Integrated National Energy and Climate Plan of the Republic of Serbia for the period 2030 with the projections up to 2050

SECTION A: NATIONAL PLAN

1 OVERVIEW AND PROCESS FOR ESTABLISHING THE PLAN

1.1 Executive Summary (overview/scope of the plan)

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

In March 2012, the European Council granted the Republic of Serbia candidate country status, while the decision of the European Council from June 2013 launched accession negotiations with the Republic of Serbia. In 2014, the Berlin Process was launched, as an initiative aiming at stepping up regional cooperation in the Western Balkans region and aiding the integration of countries into the European Union (EU). By gradually harmonizing national legal framework with the EU acquis, the Republic of Serbia performed numerous legislative alignments in the areas of climate change, environment and energy.

Due to the need to establish the global framework to avoid dangerous climate change by limiting global warming to well below 2°C and the pursuing efforts to limit it to 1.5°C, the multilateral climate change process was initiated in 2015. Thus, at the Paris climate conference (COP21), the Paris Agreement was adopted as a first-ever universal legally binding international treaty on climate change. Prior to the COP21, the Republic of Serbia had submitted Intended National Determined Contribution (INDC) to the United Nations Framework for Convention on Climate Change (UNFCCC), declaring the country's contribution to the global efforts for greenhouse gas (GHG) emissions reduction through: "*GHG emission reduction by 9,8% until 2030 compared to base-year (1990) emissions*". Following that, the Republic of Serbia ratified the Paris Agreement in 2017. Second National Determined Contribution (NDC) was submitted in August 2022, defining the intended reduction of 13.2% compared to 2010 level i.e. 33,3% compared to 1990 by 2030 (without LULUCF).

In November 2020, the Republic of Serbia signed the Sofia Declaration on the Green Agenda for the Western Balkans at the Western Balkans Summit under the framework of the Berlin Process initiative and committed to work towards the 2050 target of a carbon-neutral continent together with the European Union. At the beginning of 2021, the Republic of Serbia introduced the reforms of the national legal framework regarding energy and climate change, as the starting point for the energy transition process towards climate neutral development. A more complete harmonisation has been made with the regulations of the Third Energy Package of the EU energy legislation and certain provisions of the EU package Clean Energy for All Europeans.

The Republic of Serbia adopted a new legislative package consisting of **Amendments to Law of Energy**[1], **Law on Energy Efficiency and Rational Use of Energy**[2], **Law on Use of Renewable Energy Sources**[3], Amendments to Law on Use of RES[4], **Amendments to Law on Mining and Geological Research**[5], as well as the **Law on Climate Change**[6].

Following up on the obligation to adopt the Integrated National Energy and Climate Plan in accordance to the amendments to the **Law on Energy**, as well as in response to the **Recommendation of the Ministerial Council of the Energy Community**[7]on preparing for the development of Integrated National Energy and Climate Plans by the Contracting Parties of the Energy Community and relevant **Policy Guidance by the Energy Community Secretariat**[8], the Republic of Serbia prepared Integrated National Energy and Climate Plan (INECP) covering the period from 2021 to 2030. Furthermore, in 2021 the Ministerial Council of the Energy Community[9] incorporated Regulation (EU) 2018/1999 in the Energy Community acquis communautaire and amending Annex I of the Treaty.

Finally, it is important to point out that in December 2022 the Annex I to the Treaty Establishing the Energy Community has been amended and it incorporated Directive (EU) 2018/2001, Directive (EU) 2018/2002, Regulation (EU) 2018/1999, Delegated Regulation (EU) 2020/1044, Implementing Regulation (EU) 2020/1208, as well as Regulation (EU) 2019/942, Regulation (EU) 2019/943, Regulation (EU) 2015/1222, Regulation (EU) 2016/1719, Regulation (EU) 2017/2195, Regulation (EU) 2017/2196, Regulation (EU) 2017/1485[10]

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

The Integrated National Energy and Climate Plan has to take a holistic approach and address the five dimensions in an integrated way, as per provisions of the Rulebook on the detailed content and guidelines for determining the national goals of the Integrated National Energy and Climate Plan, the method of its preparation and reporting on its implementation[11]:

- **Decarbonisation** that presents specific area regarding the aim to present the country's commitment towards the climate action and decarbonising the economy, with specific focus on the increased use of renewable energy sources and reduction of carbon footprint.
  a) **Greenhouse Gas (GHG) Emissions** that presents specific sub-area regarding the aim to present the country's commitment towards reduction of energy-related and non-energy-related emissions.
  b) **Renewable Energy Sources (RES)** that presents specific sub-area regarding the aim to present the country's commitment towards boosting the deployment of renewables by keeping up with increasing energy consumption and addressing the transformation issue of the existing energy system in terms of technology transition.
- **Energy Efficiency** that presents specific sub-area regarding the aim to present the country's commitment towards increased energy efficiency across all sectors.
- **Energy Security** that presents specific area regarding the aim to present the country's commitment towards diversifying sources of energy and ensuring security of supply through solidarity and cooperation

[1]Official Gazette of RS, no. 40/21
[2]Official Gazette of RS, no. 40/21
[3]Official Gazette of RS, no. 40/21
[4]Official Gazette of RS, no. 35/23
[5]Official Gazette of RS, no. 40/21
[6]Official Gazette of RS, no. 26/21
[7] 2018/1/MC-EnC
[8] PG 03/2018
[9] Ministerial Council Decision 2021/14/MC-EnC of November 2021
[10] As per Ministerial Concil Decisions 2022/02/MC-EnC and 2022/03/MC-EnC.
[11] Official Gazette of RS, no. 49/22

between EU and Energy Community (EnC) countries.

- Internal Energy Market that presents specific area regarding the aim to present the country's commitment towards creation of fully integrated and functional market, enabling the free flow of energy through the Energy Community and European Union by the adequate infrastructure and without technical or regulatory barriers.
- Research, Innovation and Competitiveness that presents specific area regarding the aim to present the country's commitment towards supporting breakthroughs in low-carbon and clean energy technologies.

Strategic policy within the decarbonisation dimension includes definition of the national targets regarding the decarbonisation with the focus on the greenhouse gas (GHG) emissions reduction and share of energy from renewable sources in gross final consumption of energy. Based on the current situation, planned policy measures in the energy field, which generates about 80% of GHG emissions in the Republic of Serbia, will have a major contribution to decarbonisation process. Updated Serbia's Nationally Determined Contribution to the Paris Agreement is submitted to UNFCCC and National Emission Reduction Plan shall be implemented in practice for sulphur dioxide, nitrogen oxide and industrial dust. The majority of the policy measures are intended for the energy sector such as promotion of renewable energy sources and energy efficiency, which implementation will lead to overall GHG emissions reduction.

Definition of the national targets regarding the energy efficiency dimension which focuses on the improvement of energy efficiency can be expressed either through primary or final energy consumption, primary or final energy savings, or through energy intensity, as well as through the cumulative amount of end-use energy savings. It is important to provide indicative milestones of the long-term strategy for the renovation of the national stock of residential and non-residential buildings, both public and private, the roadmap with domestically established measurable progress indicators, an evidence-based estimate of expected energy savings and wider benefits, and the total floor area to be renovated or equivalent annual energy savings in accordance with long-term strategy for renovation of national stock of residential and non-residential buildings.

In the building sector a well-balanced mixture of policy measures, financing, fiscal and regulatory measures, will be implemented in order to support the energy renovation of the building stock and to attain the specified renovation rate. Financial support is necessary to be provided for fostering the energy upgrade of the residential and non-residential buildings. Furthermore, the most cost-effective individual heating and cooling technologies will be promoted through specialised instruments. For the case of the non-residential buildings, the planned programs will focus on measures for energy efficiency improvements taking into consideration their energy saving potential and economic effects.

The energy security dimension aims to define national targets related 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. Based on the current situation, diversification of sources of natural gas supply is of utmost importance. Another component is the upgrade of existing storage capacities or construction of new. Diversification of energy sources is addressed also in other dimensions such as promotion of RES production alternatives and assurance of security of supply through higher interconnections and fostering of market integration.

Concerning internal energy market, Serbia shall strive on the level of electricity interconnectivity, key electricity and gas transmission infrastructure projects, modernisation projects and main infrastructure projects envisaged other than Projects of Common Interest (PCIs). Furthermore, national objectives related to other aspects of the internal energy market such as increasing system flexibility, in particular related to the promotion of competitively determined electricity prices in line with relevant sectoral law, market integration and coupling, aimed at increasing the tradeable capacity of existing interconnectors, smart grids, aggregation,

demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment, and real-time price signals. The country will ensure achievement of national objectives with regard to electricity system adequacy, as well as for the flexibility of the energy system with integration of renewable energy production, while maintaining a low level of energy poverty and developing a program for vulnerable consumers.

In terms of research, innovation and competitiveness dimension, definition of the targets regarding the energy security has to focus on national objectives and funding targets for public and private research and innovation, as well as national 2050 objectives related to the promotion of clean energy technologies. Within research and innovation, an indicative number of proposed policy measures is provided to: increase the number of innovative start-ups, high-tech and intensive sectors in line with the Strategy for Smart Specialisation, improve effectiveness of research by placing an emphasis on results and providing incentives, develop skills that boost the commercial viability and to support the cooperation between research institutes and businesses in the technology transfer and exploitation of research results. Total expenditures for research and development activities in 2020 amounted to 0.91% of Gross Domestic Product (GDP). The Republic of Serbia shall strive for research and innovation as an opportunity to enhance the competitiveness of its national economy, transforming it into a driver for economic growth and job creation.

iii. Key objectives and priorities of the plan

The main pillars of the INECP comprise an increased penetration of RES in Serbia's energy mix along with targeted energy efficiency measures aiming to reduce the final energy consumption by increasing energy performance. This clean energy transition pathway tends to enhance the country's energy security, safeguards its energy dependency while ensuring a realistic reduction of lignite use, contributing to a meaningful reduction of the GHG emissions by 2030.

The increased penetration of RES will constitute one of the most important objectives of the INECP for the Republic of Serbia reaching 33.6% share in the gross final energy consumption. RES will be considered as the major domestic source of electricity production with a share reaching 45% of the gross final electricity consumption in 2030 achieved mainly through the most cost-effective exploitation of the available potential for the case of wind and photovoltaic energy.

The efficient and regionally integrated operation of the new day-ahead electricity market, including the importance of merging the regional electricity market with the european electricity market, the simplification and acceleration of the licensing procedure, the digitization of the energy system, the enhancement and expansion of the existing electricity grid and its interconnections, the market uptake of energy storage, distributed RE and demand response resources as well as the gradual electrification and the energy coupling of final consumption sectors are considered as prerequisites for the maximum penetration of RES.

The increased interest of investors in Wind and PV installations, which is evident by the large number of applications, will ensure that the required new capacities will be installed by 2030 and the increase of the share from 30% in 2021 to 45% in 2030 can be achieved.

Another priority is the promotion of electromobility, which will rely considerably on the electricity production by RES, while considerable energy savings will be delivered contributing simultaneously to the attainment of the energy efficiency targets. Finally, the further exploitation of RES for the coverage of the thermal and cooling needs in buildings, the penetration of RES distributed technologies for electricity production and the promotion of advanced biofuels in transport sector consist additional priorities within the framework of the INECP for the further deployment of RES.

In addition, the **promotion of energy efficiency** comprises a fundamental priority highlighting the necessity of implementing policies and measures that in turn demonstrate the most economically and socially effective approach for all end-uses. The final energy consumption in 2030 will amount to at most 9.6 Mtoe, while the primary energy consumption will be equal to at most 14.68 Mtoe in 2030. It should be noted that the improvement of the energy efficiency delivers additional multiple benefits, such as the reduction of the GHG emissions, the reduction of the energy costs, the improvement of the comfort conditions in buildings, the increase of the value added and employment and the improvement of businesses' competitiveness, reduction of poverty.

The **renovation of the buildings** will contribute meaningfully to the fulfilment of the energy efficiency targets. Targeted policies and measures will be initiated to foster a renovation rate equal to 1% approximately on annual basis for the case of the residential buildings (according to the provisions of the Long Term Buildings Renovation Strategy), 3% for the public buildings and 2.3% for the other non-residential buildings. Similarly, policies and measures are foreseen also for the industrial and transport sectors focusing on the promotion of the most cost-effective technologies and vehicles respectively.

Emphasis will be given on **the optimal use of available public and own financial sources** ensuring the maximization of the triggered benefits to the final consumers taking due consideration the specificities of each category of final consumers and of the characteristics of the energy sector.

Another essential objective within the framework of the INECP is the ambitious, as well as realistic, programme for **reducing the share of lignite in electricity production**, i.e., lignite phase-out, by up to 25% in 2030 compared to 2019. The lignite phase-out in the Republic of Serbia will be implemented with targeted initiatives including the adoption of integrated programmes for supporting the lignite-producing areas and ensuring the smooth transition to the post-lignite era.

All the specified objectives of the INECP will consequently contribute to the **meaningful reduction of the GHG emissions by 2030** attaining a GHG emission reduction equal to 13.2% compared to 2010 level i.e. 33,3% compared to 1990 by 2030 (excluding non-energy related emissions from agriculture, waste, land use, land use change and forestry). The target for the overall emissions reduction for 2030 is 40.3% compared to the 1990 levels (including LULUCF). Generally, the Republic of Serbia has decided to support the transition towards a climate neutral economy in order to improve the competitiveness of the economy, to increase the employment, to strengthen the role of consumers and to improve the overall operational framework of competitive energy markets increasing the social welfare.

In this context, **additional national objectives** are also being developed, taking into consideration the existing potential, the technical specificities and the qualitative characteristics of the Serbian energy sector and economy.

More specifically, the following qualitative objectives have been determined:

- Strengthen interconnectivity and security of energy supply
- Liberalize and increase competitiveness of the energy markets
- Facilitate the optimal development and operation of the energy system and energy infrastructures
- Protect and strengthen the role of consumers
- Alter the current consumption patterns and promote energy-efficient and low- emission fuels in end-users
- Strengthen the competitiveness of the national economy

- Promote the research and innovation in environmental and energy issues

It should be noted that the mobilization of significant investment funds both from the own resources and public funds and the combination of specialized financing mechanisms is considered as a prerequisite for the achievement of the established targets allowing the cost- and time-effective implementation of the foreseen policies and measures.

1.2 Overview of current policy situation

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

In this section an overview of the current energy system and policy context in the country is presented. Due to the effect of the COVID-19 epidemic on the economic growth, consumption of energy and other energy related indicators, in 2019 is taken as a reference to avoid any misinterpretation of the results and comparison between the countries. Moreover, selected neighbouring countries from Energy Community and European Union (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Montenegro and North Macedonia) and EU average values are used for comparison purposes, which should provide a better understanding of Serbia's current state in relation to other countries.

The population of the Republic of Serbia is estimated at 6.964 million people in 2019, which sets Serbia in the second place among the selected 7 countries used for comparison purposes in this section (see Figure 1.1). In terms of the real GDP growth, it was 4.3% in 2019 which is the highest growth compared to the GDP growth of other countries (see Figure 1.2). The capital investments proposed with the set of policies and measures presented in this INECP in Chapter 3 should be also taken into account as the opportunity for setting an additional value to the GDP and supporting the process for country's economic growth.

Figure 1.1: Population in 2019, in million (source: Eurostat)

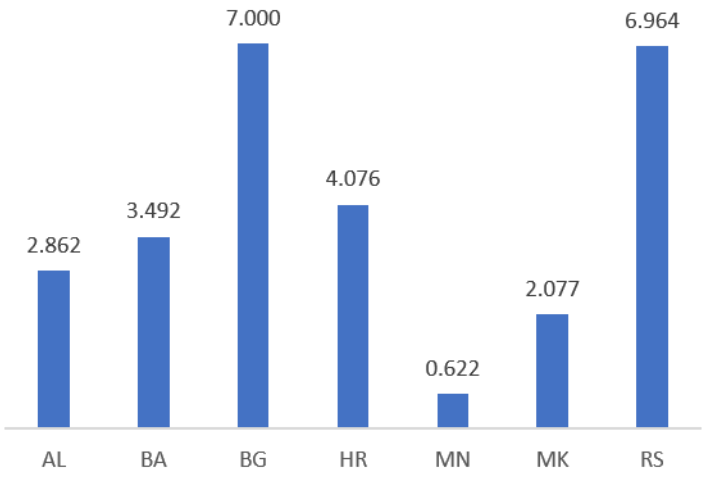


Figure 1.2: Real GDP growth rate in 2019, in % (source: Eurostat)

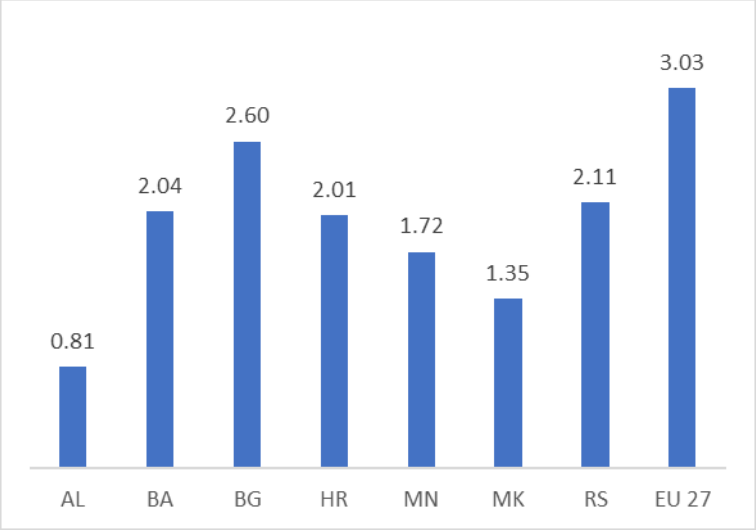
The long-term unemployment rate in Serbia is at the level of 5.3% in 2019 and continuously decreases. In comparison to the selected countries (see Figure 1.3), Serbia has the third smallest long-term unemployment rate, very close to the EU countries, while all other countries are above 12%.

Figure 1.3: Long-term unemployment rate in 2019, in % (source: Eurostat)[12]

The primary energy consumption per capita in Serbia is around 2.12 toe/capita, meaning that in average each citizen in Serbia consumes 24.6 MWh, which is 30% lower than the EU 27 average (see Figure 1.4). All countries, except Bulgaria, have a lower consumption per capita than Serbia. One of the key factors for that is due to the fact that 66.4% of electricity production in Serbia came from lignite-based power plants in 2019 and therefore thermal/lignite power plants require higher primary energy in comparison to other generation mix. For example, in Albania most of the electricity is generated from from hydro power plants leading to lower primary energy consumption.

Figure 1.4: Primary energy consumption per capita in 2019, in toe/capita (source: Eurostat)

[12]Note: Data for AL and BA are from 2018, as data for 2019 is not available on Eurostat



CO2 emissions

In Serbia each citizen is responsible for 7.8 t CO_2-eq (see Figure 1.5) that is the highest value compared to the selected neighbouring countries and slightly lower than the EU 27 average. Lower value can be seen in the case of Albania as the country produces most of its electricity from hydro.

Figure 1.5: CO_2-eq emissions per capita for 2019, in million tonnes of CO_2 (Source: Global Carbon Project)

Decarbonisation - Renewable energy sources

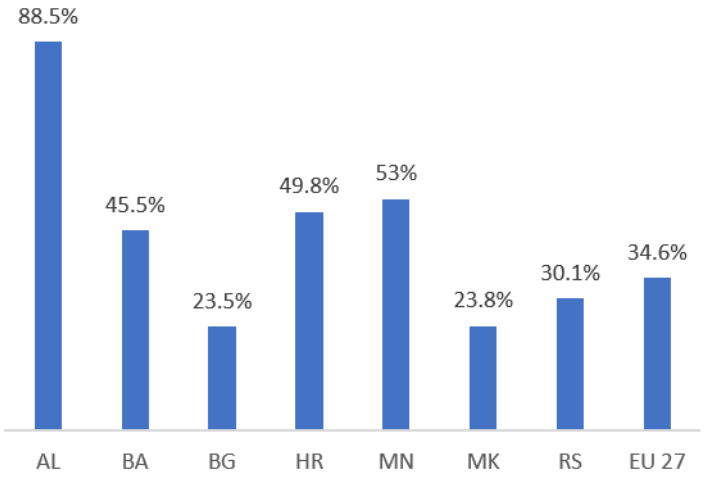
In 2019, renewable energy sources in Serbia reached 21.4 % in gross final energy consumption, while reached a 26.3% , following to a statistic revision of energy balance in 2020. This share is higher than the level of the RES share in EU 27 (see Figure 1.6). However, in comparison to the other countries, Serbia has the second lowest share of RES following North Macedonia. The RES target for Serbia is set at 27% in 2020, according to Decision D/2018/2/MC-EnC of the Energy Community Ministerial Council[13]. Although renewable energy capacities are increasing, RES share trend is countered due to rising energy consumption in the recent years.

[13] Decision D/2018/2/MC-EnC of the Energy Community Ministerial Council amending Decision 2012/04/MC-EnC of 18 October 2012 on the implementation of Directive 2009/28/EC and amending Article 20 of the Energy Community Treaty

Figure 1.6: Share of RES in gross final energy consumption for 2019, in % (source: Eurostat)

The RES share in Serbia's electricity production has been stable over the past decade. More specifically, the RES share in electricity production for 2019 is 30.1% (see Figure 1.7), which is 4.5% lower than the EU 27. In comparison to the other countries, Serbia has a higher share only from Bulgaria and North Macedonia, whereas the remaining countries have a significantly higher share due to their installed capacity mix.

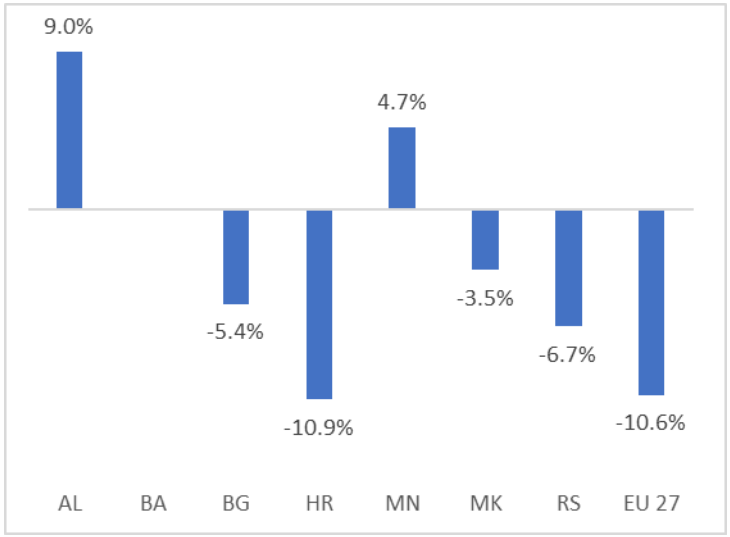
Figure 1.7: RES share in electricity production for 2019, in % (source: Eurostat)



Energy Efficiency

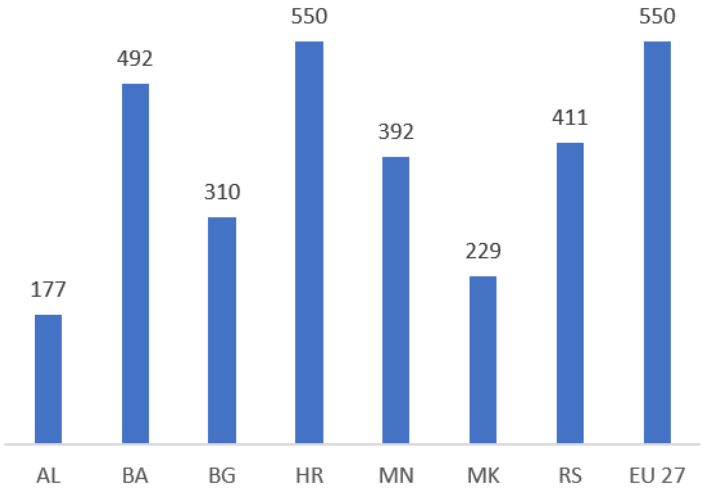
The primary energy consumption for 2019 relative to 2005 is shown in Figure 1.8. According to the available data, Serbia has managed to decrease its consumption by 6.7%, which is the third lowest value among the selected countries. In comparison to the EU 27, Serbia is lagging by 4.2%. All the countries except Albania and Montenegro have a negative trend of primary energy consumption.

Figure 1.8: Primary energy consumption for 2019 relative to 2005, in % (source: Eurostat)[14]



Households in Serbia consumed 411 kgoe on average in 2019, which is 25% lower than the EU 27 average. The final energy consumption in households per capita in Serbia is the third highest in comparison to the other countries (see Figure 1.9).

Figure 1.9: Final energy consumption in households per capita for 2019, in kgoe (source: Eurostat)[15]

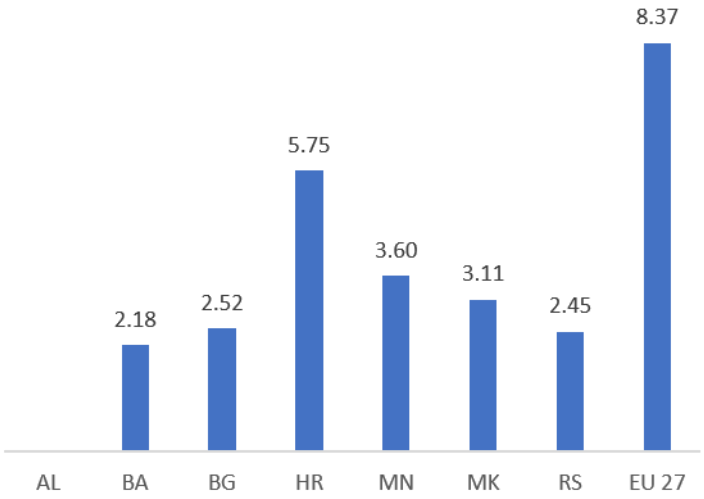


Energy productivity indicator is used to represent the economic output that is produced per unit of gross available energy. The gross available energy represents the quantity of energy products necessary to meet all the demand of entities in Serbia is presented in Figure 1.10.

[14] Note: Data for BA not available for 2005 on Eurostat

[15] Note: Data for BA are from 2018, as data for 2019 is not available on Eurostat

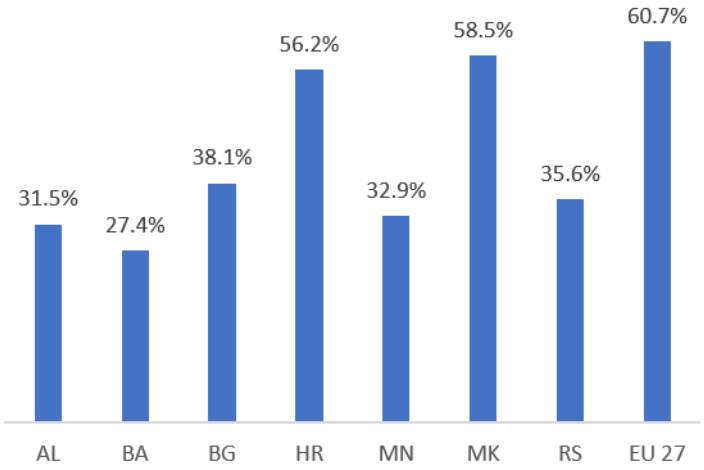
Figure 1.10: Energy productivity for 2019, in EUR/kgoe (source: Eurostat)[16]



Energy Security

The energy security of supply in Serbia, measured using as import dependency (Figure 1.11), scores high with 35.6 % and shows a very good performance compared to the EU 27 for 2019. Countries such as Albania, Montenegro and Bosnia and Herzegovina are around 30% of import dependency, whereas, on the other side, Croatia and North Macedonia score higher than 55%.

Figure 1.11: Import dependence for 2019, in % (source: Eurostat)

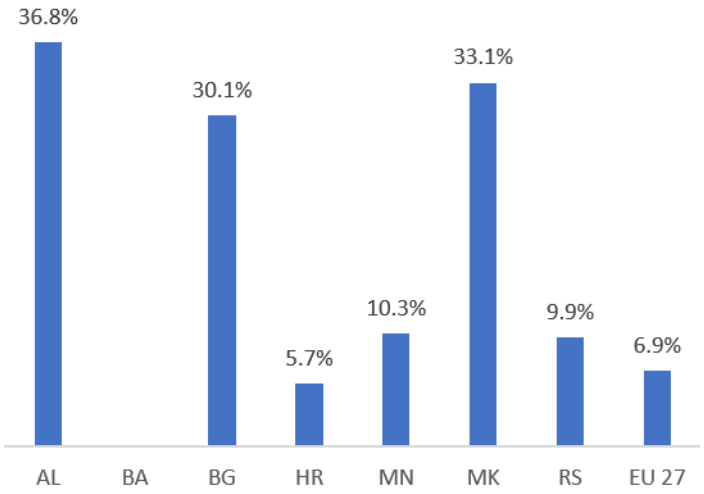


Internal Energy Market

One of the indicators for the level of energy poverty can be reflected through the ability of people to keep their homes warm. When it comes to the development of the internal energy market, this indicator is very important and should be taken into account. As can be seen in Figure 1.12, around 10% of the population in Serbia cannot maintain their houses warm and this is the second-best value in comparison to the selected countries. The situation in the EU 27 is a bit better with 6.9%.

[16]Note: Data for MN are from 2018, as data for 2019 is not available on Eurostat, and data for AL is not available

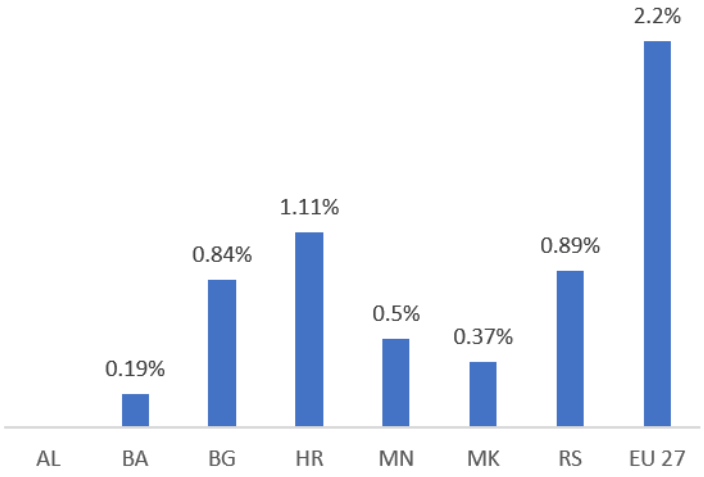
Figure 1.12: Population unable to keep home adequately warm for 2019, in % (source: Eurostat)[17]



Research, Innovation and Competitiveness

In terms of the Research and Development allocation of funds in the gross domestic expenditure, Serbia allocated 0.89% in 2019 (see Figure 1.13); an allocation which is surpassed only in Croatia. Serbia allocates two times less funds than the EU 27 average, which stands at 2.2% for 2019.

Figure 1.13: Gross domestic expenditure on R&D for 2019, in % (source: Eurostat)[18]



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

Decarbonisation – GHG Emissions

The decarbonization dimension is articulated in two key axes, i.e. reduction of emissions and renewable energy sources. The **Law on Environmental Protection**[19]presents the main legislative basis regarding the environmental issues, while the newly adopted **Law on Climate Change**[20]deals with the climate change issues

[17] Note: Data for BA is not available on Eurostat
[18] Note: Data for MN are from 2018, as data for 2019 is not available on Eurostat; data for Albania not available on Eurostat
[19] Official Gazette of RS, no. 135/04, 36/09, 36/09, 72/09, 43/11, 14/16, 76/18 and 95/18
[20]Official Gazette of RS, no. 26/21

exclusively. Through the implementation of the Law on Climate Change, that applies to the emissions of carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), fluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF6) and nitrogen trifluoride (NF3), the Republic of Serbia should establish a system for reducing greenhouse gas emissions and ensure adaptation to changed climate conditions.

Regarding the emissions, Republic of Serbia adopted the **National Emission Reduction Plan** in 2020 as an important step towards the emissions reduction from large combustion plants and showed the country's commitment to become harmonized with the EU *acquis* in the areas of climate change, environment and energy. Furthermore, the **Initial National Communication (INC)** of the Republic of Serbia, as well as the **Second National Communication (SNC)** and the **First Biennial Update Report (FBUR),** represent important national reporting documents to the UNFCCC and a basis for future actions, research, and policies in the area of climate change, national capacity building and improvement of knowledge and sustainable development of the country. In order to fulfil the UNFCCC reporting requirements, Serbia submitted its **First National Communication (NC1)** in 2010, **First Biennial Update Report (BUR1)** in 2016 and **Second National Communication (NC2)** in 2017. The preparation of the Second Biennial Update Report (BUR2) and Third National Communication (NC3) are currently ongoing.

The Republic of Serbia ratified the Paris Agreement in 2017. First National Determined Contribution was submitted in 2015, while Second National Determined Contribution (NDC) was submitted in August 2022, presenting higher ambitious and defining the intended reduction of emissions for 33.3% by 2030 compared to 1990.

In 2018, **Industrial Policy Strategy of the Republic of Serbia from 2021 to 2030**[21]was adopted, containing a comprehensive reform step in the area of industrial development, which is one of the six key areas identified in the EU industrial development area.

Another important report is the **Strategy for Cleaner Production in the Republic of Serbia**[22]**,** which elaborates a concept of sustainable development through encouraging the implementation of cleaner production, increasing energy efficiency and efficiency of natural resources use, as well as through reducing the amount of waste generation.

