 2015/1185 and (EU) 2015/1189 and replacing said devices with other heating devices

The draft National Programme for Improving the Ambient Air Quality 2018–2020 includes a measure relating to household heating: mandatory phasing out from 2020 to 2024 of solid-fuel stoves and boilers that do not meet the requirements of the Ecodesign Regulations and implementation of alternative heating measures to contribute with 78 % to the expected reduction in particulate matter PM10 emissions in the household heating sector. The final objective of the measure is the phasing out of inefficient solid-fuel

heating devices.

iv. Where applicable, a description of policies and measures to promote the role of local renewable energy communities in contributing to the implementation of policies and measures in points i, ii, iii and iv

Currently not applicable

v. Description of measures to develop measures to utilise energy efficiency potentials of gas and electricity infrastructure

To ensure efficient use of energy in production, transmission and distribution, the Energy Act lays down requirements to be taken into account by the Energy and Water Regulatory Commission when setting the prices of electricity, heat and natural gas. In the course of exercising its powers under this Act, the KEVR:

- determines maximum amounts of technology costs in the generation, transmission and distribution of electricity, the generation and transmission of heat and the transmission, distribution and storage of natural gas which can be recognised in pricing regulation in accordance with a methodology or instructions adopted by the Commission;
- requires from electricity and gas network operators to make an assessment of the energy efficiency potentials of the networks concerned through reduction of technical losses; said assessment shall include an analysis of transmission, distribution, load management, network functioning and access possibilities for distributed energy production;
- requires from network operators to include measures and to plan relevant investments for energy efficiency improvement of gas and electricity networks when developing network development plans and provide a timeframe for their implementation.

The KEVR has also powers to assess the cost-effectiveness of the implementation of intelligent metering systems proposed by the operators of the networks. Where the implementation is cost-effective, the KEVR draws up schedules for the implementation of intelligent metering systems and guarantees the interoperability of the said systems taking into account suitable standards, best practices and their significance for the development of the domestic market of electricity and natural gas.

In addition, according to the ZE the KEVR is guided by the following general principles in the exercise of its regulatory powers:

- ✓ promoting the improvement of energy efficiency in energy and natural gas production, transmission, distribution and final consumption; and
- ✓ providing incentives for transmission and distribution network operators to make

available to final customers system services permitting them to implement energy efficiency improvement measures by deploying smart networks, taking into account the costs and benefits of each measure, while ensuring the security of the system.

With regard to price regulation, the KEVR aims to ensure that (i) electricity transmission and distribution prices do not restrict energy efficiency improvement in energy production, transmission and distribution, (ii) demand response participates in balancing markets and ancillary services procurement, and (iii) network tariffs reflect cost savings in networks achieved by consumers, decentralisation of energy generation, reduction of cost of supply or for network investment and the more optimal operation of the networks.

As regards demand response, the KEVR is guided by the principle that electricity transmission and distribution prices should allow increased final customer participation in the efficiency improvement of the grid system through demand response. The KEVR also aims to encourage transmission and distribution network operators to make available system services for electricity demand response measures, demand management and distributed generation on organised electricity markets and to improve efficiency in network design and operation, in particular:

- shifting of the load from peak to off-peak times by final customers taking into account the availability of renewable energy, energy from cogeneration and distributed generation;
- energy savings from demand response of distributed generation sources through a combination of making available energy-efficient services and participation in the balancing market for electricity;
- demand reduction from energy efficiency measures undertaken by energy-efficient service providers;
- connection and dispatch of electricity generation sources at medium and low voltage levels;
- connection of electricity generation sources from closer location to the point of consumption;
- providing access to the networks for energy storage facilities.

Another objective is to introduce dynamic pricing for demand response measures by final customers by means of:

- time-of-use prices;
- critical peak pricing;
- real time pricing;
- peak time rebates for lower consumption.

Measures of gas distribution companies

The energy efficiency measures applied by gas distribution companies are:

1. Measures relating to control and diagnostics of the technical condition of networks:
 - ✓ grouping of gas pipelines by age since commissioning and introducing a shorter control period for patrolling and searching for natural gas leakages in the older sections;
 - ✓ grouping of gas pipelines by frequency of bursting and leakage; analysing the balance of entry-exit from the gas distribution network.
2. Locating natural gas leakage.
3. Measures for preventing damages caused by third parties: analysis and prevention of third party actions that break the integrity of the network and result in natural gas leakage: restricting the access to and guarding the facilities.
4. Measures during construction and filling of gas distribution networks: using certified materials and contractors.
5. Operational measures:
 - ✓ pressure control;
 - ✓ odourisation of natural gas;
 - ✓ patrolling of the gas distribution network at regular intervals;
 - ✓ building a system for remote observation of the values of electrochemical safeguards of metal gas pipelines;
 - ✓ new subscribers will be connected by wedge under pressure in order to reduce technical losses;
 - ✓ introducing intelligent metering systems in gas distribution networks.

Measures of electricity distribution companies

As regards measures for reducing technical losses in electricity transmission and distribution via the electricity distribution network, the network operators carry out the following activities:

1. Reducing technical losses in electricity transmission and distribution by means of:
 - ✓ increasing the cross-section of medium- and low-voltage conductors in cable and overhead networks;
 - ✓ building new transformer units to reduce the length of outlets of low voltage networks and/or redistribute power loads;
 - ✓ replacing installed power transformers by new ones, with lower losses of energy in no-load condition and short circuiting;
 - ✓ thermal imaging audit of transformers, medium and low voltage units to

detect problem areas with rising temperature.

2. Increasing the reliability of measuring the quantity of electricity that is received in or leaves the electricity distribution grid and limiting the option for its unauthorised use through:
 - ✓ replacement of commercial metering devices;
 - ✓ securing and re-locating commercial metering devices on the boundary of ownership;
 - ✓ building SMART GRID networks.

Measures of district heating companies

The potential for energy efficiency of the central heating and cooling infrastructure can be achieved by rehabilitation of heat transmission networks and replacing the obsolete direct subscriber district heating stations with modern highly efficient automated indirect stations which would reduce heat transmission and distribution losses and would result in reduction of GHG emissions. The best practices associated with the use of pre-insulated pipes in district heating systems help reduce losses to 3 %. A similar loss level can be achieved for high power density systems. In the context of the national conditions in the Republic of Bulgaria, it is assumed that the average power density of district heating systems will make it possible to reduce heat losses to 10 % by using the best available technology.

In order to reduce losses to 10 % (against current average losses of 23.7 %), district heating networks need to be modernised so as 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 related to the amount of transmission losses, it can be assumed that the requirement to reduce losses per one kilometre of network to 1.17 TJ/km should apply to all district heating systems in the country. The potential of district heating systems based on energy efficiency improvement is estimated at 1.6 TJ, or 30.3 % of the heat which is currently lost in the transmission of the heat exchange medium.

vi. Regional cooperation in this area, where applicable

Not applicable

vii. Financing measures, including Union support and the use of Union funds at national level

Financial mechanisms used to encourage energy efficiency improvement measures:

- Energy Efficiency and Renewable Sources Fund
- Operational Programme 'Innovation and Competitiveness' 2014—2020;
- Operational Programme 'Regions in Growth' 2014—2020;
- National Programme for Energy Efficiency of Multi-Family Residential Buildings;

- National Trust Ecofund – Investment Climate Programme;
- Rural Development Programme 2014–2020;
- Residential Energy Efficiency Credit Line Programme;
- Operational Programme 'Transport and Transport Infrastructure' 2014–2020;
- European Economic Area Financial Mechanism 2014–2021.

3.3. Dimension energy security

i. Policies and measures related to the elements set out in point 2.3

The energy security policies and measures in the country can be grouped in the following priority axes: efficient use of indigenous energy resources, increased interconnectivity and enhancing the flexibility of the national energy system.

Bulgaria will make maximum use of the existing potential of indigenous coal in the country in compliance with environmental requirements. The coal would provide feedstocks for electricity generation over the next 60 years.

The use of indigenous coal reserves has the potential of a stabilising source of energy. The power plants using indigenous coal account for about 48 % of total electricity generation and guarantee Bulgaria's energy security and the competitiveness of the Bulgarian economy. These power plants are baseload electricity generating facilities for the Bulgarian electricity system and the main supplier of balancing services in the system. Therefore they are a key factor for the country's electricity security. This determines the role of indigenous coal as a strategic energy resource for the country's energy and national security.

Kozloduy Nuclear Power Plant, being a baseload plant, plays a prominent role in maintaining the sustainability of reserves in the electricity system. It ensures about 33 % of the electricity generation in the country and guarantees Bulgaria's energy security. The Energy Strategy of the Republic of Bulgaria until 2020, adopted by the National Assembly on 1.06.2011, provides for extending the lifetime of units 5 and 6 of Kozloduy Nuclear Power Plant. The following actions were undertaken in this respect:

1. The project for extension of the lifetime of unit 5 was implemented in two stages between 2015 and 2016. As soon as the full scope of activities for the extension of the lifetime of the reactor was completed and performance audits were conducted, it was found that no restrictions existed for the safe operation of unit 5 in the period of long-term operation until 2047 (30 years). In compliance with the requirements of Articles 8 and 3 of the Regulation on the procedure for issuing licences and permits for safe use of nuclear energy, on 6.11.2017 the Nuclear Regulation Agency (NRA) issued a licence for the extension of the lifetime of unit 5 of Kozloduy Nuclear Power Plant for a period of 10 years (the maximum operational life according to the Bulgarian legislation).

2. To extend the lifetime of unit 6, 208 activities and measures under the programme for extension of the reactor's lifetime for a long-term 30-year operation were implemented by the end of 2018. In accordance with the requirements laid down in the Regulation on the procedure for issuing licences and permits for safe use of nuclear energy, on 8.09.2018 Kozloduy Nuclear Power Plant submitted to the NRA an application for the operation of unit 6 for a period of 10 years (the maximum legally prescribed period).

There is a potential for building a new 2 000 MW power facility which will contribute to the energy security of the country and the region.

To increase energy security, explorations are carried out for extraction of natural gas and oil in Han Asparuh Block and Han Kubrat Block located in the continental shelf and in the exclusive economic zone of the Republic of Bulgaria in the Black Sea.

Preparations were made for launching calls for proposals for the granting of a licence for prospecting and exploration of oil and natural gas in the area of Block 1-26 Tervel located in the continental shelf and in the exclusive economic zone of the Republic of Bulgaria in the Black Sea, and in the area of Block 6 Omurtag onshore.

To increase the flexibility of the energy system through energy demand response, Bulgaria plans, by taking legislative measures, to establish suitable conditions for creating active consumers, opportunities for associations through aggregators or energy communities and their active participation in demand response in different market segments.

During the period in question, Bulgaria envisages to introduce interim measures to enable the implementation of the following reforms:

- Introducing price limits on the balancing market in order to send correct price signals to investors. Maximum and minimum prices consistent with the day-ahead and intraday time intervals and in line with the Balancing Regulation.
- Creating appropriate conditions and increased participation of demand response, in individual or aggregated terms, both in the wholesale market and in the balancing market.
- Upgrade of the transmission network to alleviate internal overloads and increased interconnection capacity.

The main projects to increase the interconnection in the energy sector and expand the energy storage capacity are as follows:

1. In the electricity transmission infrastructure

1. Interconnection overhead power line between Bulgaria and Greece, including the following subprojects from the list of projects of common interest:

1.1. Interconnection overhead power line between Maritsa Iztok substation and Nea Santa substation

The subproject envisages the construction of a 400 kV interconnector with a length of 122 km on Bulgarian territory and a capacity of 1 500 MW between Maritsa Iztok and Nea Santa. The pre-project activities are partially financed by the Connecting Europe Facility.

1.2. Internal overhead power line between Maritsa Iztok substation and Plovdiv substation

The subproject envisages the construction of a new 400 kV power line with a length of 94 km and a capacity of 1 500 MW.

1.3. Internal overhead power line between Maritsa Iztok substation and the Open Power Distribution Device (ORU) of Maritsa Iztok 3 Thermal Power Plant

The subproject envisages the construction of a new 400 kV power line with a length of 13 km and a capacity of 1 500 MW capacity between Maritsa Iztok and Maritsa Iztok 3.

1.4. Internal overhead power line between Maritsa Iztok substation and Burgas substation

The subproject envisages the construction of a new 400 kV power line with a length of 150 km and a capacity of 1 500 MW between Maritsa Iztok and Burgas.

2. Electricity interconnector between Bulgaria and Romania, including construction of a new 400 kV power line between Dobrudzha substation and Burgas substation

The objective of the project of common interest is the construction of a new 400 kV power line with a length of 110 km and a capacity of 1 500 MW to connect Dobrudzha and Burgas.

3. 'Construction of a new dual 400 kV interconnector between the Republic of Bulgaria and the Republic of Serbia'

The project is included as a new investment in the latest ten-year Network Development Plan in Europe prepared by ENTSO-E in 2016. The assessment of the need for constructing a second interconnector between the Republic of Bulgaria and the Republic of Serbia was carried out in the context of the market surveys conducted by the ENTSO-E regional group. The project will increase the interconnection capacity on the border between Bulgaria and Serbia and will accelerate trade flows between the western borders of Bulgaria and Romania and the Western Balkan region.

3. Bulgaria-Yadenitsa hydro-pumped storage project

Yadenitsa hydro power plant is key for the balancing of the system.

The project is in the list of projects of common interest.

2. Key gas transmission infrastructure projects

- Gas interconnector Bulgaria—Greece (IGB)

The gas interconnector between Greece and Bulgaria (IGB) is of geostrategic importance for the diversification of supplies for Bulgaria, Macedonia and the region of South-Eastern and Central Europe. As part of the development of the South Gas Corridor, through the IGB Bulgaria and the neighbouring countries will get access to alternative supplies from the Caspian region and from existing or future LNG terminals. The IGB is of strategic importance for the implementation of the Vertical Gas Corridor. It will contribute to the development of the Balkan Gas Hub concept, its implementation will also create opportunities for transit transmission via the gas transmission system of Bulgartransgaz EAD to the other interconnections in Romania and Serbia. The project allows connectivity and creates synergies with other important future projects in the region: the LNG terminal at Alexandroupolis, Greece; EastMed for direct connection of resources from the Eastern Mediterranean with Greece through Cyprus and Crete and liquefied gas from Israel and Egypt.

The interconnector between Bulgaria and Greece (IGB) is included in the list of projects of common interest for the European Union.

- Construction of a gas interconnector between Bulgaria and Serbia (IBS)
The gas interconnector between Bulgaria and Serbia (IBS) is planned as a reversible connection to connect the national gas transmission networks of Bulgaria and Serbia. The gas interconnector will allow a two-way gas transmission of 1 to 1.8 billion cubic metres a year from Bulgaria to Serbia and 0.15 billion cubic metres a year from Serbia to Bulgaria. The interconnector is included in the list of projects of common European interest.

- Alexandroupolis liquefied natural gas (LNG) terminal project. The project announced by the Greek company Gastrade S.A. for the construction of a new LNG terminal in the Aegean Sea on Alexandroupolis is in strategic proximity to the gas transmission network of DESFA S.A. and is ranked by the European Commission as a project of common interest. The natural gas quantities will make it possible to balance the needs of the local market and the needs of the Bulgarian, Romanian, Macedonian, Serbian and Hungarian markets. The project will ensure diversification of gas supplies to Bulgaria. A contract has already been concluded with Azerbaijan for 1 billion cubic metres of gas per year but after the construction of the interconnector between Bulgaria and Greece we will also be able to supply liquefied gas from the USA, Algeria or Qatar.

- Project Eastring

Eastring-Bulgaria is a subproject of the cluster project Eastring included in the ENTSOG's ten-year network development plan and is ranked by the European Commission as a project of common interest.

- Gas interconnector Turkey—Bulgaria (ITB)

The project involves an interconnection between the gas transmission networks of

Bulgartransgaz EAD (Bulgaria) and Botas (Turkey) to ensure diversification of natural gas sources, supply partners and routes and thus increase the security of supply and the development of competition in the region. The ITB will contribute to the implementation of the priority Southern Gas Corridor that envisages infrastructure for transmission of gas from the Caspian Basin, Central Asia, the Middle East and the Eastern Mediterranean Basin to the Union in order to enhance the diversification of gas supply.

- **Balkan Gas Distribution Hub**

Bulgaria has developed, jointly with the European Commission, a concept for establishing the Balkan Gas Distribution Hub on the country's territory. The European Commission included the project in the list of projects of common interest. By building the necessary gas transmission infrastructure, the gas hub aims to connect the natural gas markets of Member States in the region — Bulgaria, Greece, Romania, Hungary, Croatia, Slovenia and through them — the Member States in Central and Western Europe and the contracting parties to the Energy Community like Serbia, Ukraine, Macedonia, Bosnia and Herzegovina and thus to contribute to the achievement of the main priorities of the European energy policy.