Decarbonisation –RES

In 2013, Republic of Serbia prepared its first **National Renewable Energy Action Plan (NREAP)**, pursuant to the Article 4 of Directive 2009/28/EC that requires the adoption of NREAP, setting out the country's national targets for the share of energy from renewable sources consumed in transport, electricity and heating and cooling in 2020 and listing adequate measures to be taken to achieve those national overall targets. Republic of Serbia developed **First Progress Report on promotion and use of energy from renewable energy sources (Progress Report)** in 2014, **Second Progress Report** in 2016, **Third Progress Report** in 2018 and **Fourth Progress Report** in 2020, following the requirements of the Article 22 of Directive 2009/28/EC regarding the reporting obligation on renewable energy. The RES share in the Gross Final Energy Consumption (GFEC) was 21.44% in 2019 in comparison to the set target of 27% in 2020.

The adoption of the Energy Law in 2014 aimed at harmonising the energy legislation of the Republic of Serbia with the Third Energy Package. In 2016, Republic of Serbia adopted a package of secondary legislation governing renewable energy sources and setting out the support scheme for renewable energy. Adoption of the necessary by-laws to allow for a full implementation of incentive measures for the renewable energy source projects consists of the **Decree on the Conditions and Procedure of the Acquisition, Duration and Termination of the Status of a Privileged Power Producer, Temporary Privileged Power Producer and Power**

[21]Official Gazette of RS, No. 30/18

[22] Official Gazette of the Republic of Serbia, no. 17/09

Producer from Renewable Energy Sources[23], the Decree on Incentive Measures for Electricity Generation from Renewable Energy Sources and from High-Efficiency Cogeneration of Heat and Power[24], and the Decree on Power Purchase with a Standard Model Agreement and Appendix to a Model Agreement[25]. Decree on Power Purchase Agreement and Decree on Incentives Measures for Privileged Electricity Producers[26]. This set of regulations, known as Power Purchase Agreement (PPA) Package, has fostered further development of the renewable energy capacity. In 2020, the total renewable energy source capacity reached 514.61 MW, out of which 398 MW represents wind capacity.

The Decree on Incentive Measures for the Electricity Generation from Renewable Energy Sources and High-efficiency Cogeneration of Heat and Power was initially valid until the end of 2018, and extended until the end of 2019. Following its expiration on 31 December 2019, the previously applicable feed-in tariff-based incentives are no longer available to power producers that acquired the status of a privileged power producer. Nevertheless, feed-in tariff system remains active for producers already participating it, while for newcomers there will be available either feed-in tariffs or market premiums, depending on the installed capacity. In line with a proposal from the Energy Community Secretariat, the Government of the Republic of Serbia has decided to start the development of an auction-based incentives model and finally defining it in the Law on use of Renewable Energy Sources[27] adopted in April 2021 and amendments of the Law on Use of RES[28].

In April 2021, Republic of Serbia adopted a Law on Use of Renewable Energy Sources[29] for the first time. In parallel, amendments to the Law on Energy[30] were adopted.

The Law on Use of Renewable Energy Sources (hereafter: Law on RES) envisages the development of a new incentive system for electricity generation from RES in the form of market premiums, but at the same time enables another incentive pricing scheme in the form of limited feed-in-tariff, in the separate quotas and auction processes (right to both forms of incentives is obtain within the auction process). Thus, a much more favourable regulatory framework creating an enabling environment for investments in various-scale electricity generation RES plants from RES of various capacities has been set up, while the fostering progress regarding investments of small capacity is still foreseen through the implementation of the feed in tariff supporting mechanism (projects with installed capacities under 3 MW solar wind and under 0.5 MW for power plants using other RES). Finally, the Law on Use of RES initiated additional market possibilities towards the higher market penetration of RES, such as facilitating the establishment of energy communities and providing an opportunity of becoming the prosumer.

The Law on Use of RES defines biofuels as liquid or gaseous fuels for transport produced from biomass, while biomass is defined as the biodegradable part of the product, waste and residues of biological origin from agriculture (including plant and animal material), forestry and related industries, as well as a biodegradable part of industrial and household waste, in accordance with the regulations governing waste management. Furthermore, Law on Energy also defines the concepts of biomass, biofuels and bioliquids in similar manner. In order to reach the planned share of renewables in the final energy consumption in transport, incentives can be provided to the biofuels producers only for units producing advanced biofuels. For the first time, the use of electricity generated from RES in transport sector is defined.

Furthermore, the status of biofuels, bioliquids and fuels from biomass is defined in the Law on RES. In the case that biofuels, bioliquids and fuels from biomass not produced from waste comply with sustainability criteria and achieve savings in greenhouse gas emissions, the energy generated from respective fuels may be

[23] Official Gazette of RS, no. 56/16, 60/17, 44/18 and 54/19
[24] Official Gazette of RS, no. 56/16
[25] Official Gazette of RS, no. 56/16, 23/17 and 106/20
[26] Official Gazette no. 12/16
[27] Official Gazette of RS, no. 40/21
[28] Official Gazette of RS, no. 35/23
[29] Official Gazette of RS, no. 40/21
[30] Official Gazette of RS, no. 40/21

considered as RES in the gross energy consumption used in all forms of transport and subject to incentives in line with Law on RES. The Law on RES prescribes two types of incentives: (i) incentives for use of innovative technologies and new RES such as green hydrogen, and (ii) incentives for the production of biofuels. Renewable hydrogen can be used in the heat and transport sectors, as well as replace natural gas.

Additional incentive measures are prescribed for the use of RES in the heating sector. Energy entities that perform the activity of production, distribution and supply of customers with heat energy can acquire incentive measures if they use highly efficient cogeneration, waste heat or renewable energy sources. Incentive measures in the heat sector are prescribed and provided by the local self-governments.

Energy Efficiency

The **Law on Energy Efficiency and Rational Use of Energy**[31] (LEERUE) adopted in 2021, replaced the **Law on Efficient Use of Energy**[32] (LEUE) which was in force in the period 2013-2021. LEERUE was adopted with the aim of harmonizing with the new regulation in the field of energy efficiency in EU, which was adopted in the meantime, as well as with the aim of improving certain provisions of LEUE. Today, LEERU presents a key legislative framework for the area of energy efficiency, establishing the terms and conditions for efficient use of energy and energy resources, policy of efficient energy use; energy management system; energy efficiency policy measures: energy use in buildings, in energy activities and with final customers, for energy plants and energy services; energy labelling and requirements concerning eco-design; funding, incentives and other measures in the field. The purpose of this law is creating conditions for efficient energy use and improvement of energy efficiency, which contributes to: energy savings, energy supply security; reduced environmental impact and climate change impact of the energy sector; sustainable use of natural and other resources; increased competitiveness of the economy; improved conditions for economic development and reduction of energy poverty.

With the aim of financing energy efficiency, the law created the legal basis for the establishment of Directorate for Financing and Promoting Energy Efficiency and further regulates conditions for contracting of energy services (ESCO).

LEERUE is to a great deal compliant with the **Energy Efficiency Directive 2012/27/EU**[33] (EED) and full compliance will be achieved after the adoption of by-laws. In accordance with these provisions, among other things, it is foreseen that in the period after 2021, the targets in the field of energy efficiency will be defined through IINECP, instead of through energy efficiency plans, namely, the indicative target for energy efficiency, the cumulative energy savings target, as well as the energy efficiency target in central government buildings.

LEERUE is also partially aligned with the **Regulation (EU) 2017/1369** establishing a framework for energy efficiency labeling and repealing Directive 2010/30/EU and with the **Directive 2009/125/EC** establishing eco-design requirements for the products which affect energy consumption. In addition, LEERUE transposed the part of Directive 2010/31/EU on energy efficiency of buildings into the legal system of the Republic of Serbia, with accompanying amendments, which refer to auding of heating and air conditioning systems.

In the previous period, the Republic of Serbia has adopted **four National Energy Efficiency Action Plans (NEEAPs)** for the periods of 2010 – 2012, 2013 – 2015, 2016 – 2018 and 2019 – 2021, respectively. These documents in the previous period set targets for energy efficiency improvements and defined measures for the achievement thereof. The latest **Fourth Action Plan for Energy Efficiency** (4th EEAP) of the Republic of Serbia for the period

[31] Official Gazette of RS, no. 40/21

[32] Official Gazette of RS, no. 25/13

[33] Transposition included revisions of EED with Directive 2013/12/EU, Directive (EU) 2018/844, Directive (EU) 2018/2002, Regulation (EU) 2018/1999, Delegated Directive of Commission (EU) 2019/826 and Directive (EU) 2019/944.

until 2021 was prepared in accordance with the requirements of Directive 2012/27/EU adopted by the Ministerial Council of the Energy Community.

The LPC from 2009 defines the obligation to issue a certificate, i.e. the obligation to design, build, use and maintain a building in a manner that ensures prescribed energy performance. Furthermore, the Law on Amendments to the Law on Planning and Construction (LPC)[34] was adopted in 2018 , prescribing the obligation to issue certificates on the energy performance of buildings, the so-called energy passports through the Central Register of Energy Passports (CREP), establishing a database of Energy Passports for the territory of the Republic of Serbia, which includes 10.000 certificates of energy performance of buildings. In addition, amendments to the LPC made in 2020 stablish a legal basis for the development and adoption of the " Long-Term Strategy for Encouraging Investment in the Renovation of the National Buildings Fund of the Republic of Serbia until 2050", which was adopted in the first quarter of 2022. Additionally, according to the Law on Housing and Building Maintenance,[35] sustainable housing development constitutes one of the key principles for improving the quality of housing, through the corresponding improvement of energy efficiency. Finally, the Rulebook on energy efficiency of buildings[36] regulates technical requirements, as well as the Rulebook on conditions, content and manner of issuing energy performance certificates for buildings.[37]

The new Law on Public Procurement was adopted in 2020 and provides the price-quality relationship including qualitative, environmental and/or social criteria, as well as the implementation of a cost-effectiveness approach, such as life cycle cost of goods, services or works. In this context, the country adopted the Public Procurement Development Program in the Republic of Serbia for the period 2019-2023[38], which provides specific priorities on public procurement system taking into account the relevant EU strategy and focusing on green and social field.

In addition, the Law on Fees for Use of Public Goods[39]stipulates a fee for the improvement of energy efficiency to the energy entities that perform energy activities of electricity supply, natural gas supply and public supply of natural gas, as well as to the energy entities that perform the energy activity of production of oil products and trade in oil, oil products, biofuels, etc. In 2019, the Ministry of Mining and Energy adopted the relevant Rulebook on the form of registration of records of taxpayers for energy efficiency improvement fees, on the form for monthly and annual calculation of the amount of energy/ energy carrieres supplied to consumers or placed on the market in the Republic of Serbia, i.e. imported into the territory of the Republic of Serbia, the form for the monthly and annual calculation for the payment of fees, the form for the payment reports, as well as the method of submitting these forms[40] for the records of entities liable to pay energy efficiency improvement fee from July 2019.

In 2017, the Degree on establishment of implementation of Energy Sector Development Strategy of the Republic of Serbia until 2025 for the period from 2017 to 2023 [41] was adopted. This program sets energy efficiency targets in accordance with the EED Directive until 2020, including the target for cumulative energy savings and an indicative target in the form of the maximum allowed consumption of final or primary energy.

On the basis of LEUE, in the period from 2014-2021, incentives for the improvement of energy efficiency were provided within the Budget Fund for Energy Efficiency, a budget line whose funds were managed by the Ministry of Mining and Energy. In that period, 7 public calls for the allocation of funds for the improvement of energy efficiency in buildings of public importance at the local level were implemented, through which 107 projects with a total value of about 14.4 million EUR were realized (participation of Budget Fund approx. 8.9

[34] Official Gazette of RS, no. 83/18
[35] Official Gazette of RS, no. 104/16 and 09/20
[36]Official Gazette of RS, no. 61/11
[37]Official Gazette of RS, no. 69/12
[38] Official Gazette of RS, no. 30/18
[39] Official Gazette of RS, no. 95/18, 49/19 and 86/19
[40] Official Gazette of RS, no. 41/19
[41]Official Gazette of RS no. 104/17

million EUR) and in accordance with the regulations on establishing the Program for financing activities and measures to improve the efficient use of energy, which the Government of the Republic of Serbia adopts every year on the proposal of the Ministry of Mining and Energy (MoME). In this context, significant activities related to the renovation of buildings in the country were carried out by various local institutions, as well as with the help of International Financial Institutions and donors.

One of the most significant innovations brought by LEERUE is the legal basis for the establishment of the Directorate for Financing and Promoting Energy Efficiency (EE Directorate). The EE Directorate was established at the end of 2021 as a separate legal body within the MoME, to carry out executive and expert operations related to the financing of efficient energy use, and its operation started in February 2022. The tasks of the EE Directorate are laid down in the Article 73 of the LEERUE. This facilitated the launching of pilot projects for the allocation of funds to citizens in 2021 in cooperation with local self-governments, whereby incentives up to 50% are provided by the MoME and local self-government units (25% each) and citizens approx. 50%):

- for energy rehabilitation of residential budilings, family houses and apartments 67 LSG ; approx. 5000 households; Amount of subsidies from MoME and LSG: 461 million dinars; Expected energy savings: approx. 36 million KWh. Estimated reduction of CO2 emissions: 12,154.90 t)
- for installation of solar panels: 37 LSG; 500 households; Amout of subsidies from MoME and LSG: approx. 200 milion dinars; Expected energy savings: 3.000.000 KWh annualy. Expected reduction of CO2 emissions: 3300 tons annualy.

This made the allocation of significantly larger funds for financing energy efficiency from the Budget of RS for 2022 possible, amounting to approx. 2 billion RSD or approx. 17 million. EUR, out of which approximately 10 million EUR is collected annually from compensation charges. In 2022, on the basis of these funds and in cooperation with 151 LSGs, the process of awarding incentives to citizens for the renovation of residential apartments, family houses and residential buildings and installation of solar panels is being implemented: 20,000 households; Amount of subsidies of MoME and LSG: approx. 2 billion dinars; On the basis of the level of regional development, the least developed LSG will participate with a minimum of 30%, while other LSG will participate with a minimum of 50%. Expected energy savings: 196,276,070 kWh per year. The expected reduction in CO2 emissions is 87,913 tons annually. In 2022, the 8th public call for improvement of energy efficiency of public buildings in LSG was implemented, which was the first to be implemented by the EE Directive, for which the EE Directive provided about 690 million dinars for the financing of 38 buildings of public importance; Expected energy savings of 9 million kWh per year; reduction of CO2 emissions approx. 4500 tons per year. Energy rehabilitation will be carried out.

Based on these funds, World Bank loan was secured in the amount of 50 million dollars for the implementation of the project "Clean energy and energy efficiency for citizens in Serbia" project, which will put special focus on socially vulnerable categories and provide 50 million EUR from EBRD loan for implementation of the project "Energy rehabilitation of residential and public buildings connected to the district heating system", which will focus on multi-apartment buildings with high consumption of heat energy, connected to district heating systems, in order to support the transition to billing on the basis of energy consumption. It is expected that through these projects, subsidies will be provided for around 100,000 households.

Internal Energy Market

The legislative and regulatory framework for the development and regulation of the internal energy market in the Republic of Serbia is determined by the **Law on Energy**[42].

The Electricity Transmission Network Ten Year Network Development Plan (TYNDP) is prepared by the Transmission System Operator (TSO “Elektromreža Srbije“ - EMS), which is also responsible for the operation,

[42] Official Gazette of RS, no. 145/14, 95/18 and 40/21

maintenance and construction of the electricity transmission network according to the Law on Energy and the **Electricity Market Code** adopted in April 2020. The Electricity Distribution System Operator (DSO "Elektrodistribucija Srbije"), which ownership from Public Enterprise "Elektroprivreda Srbije" (EPS) was recently unbundled, is in charge of TYNDP distribution network preparation as well as its operation and maintenance according to the Law on Energy and the **Distribution System Grid Code** adopted in February 2019. With regard to the electricity interconnectivity level as per the EU 2020 and EU 2030 interconnectivity criteria, the **Electricity Interconnection Targets in the Energy Community Contracting Parties**[43] study from February 2021 highlights that Serbia is achieving and overachieving set targets.

By adopting the Law on Energy in 2014, Republic of Serbia transposed the majority of the Gas Directive and the Gas Regulation provisions. During 2021-2022, the Energy Agency of the Republic of Serbia changed and supplemented the regulations, under its own competencies and according to the indicated needs, for the purpose of more efficient market functioning, better protection of end customers and other participants in the market.

The detailed gas regulation is defined by the **Transmission Network Code**, while the **Ten-Year Development Plan of Yugorosgaz for period 2021-2030** and **Ten-Year Development Plan of Transportgas Srbija for period 2020-2029** present key development documents prepared by market participants.

Organised day-ahead market/power exchange in Serbia (JSC "SEEPEX") was established in February 2016 on the basis of partnership between EMS and European Power Exchange (EPEX SPOT), pursuant to Law on Energy and after adopting the amendments to the Law on VAT and the new licensing rules in 2015. The successful launch of the Serbian Day-Ahead Market is important for the power market in the South Eastern Europe since it is the first organised market in the region.

At the end of 2014, the Government of the Republic of Serbia adopted a Conclusion accepting the Baseline for Restructuring JP Srbijagas, which determined that the operators of the transport and distribution system should be legally separated entities from JP Srbijagas. In 2020, the Government approved an **Action Plan for the Implementation of Activities for the Purpose of Reorganization of PE "Srbijagas"**, which stipulates the separation of its gas transport and gas distribution activities, in line with the EU obligations. In accordance with the plan, the ownership of the Transportgas Srbija company was transferred from Srbijagas to the Government in May 2021.

Pursuant to the Energy Law, the conditions for the entitlement to guaranteed supply of electricity were modified. In line with this, as of 2015, the right to guaranteed supply at prices regulated by the Energy Agency is exercised only by households and small customers up to 30.000 kWh. More specifically, households and small customers have the right to remain with the guaranteed supplier and be supplied in line with existing contracts, but they also have the option to contract with any licenced electricity supplier in the open market. In the gas sector, all final natural gas customers are entitled to select their supplier freely in the market. Households and small natural gas customers up to 100.000 m^3 are entitled since 2015, but they are also still entitled to public supply. In line with energy policy goals, the development of competition in the oil, oil derivatives, biofuels and compressed natural gas sectors was stimulated in the Republic of Serbia in order to increase the efficiency of this sector via market mechanisms. In a narrow sense of energy activity regulation, regulated prices in this sector are established only for natural monopolistic activities of oil transportation via oil pipelines, i.e. oil products transport via product lines.

Pursuant to the **new Energy Law from 2021**, a **Nominated Electricity Market Operator** was appointed in June 2022 and should be responsible for the implementation of the Day-Ahead and Intraday markets with neighbouring organised markets gaining, thus, a central role in enabling and coordinating the market coupling process. Guarantees of origin will contribute towards attracting investments in renewable sources. To this end, Republic of Serbia has implemented a functional **Guarantees of origin system** and EMS JSC became a full membership of in the **Association of Issuing Bodies (AIB)**. This will allow for cross-border trade of Guarantees

[43] Energy Community website: https://www.energy-community.org/news/Energy-Community-News/2021/02/15.html

of origin with the EU, which shall be continued after the RED II is transposed and implemented in all EU countries from July 2021.

Additionally, the new **Law on Use of Renewable Energy Sources**[44] alongwith the Amendments to the Law on Use of RES[45] provide a better environment for the modernisation of the traditional and centralised power generation system through the introduction of the concept of prosumers, energy communities and aggregators as decentralised actors in the future energy market. By empowering end-users to transform their role from passive energy consumers to active market participants through renewable self-generation, the Law on use of Renewable Energy Resources promotes the overall idea of local generation opportunities for own needs, with the ability to connect to the grid and deliver energy surplus into the network.

Pursuant to the **Law on Energy**[46], more attention is given to energy poverty, which is marked as one of the key threats within the energy transition. Republic of Serbia sets more emphasis on this issue for the first time by amending accordingly the Law on Energy. In that sense, the term "energy poverty" has been legally recognised, while the opportunities addressed to vulnerable customers have been expanded, covering heating sector as well. For example, the existing **Decree on energy vulnerable customer**[47] sets up the eligibility criteria for acquiring the status of energy vulnerable customer and has been adjusted every year until 17 December 2022. To acquire the status, one needs to submit at first a request to the municipality unit responsible for social welfare activities.

Energy Security

The core elements in the legislation of the Republic of Serbia that regulate energy security are the **Law on Energy**[48] and **Law on Commodity Reserves**[49]. While the Law on Energy regulates the whole spectrum of energy sector covering all energy sources, the Law on Commodity Reserves is relevant for the regulation of the formation and use of mandatory reserves of the oil and oil products, as a part of implementation of the Directive 2009/119/EC that imposes an obligation to maintain minimum stocks of crude oil and/or petroleum products by no later than 1 January 2023. In order to establish the full legal framework for the transposition of this Directive, several additional regulations and by-laws need to be adopted by the Government of the Republic of Serbia and the Ministry of Mining and Energy. The amendments to the Regulation on security of supply and the Regulation on access to transport systems related to mandatory gas reserves and certification of storage operators have been adopted as mandatory for implementation in the Energy Community.

In accordance to the Law on Energy, the Government adopts the **Energy Balance** on the proposal of the Ministry of Mining and Energy (MoME), by the end of December of the ongoing year for the next year, where the annual energy needs, expressed on a monthly basis, necessary to ensure reliable, secure and quality customer supply are determined. In addition, the **Law on Critical Infrastructure**[50] has identified key sectors where critical infrastructure is needed and the energy sector is listed as the first one.

The Government of the Republic of Serbia prescribes the conditions for delivery and supply of electricity, oil and natural gas, as well as the measures to be taken if the security of energy and energy sources supply is endangered due to market or system disturbances. To this end, Republic of Serbia has well established the delivery of electricity and natural gas and security of supply secondary legislation through two major decrees;

[44] Official Gazette of RS, no. 40/21
[45] Official Gazette of RS, no. 35/23
[46] Official Gazette of RS, no. 40/21
[47] Official Gazette of RS, no. 113/15, 48/16, 88/16, 49/17, 104/17, 36/18, 59/18, 88/18, 34/19, 82/19, 76/20, 144/20 and 51/21, no. 137/22
[48] Official Gazette of RS, no. 145/14, 95/18 and 40/21
[49] Official Gazette of the RS, no. 104/13, 145/14 and 95/18
[50] Official Gazette of RS, no. 87/18

i.e. the **Decree on Conditions for Delivery and Supply of Electricity**[51] and the **Decree on Conditions of Natural Gas Delivery and Supply**[52]. Moreover, the country is fully aligned with the EU acquis on emergency oil stocks in the framework of security of supply on, defined by **Decree on determining the Program of measures in case the security of energy and energy supply is endangered (Emergency plan)**[53] and **Decree on the procurement plan and criteria for the formation of mandatory oil reserves**[54]. In 2021, the Government adopted the **Decree on Amendments to the Decree on the Plan and Criteria for the Formation of Mandatory Reserves of Oil and Oil Derivatives**[55] which defines that crude oil for the purposes of forming mandatory reserves is procured in a quality whose parameters meet the conditions established by the Rules on the operation of the oil transport system by oil pipeline, as well as that mandatory reserves can be renewed by exchange, sale and purchase. Also, the **Rulebook on establishing the Annual Program for the formation and maintenance of mandatory oil reserves for 2021**[56] was adopted.

In accordance to the provisions of Article 315 of the Law on Energy stipulating the adoption of a Preventive Action Plan and Emergency Plan in order to ensure the security of natural gas supply, as well as in accordance to the provisions of the **Decree on establishment of Preventive action plan for safeguarding of security of natural gas supply**[57] and **Decree on establishment of Emergency plan for safeguarding of security of natural gas supply**[58], Republic of Serbia has developed the **Emergency Plan for safeguarding of security of natural gas supply** and **Preventive Action Plan for safeguarding of security of natural gas supply**. The Emergency plan determines measures and energy service companies that will be responsible for ensuring the security of the transmission system and the security of supply of certain groups of end customers, as well as the quantity and capacity of natural gas in case of general shortage of natural gas. The Preventive Action plan contains a risk assessment in terms of achieving security of supply in addition to measures on how to mitigate the identified risks related to the required transportation capacity in order to meet the total demand for natural gas and to secure the supply of certain groups of final customers of natural gas.

Pursuant to Article 18, paragraph 3 of the Law on Commodity Reserves, the MoME adopts **Rulebook on determining the Annual Program for the Formation and Maintenance of Mandatory Reserves of Petroleum and Petroleum Products for 2020**[59]on the regular annual basis. To this end, Serbia adopted a long-term plan to establish and maintain emergency oil stocks in 2018 and the **Emergency Response Plan**[60]in 2019. The latter lays out the procedures and steps to be undertaken by the main entities in Serbia responsible for taking action during an oil supply crisis. Those include the procedures and criteria for the identification of a supply disruption and the normalization of supply to the Serbian market. It also appoints the authorities being responsible for eliminating supply disruptions such as Governmental institutions in charge of energy and public and private entities in the oil and gas industry. In 2019, the Ministry of Mining and Energy submitted the **Security of Supply Statement 2018** to the Energy Community Secretariat.

The **Working Group (WG) for the review and monitoring the situation regarding security of energy and fuels supply** in the Republic of Serbia has been appointed by the Ministry of Mining and Energy and operates since 2005. It consists of the representatives of Ministry in charge of energy, Energy Agency of the Republic of Serbia (AERS), PE EPS, JSC EMS, PE Srbijagas, JSC NIS, Serbian Association of heating plants, Provincial Secretariat for Energy and Mineral Resources, Energy Administration of the Belgrade city, and "JKP Beogradske elektrane Beograd". Its mandate is to monitor the security of energy and energy sources supply, propose appropriate

[51] Official Gazette of the RS, no. 63/13, 91/18
[52] Official Gazette of the RS, no. 47/06, 3/10 and 48/10
[53] Official Gazette of the RS, no. 63/19
[54] Official Gazette of the RS, no. 50/16 and 48/21
[55] Official Gazette of the RS, no. 48/21
[56] Official Gazette of the RS, no. 55/21
[57] Official Gazette of the RS, no. 102/18
[58] Official Gazette of the RS, no. 102/18
[59] Official Gazette of the RS, no. 59/20
[60] Official Gazette of the RS, no. 63/19

measures, prepare the basis for a report on the security of electricity and natural gas supply and propose measures in case of compromised security of customer supply or energy system operation, due to insufficient supply on the energy market or the occurrence of other extraordinary circumstances.

Other relevant bodies in charge of energy security are the **Administration for energy reserves** within the MoME and the specifically formed **Group for central storage body**, as well as the **Department for Energy** within the **Republic Directorate for Commodity Reserves**. In line with the by-laws, Republic of Serbia has established the **National Emergency Strategy Organization (NESO)** that represents the general framework for dealing with crisis situations in the oil sector, chaired by the State Secretary of the MoME and consisted of representatives from the Oil and Gas Sector within the MoME, as well as representatives from the Republic Directorate for Commodity Reserves, the Republic Bureau of Statistics, Ministry of Trade, Tourism and Telecommunications, Ministry of Finance, Ministry of Interior, MoCTI and oil companies operating on the market of the Republic of Serbia.

In accordance with the Articles 111 and 250 of the Law on Energy, the transmission system operators for electricity and natural gas are obliged to submit a ten-year network development plan to the Regulator for approval every year. Regarding the network development planning in the natural gas sector, there are two crucial ones; i.e. **Transport System Development Plan of Transportgas for period 2020-2029** and **Transport System Development Plan of Yugorosgaz covering period 2021-2030**. With respect to the electricity sector, **Transmission System Development Plan for period 2021-2030** presents the development planning of EMS, while **Distribution System Development Plan for period 2021-2030** has been approved as well. Furthermore, in accordance with the Article 325 of the Law on Energy, energy entities that transport oil by pipelines are obliged to adopt five-year development plans.

Regarding the emerging security issue, **cyber security** in energy sector is effectively implemented through the concept of information and communication (ICT) systems of special importance, set by the **Law on Information Security**[61] in 2016 as the comprehensive overall legal and institutional framework for cybersecurity. Alongside with the Law, the **Decree on determining the List of activities in areas where activities of general interest are performed and in which information and communication systems of special importance are used**[62] emphasizes the energy sector as being one of those essential areas and lists activities such as electricity generation, transmission and distribution; exploration, exploitation, refining, transport and distribution of oil and oil derivatives; exploration, exploitation, refining, transport and distribution of natural gas and liquefied gas; coal production and processing. The **Strategy for Development of Information Security for the period 2017 – 2020** is linked to the implementation of Directive 2016/1148/EC (NIS Directive), introduces the principles and defines the objectives in security of the ICT systems of special importance, as well as fights against cybercrime. However, there were no energy-specific policies identified in the Strategy.

Risk assessment is defined in the Law on Information Security and in the **Regulation on More Detailed Contents of Enhancement on Security of ICT of Special Significance**[63]**.**It is performed by the **national computer emergency response team (SRB-CERT)**, responsible for the energy sector, operating within the Regulatory Agency for Electronic Communications and Postal Services. One of the main drawbacks of the risk assessment is the lack of consideration of cross-border component.

Starting in 2019, inspection and supervision of information and communications technologies (ICT) has been performed on an annual basis by the Department for Information Security and Electronic Business within the Sector of Information Society and Information Security of the Ministry of Trade, Tourism and Telecommunications. In 2020, inspection and supervision were carried out for EMS, Srbijagas and NIS, while during the 2021 they have to be done for Public Utility Company Beogradske elektrane (2021 Q1), Transportgas (2021 Q3) and Elektrodistribucija Srbije (2021 Q4).

[61] Official Gazette of RS, no. 06/16, 94/17 and 77/19
[62] Official Gazette of RS, no. 94/16
[63] Official Gazette of RS, no. 94/16

Research, Innovation and Competitiveness

Republic of Serbia's strategic and legislative framework in the area of science, research and innovation is in line with the EU Acquis Communautaire. In 2016, Serbia opened the **Negotiating Chapter 25: Science and Research** within the pre-accession negotiation process with the European Union and then temporarily provisionally closed it, becoming the first chapter the Serbia successfully closed in negotiations with the EU. In the same year, the **Strategy of Scientific and Technological Development of the Republic of Serbia for the period from 2016 to 2020 – "Research for Innovation"**[64] was adopted. Also, the **Smart Specialization Strategy of Serbia (4S)** development process was formally initiated in late 2016 by the Ministry of Education, Science and Technological Development and the Public Policy Secretariat of the Republic of Serbia, as a starting transformative step. Following that, Serbia became the first non-EU country to join **the Platform of Countries and Regions** that have entered into the Smart Specialization Strategy and finally, Serbia has applied new paradigm of innovation policy and smart specialisation development approach, by the adoption of **Smart Specialization Strategy of Serbia (4S) for the period 2020 to 2027**[65] in 2020.

The general vision of this strategic document is to support the development of a smart and creative Republic of Serbia, highly competitive in the world, recognized by its knowledge-based innovations, partnerships from domestic ecosystem and creativity of individuals in areas of sustainable high-technology production of high value-added food for the future, sophisticated software solutions for global market and inter-sectoral-based industrial innovations. General vision means that as of 2027, the Serbian economy will - to a great extent - be based on knowledge and innovations and include crucial priority strategy areas supported to create greater competitiveness and better positions in global supply chains. Thus, the key pillars of this strategy are science, competitiveness, education, communication and digitalization, and agriculture.

In the period from the adoption of the strategy titled "Research for Innovation", a number of envisaged measures were implemented, such as an adoption of the **Law on the Science Fund**[66]in 2018 and the **Law on Science and Research**[67] in 2019, that has made key steps in reforming the system of organization and financing of science. Those laws enabled implementation of a new model of financing research activities through institutional and competitive project financing. The establishment and operation of the **Science Fund of the Republic of Serbia** regulates and improves the area of support for scientific research, while the institutional support of the Government through the **Innovation Fund** has as goal to enable cooperation between investors and international donors to provide greater funding, to foster university-business cooperation in order to translate scientific achievements into real economy, and to encourage small and medium-sized enterprises engaged in innovation activities.

Following that, the **Strategy of Scientific and Technological Development of Serbia from 2021 to 2025**, titled **"The Power of Knowledge"**[68], was prepared by the Ministry of Education, Science and Technological Development and adopted in 2021. An integral part of this strategy is the three-year period **Action Plan for 2021-2023**. The strategy aims to enable the acceleration of Serbia's development and the country's integration into the European research space through the upgrade of the science-technology and innovation system. The **Industrial Policy Strategy from 2021 to 2030** that replaced the previous **Strategy for the Development of Industry** is extremely relevant to 4S and the overall objective of the new strategy is to raise competitiveness of the industry of the Republic of Serbia with a focus on industry-led development, which implies advanced production and high value-added services.

[64] Official Gazette of RS, no. 25/16
[65] Official Gazette of RS, no. 21/20
[66] Official Gazette of RS, no. 95/18
[67] Official Gazette of RS, no. 49/19
[68] Official Gazette of RS, no. 10/21

Focusing on the national capacities and current state of development, Republic of Serbia has around 2,000 researchers per one million inhabitants, which is higher than other countries of the Western Balkans region, but less than developed EU countries in the region. In total, there are around 15,000 researchers officially and this number has been constantly rising. Given that the greatest number of researchers are in the public sector, such as institutions of higher education and institutes, the number of researchers has been stagnant since 2016 and even a mild decrease has been registered.