- **Expanding the capacity of Chiren Underground Gas Storage (UGS)**

The aim of the project of common interest is to achieve higher volumes of gas storage, higher pressures in the gas reservoir and higher average 24-hour gas extraction and compression capacity. Enhanced technical parameters will allow the storage facility to be used not only for the needs of the Bulgarian market, as is currently the case, but also to meet the peak consumption of the countries in the region.

- **Gas interconnector Bulgaria—Romania**

The project 'Gas interconnector between Bulgaria and Romania' (IBR) was implemented jointly by Bulgartransgaz EAD and Transgaz S.A. according to the Memorandum of Understanding signed on 1.06.2009.

- **A gas pipeline for increasing the interconnection capacity of the Northern Ring of the Bulgarian and Romanian gas transmission networks (BRUA)**

The project for coordinated development of the gas transmission networks of Bulgaria, Romania and Hungary (the Bulgaria—Romania—Hungary—Austria— BRUA transmission corridor) is included in the ten-year network development plan of Bulgartransgaz EAD for the period 2018—2027. BRUA will ensure bi-directional transmission between the countries of natural gas from sources in the Southern Gas Corridor and from the Black Sea and transmission of Central European gas to South-Eastern Europe. Its capacity will be 1.75 billion m³ p.a. in the first stage and 4.4 billion m³ p.a. in the second stage; an option is envisaged for a further expansion of the project in the third stage if its economic viability is demonstrated.

ii. Regional cooperation in this area

As a Member State of the European Union, Bulgaria is pursuing in the energy area a policy that is consistent with the primary objectives of the energy policy of the European Union for security, competitiveness and sustainable development. The proper structuring of the internal energy market and the development of the energy infrastructure and trans-European networks are essential for achieving energy stability in the region and security of natural gas and electricity supply in the country. Our efforts are focused on limiting external dependence on imported energy resources, tackling adverse climate changes, encouraging economic growth and employment and thus providing a secure and affordable energy to consumers.

One of Bulgaria's top priorities is to guarantee the energy security of the country, including through diversification of sources, routes and natural gas suppliers. Bulgaria has invested efforts in building gas interconnectors with neighbouring countries such as Greece, Serbia, Romania, Turkey and electricity interconnectors with Greece and Serbia. At the same time, serious efforts are focused on modernisation and expansion of the existing gas transmission network in the country, expansion of the gas storage facility in Chiren, indigenous natural gas exploration and prospecting in the Black Sea in Han Kubrat (former name Silistar) and Han Asparuh blocks which are an integral part of the implementation of the Balkan Gas Distribution Hub project on the country's territory. New internal power lines are being built and will be connected to the interconnectors.

The energy sector is one of the key areas in the bilateral relations between Bulgaria and neighbouring countries. The countries have traditionally maintained good relations both bilaterally and within the EU and various international initiatives such as the South-East Europe Cooperation Process (SEEC), the Stability Pact and its successor, the Regional Cooperation Council, the Central and South-Eastern Europe Gas Connectivity (CESEC), the Three Seas Initiative, etc. The existence of a common regulatory framework — the Union energy legislation — is essential for the long-term and mutually beneficial development of energy relations among the countries in the region.

The joint work within the Central Eastern and South-Eastern Europe Gas Connectivity (CESEC) initiative will focus not only on building new gas pipelines, but also on making the best use of the existing infrastructure, for example by creating possibilities for reverse flows. Many infrastructure facilities and projects in the region, such as the Trans Adriatic Pipeline (TAP), the strengthening of the systems in Bulgaria and Romania, the gas interconnectors between Greece and Bulgaria and between Bulgaria and Serbia are identified as key priorities in the action plan approved by the group. They will help diversify sources of supply; ultimately, each Member State in the region should have access to at least three different sources of gas.

As a Member State of the EU, our country is working actively on establishing a

sustainable Energy Union and increasing the potential for regional cooperation by promoting the construction of missing infrastructure in order to ensure the security of energy supply in the region of South-Eastern Europe and throughout the Union.

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

To finance key projects in the area of electricity transmission infrastructure, Bulgaria plans to use funds from the Connecting Europe Facility, the new facilities for financing low-carbon innovations and energy sector modernisation within phase 4 of the EU Emissions Trading Scheme and other programmes with European and national financing. Key projects in the gas distribution infrastructure are partially financed through: the European Energy Programme for Recovery, Operational Programme 'Innovations and Competitiveness' 2014–2020 (OPIC), Operational Programme 'Development of the Competitiveness of the Bulgarian Economy' and the Connecting Europe Facility programme.

3.4. Dimension Internal energy market⁵

3.4.1. Electricity infrastructure

i. Policies and measures to achieve the targeted level of interconnectivity as set out in point (d) of Article 4

According to the ten-year plan of ENTSO-e, the interconnection of the electricity system of Bulgaria will reach 22 % after the implementation of the projects of common interest for the construction of new 400 kV power lines (PLs):

- ✓ 400 kV PL from Maritsa Iztok substation (BG) to Nea Santa substation (GR);
- ✓ 400 kV PL from Plovdiv substation to Maritsa Iztok substation;
- ✓ 400 kV PL from Maritsa Iztok substation to Maritsa Iztok 3 Thermal Power Plant;
- ✓ 400 kV PL from Maritsa Iztok substation to Burgas substation;
- ✓ 400 kV PL from Burgas substation to Varna substation;
- ✓ 400 kV PL from Sofia zapad substation (BG) to Nish substation (RS) (2).

ii. Regional cooperation in this area

Bulgaria fully recognises the role of the projects of common interest pursuant to Regulation No 347/2013 concerning the trans-European energy infrastructure for the completion of the EU's Internal Energy Market and achieving the targets of the EU energy

⁵Policies and measures shall reflect the energy efficiency first principle

policy in order to ensure the security of electricity supplies for the country and the region of South-Eastern Europe.

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

Financing key projects for modernisation and expansion of the electricity transmission network in Bulgaria:

To finance key projects in the area of electricity transmission infrastructure, Bulgaria plans to use funds from the Connecting Europe Facility, the new facilities for financing low-carbon innovations and energy sector modernisation within phase 4 of the EU Emissions Trading Scheme and other programmes with European and national financing.

3.4.2. Electricity and gas transmission 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 transmission network is part of the integrated transmission network of the countries in continental Europe and its development is closely related to the development of the networks neighbouring countries.

In the context of the European objectives for establishing an interconnected and single European gas market, the development of Bulgaria's infrastructure is directly linked to the country's positioning as one of the gas distribution hubs in Eastern Europe and is in line with the projects for development of the Southern Gas Corridor and with the plans for development of the gas infrastructure in the region and in Europe. The strategic objectives for improved security of supply and diversification of the sources of natural gas supply have an important role in the European energy policy.

To achieve these objectives, a number of measures are envisaged for effective implementation of the following projects:

1. Key electricity transmission infrastructure projects

1. Interconnection overhead power line between Bulgaria and Greece, including the following subprojects from the list of projects of common interest:

1.1. Interconnection overhead power line between Maritsa Iztok substation and Nea Santa substation

The subproject envisages the construction of a 400 kV interconnector with a length of 122 km on Bulgarian territory and a capacity of 1 500 MW between Maritsa Iztok and

Nea Santa. The pre-project activities are partially financed by the Connecting Europe Facility.

On 30.03.2017 the Ministry of Environment and Water approved the EIA with respect to the project. A final Detailed Spatial Plan (PUP) was also approved, and the technical board of ESO EAD approved and adopted the Detailed and Technical designs. The documentation for the selection of a contractor for the construction of the interconnector on Bulgarian territory was drafted.

1.2. Internal overhead power line between Maritsa Iztok substation and Plovdiv substation

The subproject envisages the construction of a new 400 kV power line with a length of 94 km and a capacity of 1 500 MW. In 2017, the Ministry of Regional Development and Public Works approved a final PUP. ESO EAD approved and adopted the finalised detailed design.

1.3. Internal overhead power line between Maritsa Iztok substation and the Open Power Distribution Device (ORU) of Maritsa Iztok 3 Thermal Power Plant

The subproject envisages the construction of a new 400 kV power line with a length of 13 km and a capacity of 1 500 MW capacity between Maritsa Iztok and Maritsa Iztok 3. In 2017, the Ministry of Regional Development and Public Works approved a final PUP. ESO EAD approved and adopted the finalised detailed design. The documentation for the selection of a contractor for the construction works was drafted.

1.4. Internal overhead power line between Maritsa Iztok substation and Burgas substation

The subproject envisages the construction of a new 400 kV power line with a length of 150 km and a capacity of 1 500 MW between Maritsa Iztok and Burgas. Pre-investment activities were partially co-financed by the EU under an agreement funded by the Connecting Europe Facility and with funds from the Kozloduy International Fund. All pre-investment activities were completed, including a draft PUP, a technical design, an EIA, a final PUP and a detailed design. A contract for consultancy services in accordance with Article 166 of the Spatial Development Act (ZUT) for execution of construction works on the site was signed with the selected contractor. Procedures are being held for contractors of the works by lots.

2. Electricity interconnector between Bulgaria and Romania, including construction of a new 400 kV power line between Dobrudzha substation and Burgas substation. The objective of the project of common interest is the construction of a new 400 kV power line with a length of 110 km and a capacity of 1 500 MW capacity to connect Dobrudzha and Burgas.

Pre-investment activities were partially co-financed with funds from the Connecting Europe Facility. All pre-investment activities were completed: a draft PUP, a technical

design, an EIA, a final PUP and a detailed design. The final report on the implementation of the activities was approved by the Innovation and Networks Executive Agency created by the Commission and the project organiser ESO EAD received a final payment under the agreement with the CEF.

On 30 April 2018 the documentation for conducting a procedure for award of the works contract for the pipeline was approved. The procurement procedures for the selection of the contractor are underway.

A groundbreaking ceremony for the facilities in Burgas substation connecting the 400 kV overhead power line between Dobrudzha and Burgas was held on 22.11.2018. ESO EAD delivered protocol No 2 for the commencement of construction.

3. 'Construction of a new dual 400 kV interconnector between the Republic of Bulgaria and the Republic of Serbia'

The project is included as a new investment in the latest ten-year Network Development Plan in Europe prepared by ENTSO-E in 2016. The assessment of the need for constructing a second interconnector between the Republic of Bulgaria and the Republic of Serbia was carried out in the context of the market surveys conducted by the ENTSO-E regional group. Network and market simulations revealed the need to increase the interconnection capacities along the East-West axis in South-Eastern Europe, between Romania and Bulgaria on the one hand and the countries of the Western Balkans on the other hand. The project will increase the interconnection capacity on the border between Bulgaria and Serbia and will accelerate trade flows between the western borders of Bulgaria and Romania and the Western Balkan region. The new 400 kV electricity interconnector is envisaged to be about 85 km long and to connect Sofia-Zapad substation in Bulgaria and Nish substation in Serbia. The investment proposal is in an initial stage and the future assessments of its implementation will cover the necessary modernisation of the internal network in the Republic of Serbia.

3. Bulgaria-Yadenitsa hydro-pumped storage project

Yadenitsa hydro power plant is key for the balancing of the system. The project is in the list of PCIs. Pre-investment activities were partially co-financed with funds from the Connecting Europe Facility granted under an agreement.

The final technical and financial report will be presented in January 2019. The following activities were completed: an effective EIA decision; an updated working design which is undergoing coordination procedures; completed financial analysis and risk assessment. The Minister for Regional Development and Public Works approved the final draft of the PUP on 21.12.2018.

2. Key gas transmission infrastructure projects

- Gas interconnector Bulgaria—Greece (IGB)

The gas interconnector between Greece and Bulgaria (IGB) is of geostrategic importance for the diversification of supplies for Bulgaria, Macedonia and the region of South-Eastern and Central Europe. The projected capacity of the gas interconnector is from 3 to 5 billion m³ p.a. and Bulgaria has negotiated the supply of 1 billion m³ p.a. under this project from Shah Deniz 2, Azerbaijan, effective 2020. As part of the development of the South Gas Corridor, through the IGB Bulgaria and the neighbouring countries will get access to alternative supplies from the Caspian region and from existing or future LNG terminals. The IGB is of strategic importance for the implementation of the Vertical Gas Corridor. It will contribute to the development of the Balkan Gas Hub concept, its implementation will also create opportunities for transit transmission via the gas transmission system of Bulgartransgaz EAD to the other interconnections in Romania and Serbia. The project allows connectivity and creates synergies with other important future projects in the region: the LNG terminal at Alexandroupolis, Greece; EastMed for direct connection of resources from the Eastern Mediterranean with Greece through Cyprus and Crete and liquefied gas from Israel and Egypt.

The interconnector between Bulgaria and Greece (IGB) is included in the list of projects of common interest for the European Union.

Over the recent three years, with the strong support of the Bulgarian and the Greek parties, the IGB project achieved enormous progress. On 10 December 2015, the shareholders took a final and irreversible investment decision for the project implementation. At the end of 2017, the second binding stage of the IGB market test ended successfully for a booked capacity of 1.57 billion m³ p.a. and ICGB signed the preliminary agreements.

In September 2017, a permit for building the IGB on the Bulgarian territory was granted. The decision of the regulators on the clearance procedure was made at the end of May 2018 and on 25.07.2018 the Commission issued its formal decision. As a result of the EC decision received on 8.08.2018, the regulators of Greece and Bulgaria took a joint formal decision for the clearance of the IGB project.

Upon receipt of the Clearance decision, the project company began drafting a Tariff and Network Code for the gas pipeline. According to the requirements laid down by the regulators in the clearance decision, the network code must be submitted 12 months before the launch of commercial operation or about July 2019. The aim of the project company is to complete the process by the end of the first quarter of 2019.

At the end of 2018, all public procurement procedures were launched: for the award of design, supply and works; for the selection of the contractor for the supply of linear pipes, for the selection of the engineering consultant; for the selection of the construction supervision consultant for the Bulgarian section of the gas pipeline and for the archaeological surveys along the gas pipeline route.

Key agreements relating to the project development were signed at the CESEC summit held on 29 June 2018: a Cooperation Agreement between IGB and TAP (Trans Adriatic Pipeline) to prepare the terms and content of the interconnector agreement; a Memorandum of Understanding between Bulgarian Energy Holding and the European Investment Bank to ensure preferential loan financing in relation to the use of the state guarantee of Bulgaria; a Joint Declaration of the shareholders in the project company confirming their commitment to develop and approve a final business plan and the irreversible commitment of the shareholders to be prepared to start construction; a Cooperation Agreement for interconnection between ICGB and DESFA.

Financing:

- A grant of EUR 45 million was approved by the European Energy Programme for Recovery.
- Long-term loan financing in the amount of EUR 110 million (BGN 215 million) secured by the state guarantee provided for the project in the State Budget Act. The process of entering into a loan agreement for a state-guaranteed loan of up to EUR 110 million was launched and the agreement is expected to be signed in early December 2018.
- On 21.12.2018, the Managing Authority of OPIC and the project company ICGB AD signed an Administrative Contract for direct grant for the project 'Construction of gas interconnector between Bulgaria and Greece'. The grant amounts to EUR 39 million.
- Short-term loan financing is expected to be raised to ensure liquidity during construction.
- Equity of about EUR 50 million provided by the shareholders.
- A draft intergovernmental agreement between Bulgaria and Greece was drawn up. Its main focus is the establishment of the tax regime for the project.

The objective set for the shareholders in Bulgaria and Greece and for the EC is to complete the construction of the interconnector by the end of 2020.

- Construction of a gas interconnector between Bulgaria and Serbia (IBS)
The gas interconnector between Bulgaria and Serbia (IBS) is planned as a reversible connection to connect the national gas transmission networks of Bulgaria and Serbia. The interconnector has a total length of 170 km from the town of Novi Iskar in Bulgaria to the town of Nish in Serbia, including 62.2 km on Bulgarian territory, and the diameter of the pipe is DN 700 mm. The gas interconnector will allow a two-way gas transmission of 1 to 1.8 billion cubic metres a year from Bulgaria to Serbia and 0.15 billion cubic metres a year from Serbia to Bulgaria. The interconnector is included in the list of projects of common European interest.

The organiser for Phase I of the IBS project on Bulgarian territory is the Ministry of Energy (ME) and on Serbian territory the project is implemented by Serbia Gas pursuant to a Memorandum of Understanding signed on 14.12.2012, as updated on 19.01.2017.