More than half of business entities in Serbia have been characterized as innovative with a significant upward trend in the number of innovative enterprises in the last couple of years. Enterprises, on the other hand, invest very little in R&I, while innovations are generally incremental in nature with very few businesses that have made radical innovations and developed a worldwide product. This situation in the business sector is also reflected in the relatively low number of patents compared to other countries. Anyway, there has been a growing trend in the number of innovators among business entities since 2012. The largest share of innovators' businesses is in the Information and Communication sector and in the Manufacturing industry, while in the case of energy sector, the share of innovators' businesses was over 42% in period 2012-2018. On the other hand, the number of patent applications is at a low level, but the number of patents granted for inventions by domestic inventors abroad on the basis of international and/or European patent applications has grown over the last couple of years.

In 2015, a partnership of the Government, the City of Belgrade and the University of Belgrade established the first Science and Technological Park, located in Belgrade, as a measure to stimulate scientific and innovation development. Additional science and technology parks have been constructed in three more cities – Nis, Novi Sad and Cacak. In 2018, with a view to implementing positive changes to the European scientific community, the Platform for Open Science was adopted in Serbia. At national level in the energy and climate area, within the Sector for technological development, technology transfer and innovation system of the Ministry of Education, Science and Technological Development, there is an Energy, Mining and Energy Efficiency area as one of the key fields. Another body that exists under the Ministry of Education, Science and Technological Development is the National Council for Scientific and Technological Development. Besides that, there are many other institutions and bodies that are contributing to the development of the research and innovation issues, such as the Serbian Academy of Sciences and Arts (SANU) and the Center for Promotion of Science, with different responsibilities and objectives. However, most of them don't have specific targets and objectives regarding the research and innovation in the field of energy, as is also the case with the above-mentioned strategies, while there are no specific calls in the fields of Energy and Environment (and/or Climate Change). In any case, many institutes and faculties are very active in conducting and performing research and innovation in energy technologies. Regarding the competitiveness, relevant institutions are the Chamber of Commerce and Industry of Serbia, Development Agency of Serbia and Commission for Protection of Competition.

The Republic of Serbia is successfully conducting international cooperation, mainly through bilateral cooperation programs, cooperation within the region/macro region, and EU programs. An agreement signed in 2014 by the Government of Serbia and the European Union enabled participation of the former in the Horizon 2020 program. As a result of that, the participation of Serbian scientific teams significantly expanded in the projects financed by Horizon 2020. According to the data from January 2020, 446 institutions from the Republic of Serbia participate in the program as part of 311 projects approved for financing, where 149 participants are from the private sector. The majority of projects are in the area of food, about 20%, followed by the energy and information technology.

Additionally, the Republic of Serbia is extremely active in the implementation of the EU Strategy for the Danube Region where it coordinates the Priority Area 7 "To develop the Knowledge Society (research, education and ICT)". The Republic of Serbia is currently coordinating the pillar connecting the region with the EU Strategy for the Adriatic-Ionian Region, an initiative that has the objective to promote economic and social prosperity and growth in the region by improving its attractiveness, competitiveness and cohesion. The Republic of Serbia is also active in the European Strategic Forum for Research Infrastructure (ESFRI) and in four consortiums of the European Research Infrastructure Consortium (ERIC): CERIC (Central European Research Infrastructure

Consortium), DARIAH (Digital Research Infrastructure for the Arts and Humanities), ESS (European Social Survey) and CESSDA (Consortium of European Social Science Data Archives). Moreover, Serbia has developed intensive cooperation at several levels with Joint Research Center (JCR) of the European Commission, and it also demonstrates a high level of activity in EUREKA and COST programs. Finally, the Common Regional Market Action Plan for 2021-2024, prepared by Central European Free Trade Agreement (CEFTA) Secretariat contains expectations and plans regarding the regional mobility of researchers, knowledge sharing and cooperation in the field of innovation, as one of the key pillars.

iii. Key issues of cross-border relevance

The Republic of Serbia is member of the Central and South Eastern Europe energy connectivity (CESEC), an organisation that works to accelerate the integration of central eastern and south eastern European gas and electricity markets, together with all other EnC Contracting Parties and nine EU Member States, i.e. Austria, Bulgaria, Croatia, Greece, Hungary, Italy, Romania, Slovakia and Slovenia. Furthermore, the Republic of Serbia participates and contributes to the Regional Meetings and Workshops, as well as the Regional Exchange events organized by the GIZ Open Regional Fund - Energy Efficiency (ORF-EE) in order to facilitate a discussion on modelling approaches, data availability and quality, challenges, best practices, cross-sectoral and regional issues.

More specifically, the Ministry of Energy and Mining participates in the listed Energy Community technical working groups:

- Energy Efficiency Coordination Group,
- Renewable Energy Coordination Group,
- Security of Supply Coordination Group,
- Coordination Group of Distribution System Operators for Electricity,
- Coordination Group for Cyber security and Critical Infrastructure,
- PECI electricity and gas Coordination Groups.

EMS is a full member of the European Network of Transmission System Operators for Electricity (ENTSO-E). EMS is also one of the founders of the first Regional Security Coordinator in the Southeast Europe, company Security Coordination Centre SCC Ltd. Belgrade, and stakeholder together with JSC “Crnogorski Elektroprenosni Sistem” (CGES) that is TSO from Montenegro and “Nezavisni Operator Sistema u Bosni i Hercegovini” (NOSBiH) that is ISO from Bosnia and Herzegovina.

The Energy Agency of the Republic of Serbia participates in the work of the Energy Community Regulatory Board, is part of the advisory body of the Ministerial Council of the Energy Community , and in the work of the Electricity and Natural Gas Forums, as well as in the Balkan Forum. The Energy Agency of the Republic of Serbia is a fully empowered member of the Energy Regulators Regional Association (ERRA), a specialized association of regulators with the aim to improve collaboration, experience exchange, and capacity building of member regulators. The Energy Agency of the Republic of Serbia also participates, as an observer, in the work of the Council of European Energy Regulators (CEER). By joining this Council, the Energy Regulatory Commission gains experience in implementing the Third Package of Legislation and the challenges that EU Member States face in creating a single, competitive, efficient and sustainable internal energy market in the European Union, as well as with new packages of the European legislation.

SEEPEX is participant to the TRINITY project (transmission system enhancement of regional borders by means of intelligent market technology), the main goal of which is to enhance cooperation and coordination among the Transmission System Operators of South-Eastern Europe (SEE) in order to support the integration of the electricity markets in the region, while promoting higher penetration of clean energy sources. TRINITY addresses the EU’s Research Horizon Framework 2020 Programme within the call “Building a low-carbon,

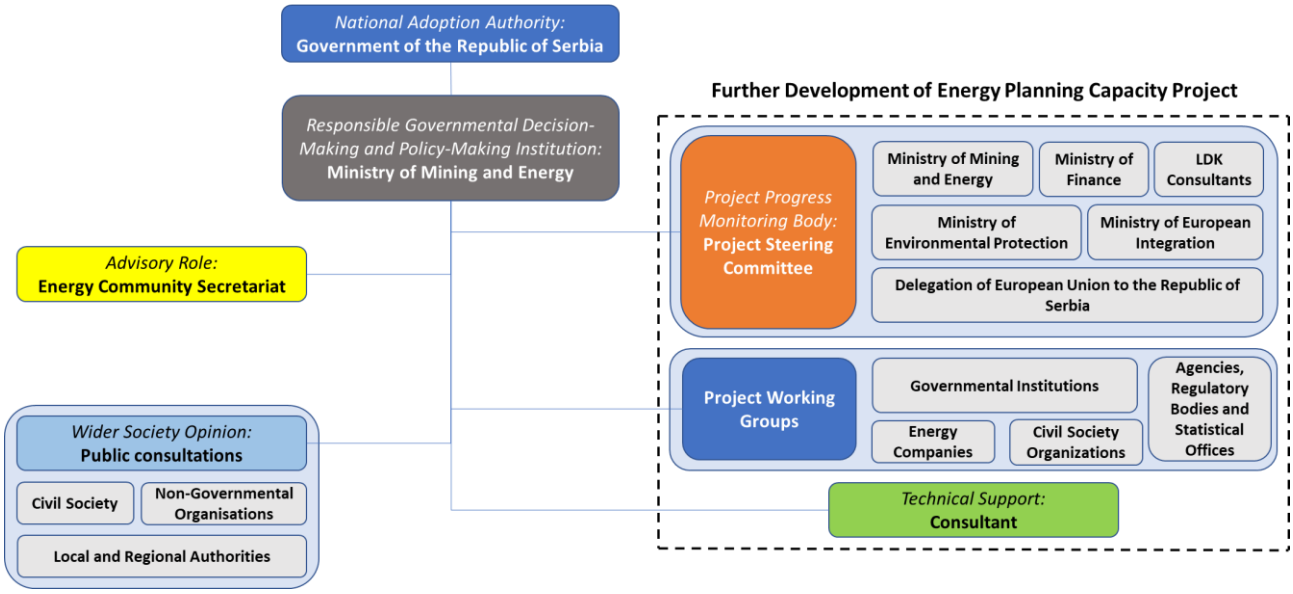
climate resilient future: secure, clean and efficient energy". SEEPEX is the leader of Work Package 3: TRINITY SEE Cross-Border Market Coupling Framework that aims to demonstrate benefits of a coordinated work of the intra-day electricity market, common regional capacity reserve market, bilateral trade and guarantees of origin market, taking into consideration EU and non-EU countries.

iv. Governance structure of implementing national energy and climate policies

The process of developing and preparing the Integrated National Energy and Climate Plan has been implemented within the framework of the project "Further Development Energy Planning Capacity", launched in February 2021. Following the identification of the relevant institutions, bodies and companies, the Working Groups have been established (see Chapter 1.3.ii).

The Government of the Republic of Serbia represents the national adoption authority for a period of up to ten years, as per the Law on Energy, while the Ministry of Mining and Energy is responsible for the preparation of the INECP in cooperation with other relevant ministries . During the development and preparation of the INECP, the Consultant provided technical support to the Ministry of Mining and Energy, as well to the other institutions and bodies involved in the process, in terms of transfer knowledge based on the extensive international experience, implementation of best solutions and specific expertise that would facilitate and accelerate the process. Finally, the responsibility over the project progress is assigned to the Project Steering Committee, which is the implementation and monitoring body consisting of various governmental institutions.

Figure 1.14 Governance of the preparation and development of the Integrated National Energy and Climate Plan



The advisory role of the Energy Community has been exerted to a certain extent, mainly during the official consultations of the Republic of Serbia with the Energy Community Secretariat on Draft INECP and while providing the recommendations for the finalization of the document. However, from the early phase of the development and preparation of INECP, the Energy Community has been regularly following the overall progress, primarily through the various Energy Community working groups and other relevant communication platforms and mechanisms. In parallel with the consultations with the Energy Community Secretariat, the Draft INECP has to be put up for public consultations, providing the opportunity to the wider public, civil society, non-governmental institutions, local and regional authorities, and any other interested party to comment, as part of ensuring transparency within the planning process.

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

i. Involvement of the National Assembly

The provisions of the Energy Law do not envisage the participation of the Parliament in the process of preparation or adoption of the Integrated National Energy and Climate Plan of the Republic of Serbia. In accordance with the Article 8a of the Law on Energy, the Integrated National Energy and Climate Plan of the Republic of Serbia shall be adopted by the Government of the Republic of Serbia.

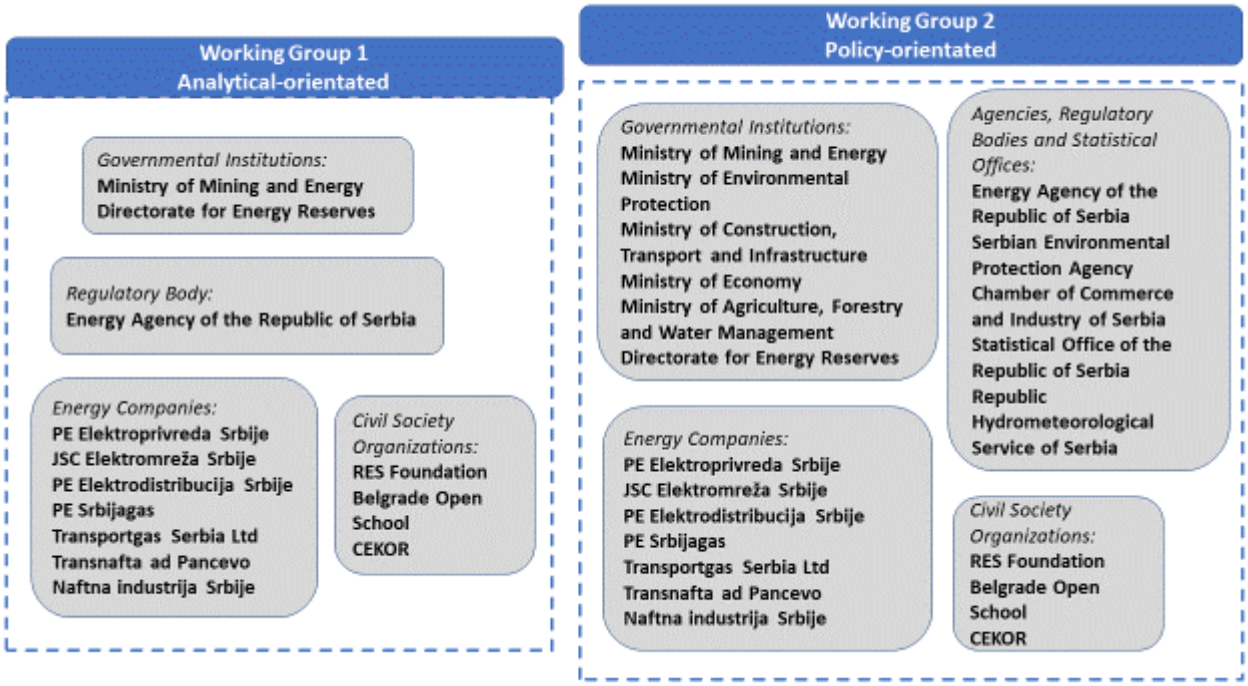
ii. Involvement of local and regional authorities

Since the implementation of the energy and climate objectives has to be achieved by the bottom-up support of the top-down approach of planned activities, the preparation of the Integrated National Energy and Climate Plan has focused on taking into consideration the of local and regional authorities as well. First of all, various local and regional authorities have been involved in drafting the Integrated National Energy and Climate Plan on ad-hoc basis, providing the necessary data for specific fields and giving their opinion on certain issues as supporting parties in the planning process. Furthermore, the major conclusions of the planning are conducted at the local level, such as the Green City Action Plan of the City of Belgrade and the Sustainable Energy and Climate Action Plan of the City of Belgrade for the period until 2030, have been taken into consideration in the early phase of the development and preparation of the Integrated National Energy and Climate Plan, due to the need for achieving comprehensiveness and compatibility of the national-level and local-level planning. Finally, relevant stakeholders at the local and regional levels will be officially invited to participate in the public consultations process and provide their contributions.

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

At the beginning of 2021, two Working Groups were established, composed of numerous representatives of the relevant institutions and major companies from the public and private sectors. Specifically, WG1 is modelling-orientated and responsible for analytical work, while WG2 is policy-orientated and tasked with the drafting of the Integrated National Energy and Climate Plan (INECP). The overall process of the development and preparation of the INECP is coordinated by the Ministry of Mining and Energy, being the leading Ministry for document preparation and key beneficiary of the above-mentioned project.

Figure 1.15: Structure of the Working Groups per entities involved

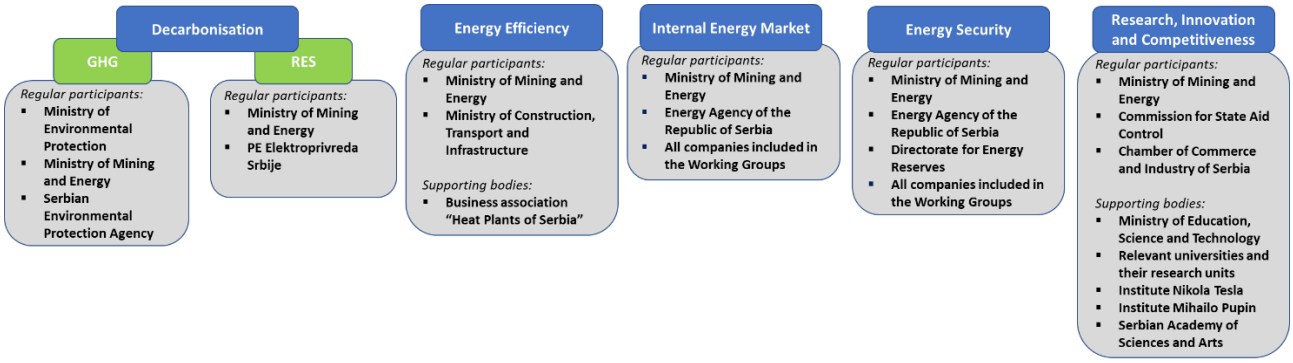


Initially, the Working Groups consisted of 19 national stakeholders and a total of 83 representatives. The stakeholders include: 6 governmental institutions (5 Ministries and Directorate for Energy Reserves, including the Deputy Prime Minister as well), 6 stakeholders representing agencies, regulators and a statistical office, and 7 energy companies. In order to ensure that representatives of the civil society participate regularly in the development and preparation process of the INECP, the working groups have been subsequently expanded. Public call to civil society organizations for membership in the working groups of the Ministry of Mining and Energy was initiated in 2021. Thus, the representatives of the RES Foundation, Belgrade Open School (BOS) and Center for ecology and sustainable development (CEKOR) joined WG1 and WG2 as regular members.

Additionally, in order to secure high quality of planning, mitigate gaps and fully mobilize existing national capacities, the overall process is constantly supported by a number of relevant bodies, such as various business associations, research institutions and others, on *ad hoc* basis for particular issues. The concept of the decision-making process, discussion sessions and overall communication is realized through the Working Group meetings that have been held regularly, but also through the introduction of the regularly conducted so-called "dimensional meetings", dedicated to each of the five dimensions (i.e. Decarbonization, Energy Efficiency, Internal Energy Market, Energy Security, and Research, Innovation and Competitiveness) and with aim to elaborate each dimension in details. Due to the limited timeframe for the elaboration of the INECP and the rather demanding organizational effort, there is no strict definition or establishment of sub-groups along the five dimensions of the Energy Union, but their participation has been unofficially allocated as per their responsibility and relevance.

The detailed scheme of the relevant participants per dimension within the project is presented in the following figure:

Figure 1.16: Involvement of project participants per dimension



The institutions that represent supporting bodies in the project, which are not members of the Working Group, are mainly active in the dimensions of energy efficiency and research, innovation and competitiveness. The Ministry of Mining and Energy has launched the procedure of collecting the opinions of various educational institutions on specific topics, in accordance with their responsibilities and relevance, such as University of Belgrade, University of Novi Sad, University of Nis and University of Kragujevac. The same procedure applies for the Electrical Engineering Institute Nikola Tesla and Institute Mihailo Pupin, as well as the Serbian Academy of Sciences and Arts (SANU). Additionally, the business association "Heat Plants of Serbia" has been participating in the meetings regarding the district heating, while the Belgrade Metro and Train Company has delivered appropriate data and information on the ongoing project and planned activities regarding the development of the railway transport in the city of Belgrade. Moreover, during the analysis of the energy poverty situation in the Republic of Serbia and preparation of the INECP, the study of the non-governmental organization RES Foundation on the energy poverty in the Republic of Serbia in 2021 was taken into consideration.

Finally, during the preparation of draft INECP, a series of bilateral and multilateral meetings has been held with various stakeholders. Thus, efforts made resulted in 11 Working Group meetings and about 50 bilateral meetings, as the inclusiveness has been governance's priority.

iv. Consultations of other Energy Community Contracting Parties and European Union Member States

Since the European Union Member States have finalized and adopted their INECPs until 2021, the Republic of Serbia had an opportunity to access each plan with a special focus on those prepared by the neighbouring countries. First and foremost, the Republic of Serbia assessed the INECPs of countries with common borders, such as Croatia, Bulgaria, Romania and Hungary, primarily regarding the planning activities with cross-border relevance and wider regional impact. At the same time, the Republic of Serbia considered all European INECPs. Moreover, while the Republic of Serbia was drafting its INECP, North Macedonia submitted its draft document to the Energy Community Secretariat and this enabled the Republic of Serbia to analyse the planning process in this neighbouring country as well. The INECP consultations with the other Energy Community Contracting Parties that are developing and preparing their INECPs in parallel with the Republic of Serbia have been realized through the already existing bodies and mechanisms for regional cooperation, such as:

- Western Balkan 6,
- Central and South Eastern Europe energy connectivity (CESEC),
- Ministerial Council of the Energy Community,
- Energy and Climate Committee,
- Energy and Climate Technical Working Group,
- Renewable Energy Coordination Group,
- Energy Efficiency Coordination Group,

- Security of Supply Coordination Group,
- Coordination Group of Distribution System Operators for Electricity,
- Coordination Group for Cybersecurity and Critical Infrastructure,
- PECI electricity and gas Coordination Groups,
- EnC Permanent High-Level Group and,
- Platforms for Gas and Electricity,
- Energy Community Just Transition Forum,
- Other regular and occasional bilateral and multilateral high-level events

v. Iterative process with the Energy Community Secretariat

Since the beginning of the development and preparation of the Draft INECP of the Republic of Serbia, the Energy Community Secretariat has been closely following the progress of the overall process, providing the necessary support as needed. Formally, this involvement of the EnC Secretariat is realized through the work of Ministerial Council of the EnC, as well as within the various existing thematic coordination groups, platforms and initiatives at the level of the Energy Community, but also other regional energy-related and climate-related formats where Energy Community actively participates. Once the draft INECP had been completed, the Republic of Serbia has submitted the document to the Energy Community Secretariat for the purpose of consultations and provision of recommendations.

1.4 Regional cooperation in preparing the plan

i. Elements subject to joint or coordinated planning with other Energy Community Contracting Parties and European Union Member States

From the point of view of the Republic of Serbia, the recognised elements of cross-border significance are:

- integration of energy markets,
- major infrastructure projects close to the national border and cross-border infrastructure projects,
- international scientific and research cooperation, and
- other activities that may affect other EnC Contracting Parties and EU Member States.

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

Consultation with the region will be implemented in parallel with the public consultation of the Draft Plan. The results of this consultation process will be incorporated in the Final Plan.

2 NATIONAL OBJECTIVES AND TARGETS

The main policy priorities are presented in the following sub-chapters for each dimension of the NECP separately.

2.1 Climate change, emissions and reduction of greenhouse gases

A central target has been set for **reducing the GHG emissions** by 40.4% in 2030 compared to 1990 including agriculture, waste and LULUCF. This is consistent with the targets set in the recently updated Nationally Determined Contribution (NDC). A well-balanced mixture of policies and measures will be initiated in order to mitigate the GHG emissions in all supply and demand sectors.

Priority is also given on the **climate change adaptation**, as Republic of Serbia will develop and adopt the National Strategy for Adaptation to Climate Change, which will specify the general objectives, guidelines and means of implementation of a modern, effective and developmental climate change adaptation strategy within the framework set by the United Nations Convention on Climate Change, EU directives and international experience.

Finally, the promotion of the **circular economy and bioeconomy will be fostered also** contributing to the attainment of the climate change mitigation objective. The shift to a circular pattern can lead to a significant reduction in GHG emissions through the recycling and re-use of materials, the more efficient use of resources and more eco-friendly product design, as well as the introduction of new circular business models, especially in industry, transport and the built environment.

2.2 Renewable energy sources

The national objective for the **penetration of RES** has been specified within the NECP. More specifically, the RES share in the gross final energy consumption should amount at least to 33.6% in 2030. Additional objectives have been set in order the share of RES in the gross final electricity consumption to reach at least 45.2%, the share of RES in covering heating and cooling demand to reach 41.4% and the share of RES in the transport sector to reach 7% in alignment with the relevant EU calculation methodology.

The specified objectives for **the penetration of RES are related directly to the evolution of final consumption necessitating the achievement of the relevant energy efficiency targets**. Apparently, the key pillar for fulfilling the national objective for the penetration of RES is the contribution of RES in the electricity consumption posing the highest demand for the timely and efficient implementation of the planned policies and measures.

Despite the fact that the target can be assessed as ambitious, it can be assessed also as realistic taking into consideration both the technical and economic potential and the entrepreneurial interest already expressed.

The **electrification and the coupling of the final consumption sectors** are also promoted in order to increase the share of RES in the final energy consumption. Initially, the **gradual electrification of the transport sector** comprises a major challenge until 2030. More specifically, a considerable penetration of electric vehicles is expected to substantially influence a number of dimensions in the NECP. The aim is to achieve this penetration at the most cost-effective approach for the national economy, while ensuring that certain

prerequisites for the electrification of the transport sector, such as the simultaneous development of the charging infrastructure and the adoption of the regulatory framework are timely fulfilled.

Moreover, the **sector coupling** will contribute to the maximization of the RES in the different end-uses and, apparently, the electrification of different end-uses is an essential component in achieving this aim. The role of heat pumps, along with the energy storage systems and the self-consumption schemes, is critical for the fulfilment of the sector coupling. Similarly, the mixing of hydrogen or biomethane into the natural gas network will contribute also to sector coupling.

An objective has also been set for **promoting RES technologies in buildings through self-consumption and net metering schemes**. More specifically, the installed capacity of the RES technologies for electricity production (mainly Roof top photovoltaic systems) are expected to reach up to 0.5 GW in 2030 being capable of covering approximately 5% of the electricity consumption in residential sector.

New **innovative RES technologies** for electricity production will be promoted also within the NECP through pilot projects in order to assess their effectiveness, such as: hydrogen production, small wind turbines etc.

The use of RES for covering the heating and cooling demand will be achieved mainly through the **large installation of heat pumps** (approximately 7 GW), while the role of solar thermal systems, geothermal energy, and biomass is also essential.

Moreover, the **further utilization of RES in the district heating networks** will be achieved mainly through biomass (2.7 ktoe), while the gradual exploitation of other RES is intended, such as biomethane, hydrogen and geothermal energy.

Finally, the **contribution of electric vehicles** is expected to be substantial for the further promotion of RES. It should be noted that 40 thousand electric vehicles (both passenger and light-duty) approximately will be registered until 2030. Last but not least, the contribution of biofuels will remain dominant, with a particularly increasing share of advanced biofuels until 2030 (49 ktoe without assuming the foreseen multipliers).

2.3 Improvement in energy efficiency

An objective with significant importance within the INECP is **the improvement of energy efficiency** managing to restrain the final energy consumption at a level that doesn't exceed 9.7 Mtoe in 2030. The same tendency is observed also for the case of primary energy consumption, which should be less than 14.68 Mtoe in 2030.

An additional **energy saving target has been specified according to the provisions of Article 7 of Directive 2012/27/EU**. Moreover, specifically, 506 ktoe of cumulative final energy savings should be achieved by the implementation of energy efficiency measures over the period 2024-2030.

The need to **renovate the existing building stock** is indisputable, leading not only to significant energy and cost savings but improving simultaneously the comfort, safety and health conditions in the renovated buildings. The renovation rates, estimated within the framework of the Long-term Strategy for Encouraging Investments in Renovation of the National Building Stock of the Republic of Serbia by for the case of the residential and non-residential buildings, respectively, have been taken into consideration within the framework of the NECP until 2030 in order to ensure their full alignment and to facilitate the sufficient renovation of the building stock.

Finally, the implementation of the planned policies and measures in the end-users for improving the energy efficiency requires the **design of efficient financing mechanisms** in order to increase and maximize the

current levels of own funds leverage. The active involvement of the financial sector and the promotion of innovative financing instruments, including the promotion of energy performance contracts and energy services, are critical parameters for attaining this objective. The Energy Efficiency Directorate will play a special role for the creation and implementation of financing mechanism. The capacities of the Directorate should be strengthened in the coming period, and its legal status should be further improved. This will enable the implementation of adequate financial mechanisms for the promotion of EE. The Directorate is already implementing activities for the financing of energy efficiency improvements in households and in public sector buildings at on the local level as previously described.

2.4 Energy security

The diversification of energy sources and fuel supplying countries is the main objective of the NECP for the dimension of energy security. More specifically, policies and measures will be launched to strengthen the diversification of energy sources in order to prevent the dependence on just one fuel or just one country. The achieved diversification will increase the competitiveness between fuels and suppliers from third countries leading to reduced energy prices, enhancing the security of supply and also protecting the supply of energy in the event of an energy crisis at regional level.

Obviously, the optimal utilization of domestic energy sources should be ensured to enhance the energy security. The identification of the existing potential and the most cost-effective utilization of domestic energy sources is essential target within the framework of the NECP. Emphasis will be given on the utilization and use of RES potential, both for electricity production and for direct use in end-uses contributing substantially towards energy security.

Strengthening the geopolitical role of the Republic of Serbia constitutes another vital objective. Therefore, it is urgent to complete the existing interconnections and to design new international interconnections with pipelines from neighbouring countries. Furthermore, these actions will also contribute to the diversification of energy sources and supply routes from third countries. Several cross-border / international natural gas transportation projects will be promoted, enhancing the diversification of energy sources and, in conjunction with the promotion of natural gas storage projects, ensuring the adequacy in the case of a natural gas shortage.

The stabilization of the energy dependency rate is another important objective within the NECP. The current energy dependency is relatively low and it is imperative to restrain it in similar levels due to the high penetration of petroleum products and, to a lesser degree, natural gas. Consequently, the energy dependency should not surpass the level of 41% in 2030.

Finally, another objective is to ensure the required electricity system adequacy in order to attain a minimum level of reliability for covering the demand for electricity, in conjunction with the decision to reduce the electricity production by lignite plants. To attain this objective, it will be necessary to adopt mechanisms for strengthening the system with additional electricity production capacity or promoting a demand response scheme.

2.5 Internal energy market

The **market integration and the establishment of competitive energy markets** will be promoted within the dimension of internal energy market. The required reforms will be initiated for harmonizing the domestic markets in electricity and natural gas with the EU directives and regulations on the respective markets.

The **coupling of the energy markets** will, due to improved energy flows via the interconnections, help to increase the liquidity of the interconnected markets and enable the participation of RES in the cross-border trade of electricity.

The participation in the new energy markets will allow RES to have the incentive and the capability to balance their production closer to real time, thus reducing the needs and the associated costs for reserves and increasing the system security.

Another objective is also to **strengthen the role of electricity market consumers** by increasing demand-side participation in the electricity market and to promote the deployment of storage systems that will ensure lower energy prices and will strengthen the penetration of RES and electricity system adequacy.

The **digitization of the energy system** is a prerequisite for the development of properly operational and competitive domestic energy markets and for the optimal implementation and use of all technological applications and market mechanisms that can be developed in the context of the energy markets. Emphasis will be placed, through the operators' development programmes, on planning and implementing the relevant infrastructure projects, information systems, control centres and metering devices that will allow for the complete transition from the current energy system to a fully digitized one, also ensuring the secure management of the consumer data.

The **alleviation of energy poverty** is perceived also as an objective taking into account that it has worsened gradually due to the energy crisis. The reduction of energy poverty by 75% in 2030 compared to 2020 has been set as national target.

Finally, the contribution of **net metering and local energy community schemes** is twofold, as they will contribute both to the implementation of RES and energy efficiency investments, as presented previously, and to the more active participation of the local community strengthening of the role of consumers. The quantitative objective has been specified to install and operate new self-consumption and net metering systems with an installed capacity equal to 0.5 GW (mainly Roof top photovoltaic systems) in 2030.

2.6 Research, innovation and competitiveness

The **promotion of research and innovation** will continue to be a priority through supporting innovative technologies, which will contribute to the fulfilment of the energy and climate targets. The annual expenditure for the further support of the research and technological development is expected to double in 2030 compared to 2020.

The **improvement of the energy intensity and greenhouse gas emissions intensity** will manage to increase the competitiveness of Serbian economy. More specifically, the adoption of targeted energy efficiency policies and measures will contribute to both to reduce energy costs and to enhance the competitiveness of the various economic sectors.

The **reduction of the energy cost** will make the energy products more accessible to all consumers. The design of the required policies and measures will take into account the purchasing power of consumers and their

special groups, as well as any specificities related to local characteristics, such as those of rural areas. Maintaining an average cost of energy products below the European average end-user level has been set as a goal within the NECP.

The domestic added value of the energy sector will be increased with the identification and promotion of innovative applications and services in the energy sector with high domestic added value increasing the gross domestic product and enhancing the sustainability of the energy sector. In addition, this objective also ensures an increase in the number of direct and indirect jobs due to activities in the energy sector.

Finally, the policies and measures, which will be integrated into the Just Transition Plan, will be implemented in the areas that will be affected most by the transition to a low-carbon economy. The challenges faced in the lignite-dependent areas during the transition to a low-carbon economy can be tackled with tailored solutions to support the structural transformation and to accelerate the process of economic diversification and technological transition. The aim is to elaborate a sustainable development strategy, focusing on sectors with dynamic prospects in terms of output, employment and income indicators.

3 POLICIES AND MEASURES

3.1 Dimension Decarbonisation

3.1.1 GHG emissions and reduction

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-carbon economy with a 50 years perspective and achieving a balance between emissions and reduction in accordance with the Paris Agreement

The INECP envisages a number of decarbonisation-related policy measures in terms of energy and non-energy related GHG emissions. The existing and planned policy measures in the energy field, which generates about 80% of GHG emissions in the Republic of Serbia, will have a major contribution to decarbonisation process. Existing measures for decarbonisation will be extended until 2030 and will complement the measures supporting RES sector transformation and other dimensions of the Energy Union, including energy efficiency, the internal energy market and energy security.

Work on improving greenhouse gas inventories and updating Serbia's Nationally Determined Contribution to the Paris Agreement is progressing. Alignment of legislation on monitoring, reporting and verification of GHG emissions in line with the EU Emissions Trading System (ETS) and Effort Sharing Regulation is implemented through the Law on Climate Change ("Official Gazette of the RS", No. 26/21). The Republic of Serbia needs to strengthen its administrative and technical capacity at all levels and further increase investments towards green energy transition.

Regulatory Measures

Apart from proposed policy measures regarding energy and non-energy related GHG emission reduction targets, 6 policy measures are also proposed in order to improve the existing regulatory framework and aware the public for the environmental impact of energy consumption with the aim of motivating, stimulating and informing them to change their behaviour and continue to engage.

Policy measure code:	PM_D1	Title:	Preparation for and Introduction of carbon tax
Main objective:	Carbon emissions reduction		
Quantified objective:	Reduction of GHG emissions by 40% (with LULUCF) by 2030 compared to 1990 levels		
Description:	PM_D1 will facilitate the introduction of a CO_2 tax in order to speed up the phasing-out of conventional fuels and at the same time stimulate the investments in RES and increase the penetration of energy efficiency measures.		
Implementation Timeframe	2023-2030 including the preparation period		
Type of measure	Reform		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Ministry of Environmental Protection ▪ Energy Agency of the Republic of Serbia (AERS) ▪ Ministry of Economy		

	▪ Private investors
Monitoring Entity	▪ Ministry of Environmental Protection ▪ Ministry of Mining and Energy
Progress indicators	Annual emissions reduction (Gg CO_2-eq)
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842 ▪ European Commission, Communication: An EU Strategy on Adaptation to Climate Change, COM (2013)
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Climate Change
Implementation cost	-
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D2	Title:	Adoption, Implementation and monitoring of the Low-carbon Development Strategy and Action Plan for its implementation and developing an Adaptation Plan to Climate Change
Main objective:	Carbon emissions reduction		
Quantified objective:	Reduction of GHG emissions by 40% by 2030 compared to 1990 levels		
Description:	PM_D1 will facilitate the process of implementing and monitoring the adopted low-carbon development strategy together with the concrete action plan for its implementation, as foreseen in the adopted Law on Climate Change. More specifically, measures needed to adapt to climate change have to be taken into consideration, aiming at conserving biodiversity, more efficient use of water resources, improved forest management, etc., as well as a range of actions in areas such as agriculture, fisheries, energy, tourism and health. The implementation of these measures and actions will be determined in the context of the National Adaptation Plan to Climate Change.		
Implementation Timeframe	2024-2030		
Type of measure	Reform		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Ministry of Environmental Protection		
Monitoring Entity	▪ Ministry of Environmental Protection ▪ Ministry of Mining and Energy		
Progress indicators	Annual emissions reduction (Gg CO_2-eq)		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842 ▪ European Commission, Communication: An EU Strategy on Adaptation to Climate Change, COM (2013)		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Climate Change		

Implementation cost	1.4 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D3	Title:	Promoting circular economy
Main objective:	GHG emissions reduction		
Quantified objective:	Communal waste recycling 60% by 2030, -Reducing food waste by 50% by 2030.		
Description:	PM_D2 will promote actions in accordance to the Roadmap for Circular Economy in Serbia aiming at shifting to a circular pattern that can lead to a significant reduction in GHG emissions through recycling and reuse of materials, more efficient use of resources and more eco-friendly product design, as well as through the introduction of new 'circular' business models, especially in industry, transport and the built environment. A series of actions for the development of financial instruments, planning and establishment of a regulatory framework will also be examined.		
Implementation Timeframe	2023-2030		
Type of measure	Reform		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Ministry of Environmental Protection		
Monitoring Entity	▪ Ministry of Environmental Protection ▪ Agency for Environmental Protection		
Progress indicators	Annual emissions reduction (Gg CO2-eq)		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842 ▪ A new Circular Economy Action Plan For a cleaner and more competitive Europe COM/2020/98		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Roadmap for circular economy in Serbia (Study)		
Implementation cost	4.5 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_D4	Title:	Organizing awareness campaigns for better information dissemination
Main objective:	GHG emissions reduction		
Quantified objective:	Reduction of GHG emissions by 40% by 2030 compared to 1990 levels		
Description:	PM_D3 will promote the organisation of information and awareness-raising activities and consultations. These will be focused on behavioural changing through initiatives in the areas of teaching, education and awareness raising, with particular attention being paid to the importance of raising awareness on the environmental impact of consumption and with the aim of motivating, stimulating and informing the public to change their behaviour and continue to engage.		

Implementation Timeframe	2023-2030
Type of measure	Reform
Sectors covered/affected	All NECP subject fields
Implementing Entity	▪ Ministry of Environmental Protection
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Environmental Protection
Progress indicators	Annual emissions reduction (Gg CO2-eq)
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Low Carbon Development Strategy with Action Plan
Implementation cost	3.0 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D5	Title:	Establishment and operation of the National Climate Change Council, a Carbon Footprint Observatory for all sectors, and a National GHG inventory system
Main objective:	GHG emissions reduction		
Quantified objective:	Reduction of GHG emissions by 40% by 2030 compared to 1990 levels		
Description:	PM_D4 will facilitate the establishment and operation of: 1) the National Climate Change Council as an advisory body to the Government, according to the provisions of the Climate Change Law. 2) an Observatory for the calculation and reduction of carbon footprint of non-ETS economic operators in order to reduce the total GHG emissions for all activities which the economic operator is responsible for or dependent upon. 3) a National GHG Inventory System for the assessment of GHG emissions from sources and removals by sinks, as well as the timeliness, transparency, accuracy, consistency, comparability and completeness of GHG inventories.		
Implementation Timeframe	2023-2030		
Type of measure	Reform		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Ministry of Environmental Protection		
Monitoring Entity	▪ Ministry of Environmental Protection ▪ Agency for Environmental Protection ▪ Ministry of Mining and Energy		
Progress indicators	Annual emissions reduction (Gg CO2-eq)		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842		

Relevant National Planning Document (Legal, Regulatory Acts, etc.)	▪ Law on Climate Change ▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017)
Implementation cost	0.5 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D6	Title:	Implementation and monitoring of Just Transition and related Action Plan
Main objective:	Carbon emissions reduction		
Quantified objective:	Reduction of GHG emissions by 40% by 2030 compared to 1990 levels		
Description:	PM_D6 will aim at the revival of the local economy, the securing of jobs and the creation of new ones, through a flexible developmental transformation of the areas involved. The Just Transition Plan will identify the pillars of development, which will contribute on the achievement of the goals, while emphasis will be given on the improvement of infrastructure and the alternative utilization of lands, currently occupied by lignite mines. In addition, stakeholder consultation and engagement in the preparation of the plans, including with social partners and civil society, is critical. It will also include tax incentives, along with the subsidies, to attract investments, the conduction of spatial planning in order to identify the available land uses after the closure of lignite mines and the timetables for the implementation of investments. Finally, a governance and monitoring mechanism of the Just Transition Plan will be established, with the participation of all critical entities, specifying their main duties and responsibilities.		
Implementation Timeframe	2023-2030		
Type of measure	Reform		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity	▪ Ministry of Environmental Protection ▪ Ministry of Mining and Energy		
Progress indicators	Annual emissions reduction (Gg CO_2-eq)		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842 ▪ European Commission, Communication: An EU Strategy on Adaptation to Climate Change, COM (2013)		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Climate Change		
Implementation cost	2.0 M€		
Financing source(s)	EU and other funds, public funds		

Energy Sector

GHG emissions in the energy sector (generation of electricity and heat, petroleum processing, production of solid energy resources) are determined by the quantity of energy used in processes and the unit emission factor of energy sources. GHG emissions can be reduced by decreasing the quantity of consumed energy, by increasing the use of renewable energy sources, and by replacing fossil fuels.

The majority of the policy measures with an impact on decarbonisation intended for the energy sector are included, among others, in the dimensions of renewable energy sources, energy efficiency, the internal energy market and energy security, as the changes in these dimensions lead to overall GHG emissions reduction.

Industrial Sector

As regards industrial pollution and risk management, alignment with most of the EU acquis is at an early stage across the industrial sector, including on the Industrial Emissions Directive (IED). Inspection and law enforcement remain areas of concern. The Republic of Serbia needs to increase capacities for managing the integrated permitting processes, while the country should tackle industrial pollution by enforcing the polluters' pay-principle in order to encourage the industry to invest in green solutions.[69]

Furthermore, regarding buildings in the industrial and service sectors, demand for cooling during the summer needs to be reduced (thermal renovation and efficiency standards for new buildings). Support will be possible under the funding policy in place for phasing out the use of fluorinated gases with a high global warming potential (GWP) (e.g. refrigeration and air-conditioning units) at an earlier stage. It will also be ensured (e.g. through contact with trade associations in the refrigeration and air-conditioning industry and providing information about new refrigerants) that Serbian companies or persons working at such companies have the necessary knowledge regarding alternative refrigerants and skills for working with such refrigerants.

Policy measure code:	PM_D5	Title:	Implementation of technological changes in production processes in specific industries
Main objective:	GHG emissions reduction		
Quantified objective:	Limit GHG emissions growth from industrial processes and product use by 7% by 2030 compared to 2010		
Description:	PM_D5 will facilitate non-energy related GHG emission reductions by modernization of industrial process technology and increased material efficiency in the production process in the cement industry, the iron and steel industry, the nitric acid production, and the petrochemical and carbon black acid production.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Industry		
Implementing Entity	▪ Ministry of Environmental Protection ▪ Ministry of Finance		
Monitoring Entity	▪ Ministry of Environmental Protection ▪ Ministry of Finance		
Progress indicators	Annual emissions reduction (Gg CO2-eq)		
Other relevant Energy Union dimension(s) affected	▪ Energy Efficiency		
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017)		
Implementation cost	29 M€		

[69] https://ec.europa.eu/neighbourhood-enlargement/serbia-report-2021_en

Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D6	Title:	Emission reduction measures in the refrigeration and air conditioning - fluorinated gas emissions
Main objective:	Fluorinated gas emissions reduction		
Quantified objective:	Limit GHG emissions growth from industrial processes and product use by 7% by 2030 compared to 2010		
Description:	PM_D6 will facilitate the reduction of fluorinated gas emissions through the prevention of leaks and emissions, as well as the control of the use of fluorinated gases. Indicative measures are the cessation of production of new refrigerators operating with fluorinated gases with Global Warming Potential (GWP) > 150, the production of fire protection equipment containing fluorinated gases HFC-23, the training and certification of technical personnel dealing with fluorinated gases, the installation of leak detection systems in large cooling, air conditioning and fire protection systems as well as the traffic of vehicles, which use fluorinated gases that do not have GWP>150.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Industrial, services		
Implementing Entity	▪ Ministry of Environmental Protection		
Monitoring Entity	▪ Ministry of Environmental Protection ▪ Agency for Environmental Protection		
Progress indicators	Annual F-gases emissions reduction (Gg CO2-eq)		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017) ▪ Low Carbon Development Strategy with Action Plan		
Implementation cost	16 M€		
Financing source(s)	EU and other funds, public funds		

Waste Management Sector

The Ministry of Environmental Protection published the Roadmap for the Circular Economy in Serbia[70] in 2020, which confirms the strategy to harmonise Serbian and EU waste legislation, in particular the waste framework, landfill, packaging and plastics directives. The Roadmap contains recommendations on the sustainable use of resources, waste prevention and circular product design, as well as more specific measures for manufacturing, agricultural, packaging and construction waste.

[70] https://circulareconomy.europa.eu/platform/sites/default/files/roadmap-for-circular-economy-in-serbia.pdf

The Republic of Serbia also prepared a New Waste Management Strategy 2020-2025[71] with concrete plans for individual waste streams and a waste prevention programme was drawn up. The New Waste Management Strategy defines measures by 2025 that will bring Serbia's waste management up to European standards and pave the way towards sustainable development.

All in all, the Republic of Serbia has a good level of alignment with the EU acquis. Serbia developed with EU financial assistance a national waste management strategy and a national sludge management strategy, which are in the adoption procedure since 2019. The by-law on treatment of the equipment and waste containing polychlorinated biphenyl, currently in the adoption procedure, will fully transpose the relevant EU directive. Serbia proceeded with the permanent disposal of historic hazardous waste. Additional economic instruments for special waste streams need to be developed. The proportion of recycled waste in overall waste management is still low, e.g. 3% for municipal waste, based on European Commission's data[72]. Serbia needs to redouble its efforts to close its non-compliant landfills and invest in waste reduction, separation and recycling. The remediation of the Belgrade landfill and the construction of a waste to energy facility have continued in 2020.

Policy measure code:	PM_D14	Title:	Improvement of wastewater treatment and discharge
Main objective:	GHG emissions reduction		
Quantified objective:	Reduce GHG emissions in the waste sector by 13% by 2030 compared to 2010		
Description:	PM_D14 will facilitate actions, such as the construction of wastewater treatment facilities, for improving the wastewater treatment and disposal, as wastewater can be a source of methane (CH_4) when treated or disposed anaerobically or, when dissolved, CH_4 enters aerated treatment systems. It can also be a source of nitrous oxide (N_2O) emissions.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Waste		
Implementing Entity	▪ Ministry of Environmental Protection		
Monitoring Entity	▪ Ministry of Environmental Protection		
Progress indicators	Annual emissions reduction (Gg CO2-eq)		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017)		
Implementation cost	90 M€		
Financing source(s)	EU and other funds, public funds		

[71] https://www.umweltbundesamt.at/en/news-reports/news-eaa/en-news-2020/news-200129-enThe Waste Management Programme for the period 2022-2031 was adopted in 2018 ("Official Gazette of RS", no. 30/18) based on the Law on the Planning System of the Republic of Serbia.

[72] https://ec.europa.eu/neighbourhood-enlargement/serbia-report-2021_en

Policy measure code:	PM_D15	Title:	Improvement of waste management practices, including a decrease of biodegradable components of waste disposed on landfills and increased recycling
Main objective:	GHG emissions reduction		
Quantified objective:	Reduce GHG emissions in the waste sector by 13% by 2030 compared to 2010, diversion of 65% of biodegradable waste from landfill by 2030 (compared to 2008)		
Description:	PM_D15 will promote actions concerning the integrated management of organic waste and include its separate collection and treatment, either aerobic or anaerobic, which may produce compost, digestion or other material and/or energy recovery. In addition, it is planned to strengthen and upgrade the recycling infrastructure in order to fully cover the needs of the country. As part of a comprehensive waste management plan, a number of waste treatment plants are expected to be constructed in order to reduce processing residues, aiming at diverting from landfill a percentage of more than 90%.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Waste		
Implementing Entity	▪ Ministry of Environmental Protection		
Monitoring Entity	▪ Ministry of Environmental Protection		
Progress indicators	Annual amount of emissions reduction from improved waste management practices (Gg CO_2-eq)		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017) ▪ Low Carbon Development Strategy with Action Plan		
Implementation cost	80 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_D16	Title:	Higher percentage of municipal solid waste treated by biological treatment options
Main objective:	GHG emissions reduction		
Quantified objective:	Reduce GHG emissions in the waste sector by 13% by 2030 compared to 2010		
Description:	PM_D16 will promote the municipal waste treatment through biological treatment options, namely composting and anaerobic digestion of organic waste, such as food waste, garden (yard) and park waste and sludge. The end-products of the biological treatment can, depending on its quality, be recycled as fertiliser and soil amendment, or be disposed in Solid Waste Disposal Sites (SWDS).		
Implementation Timeframe	2023-2030		
Type of measure	Investment		

Sectors covered/affected	Waste
Implementing Entity	▪ Ministry of Environmental Protection
Monitoring Entity	▪ Ministry of Environmental Protection
Progress indicators	Annual amount of emissions reduction (Gg CO_2-eq)
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017) ▪ Low Carbon Development Strategy with Action Plan
Implementation cost	85 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D17	Title:	Utilisation of the entire amount of methane (CH_4) generated from all the dumped quantities of waste that end up in sanitary landfills
Main objective:	CH_4 emissions reduction		
Quantified objective:	Reduce GHG emissions in the waste sector by 13% by 2030 compared to 2010		
Description:	PM_D17 will facilitate the process in which the methane produced from the waste disposal sites can be sustainably utilized as a source of energy through transforming Municipal Solid Waste (MSW) disposal sites (open dumps) to sanitary landfills with methane capturing and utilization facilities.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Waste		
Implementing Entity	▪ Ministry of Environmental Protection		
Monitoring Entity	▪ Ministry of Environmental Protection		
Progress indicators	Annual amount of CH_4(m^3) captured and emissions reduction (Gg CO_2-eq)		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017)		
Implementation cost	48 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_D18	Title:	Promotion of composting in both centralised and household perspectives
Main objective:	GHG emissions reduction		
Quantified objective:	Reduce GHG emissions in the waste sector by 13% by 2030 compared to 2010		
Description:	PM_D18 will promote the production of compost as a large part of waste is organic and suitable for conversion into compost. Good composting practices minimize greenhouse gas emissions. The use of compost provides numerous greenhouse gas benefits, both directly through carbon sequestration and indirectly through improved soil health, reduced soil loss, increased water infiltration and storage, and reduction in other inputs. Home composting can be assisted based on the number of compost bins distributed.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Waste		
Implementing Entity	▪ Ministry of Environmental Protection		
Monitoring Entity	▪ Ministry of Environmental Protection		
Progress indicators	Annual amount of produced compost (kt) and emissions reduction (Gg CO_2-eq)		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017) ▪ Low Carbon Development Strategy with Action Plan		
Implementation cost	60 M€		
Financing source(s)	EU and other funds, public funds		

Agriculture, Forestry and Other Land Use (AFOLU)

(i) Agriculture

CH_4 is the main GHG emitted by the agricultural sector from enteric fermentation and manure management. Very small amounts of N2O are also emitted from manure management and fertiliser use. Various policies and measures are being implemented as agricultural practices, which reduce the GHG emissions profile of the local agricultural sector. N_2O emissions from the use of fertiliser are expected to decrease over time as improved cultivation practices are adopted.

In the Republic of Serbia, agricultural policy is based on the Act on Agriculture and Rural Development[73] and the Act on Incentives in Agriculture and Rural Development[74]. However, none of these two acts enable the regulation of the agricultural products market and the introduction of new market regulation mechanisms,

[73] https://www.paragraf.rs/propisi/zakon_o_poljoprivredi_i_ruralnom_razvoju.html
[74] https://www.paragraf.rs/propisi/zakon_o_podsticajima_u_poljoprivredi_i_ruralnom_razvoju.html

which are necessary to help Serbian agriculture maintain steady development. Market mechanisms in the Republic of Serbia are not in accordance with the common EU market organization. Serbia lacks a similar unique legal framework to implement most measures of market regulation.

In order to harmonize further with mechanisms in the EU, the Agriculture, Forestry and Water Management Committee of the Serbian National Assembly adopted the Bill on the Regulation of the Agricultural Products Market. The Bill regulates the requirements and measures for the regulation of the agricultural products market.

Beyond this, and as regards specifically the GHG emissions, manure management is set to improve through the enactment of the proposed policy measure PM_D11, which requires both an investment in new infrastructure and a change in current operations.

(ii) Land Use, Land Use Change and Forestry

According to UNECE[75], Serbia has 2,252,400 ha of forest, with a forest cover of 29.1%. More than half (53%) is state-owned and the rest is owned privately (individual owners, religious communities, and private enterprises).

Article 3 of the Serbian Forest Law[76] defines the objectives of Forest Landscape Restoration as follows: "This Law shall ensure the conditions for sustainable management of forests and forest lands as goods of public interest, in a manner and to an extent which conserves and enhances their productivity, biological diversity, ability to regenerate and vitality, and increases their potential for the mitigation of climate change and their economic, ecologic and social functions, without inflicting damage to the surrounding ecosystems".

The general condition of state forests is considered unsatisfactory, reflecting low volume production, low forest cover, an unfavourable age-class structure and poor health. In the Forest Law, guiding principle 3.9 suggests preventing forest degradation primarily by applying the mechanism of environmental impact assessment and by fostering intersectoral cooperation in solving of such conflicts. The same document suggests efforts to maintain and increase the area covered by forests by reclamation, afforestation and forest cultivation on the abandoned, degraded and treeless land and advocates intersectoral cooperation to prevent further forest degradation[77].

The Forest Law and all other planning documents focus on restoration at the level of forests and forest land. No planning documents operate at a landscape level, making it difficult to articulate and implement Forest Landscape Restoration on the ground. An objective exists to increase forest cover to 41.4% by 2050, primarily by establishing 1,000,000 ha of new plantations[78].

The Republic of Serbia seeks to enhance removals or reduce emissions in the LULUCF sector. In view of this, afforestation projects have been undertaken in recent years, which had an effect on the area covered by permanent vegetation, particularly trees. However, the CO_2 removals as a result of such policy actions, have not been estimated, given that the scale of projects and the scale of removals would be very limited.

[75] https://unece.org/sites/default/files/2021-07/2106522E_WEB.pdf
[76] http://www.fao.org/faolex/results/details/en/c/LEX-FAOC143404
[77] http://www.fao.org/forestry/16159-0f033f89b9da00ac3d5a3c81cda247f26.pdf
[78] Ratknic, M., Rakonjac, Lj., Braunovic, S., Miletic, Z., Ratknic, T. (2015), "The Republic of Serbia's afforestation strategy with an action plan", *Reforesta*. pp. 13-22.

Policy measure code:	PM_D7	Title:	Sustainable forest management (forest land remaining forest land)
Main objective:	Carbon emissions reduction		
Quantified objective:	Increase the carbon sink in the Serbian Forest by 17% by 2030, compared to 2010		
Description:	PM_D7 aims to reverse the loss of forest cover through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Agriculture, Forestry and Other Land Use (AFOLU)		
Implementing Entity	▪ Ministry for Agriculture, Forestry and Water Management		
Monitoring Entity	▪ Ministry of Environmental Protection ▪ Ministry for Agriculture, Forestry and Water Management		
Progress indicators	Forest area (ha), forest planted/covered with new seedlings (ha) and number of seedlings planted and alive		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017) ▪ Low Carbon Development Strategy with Action Plan		
Implementation cost	354 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_D8	Title:	Land conversion to cropland
Main objective:	Carbon emissions reduction		
Quantified objective:	Increase the carbon sink in the Serbian Forest by 17% by 2030, compared to 2010		
Description:	PM_D8 will facilitate conversion of lands on inclined terrains into perennial grassland (pastures, meadows), which will significantly decrease intensity of soil organic matter depletion and emission of soil carbon, and will lead to carbon sink. This conversion supposes land use change and change of the production system, which might influence the net annual income of primary producers. Due to this, its implementation should be supported with incentives, especially in the first years of conversion, in order to bridge possible loss of incomes in farm holds.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Agriculture, Forestry and Other Land Use (AFOLU)		
Implementing Entity	▪ Ministry for Agriculture, Forestry and Water Management		
Monitoring Entity	▪ Ministry of Environmental Protection ▪ Ministry for Agriculture, Forestry and Water Management		

Progress indicators	Area converted on yearly base (ha/year), percentage of soil organic matter increase and carbon sink per ha
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017) ▪ Low Carbon Development Strategy with Action Plan
Implementation cost	8.5 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D9	Title:	Increase the tree-planted areas (groves / parks / green roofs)
Main objective:	Carbon emissions reduction		
Quantified objective:	Increase the carbon sink in the Serbian Forest by 17% by 2030, compared to 2010		
Description:	PM_D9 will promote the increase of tree-planted areas in the country, including groves, parks and green roofs. This can be done through numerous related initiatives and information campaigns for citizens, explaining the environmental benefits in terms of the reduction of CO2 emissions, as well as through the provision of financial incentives.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Agriculture, Forestry and Other Land Use (AFOLU)		
Implementing Entity	▪ Ministry of Environmental Protection ▪ Ministry of Construction, Transport and Infrastructure		
Monitoring Entity	▪ Ministry of Environmental Protection		
Progress indicators	Number of groves / parks / green roofs that have been added on annual base, emissions reduction (Gg CO_2-eq)		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017)		
Implementation cost	6.5 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_D10	Title:	Measures for the reduction of CH_4 emissions from the enteric fermentation of animals
Main objective:	CH_4 emissions reduction		

Quantified objective:	Decrease the CH_4 emissions from the enteric fermentation of animals by 15% by 2030, compared with 2010
Description:	PM_D10 will facilitate the reduction of CH_4 emissions through the modification of the feed composition and nutrition practice in livestock. It is a cost-effective measure, as it does not require subsidies or incentives. Practical training and demonstration for farmers will be sufficient.
Implementation Timeframe	2023-2030
Type of measure	Reform
Sectors covered/affected	Agriculture, Forestry and Other Land Use (AFOLU)
Implementing Entity	▪ Ministry for Agriculture, Forestry and Water Management
Monitoring Entity	▪ Ministry of Environmental Protection ▪ Ministry for Agriculture, Forestry and Water Management
Progress indicators	Number of farms (dairy cows and other animals as a percentage of the total population) used total mixed ration (TMR) modified feed and nutrition management on biannual base, CH_4 emissions reduction (Gg CO_2-eq)
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842
Relevant National Planning Document (Legal, Regulatory Acts etc.)	▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017) ▪ Low Carbon Development Strategy with Action Plan
Implementation cost	0.5 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D11	Title:	Improvement of manure management for the reduction of CH_4 and N_2O emissions
Main objective:	CH_4 and N_2O emissions reduction		
Quantified objective:	Decrease the CH_4 and N_2O emissions through the improvement of manure management by 15% by 2030, compared with 2010		
Description:	PM_D11 will facilitate the reduction of both $CH_4$and indirect nitrous oxide (N_2O) emissions through the improvement of manure management by anaerobic digestion.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Agriculture, Forestry and Other Land Use (AFOLU)		
Implementing Entity	▪ Ministry for Agriculture, Forestry and Water Management		
Monitoring Entity	▪ Ministry of Environmental Protection ▪ Ministry for Agriculture, Forestry and Water Management		
Progress indicators	Number of farms (dairy cows and other animals as a percentage of the total population) used modified manure management on 2-5 years base, CH_4 and N_2Oemissions reduction (Gg CO_2-eq)		
Other relevant Energy Union dimension(s) affected			
	▪ Regulation 2018/842		

Union policy which resulted in the implementation of the PaM	
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017) ▪ Low Carbon Development Strategy with Action Plan
Implementation cost	9 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D12	Title:	Measures for the reduction of direct and indirect N_2O emissions from managed soils
Main objective:	N_2O emissions reduction		
Quantified objective:	Decrease of direct and indirect N_2O emissions from managed soils by 15% by 2030, compared with 2010		
Description:	PM_D12 will facilitate the N_2O emission reduction from managed soils through the following indicative ways: ▪ Use less nitrogen fertiliser. ▪ Use split applications of nitrogen fertilisers. ▪ Use legume crops or pastures in the rotation instead of nitrogen fertiliser. ▪ Use minimum tillage for cropping. ▪ Prevent waterlogging. ▪ Use nitrification inhibitors.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Agriculture, Forestry and Other Land Use (AFOLU)		
Implementing Entity	▪ Ministry for Agriculture, Forestry and Water Management		
Monitoring Entity	▪ Ministry of Environmental Protection ▪ Ministry for Agriculture, Forestry and Water Management		
Progress indicators	Annual N_2Oemissions reduction (Gg CO_2-eq)		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017) ▪ Low Carbon Development Strategy with Action Plan		
Implementation cost	6 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_D13	Title:	Measures for reducing emissions from fertilizers use
Main objective:	GHG emissions reduction		
Quantified objective:	Reduce GHG emissions in agriculture by 15% by 2030 compared to 2010		

Description:	PM_D13 will facilitate the reduction of ammonia and nitrous oxide emissions resulting from the use of fertilizers through the application of new technologies such as: ▪ foliar application; ▪ coated soluble granules to allow controlled release of nutrients in the root zone; ▪ urea deep placement; ▪ adding inhibitors to slow the conversion of urea fertilizer to ammonia; ▪ adding soluble fertilizer to irrigation water to deliver nutrients to the root zone in a more precise and timely manner.
Implementation Timeframe	2023-2030
Type of measure	Investment
Sectors covered/affected	Agriculture, Forestry and Other Land Use (AFOLU)
Implementing Entity	▪ Ministry for Agriculture, Forestry and Water Management
Monitoring Entity	▪ Ministry of Environmental Protection ▪ Ministry for Agriculture, Forestry and Water Management
Progress indicators	Annual amount of emissions reduction from fertilizers use (Gg CO2-eq)
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Regulation 2018/842
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Second National Communication of the Republic of Serbia under the UNFCCC (2017) ▪ Low Carbon Development Strategy with Action Plan
Implementation cost	28 M€
Financing source(s)	EU and other funds, public funds

ii. Regional cooperation in this area

Western Balkans Green Fund Project

The "Western Balkans Green Fund" Project offers an opportunity for the Republic of Serbia to play a leading role in the development of projects of Western Balkan region[79] related to their Nationally Determined Commitments and climate adaptation objectives, and allows Serbian undertakings to access more tender opportunities within the region.

The Western Balkans is an emerging region of SE Europe where some of the challenges and risks are still rooted in extreme climatic events and environmental pollution. Such risks, however, may also encourage the introduction of new, efficient technologies and methods to ensure a greener and more sustainable future in the Western Balkan region. The project supports the transformation process, aiming at the inclusion of Serbian

[79]Albania, Bosnia and Herzegovina, Kosovo*, North Macedonia, Montenegro, Republic of Serbia. Throughout INECP, Kosovo's* designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo* declaration of independence.

companies, and may provide assistance in meeting the EU accession obligations of countries in the Western Balkan region, in addition to enhancing the provision of services with high added value and the trade in goods.

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

A significant part of the funding for the implementation of the aforementioned proposed policy measures, especially in the areas of waste, rural development and forestry, is expected to come from EU funds.

3.1.2 Renewable energy

i. Policies and measures to achieve the national contribution to the binding EU level 2030 target for renewable energy and trajectories as presented in 2.1.2 including sector- and technology-specific measures

Electricity

The support scheme, which is foreseen within the Law on the Use of Renewable Energy Sources, will be continued for renumerating the produced electricity from the most cost competitive renewable energy technologies. Operational aid will be provided in the form of a market premium to renewable energy projects, while the conduction of auctions will ensure that the operational aid will be provided with an open, transparent, competitive, non-discriminatory and cost-effective manner avoiding unnecessary distortions of electricity markets as well as taking into account possible system integration costs and the required grid stability. Simultaneously, an obligation will be imposed to renewable energy stations for their participation in the electricity market according to the legislative framework, which will be adopted according to the provisions of Directive (EU) 2019/944 for the common rules in order to function the internal electricity market and the Regulation (EU) 943/2019/943 for specifying balancing responsibilities of the participants. It should be noted that the Law on the Use of Renewable Energy Sources has to be harmonised taking into account the beforementioned provisions. The gradual obligation will be foreseen in accordance to the installed capacity and technical maturity of the stations, while the operation of aggregators will be foreseen also as alternative option for fulfilling their balancing responsibilities. Generally, the significant regulatory and implementation challenges in regards the compliance with the balancing responsibilities should be addressed effectivelly in the coming period ensuring the smooth penetration of renewable technologies for electricity production.

Additional financial and fiscal incentives will be provided to innovative and demonstration projects for electricity production under the precondition that they are capable of leading to a considerable increase of the national value added and addressing significant local energy needs. The support of small decentralized renewable energy systems will be also examined within the framework of the established monitoring mechanism at least on annual basis taking into consideration the potential benefits to the electricity grids due to the avoided investments for the adaptation, enhancement and expansion of the grid networks.

The guarantees of origin scheme will foster the further deployment of renewable energy technologies as a supplementary environmental mechanism informing the final customers about the share or quantity of the energy from renewable sources in an energy supplier's energy mix and in the energy supplied to consumers under contracts marketed with reference to the consumption of energy from renewable sources with objective, transparent and non-discriminatory criteria.

Finally, the adaptation, enhancement and expansion of the electricity grid networks will be facilitated in order to avoid congestions and to enable the optimal penetration of the planned renewable energy plants. The distribution and transmission codes will be revised accordingly, while the design of the required investments

in electricity grid networks will continue to be carried out taking into account the planned integration of new renewable energy plants.