Phase I of the project, conditionally called 'Design' and funded by OP 'Development of the Competitiveness of the Bulgarian Economy' 2007–2013, ended on 31.12.2015 with the implementation of the following activities:

- Detailed Spatial Plan – Land Plot Plan (PUP-PP) – Final design drafted, agreed and approved;
- an investment design – Technical Design certified by the Consultant in accordance with Article 166(1) of the ZUT, agreed by the Contracting Authority (ME) and submitted for coordination to all competent institutions;
- consulting activities carried out for the preparation for acquisition of real rights by tracking down owners (up-to-date register);
- valuations made by independent licensed valuers of land properties affected by the gas pipeline;
- terrain surveys, search for archaeological sites in the boundaries of the easement and carrying out most of the rescue archaeological excavations.

On 17 May 2018, at the Western Balkans Summit, the ministers for energy of Bulgaria and Serbia signed a Joint Statement on the implementation of the IBS project. Bulgaria declared in this statement its intention to designate, with the consent of the EC, the operator of the transmission system Bulgartransgaz EAD as the organiser of the project and the operator of the future gas interconnector on Bulgarian territory. In the statement, the two parties confirmed the deadline for commissioning the gas pipeline: May 2022.

In 2018, actions were taken to modify Operational Programme 'Innovations and Competitiveness' 2014–2020 in order to enable Bulgartransgaz EAD to apply for technical assistance in the amount of EUR 6 million for the completion of the preparatory activities necessary for the commencement of the construction of the interconnector between Bulgaria and Serbia. By Decision No C(2018)8712 of 11 December 2018, the European Commission formally approved the modifications in OPIC proposed by the Managing Authority and added Bulgartransgaz EAD as a new beneficiary of technical assistance for the preparatory activities required for the interconnector between Bulgaria and Serbia.

- Alexandroupolis liquefied natural gas (LNG) terminal project. The project announced by the Greek company Gastrade S.A. for the construction of a new LNG terminal in the Aegean Sea on Alexandroupolis is in strategic proximity to the gas transmission network of DESFA S.A. and is ranked by the European Commission as a project of common interest. In February 2017, one of the large international fleets

possessing tankers for transportation of liquefied natural gas, Gas Log Ltd., acquired 20 % of Gastrade S.A. DEPA S.A. which recently confirmed its participation and Bulgaria which is conducting negotiations through the Bulgarian Energy Holding EAD to join the project are interested in the construction of this LNG terminal. In August 2017, the company Wood Group entered into a contract with Gastrade S.A. for studies and preparation of a technical design for development of a floating facility for receiving, storage and regasification of liquefied natural gas (FSRU) in Alexandroupolis. The terminal has a rated annual capacity of 6.1 billion m³ and a storage capacity of 170 000 m³. These natural gas quantities will make it possible to balance the needs of the local market and the needs of the Bulgarian, Romanian, Macedonian, Serbian and Hungarian markets.

The project is considered in the context of the gas interconnector between Bulgaria and Greece which is under construction and of the Trans Adriatic Pipeline. Potential sources of supply include countries producing liquefied natural gas such as Algeria, Qatar, the USA, etc., and potentially Cyprus and Israel in the future, and the two Egyptian export terminals will be used.

A final investment decision for the implementation of the project was taken and the terminal is expected to be commissioned in early 2020.

Bulgaria will participate as a shareholder in the liquefied natural gas terminal to be built in Alexandroupolis. The decision was taken by the government. To this end, Bulgartransgaz EAD will become a minority shareholder in the international company. Bulgaria will thus ensure diversification of gas supplies to Bulgaria. A contract has already been concluded with Azerbaijan for 1 billion cubic metres of gas per year but after the construction of the interconnector between Bulgaria and Greece we will also be able to supply liquefied gas from the USA, Algeria or Qatar.

Bulgaria considers the Alexandroupolis terminal project as complementing the gas connection with Greece and the Trans Adriatic Pipeline (TAP), and the sources of supply are producers and suppliers of liquefied gas from the USA (Cheniere Energy), Cyprus, Israel, Qatar, Algeria and other.

The Bulgarian participation in the project for the construction of a liquefied natural gas terminal near Alexandroupolis is of key importance for the country and for the region of South-Eastern Europe. The synergy of this project with the construction of the interconnector between Greece and Bulgaria will contribute to the security and diversification of energy supply.

- Project Eastring

Eastring-Bulgaria is a subproject of the cluster project Eastring included in the ENTSOG's ten-year network development plan and is ranked by the European Commission as a project of common interest. For Bulgaria, this is an entirely new infrastructure, which is

planned to be built in two stages:

Stage 1: construction of a new gas pipeline with DN 1400, a length of about 257 km, from a new entry/exit point on the border between Bulgaria and Romania to a new entry/exit point on an external border of the EU on the territory of Bulgaria, including construction of new compressor facilities with a capacity of 88—90 MW.

Stage 2: additional construction of new compressor facilities. An option is provided for connecting to the network of Bulgartransgaz EAD.

The implementation of the 'Feasibility study for the Eastring project' started in September 2017 and a contract with the selected contractor was signed at the end of August the same year. After the end of the study, its results were officially presented to the stakeholders at the meeting held on 20.09.2018 in Bratislava, Slovakia. The study was aimed at designing a bi-directional gas interconnector along the main European gas corridor between Slovakia and the border of South-Eastern Europe (Black Sea or Turkey). The bi-directional gas interconnector with a diameter of 1 400 mm and an operating pressure of 100 bars will have a capacity of up to 20 bcm per year in the first stage, with a potential increase up to 40 bcm per year in the next stage. Capital expenses (CAPEX) for Phase I of the project are estimated at EUR 2.6 billion. If an investment decision is taken, the new gas pipeline may become operational in the beginning of 2025.

- Gas interconnector Turkey—Bulgaria (ITB)

The project involves an interconnection between the gas transmission networks of Bulgartransgaz EAD (Bulgaria) and Botas (Turkey) to ensure diversification of natural gas sources, supply partners and routes and thus increase the security of supply and the development of competition in the region. The ITB will contribute to the implementation of the priority Southern Gas Corridor that envisages infrastructure for transmission of gas from the Caspian Basin, Central Asia, the Middle East and the Eastern Mediterranean Basin to the Union in order to enhance the diversification of gas supply.

The feasibility study of the ITB was completed in August 2016. The most appropriate route option was selected, with technological sites, technological scheme and basic equipment for the ITB.

The results of the feasibility study were duly notified to the Turkish party and an invitation for a meeting in Sofia to discuss the technical parameters was extended. The technical meeting concerning the project with Botas was held on 27.09.2017 in Sofia. As a result of the meeting, in a letter dated 6.10.2017 to Bulgartransgaz EAD Botas expressed its willingness for the further development of the project.

In November 2017, the European Commission published the Third List of projects of common interest but the ITB project was not included in it.

- Balkan Gas Distribution Hub

Bulgaria has developed, jointly with the European Commission, a concept for establishing the Balkan Gas Distribution Hub on the country's territory. The European Commission included the project in the list of projects of common interest. By building the necessary gas transmission infrastructure, the gas hub aims to connect the natural gas markets of Member States in the region — Bulgaria, Greece, Romania, Hungary, Croatia, Slovenia and through them — the Member States in Central and Western Europe and the contracting parties to the Energy Community like Serbia, Ukraine, Macedonia, Bosnia and Herzegovina and thus to contribute to the achievement of the main priorities of the European energy policy.

Bulgaria is suitable for the construction of a regional gas distribution hub because of its strategic geographic location, well-developed gas transmission network and existing compressor stations (80 % of compressor stations in the region are on Bulgarian territory). In recent years, Bulgaria made investments in the modernisation of the gas transmission network in the amount of approximately BGN 200 million.

In February 2017, the European Commission granted EUR 920 000 to Bulgartransgaz EAD for the preparation of a feasibility study of the Balkan Gas Distribution Hub which had to provide an insight into the technical and economic parameters of the project. On 15 March 2018, the national gas transmission operator Bulgartransgaz EAD and the selected Bulgarian-Swedish consortium DZZD AF-EMG Consult signed the contract for the feasibility study of the Balkan Gas Distribution Hub. The main goal is to study in detail the technical aspects of the project, make a detailed assessment of its commercial and technical viability and define the specific business model for implementation, the possibility to finalise the regulatory framework and the structure of funding. Target markets, natural gas demand and supply and the road map for the project implementation were analysed as part of the study.

On 12 June 2018, in the building of the EC in Brussels, the interim results from the feasibility study of the implementation of the Balkan gas distribution hub for Europe were presented. Several versions of gas infrastructure routes on the territory of Bulgaria developed on the basis of the expected sources of natural gas supply were presented. On 18.06.2018, the contractor submitted a Final Report on the study that included the following feasibility study sections: a business section, a risk management section and a section relating to the project management. The report is under examination.

In order to ensure an operational and liquid gas exchange, the Bulgarian national gas transmission operator Bulgartransgaz EAD and the Austrian Central European Gas Hub (CEGH) which operates a gas exchange on the markets in Austria and the Czech Republic signed a Memorandum of Understanding for cooperation in the course of development of the Balkan Gas Distribution Hub. The Memorandum provides for the two companies to cooperate on five major aspects: training and sharing of good practices, trading issues,

legal and regulatory matters, practical gas exchange implementation and interconnection to provide the infrastructure necessary for the execution of commercial transactions.

- Expanding the capacity of Chiren Underground Gas Storage (UGS)

The aim of the project of common interest is to achieve higher volumes of gas storage, higher pressures in the gas reservoir and higher average 24-hour gas extraction and compression capacity. It is expected that the modernisation and expansion of the capacity of the underground gas storage in Chiren would contribute to increasing the daily natural gas flow to up to 5.0 million m³/24 hours in the short-term. The project envisages the volume of operational gas to rise to 1 billion m³ and the flow and compression to increase from 8 to 10 million m³/day. Enhanced technical parameters will allow the storage facility to be used not only for the needs of the Bulgarian market, as is currently the case, but also to meet the peak consumption of the countries in the region. The project is in a preparatory phase which includes all the geological and geophysical studies required for the expansion. At the same time, work is under way for the implementation of a software application aimed at collecting and creating databases and subsequently establishing optimum modes of operation of the storage facility. For higher precision of the expansion option, 3D seismic explorations are being carried out, along with a geo-mechanic simulation and a ground gas analysis. In 2016, the geo-mechanic simulation of the Chiren reservoir and the ground gas analysis of the area of the Chiren structure were completed.

A grant in the amount of EUR 3 900 000 (up to 50 % of the projected cost of the action) was provided under the Connecting Europe Facility programme for the implementation of '3D field seismic explorations on the area of the Chiren structure' and 'Quality control on the 3D field seismic explorations'. On 25.05.2018, a contract was signed with the selected contractor Geofizyka Toruń, Poland, and the preparation of a preliminary plan for the execution of the seismic works began.

Quality control of the execution of the 3D field seismic surveys and processing of data obtained will be carried out by the selected contractor Mingeounivers Engineering-NIS-MGU EOOD and according to the contract signed on 15.07.2016 this is to start after a contract with the contractor for the implementation of 3D seismic field seismic surveys is signed. In a letter dated 18 June 2018, the contractor for the quality control was notified of the signed contract for the implementation of the seismic studies.

- Gas interconnector Bulgaria—Romania

The project 'Gas interconnector between Bulgaria and Romania' (IBR) was implemented jointly by Bulgartransgaz EAD and Transgaz S.A. according to the Memorandum of Understanding signed on 1.06.2009.

The project is divided into three parts: a section under the Danube river, a ground part on Bulgarian territory and a ground part on Romanian territory. The total length of the

reverse interconnector is 25 km, including 15.4 km on Bulgarian territory, 7.5 km on Romanian territory and 2.1 km under the Danube river. The maximum capacity of the interconnector is 1.5 billion m³ p.a., the diameter of the pipe is 500 mm and the operating pressure is 54 bars.

In November 2016, the interconnector was formally commissioned.

To achieve an optimum two-way operation of the interconnector constructed between Bulgaria and Romania, the Romanian gas transmission operator Transgaz S.A. has committed to build the Podishor compressor station in Romania which is to provide a technical capacity for natural gas transmission of 1.5 billion m³ p.a. from Romania to Bulgaria. The compressor station is part of the project 'Development of the Romanian gas transmission system along the Bulgaria—Romania—Hungary—Austria route' (BRUA) which includes the construction of new gas transmission sections with an approximate length of 528 km and three new compressor stations: Jupa, Bibesti and Podisor.

- A gas pipeline for increasing the interconnection capacity of the Northern Ring of the Bulgarian and Romanian gas transmission networks (BRUA)

The project for coordinated development of the gas transmission networks of Bulgaria, Romania and Hungary (the Bulgaria—Romania—Hungary—Austria— BRUA transmission corridor) is included in the ten-year network development plan of Bulgartransgaz EAD for the period 2018—2027. BRUA will ensure bi-directional transmission between the countries of natural gas from sources in the Southern Gas Corridor and from the Black Sea and transmission of Central European gas to South-Eastern Europe. Its capacity will be 1.75 billion m³ p.a. in the first stage and 4.4 billion m³ p.a. in the second stage; an option is envisaged for a further expansion of the project in the third stage if its economic viability is demonstrated.

A significant part of this corridor is the new interconnector Ruse—Giurgiu which was commissioned at the end of 2016 and the first quantities of natural gas along which were transferred from Bulgaria in 2017. As part of BRUA, various activities are planned to be carried out on Romanian territory, including the construction of a new compressor station in the area of Podisor, in order to reach the operating pressure of the Bulgarian gas transmission network and ensure the technical parameters required for the optimum operation of the Bulgaria—Romania interconnector in the direction to Bulgaria.

The BRUA project and the Black Sea gas interconnector which is part of the overall concept for the Bulgaria—Romania—Hungary—Austria transmission corridor are implemented in order to comply with the requirements of the European Energy Union and of the European energy strategy for interconnection of the gas transmission systems of the countries in the region. The project is ranked by the European Commission as a project of common interest.

- Rehabilitation and modernisation of the national gas transmission network

The Bulgarian gas transmission network will ensure not only transmission of natural gas to Bulgarian consumers, but also transmission of natural gas from Azerbaijan and LNG from IGB to IBR and IBS, i.e. to Romania and Serbia, and from there to Hungary and Central Europe. It is an important element of the North-South Corridor.

Phase 1 of the project activities — the construction of the Gas Pipeline from Lozenets compressor station to Nedyalsko purifying station — was completed and an authorisation for use was issued on 25 June 2018. The 20 km gas transmission section from Lozenets compressor station to Nedyalsko purifying station is directly related to the security of the transmission system and ensures opportunities for transmission of additional gas quantities through the gas transmission pipeline between Lozenets compressor station and the Bulgaria—Turkey border. It also provides a technical opportunity for reverse flow should it be necessary.

The implementation of Phase 2 of the project is funded by the Connecting Europe Facility under two agreements with a total amount of the grant of up to EUR 1 032 000. In 2018, preparatory works for the rehabilitation of the North Semi-ring of the gas transmission system continued with works to replace the (main) gas transmission pipeline in the section Beglezh purifying station—Dermantsi valve station—Batultsi valve station—Kalugerovo valve station. The quality of the EIA report submitted to the MOSV on 30 April 2018 is currently assessed. The preparatory activities for modernisation of three compressor stations, Lozenets CS, Ihtiman CS and Petrich CS, were completed. The project is ranked by the European Commission as a project of common interest.

ii. Regional cooperation in this area⁶

Gas interconnector Turkey—Bulgaria (ITB)

The project involves an interconnection between the gas transmission networks of Bulgartransgaz EAD (Bulgaria) and Botas (Turkey) to ensure diversification of natural gas sources, supply partners and routes and thus increase the security of supply and the development of competition in the region. The ITB will contribute to the implementation of the priority Southern Gas Corridor that envisages infrastructure for transmission of gas from the Caspian Basin, Central Asia, the Middle East and the Eastern Mediterranean Basin to the Union in order to enhance the diversification of gas supply.

The feasibility study of the ITB was completed in August 2016. The most appropriate route option was selected, with technological sites, technological scheme and basic equipment for the ITB.

The results of the feasibility study were duly notified to the Turkish party and an invitation for a meeting in Sofia to discuss the technical parameters was extended. The technical meeting concerning the project with Botas was held on 27.09.2017 in Sofia. As

⁶ Other than the PCI Regional Groups established under Regulation (EU) No 347/2013

a result of the meeting, in a letter dated 6.10.2017 to Bulgartransgaz EAD Botas expressed its willingness for the further development of the project.

In November 2017, the European Commission published the Third List of projects of common interest but the ITB project was not included in it.

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

To finance key projects in the area of electricity transmission infrastructure, Bulgaria plans to use funds from the Connecting Europe Facility, the new facilities for financing low-carbon innovations and energy sector modernisation within phase 4 of the EU Emissions Trading Scheme and other programmes with European and national financing. Key projects in the gas distribution infrastructure are partially financed through: the European Energy Programme for Recovery, Operational Programme 'Innovations and Competitiveness' 2014–2020 (OPIC), Operational Programme 'Development of the Competitiveness of the Bulgarian Economy' and the Connecting Europe Facility programme.

3.4.3. Market integration

i. Policies and measures related to the elements set out in point 2.4.3

Legislative changes will be made in order to transpose the new Directive concerning common rules for the internal market in electricity. The legislative changes will establish the process of full liberalisation of the electricity market.

In order to integrate the electricity market into the single European energy market, the country's exchange market will couple with the exchange markets of neighbouring countries.

Day-Ahead Market

Bulgaria is a member of the MRC market coupling and is technically prepared to launch a project for market integration in the day-ahead market. Recognising the important role of market coupling both in terms of the better opportunities for commercial players and users and in terms of security and supply, Bulgaria will undertake all measures within its power to realise market couplings within the market on the two borders with Member States. Bulgaria's neighbouring Member States are Romania and Greece. Romania is part of the 4MMC market coupling and a precondition for launching a process of market coupling on the Bulgaria–Romania border is for the 4MMC and MRC to combine; this is expected to occur in 2020 or 2021. Bulgaria plans to start negotiations with Romania in 2020 and expects the BG-RO market coupling to become operational in 2022.

Market coupling on the Bulgaria–Greece border will be possible after the day-ahead

market is introduced in Greek territory. In view of the plans announced by Greece, it is expected that an operational day-ahead market in the bidding zone will be in place in 2019. Bulgaria intends to start negotiations with Greece for market coupling immediately after this market is a fact and this would allow to launch a market coupling on the Bulgaria—Greece border in 2022.

Intraday market

Bulgaria is part of the local project LIP 15, which envisages the country to have an operational, coupled intraday market through the Bulgaria—Romania border in the second half of 2019. On the Bulgaria—Greece border a market coupling will be possible after an intraday market is established in the bidding zone of Greece but currently no official information is available in this respect.

Demand response

By introducing amendments to national law, Bulgaria plans to establish suitable conditions for creating active consumers, opportunities for associations through aggregators or energy communities and their active participation in 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

During the period in question, Bulgaria envisages to introduce interim measures to enable the implementation of the following reforms:

- Introducing price limits on the balancing market in order to send correct price signals to investors. Maximum and minimum prices consistent with the day-ahead and intraday time intervals and in line with the Balancing Regulation.
- Creating appropriate conditions and increased participation of demand response, in individual or aggregated terms, both in the wholesale market and in the balancing market.
- Upgrade of the transmission network to alleviate internal overloads. Increased interconnection capacity.

The implementation of the Yadenitsa project aimed at increasing the volume of the lower reservoir of Chaira Pumped Storage Plant (PAVETs) by construction of Yadenitsa Dam and a reversible pressure tunnel connection with Chaira Dam will ensure a balancing capacity in the country's electricity system and will allow further development of

electricity generation from renewable energy sources according to the long-term strategies for energy development in Bulgaria and the European Union.

The Bulgarian Independent Energy Exchange (BNEB) has been administering the day-ahead markets on the country's territory since the beginning of 2016 in line with the rules and principles adopted by the PCR⁷ consortium and the MRC⁸ initiative. From April 2018, the exchange operator also began to administer the intraday market segment in full compliance with the technical requirements of the XBID project⁹. The development of these market segments is a step towards market integration with all neighbouring bidding zones.

In this regard, the BNEB launched strategic projects for market coupling in pursuance of the provisions of Article 20 of Commission Regulation 1222/2015 (Capacity Allocation and Congestion Management GL):

1. Initiative for joining the IBWT¹⁰ (Italian borders working table) project which would enable the launch of a project for market coupling with the bidding zone of the Republic of Greece as early as possible (the second half of 2019).
2. Joining the WB6 (West Balkan 6) Memorandum and all activities stated as its objectives. The aim of the project is the market integration of the day-ahead markets of the bidding zones of the Republic of Macedonia and the Republic of Bulgaria in the beginning of 2020.
3. Launch and participation in a project for trilateral market coupling of day-ahead markets of the bidding zones of the Republic of Bulgaria, the Republic of Serbia and the Republic of Croatia.
4. BNEB EAD and ESO EAD are already parties to the Intraday Operational Agreement (IDOA) signed between all market and transmission operators. Along with the provisions of the CACM GL, this agreement sets out the obligations and objectives of all nominated electricity market operators (NEMOs) and transmission operators in relation to the operation of the single market coupling of intraday markets. In this regard, BNEB EAD launched a formal initiative to join the XBID

⁷ - The PCR (Price coupling of region) project is an initiative of the seven largest exchange operators in Europe (associated in the form of a consortium) aimed at implementation, through common rules and procedures, of the target model for single [translator's note: unfinished sentence]

⁸ - The MRC (Multi-regional coupling project) is a project for coupling the national electricity markets based on the European target model (Single Price Market Coupling for DAM) with implicit allocation of cross-border transmission capacities

⁹ The XBID (Cross border Intraday) is a pan-European project for market coupling of Intraday markets which was launched on 15 borders in Europe on 12.06.2018. The objective and organisation of the XBID project are similar to those of the PCR (Price Coupling of Regions) project which aims at coupling day-ahead markets and already includes major European market and transmission operators

¹⁰ The IBWT is a project for market coupling of all day-ahead markets in countries which have a common border with Italy and markets of neighbouring bidding zones bordering on Italy. This project supports the expansion of the MRC initiative and enables a coordinated implementation of market integration projects based on experience gained, such as market couplings of Italy with France, Slovenia, Austria, and of Slovenia with Croatia

project for the market coupling of intraday markets through participation in the so-called LIP 15 (Local implementation project) members of which are the market and transmission operators of Romania, Hungary, the Czech Republic, Slovenia, Croatia, Austria and Germany and which will be part of the so-called second wave for accession to the XBID.

iv. Where applicable, measures to ensure the non-discriminatory participation of renewable energy, demand response and storage, including via aggregation, in all energy markets

Not applicable

v. 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

Currently Bulgaria is implementing a measure to support persons that meet the criteria for income-based and property-based poverty. Pursuant to the Social Assistance Act and Regulation No RD-07-5 of 16.05.2008 on the terms and procedure for allocation of targeted heating assistance, targeted heating assistance is provided to some socially vulnerable groups during the heating season. The programme covers the persons and families that meet the legally established conditions and requirements for income, property and health status, marital status, age, training and job employment, etc. The regulation defines 17 risk groups with differentiated minimum income that are eligible for heating assistance depending on the degree of risk and the priorities set. At present, about 250 000 individuals and families are recipients of such assistance.

The assistance mechanism is as follows: The assistance is provided for the respective heating season (1 November—31 March), i.e. for 5 months, and its amount is determined by an order of the Minister for Labour and Social Policy before the beginning of the season in line with the electricity price for household customers established by the KEVR and on the basis of 385 kWh electricity, including 280 kWh daytime rate and 105 kWh night-time rate (the quantity of energy required for heating one room). There is an option to select the type of fuel: solid fuel, electricity, gas or heat. This type of assistance will continue to be applied as a measure to support energy poor people.

The electricity market in Bulgaria is partly liberalised and its regulated share is 48 %. In line with Third Liberalisation Package of the EU, Bulgaria took steps towards full liberalisation of the electricity market. The phasing out of regulated prices for all end consumers will boost competition among electricity suppliers while exposing consumers to greater price volatility. Bulgaria sets the objective to provide adequate protection to vulnerable household consumers of electricity. In this regard, based on a detailed

analysis, policies and measures were developed to ensure that the transition to a liberalised retail electricity market will be smooth and staged for household consumers. The transition will involve a partial regulation of the price in the beginning until the regulated component of the price is completely eliminated. Before the process of full liberalisation of the electricity market commences, a mechanism for protection of vulnerable consumers of electricity will be implemented; it will include criteria for identification of such customers and financial and non-financial measures for their protection. The mechanism for protection of vulnerable consumers will be implemented through the social assistance system. The mechanism for protection of vulnerable consumers of electricity aims to ensure all-year cover of minimum electricity needs other than heating needs.

vi. Description of measures to enable and develop demand response including those addressing tariffs to support dynamic pricing¹¹

The 'enter—exit' method was introduced to determine natural gas transmission tariffs in accordance with the European regulation. It provides an opportunity for tariff setting.

3.4.4. Energy Poverty

i. Where applicable, policies and measures to achieve the objectives set out in point 2.4.4

Currently Bulgaria is implementing a measure to support persons that meet the criteria for income-based and property-based poverty. Pursuant to the Social Assistance Act and Regulation No RD-07-5 of 16.05.2008 on the terms and procedure for allocation of targeted heating assistance, targeted heating assistance is provided to some socially vulnerable groups during the heating season. The programme covers the persons and families that meet the legally established conditions and requirements for income, property and health status, marital status, age, training and job employment, etc. The regulation defines 17 risk groups with differentiated minimum income that are eligible for heating assistance depending on the degree of risk and the priorities set. At present, about 250 000 individuals and families are recipients of such assistance.

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¹¹ In accordance with Article 15(8) of Directive 2012/27/EU.

option to select the type of fuel: solid fuel, electricity, gas or heat. This type of assistance will continue to be applied as a measure to support energy poor people.

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3.5. Dimension Research, innovation and competitiveness

i. Policies and measures related to the elements set out in point 2.53

The deployment of new technologies will help reduce technological network losses, expand the energy market and contribute to addressing climate change challenges. As a result of the dedicated efforts of academic and technical communities and global efforts, energy-saving technologies that lead to significant reduction of energy costs, more comfort and better quality of life are evolving at a rapid pace. Innovations in the energy sector will contribute both to achieving overall energy cost reductions and to imposing new energy efficiency standards and shifting towards lower and more sustainable energy consumption.

Considering this, the attention and efforts will focus on implementation of programmes to introduce innovations in the area of energy. These programmes will be based on the Strategic Energy Technology Plan for Europe (SET plan) which is aimed at investment and implementation of new high-efficiency energy technologies. Changes in the overall energy model are being discussed, such as the penetration of the so-called 'smart energy networks', energy storage, etc.

The energy system, the development and application of renewable energy sources and

the more efficient use of conventional energy resources are central to the applied research of the Bulgarian Academy of Sciences.

The research is related to the provision of scientific services and to securing the nuclear power and the safety of Kozloduy Nuclear Power Plant, to nuclear technologies in industry, medicine and national security, to prevention of illegal trafficking in radioactive materials.

In line with the priorities and long-term energy interests of Bulgaria, technological processes and materials are being developed and components for use of solar energy in households and industry and components aimed at optimisation of industrial electricity production by transforming solar energy into electricity are being created.

Development of electrochemical sources of energy such as batteries and accumulators continues, along with hydrogen technology and fuel cell development.

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

Not applicable

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

Not applicable

SECTION B: ANALYTICAL BASIS

4. CURRENT STATUS AND PROJECTIONS UNDER EXISTING POLICIES AND MEASURES

4.1. Projected evolution of main exogenous factors influencing energy system and GHG emission developments

i. Macroeconomic forecasts (GDP and population growth)

Population change, million inhabitants

Year	2005	2010	2015	2020	2025	2030	2035	2040
Population	8	8	7	7	7	7	6	6

GDP change, million euro

Year	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
GDP	32 174	38 230	41 271	50 002	57 785	65 200	71 195	76 147	81 523	86 894

ii. Sectorial changes expected to impact the energy system and GHG emissions

iii. Global energy trends, international fossil fuel prices, EU ETS carbon prices

Year		2020	2025	2030	2035	2040	2045	2050
International fossil fuel prices	EUR/toe							
Liquid fuels	EUR/toe	88	104	115	119	125	129	132
Natural gas	EUR/toe	57	65	70	75	78	79	80
Coal	EUR/toe	17	20	23	25	26	27	28
Carbon emissions prices	CO₂	30	45	60	60	60	60	60

iv. Technology cost developments

4.2. Decarbonisation

4.2.1. GHG emissions and removals

In 2016, GHG emissions in Bulgaria amounted to 59 060 Gg CO₂, excluding the LULUCF sector. Emissions have decreased by 49.41 % compared to the baseline year (1988) and by 4.4 % compared to the emissions in the previous 2015 year.

The main reasons for the reduction of GHG emissions in Bulgaria are:

- ✓ the structural reforms in the economy that resulted from the transition from

- planned to market economy;
- ✓ the reduced electricity generation by thermal power plants (and increased shares of water and nuclear energy);
 - ✓ the structural changes in industry (including the lower output of energy-intensive enterprises and the improved energy efficiency);
 - ✓ implementing energy efficiency measures in the housing sector;
 - ✓ shift from solid and liquid fuels to natural gas in energy consumption;
 - ✓ the decline in the populations of bovine animals and sheep and in the use of fertilisers.

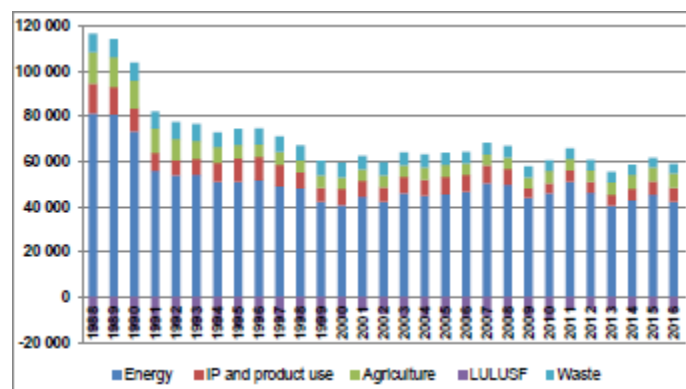


Figure 7. Total emissions in Bulgaria by sector, 1988–2016, Gg CO₂eq

The Energy sector (GHG emissions from combustion of fuels) held the highest share in total GHG emissions in 2016: 71.8 %. The Agriculture sector ranked second, with 11.0 %, the Industrial Processes and Use of Solvents sector (IPUS) ranked third with 10.3 % and the Waste sector came next with 6.9 %.

The share of emissions covered by the emissions trading scheme in total GHG emissions was 56.6 % in 2016, and the share of emissions outside the scheme was 42.2 %.

Energy sector

In 2016, the emissions from the Energy sector decreased by 47.9 % compared to the baseline year (42 386 Gg CO₂eq in 2016 compared to 81 320 Gg CO₂eq in 1988). Compared to the previous year, in 2016 the emissions decreased by 6.9 % due to the lower electricity output from fossil fuels.

The main source of emissions in the sector is the incineration of solid fuels which accounted for 57.8 % of the emissions in the sector in 2016, followed by liquid fuels at 29.0 % and gaseous fuels at 12.2 %.

The main reason for the reduced GHG emissions in the energy sector is the transition from planned to market economy. This caused a sharp decline in demand for electricity

from thermal power.

GHG emissions between 1988 and 2016 were driven by the significant reduction in emissions from fuel combustion in the energy industries (35.7 %) and in the use of energy in the manufacturing industry and construction (83.4 %) and in other sectors (commercial, residential, forestry): 72.3 %, as well as by the clear increase in GHG emissions from transport: by 30.2 %.

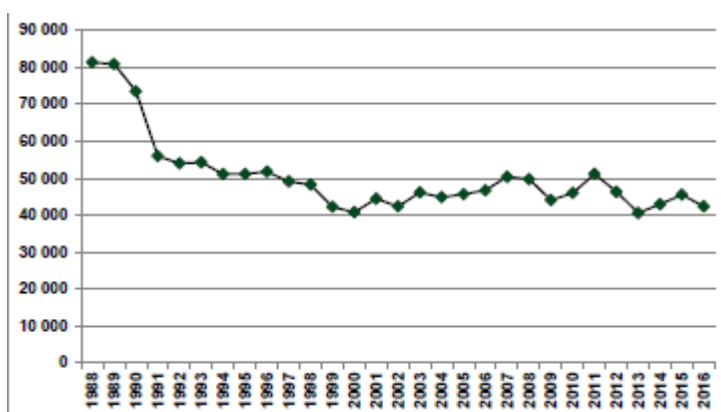


Figure 8. GHG emissions from the Energy sector, 1988—2016, Gg CO₂eq

Industrial Processes and Use of Solvents sector (IPUS)

A steady downward trend in emissions in this sector is observed since 1988. Emissions in 2016 decreased by 54.9 % compared to the baseline 1988 year.

In 2016, the IPUS sector accounted for 10.3 % of the total national GHG emissions excluding the LULUCF sector compared to 11.5 % in the baseline 1988 year.

In 2016, the GHG emissions from IPUS amounted to 6 062 Gg CO₂ compared to 13 438 Gg CO₂ in the baseline 1988 year.