Policy measure code:	PM_D19	Title:	Support scheme based on tendering procedures (auction scheme) for commercially cost-effective RES technologies
Main objective:	Increase share of RES in electricity		
Quantified objective:	≈2.6 GW of wind parks and photovoltaic plants		
Description:	PM_D19 will continue the implementation of a support scheme for the production of electricity from renewable energy sources according to the provisions of the Law on the use of renewable energy sources. Operational aid will be provided through the developed support scheme in the form of a market premium, so as to foster the electricity production from the most cost competitive renewable technologies. The conduction of auctions will ensure that the operational aid will be provided with an open, transparent, competitive, non-discriminatory and cost-effective manner avoiding unnecessary distortions of electricity markets as well as taking into account possible system integration costs and the required grid stability. Moreover, the sustainability of the financial support will be ensured, while the publication of a long-term schedule of auctions and quotas will provide the required stability for the investors, who are willing to participate into the planned auctions.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Electricity		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Installed capacity and produced RES electricity		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the use of renewable energy sources		
Implementation cost	2.1 B€		
Financing source(s)	Own funds that will be compensated through the operational aid		

Policy measure code:	PM_D20	Title:	Application of the legislative framework for the participation of the RES producers in electricity market
Main objective:	Increase share of RES in electricity		
Quantified objective:	Contribution to the smooth and efficient operation		

Description:	PM_D20 will ensure the application of the imposed obligation for renewable energy stations to participate in the electricity market. The legislative framework for the participation of the renewable energy producers in electricity market will be applied, while the impact of the obligation will be introduced examined in regards theirtheirthe balancing responsibilities of the different types of renewable stations taking into consideration their installed capacity and their technical maturity. Moreover, the provided capability to fulfil the obligation by aggregators will be reinforced focusing on all the operational aspects so as to be applied with accuracy and transparency.
Implementation Timeframe	2025-2030
Type of measure	Regulatory
Sectors covered/affected	Electricity
Implementing Entity	▪ Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	Development of legislative and regulatory framework
Other relevant Energy Union dimension(s) affected	▪ Internal energy market
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy ▪ Law on the use of renewable energy sources
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D21	Title:	Support RES technologies that will not participate into the tendering procedures
Main objective:	Increase share of RES in electricity		
Quantified objective:	≈0.5 GW of photovoltaic systems will be supported by PM_D21 in combination with PM_D27		
Description:	PM_D21 will foresees the potential provision of economic support to the renewable energy sources, which will not participate into the planned auctions within the framework of PM_D19, primarily for small scale-decentralized RES systems. The economic support will be differentiated for each renewable energy source separately according to their operational characteristics in order to ensure that a fair and transparent profitability will be given to the investors. A monitoring mechanism will be applied for determining the provided support for each renewable energy technology separately according to the evolution of their cost and the technological improvements and for assessing the effectiveness of the provided incentives. The support to small decentralized renewable energy systems will be designed taking into consideration the potential benefits to the electricity grids, due to the avoided investments for the adaptation, enhancement and expansion of the grid networks, and supporting households as micro-investors. Finally, the legislative framework for the conclusion of bilateral contracts for renewable power purchase agreements among RES suppliers and final		

	energy consumers in order to sell the produced electicity for anana predefined period will facilitate the further deployment of renewable energy.
Implementation Timeframe	2025-2030
Type of measure	Investment, Regulatory
Sectors covered/affected	Electricity
Implementing Entity	▪ Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	Installed capacity and produced RES electricity
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy ▪ Law on the use of renewable energy sources
Implementation cost	0.7 B€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_D22	Title:	Provision of economic support to innovative and demonstration pilot RES projects
Main objective:	Increase share of RES in electricity		
Quantified objective:	Contribution to measure PM_D21		
Description:	PM_D22 will provide financial and fiscal incentives, such as investment aid, tax exemptions or reductions, tax refunds, to innovative and demonstration projects under the precondition that they lead to a considerable increase of the national value added and address significant local energy needs. The installation of floating photovoltaics and vertical wind turbines, the promotion of small wind turbines, the construction of concentrated solar power plants and the development enhanced geothermal systems comprise indicative innovative and demonstration pilot RES projects, which should be examined. The support of small decentralized renewable energy systems will be also examined taking into consideration the potential benefits to the electricity grids.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Electricity		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Finance ▪ Ministry of Science, Technological Development and Innovation		
Monitoring Entity			
Progress indicators	Installed capacity and produced RES electricity		
Other relevant Energy Union dimension(s) affected			
	▪ Directive 2018/2001/EU		

Union policy which resulted in the implementation of the PaM	
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the use of renewable energy sources
Implementation cost	Be integrated into PM_D21
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D23	Title:	Fostering the further utilization of guarantees of origin for energy from RES
Main objective:	Increase share of RES in electricity, increase share of RES in heating and cooling and increase share of RES in transport		
Quantified objective:	Provision of additional profits		
Description:	PM_D23 will improve the guarantees of origin scheme, which is foreseen within the Law on the use of renewable energy sources, as a supplementary environmental mechanism informing the final customers about the share or quantity of the energy from renewable sources in an energy supplier's energy mix and in the energy supplied to consumers under contracts marketed with reference to the consumption of energy from renewable sources with objective, transparent and non-discriminatory criteria. The existing legislative framework will be expanded so as to cover not only the produced electricity from RES stations, but the utilized RES in heating, cooling and transport. The operation of the registry of guarantees of origin will be continued enhanced facilitating the provision of information to all citizens. Moreover, an auction scheme will be launched giving the opportunity to the interested enterprises to purchase guarantees of origin.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	Electricity		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Issued guarantees of origin		
Other relevant Energy Union dimension(s) affected	▪ Internal energy market		
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the use of renewable energy sources		
Implementation cost	0.1 M€		
Financing source(s)	EU and other funds and public funds		

Policy measure code:	PM_D29	Title:	Adaptation, enhancement and expansion of the grid networks for avoiding congestions and enabling the optimal penetration of RES

Main objective:	Increase share of RES in electricity
Quantified objective:	Contribution to the smooth and efficient operation
Description:	PM_D29 will facilitate the adaptation, enhancement and expansion of the grid networks in order to avoid congestions and to enable the optimal penetration of the planned renewable energy stations taking into consideration their variability according to the respective forecasts. Moreover, the operators of the electricity grid will continue to take into account the planned integration of new renewable energy stations during their decisions for the adaptation, enhancement and expansion of the electricity grid networks, while the cost of the required investments will be recovered through the electricity tariffs.
Implementation Timeframe	2025-2030
Type of measure	Reform
Sectors covered/affected	Electricity
Implementing Entity	▪ DSO Elektrodistribucija Srbije ▪ Joint Stock Company EMS
Monitoring Entity	
Progress indicators	Adapted, enhanced and expanded grid networks Developed legislative and regulatory framework
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪
Implementation cost	Under examination
Financing source(s)	Under examination

Heating and Cooling

The renewable energy technologies for heating and cooling will be through the integration of specific provisions and requirements into the Rulebook on Energy Efficiency in Buildings encouraging an increase in the number of nearly zero-energy buildings by applying cost-effective packages of measures. The mandatory installation of renewable energy technologies will be examined both for the case of new and renovated buildings, while the potential determination of minimum renewable energy participation in all buildings will be explored taking into consideration both the economic viability of the renewable energy technologies and the delivered energy savings. Moreover, targeted fiscal and economic incentives will be provided for the installation of the most cost-effective renewable energy technologies for heating and cooling.

These policy measures will be designed accordingly so as to maximize the synergies with the respective measures in the energy efficiency dimension.

Policy measure code:	PM_D30	Title:	Promotion of RES for heating and cooling in new and renovated buildings
Main objective:	Increase share of RES in heating and cooling		
Quantified objective:	Maximize synergies with energy efficiency dimension Contribution to the quantified objective of PM_D31		

Description:	PM_D30 will facilitate the penetration of renewable energy technologies for heating and cooling through the integration of specific provisions and requirements into the Rulebook on energy efficiency of buildings so as to facilitate the most cost-effective increase of the zero energy buildings. The mandatory installation of renewable energy technologies will be examined both for the case of new and renovated buildings, while the potential determination of minimum renewable energy participation in public buildings will be explored taking into consideration both the economic viability of the renewable energy technologies and the delivered energy savings.
Implementation Timeframe	2025-2030
Type of measure	Regulatory
Sectors covered/affected	Heating and cooling
Implementing Entity	▪ Ministry of Construction, Transport and Infrastructure
Monitoring Entity	
Progress indicators	Produced RES heating and cooling
Other relevant Energy Union dimension(s) affected	▪ Energy efficiency
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy Efficiency and Rational Use of Energy
Implementation cost	Budget incorporated into energy efficiency dimension measures (PM_EE4-PM_EE8)
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_D31	Title:	Provision of fiscal and economic incentives to foster RES in heating and cooling
Main objective:	Increase share of RES in heating and cooling		
Quantified objective:	1476 ktoe of biomass, 4 ktoe of geothermal energy, 25 ktoe of solar thermal energy and 145 ktoe of ambient heat Maximize synergies with energy efficiency dimension		
Description:	PM_D31 will provide fiscal and economic incentives for the cost-effective support of renewable energy technologies for heating and cooling according to the provisions of Articles 71 and 74 of the Law on the use of renewable energy sources. The selection of the most effective technologies will be performed taking into account the available technical and economic potential and the technical peculiarities of each end-use sector separately. The role of the local self-governments, which are also responsible for the implementation of incentive measures, will be enabled.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Heating and cooling		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity			

Progress indicators	Produced RES heating and cooling
Other relevant Energy Union dimension(s) affected	▪ Energy efficiency
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the use of renewable energy sources ▪ Law on Energy Efficiency and Rational Use of Energy
Implementation cost	Budget incorporated into energy efficiency dimension measures (PM_EE1-PM_EE3, PM_EE5, PM_EE8)
Financing source(s)	EU and other funds, public funds and own funds

Transport

The production of domestic biofuels (mainly advanced) will be promoted through the provision of subsidies and fiscal incentives. Mandatory quota for the suppliers and blending thresholds for the case of biodiesel and biogasoline will be imposed in order to foster the further consumption of biofuels.

Furthermore, special emphasis will be given on the promotion of electromobility. Specifically, the required legislative framework will be adopted, while the design and deployment of the required infrastructure for charging the electric vehicles will be ensured. Finally, a combination of financial and fiscal incentives will be utilised for the further penetration of electric vehicles supplementary to the regulatory and infrastructural ones focusing on energy-intensive categories, such as taxes, light-heavy duty vehicles etc. Last but not least, biomethane and green hydrogen constitute alternative options for the further deployment of RES in transport sectors mainly through the implementation of demonstration projects.

Policy measure code:	PM_D33	Title:	Fostering the production of biofuels for use in transport sector
Main objective:	Increase share of RES in transport		
Quantified objective:	Achieving a satisfactory blending obligation 49 ktoe of biofuels		
Description:	PM_D33 will foster the production of domestic biofuels (mainly advanced) through the provision of subsidies and fiscal incentives.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Transport		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Produced biofuels		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the use of renewable energy sources		

Implementation cost	30 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_D34	Title:	Fostering the consumption of biofuels in transport sector
Main objective:	Increase share of RES in transport		
Quantified objective:	Achieving a satisfactory blending obligation Contribution to the quantified objective of PM_D33		
Description:	PM_D34 will promote the further consumption of biofuels through the imposition of mandatory quota for the suppliers and blending thresholds for the case of biodiesel and bio gasoline taking into consideration the minimum technical limits, which can be considered as acceptable for the current vehicle stock.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	Transport		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Consumed biofuels		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the use of renewable energy sources		
Implementation cost	0.5 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_D35	Title:	Development of the required infrastructure for recharging electric vehicles
Main objective:	Increase share of RES in transport		
Quantified objective:	20.5 thousand electric vehicles, 18.9 thousand electric LDV and 2.4 electric buses 88 ktoe of electricity		
Description:	PM_D35 will facilitate the adoption of the legislative framework for the promotion of electromobility. Moreover, the design and deployment of the required infrastructure for charging the electric vehicles will be carried out with the provision of economic support.		
Implementation Timeframe	2025-2030		
Type of measure	Investment & Regulatory		
Sectors covered/affected	Transport		
Implementing Entity	▪ Ministry of Construction, Transport and Infrastructure ▪ DSO		

Monitoring Entity	
Progress indicators	Consumed electricity in transport sector Number of electric vehicles and electric LDV
Other relevant Energy Union dimension(s) affected	▪ Energy efficiency
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	
Implementation cost	Budget incorporated into energy efficiency dimension measures (PM_EE13)
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_D36	Title:	Provision of fiscal and economic incentives to foster the further deployment of electric vehicles
Main objective:	Increase share of RES in transport		
Quantified objective:	Contribution to the quantified objective of PM_D35		
Description:	PM_D36 will provide subsidies and fiscal incentives for the further penetration of electric vehicles focusing on energy-intensive categories, such as taxes, light-heavy duty vehicles etc. The planned incentives will be distinguished for the acquisition and the operation of electric vehicles. Indicative measures include the provision of purchase price grants, reduced registration and utilization costs through tax exemptions and reductions, the initiation of special pricing policy in insurance programs, reduced tolls, the free entrance and parking to the urban centres and the allowance to use specific parking areas.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	Transport		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Construction, Transport and Infrastructure		
Monitoring Entity			
Progress indicators	Consumed electricity in transport sector Promoted electric vehicles		
Other relevant Energy Union dimension(s) affected	▪ Energy efficiency		
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on tax for the use and carrying of goods		
Implementation cost	Budget incorporated into energy efficiency dimension measures (PM_EE12, PM_EE14, PM_EE18)		
Financing source(s)	EU and other funds, public funds and own funds		

Cross-cutting

The promotion of energy storage technologies will be fostered. Specifically, the legislative framework will be adopted for the installation of energy storage stations, while different support instruments will be assessed for the case of the decentralised energy storage units under the prerequisite that the self-consumption of the produced energy from the renewable energy sources will be maximized and the energy efficiency will be promoted.

Furthermore, the production and utilization of biomethane and renewable hydrogen will be boosted with the design and implementation of demonstration projects aiming at the meaningful reduction of their production cost and the improvement of their technical feasibility in regards to their transportation with the existing natural gas network. Simultaneously, the appropriate legislative framework will be adopted for the development of the required infrastructure increasing the further consumption of biomethane and renewable hydrogen in all end-use sectors. The construction of dedicated infrastructures for large-scale storage and transportation of pure hydrogen, going beyond point-to-point pipelines within industrial clusters, will be explored.

Finally, the existing public procurement procedures will be improved so as to facilitate the further deployment of renewable energy sources through the specification of mandatory quotas for specific renewable energy technologies ensuring that a specific number of renewable technologies will be utilised.

Generally, the previously mentioned policy measures will accelerate the transition towards a more integrated energy system. The use of renewable and low-carbon fuels, including hydrogen, for end-use applications, is imperative in the case that the direct heating or electrification are not feasible.

Policy measure code:	PM_D38	Title:	Development of the legislative framework for the promotion of energy storage technologies
Main objective:	Increase share of RES in electricity increase share of and RES in heating and cooling		
Quantified objective:			
Description:	PM_D38 will facilitate the development of the legislative framework for the different types of energy storage technologies. Investment aid will be provided for the central energy storage stations focusing not only to the adoption of the required licencing procedures, but to the potential provision of operating aid as economic support. For the case of decentralized energy storage plants specific subsidies and fiscal incentives will be assessed under the preconditions that the self-consumption of the produced energy from the renewable energy sources will be maximized and the energy efficiency will be promoted.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Electricity, Heating and Cooling		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Installed capacity Developed legislative and regulatory framework		
Other relevant Energy Union dimension(s) affected	▪ Internal energy market		
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU		

Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy Law on the use of renewable energy sources
Implementation cost	1 M€
Financing source(s)	own funds

Policy measure code:	PM_D39	Title:	Supporting demonstration projects for the promotion of biomethane and renewable hydrogen
Main objective:	Increase share of RES in electricity, increase share of RES in heating and cooling and increase share of RES in transport		
Quantified objective:	Conduction of specific projects 87 ktoe of biomethane		
Description:	PM_D39 will finance the design and implementation of demonstration projects for the production and utilization of biomethane and renewable hydrogen so as to be consumed in all end-use sectors contributing to the meaningful reduction of their production cost and improving their technical feasibility in regards to Hydrogen & biomethane transportation with the existing natural gas network.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Electricity, Heating and cooling, Transport		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Consumed biomethane and renewable hydrogen		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU		
Relevant National Planning Document (Legal, Regulatory Acts etc)			
Implementation cost	35 M€		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_D40	Title:	Development of the required legislative framework and the required infrastructure for the deployment of biomethane and renewable hydrogen
Main objective:	Increase share of RES in electricity, increase share of RES in heating and cooling and increase share of RES in transport		
Quantified objective:	Conduction of specific projects Contribution to the quantified objective of PM_D39		
Description:	PM_D40 will adopt the legislative framework (e.g., licensing, technical guidelines) and facilitate the deployment of the required infrastructure for allowing the use and consumption of biomethane and renewable hydrogen in the end-use sectors. Indicatively, the following aspects will be examined: • Identification of the most suitable business model for the further exploitation of hydrogen and biomethane.		

	• Specification of the licencing and permitting procedures of the plants for the production of renewable hydrogen and biomethane including the provisions of the spatial planning framework. • Promotion of the sustainability and certification of the produced renewable hydrogen and biomethane. • Definition of the technical specifications for the transmission, storage and ejection of the produced renewable hydrogen and biomethane into the natural gas infrastructure. • Determination of the conditions for the third-party access to natural gas infrastructure. • Adoption of the duties and responsibilities of the administrators of the natural gas distribution networks. • Exploitation of the available potential in the biological treatment plants and the organic residue of municipal waste. The construction of dedicated infrastructures for large-scale storage and transportation of pure hydrogen, going beyond point-to-point pipelines within industrial clusters, will be explored.
Implementation Timeframe	2025-2030
Type of measure	Reform
Sectors covered/affected	Electricity, Heating and cooling, Transport
Implementing Entity	▪ Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	Developed legislative and regulatory framework
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	
Implementation cost	0.8 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D44	Title:	Promotion of RES through public procurement procedures
Main objective:	Increase share of RES in electricity, increase share of RES in heating and cooling and increase share of RES in transport		
Quantified objective:	Maximize synergies with energy efficiency dimension		
Description:	PM_D44 will facilitate the further deployment of renewable energy sources through the existing public procurement procedures demonstrating simultaneously the exemplary role of the public sector. The appropriate legislative framework will be improved ensuring the promotion of renewable technologies through public procurement procedures. Furthermore, specific obligations will be imposed to public authorities in the form of mandatory quotas for the promotion of specific renewable energy technologies for all sectors of the final energy consumption.		

Implementation Timeframe	2025-2030
Type of measure	Investment & Regulatory
Sectors covered/affected	Electricity, Heating and cooling, Transport
Implementing Entity	▪ Ministry of Finance ▪ Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	Installed capacity, produced RES electricity, heating and cooling and promoted biofuels and electric vehicles Percentage of the green public procurements in the total volume of public procurements
Other relevant Energy Union dimension(s) affected	▪ Energy efficiency
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	
Implementation cost	Budget incorporated into energy efficiency dimension measures (PM_EE33)
Financing source(s)	EU and other funds, public funds and own funds

ii. Specific measures for regional cooperation, as well as 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 presented in 2.1.2

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There are no specific measures concerning regional cooperation. The Consultation with the region will be implemented in parallel with the public consultation of the Draft Plan. The results of this consultation process will be incorporated in the Final Plan.

iii. Specific measures on financial support, including EU support and the use of EU funds, for the promotion of the production and use of energy from renewable sources in electricity, heating and cooling, and transport

Targeted financial measures and support scheme will be launched for supporting the renewable energy for electricity, heating and cooling and transport. The key financial instruments, which will be utilised for financing the foreseen renewable energy investments, include:

- Domestic and international financial resources.
- The Special RES Account with specific sources of financial revenues for renumerating the produced renewable energy within the framework of the designed support schemes.
- National operational programmes in the period 2021-2027.
- Resources from national and EU research programmes, as well as resources for the implementation of innovative and pilot applications in the context of international collaborations.

iv. Specific measures to introduce a one-stop-shop, streamline administrative procedures, provide information and training, and empower renewable self-consumers and energy communities

The existing authorization, certification, permit-granting and licensing procedures will be examined in order to update, simplify and optimize them so as to become more operational and transparent facilitating the further deployment of renewable energy sources.

The identical procedure will be followed for the spatial planning framework in order to become more transparent and effective avoiding subjectivity about the selected criteria during the conduction of the spatial planning.

Moreover, the grid connection procedures will be improved and simplified for specific categories of renewable energy projects. The existing methodology and specific allocation rules for the foreseen grid connection costs will continue to be applied providing transparency to the potential investors.

The establishment of a one-stop shop will be examined so as to provide the required information and technical guidance to the interested investors facilitating the realization of the planned investments.

The renewables self-consumers will be supported through a specialised support scheme with the inclusion of targeted financial and fiscal incentives. The foreseen charges and fees will become non-discriminatory and proportionate, while the potential other barriers will be addressed effectively. Furthermore, the role and operation of both the renewable energy communities and the citizen energy communities will be strengthened with the initiation of targeted fiscal and economic incentives.

A registry will be developed in order to provide information to all citizens about the net benefits, cost and energy efficiency of the installed renewable energy stations for electricity production. Moreover, the registry of guarantees of origin will act as an additional information point for all citizens.

Finally, information, awareness-raising, guidance or training programmes will be carried out in order to inform citizens of how to exercise their rights as active customers, and of the benefits and practicalities, including technical and financial aspects. The provision of clear and easily accessible information is essential to enable citizens to change energy consumption patterns and switch to solutions that support an integrated energy system.

Policy measure code:	PM_D24	Title:	Updating, simplifying and optimizing the authorization, certification, permit-granting and licensing procedures - Establishment of One stop shop
Main objective:	Increase share of RES in electricity		
Quantified objective:	Contribution to the smooth and efficient operation		
Description:	PM_D24 will examine the update, simplification and optimization of the existing authorization, certification, permit-granting and licensing procedures so as to become more operational and to lead to the implementation of the required renewable energy stations for achieving the national target. Moreover, the different entrepreneurial, environmental and social parameters will be combined and integrated in a fair and transparent framework. The main objective of the measure is to accelerate the completion and commercialization of the planned investments and to create reliable conditions for the potential investors in order to mobilize new investments. Finally, the potential establishment of a one-stop shop will be examined so as to provide the required information and technical guidance to the interested investors facilitating the realization of the planned investments.		

Implementation Timeframe	2025-2030
Type of measure	Reform
Sectors covered/affected	Electricity
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Construction, Transport and Infrastructure
Monitoring Entity	
Progress indicators	Developed legislative and regulatory framework
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	Law on Energy
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D25	Title:	Updating, simplifying and optimizing the spatial planning framework
Main objective:	Increase share of RES in electricity		
Quantified objective:	Contribution to the smooth and efficient operation		
Description:	PM_D25 will examine the update, simplification and optimization of the existing spatial planning framework so as to become more transparent and effective avoiding subjectivity about the selected criteria during the conduction of the spatial planning. Specifically, the different categories of areas, in which the installation of renewable energy projects will be fully or partially excluded, have to be known in advance within a transparent framework. Moreover, the preconditions for the potential installation of renewable energy projects will be determined taking into account different criteria, such as the physiognomy, the environmental protection, the actual technical and economic potential for the exploitation of renewable energy sources and the anthropogenic activities for each installation area separately.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	Electricity		
Implementing Entity	▪ Ministry of Construction, Transport and Infrastructure		
Monitoring Entity			
Progress indicators	Developed legislative and regulatory framework		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU		

Relevant National Planning Document (Legal, Regulatory Acts etc)	
Implementation cost	0.1 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D26	Title:	Updating, simplifying and optimizing the grid connection procedures and setting detailed methodology and allocation rules for RES grid connection costs
Main objective:	Increase share of RES in electricity		
Quantified objective:	Contribution to the smooth and efficient operation		
Description:	PM_D26 will further update, simplify and optimize the grid connection procedures for the renewable energy stations. A simple-notification procedure will be examined for installations or aggregated production units provided that grid stability, grid reliability and grid safety are maintained. Finally, the existing methodology and allocation rules for the foreseen grid connection costs will continue to be utilised providing transparency to the potential investors taking into considerationconsiderationdue to the fact that the various characteristics are taken into account during the connection of the renewable systems with the transmission and distribution grids.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	Electricity		
Implementing Entity	▪ Energy Agency of the Republic of Serbia ▪ DSO		
Monitoring Entity			
Progress indicators	Developed legislative and regulatory framework		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the use of renewable energy sources		
Implementation cost	0.1 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_D27	Title:	Fostering the self-consumption of the produced electricity
Main objective:	Increase share of RES in electricity		
Quantified objective:	Contribution to measure PM_D21		

Description:	PM_D27 will support renewables self-consumers for the installation of decentralized renewable energy systems with the initiation of a dedicated support scheme including the provision of financial and fiscal incentives. The design of the support scheme will be carried out taking into account the triggered benefits due to the deployment of decentralized renewable energy systems and the increase of prosumerism. Moreover, non-discriminatory and proportionate charges and fees will be applied to renewables self-consumers, while transparent and fair allocation rules will be specified in the case that the renewables self-consumers are located in the same building. Finally, an analysis will be occurred in order to identify potential barriers, while specific policies and measures will be initiated for addressing them in the case that their existence will be justified.
Implementation Timeframe	2025-2030
Type of measure	Investment
Sectors covered/affected	Electricity
Implementing Entity	▪ Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	Installed capacity and produced RES electricity
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the use of renewable energy sources
Implementation cost	Be integrated into PM_D21
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D28	Title:	Establishing public accessible registry for RES electricity producers
Main objective:	Increase share of RES in electricity		
Quantified objective:	Contribution to the smooth and efficient operation		
Description:	PM_D28 will foresee the development of a registry by the competent authority for providing information to all citizens about the net benefits, cost and energy efficiency of the installed renewable energy stations for electricity production.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	Electricity		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Developed registry		
Other relevant Energy Union dimension(s) affected			
	▪ Directive 2018/2001/EU		

Union policy which resulted in the implementation of the PaM	
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the use of renewable energy sources
Implementation cost	0.5 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_D37	Title:	Promotion of renewable energy communities
Main objective:	Increase share of RES in electricity and increase share of RES in heating and cooling		
Quantified objective:	Contribution to measure PM_D21		
Description:	PM_D37 will strengthen the role and operation of both the renewable energy communities and the citizen energy communities through the design and implementation of specialized financial instruments. Specifically, dedicated fiscal and economic incentives will be provided so as to foster the further deployment of renewable energy sources, such wind parks and photovoltaic stations. Moreover, PM_D39 can contribute also to the promotion of decentralized renewable energy systems additionally to PM_D21.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Electricity, Heating and Cooling		
Implementing Entity	Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Installed capacity and produced RES electricity, heating and cooling		
Other relevant Energy Union dimension(s) affected	▪ Internal energy market		
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the use of renewable energy sources		
Implementation cost	Be integrated into PM_D21		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_D43	Title:	Conduction of information and training activities to all to all relevant actors for the use of RES including the development of a certification scheme for RES professionals
Main objective:	Increase share of RES in electricity, increase share of RES in heating and cooling and increase share of RES in transport		
Quantified objective:	Cross-cutting measure		

Description:	PM_D43 will promote the conduction of information, awareness-raising, guidance or training programmes in order to inform citizens of how to exercise their rights as active customers, and of the benefits and practicalities, including technical and financial aspects, of developing and using energy from renewable sources, including by renewables self-consumption or in the framework of renewable energy communities. Guidance will be available to all relevant actors focusing explicitly on planners and architects so as to consider the optimal combination of energy from renewable sources when planning, designing, building and renovating industrial, commercial or residential areas. Emphasis will be given on improving the social acceptance of the renewable energy sources for electricity production. Furthermore, a certification scheme will be developed for installers for different renewable energy sources technologies. The provision of clear and easily accessible information is essential to enable citizens to change energy consumption patterns and switch to solutions that support an integrated energy system.
Implementation Timeframe	2025-2030
Type of measure	Investment
Sectors covered/affected	Electricity, Heating and cooling, Transport
Implementing Entity	▪ Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	Affected stakeholders
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

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

The further penetration of renewable energy technologies into the existing and planned district heating networks will be supported through the provision of specific financial aid for the required investment cost. Furthermore, the potential imposition of a mandatory quota in the utilization of renewable energy sources as fuel in the district heating networks will be scrutinized. Finally, the initiation of modern low-temperature district heating systems will be examined promoted connecting local demand with renewable and waste energy sources, as well as the wider electric and gas grid contributing to the optimisation of supply and demand across energy carriers.

Policy measure code:	PM_D32	Title:	Facilitating the penetration of RES into district heating networks
Main objective:	Increase share of RES in heating and cooling		
Quantified objective:	2.65 ktoe of biomass Maximize synergies with energy efficiency dimension		

Description:	PM_D32 will support the further penetration of renewable energy technologies into the existing and planned district heating networks through the provision of specific economic incentives. Moreover, the potential imposition of a mandatory quota in the utilization of renewable energy sources as fuel in the district heating networks will be scrutinized. Finally, the initiation of modern low-temperature district heating systems will be examined promoted connecting local demand with renewable and waste energy sources, as well as the wider electric and gas grid contributing to the optimisation of supply and demand across energy carriers.
Implementation Timeframe	2025-2030
Type of measure	Investment
Sectors covered/affected	Heating and cooling
Implementing Entity	▪ Ministry of Mining and Energy ▪ Local self-governments
Monitoring Entity	
Progress indicators	Produced RES heating and cooling
Other relevant Energy Union dimension(s) affected	▪ Energy efficiency
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the use of renewable energy sources
Implementation cost	8 M€
Financing source(s)	EU and other funds, public funds and own funds

vi. Specific measures on the promotion of the use of energy from biomass, especially for new biomass mobilisation

Specialized support programmes will be designed and implemented targeting to the development of efficient supply chains of residual biomass and biodegradable material, which is required for the achievement of the specified targets. Additional measures will be examined so as to increase the quantities of biomass, which will be utilized for energy production, such as the potential imposition of gate fee.

Finally, a holistic framework will be set-up for fulfilling the sustainability and greenhouse gas emissions saving criteria for the different types of biomass according to the provision of the Directive 2018/2001/EU including the establishment and operation of a monitoring, control and verification mechanism ensuring and justifying the fulfilment with the defined criteria.

Policy measure code:	PM_D41	Title:	Development of effective supply chains for the exploitation of the available potential of biofuels, bioliquids and biomass
Main objective:	Increase share of RES in electricity, increase share of RES in heating and cooling and increase share of RES in transport		
Quantified objective:	Conduction of specific projects		

Description:	PM_D41 will apply specialized support programs both for the development of efficient supply chains of residual biomass and biodegradable material and the support of the most effective and environmental-friendly bioenergy applications. More specifically, the required equipment and infrastructure will be supported economically in different stages of the supply chain, such as indicatively the feedstock production and the felling/processing, transportation, collection and storage of the collected residual biomass. Moreover, the potential imposition for collecting the biomass in the form of gate-fee levy will be examined in order to increase the quantities of biomass, which will be utilized for energy production.
Implementation Timeframe	2025-2030
Type of measure	Investment
Sectors covered/affected	Electricity, Heating and cooling, Transport
Implementing Entity	
Monitoring Entity	
Progress indicators	Promoted biofuels, bioliquids and biomass
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	
Implementation cost	Be integrated into PM_D30 and PM_D34
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_D42	Title:	Specification of the sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels including the required monitoring and verification activities
Main objective:	Increase share of RES in electricity, increase share of RES in heating and cooling and increase share of RES in transport		
Quantified objective:	Contribution to the smooth and efficient operation		
Description:	PM_D42 will develop a holistic framework for fulfilling the sustainability and greenhouse gas emissions saving criteria for the different types of biomass according to the provision of the Directive 2018/2001/EU. Moreover, a monitoring, control and verification mechanism will be established ensuring and justifying the fulfilment with the defined criteria.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	Electricity, Heating and cooling, Transport		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Developed legislative and regulatory framework		
Other relevant Energy Union dimension(s) affected			

Union policy which resulted in the implementation of the PaM	▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the use of renewable energy sources
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Except the measures presented in the previous tables, the following measures related to the other dimensions also affect the decarbonisation dimension and contribute to the achievement of the decarbonisation targets:

- Dimension energy efficiency: PM_EE1– PM_EE45
- Dimension energy security: PM_ES1, PM_ES2, PM_ES3, PM_ES3.1 and PM_ES8
- Dimension internal energy market: PM_IEM8 (PM_IEM8.1 – PM_IEM8.8), PM_IEM17, PM_IEM20, PM_IEM30, PM_IEM31 and PM_IEM37

3.2 Dimension Energy Efficiency

i. Energy efficiency obligation schemes and alternative measures under Article 7 of Directive 2012/27/EU

The target under Article 7 of Directive (EU) 2012/27, as amended by Directive (EU) 2018/2002, will be attained through the implementation of alternative policy measures. The planned alternative measures should deliver 2023 ktoe of cumulative final energy savings in the period 2024-2030, which correspond to 506 ktoe of new final energy savings in the examined period. The calculation of the energy saving target was estimated taking into account the average final energy consumption of the period 2018-2020 (9,031 ktoe based on EUROSTAT's data) assuming energy saving factor equal to 0.8% in the period 2024-2030.

The evolution of the required new and cumulative final energy savings is presented in Table 3.1 on annual basis.

Table 3.1: **New and cumulative final energy savings in the period 2024-2030**

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
End-use energy savings (ktoe)										72	End-use energy savings (ktoe)
									72	72	
								72	72	72	
							72	72	72	72	
						72	72	72	72	72	
					72	72	72	72	72	72	
				72	72	72	72	72	72	72	
			0	0	0	0	0	0	0	0	
		0	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	0	0	
Total	**0**	**0**	**0**	**72**	**144**	**217**	**289**	**361**	**433**	**506**	**2023**

The alternative measures, which will contribute to the fulfilment of Article 7's target in the period 2024-2030, are presented in Table 3.2 taking into consideration the contrubition of each measure as presented in the following sections of the NECP. It should be noted that only the energy efficiency interventions, which will be occurred after 2024, has been taking into consideration for calculating their contribution, where it should be borne in mind that in accordance with the Decision D/2021/14/MC-EnC of the Ministerial Council of the Energy Community in order to achieve the goals based on Article 7, the savings generated in the specified period as a result of the implemented measures can be taken into account in the period from 2021 to 2024.