In 2016, the most important category were mineral products (mainly production of clinker and lime) with a 40.44 % share in total emissions from IPUS. The second category was the chemical industry (production of ammonia and nitric acid) with 30.32 %, followed by the use of products intended as substitutes for ozone-depleting substances with a share of 23.1 % and the manufacturing of metals (steel) with a share of 3.69 %.

The GHG emissions from the IPUS sector vary over time and reached a record low in 2009. The reduction in 2016 for the entire sector reached 54.9 % of the baseline year value and the highest reduction was observed in metals manufacturing: 94.4 %.

This was mainly due to the economic crisis and the 2009 global economic crisis in particular. After 1996, a process of privatisation began, which led to lower output of enterprises. This process was followed by restructuring and modernisation of production while some enterprises discontinued their operation.

The overall decline in emissions over the years was also influenced by the deployment of

better technologies at company level.

Agriculture sector

The total reduction of emissions in the sector for the period since 1988 was 52.6 %. In 2016, agriculture contributed with 11.0 % to total GHG emissions in Bulgaria (excluding the LULUCF).

The emissions reduction was mainly due to the consistent decrease in agricultural land as a result of abandoned cropland and lower livestock population. The decreased use of fertilisers was another driver of emissions reduction.

Land Use, Land Use Change and Forestry (LULUF) sector

The LULUCF sector plays the role of greenhouse gas remover for Bulgaria through the two CO₂ removal categories: 'Forests' and 'Grassland'. All the other categories (Cropland, Settlements, Wetland) are sources of CO₂ emissions. The net removal of CO₂ from LULUCF decreased by 57.1 % since the baseline 1988 year. The overall reduction of CO₂ emission removals by the LULUCF was mainly due to the lower removals by the Forests category and the slight increase of emissions from the Cropland, Settlements and Wetland categories.

The key reason for the reduced removals by the Forests category was the reported decline in the growth of forests as the average age of forests has been consistently increasing during the reporting period. Despite said decline, the share of removals in total GHG emissions (in CO₂ eq) is still significant. This is because the emissions in the other sectors have decreased too. The share of removals in the baseline year was 15.01 % of the total CO₂ emissions, and in 2016 their share was 12.44 %.

Compared to the baseline year, an increase in cropland, settlements and wetland is observed. Total emissions from cropland fluctuated throughout the period. Emissions from settlements increased in recent years due to changes from other land uses near settlements to accommodate increased infrastructure activities after Bulgaria's accession to the EU.

Waste sector

The total emissions reduction of the sector compared to the baseline year is 50.4 %. The reduction resulted mainly from the continuous decline in the population over the past 10 years.

Bulgaria's emissions and removals by sector, Gg CO₂eq

Sectors	1988	1990	1995	2000	2005	2010	2016	Change 1988/2016, %
Energy	81 320	73 503	51 180	40 772	45 673	46 044	42 386	-47.9
IPUS	13 437	10 046	10 453	7 210	7 683	4 444	6 062	-54.9
Agriculture	13 767	12 461	5 933	5 205	5 170	5 454	6 583	-52.2
LULUCF	-15 234	-14 870	-13 533	-9 427	-8 894	-9 121	-6 536	-57.1
Waste	8 227	7 977	6 999	6 380	5 380	4 604	4 081	-50.4
Total (excluding LULUCF)	101 519	89 118	61 033	50 141	55 012	51 426	52 577	-48.2

Projections by sector with the existing national and Union policies and measures by 2040 (including 2030)

Projected GHG emissions in the Energy sector

Energy industries

Projected GHG emissions in the sector of energy industries is based on an analysis of the country's energy balance. The analysis is based on modelling using the software for long-term assessment and energy planning. Projections take into account all existing measures for GHG emissions reduction.

The energy sector covers the following activities:

- electricity generation and transmission, including cogeneration;
- heat generation and transmission for public needs;
- natural gas transmission (maintaining the pressure of compressor stations). The sector of energy industries consists of large-scale electricity and heat generation facilities. This sector is responsible for the greatest quantity of GHG emissions. This sector is envisaged to continue to account for the highest share of emissions.

Projected emissions in the Energy industry subsector, in Gg CO₂eq

Year	1988	1990	2016	2020	2025	2030	2035	2040
Aggregated emissions, CO ₂ eq	42 179	38 677	27 128	37 068	29 937	26 636	19 614	19 532

Manufacturing industry and construction

The projections for this sector are based on the expectations and forecasts for economic development, the shares of individual subsectors, the projected use of fuels, as well as on general projections for the use of some of the primary energy sources.

Projected emissions in the Manufacturing industry and construction subsector, Gg CO₂eq

Year	1988	1990	2016	2020	2025	2030	2035	2040
Aggregated emissions, CO ₂ eq	17 503	17 768	2 910	4 354	3 773	3 296	3 298	3 263

Transport

In the period from 1988 to 1991, fuel consumption in the transport sector fell by 48 % as a result of the collapse of the economy. Since 1991, fuel consumption has been steadily increasing mainly due to road transport. Despite the decline in 2013, since 2014 the use of road transport fuels has begun to increase again.

The projection for the development of the Transport subsector is based on the projected use of fuels in the sector.

Projections for CO₂ from the Transport subsector are calculated on the basis of the projected energy consumption in the transport sector. The transport sector is divided into four subsectors: road traffic, air traffic, rail traffic and navigation.

Projected emissions in the Transport subsector, Gg CO₂eq

Year	1988	1990	2016	2020	2025	2030	2035	2040
Aggregated emissions, CO ₂ eq	7 179	6 605	9 350	10 443	9 646	10 045	9 426	9 042

Projected GHG emissions in the Industrial Processes and Use of Solvents sector

The projection for the development of the sector reflects expectations for recovery and a gradual growth after the decline driven by the economic crisis. The change in the industrial structure reflects the projected change in the structure of subsectors.

Industrial Processes and Use of Solvents sector, Gg CO₂eq

Year	1988	1990	2016	2020	2025	2030	2035	2040
Aggregated emissions, CO ₂ eq	13 438	10 047	6 062	5 126	5 231	5 298	5 240	5 444

Projected GHG emissions in the Agriculture sector

This sector has not implemented any measures for emissions reduction. The reduction results directly from the overall decline in agriculture since 1988. Emission reduction from livestock breeding reflects the reduced number of cattle.

Projected GHG emissions in the Agriculture sector, Gg CO₂eq

Year	1988	1990	2016	2020	2025	2030	2035	2040
Aggregated emissions, CO ₂ eq	13 768	12 462	6 583	5 031	5 231	5 419	5 649	5 863

Projected GHG emissions and removals in the LULUCF sector

In the inventory of GHG emissions and removals Bulgaria uses a combination of methods in accordance with the Guidelines of the Intergovernmental Panel on Climate Change in order to obtain a consistent and comprehensive analysis for the country. Therefore, in its projections for emissions/removals from LULUCF Bulgaria follows the degree 1 methods which comprise statistical processing of historical data. Projections made have a horizon by 2040 and take into account the targets set out in the following strategic documents:

- Third National Climate Change Action Plan (2013—2020)
- National Strategy for Development of the Forestry Sector in the Republic of Bulgaria 2013—2020
- Strategic Plan for the Development of the Forestry Sector 2014—2023
- Common Agricultural Policy 2014—2020.

Projected emissions and removals by LULUCF category, Gg CO₂eq

LULUCF categories	2016	2020	2025	2030	2040
Total for the LULUCF sector	-7 172.68	-11 304.91	-11 832.83	-12 360.75	-13 275.80
A. Forests	-6 096.04	-10 843.20	-11 027.68	-11 212.16	-11 557.26
B. Cropland	834.92	668.07	654.28	640.50	684.550
C. Grassland	-1 767.85	-1 392.96	-1 557.37	-1 721.77	-2 050.58
D. Wetlands	272.49	293.99	293.99	293.99	293.98
E. Settlements	718.94	1 001.60	1 012.96	1 024.32	1 047.03
F. Other land	-591.13	-257.85	-289.28	-320.70	-338.25
G. Harvested wood products	-544.01	-629	-775	-920	-1 355.27

Projected GHG emissions in the Waste sector

The GHG emitted by the Waste sector are CO₂, CH₄ and N₂O. The main share of CH₄ from the sector is due to municipal solid waste disposal. N₂O is emitted in waste water treatment and biological treatment and incineration of waste. CO₂ comes from waste incineration.

Projections take account of the current status of waste management in compliance with the effective legislation. Planned measures for GHG emission reduction in the sector

involve mainly the management of municipal solid waste.

Projected emissions in the sector entail the implementation of programmes for reduction of biodegradable waste going to landfills and landfill methane capture and incineration. The best practices can ensure capture and incineration of only about 50 % of the generated gas.

Projected emissions in the Waste sector, Gg CO₂eq

Year	1988	1990	2016	2020	2025	2030	2035	2040
Aggregated emissions, CO ₂ eq	8 227	7 977	4 082	3 990	3 834	3 684	3 543	3 411

4.2.2. Renewable energy

i. Current share of renewable energy in gross final energy consumption and in different sectors (heating and cooling, electricity and transport) as well as per technology in each of these sectors

In accordance with the requirements of Directive 2009/28/EC on the promotion of the use of energy from renewable sources, the National Renewable Energy Action Plan (NREAP) sets a binding national target of a 16 % share of energy from renewable sources in gross final consumption in the country by 2020. In line with the scenario for 'additional energy efficiency' adopted in the NREAP, the expected gross final energy consumption for 2020 is estimated at 10 738 ktoe, and to achieve the binding national target the energy from renewable sources consumed should be 1 718 ktoe. The breakdown of expected consumption by sector for 2020 and the quantities of energy from renewable sources are given in the table below.

	Energy from renewable sources by sector	Share of energy from renewable sources
	ktoe	%
Energy from renewable sources in the heating and cooling sector	1 103	23.0
Energy from renewable sources in the heating and cooling sector	654	20.8
Energy from renewable sources in the transport sector	302	10.8
Final consumption of energy from renewable sources	2 059	
Surplus to be used under the cooperation mechanism	341	3.2
Final consumption of energy from renewable sources required to achieve the binding national target	1 718	16.0

Source: National Renewable Energy Action Plan

The Second national report on Bulgaria’s progress in the promotion and use of energy from renewable sources which was submitted to the EC at the end of 2013 stated that in 2012 the Republic of Bulgaria has overachieved the binding national target of a 16% share of energy from renewable sources in gross final energy consumption for 2020. The next national reports (Third and Fourth national reports on Bulgaria’s progress in the promotion and use of energy from renewable sources) indicate an ongoing growth of the energy use from renewable sources and in 2016 a 18.8 % share of energy from renewable sources in the country’s gross final energy consumption was achieved. The target for the transport sector was also overachieved and in 2016 it accounted for 7.27 % against the interim target for 2016 laid down in the NREAP. In 2016, the gross final consumption of energy from renewable sources reached 1 999.5 ktoe and registered a growth of 21 % compared to 2012. From 2012 to 2016, energy consumption in the heating and cooling sector and the electricity sector rose by 7.2% and 19.5 % respectively. The use of energy from renewable sources increased considerably in the Transport sector, up from 5.1 ktoe in 2012 to 171.6 ktoe in 2016.

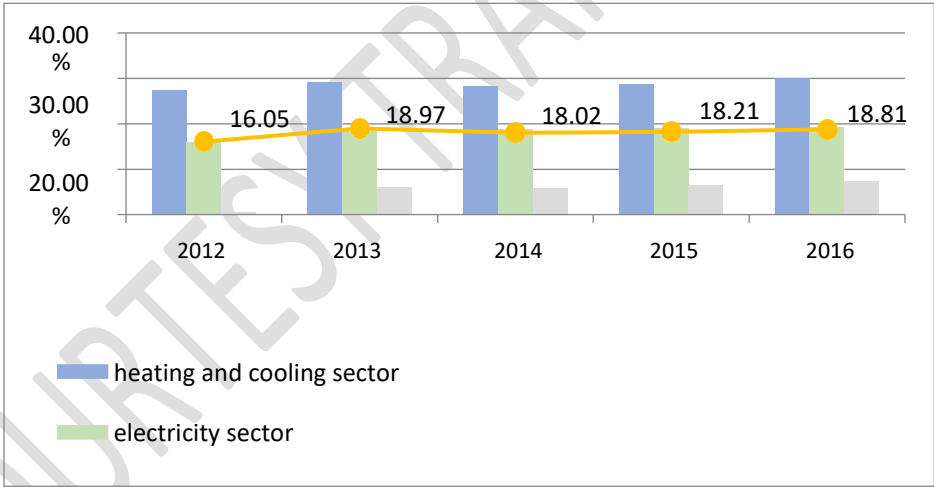


Figure 9. Share of energy from renewable sources in gross final energy consumption in the country, %

The breakdown of energy from renewable sources by sector is as follows:

- heating and cooling sector;

The heating and cooling sector is the greatest contributor to the achievement of the binding national target. In 2016 consumption of energy from renewable sources in this sector was 1 174 ktoe, registering an increase by 6.6 % (1 101 ktoe) compared to 2012.

Overall actual contribution (final energy consumption) of each technology used for production of renewable energy in the Republic of Bulgaria to the binding targets for 2020 and to the indicative trajectory for the shares of energy from renewable sources in heating and cooling (ktoe)

	2012	2013	2014	2015	2016
Geothermal (excluding low temperature geothermal heat used in heat pump systems)	33	33	33	33	35
Solar energy	15	19	20	22	22
Biomass	1 005	1 010	963	1 009	1 036
solid biomass	1 005	1 010	961	1 005	1 010
biogas	0	1	2	4	26
bioliquids	0	0	0	0	0
Renewable energy from heat pumps	47	64	65	75	81
of which aerothermal	0	0	0	59	63
of which geothermal	0	0	0	0	0
of which hydrothermal	0	0	0	16	18
TOTAL	1 101	1 127	1 081	1 139	1 174
of which for district heating systems					
of which energy from biomass used in households	759	750	733	716	758 ¹²

The share of biomass was 91 % in 2012 and despite its decrease to 88 % in 2016, it remained the renewable source with the greatest application in this sector. In 2016, as compared to 2012, a positive trend was that the use of renewable energy from heat pumps increased by 73 %, followed by solar energy with a 45 % increase and geothermal energy with a 4 % increase. Solid biomass continues to be the renewable source of highest importance to this sector and with the greatest application in the Household sector. In recent years the use of wood wastes, other plant wastes and biomass from agriculture and sewage sludge increased, although not at the expected rate.

- electricity sector;

In 2016, the renewable electricity generated was 7 365 GWh, registering a 20 % increase compared to 2012. This resulted from the commissioning of new wind and photovoltaic power plants and biomass power plants, whereby the installed capacity for the indicated years increased from 4 885 MW to 5 007 MW.

¹² Source: Fourth national report on Bulgaria's progress in the promotion and use of energy from renewable sources

Overall actual contribution (expressed in installed capacity and gross electricity generation) of each technology for renewable electricity generation used in the Republic of Bulgaria to the targets for 2020 and to the indicative trajectory for the shares of energy from renewable sources in electricity

	2012		2013		2014		2015		2016	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
Hydro Power Plants*	3 181	4 225	3 203	4 277	3 219	4 321	3 219	4 284	3 223	4 218
off-pump	2 168	3 926	2 190	4 017	2 206	4 103	2 206	4 065	2 210	3 917
< 1 MW	61	146	64	156	67	171	63	168	63	177
1 MW – 10 MW	249	601	251	605	264	674	238	634	258	721
> 10 MW	1 858	3 600	1 875	3 670	1 875	3 666	1 905	3 671	1 889	3 441
Pumped-Storage Hydropower Plants	864		864		864		864		864	
Mixed mode of operation (pump and off-pump accumulation)**	149	421	149	413	149	409	149	407	149	422
Geothermal power plants										
Solar power plants	1 013	814	1 020	1 361	1 026	1 252	1 029	1 383	1 028	1 386
photovoltaic	1 013	814	1 020	1 361	1 026	1 252	1 029	1 383	1 028	1 386
concentrated solar power										
Tide, wave, ocean energy										
Wind power installations	677	1 039	683	1 220	600	1 301	600	1 366	600	1 408
onshore										
offshore										
Biomass***	14	66	34	112	40	201	54	270	57	354
solid biomass	14	65	30	95	30	139	34	151	19	163
biogas	0	1	4	17	10	62	20	119	38	191
bioliquids										
TOTAL	4 885	6 144	4 040	6070	4 084	7 075	5 001	7 303	5 007	7 365
of which cogeneration plants (CHP)		66		110		182		234		254

Source: Fourth national report on Bulgaria's progress in the promotion and use of energy from renewable sources

* Data normalised in accordance with Directive 2009/28/EC and the Eurostat methodology

** According to the new Eurostat methodology

*** Take into account only those complying with applicable sustainability criteria, cf. the last subparagraph of Article 5(1) of Directive 2009/28/EC

Electricity generation from hydro power plants (VETs) remained basically unchanged from 2012 to 2016, while photovoltaic plants (FETs) and Wind Plants (VtETs) increased by 19 %. The generation of electricity by biomass plants increased by 5 %.

- Transport sector

In 2012, deployment of biofuels was not taken into account because the requirements for the sustainability criteria were not introduced in the environmental legislation. For this reason, the renewable energy reported in 2012 in the Transport sector was 5.1 ktoe (only electricity consumption was reported). From 2013 to 2016, the final consumption of energy from renewable sources in the transport sector marked a sustainable growth to reach 171.5 ktoe in 2016. Higher consumption of energy from renewable sources was due to the consumption of bioethanol and biodiesel.

Overall actual contribution of each technology for renewable energy generation used in the Republic of Bulgaria to the binding targets for 2020 and to the indicative interim trajectory for the shares of energy from renewable sources in the transport sector (ktoe)*

	2012	2013	2014	2015	2016
Bioethanol	0.0	8.4	14.8	32.2	32.9
Biodiesel (FAME)	0.0	95.9	95.9	112.5	130.3
Renewable electricity	5.1	5.2	6.2	7.7	8.4
Including:					
consumed in road transport	0.7	1.0	1.7	1.2	1.3
consumed in rail transport	3.9	3.6	3.9	5.9	6.5
consumed in other transport sectors	0.5	0.5	0.6	0.6	0.6
TOTAL	5.1	109.4	116.9	152.5	171.513 ¹³

ii. *Indicative projections of development with existing policies for the year 2030 (with an outlook to the year 2040)*

4.3. Dimension Energy Efficiency

i. *Current primary and final energy consumption in the economy and per sector (including industry, residential, service and transport)*



Figure 10. Primary energy consumption, 2012–2016, ktoe

In 2013, primary energy consumption (PEC) marked a significant drop, by over 1.3 thousand ktoe compared to the previous year due to the impact of the economic crisis and reached its minimum value of 16 492 ktoe for the period.

In the next two years PEC rose but in 2016 it decreased again and remained below the 2012 level.

A positive trend was the higher use of renewable energy; the share of renewable energy

¹³ Source: Fourth national report on Bulgaria's progress in the promotion and use of energy from renewable sources

* For biofuels only the quantities compliant with the sustainability criteria should be taken into account, cf. the last subparagraph of Article 5(1) of Directive 2009/28/EC

in PEC rose from 9.1 % in 2012 to 11 % in 2016.

1. Final energy consumption



Figure 11. Final energy consumption, 2012–2016, ktoe. Source: NSI data

Final energy consumption by sector

Final energy consumption (FEC) also reached its lowest value in 2013, then increased and in 2016 exceeded the 2012 level by almost 500 ktoe.

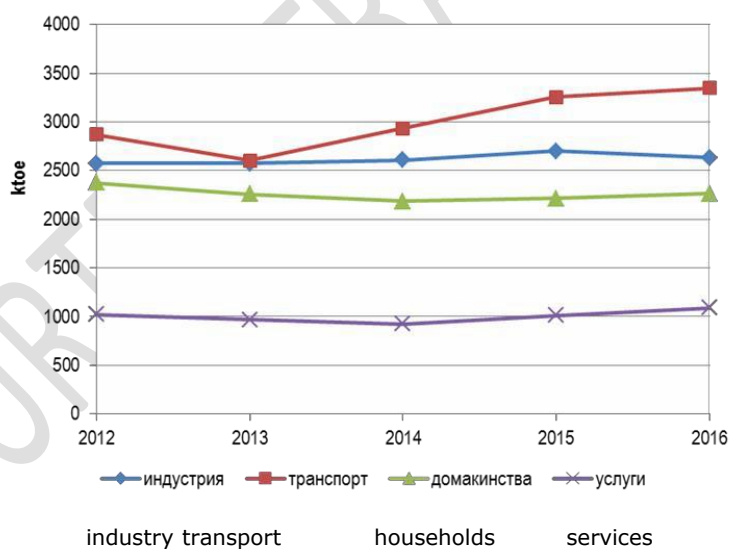


Figure 12. Final energy consumption by sector, 2012–2016. Source: NSI data

From 2012 to 2016, energy consumption rose more significantly in the Transport sector, by 16.6 % for the entire period under review. After 2008, as a result of the economic crisis, this sector replaced industry as the largest consumer of energy in the country. After 2013, the trend was for the FEC in transport to grow year-on-year but at a declining pace: from 12.8 % in 2014 to 2.9 % in 2016. The increased consumption in transport is largely associated with the significant decline in international oil prices after

2013.

In the period under review, a minimal increase was also observed in the FEC in the Services sector (6.6 %) and in the Industry sector (2.3 %).

From 2012 to 2016, the FEC in the Households sector declined by about 5 %.

Energy intensity

Energy intensity is the main indicator of how efficiently energy is used. The movements in primary and final energy intensity between 2012 and 2016 are shown in Figure 13.

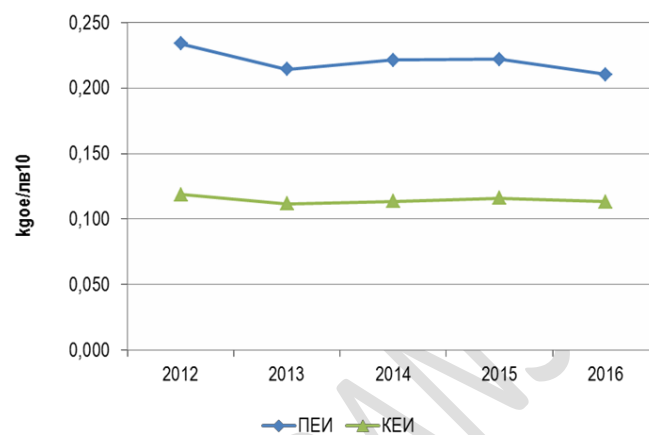


Figure 13. Primary and final energy intensity, 2012–2016, kgoe/BGN, 2010.

Source: NSI data

In 2013 and 2016, primary and final energy intensity decreased, while in 2014 and 2015 they increased. Over the entire period under consideration (from 2012 to 2016), primary and final energy intensity decreased minimally, by 10 % and 4.4 % respectively. The ratio of final to primary energy consumption rose from 50.7 % to 53.9 %, indicating a reduction of losses in the energy sector.

The low reduction rates of final energy intensity from 2012 to 2016 are due to the following factors:

- The impact of the economic crisis on all business entities and households reduced their opportunities to self-finance activities aimed at increasing energy efficiency.
- Incomplete utilisation of the production capacity and lack of funds for current repair of equipment, buildings, vehicles, etc.
- Considerably lower prices of natural gas and oil after 2013, which reduced the economic attractiveness of energy efficiency improvement projects and boosted fuel consumption in transport.
- Increased number and use of private cars at the expense of more energy-efficient modes of transport, poor technical condition of most of the car fleet and longer and massive congestions in large city centres where road traffic is concentrated.

- ii. Current potential for the application of high efficiency cogeneration and efficient district heating and cooling¹⁴

Existing capacity for high efficiency cogeneration

Parameter	Capacity for electricity generation from high efficiency cogeneration (MWe)
Total installed capacity for electricity generation (MWe)	13 563
Installed electricity capacity of large power plants and CHP plants (GWh/year)	8 585
Installed electricity capacity of CHP plants with certified high efficiency cogeneration (MWe)	814

The majority of the installed capacities of electricity generating plants are also capable of producing heat (63 %), i.e. they are cogenerations, but only 814 MWe of their heat generation capacity can be defined as high efficiency cogeneration.

Technical potentials in 2025

The table below shows the total heating demand in 2025, taking account of the projected GDP growth in Bulgaria and the expected reduction of energy intensity in the same period. Accordingly, gross heat generation envisages lower heat losses in transition for existing district heating networks, from slightly above 23 % in 2014 to 10 % in 2025, or a reduction of total losses from 7 % in 2014 to 5 % in 2025.

The potential for new high efficiency cogeneration facilities is assessed on the basis of the population without district heating and of the climatic indicators in the areas with such population. The applying of the following criteria:

- population above 42 000 inhabitants and
- heat consumption exceeding 10 GWh per annum

showed that about 50 % of the population without district heating in the country or 19 settlements fall in the potential for new high efficiency cogeneration.

The average heat load (based on the average duration of the heating season and the share of heat for heating, assumed ratio of $f_t=0.9$) is determined taking into account the heat supplied to these settlements. The total heating load plus losses is determined by taking into account the load for household hot water and applying the expected losses of heat in transmission. The average minimum and the average outside temperatures show the peak heat load for the respective settlements.

When the potential is calculated, the change in GDP and the energy intensity are taken

¹⁴ In accordance with Article 14(1) of Directive 2012/27/EU.

into account.

The net present value is calculated for each potential new high efficiency cogeneration facility, taking into account:

- the electricity and heat required to satisfy the base heat load;
- the operational hours;
- the lifetime of the installation;
- the fixed and variable costs;
- the capital expenditure required for the construction of the facility;
- the type of fuel.

The technology is selected on the basis of the highest net present value and the area where it should be deployed (which is generally a condition for access to various fuels).

The heat quantities from the new facilities should be connected to new local district networks. Additional high efficiency gas-fired facilities are envisaged to be built in the places with existing cogeneration facilities and the difference to peak load is to be covered by boilers. In places without existing cogeneration, gas-fired boilers will be constructed.

These facilities are envisaged to replace inefficient facilities in the public sector and the services sector which are not connected to district heating.

Technical potential for heat generation in new high efficiency cogenerations and alternatives in 2025.

Technical potential for heat generation GWh/year	Share by sector and by district heating network					TOTAL
	Existing district heating networks	Industry	Public sector and services not connected to district heating	Individual heating in residential buildings not connected to district heating	New district heating networks – local and extensions	
Total heating demand	5 967	11 013	6 642	21 967	1 038	46 627
Breakdown: combined energy production with additional heat from boilers						
Share of high efficiency cogeneration	64 %	83 %			100 %	
Share of boilers	36 %	17 %			0 %	
Total generation, gross	6 563	11 123	6 538	21 967	1 142	47 334
Places with existing cogeneration	4 221	9 189	-	-	993	14 404
High efficiency gas-powered cogeneration with additional heat from boilers	2 895	7 627			993	11 515
High efficiency coal-powered cogeneration with additional heat from boilers	1 326	1 562			-	2 888
Places without existing cogeneration	2 342	1 934	6 538	21 967	149	32 930
Heat generation from gas-fuelled boilers	2 302	-	6 538		149	8 989
Heat generation from coal-fuelled boilers	-	-				-
Heat generation from biomass-fuelled boilers	39	-				39
Gas-powered micro cogeneration	-	-				-
Alternative high efficiency solutions						
Heat pumps			6 538			
Solar and geothermal installations, with additional heat from boilers						

The potential for heat generation in new cogeneration installations can be realised mainly through:

- switching from separate heat generation to high efficiency cogeneration CHP;
- switching from Rankine steam cycle to combined gas and steam cycle;
- waste use potential.

iii. Projections considering 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 for the year 2030)

iv. Cost-optimal levels of minimum energy performance requirements resulting from national calculations, in accordance with Article 5 of Directive 2010/31/EU

4.4. Dimension Energy security

i. Current energy mix, domestic energy resources, import dependency, including relevant risks

➤ *Current energy mix*

According to 2017 data of the National Statistical Institute (NSI), the production of primary energy in the country in 2017 was 11 674 ktoe and met 62 % of the gross inland consumption; its structure remained comparatively unchanged in recent years and its dynamics was driven by inland energy consumption.

In the structure of primary energy production by type of fuel and energy, solid fuels (indigenous lignite and brown coal) have the highest share of 48.9 %, followed by nuclear energy at 33.8 %. The breakdown of the other fuels and energy is as follows: renewable energy at 16.6 %, natural gas at 0.6 % and liquid fuels at 0.2 %.



Solid fuels 48.9 % Liquid fuels 0.2 % Natural gas 0.6 %
 Renewable energy 16.6 % Nuclear energy 33.8 %

Figure 14. Structure of primary energy production in 2017, %. Source: 2017 NSI data

Compared to 2016, primary energy production increased by 3.8 %. This was entirely due to the increase of indigenous coal production by 10.4 %. All other fuels and energy registered a decline: natural gas by 15.7 %, renewable energy by 3.3 %, nuclear energy by 1.8 % and liquid fuels by 0.4 %.

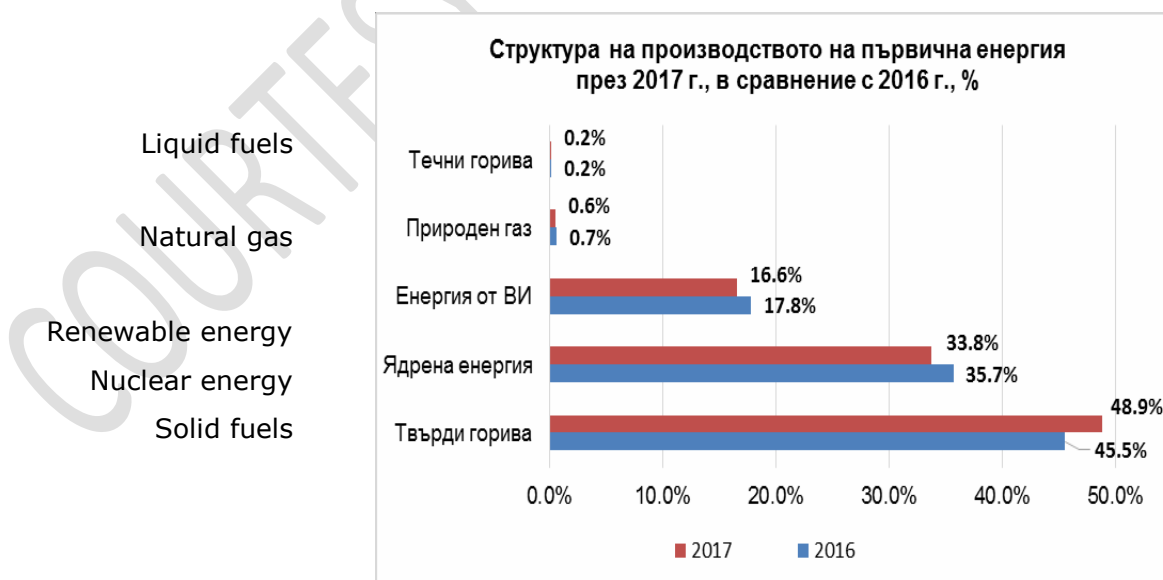


Figure 15. Structure of primary energy production in 2017 relative to 2016, %. Source: 2017 NSI data

In 2017, imports of fuels and energy amounted to 13 298 ktoe. Oil and petroleum

products had the largest share, 72.0 %, followed by natural gas with a share of 20.5 %. The breakdown of the other fuels and energy is as follows: solid fuels at 4.4 %, electricity at 2.4 % and renewable energy at 0.8 %.



Solid fuels 4.4 %

Liquid fuels 72.0 %

Natural gas 20.5 %

Renewable energy 0.8 %

Electricity 2.4 %

Figure 16. Imports of fuels and energy, %. Source: 2017 NSI data

Compared to 2016, imports increased by 4 %. Imports of liquid fuels (oil and petroleum products) rose by 5.3 %, of natural gas by 4.8 % and of solid fuels by 3.6 %. Reductions occurred in renewable energy (by 55.3 %) and nuclear energy (by 23.3 %).

In 2017, imports of fuels and energy amounted to 5 813 ktoe. Liquid fuels (petroleum products) at 83.9 % and electricity at 13.6 % held the highest share. The breakdown of the other fuels and energy is as follows: renewable energy at 1.8 %, natural gas at 0.5 % and solid fuels at 0.2 %.



Solid fuels 4.4 %
 Natural gas 20.5 %
 Electricity 2.4 %
 Liquid fuels 72.0 %
 Renewable energy 0.8 %

Figure 17. Exports of fuels and energy, %. Source: 2017 NSI data

The gross inland consumption of fuels and energy in the country amounted to 18 884 ktoe in 2017. Solid fuels held the highest share at 32.6 %, followed by liquid fuels at 24.1 %. The breakdown of the other fuels and energy is as follows: nuclear energy at 20.9 %, natural gas at 14.6 % and renewable energy at 10.3 %.