Table 3.2: **Selected alternative measures for the achievement of Article 7's target in the period 2024-2030**

Alternative measures	Annual savings (ktoe)
Promotion of EE measures in industrial sector (PM_EE21, PM_EE22 and PM_EE23)	273
Promotion of electric passenger vehicles (PM_EE13)	4
Promotion of electric LDV (PM_EE14)	12
Promotion of electric buses (PM_EE18)	17
Upgrade of building envelope in residential sector (PM_EE1)	35
Upgrade of building envelope in tertiary sector (PM_EE2 and PM_EE3)	37
Installation of heat pumps (PM_EE1, PM_EE2 and PM_EE3)	86
Energy upgrading of street lighting (PM_EE30)	17
Promotion of energy efficiency lighting & appliances (PM_EE9)	18
Promotion of energy efficiency in agricultural sector (PM_EE24 and PM_EE25)	8
Total	**506**

ii. Long-term strategy for Encouraging Investment in the Renovation of the National Buildings Fund of the Republic of Serbia until 2050 including policies and measures to stimulate cost-effective deep and staged deep renovations

A well-balanced mixture of policy measures, financing, fiscal and regulatory, will be implemented in order to support the energy renovation of the building stock and to attain the specified renovation rate. All the planned measures will be systematised in the Long-Term Strategy for Encouraging Investment in the Renovation of the National Buildings Fund of the Republic of Serbia until 2050[80], and are intended for residential and non-residential buildings, both public and private.

Financial support will be provided for fostering the improvement of energy performance and energy modernisation of the residential and non-residential buildings . The design and provision of the dedicated financial incentives will facilitate the deep energy upgrade of the residential buildings both attaining the optimum cost-effectiveness ratio and increasing the level of leverage. Furthermore, the most cost-effective individual heating and cooling technologies will be promoted through specialized instruments. Additional financial and fiscal measures will be initiated, such as the adoption of targeted tax deductions, credit lines and soft-interest loans in the case that the contribution of the planned subsidies is not sufficient. For the case of the non-residential buildings, the planned programs will focus on targeted final energy consumption sectors taking into consideration their energy saving potential. Emphasis will be given on measures for the further

[80] The long-term strategy for encouraging investment in the renovation of the national building fund of of the Republic of Serbia until 2050 was adopted on February 25, 2022. ("Official Gazette of RS", number 27/22).

penetration of solar thermal systems such as the mandatory installation in new buildings and in buildings undergoing major renovation.

Moreover, the coherence and compliance of the legislative framework with the provisions of the Directive 2018/844/EU will be ensured as will be amended by the Directive 2018/844/EU, while the foreseen minimum requirements will be incorporated in the Regulation on Energy Efficiency of Buildings so as to increase the number of near-zero energy buildings. The inspections of the heating and air-conditioning systems will be conducted according to the respective provisions. The adoption of specific regulatory measures will be examined through the examination of different alternatives. Specific programmes will be implemented for exceeding the energy requirements beyond the minimum ones through the initiation of regulatory measures and additional fiscal and financial measures.

Finally, the role of the Energy Performance Certificates will be enhanced aiming at their transformation into renovation passports so as to facilitate the implementation of the most cost-effective interventions. Moreover, the role of the energy management systems can be also essential to the attainment of the energy efficiency targets.

Policy measure code:	PM_EE1	Title:	Supporting financially the energy renovation of residential buildings
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 4 ▪ Article 7		
Quantified objective:	▪ 131 thousand renovated residential buildings (final energy savings 35 ktoe) ▪ 2 GW new capacity of heat pumps (final energy savings 34 ktoe)		
Description:	PM_EE1 will provide subsidies for the energy renovation of the existing residential buildings. The design and provision of the dedicated financial incentives will facilitate the more extensive energy renovation of the residential buildings through the rehabilitation of the building envelope attaining the optimum cost-effectiveness ratio and increasing the share of the own funds, which will be utilised. Furthermore, heat pumps will be promoted through specialized actions. Additional financial and fiscal measures will be initiated, such as the adoption of targeted tax deductions, credit lines and soft-interest loans in the case that the contribution of the planned subsidies is not sufficient.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Residential		
Implementing Entity	▪ IFIs ▪ Ministry of Mining and Energy – EE Directorate ▪ Donors		
Monitoring Entity			
Progress indicators	▪ Energy Renovated buildings ▪ Installed capacity of heat pumps		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		

Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2010/31 ▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002 ▪ Directive (EU) 2018/844
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy Efficiency and Rational Use of Energy ▪ 4th NEEAP ▪ Long Term Renovation Strategy
Implementation cost	1,311 M€
Financing source(s)	EU and other funds, grants, public funds and own funds, funds of international financial institutions

Policy measure code:	PM_EE2	Title:	Support financially the energy renovation of public buildings
Main objective:	Fulfilment Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 4 ▪ Article 5 ▪ Article 7		
Quantified objective:	1,026 thousand m2 renovated public buildings (final energy savings 5 ktoe)		
Description:	PM_EE2 will promote the energy renovation of the public buildings highlighting the exemplary role of the public sector. The most cost-effective interventions will be supported as prioritized within the framework of the energy management systems, which will be developed by the responsible authorities in accordance with the Law on Energy Efficiency and Rational Useo f Energy. The achievement of the target for the energy renovation of buildings owned and used by the central administration (central government buildings – CGB in accordance with article 5 of Directive (EU) 2012/27 of 3% annually will be achieved with the most cost-effective approach, while the potential more ambitious targets, related to the renovation of the specific percentage of heated and cooled state-owned buildings used by the public administration will be examined.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Public		
Implementing Entity	▪ Ministry of Mining and Energy – EE Directorate ▪ Provincial Secretariat of Vojvodina		
Monitoring Entity			
Progress indicators	▪ Renovated m2 public buildings		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2010/31 ▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002 ▪ Directive (EU) 2018/844		

Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy Efficiency and Rational Use of Energy ▪ 4th NEEAP ▪ Long Term Renovation Strategy
Implementation cost	55 M€
Financing source(s)	EU and other funds, public funds. Possibility of application of ESCO model of financing.

Policy measure code:	PM_EE3	Title:	Financing programs for the renovation of non-residential buildings (not public)
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 4 ▪ Article 7		
Quantified objective:	▪ 87,681 thousand m2 renovated non-residential buildings (final energy savings 32 ktoe) ▪ 5.7 GW new capacity of heat pumps (final energy savings 60 ktoe)		
Description:	PM_EE3 will foresee the provision of subsidies for the energy renovation of non-residential buildings emphasising on specific end-uses of the service sector. The dedicated programs will be designed for the targeted end-uses in accordance to the energy saving potential promoting the most cost-effective improvement of energy efficiency of buildings and technical systems, as part of a more extensive renovation. Additional financial and fiscal measures will be initiated, such as the adoption of targeted tax deductions and the unhampered access to the required funds through credit lines, guarantees and soft-interest loans in the case that the contribution of the planned subsidies is not sufficient.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Commercial, industrial		
Implementing Entity	▪ Ministry of Construction, Transport and Infrastructure ▪ Ministry of Mining and Energy – EE Directorate ▪ IFIs		
Monitoring Entity			
Progress indicators	▪ Total usable floor area of renovated buildings ▪ Installed capacity of heat pumps		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2010/31 ▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002 ▪ Directive(EU) 2018/844		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy Efficiency and Rational Use of Energy ▪ 4th NEEAP ▪ Long Term Renovation Strategy ▪ Law on Planning and Construction ▪ Rulebook on Energy Efficiency in Buildings ▪ Rulebook on Energy Certification		

Implementation cost	2.017 B€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_EE4	Title:	Completion of legislative framework in alignment with Directives 2010/31/EU and 2018/844/EU and regulatory measures to promote nearly-zero energy buildings (nZEBs)
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 4		
Quantified objective:	Contribution to PM_EE1-PM_EE3		
Description:	PM_EE4 will ensure the coherence and compliance of the legislative framework with the provisions of the Directives (EU) 2010/31/EU and 2018/844. The minimum requirements will be incorporated in the Rulebook on Energy Efficiency of Buildings increasing the number of nearly-zero energy buildings. The inspections of the heating and air-conditioning systems will be conducted according to the respective provisions adopted on the basis of the Law on Energy Efficiency and Rational Use of Energy. Moreover, the adoption of specific regulatory measures will be scrutinized through the examination of different alternatives such as, for example: i) where applicable, buildings housing public authorities to be renovated to achive the best possible energy class of the builing energy performance certificate, ii) all new buildings or building units rented or purchased by central government bodies to be nearly-zero energy buildings, taking into the account the availability and the rental price of such buildings at the marketand iii) the mandatory installation of specific technologies in new buildings (such as heat pumps, solar thermal system) and those undergoing major renovation.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	Residential, public, commercial		
Implementing Entity	▪ Ministry of Construction, Transport and Infrastructure		
Monitoring Entity			
Progress indicators	Developed legislative and regulatory framework		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directve (EU) 2010/31 ▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002 ▪ Directive (EU) 2018/844		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Decree on energy efficiency of buildings ▪ 4th NEEAP (Draft) ▪ Long Term Renovation Strategy		
Implementation cost	Be integrated into PM_EE1, PM_EE2 and PM_EE3		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_EE5	Title:	Programs for the renovation of buildings exceeding minimum energy requirements
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 4 ▪ Article 5 ▪ Article 7		
Quantified objective:	Contribution to PM_EE1-PM_EE3		
Description:	PM_EE5 will foster the conduction of energy efficiency interventions providing incentines so as to exceed energy requirements beyond the minimum ones both for new buildings and energy renovated residential and non residential buildings through the initiation of regulatory measures (such as the increase of the allowed building area with higher energy performance than the minimum ones and the obligation to examine at the stage of preparing a building permit design the use of high-efficiency alternative energy and heat supply systems) and additional fiscal and financial measures. It should be noted that the measure can target also to the promotion of passive buildings.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Residential, public, commercial		
Implementing Entity	▪ Ministry of Construction, Transport and Infrastructure ▪ Ministry of Mining and Energy – EE Directorate ▪ IFI		
Monitoring Entity			
Progress indicators	▪ Total usable floor area of renovated buildings ▪ Installed capacity of heat pumps		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2010/31 ▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002 ▪ Directive (EU) 2018/844		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Lack of national definition of nearly zero energy buildings (NZEBs) ▪ Notification under the Article 5 of the Directive (EU) 2012/27 on Energy Efficiency ▪ Exemplary role of public bodies' buildings		
Implementation cost	Be integrated into PM_EE1, PM_EE2 and PM_EE3		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_EE6	Title:	Mandatory installation of solar thermal systems in new buildings and in buildings undergoing major renovation
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 4 ▪ Article 5		

	▪ Article 7
Quantified objective:	1.8 GW capacity of solar thermal systems (primary energy savings 41 ktoe)
Description:	PM_EE6 will facilitate the mandatory installation of solar thermal systems in new buildings and those undergoing major renovation facilitating simultaneously the further deployment of renewable energy.
Implementation Timeframe	2025-2030
Type of measure	Regulatory
Sectors covered/affected	Residential, public, commercial
Implementing Entity	▪ Ministry of Construction, Transport and Infrastructure ▪ Ministry of Mining and Energy – EE Directorate
Monitoring Entity	
Progress indicators	Installed capacity of solar thermal systems
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2010/31 ▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002 ▪ Directive (EU) 2018/844
Relevant National Planning Document (Legal, Regulatory Acts etc)	
Implementation cost	637 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_EE7	Title:	Enhancing the role of the energy performance certificates
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 4		
Quantified objective:	Contribution to PM_EE1-PM_EE3		
Description:	The role of energy performance certificates of buildings will be improved, among other things, by transforming them into renovation passports, with a recommendation for the implementation of the most cost-effective energy rehabilitation measures within PM_EE7. Moreover, a system for the permanent monitoring and control of the energy performance of buildings certificates will be established.		
Implementation Timeframe	20232025-2030		
Type of measure	Reform		
Sectors covered/affected	Residential, public, commercial		
Implementing Entity	▪ Ministry of Construction, Transport and Infrastructure		
Monitoring Entity			
Progress indicators	Developed legislative and regulatory framework		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
	▪ Directive (EU) 2010/31		

Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002 ▪ Directive (EU) 2018/844
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Long Term Renovation Strategy ▪ Law on Planning and Construction ▪ Rulebook on Energy Efficiency in Buildings ▪ Rulebook on Energy Certification
Implementation cost	Be integrated into PM_EE1, PM_EE2 and PM_EE3
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_EE8	Title:	Overcoming split incentive barrier
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	Contribution to PM_EE1-PM_EE3		
Description:	PM_EE8 will remove the potential regulatory and non-regulatory barriers to energy efficiency, without prejudice to the basic principles of the property and tenancy law regarding the split of incentives between the owner and the tenant of a building or among owners. It will be ensured that the involved parties will not be deterred from making efficiency-improving investments that they would otherwise have made due to the fact that they will not individually obtain the full benefits or by the absence of rules for dividing the costs and benefits between them. A targeted study will be commissioned in order to identify and assess the potential barriers proposing policy recommendations. Moreover, the decision- making processes in multi-owner properties will be simplified. Such measures to remove barriers may include providing incentives, repealing or amending legal or regulatory provisions, or adopting guidelines and interpretative communications, or simplifying administrative procedures.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	Residential, commercial		
Implementing Entity	▪ Ministry of Construction, Transport and Infrastructure ▪ Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	▪ Renovated area of buildings ▪ Installed capacity of heat pumps		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Housing and Building Maintenance ▪ Long Term Renovation Strategy ▪ Rulebook on Energy Efficiency in Buildings		
Implementation cost	Be integrated into PM_EE1, PM_EE2 and PM_EE3		

Financing source(s)	EU and other funds, public funds and own funds

iii. 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

A holistic framework will be established for the promotion of energy services emphasizing on the removal of the potential barriers. The existing standard contracts will be promoted along with guidelines, which will be developed, facilitating the design and implementation of energy efficiency projects through Energy Performance Contracts.

Targeted pilot projects will be designed for the renovation of the public buildings and the upgade of the street-lighting through energy performance contracts also in order to create the required conditions for the promotion of energy services in public sector. The compliance with the public procurement procedures will has be ensured according to the provisions of the Law on EE and Rational Use of Energy incorporating the developed contracts and the formulated guidelines in order to facilitate the implementation of the planned programs.

Moreover, targeted financing programs will be initiated in specific final energy consumption sectors, such as industrial and commercial sectors taking into consideration the results of the pilot projects. Additional financing instruments will be applied, such as the provision of low-interest loans or guarantees to energy saving service providers in order to facilitate the smooth access to financing and the implementation of energy efficiency projects in the tertiary and industrial sectors.

Finally, different authorities will be appointed for monitoring the legislation on energy performance contracts ensuring the eradication of potential market barriers, undertaking the role of an independent mechanism, such as an ombudsman for the efficient handling of complaints and out-of-court settlement of disputes arising from energy service contracts and undertaking the role of an independent market intermediary in order to stimulate the market development on the demand and supply sides according to the provisions of the EED.

Policy measure code:	PM_EE26	Title:	Promotion of energy services and energy performance contracts through targeted financing programs
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	Contribution to all final energy consumption measures		
Description:	PM_EE26 will promote energy services through targeted financing programs in specific final energy consumption sectors. Specifically, energy efficiency projects will be implemented through energy performance contracts in industrial and commercial. Consequently, specialized financing mechanisms will be applied, such as the provision of low-interest loans or guarantees to energy service providers in order to facilitate the smooth access to financing. Moreover, targeted pilot projects will be designed for the renovation of the public buildings for which the application of agreement models prescribed by the Law on Energy Efficiency and Rational Use of Energy is mandatory in order to create the required conditions for the promotion of energy services in public sector. Finally, the energy upgrade of the stree lighting can be achieved also through the provision of energy services.		
Implementation Timeframe	2025-2030		

Type of measure	Reform
Sectors covered/affected	Public, commercial, industrial
Implementing Entity	▪ Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	Number of energy service contracts
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy Efficiency and Rational Use of Energy
Implementation cost	Budget incorporated into all final energy consumption measures
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_EE27	Title:	Promotion of energy services and energy services contracts through supplementary activities
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27, as amended by Directive (EU) 2018/2002: ▪ Article 3		
Quantified objective:	Contribution to PM_EE1-PM_EE3		
Description:	PM_EE27 will create a holistic framework for the promotion of energy services removing the potential barriers. Firstly, the existing standard contracts will be promoted, while targeted guidelines will be developed in order to facilitate the design and implementation of energy efficiency projects through Energy Performance Contracts. The implementation of the new rulebook on contract models and the rulebook on minimum requirements for buildings applying the contract on efficient energy supply will be fostered according to the provisions of Articles 43-47 of the Law on Energy Efficiency and Rational Use of Energy. The conduction of technical training programmes and the provision of technical assistance will familiarize the involved parties leading to successful case studies. The existing public procurement procedures will be applied, while the existing legislative framework will be improved so as to become more effective. Finally, different authorities will be appointed for i) monitoring the legislation on energy performance contracts ensuring the eradication of potential market barriers, ii) undertaking the role of an independent mechanism, such as an ombudsman for the efficient handling of complaints and out-of-court settlement of disputes arising from energy service contracts and iii) undertaking the role of an independent market intermediary in order to stimulate the market development on the demand and supply sides.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	Public, commercial, industrial		
Implementing Entity	▪ Ministry of Mining and Energy – EE Directorate ▪ Public private partnership commission		
Monitoring Entity			

Progress indicators	Number of energy services contracts
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy Efficiency and Rational Use of Energy
Implementation cost	Be integrated into PM_EE1, PM_EE2 and PM_EE3
Financing source(s)	EU and other funds, public funds

iv. Other planned policies, measures and programmes to achieve the indicative national energy efficiency target for 2030 as well as other objectives presented in 2.2

Transport sector

The promotion of energy efficient vehicles through the provision of specific tax advantages for mobilizing the purchase of energy efficient vehicles will be the main instrument. In the case that the fiscal measures are not sufficient to the fulfilment of the established targets, financial incentives will be provided to end-users so as to foster considerably the replacement of the conventional vehicles with new energy efficient ones. Furthermore, stricter minimum requirements will be imposed regarding the applied emission standards in imported used passenger cars ensuring the achievement of acceptable energy efficiency levels compared to the new energy efficient one.

Priority will be given on the promotion of energy efficiency of the freight transport with initiatives, such as the replacement of the vehicle fleets and the facilitation of the modal shift to other means of transport. To this direction, a holistic framework will be developed for the promotion of modal shift both for passenger and freight transport enabling 'Mobility as a Service' (MaaS) with the exploitation of the available data, the information and communication technologies and artificial intelligence for smarter mobility.

Furthermore, the promotion of alternative fuels will be supported with the development of the required infrastructure for all the promoted types of alternative fuels maximizing the synergies with the policy measures, which have been integrated into the RES dimension. It should be noted that emphasis will be given on the targeted deployment of electromobility so as to attain the target in regards the penetration of electric vehicles.

The continuous enhancement and extension of the relative infrastructure for public transport will be ensured, while the exemplary role of the public sector will be reinforced with dedicated measures, such as indicatively the determination of a compulsory quota of vehicles with higher energy efficiency in public agencies and organisations by setting higher energy efficiency limits.

The development of sustainable regional or municipal mobility plans will facilitate the implementation of the above-mentioned measures at local and regional level, while existing various measures for the promotion of energy efficient tyres for all types of vehicles will be continued, such as the promotion of energy efficient tyres and lubricants, the regular technical inspections of vehicles in compliance with specific quality requirements, the promotion of fuel additives, the establishment of a framework for fuel labelling and fuel quality monitoring.

Finally, targeted measures will be implemented aiming at the promotion of energy efficiency in inland waterways and rail transport both for the freight and passenger transport through the provision of either financial, fiscal or regulatory measures.

Policy measure code:	PM_EE10	Title:	Promotion of energy efficient passenger and light-heavy duty vehicles
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	Final energy savings (5 ktoe)		
Description:	PM_EE10 will target to the promotion of energy efficiency in transport sector through the compliance with the regulations 443/2009/EC and 510/2011/EC setting emission performance standards for new passenger cars and new light commercial vehicles respectively. Moreover, the promotion of energy efficient vehicles will be achieved also through the provision of specific tax advantages for mobilizing the purchase of energy efficient vehicles including the vehicles that consume alternative fuels. The taxation framework of the transport sector will be streamlined selecting the most effective forms of tax in order to balance the total cost of ownership and promoting the energy efficiency of vehicles and the use of low-emission fuels. The selection of the most effective form of taxation will be resulted by the assessment of various types, such as indicatively the introduction of vehicle excise duty based on CO2 emissions, the vehicle circulation tax, the excise tax on road transport fuels exceeding the minimum levels as required in Directive 2003/96/EC, the establishment of road charges for heavy-duty vehicles etc.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Transport		
Implementing Entity	TBD with the Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Number of energy efficient vehicles		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP		
Implementation cost	1.713 B€		
Financing source(s)	own funds		

Policy measure code:	PM_EE11	Title:	Ensuring the energy efficiency in imported used passenger cars
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002:		

	▪ Article 3 ▪ Article 7
Quantified objective:	Contribution to PM_EE10, PM_EE12 and PM_EE14
Description:	PM_EE11 will impose stricter minimum requirements regarding the applied emission standards in imported passenger cars, which are used, ensuring the achievement of acceptable energy efficiency levels compared to the new energy efficient one.
Implementation Timeframe	2025-2030
Type of measure	Reform
Sectors covered/affected	Transport
Implementing Entity	TBD with the Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	Number of energy efficient vehicles
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP
Implementation cost	Be integrated into PM_EE10, PM_EE12 and PM_EE14
Financing source(s)	own funds

Policy measure code:	PM_EE12	Title:	Financing programs for the promotion of energy efficiency passenger vehicles
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	20.5 thousand electric vehicles (final energy savings 9 ktoe)		
Description:	PM_EE12 will provide subsidies for the purchase of energy efficient passenger vehicles so as to replace conventional ones in the case that the fiscal measures are not sufficient to the fulfilment of the established targets. The provided subsidies will consider as eligible the vehicles that consume alternative fuels.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Transport		
Implementing Entity	TBD with the Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Number of passenger vehicles		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
	▪ Directive (EU) 2012/27		

Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Strategy Implementation Programme (2017)
Implementation cost	570 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_EE13	Title:	Development of the required infrastructure for the promotion of alternative fuels
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	Contribution to PM_EE10, PM_EE12 and PM_EE14		
Description:	PM_EE13 will promote the further penetration of alternative fuels with the development of the required infrastructure. Especially for the case of electromobility, an electrification action plan for passenger and freight transport, roads and infrastructure will be compiled emphasizing also on the development of the legal framework and the exploitation of various financial instruments.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Transport		
Implementing Entity	TBD with the Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Number of infrastructures		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Strategy Implementation Programme (2017)		
Implementation cost	Be integrated into PM_EE10, PM_EE12 and PM_EE14		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_EE14	Title:	Promotion of energy efficiency of the freight transport
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7.		
Quantified objective:	18.9 electric LD vehicles (final energy savings 23 ktoe)		

Description:	PM_EE14 will foster the promotion of energy efficiency of the freight transport with various initiatives such as the replacement of the conventional light-duty and heavy-duty vehicles with new more energy efficient and the facilitation of the freight transport through specialized taxation measures. A specialized action plan will be prepared identifying the most effective activities, while special focus will be given on how the logistics sector will become more sustainable.
Implementation Timeframe	2025-2030
Type of measure	Investment
Sectors covered/affected	Transport
Implementing Entity	TBD with the Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	▪ Number of Light Duty and Heavy-Duty vehicles
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP
Implementation cost	1.596 B€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_EE15	Title:	Promotion of modal shift both for passenger and freight transport - Enabling 'Mobility as a Service' (MaaS)
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	Contribution to PM_EE10, PM_EE12 and PM_EE14		
Description:	PM_EE15 will foresee the development of a holistic framework for the promotion of modal shift both for passenger and freight transport. A dedicated action plan will be compiled facilitating the implementation of integrated modal shift measures and enabling 'Mobility as a Service' (MaaS) with the exploitation of the available data, the information and communication technologies and artificial intelligence for smarter mobility. Moreover, measures will be implemented for increasing significantly the proportion of cyclists and improving the conditions for walking including the development of the required infrastructure. Finally, the provision of carpooling and car sharing services will be also promoted.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	Transport		
Implementing Entity	TBD with the Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Affected passenger and freight transport (passenger-km and tonne-km)		

Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP ▪ Sustainable Urban Development Strategy for 2030
Implementation cost	Be integrated into PM_EE10, PM_EE12 and PM_EE14
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_EE16	Title:	Promotion of energy efficiency in inland waterways transport
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	Final energy savings		
Description:	PM_EE16 will aim at the promotion of energy efficiency in inland waterways transport both for the freight and passenger transport through the provision of either financial, fiscal or regulatory measures. The existing fleet and port infrastructure will be modernized, while emphasis will be given on the development of energy management systems and the promotion of renewable energy sources in ports.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Transport		
Implementing Entity	TBD with the Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	▪ Affected passenger and freight transport		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Strategy of the water traffic 2021-2025 ▪ Sustainable Urban Development Strategy for 2030		
Implementation cost	under examination		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_EE17	Title:	Promotion of energy efficiency in rail transport
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002:		

	▪ Article 3 ▪ Article 7
Quantified objective:	Final energy savings
Description:	PM_EE17 will target to the modernization and extension of the existing railway infrastructure through the provision of either financial, fiscal or regulatory measures. New energy efficient trains will be purchased substituting the conventional ones. Moreover, the rail network will be connected to production centres and ports, while smart digital systems for rail traffic management will be installed.
Implementation Timeframe	2025-2030
Type of measure	Investment
Sectors covered/affected	Transport
Implementing Entity	TBD with the Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	▪ Affected passenger and freight transport
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Sustainable Urban Development Strategy for 2030
Implementation cost	256 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_EE18	Title:	Continuous enhancement and extension of the relative infrastructure for public transport
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	2.4 thousand electric buses (final energy savings 17 ktoe)		
Description:	PM_EE18 will support the enhancement and extension of the relative infrastructure for public transport contributing to the target for cleaner mobility. New energy efficient vehicles will be purchased substituting the conventional ones, while energy recovery systems will be installed. Moreover, the exemplary role of the public sector will be reinforced with measures, such as indicatively the determination of a compulsory quota of vehicles with higher energy efficiency in public agencies and organizations by setting higher energy efficiency limits. Finally, smart digital systems for road traffic management will be installed.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Transport		
Implementing Entity	probably local level - TBD with the Ministry of Mining and Energy		
Monitoring Entity			

Progress indicators	Number of energy efficient buses
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP ▪ Sustainable Urban Development Strategy for 2030
Implementation cost	505 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_EE19	Title:	Development of sustainable regional or municipal mobility plans
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3		
Quantified objective:	Contribution to PM_EE10, PM_EE12 and PM_EE14		
Description:	PM_EE19 will facilitate the development of sustainable regional or municipal mobility plans leading to the completion of the holistic framework for the implementation of the above-mentioned measures at local and regional level taking into consideration the local peculiarities and design elements from all the above-mentioned measures. The dimension of the spatial planning will be taken into consideration during the design of the planned measures, which will be implemented for the promotion of the modal shift.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	Transport		
Implementing Entity	local level		
Monitoring Entity			
Progress indicators	Affected passenger and freight transport		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Sustainable Urban Development Strategy for 2030		
Implementation cost	Be integrated into PM_EE10, PM_EE12 and PM_EE14		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_EE20	Title:	Supplementary actions for the promotion of energy efficiency in transport sector

Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3
Quantified objective:	Contribution to PM_EE10, PM_EE12 and PM_EE14
Description:	PM_EE20 will foresee existing various measures for the promotion of energy efficient tyres for all types of vehicles such as the promotion of energy efficient tyres and lubricants, the regular technical inspections of vehicles in compliance with specific quality requirements, the promotion of fuel additives, the establishment of a framework for fuel labelling and fuel quality monitoring.
Implementation Timeframe	2025-2030
Type of measure	Reform
Sectors covered/affected	Transport
Implementing Entity	▪ Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	Affected passenger and freight transport
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP
Implementation cost	Be integrated into PM_EE10, PM_EE12 and PM_EE14
Financing source(s)	EU and other funds, public funds and own funds

Industrial sector

Support schemes will be designed for the implementation of energy efficiency projects in the industrial sector combining various financial instruments, such as direct financial support, low-interest loans, tax deductions, credit lines and guarantees.

The further deployment of the best available technologies will be supported in compliance with the respective legislation, while the development of the appropriate monitoring and surveillance mechanism will contribute to the fulfilment of this target. Moreover, the application of the eco-design requirements will ensure the penetration of energy efficient technologies and equipment.

Furthermore, various supplementary actions will be implemented through the provision of financial and fiscal incentives in order to promote the energy efficiency in industrial sector, such as the establishment of industrial-business zones served by centralized CHP and central heat generation and distribution systems, the deployment of cogeneration systems, the promotion of circular economy including the exploitation of waste heat and the extended digitalization of the industrial processes.

Finally, the further exploitation of renewables for electricity, heating and cooling production and the promotion of other alternative fuels will contribute to the improvement of energy efficiency maximizing the synergies with the policy measures, which have been integrated into the RES dimension.

Policy measure code:	PM_EE21	Title:	Support schemes for the promotion of energy efficiency in industrial sector
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	Final energy savings (282 ktoe)		
Description:	PM_EE21 will initiate a targeted support scheme for the implementation of energy efficiency projects in industrial sector combining various financial and fiscal instruments, such as direct financial support, low-interest loans, tax deductions, credit lines and guarantees. The implementation of PM_EE21 is linked also with PM_EE28, which foresees the mandatory conduction of energy audits and development of energy management systems in order to identify the most cost-effective energy efficiency interventions for being supported economically.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Industrial		
Implementing Entity	TBD with the Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	▪ Number of industrial plants that underwent improvement of energy efficiency		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP		
Implementation cost	43.366 B€		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_EE22	Title:	Regulatory measures for the promotion of energy efficiency in industrial sector
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3		
Quantified objective:	Final energy savings - Contribution to the quantified objective of PM_EE21		
Description:	PM_EE22 will facilitate the further deployment of the best available technologies in compliance with the respective legislation (Industrial Emission Directive), while the development of the appropriate monitoring and surveillance mechanism will be considered as a vital prerequisite for the implementation of the measure. Moreover, the application of the eco-design requirements will ensure the penetration of energy efficient technologies and equipment. The measure must be in corelation with PM EE 28.		

Implementation Timeframe	2025-2030
Type of measure	Regulatory
Sectors covered/affected	Industrial
Implementing Entity	▪ Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	Developed legislative and regulatory framework
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP ▪ Industrial Policy Strategy of the Republic of Serbia from 2021 to 2030 ▪ Sustainable Urban Development Strategy for 2030 ▪ Law on Energy Efficiency and Rational Use of Energy
Implementation cost	Budget incorporated into PM_EE21
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_EE23	Title:	Supplementary actions for the promotion of energy efficiency in industrial sector
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3		
Quantified objective:	Final energy savings - Contribution to the quantified objective of PM_EE21		
Description:	PM_EE23 will boost the implementation of various measures for the promotion of energy efficiency in industrial sector such as the establishment of industrial-business zones served by centralized CHP and central heat generation and distribution systems, the deployment of cogeneration systems, the promotion of circular economy including the exploitation of waste heat and the extended digitalization of the industrial processes. The further exploitation of renewables for electricity, heating and cooling production and the promotion of other alternative fuels will contribute to the improvement of energy efficiency maximizing the synergies with the RES dimension. The promotion of the planned interventions will be achieved either through the development of the appropriate infrastructure or the provision of financial and fiscal incentives.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Industrial		
Implementing Entity	TBD with the Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Number of industrial units		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		

Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP ▪ Industrial Policy Strategy of the Republic of Serbia from 2021 to 2030 ▪ Sustainable Urban Development Strategy for 2030
Implementation cost	Budget incorporated into PM_EE21
Financing source(s)	EU and other funds, public funds and own funds

Agricultural sector

Specialised financial incentives will be designed for increasing the energy efficiency in agricultural machineries, irrigation systems, livestock farming and greenhouses, and fisheries. Moreover, the further penetration of RES and the production and exploitation of biomass respectively will be encouraged, while the provision of advisory services and the conduction of energy audits to farmers will be foreseen in order to improve the existing level of knowledge in the agricultural sector.

Policy measure code:	PM_EE24	Title:	Support schemes for the promotion of energy efficiency in agricultural sector
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	Final energy savings (8 ktoe)		
Description:	PM_EE24 will provide financial incentives for increasing energy efficiency in agricultural machineries, irrigation systems, livestock farming and greenhouses, and fisheries. Moreover, the further penetration of renewables for the generation of electricity and thermal energy and the production and exploitation of biomass respectively will be encouraged. The existing measures regarding the lending of the abandoned agricultural land for the further deployment of renewables, the financial support for the on-site consumption of the produced electricity and thermal energy by renewables and the provision of incentives for the connection of the agricultural farms and businesses with the district heating systems will be continued, where feasible, ensuring the improved cost-effectiveness. In the case that the contribution of the financial aid is not sufficient for fulfilling the established targets, additional financial, regulatory and fiscal measures must be planned. The most cost-effective measures must be initiated setting as priority the adoption of targeted tax deductions, the mandatory replacement of certain technologies and the provision of tools facilitating the access to the required funds such as credit lines, guarantees and soft loans.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Agriculture		
Implementing Entity	▪ Ministry of Agriculture ▪ IPARD program		
Monitoring Entity			

Progress indicators	Number of affected agricultural units
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP ▪ Law on Agricultural Land ▪ Rulebook on the Conditions and Procedure for Leasing and Lending State-Owned Agricultural Land ▪ Regulation on the Incentives for Investment in the Processing and Marketing of Agricultural and Food Products in the Sector of Production of Strong Alcoholic Beverages ▪ Regulation on the Incentives for Investment in Processing and Marketing of Agricultural and Food Products in the Sector of Wine Production ▪ Regulation on the Incentives for Investment in Tangible Property of Agricultural Farms for the Procurement of New Machines and Equipment for Improving Primary Production of Plants ▪ Rulebook on the Incentives for Investment in Tangible Property of Agricultural Farms for the Procurement of New Machines and Equipment for Improvement of Primary Agricultural Production in Livestock Farming Rulebook on the Incentives for Programmes for Income Diversification and Improving the Quality of Life in Rural Areas Through Support to Young Farmers
Implementation cost	2.678 B€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_EE25	Title:	Advisory services and energy audits for farmers
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	Final energy savings - Contribution to the quantified objective of PM_EE24		
Description:	PM_EE25 will encourage the provision of advisory services and the conduction of energy audits to the performed agricultural activities in order to improve the existing level of knowledge in the agricultural sector.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Agriculture		
Implementing Entity	TBD with the Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Number of affected agricultural units		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		

Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP
Implementation cost	Budget incorporated into PM_EE24
Financing source(s)	EU and other funds, public funds and own funds

Cross-cutting

Various awareness-raising activities will be organised for enhancing the existing level of knowledge of all end-users. Priority should be given also on the substitution of inefficient appliances and technologies with new energy efficient ones along with the effective application of energy labelling and eco-design Directives.