Solid fuels 0.2 %
 Natural gas 0.5 %
 Electricity 13.6 %
 Liquid fuels 83.9 %
 Renewable energy 1.8 %

Figure 18. Gross inland consumption, %. Source: 2017 NSI data

Compared to 2016, gross inland consumption increased by 3.4 %. Consumption of solid fuels rose by 6.9 %, of liquid fuels by 4.5 % and of natural gas by 2.7 %. Reductions occurred in renewable energy (by 3.9 %) and nuclear energy (by 1.8 %). In 2017, final energy consumption was 9 777 ktoe. Liquid fuels held the highest share in the structure of final energy consumption at 34.9 %, followed by electricity at 26.3 %. The breakdown of the other fuels and energy is as follows: renewable energy at 14.1 %, natural gas at 13.8 %, heat energy at 6.7 % and solid fuels at 4.2 %.

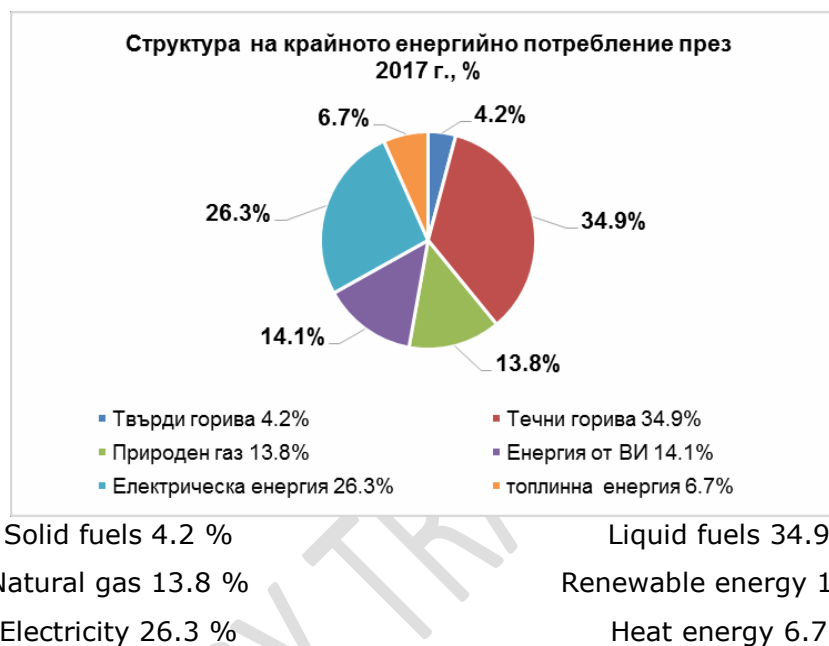


Figure 19. Structure of final energy consumption, %. Source: 2017 NSI data

All sectors show higher final energy consumption; the Agriculture sector is an exception with a decline in 2017 compared to 2016. The reported growth in the other sectors is as follows: in the Industry sector by 4.5 %, in the Transport sector by 2.5 %, in the Services sector by 2.4 % and in the Household sector by 1.9 %. In 2017, the Transport sector had a 34 % share in final energy consumption and retained its 10-year position of a leading sector in final energy consumption. The increase reported in the Industry sector, however, could not offset the decline in the recent years. With a share of 28 %, it was the second important sector. The shares in final energy consumption of the Household, Services and Agriculture sectors were 24 %, 12 % and 2 % respectively. The structure of final energy consumption by sector in 2017 was identical to that in 2016.

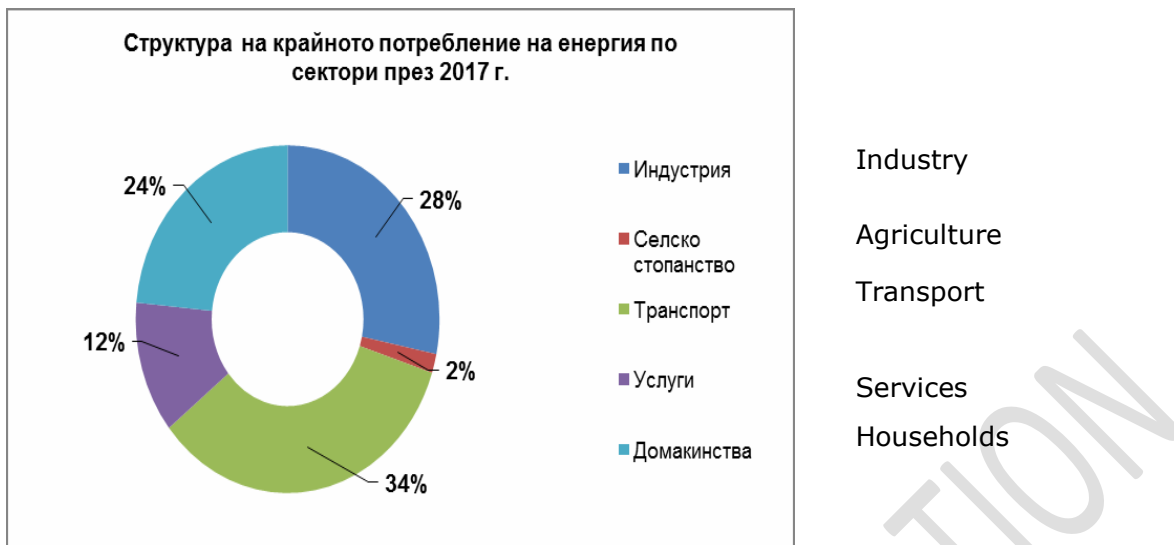
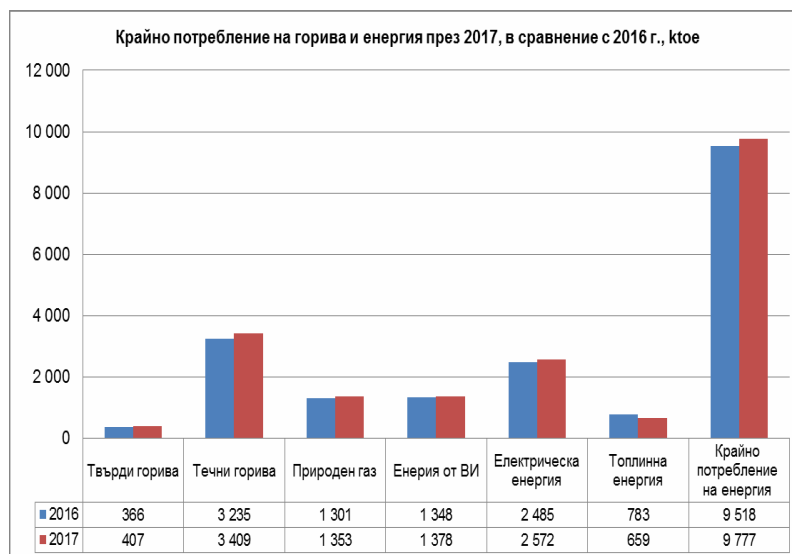


Figure 20. Structure of final energy consumption, %. Source: 2017 NSI data

With a 34.9 % share in 2017, liquid fuels which are mainly used in road transport (84 %) were the most common energy carrier in final energy consumption. In 2017, electricity consumption amounted to 2 572 ktoe (29 912 GWh), with a 26.3 % share in final energy consumption and a growth of 3.4 % compared to 2016. In 2017, the use of renewable energy rose by 2.2 %. The main renewable source used in the country is biomass. It accounts for 87 % of final consumption of renewable energy. The increase in the final consumption of natural gas by 3.9 % can be highlights as a positive trend in 2017. In 2017, final heat consumption decreased by 18.9 %. One of the reasons for this was the milder winter. Solid fuels rose by 10.1 %.



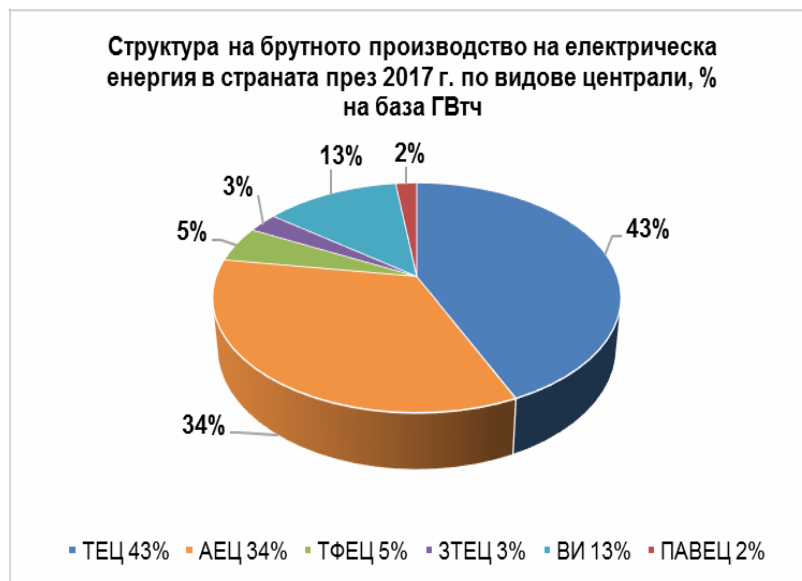
Solid fuels Liquid fuels Natural gas Renewable energy Electricity Heat Final energy consumption

Figure 21. Final energy consumption in 2017 relative to 2016, %. Source: NSI data

The Republic of Bulgaria has a diverse electricity generation mix, including nuclear and thermal power plants and RES plants (water, wind and solar power plants and biomass plants).

According to 2017 data of the Ministry of Energy, gross electricity generation was 45.5 TWh, up by 0.8% compared to 2016.

Thermal power plants (TETs) held the highest share in electricity generation in 2017 at 43 %, followed by the Nuclear power plant (AETs) at 34 %, renewable energy installations at 13 %, district heating plants (TfETs) at 5 %, factory thermal power plants (ZTETs) at 3 % and pumped-storage hydropower plants (PAVETs) at 2 %.



TETs 43 % AETs 34 % TFETs 5 % ZTETs 3 % RES 13 % PAVETs 2 %

Figure 22. Structure of gross electricity generation, by type of power plant, %. Source: 2017 NSI data

The share of indigenous energy carriers input in electricity generation was 96 % and the share of imported energy carriers was 4 % (nuclear energy is reported as an indigenous energy carrier).

➤ *own energy sources*

Bulgaria makes maximum use of the existing potential of its indigenous resources in compliance with environmental requirements. The main energy sources of energy generation are solid fuels and nuclear energy.

The power plants using indigenous coal account for about 48 % of total electricity generation and guarantee Bulgaria's energy security and the competitiveness of the Bulgarian economy. Indigenous coal will provide resources for electricity generation in the next 60 years.

Nuclear energy is a key energy carrier that ensures base electricity production at predictable and competitive prices. Kozloduy Nuclear Power Plant AD generates about 33 % of the electricity in the country and guarantees Bulgaria's energy security.

Deployment of renewable energy is the third important local energy resource in recent years. The main reason is associated with the higher deployment of biomass and solar and wind energy in electricity generation.

➤ *import dependency*

In 2016, according to Eurostat data, the country's energy dependency on fuels and

energy in gross final consumption was 37.2 % and was much lower than the average figure for the EU Member States (53.6 %). This is due to the methodology adopted by Eurostat, according to which nuclear energy is reported as indigenous energy source.

➤ *relevant risks*

Imports of oil and natural gas come mainly from the Russian Federation. Abrupt interruptions of supply for a longer period could affect adversely all aspects of the Bulgarian economy, including energy production and technological processes in industry, transport, etc. that rely on said supplies.

ii. Projections of development with existing policies and measures at least until 2040 (including for the year 2030)

For the purposes of the Integrated National Plan, a forecast energy balance was developed on the basis of a combination of forecasts for extraction and imports of energy carriers which are necessary to meet the consumption of fuels and energy in the country. Estimates were made of the future development of the sectors of electricity, heating and cooling, oil processing and other conversion processes. The forecasts for the total balance of fuels and energy in the country are based on forecast results from Eurostat, the National Statistical Institute, the Bulgarian Academy of Sciences, the Electricity System Operator Bulgartransgaz EAD, LUKOIL Neftohim Burgas AD, the Ministry of Energy, the Black Sea Energy Research Centre, etc.

The projected electricity balance of the country takes account of the opportunities for energy efficiency improvement and is based on the planned final consumption in the country.

The projection of the electricity sector is based on the following assumptions:

- preserving the role of indigenous coal as a main source of electricity generation by thermal power plants;
- preserving the role of nuclear energy;
- electricity generation from renewable sources without new support schemes, under market conditions and with a focus on captive consumption.

The forecast assumes energy efficiency improvement by 27 % and a higher share of renewable energy in gross final energy consumption of up to 25 %.

In 2030 and 2040, primary energy production is expected to increase by 17 % and 22 % compared to 2017. A decline of 3 % compared to 2040 is expected in 2050.

Imports of primary fuels will reach their highest value in 2021 and after that a downward trend will follow until 2050. The main reasons behind this are improved energy efficiency and the possible commissioning of new nuclear power facilities.

As regards exports of electricity in 2030, there is a 59 % growth compared to 2017. This

growth will continue until 2040, reaching 68 % compared to 2017. In 2050, exports of electricity will decrease by 20 % compared to 2040.

By 2030, gross final energy consumption will decrease by nearly 1 % compared to 2017 and the trend will continue further until 2040 and 2050.

By 2030, final energy consumption will decrease by 11 % compared to 2017 and is expected to decrease further in 2040 and 2050.

In 2030, final electricity consumption in the country is expected to decrease by 6 % compared to 2017. In the longer-term until 2050, electricity consumption is expected to rise by 5 % compared to 2017.

4.5. Dimension Internal energy market

4.5.1. Electricity interconnectivity

i. Current interconnection level and main interconnectors

The Bulgarian electricity system (EES) operates in parallel with the electricity systems of the countries in continental Europe. Our EES is interconnected with the united European EES through the following interconnectors:

- 400 kV interconnector from Kozloduy Nuclear Power Plant (BG) to Cancarene substation (RO);
- 400 kV interconnector from Kozloduy Nuclear Power Plant (BG) to Cancarene substation (RO);
- 400 kV interconnector from Varna substation (BG) to Stupina substation (RO);
- 400 kV interconnector from Dobrudzha substation (BG) to Rahman substation (RO);
- 400 kV interconnector from Sofia zapad substation (BG) to Nish substation (RS);
- 400 kV interconnector from Chervena Mogila substation (BG) to Štip substation (MK);
- 400 kV interconnector from Blagoevgrad substation (BG) to Thessaloniki substation (GR);
- 400 kV interconnector from TETs Maritsa Iztok 3 (BG) to Hamitabat substation (TR);
- 400 kV interconnector from TETs Maritsa Iztok 3 (BG) to Hamitabat substation (TR).

The current level of electricity interconnection is:

- 16.2 % of transmission capacity in exports, taking into account the security criteria;
- 13.2 % of transmission capacity in imports, taking into account the security criteria;
- 152 % of rated heat transmission capacity against peak load;
- 281 % of total rated heat transmission capacity against the installed renewable generation capacity.

ii. Projections of interconnector expansion requirements (including for the year 2030)

Outlook for the development of electricity interconnection at least until 2040 and at least until 2030:

Construction of the following new electricity interconnectors is envisaged:

- 400 kV interconnector from Maritsa Iztok substation (BG) to Nea Santa substation (GR);
- 400 kV interconnector from Sofia zapad substation (BG) to Nish substation (RS), second connection.

The new electricity interconnector between Maritsa Iztok and Nea Santa is a project of common interest (PCI).

After the new interconnectors listed above are constructed, the transfer capacity for electricity exchange will reach 22 %.

The development of transmission networks and interconnectors of the countries in the South-Eastern part of continental Europe is planned in the regional investment plan and is approved every two years in the ten-year network development plan drawn up by ENTSO-E with a long-term horizon until 2040.

Bulgaria, Greece and Turkey are implementing a trilateral project to assess the possibilities for construction of a third interconnector between Bulgaria and Turkey. The work has not been completed yet. For the time being, Turkey has not presented an official proposal for including the construction of new electricity interconnectors in the regional investment plan of ENTSO-E.

4.5.2. Electricity and gas transmission infrastructure

i. Key characteristics of the existing transmission infrastructure for electricity and gas

Structure of the electricity transmission network:

The Bulgarian electricity system operates in parallel with the electricity systems of the

countries in continental Europe. Our EES is interconnected with the united European EES through four interconnectors with Romania, two interconnectors with Turkey and one each with Serbia, Macedonia and Greece as follows:

- 400 kV interconnector from Kozloduy Nuclear Power Plant (BG) to Cancarene substation (RO);
- 400 kV interconnector from Kozloduy Nuclear Power Plant (BG) to Cancarene substation (RO);
- 400 kV interconnector from Varna substation (BG) to Stupina substation (RO);
- 400 kV interconnector from Dobrudzha substation (BG) to Rahman substation (RO);
- 400 kV interconnector from Sofia zapad substation (BG) to Nish substation (RS);
- 400 kV interconnector from Chervena Mogila substation (BG) to Štip substation (MK);
- 400 kV interconnector from Blagoevgrad substation (BG) to Thessaloniki substation (GR);
- 400 kV interconnector from TETs Maritsa Iztok 3 (BG) to Hamitabat substation (TR);
- 400 kV interconnector from TETs Maritsa Iztok 3 (BG) to Hamitabat substation (TR).

The existing electricity transmission infrastructure covers: 2 571 km of 400 kV power lines, 2 837 km of 220 kV power lines, 9 960 km of 110 kV power lines, 34 system substations and 263 reducing substations.

National electricity transmission system power lines:

- 400 kV PLs with a total length of 2 519 km;
- 220 kV PLs with a total length of 2 812 km;
- 110 kV PLs with a total length of 9 990 km;

Transformer substations:

- 32 system substations with a total transformer capacity of 15 888 MVA;
- 259 reducing substations with a total transformer capacity of 15 383 MVA;

Distribution stations:

- one 400 kV distribution station;
- one 110 kV distribution station;

Optical network:

- with a total length of 3 118 km.

Structure of the gas transmission network:

The gas infrastructure owned by Bulgartransgaz EAD on the territory of the Republic of Bulgaria covers the national gas transmission network with a total length of the gas infrastructure of 2 765 km that provides gas to the majority of consumers in Bulgaria and

transit transfer of natural gas for Turkey, Greece and Macedonia and an underground gas storage facility in Chiren (Chiren UGS) which is directly connected to the national gas transmission network.

The national gas transmission network (NGPM) [comprises] 9 compressor stations: Kardam-1 CS, Valchi Dol CS, Polski Senovets CS, Kardam-2 CS, Provadia CS, Lozenets CS, Strandzha CS, Ihtiman CS and Petrich CS, with a total installed capacity of 319 MW, gas regulation stations, gas measuring stations, cathodic protection, end-of-pipe equipment, communication system, information system and other ancillary facilities. The technical transfer capacity to consumers connected to the grid in Bulgaria amounts to 7.4 billion m³ p.a. and the maximum operating pressure is 54 bars. The technical natural gas transit transfer capacity for the three directions totals 17.8 billion m³ p.a. and the maximum operating pressure is 54 bars.

Bulgartransgaz EAD has built and put into service two reverse stations measuring the natural gas flows, Ihtiman Gas Measuring Station and Lozenets Gas Measuring Station, which allow the operator to transfer natural gas to users via different routes.

The Chiren Underground Gas Storage is built in the land of the village of Chiren and is based on the already exhausted gas condensing storage with the same name. It is equipped with the required specialised underground and ground devices to ensure compression, extraction and quality of gas storage. Chiren UGS has 24 drilling wells and a compressor station with a total installed capacity of 10 MW. The current capacity of the facility can ensure natural gas storage of 550 million m³. The extraction and compression capacity is directly dependent on the layer pressure and on the degree to which the storage facility is filled. The minimum extraction capacity is 0.5 million m³/day and the maximum extraction capacity is 3.4 million m³/day. Where necessary, the so-called forced (emergency) extraction can be carried out and the extraction capacity may reach up to 4.2 million m³/day. However, the emergency mode of operation can be implemented provided the gas storage is full and for a period of maximum 30 days. Chiren UGS is used to cover the seasonal fluctuations in consumption in the Republic of Bulgaria.

ii. Projections of network expansion requirements at least until 2040 (including for the year 2030)

Electricity transmission infrastructure:

The following new 400 kV internal power lines (PLs) are envisaged to be constructed:

- 400 kV PL from Plovdiv substation to Maritsa Iztok substation;
- 400 kV PL from Maritsa Iztok substation to Maritsa Iztok 3 Thermal Power Plant;
- 400 kV PL from Maritsa Iztok substation to Burgas substation;
- 400 kV PL from Burgas substation to Varna substation.

The new internal power lines mentioned above are projects of common interest (PCI).

Next in order of importance are the new 400 kV power lines in the North—South direction (Vetren—Blagoevgrad and Tsarevets—Plovdiv). A renovation of a substantial part of the 110 kV network is planned. Modernisation and expansion of many substations will take place through replacement of equipment and protection relays, telecommunication devices and method of management. The transformer capacity between 220 kV and 110 kV networks in the Open Distribution System (ORU) of Varna Thermal Power Plant will be increased. Stationary compensating devices will be provided to offset high pressure in minimum modes in the area of Marishki Basein and Dobrudzha substation. New communication routes will be built.

If a positive decision for the construction of a new nuclear facility is granted, the electricity transmission network in the North—South direction will be developed further and the northern part of the 400 kV ring will be reinforced.

Gas transmission infrastructure:

The planned activities of the gas transmission operator will ensure the infrastructure required to enable acceptance of gas flows for transfer to and from different regions. The operator will provide the required cross-border capacity that would allow transmission diversity in gas flow directions. The actual use of this capacity and the specific flow directions will depend directly on the outlook for gas market development in Europe and in the country.

iii. Indicative projections of development with existing policies for the year 2030 (with an outlook to the year 2040)

Electricity transmission infrastructure:

The transmission capacity must be at least 10 % of the installed generation starting from 2020 and at least 15 % of the installed generation starting from 2030, taking into account the security, the (N-1) criterion and the reliability margin.

After the new power lines referred to in point (ii) are built, the transfer capacity for electricity exchange will reach 22 %.

4.5.3. Electricity and gas markets, energy prices

i. Current situation of electricity and gas markets, including energy prices

With regard to restructuring the activities relating to production, transmission and energy system management, in accordance with Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC (Directive 2009/72/EC) the Republic of Bulgaria chose the 'independent transmission operator' model. In this model the transmission operator and grid assets are allocated to a separate legal entity within a vertically integrated undertaking that performs the functions of production and supply.

In line with the requirements of Directive 2009/72/EC, after the procedure for separation of ESO EAD from NEK EAD was completed in 2014, ESO EAD is the owner and operator of the entire electricity transmission network in the Republic of Bulgaria.

ESO EAD was certified as an independent transmission operator with a decision of the KEVR of 2015. Thus the requirements laid down in Articles 10 and 11 of Directive 2009/72/EC and Article 3 of Regulation (EC) No 714/2009 were complied with.

Electricity distribution is carried out by operators of electricity distribution networks for designated territories: CEZ Razpredelenie Bulgaria AD (CEZ Distribution Bulgaria AD), Elektrorazpredelenie Sever AD (Electricity distribution North AD), Elektrorazpredelenie Yug AD (Electricity distribution South AED) and Elektrorazpredelenie Zlatni Piasatsi AD (Electricity distribution Zlatni Piasatsi AD).

In accordance with Directive 2009/72/EC and the ZE, the electricity market in Bulgaria was liberalised starting from 1.07.2007. The liberalisation process is staged and electricity in Bulgaria is traded on two market segments: at freely negotiated prices and at regulated prices.

The electricity market in Bulgaria is identified as national. Its structure and organisation are laid down in Rules for Electricity Trading. The electricity market includes an electricity market based on bilateral contracts entered into on the exchange platform, a balancing energy market, a market for reserve and ancillary services and a market for interconnection capacity.

Commercial players are electricity producers, traders in electricity, coordinators of balancing groups, final customers, the public electricity provider, end suppliers of electricity, the independent transmission operator, the exchange market operator, the operators of electricity distribution networks, the suppliers of last resort and the traction electric power distribution company.

The electricity exchange is organised by BNEB EAD which holds the licence for that activity. BNEB administers all transactions in the Day Ahead and Intraday segments and in the centralised market for electricity purchases and sales based on bilateral contracts.

Following the legislative changes made in 2018, transactions in electricity at freely negotiated prices effected by electricity producers with a total installed capacity of 4 MW and above 4 MW take place on the organised electricity exchange. This is a step towards increased market liquidity.

Observations in 2017 showed that the balancing energy market was operating soundly and ensured a predictable environment for the commercial players covered.

In 2017, the following were registered with the balancing energy market:

- ✓ 57 coordinators of standard balancing groups, which is double the number in the previous year;
- ✓ 15 coordinators of special balancing groups;

- ✓ 14 coordinators of combined balancing groups.

Pursuant to the ZE, every year the KEVR sets a maximum price for execution of transactions on the balancing energy market. For each settlement period, two prices of balancing energy are determined. The average price for energy deficit in 2017 was 191.17 BGN/MWh. The average price for energy surplus in 2017 was 13.56 BGN/MWh.

Four operators of electricity distribution networks operate on the retail market. They are licensed to distribute electricity to customers connected to the low- and medium-voltage network in the respective designated territories.

In terms of supply, the retail market comprises three groups of suppliers:

- ✓ The supplier of last resort (SOLR) is a provider that guarantees the provision of a universal service as a last resort, in line with a licence granted by the KEVR, and is obliged to deliver electricity to customers which are connected to the distribution network and have not selected a trader of commercial energy or to deliver electricity to customers where the trader they have selected does not carry out supply for reasons beyond the customers' control. The final selling prices of the POLR are determined on the basis of the KEVR Methodology for setting electricity prices of supplier of last resort.
- ✓ The End Supplier of electricity supplies electricity at regulated prices set by the KEVR to sites of household and non-household final customers connected to the low-voltage electricity distribution network.
- ✓ Free market supplier is a trader providing electricity to household and non-household customers at prices based on demand and supply.

Household and non-household final customers connected to the electricity distribution network at low-voltage level purchase electricity from end suppliers at prices subject to regulation by the KEVR.

ii. Projections of development with existing policies and measures at least until 2040 (including for the year 2030)

For the purposes of the Integrated National Plan, a forecast energy balance was developed on the basis of a combination of forecasts for extraction and imports of energy carriers which are necessary to meet the consumption of fuels and energy in the country. Estimates were made of the future development of the sectors of electricity, heating and cooling, oil processing and other conversion processes. The forecasts for the total balance of fuels and energy in the country are based on forecast results from Eurostat, the National Statistical Institute, the Bulgarian Academy of Sciences, the Electricity System Operator Bulgartransgaz EAD, LUKOIL Neftohim Burgas AD, the Ministry of Energy, the Black Sea Energy Research Centre, etc.

The projected electricity balance of the country takes account of the opportunities for energy efficiency improvement and is based on the planned final consumption in the

country.

The projection of the electricity sector is based on the following assumptions:

- preserving the role of indigenous coal as a main source of electricity generation by thermal power plants;
- preserving the role of nuclear energy;
- electricity generation from renewable sources without new support schemes, under market conditions and with a focus on captive consumption.

The forecast assumes energy efficiency improvement by 27 % and a higher share of renewable energy in gross final energy consumption of up to 25 %.

In 2030 and 2040, primary energy production is expected to increase by 17 % and 22 % compared to 2017. A decline of 3 % compared to 2040 is expected in 2050.

Imports of primary fuels will reach their highest value in 2021 and after that a downward trend will follow until 2050. The main reasons behind this are improved energy efficiency and the possible commissioning of new nuclear power facilities.

As regards exports of electricity in 2030, there is a 59 % growth compared to 2017. This growth will continue until 2040, reaching 68 % compared to 2017. In 2050, exports of electricity will decrease by 20 % compared to 2040.

By 2030, gross final energy consumption will decrease by nearly 1 % compared to 2017 and the trend will continue further until 2040 and 2050.

By 2030, final energy consumption will decrease by 11 % compared to 2017 and is expected to decrease further in 2040 and 2050.

In 2030, final electricity consumption in the country is expected to decrease by 6 % compared to 2017. In the longer-term until 2050, electricity consumption is expected to rise by 5 % compared to 2017.

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)*
- 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 of current price elements that make up the main three price components (energy, network, taxes/levies)*
- iv. Description of energy subsidies, including for fossil fuels*

Not applicable

5. IMPACT ASSESSMENT OF PLANNED POLICIES AND MEASURES

5.1. Impacts of planned policies and measures described in section 3 on energy system and GHG emissions and removals, including comparison to projections with existing policies and measures (as described 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 policy interactions (between existing policies and measures and planned policies and measures within a policy dimension and between existing policies and measures and planned policies and measures of different dimensions) at least until the last year of the period covered by the plan, in particular to establish a robust understanding of the impact of energy efficiency/energy savings policies on the sizing of the energy system and to reduce the risk of stranded investment in energy supply*
- 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*

The assessment of interactions will be made after the draft INECP is consulted with the EC

5.2. Macroeconomic and, to the extent feasible, the health, environmental, employment and education, skills and social impacts, including just transition aspects (in terms of costs and benefits as well as cost-effectiveness) of the planned policies and measures described in section 3 at least until the last year of the period covered by the plan, including comparison to projections with existing policies and measures

The macroeconomic and social policy impacts of the planned policies and measures will be assessed and a cost-benefit analysis will be carried out after the draft INECP is consulted with the EC.

5.3. Overview of investment needs

- i. existing investment flows and forward investment assumptions with regard to the planned policies and measures*
- ii. sector or market risk factors or barriers in the national or regional context*
- iii. analysis of additional public finance support or resources to fill identified gaps identified under point iii.*

The investment needs will be analysed before the final version is submitted to the EC.

5.4. Impacts 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 to projections with existing policies and measures

- i. Impacts on the energy system in neighbouring and other Member States in the region to the extent possible*

The impacts of the planned policies and measures on the energy system in neighbouring countries will be assessed after the draft INECP is coordinated with the EC.

- ii. Impacts on energy prices, utilities and energy market integration*

An analysis of the impacts of the planned policies and measures on energy prices, utilities and the energy market integration will be made after the draft INECP is consulted with the EC.

- iii. Where relevant, impacts on regional cooperation*

Part 2

List of parameters and variables to be reported in Section B of 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. GENERAL PARAMETERS AND VARIABLES

- (1) Population [million]
- (2) GDP [euro million]
- (3) Sectoral gross value added (including main industrial, construction, services, and agriculture sectors) [euro million]
- (4) Number of households [thousands]
- (5) Household size [inhabitants/household]
- (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 tonnes-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 [EUR/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

¹⁵ For the plan covering the period from 2021 to 2030: For each parameter/variable in the list, trends over the years 2005–2040 (2005–2050 where appropriate) including for the year 2030 in five-year intervals should be reported in sections 4 and 5. 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. ENERGY BALANCES AND INDICATORS

2.1. Energy supply

- (1) Indigenous Production by fuel type (all fuels and energies that are produced in significant quantities) [ktoe]
- (2) Net imports by fuel type and energy carriers (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 by fuel type source (including solids, all energy products: coal, crude oil and petroleum products, natural gas, nuclear energy, electricity, derived heat, renewables, waste) [ktoe]

2.2. Electricity and heat

- (1) Gross electricity generation [GWh]
- (2) Gross electricity generation by fuel (all energy products) [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 plants
- (6) Heat generation from combined heat and power plants, including industrial waste heat
- (7) Cross-border interconnection capacities for gas and electricity [definition for electricity in line with outcome of ongoing discussions on basis for 15 % interconnection target] and their projected usage rates

2.3. Transformation sector

- (1) Fuel inputs to thermal power generation (including solids, oil, gas) [ktoe]
- (2) Fuel inputs to other conversion processes [ktoe]

2.4. Energy consumption

- (1) Primary and final energy consumption [ktoe]
- (2) Final energy consumption by sector (including industry, residential, tertiary, agriculture and transport (including split between passenger and freight transport, when 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. Renewables

- (1) Gross final consumption of energy from renewable sources and share of renewable energy in gross final energy consumption and by sector (electricity, heating and cooling, transport) and by technology
- (2) Electricity and heat generation from renewable energy in buildings; this shall include, where available, disaggregated data on energy produced, consumed and injected into the grid by solar photovoltaic systems, solar thermal systems, biomass, heat pumps, geothermal systems, as well as all other decentralised renewables systems
- (3) Where applicable, other national trajectories, including those that are long-term or sectoral the share of food-based and advanced biofuels, the share of renewable energy in district heating, as well as the renewable energy produced by cities and renewable energy communities, pursuant to the definition given in Article 22 of Directive (EU) 2018/2001.

3. GHG EMISSIONS AND REMOVALS RELATED INDICATORS

- (1) GHG emissions by policy sector (EU ETS, Regulation on effort sharing and LULUCF)
- (2) GHG emissions by IPCC sector and by gas (where relevant, split into EU ETS and effort sharing sectors) [tCO₂eq]
- (3) Carbon Intensity of the overall economy [tCO₂eq/GDP]

- (4) CO₂ emission related indicators
 - (a) GHG intensity of domestic power and heat generation [tCO₂eq/MWh]
 - (b) GHG intensity of final energy consumption by sector [tCO₂eq/toe]
- (5) Non-CO₂ emission related parameters
 - (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 fertilizers [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 CH₄ recovery in total CH₄ generation from landfills [%]

COURTESY TRANSLATION