The conduction of energy audits and the development of energy management systems in all end-use sectors including non-SMEs and households will be fostered. Moreover, the implementation of the derived recommendations both by the energy audits and the energy management systems will be supported either through the provision of financial aid or through the mandatory implementation under the prerequisite that specific preconditions are fulfilled.

The smooth and efficient application of green public procurement procedures will be ensured, while the energy efficiency in street lighting through the installation of energy efficient luminaries will continue to be improved through specialised financial support schemes through public funds additionally to the energy performance contracts.

The promotion of energy efficiency in water sector will be assisted focusing on the examination of the energy-water nexus, the implementation of water management techniques, the installation of water-efficient end-use equipment and the conduction of other energy conservation measures in compliance with the Principle "Energy efficiency first".

Improvement of the existing and, when needed, establishment of new qualification, accreditation and certification schemes for all the energy efficiency professionals (providers of energy services, energy ,advisors energy managers and installers of energy-related building elements) will be carried out accompanied by specialised training programs, the development of tools and the provision of technical support.

Moreover, regulatory measures and financing programs will be initiated for promoting/modernizing high efficient CHP units and district heating/cooling networks. Finally, the technical and administrative capacity of the involved policy makers will be reinforced in order to facilitate the effective design, implementation, monitoring and evaluation of the energy efficiency measures through specialized trainings, sophisticated tools and materials.

Last but not least, the model of smart and carbon neutral cities until 2030 will be promoted through the establishment of a holistic approach considering the planning and implementation of policy measures in the building, transport and network sectors.

Policy measure code:	PM_EE9	Title:	Promotion of energy efficient appliances in households
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	Final energy savings (18 ktoe)		
Description:	PM_EE9 will promote the substitution of inefficient appliances and technologies with new energy efficient ones in the case that the application of the Energy Labelling and Eco-Design Directives is not adequate through measures, such as the provision of subsidies of the existing inefficient electric appliances with new more efficient.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Residential, commercial		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Number of substituted energy efficiency appliances		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP (Draft)		
Implementation cost	1,494 M€		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_EE28	Title:	Mandatory conduction of energy audits and development of energy management systems
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	Contribution to all final energy consumption measures		
Description:	PM_EE28 will foresee the continuation of the mandatory development of energy management systems and the conduction of energy audits to the obligated parties for Energy Management System (e.g. big energy consumers from industrial and commercial sector, as well as public sector). The potential expansion of the measure to additional designated parties will be scrutinized inclusing the application of Directive (EU) 2012/27 requirements in regards to the energy audits implementation. The aim of the measure is the identification of the most cost-effective energy efficiency interventions, while their financing will be aligned with the planned support scheme. In the following period, obligated parties for developing Energy Management System will have to appoint the required number of energy managers and plan/implement measures to reduce		

	energy consumption in accordance with the requirements set by the Government, as well as to report to the Ministry on the implemented measures. If necessary, in the coming period the regulatory framework for the implementation of the Energy Management System will be improved. In order to monitor the implementation of the implemented measures, the Ministry of Mining and Energy will ensure the operation of the necessary information systems.
Implementation Timeframe	2025-2030
Type of measure	Reform & Investment
Sectors covered/affected	Public, commercial, industrial
Implementing Entity	▪ Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	Number of conducted energy audits
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy Efficiency and Rational Use of Energy ▪ 4th NEEAP
Implementation cost	Budget incorporated into all end-use measures – savings under consideration
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_EE29	Title:	Promotion of energy audits in SMEs and in households
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	Contribution to PM_EE1 – PM_EE3		
Description:	PM_EE29 will foster the conduction of energy audits in all final energy consumption sectors including SMEs and households will be fostered. Especially for the case of households, a pilot program will be launched covering the implementation cost in order to increase their awareness and to promote their further conduction according to the provisions of the EED. A similar program can be initiated also for the case of SMEs covering partly the implementation cost. Furthermore, the derived recommendations can be supported either through the provision of financial aid.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	Commercial, residential		
Implementing Entity	▪ Ministry of Mining and Energy – EE Directorate ▪ Ministry of Construction, Transport and Infrastructure		
Monitoring Entity			

Progress indicators	Number of conducted energy audits
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy Efficinecy and Rational Use of Energy ▪ 4th NEEAP ▪ Long Term Renovation Strategy
Implementation cost	Be integrated into PM_EE1 and PM_EE3
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_EE30	Title:	Financing programs for the energy upgrading of street lighting
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	Final energy savings (17 ktoe)		
Description:	PM_EE30 will facilitate the energy efficiency improvement of the street lighting through public funds and specialized financial support schemes, such as low-interest loans and guarantees in conjunction with the activities for the promotion of energy performance contracts within the context of PM_EE26 and when needed through provision of subsidies according to the existing scheme.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	Public		
Implementing Entity	▪ Ministry of Mining and Energy ▪ ESCOs ▪ Local self-governments		
Monitoring Entity			
Progress indicators	Number of renovated street lighting systems		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP		
Implementation cost	1.669 B€		
Financing source(s)	EU and other funds, public funds, providers of energy services		

Policy measure code:	PM_EE31	Title:	Conduction of awareness raising activities
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 7		
Quantified objective:	Contribution to all end-use measures		
Description:	PM_EE31 will promote the conduction of awareness raising and dissemination activities in all final energy consumption sectors with focus on households. In building sector specialized awareness-raising and dissemination activities will be organized both for the consumers and the involved engineers, while the establishment of one-stop shop will be assessed including the option also to provide financial support and undertake the implementation of the energy efficiency interventions on behalf of the interested end-users. Moreover, the development of databases with information about the building stock and the implemented energy efficiency interventions and voluntary certification schemes of ecological, green and sustainable buildings can improve the current level of knowledge and awareness. In transport sector, thematic campaigns should be conducted, while the eco-driving will be also promoted. In agricultural sector, the farmers will be educated for all the agricultural technologies within the whole chain of the agricultural products, while special emphasis must be given on the operation of irrigation pumping stations. In commercial and industrial sectors, the conduction of energy audits will increase the current level of knowledge. Furthermore, the concept of carbon footprint and impact of energy efficiency measures throughout the entire life cycle of the promoted technologies and equipment should be promoted for familiarizing the involved stakeholders with the full impact of energy efficiency.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	All final energy consumption sectors		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Number of affected end-users		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP (Draft) ▪ Long Term Renovation Strategy		
Implementation cost	Budget incorporated into all end-use measures		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_EE32	Title:	Promotion of energy-efficient products through the implementation of energy labelling and eco-design Directives
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3		
Quantified objective:	Contribution to PM_EE1 – PM_EE3 and PM_EE10		
Description:	PM_EE32 will ensure the effective implementation of energy labelling and eco-design Directives. It is necessary to strengthen the capacity of the institutions responsible for market monitoring, which are the implementing entities for the current measure. It is also necessary to strengthen the capacity of conformity assessment bodies and conduct promotional and educational campaigns for all interested parties, including general public.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	All final energy consumption sectors		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Number of energy efficiency appliances and equipment		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy Efficiency and Rational Use of Energy ▪ 4th NEEAP (Draft)		
Implementation cost	Be integrated into PM_EE1, PM_EE2, PM_EE3, PM_EE10 and measures for industrial sector		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_EE33	Title:	Promotion of green public procurements
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive 2018/2002: ▪ Article 3		
Quantified objective:	Contribution to PM_EE2		
Description:	PM_EE33 will facilitate the smooth and efficient application of green public procurement procedures. The life cycle energy consumption will be utilized as the basic criterion for the promotion of highly energy-efficient technologies and services demonstrating simultaneously the exemplary role of the public sector.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	Public		
Implementing Entity	▪ Ministry of Mining and Energy		

Monitoring Entity	
Progress indicators	Number of energy efficiency appliances, equipment and devices being financed within the framework of the green public procurements
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy Efficiency and Rational Use of Energy and relevant by-law ▪ 4th NEEAP
Implementation cost	Be integrated into PM_EE2
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_EE34	Title:	Regulatory measures and financing programs for promoting/modernizing high efficient CHP units and district heating/cooling networks
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3 ▪ Article 14		
Quantified objective:	23 MW (Electricity output: 31 ktoe, Heat output for district heating: 6 ktoe, Industrial heat output: 13 ktoe)		
Description:	PM_EE34 will launch financial programs for the installation of new and the modernization of existing high efficient CHP units and district heating/cooling networks. For the case of the new high efficient CHP units, planned incentives will be carried out in alignment with the Law on Energy Efficiency and Rational Use of Energy. Furthermore, energy plants, which are being bulit of refurbished, must fulfil prescribed minimal energsy efficiency requirements according of the Law on Energy Efficiency and Rational Use of Energy.		
Implementation Timeframe	2025-2030		
Type of measure	Reform and Investment Implementation		
Sectors covered/affected	All final energy consumption sectors		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Local self-governments ▪ Heating plants		
Monitoring Entity			
Progress indicators	▪ Installed capacity of new high efficient CHP units in accordance with the Law on Energy Efficiency and Rational Use of Energy ▪ Installed capacity of modernized CHP units and district heating/cooling networks		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		

Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy Efficiency and Rational Use of Energy ▪ 4th NEEAP
Implementation cost	35m €
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_EE35	Title:	Improvement and further development of a scheme for the qualification, accreditation and certification of energy efficiency professionals
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3		
Quantified objective:	Contribution to all end-use measures		
Description:	PM_EE35 will include improvement of the existing and, if necessary, establishment of new qualification, accreditation, or certification schemes for all energy efficiency professional (providers of energy services, energy advisors, energy managers and installers of energy related budling elements that are related to the improvement of the energy performance of a building, developers of design and technical documentation). Specialized training programs will be organized, tools will be developed and technical support will be provided within the framework of the current measure.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	All final energy consumption sectors		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Construction, Transport and Infrastructure ▪ Chamber of Engineers of Serbia ▪ School of Mechanical Engineering, University of Belgrade		
Monitoring Entity			
Progress indicators	Number of affected energy efficiency professionals with improved skills		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002 ▪ Directive (EU) 2010/31 ▪ Directive (EU) 2018/844		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy Efficiency ▪ Rational Use of Energy 4th NEEAP		
Implementation cost	Budget incorporated into all end-use measures – under consideration		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_EE36	Title:	Promotion of energy efficiency in water supply, distribution and consumption
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3		

	▪ Article 7
Quantified objective:	Under examination
Description:	PM_EE36 will promote energy efficiency in water sector mainly through the provision of economic incentives either in the form of subsidies or soft loans. The measure will focus on the identification of the relationship between the water used for energy production (energy-water nexus), the implementation of water management techniques, the installation of water-efficient end-use equipment and the conduction of other energy conservation measures in compliance with the Principle "Energy efficiency first". A targeted action plan will be prepared for indentifying the most cost-effective eqipments and technologies in order to promote the energy efficiency in water supply, distribution and consumption.
Implementation Timeframe	2025-2030
Type of measure	Investment
Sectors covered/affected	All final energy consumption sectors
Implementing Entity	TBD with the Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	▪ Modernised water network ▪ Number of energy-water nexus projects
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Sustainable Urban Development Strategy for 2030 ▪ Other strategic documents in the field of environmental protection
Implementation cost	Under examination
Financing source(s)	Under examination

Policy measure code:	PM_EE37	Title:	Strengthening the technical and administrative capacity of the involved policy makers
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3		
Quantified objective:	Contribution to all final energy consumption measures		
Description:	PM_EE37 will reinforce on continuous basis the technical and administrative capacity of the involved policy makers in order to facilitate the effective design, implementation, monitoring and evaluation of the energy efficiency measures. Specialized trainings will be organized and sophisticated tools and materials will be prepared ensuring that the existing level of knowledge and the required skills are sufficient. Training can include requirements for the preparation of project/technical documentation in order to increase the quality and the utilization of the projects for the deep renovation of the buildings, but also preparation of technical documentation and design brief for their implementation. Finally, tools will be further improved and, when needed, developed for		

	monitoring the achievement of the established targets and the performance of the implemented policies and measures including the compliance with the energy efficiency first principle.
Implementation Timeframe	2025-2030
Type of measure	Reform
Sectors covered/affected	All final energy consumption sectors
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Construction, Transport and Infrastructure
Monitoring Entity	
Progress indicators	Number of affected policy makers with improved skills
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2010/3 ▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002 ▪ Directive (EU) 2018/844
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Long Term Renovation Strategy
Implementation cost	Budget incorporated into all end-use measures -
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_EE41	Title:	Promotion of smart and carbon neutral cities
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3		
Quantified objective:	Contribution to all end-use measures		
Description:	PM_EE41 will promote the model of smart and carbon neutral cities until 2030 through the establishment of a holistic approach considering the planning and implementation of policy measures in all end-use sectors. In this context, both buildings and vehicles, as independent entities, will be capable of communicating and interacting through support structures based on the use of smart information and communication technologies contributing to the alleviation of the adverse impacts triggered by urbanism. The massive deployment of smart meters is considered as a prerequisite for the realization of the smart and carbon neutral cities.		
Implementation Timeframe	20262025-2030		
Type of measure	Investment		
Sectors covered/affected	All final energy consumption sectors		
Implementing Entity	▪ Ministry of Mining and Energy Ministry of Construction, Transport and Infrastructure		
Monitoring Entity	TBD with the Ministry of Mining and Energy		
Progress indicators	Number of involved cities		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		

Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Sustainable Urban Development Strategy for 2030
Implementation cost	Budget incorporated into all end-use measures
Financing source(s)	EU and other funds, public funds and own funds

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

The energy efficiency of the electricity and gas infrastructures will be improved by the measures, which will be conducted by the respective operators within the framework of their development programmes in compliance with the energy efficiency first principle. Targeted technical measures will be initiated for reducing the losses in transmission and distribution network, load management, improving the network interoperability.

Moreover, reports will be prepared on annual basis describing analytically the performed actions, while the incentives will be given on both natural gas and electricity transmission and distribution network operators in order to have a higher return on the invested capital if they attain specific energy efficiency targets.

Finally, the massive installation of smart meters will be ensured facilitating the provision of demand response services, while the necessary legislative framework will be adopted in order to foster the dynamic pricing and tariffs.

Policy measure code:	PM_EE40	Title:	Deployment of smart meters (synergies with energy market dimension)
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3		
Quantified objective:	Contribution to all end-use measures		
Description:	PM_EE40 will facilitate the deployment of smart meters through the identification of the most effective business model and the development of the required infrastructure.		
Implementation Timeframe	2025-2030		
Type of measure	Investment		
Sectors covered/affected	All final energy consumption sectors		
Implementing Entity			
Monitoring Entity			
Progress indicators	Number of installed smart meters		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law		
Implementation cost	Budget incorporated into all end-use measures		

Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_EE42	Title:	Promotion of measures for improving energy efficiency in electricity infrastructure
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3		
Quantified objective:	Reduction of the losses equal to 3.7% and 5.6% in 2030 compared to 2023 in the transformation and distribution network respectively.		
Description:	PM_EE42 will promote measures for increasing the energy efficiency of the electricity infrastructures, which will be conducted by the respective operators within the framework of their development programmes. Targeted technical measures will be initiated for reducing the losses in transmission and distribution network, load management, improving the network interoperability and facilitating the penetration of decentralised electricity generation installations. Electricity infrastructure operators will be obliged to prepare reports on annual basis describing analytically the performed actions, while the required measures and investments will be specified for the materialization of the most cost-effective energy efficiency interventions in the network infrastructure including a timetable for their implementation. Moreover, incentives will be given on electricity transmission and distribution network operators in order to have a higher return on the invested capital if they attain specific energy efficiency targets. Obviously, in the case that the energy efficiency targets will not be achieved a reduction to the return on the invested capital must be foreseen. Moreover, the energy efficiency first principle will be used for taking the most effective decision in regards to the design and operation of the energy transmission and distribution networks contributing meaningfully to the fulfilment of the established energy efficiency targets.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	All final energy consumption sectors		
Implementing Entity			
Monitoring Entity			
Progress indicators	Modernised electricity network		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP ▪ Sustainable Urban Development Strategy for 2030		
Implementation cost	Under examination		
Financing source(s)	Under examination		

Policy measure code:	PM_EE43	Title:	Promotion of measures for improving energy efficiency in natural gas infrastructure
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3		
Quantified objective:	Reduced losses		
Description:	PM_EE43 will promote measures for increasing the energy efficiency of the gas infrastructures, which will be conducted by the respective operators within the framework of their development programmes. Targeted technical measures will be initiated for reducing the losses in transmission and distribution network and for improving the load management. Gas infrastructure operators will be obliged to prepare reports on annual basis describing analytically the performed actions, while the required measures and investments will be specified for the materialization of the most cost-effective energy efficiency interventions in the network infrastructure including a timetable for their implementation. Moreover, incentives will be given on natural gas transmission and distribution network operators in order to have a higher return on the invested capital if they attain specific energy efficiency targets. Obviously, in the case that the energy efficiency targets will not be achieved a reduction to the return on the invested capital must be foreseen. Moreover, the energy efficiency first principle will be used for taking the most effective decision in regards to the design and operation of the energy transmission and distribution networks contributing meaningfully to the fulfilment of the established energy efficiency targets. Finally, the proposed measures will facilitate also the reduction of emissions with the greenhouse effect (methane), while new technologies for the identification of emissions will be promoted during their implemenatation.		
Implementation Timeframe	20232025-2030		
Type of measure	Reform		
Sectors covered/affected	All final energy consumption sectors		
Implementing Entity	▪ Ministry of Mining and Energy Energy Agency of the Republic of Serbia		
Monitoring Entity			
Progress indicators	Modernised natural gas network		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ 4th NEEAP ▪ Law on Energy Efficiency and Rational Use of Energy ▪ Sustainable Urban Development Strategy for 2030		
Implementation cost	Under examination		
Financing source(s)	Under examination		

Policy measure code:	PM_EE44	Title:	Promotion of demand response and dynamic pricing and tariffs
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3		
Quantified objective:	Contribution to all end-use measures		
Description:	PM_EE44 will adopt the legislative framework for the provision of demand response services and the establishment of dynamic pricing and tariffs in compliance with the provisions of the EED leading to effective electricity balancing and peak load management additionally to the delivery of final energy savings.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	All final energy consumption sectors		
Implementing Entity	▪ Ministry of Mining and Energy Energy Agency of the Republic of Serbia		
Monitoring Entity			
Progress indicators	Developed legislative and regulatory framework		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law ▪ Law on Energy Efficiency and Rational Use of Energy		
Implementation cost	Budget incorporated into all end-use measures		
Financing source(s)	EU and other funds, public funds and own funds		

vi. Regional cooperation in this area, if applicable

Consultation with the region will be implemented in parallel with the public consultation of the Draft INECP. The results of this consultation process will be incorporated in the Final Plan.

vii. Financing measures, including EU support and the use of EU funds, in the area at national level

The main challenges, which are derived by the design and implementation of the envisaged financial measures will be addressed, such as the maximization of the expected leverage, the most cost-effective exploitation of the available fund, the exploitation of addtional financing tools and the active mobilization of the domestic financial sector.For the purpose of the implementation of activities for financing and promotion of energy efficiency at the national level, the EE Directorate was established as a separate legal entity within the Ministry of Mining and Energy. The Directorate awards incentives in accordance with the Financing Program adopted by the Government every year at the proposal of the Ministry of Mining and Energy and the EE Directorate. Activities carried out by the Directorate are financed from the Budget, donations and loans from international financial institutions. Improvement of EE Directorate operation is essential for the effective implementation of the planned financial measures with special focus on building sector.

,In the following period, EE Directive should provide support for the implementation of innovative pilot energy efficiency projects for the promotion of sustainable green solutions including the area of buildings, and above of all, it is important to work on the establishment of the new financing mechanisms. In that sense, technical assistance will be provided for capacity building of EE Directorate which will include support for the accreditation of EE Directorate for utilization of EU and other funds and consideration of possibilities for upgrading of the legal status of Directorate into the independent National Energy Efficiency Fund, which would facilitate implementation of various financing mechanisms and accumulation of all available public financing streams into one achieving a considerably better level of coordination and effectiveness.

Finally, the bankability of the energy efficiency projects will be increased with the utilization of specialized tools and methodologies so as to minimize the existing levels of risk. The mobilization of the banking sector will be encouraged, while the conduction of specialized training will enhance the current level of knowledge and skills of the employees in the banking sector.

Policy measure code:	PM_EE38	Title:	Development of sustainable and innovative financing of energy efficiency projects
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive (EU) 2018/2002: ▪ Article 3		
Quantified objective:	Contribution to all end-use measures		
Description:	PM_EE38 will address the main challenges, which are derived by the design and implementation of the envisaged financial measures such as the maximization of the expected leverage, the most cost-effective exploitation of the available fund, the adoption of innovative financing tools and the active mobilization of the domestic financial sector. All the available funds will be mobilized at national and EU levels including funds from other donors. The effective coordination of the available financial stream is essential for the effective implementation of the planned financial measures. The Directorate for financing and promoting energy efficiency will undertake the administration of the available funds (Budget Fund for Energy Efficiency) and implement other activities necessary for the utilization of other sources such as grants and/or loans by IFI, grants and/or loans by World Bank, EBRD, EU, etc.. The first task of the EE Directory is to provide a wide availability of incentives for the relisation of energy efficiency measures. in all segments of energy consumption with focus on building sector, however in the following period it should also implement innovative pilot energy efficiency project will be financed for the promotion of promoting sustainable green solutions including the area of buildings. Moreover, the provision of technical assistance will be foreseen for facilitating the financing of the energy efficiency projects. Support for the capacity building of EE Directorate should include also the suport for the accreditation of EE Directorate for the utilization of EU and other funds and consideration of possibilities for upgrade of the legal status of Directory into the independent National Energy Efficiency Fund which would facilitate the implementation of various financing mechanisms and accumulation of all available public financing streams into one achieving a considerably better level of coordination and effectiveness. With the aim of improving cost-effectiveness of the implemented energy efficiency projects, other mechanisms which can contribute to the financing of energy efficiency will be considered, as well as how to avoid the potential overlaps of various energy efficiency subsidies schemes. The provided subsidies must be aligned with the regulation on state aid.		

Implementation Timeframe	2025-2030
Type of measure	Reform
Sectors covered/affected	All final energy consumption sectors
Implementing Entity	▪ Ministry of Mining and Energy – EE Directorate ▪ Ministry of Construction, Transport and Infrastructure
Monitoring Entity	
Progress indicators	Financed energy efficiency projects
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation ▪ Research, innovation and competitiveness
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2012/27 ▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy Efficiency and Rational Use of Energy
Implementation cost	Budget incorporated into all end-use measures
Financing source(s)	EU and other funds (e.g., World bank, EBRD, IFIs etc.), public funds and own funds

Policy measure code:	PM_EE39	Title:	Improve the bankability of energy efficiency projects
Main objective:	Implementation of the following articles of the Directive (EU) 2012/27/EU, as amended by Directive 2018/2002: ▪ Article 3		
Quantified objective:	Contribution to all end-use measures		
Description:	PM_EE39 will improve the bankability of the energy efficiency projects with the utilization of specialized tools and methodologies so as to minimize the existing levels of risk. Moreover, the implementation of a quality assurance scheme and the establishment of a methodological approach for the standardization of the different steps during the evaluation of energy efficiency projects will facilitate the de-risking of the energy efficiency investments. The involvement of the banking sector is essential, while the design of new financial products specifically dedicated to the financing of the energy efficient projects will facilitate the financing of the energy efficiency projects. Specialized training will be organised in order to achieved the above-mentioned objectives.		
Implementation Timeframe	2025-2030		
Type of measure	Reform		
Sectors covered/affected	All final energy consumption sectors		
Implementing Entity	Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Affected energy efficiency projects and employees in the banking sector		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
	▪ Directive (EU) 2012/27		

Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2018/2002
Relevant National Planning Document (Legal, Regulatory Acts etc)	
Implementation cost	Budget incorporated into all end-use measures
Financing source(s)	EU and other funds, public funds and own funds

Except the measures presented in the previous tables, the following measures related to the other dimensions also affect the energy efficiency dimension and contribute to the achievement of the energy efficiency targets:

- Dimension decarbonisation: **PM_D30 – PM_D32**, **PM_D35, PM_36** and **PM_D44**
- Dimension internal energy market: **PM_IEM11**, **PM_IEM13**, **PM_IEM17, PM_IEM20** and **PM_IEM37**

3.3 Dimension Energy Security

For the achievement of the target regarding the energy security, 7 policies and measures are defined. The following tables present details for each of them.

Policy measure code:	PM_ES1	Title:	Gas interconnector Serbia Bulgaria (MG10)
Main objective:	The aim of the project is the increase of the security and diversification of gas supply, fostering regional energy integration and increasing regional market integration.		
Quantified objective:	Increased interconnection capacity, CBA indicators as per ENTSO-G		
Description:	PM_ES1 is project Gas_09 in the Energy Community PLIMA Database and project TRA-N-137 in ENTSOG TYNDP 2020. Interconnection Bulgaria-Serbia aims to connect the national gas transmission networks of Bulgaria and Serbia. The project envisages the construction of a gas pipeline from Novi Iskar to Kalotina with branch to Slivnitsa and Dragoman on Bulgarian territory and a gas pipeline Nis to Dimitrovgrad on Serbian territory. The project on Bulgarian territory includes the construction of 2 AGRS at Slivnitsa and Dragoman and the construction of GMS Kalotina at a joint site with a reverse pigging station of the gas pipeline. The project is part of the Balkan Gas Hub concept. Along with the projects IGB and IBR, it will provide for market integration, increased security of supply and competition by opening a new bidirectional supply route. The pipeline was included in the 5th PCI list published by the European Commission in November 2021.The Construction of the pipeline started in February 2022, with the originally planned 2022 completion date delayed to the fourth quarter of 2023.		
Implementation Timeframe	2023		
Type of measure	Investment		
Sectors covered/affected	Gas		
Implementing Entity	▪ Public Enterprise Srbijagas Novi Sad		
Monitoring Entity	▪ Transportgas Srbija ▪ Ministry of Mining and Energy ▪ Energy Agency of the Republic of Serbia (AERS)		

	▪ Ministry of Finance ▪ Ministry of Infrastructure
Progress indicators	Interconnection capacity
Other relevant Energy Union dimension(s) affected	▪ Internal energy market ▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC ▪ Regulation (EU) No 347/2013
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy
Implementation cost	82,95 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_ES2	Title:	Enhancement of regional electricity and gas interconnections
Main objective:	Diversification of routes, reduce import dependency from a single route and single source, ability to cope with constrained or interrupted supply of an energy source, flexibility of the national energy system		
Quantified objective:	Increased interconnection capacities		
Description:	PM_ES2 aligns with the EU Energy System Integration Strategy which aims for more physical links between energy carriers. This calls for a new, holistic approach for both large-scale and local infrastructure planning, including the protection and resilience of critical infrastructures. Furthermore, the strategy infers that infrastructure planning should facilitate the integration of various energy carriers and arbitrate between the development of new infrastructure or re-purposing of existing ones. In response Serbia should follow the developments in regards to the revision of the of the TEN-E and TEN-T regulations which will fully support a more integrated energy system, including through greater synergies between the energy and transport infrastructure. In addition, the country should follow-on with the developments in the EU and review the scope and governance of the TYNDP to ensure full consistency with the EU's decarbonisation objectives and cross-sectoral infrastructure planning as part of the revision of the TEN-E Regulation and other relevant legislation. ES2 for Electricity includes the Interconnection projects are included in the Serbian TYNDP 2021-2030, namely: 1) Transbalkan corridor – first phase, 2) North CSE corridor, 3) Central-Balkan corridor with an implementation horizon after 2030 and 4) Pannonian corridor with an implementation horizon after 2030 but not later than 2035 and the 400 kV OHL between Serbia and Croatia with an implementation horizon that extends beyond 2030. (Important note: the aforementioned electricity projects are discussed on an individual basis later on in the description of measures PM_IEM1 to PM_IEM6) PM_ES2 for gas includes the cumulative interconnections may be considered as stemming from PLIMA and relevant to gas interconnections: Gas_10 (TRA-N-70) Interconnector Serbia-Croatia, Gas_11 (TRA-N-965)		

	Interconnector Serbia-North Macedonia, G08 Serbia-Romania (not included in ENTSOG TYNDP 2020, TRA-N-1268 in TYNDP 2018)
Implementation Timeframe	2021-2030
Type of measure	Investment
Sectors covered/affected	Electricity, Gas
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Finance ▪ EMS ▪ Srbijagas ▪ Donors
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Construction, Transport and InfrastructureAERS
Progress indicators	Interconnectivity targets
Other relevant Energy Union dimension(s) affected	▪ Internal energy market ▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Directive 2009/73/EC ▪ Regulation (EU) No 347/2013
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy ▪ Serbian TYNDP 2021-2030
Implementation cost	187.2 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_ES3	Title:	Building capacities for electricity storage
Main objective:	Ability to cope with constrained or interrupted supply of an energy source, flexibility of the national energy system		
Quantified objective:			
Description:	PM_ES3 concerns energy storage which cumulatively address the aspects of security supply and smart system integration. The CEP and in particular the Electricity Directive and the Electricity Regulation and in particular the latter, aims at setting principles for well-functioning, integrated electricity markets, which allow, *inter alias* particular, for non-discriminatory market access for providers of demand response and energy storage services. Disproportionate grid infrastructure should not be built where other options, including storage, provide a better economic option. This has to be assessed by means of an adequacy study by the relebant system operators. Member States should also incentivise transmission and distribution system operators to procure flexibility services, including storage services. However, a common approach that tackles the known barriers of energy storage (a) grid fees; (b) combining revenues from different services; (c) ownership of energy storage facilities; and (d) combining electricity with other forms of energy, is yet to be developed in Europe and subsequently in Serbia; e) pump up/storage hydropower plants as a specific form of electricity storage.			

Implementation Timeframe	2024-2030
Type of measure	Reform
Sectors covered/affected	Electricity
Implementing Entity	▪ Ministry of Mining and Energy ▪ EMS ▪ EPS ▪ Private sector
Monitoring Entity	▪ EMS ▪ AERS
Progress indicators	Variable RE penetration, curtailed RES electricity
Other relevant Energy Union dimension(s) affected	▪ Internal energy market ▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive (EU) 2019/944 ▪ Regulation (EU) 2019/943
Relevant National Planning Document (Legal, Regulatory Acts etc)	Energy Law, Transmission Grid Code, TYNDP
Implementation cost	1 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_ES3.1	Title:	Banatski dvor, natural gas storage expansion
Main objective:	Ability to cope with constrained or interrupted supply of an energy source, flexibility of the national energy system		
Quantified objective:	Interconnection capacities		
Description:	PM_ES3.1 Refers to the expansion of Banatski Dvor underground gas storage as per Memorandum of Understanding signed between JP Srbijagas and Gazprom in early 2019		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Gas		
Implementing Entity	▪ Gas Storage Operator		
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Finance ▪ Ministry of Infrastructure		
Progress indicators	Storage capacity, injection and withdrawal rates		
Other relevant Energy Union dimension(s) affected	▪ Internal energy market ▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC ▪ Regulation (EU) No 347/2013		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy ▪ Srbijagas Investment Plan		

Implementation cost	100 M€
Financing source(s)	Levy on retail price of motor fuels

Policy measure code:	PM_ES3.2	Title:	Creating mandatory reserves of oil and petroleum products
Main objective:	Ability to cope with constrained or interrupted supply of an energy source, flexibility of the national energy system		
Quantified objective:	Available storage space for crude oil and oil products		
Description:	The mandatory oil stocks of the Republic of Serbia will be established in oil products and crude oil, whereas at least one third of the stockholding obligation shall be in finished products of certain oil products (unleaded motor gasoline, Euro diesel, kerosene jet fuel and residual fuel oil). It is necessary to hold an additional 435,000 metric tons of oil products (216,000 tons privately owned) and 75,000 metric tons of crude oil		
Implementation Timeframe	June 2021 – December 2026		
Type of measure	Reform		
Sectors covered/affected	Oil		
Implementing Entity	▪ Energy Reserves Directorate ▪ Transnafta ad Pancevo ▪ Private entities		
Monitoring Entity	▪ Energy Reserves Directorate ▪ Ministry of Mining and Energy ▪ Ministry of Finance		
Progress indicators	Available storage space for crude oil and oil products		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/119/EC ▪ Energy Law ▪ Law on Compulsory Reserves of Oil and Oil Derivatives ▪ Action Plan for establishment and maintenance of emergency stocks of crude oil and oil products (2017 – 2022) ▪ Decree on the methodology of data collection and processing and calculation of average daily net imports, average daily consumption and amounts of required emergency stocks of crude oil and oil products ▪ Rulebook on defining the yearly programme of emergency oil (2019) ▪ Decree on the amount, method of calculation, payment and disposal of the fee for the establishment of emergency stocks of crude oil and oil products ▪ Rulebook on keeping a register of emergency stocks of oil and oil products and preparing of monthly statistical reports on the quantity, quality, composition and deployment of emergency and other stocks of crude oil and oil products ▪ Emergency Response Plan ▪ Draft Action Plan for Establishment and Maintenance of Emergency Stocks of Crude Oil and Oil Products (June 2021 – December 2026)		

Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Action plan for establishment and maintenance of emergency stocks of crude oil and oil products
Implementation cost	0.5 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_ES4	Title:	Creating operational reserves of oil, coal and other energy derivatives
Main objective:	Ability to cope with constrained or interrupted supply of an energy source, flexibility of the national energy system		
Quantified objective:	Level of operational reserves by supplier and type of energy product		
Description:	This measure refers to the introduction of obligations of maintaining commercial reserves (obligations upon suppliers): Decree on operational stocks of oil, coal and other energy carriers ("Official Gazette of the Republic of Serbia", no. 79/21), adopted on 6 August 2021.		
Implementation Timeframe	2022		
Type of measure	Reform		
Sectors covered/affected	Oil and coal		
Implementing Entity	▪ Energy entities that have the obligation to form operational reserves		
Monitoring Entity	▪ Ministry of Mining and Energy		
Progress indicators	Volume of energy product in stock by product		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/119/EC		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law ▪ Law on Compulsory Reserves of Oil and Oil Derivatives ▪ Action Plan for establishment and maintenance of emergency stocks of crude oil and oil products (2017 - 2022) ▪ Decree on the plan and procurement criteria for the formation of emergency reserves (2016) ▪ Rulebook on defining the yearly programme of emergency oil (2019), Emergency response plan (2019)		
Implementation cost	0.5 M€		
Financing source(s)	Funds of obliged parties		

Policy measure code:	PM_ES5	Title:	Creating mandatory natural gas reserves
Main objective:	Ability to cope with constrained or interrupted supply of an energy source, Flexibility of the national energy system		

Quantified objective:	Level of gas in storage to meet at least 30-day demand of consumers
Description:	In accordance with the Law on Energy, energy entities that perform the energy activity of natural gas supply are obliged to provide mandatory natural gas reserves that are at least equal to the thirty-day average needs of these customers in the current year.
Implementation Timeframe	2021-2030
Type of measure	Reform
Sectors covered/affected	Gas
Implementing Entity	▪ Suppliers
Monitoring Entity	▪ Energy Reserves Directorate ▪ Ministry of Mining and Energy
Progress indicators	Volume of energy product in stock
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC ▪ Directive 2017/1938 ▪ Prevention and crisis plan (Government Regulation)
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy
Implementation cost	0.5 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_ES6	Title:	Electricity Risk Preparedness plan
Main objective:			
Quantified objective:			
Description:	PM_ES6 concerns the preparation and implementation of measures of a Risk Preparedness Plan in accordance to the provisions of Regulation (EU) 2019/941. The Risk Preparedness Regulation in Power Sector introduces important rules for the cooperation between Member States (and on Serbia when adopted by the Energy Community) with the aim to prevent, prepare for, and manage electricity crises. It also establishes common provisions for risk assessment, risk preparedness plans, managing electricity crises, evaluation and monitoring. The plan is based on regional and national electricity crisis scenarios and therefore comprises national, regional and where applicable, bilateral measures planned or taken to prevent, prepare for and mitigate electricity crises.		
Implementation Timeframe	2024-2025		
Type of measure	Reform		
Sectors covered/affected	Electricity		
Implementing Entity	▪ Ministry of Mining and Energy ▪ AERS ▪ EMS		
Monitoring Entity	▪ AERS		
Progress indicators	Risk Preparedness Regulation in Power Sector 2019/941 adopted and Risk Preparedness Plan prepared and approved		

Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market
Union policy which resulted in the implementation of the PaM	▪ Regulation (EU) 2019/941
Relevant National Planning Document (Legal, Regulatory Acts etc)	Energy Law
Implementation cost	0.5 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_ES7	Title:	Update in Security of supply regulation (at least at a national level)
Main objective:	Ability to cope with constrained or interrupted supply of an energy source, Flexibility of the national energy system		
Quantified objective:	n.a.		
Description:	The Decree on establishing the Crisis Plan to ensure security of natural gas supply and the Decree on establishing the Preventive Action Plan to ensure security of natural gas supply, adopted in 2018, are in line with the requirements of EU Regulation 994/2010 on measures to ensure security of natural gas supply. In the coming period, these acts will be harmonized with the requirements of EU Regulation 2017/1938 on measures to ensure security of natural gas supply. In order to achieve the objectives of the INECP, a temporary support measure through a capacity renumeration mechanism will be considered. This measure will remunerate eligible participants for their contribution to medium and long-term security of supply (i.e. being available to increase generation or reduce demand when needed).		
Implementation Timeframe	2021-2025		
Type of measure	Reform		
Sectors covered/affected	Electricity, Gas		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity	▪ Ministry of Mining and Energy		
Progress indicators	Adoption of regulation, preparation of preventive and emergency action plan according to the updated regulation		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM			
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy		
Implementation cost	0.5 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_ES8	Title:	Oil product pipeline from Pancevo refinery to Novi Sad, Sombor, Belgrade and Nis, through Smederevo and Jagodina
Main objective:	More efficient, cheaper, safer and more environmentally friendly supply of motor fuels to the market of the Republic of Serbia.		
Quantified objective:	n.a.		
Description:	Transnafta plans the construction of a pipeline for transport of oil derivatives (gasoline and diesel) in the territory of Serbia, starting from Pancevo refinery to Novi Sad, Sombor, Belgrade and Nis, through Smederevo and Jagodina. The pipeline system will include terminals with appropriate storage capacities, pumping stations (secondary and main pumps) and measuring points for commercial measurement of received and delivered quantities. The pipeline's total length is 402km, while its total capacity is 4.3 Mt/year. The pipeline system is expected to create conditions for cheaper, safer, more secure and more environment friendly supply of the market in motor fuels. The project includes three facilities: Facility I: Pancevo – Smederevo section; Pancevo - Novi Sad section. Facility II: Smederevo – Jagodina section; Jagodina – Nis section. Facility III: Pancevo – Beograd section; Novi Sad - Sombor section.		
Implementation Timeframe	2021-2025		
Type of measure	Investment		
Sectors covered/affected	Oil		
Implementing Entity	▪ Transnafta ad Pancevo		
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Infrastructure		
Progress indicators	Pipeline capacity by product, pipeline length, terminals		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM			
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy		
Implementation cost	400 M€		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_ES9	Title:	Development of a pumped storage project in Bistrica
Main objective:	More diverse energy mix, enabler for the penetration of RES with the ability to absorb redundant energy from uncontrollable RES, contribution to the necessary power adequacy of the system		
Quantified objective:	600MW of additional generation capacity		

Description:	In order to achieve the objectives of the INECP in the most cost-efficient manner and facilitate the penetration of RES, there is a need for energy storage systems to be built. More specifically, based on the perfomed studies and modelling results, the SEMS model considers that a new pumped storage project will be integrated in the system in 2031. This asset will also support the operation of the system since it will increase the volume of available regulation capacities in the system.
Implementation Timeframe	2023-2031
Type of measure	Investment
Sectors covered/affected	Electricity
Implementing Entity	▪ EPS
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Infrastructure ▪ AERS
Progress indicators	Volume of pumped storage capacity in the system
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy
Implementation cost	835 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_ES10	Title:	Development of additional dispatchable generation from natural gas
Main objective:	More diverse energy mix, enabler for the penetration of RES, contribution to the necessary power adequacy of the system		
Quantified objective:	350MW of additional generation capacity		
Description:	In order to achieve the objectives of the INECP in the most cost-efficient manner and facilitate the penetration of RES, there is a need for additional dispatchable generation to be built. More specifically, based on the performed studies and modelling results, the SEMS model considers that a new gas power plant will be integrated in the system by 2028. This asset will also support the operation of the system since it will increase the volume of available regulation capacities in the system.		
Implementation Timeframe	2023-2028		
Type of measure	Investment		
Sectors covered/affected	Electricity		
Implementing Entity	▪		
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Infrastructure ▪ AERS		

Progress indicators	Volume of dispatchable generation capacity in the system
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy
Implementation cost	300 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_ES11	Title:	Modernisation of the coal mining industry
Main objective:	Ability to cope with constrained or interrupted supply of an energy source, Flexibility of the national energy system		
Quantified objective:	Sufficient level of coal in storage		
Description:	In order to achieve the objectives of the INECP in the most cost-efficient manner and ensure a safe and reliable energy system, investments should be made to modernise the coal mining industry in Serbia. This will mitigate any concerns regarding constrained or interrupted supply of energy.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Coal		
Implementing Entity	▪ EPS		
Monitoring Entity	▪ Energy Reserves Directorate ▪ Ministry of Mining and Energy		
Progress indicators	Volume of energy product in stock		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Prevention and crisis plan (Government Regulation)		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy		
Implementation cost	1.3 B€		
Financing source(s)	Own funds		

Except the measures presented in the previous tables, the following measures related to the other dimensions also affect the energy security dimension and contribute to the achievement of the energy security targets:

- Dimension internal energy market: PM_IEM1 - PM_IEM7, PM_IEM8 (PM_IEM8.1 –PM_IEM8.8), PM_IEM9

- PM_IEM14, PM_IEM16, PM_IEM18, PM_IEM20, PM_IEM21, PM_IEM32 and PM_IEM33

- Dimension research, innovation and competitiveness: PM_RIC10 – PM_RIC14

3.4 Dimension Internal Energy Market

3.4.1 Electricity interconnectivity

Policy measure code:	PM_IEM1	Title:	Implementation of Transbalkan Corridor: OHL SS Kragujevac (RS) - Kraljevo (RS)
Main objective:	To maintain and ensure an interconnectivity target, plan and implement 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.		
Quantified objective:	Interconnectivity targets maintained as they are foreseen until 2030, N-1 security criterion, other CBA indicators		
Description:	PM_IEM1 corresponds to a set of infrastructure measures comprising the Transbalkan Corridor -Phase I as it its included in the Serbian TYNDP 2021-2030. The overall project cost is estimated at 26,9 million of which 6.6 million have been provide as an IPA/NIF grant. Of the remainder 20,3 million a loan by KfW covers 15million Euro. The infrastructure works are expected to be fully in operation by late 2021 or early 2022		
Implementation Timeframe	2021-2030		
Type of measure	Investment		
Sectors covered/affected	Electricity		
Implementing Entity	▪ Ministry of Mining and Energy ▪ EMS		
Monitoring Entity	▪ EMS		
Progress indicators	Interconnectivity targets		
Other relevant Energy Union dimension(s) affected	▪ Energy Security		
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Regulation (EU) 347/2013		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ TYNDP 2021-2030		
Implementation cost	26,9 M€		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_IEM2	Title:	Implementation of Transbalkan Corridor: OHL Obrenovac (RS) - Bajina Basta (RS)

Main objective:	To maintain and ensure an interconnectivity target, plan and implement 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.
Quantified objective:	Interconnectivity targets maintained as they are foreseen until 2030, N-1 security criterion, other CBA indicators
Description:	PM_IEM2 corresponds to a set of infrastructure measures comprising the Transbalkan Corridor -Phase I as it its included in the Serbian TYNDP 2021-2030. The overall project cost is estimated at 58,24 million (EUR 40 million) and donations (EUR 13.1 million) were signed at the end of 2020 and the beginning of 2021.
Implementation Timeframe	2021-2030
Type of measure	Investment
Sectors covered/affected	Electricity
Implementing Entity	▪ Ministry of Mining and Energy ▪ EMS
Monitoring Entity	▪ EMS
Progress indicators	Interconnectivity targets
Other relevant Energy Union dimension(s) affected	▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Regulation (EU) 347/2013
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ TYNDP 2021-2030
Implementation cost	89,68 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_IEM3	Title:	Implementation of Transbalkan Corridor: OHL B.Basta (RS) – Visegrad (BA) – Pljevlja (ME)
Main objective:	To maintain and ensure an interconnectivity target, plan and implement 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.		
Quantified objective:	Interconnectivity targets maintained as they are foreseen until 2030, N-1 security criterion, other CBA indicators		
Description:	PM_IEM3 corresponds to a set of infrastructure measures comprising the Transbalkan Corridor -Phase I as it its included in the Serbian TYNDP 2021-2030. The overall project cost is estimated at 40,8 million. There is still no firm grant and loan agreement for the project. It is expected to be fully operational by 2026, provided that the required level of investment grant is approved during 2022.		
Implementation Timeframe	2021-2030		
Type of measure	Investment		

Sectors covered/affected	Electricity
Implementing Entity	▪ Ministry of Mining and Energy ▪ EMS
Monitoring Entity	▪ EMS
Progress indicators	Interconnectivity targets
Other relevant Energy Union dimension(s) affected	▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Regulation (EU) 347/2013
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ TYNDP 2021-2030
Implementation cost	52,32 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_IEM4	Title:	Interconnection between Resita (RO) and Pancevo (RS) (PCI 3.22.1)
Main objective:	To maintain and ensure an interconnectivity target, plan and implement 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.		
Quantified objective:	Interconnectivity targets maintained as they are foreseen until 2030, N-1 security criterion, other CBA indicators		
Description:	PM_IEM4 corresponds to a set of infrastructure measures comprising the Serbian - Romanian Interconnection as it its included in the Serbian TYNDP 2021-2030. The project has been completed on the Serbian side up to the Romanian border. Completion on the Romanian side still underway. It is necessary for the Romanian transmission system operator Transelectrica to implement the 400 kV TS Resica as well as a 400 kV OHL from TS Portile de Fier to TS Resica section from the border to TS Resita. The section of the 400 kV transmission line from the Romanian border to TS Resica has been completed.		
Implementation Timeframe	2026-2030		
Type of measure	Investment		
Sectors covered/affected	Electricity		
Implementing Entity	▪ Ministry of Mining and Energy ▪ EMS		
Monitoring Entity	▪ EMS		
Progress indicators	Interconnectivity targets		
Other relevant Energy Union dimension(s) affected	▪ Energy Security		
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Regulation (EU) 347/2013		

Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ TYNDP 2021-2030
Implementation cost	Project completed from the Serbian end
Financing source(s)	None required

Policy measure code:	PM_IEM5	Title:	Pannonian corridor
Main objective:	To maintain and ensure an interconnectivity target, plan and implement 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.		
Quantified objective:	Interconnectivity targets maintained as they are foreseen until 2030, N-1 security criterion, other CBA indicators		
Description:	It corresponds to a set of infrastructural 400 kV transmission lines in the area of Vojvodina, which will further enable the integration of electricity from renewable sources, as well as increase the cross-border transmission capacity between Serbia and Hungary.		
Implementation Timeframe	2021 - 2030		
Type of measure	Investment		
Sectors covered/affected	Electricity		
Implementing Entity	▪ Ministry of Mining and Energy ▪ EMS		
Monitoring Entity	▪ EMS		
Progress indicators	Interconnectivity targets, integration of additional Variable RES [MW]		
Other relevant Energy Union dimension(s) affected	▪ Energy Security		
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Regulation (EU) 347/2013		
Relevant National Planning Document (Legal, Regulatory Acts etc)	TYNDP 2021-2030		
Implementation cost	108 M€		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_IEM6	Title:	Central Balkan Corridor
Main objective:	To maintain and ensure an interconnectivity target, plan and implement 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.		
Quantified objective:	Interconnectivity targets maintained as they are foreseen until 2030, N-1 security criterion, other CBA indicators		

Description:	The measure corresponds to a set of infrastructural 400 kV transmission lines in the area of central Serbia, which will enable the further the integration of electricity from renewable sources, increase the reliability of supply and increase cross-border transmission capacity between Serbia, Bulgaria, Montenegro and Bosnia and Herzegovina.
Implementation Timeframe	2021 - 2030
Type of measure	Investment
Sectors covered/affected	Electricity
Implementing Entity	▪ Ministry of Mining and Energy ▪ EMS
Monitoring Entity	▪ EMS
Progress indicators	Interconnectivity targets, integration of additional Variable RES [MW]
Other relevant Energy Union dimension(s) affected	▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Regulation (EU) 347/2013
Relevant National Planning Document (Legal, Regulatory Acts etc)	TYNDP 2021-2030
Implementation cost	214,07 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_IEM7	Title:	RES integration cluster of projects - North Continental South East (CSE) Corridor
Main objective:	To maintain and ensure an interconnectivity target, plan and implement 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.		
Quantified objective:	Interconnectivity targets maintained as they are foreseen until 2030, N-1 security criterion, other CBA indicators		
Description:	PM_IEM7 corresponds to a set of infrastructure measures complementing the BEOGRID cluster and together with the Serbian - Romanian Interconnection are collectively referred to as North CSE Corridor in the Serbian TYNDP 2021-2030. Further projects for RES integration correspond to an investment of ca. 120 mEUR. Overall, the infrastructure works correspond to an overall investment of ca. 200 million EUR are expected to be fully in operation by 2030		
Implementation Timeframe	2021-2030		
Type of measure	Investment		
Sectors covered/affected	Electricity		
Implementing Entity	▪ Ministry of Mining and Energy ▪ EMS		
Monitoring Entity	▪ EMS		
Progress indicators	Interconnectivity targets, integration of additional Variable RES [MW]		
Other relevant Energy Union dimension(s) affected	▪ Energy Security		

Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Regulation (EU) 347/2013
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ TYNDP 2021-2030
Implementation cost	200 M€
Financing source(s)	EU and other funds, public funds and own funds

3.4.2 Energy transmission infrastructure

Policy measure code:	PM_IEM8	Title:	Regional gas connection through the implementation of interconnection projects
Main objective:	Infrastructure, market integration aimed at increasing the tradeable capacity, consumer protection and improvement of competition, regional integration		
Quantified objective:	Increased interconnection capacity		
Description:	This includes the following interconnections: for gas includes the following interconnections may be considered as stemming from PLIMA and relevant to gas interconnections: Gas_10 (TRA-N-70) Interconnector Serbia-Croatia, Gas_11 (TRA-N-965) Interconnector Serbia-North Macedonia, G08 Serbia-Romania (not included in ENTSOG TYNDP 2020, TRA-N-1268 in TYNDP 2018) and Gastrans		
Implementation Timeframe	2026-2030		
Type of measure	Investment		
Sectors covered/affected	Gas		
Implementing Entity	▪ Transportgas		
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Infrastructure ▪ Ministry of Finance ▪ Government of Serbia ▪ AERS		
Progress indicators	Final Investment Decision, building permit, commissioning date, commercial operation date		
Other relevant Energy Union dimension(s) affected	▪ Energy security ▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Regulation (EU) 2013/347		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law		
Implementation cost	224 M€		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_IEM8.1	Title:	Implementation of the Serbia-Bulgaria gas interconnection project
Main objective:	Infrastructure, market integration aimed at increasing the tradeable capacity, consumer protection and improvement of competition, regional integration		
Quantified objective:	Increased interconnection capacity		
Description:	This is project Gas_09 in the Energy Community PLIMA Database and project TRA-N-137 in ENTSOG TYNDP 2020. Interconnection Bulgaria-Serbia aims to connect the national gas transmission networks of Bulgaria and Serbia. The project envisages the construction of a gas pipeline from Novi Iskar to Kalotina with branch to Slivnitsa and Dragoman on Bulgarian territory and a gas pipeline Nis to Dimitrovgrad on Serbian territory. The project on Bulgarian territory includes the construction of 2 AGRS at Slivnitsa and Dragoman and the construction of GMS Kalotina at a joint site with a reverse pigging station of the gas pipeline. The project is part of the Balkan Gas Hub concept. Along with the projects IGB and IBR, it will provide for market integration, increased security of supply and competition by opening a new bidirectional supply route. Interconnection Bulgaria-Serbia aims to connect the national gas transmission networks of Bulgaria and Serbia. The project envisages the construction of a gas pipeline from Novi Iskar to Kalotina with branch to Slivnitsa and Dragoman on Bulgarian territory and a gas pipeline Nis to Dimitrovgrad on Serbian territory. The project on Bulgarian territory includes the construction of 2 AGRS at Slivnitsa and Dragoman and the construction of GMS Kalotina at a joint site with a reverse pigging station of the gas pipeline. The project is part of the Balkan Gas Hub concept. Along with the projects IGB and IBR, it will provide for market integration, increased security of supply and competition by opening a new bidirectional supply route.		
Implementation Timeframe	2021-2030		
Type of measure	Investment		
Sectors covered/affected	▪ Transportgas		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Finance ▪ Government of Serbia ▪ AERS		
Monitoring Entity	Final Investment Decision, building permit, commissioning date, commercial operation date		
Progress indicators			
Other relevant Energy Union dimension(s) affected	▪ Energy security ▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC ▪ Regulation (EU) No 347/2013		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law		
Implementation cost	85.5 M€		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_IEM8.2	Title:	Project for Serbia-Romania gas interconnection 85.5 km (out of which 12.8 km is on the territory of the Republic of Serbia), with a capacity of 1.2 billion m3/year
Main objective:	Infrastructure, market integration aimed at increasing the tradeable capacity, consumer protection and improvement of competition, regional integration		
Quantified objective:	Increased interconnection capacity		
Description:	As descried in the policy measure. This for G08 Serbia-Romania proposed project in the PLIMA Database (not included in ENTSOG TYNDP 2020, TRA-N-1268 in TYNDP 2018)		
Implementation Timeframe	2026-2030		
Type of measure	Investment		
Sectors covered/affected	Gas		
Implementing Entity	▪ Transportgas		
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Infrastructure ▪ Ministry of Finance ▪ Government of Serbia ▪ AERS		
Progress indicators	Final Investment Decision, building permit, commissioning date, commercial operation date		
Other relevant Energy Union dimension(s) affected	▪ Energy security ▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC ▪ Regulation (EU) No 347/2013		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law		
Implementation cost	16 M€		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_IEM8.3	Title:	Project for Serbia-Croatia gas interconnection (95 km, with a capacity of 1.5 billion m3/year)
Main objective:	Infrastructure, market integration aimed at increasing the tradeable capacity, consumer protection and improvement of competition, regional integration		
Quantified objective:	Increased interconnection capacity		
Description:	This is Gas_10 Interconnector Serbia-Croatia in the PLIMA database, ENTSOG TRA-N-70		
Implementation Timeframe	2021-2023		

Type of measure	Investment
Sectors covered/affected	Gas
Implementing Entity	▪ Transportgas
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Infrastructure ▪ Ministry of Finance ▪ Government of Serbia ▪ AERS
Progress indicators	Final Investment Decision, building permit, commissioning date, commercial operation date
Other relevant Energy Union dimension(s) affected	▪ Energy security ▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC ▪ Regulation (EU) No 347/2013
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law
Implementation cost	144 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_IEM8.4	Title:	Project for Serbia-BiH gas interconnection 90 km, with a capacity of 1.2 billion m3/year
Main objective:	Infrastructure, market integration aimed at increasing the tradeable capacity, consumer protection and improvement of competition, regional integration		
Quantified objective:	Increased interconnection capacity		
Description:	The construction of a new gas pipeline Indjija - Macvanski Prnjavor (Serbia-BiH interconnection) that will enable the continuation of gasification of the Macva district and strategic companies, considering that the old pipeline constructed in 1979 needs heavy rehabilitation.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Gas		
Implementing Entity	▪ Transportgas		
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Infrastructure ▪ Ministry of Finance ▪ Government of Serbia ▪ AERS		
Progress indicators	Final Investment Decision, building permit, commissioning date, commercial operation date		
Other relevant Energy Union dimension(s) affected	▪ Energy security ▪ Decarbonisation		

Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC ▪ Regulation (EU) No 347/2013
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law
Implementation cost	47 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_IEM8.5	Title:	Main gas pipeline RG 11-02 Leskovac-Vladicin Han-Vranje 71 km
Main objective:	Infrastructure, market integration aimed at increasing the tradeable capacity, consumer protection and gasification of South Serbia		
Quantified objective:	Increased interconnection capacity		
Description:	Development of the transport gas pipeline network of 71km length, diameter DN 500 mm		
Implementation Timeframe	2021-2030		
Type of measure	Investment		
Sectors covered/affected	Gas		
Implementing Entity	▪ Transportgas, Jugorosgaz Transport		
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Infrastructure ▪ Ministry of Finance ▪ Government of Serbia ▪ AERS		
Progress indicators	Final Investment Decision, building permit, commissioning date, commercial operation date		
Other relevant Energy Union dimension(s) affected	▪ Energy security ▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC ▪ Regulation (EU) No 347/2013		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law		
Implementation cost	50 M€		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_IEM8.6	Title:	Gas pipeline - interconnection with Montenegro
Main objective:	Infrastructure, market integration aimed at increasing the tradeable capacity, consumer protection and improvement of competition, regional integration		

Quantified objective:	Increased interconnection capacity
Description:	Capacity 1.5 billion m3 / year. Construction of the gas pipeline - interconnection with Montenegro will contribute to the diversification of gas supply routes and will enable connection through another national gas system with the IAP gas pipeline. The project contributes to increasing security of supply, market development and increasing competition in the natural gas market. Diversification of natural gas supply sources in accordance with European rules; section length-114 km, diameter DN 500 mm, maximum inlet pressure 50 bar, minimum inlet pressure 16 bar, year of investment start 2024, planned year of commissioning 2028, planned annual quantity 1000 million Sm^3 / year, max. daily (technical) capacity 2.7 million Sm^3 / day
Implementation Timeframe	2026-2030
Type of measure	Investment
Sectors covered/affected	Gas
Implementing Entity	▪ Transportgas
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Infrastructure ▪ Ministry of Finance ▪ Government of Serbia ▪ AERS
Progress indicators	Final Investment Decision, building permit, commissioning date, commercial operation date
Other relevant Energy Union dimension(s) affected	▪ Energy security ▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC ▪ Regulation (EU) No 347/2013
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law
Implementation cost	60 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_IEM8.7	Title:	Project for Serbia-Macedonia gas interconnection 70.7 km, with a capacity of 0.8 billion m3/year
Main objective:	Infrastructure, market integration aimed at increasing the tradeable capacity, consumer protection and improvement of competition, regional integration		
Quantified objective:	Increased interconnection capacity		
Description:	This is Gas_11 Serbia-Macedonia.		
Implementation Timeframe	2021-2030		
Type of measure	Investment		
Sectors covered/affected	Gas		

Implementing Entity	▪ Transportgas
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Finance ▪ Ministry of Infrastructure ▪ AERS ▪
Progress indicators	Final Investment Decision, building permit, commissioning date, commercial operation date
Other relevant Energy Union dimension(s) affected	▪ Energy security ▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC ▪ Regulation (EU) No 347/2013
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law
Implementation cost	20 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_IEM8.8	Title:	Project for Nis-Pristina gas pipeline construction 65 km, with a capacity of 0.8 billion m3/year
Main objective:	Infrastructure, market integration aimed at increasing the tradeable capacity, consumer protection and improvement of competition, regional integration		
Quantified objective:	Increased interconnection capacity, decrease in the use of other fuels in the southern part of the Republic of Serbia		
Description:	The construction of this gas pipeline will create conditions for the construction of distribution gas pipelines in the southern part of the Republic of Serbia and the Autonomous Province of Kosovo* and Metohija and the connection of industrial, communal and individual consumers to the gas pipeline system. This will enable the use of natural gas as an environmentally friendly energy source, and will significantly relieve the electricity capacity. Gas interconnection Serbia-Montenegro- Section Nis (Doljevac) - Pristina, development plan 2021-2030		
Implementation Timeframe	2021-2030		
Type of measure	Investment		
Sectors covered/affected	Gas		
Implementing Entity	▪ Transportgas		
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Infrastructure ▪ Ministry of Finance ▪ Government of Serbia ▪ AERS		
Progress indicators	Final Investment Decision, building permit, commissioning date, commercial operation date		

Other relevant Energy Union dimension(s) affected	▪ Energy security ▪ Decarbonisation
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC ▪ Regulation (EU) No 347/2013
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law
Implementation cost	30 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_IEM9	Title:	Investments related to the digitalisation of the networks aiming at increasing RES integration and improvement of quality of supply
Main objective:	Increased system flexibility and quality of electricity supply, in particular through policies and measures related to market-based price formation in compliance with applicable law; market integration and coupling, aiming to increase the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment and real-time price signals,		
Quantified objective:	Increased quality of supply indicators, reduction of RES forecasting errors		
Description:	PM_IEM9 refers to a policy and financially-backed programme which should aim at the promotion of smart grids and in particular prioritise the application of IEC 61850, the designation of sensing points and forecasting tools for demand and RES forecasting at mid and short-term time scales, the monitoring of quality of supply parameters (sags, swells, etc), as well as, the dynamic line rating for lines and cabling at important nodes to the system. These measures are expected to improve observability of dynamic phenomena and improve the forecasting accuracy by the network operators. In addition, the measure envisages the installation of DLR and FACTS devices on the transmission network in parts that are considered to allow greater flexibility in the integration of renewable sources.		
Implementation Timeframe	2026-2030		
Type of measure	Investment		
Sectors covered/affected	Electricity		
Implementing Entity	▪ Ministry of Mining and Energy ▪ EMS ▪ DSO		
Monitoring Entity	▪ EMS ▪ DSO		
Progress indicators	Quality of supply indicators (e.g. SAIDI, SAIFI, ENS)		
Other relevant Energy Union dimension(s) affected	▪ Energy Security		
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Regulation (EU) 347/2013		

Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy ▪ Law on RES
Implementation cost	10 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_IEM10	Title:	Cluster of network infrastructure projects in the wider area of Belgrade (BEOGRID)
Main objective:	To maintain and ensure an interconnectivity target, plan and implement key electricity transmission infrastructure projects, and, where relevant, modernisation projects.,		
Quantified objective:	Interconnectivity targets maintained as they are foreseen until 2030, N-1 security criterion, other CBA indicators		
Description:	PM_IEM10 corresponds to a set of infrastructure measures comprising the BEOGRID cluster as it its included in the Serbian TYNDP 2021-2030. The overall project comprises the Belgrade 50 substation 400/110 kV with associated 400 kV and 110 kV outlets and the overhead double line 400 kV TS from Belgrade 50 substation to the region of southern Banat (close to wind farm Cibuk). The infrastructure works correspond to an overall investment of around 90 mEUR are expected to be fully in operation by 2025		
Implementation Timeframe	2021-2030		
Type of measure	Investment		
Sectors covered/affected	Electricity		
Implementing Entity	▪ Ministry of Mining and Energy ▪ EMS		
Monitoring Entity	▪ EMS ▪ Ministry of Infrastructure		
Progress indicators	Interconnectivity targets, integration of additional Variable RES [MW]		
Other relevant Energy Union dimension(s) affected	▪ Energy Security		
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Regulation (EU) 347/2013		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ TYNDP 2021-2030		
Implementation cost	65.6M€		
Financing source(s)	own funds		

3.4.3 Market integration

Policy measure code:	PM_IEM11	Title:	Smart meters roll out in electricity DSO
Main objective:	Increased system flexibility and quality of electricity supply, in particular through policies and measures related to market-based price formation in compliance with applicable law; market integration and coupling, aiming to increase the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment and real-time price signals,		
Quantified objective:	Increased quality of supply indicators, deployment smart grids, aggregation, demand response services as well as storage and distributed generation		
Description:	PM_IEM11 concerns the roll-out of electricity smart meters in Serbia covering at least 80% of consumption (the target refers to electricity transmission and distribution networks where transmission roll-out has already been fully covered). The roll-out is expected to be implement following the preparation of a cost-benefit analysis (CBA) study. The roll-out is expected to bring benefits in both the energy market and energy efficiency dimensions.		
Implementation Timeframe	2021-2030		
Type of measure	Investment		
Sectors covered/affected	Residential, public, commercial, industrial		
Implementing Entity	▪ Elektrodistribucija Srbije doo Beograd (EDS) ▪ Government		
Monitoring Entity	▪ AERS ▪ Government		
Progress indicators	Number of distribution network connections with a smart meter		
Other relevant Energy Union dimension(s) affected	▪ Energy Efficiency ▪ Energy Security		
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Directive (EU) 2019/944 ▪ Regulation (EU) 2019/943		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy		
Implementation cost	32.2 M€		
Financing source(s)	own funds		

Policy measure code:	PM_IEM12	Title:	Studies for gas in smart meters roll out in natural gas distribution
Main objective:	Gas distribution infrastructure, consumer protection and improvement of competition, enable EE at the supply side (i.e. through the reduction of losses)		
Quantified objective:	Decision to proceed with gas smart meters deployment at distribution level		
Description:	PM_IEM12 concerns the assessment (via all applicable studies to be conducted from the DSOs and onwards approved by AERS) regarding the economic feasibility of the roll-out of gas smart meters in Serbia aiming at a target of at least 85% of consumption (the target refers to gas distribution networks because smart meteres were already installed at the gas transport systems)..		

Implementation Timeframe	2021 -– 2025
Type of measure	Reform
Sectors covered/affected	Gas
Implementing Entity	▪ Distribution system operators
Monitoring Entity	▪ AERS
Progress indicators	Number of Smart Meters on distribution
Other relevant Energy Union dimension(s) affected	▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy
Implementation cost	1 M€
Financing source(s)	own funds

Policy measure code:	PM_IEM13	Title:	Design and implement market and network data management model
Main objective:	Increased system flexibility and quality of electricity supply, in particular through policies and measures related to market-based price formation in compliance with applicable law; market integration and coupling, aiming to increase the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment and real-time price signals,		
Quantified objective:	Increased quality of supply indicators, deployment smart grids, aggregation, demand response services as well as storage and distributed generation		
Description:	PM_IEM13 concerns the design and implementation of a data management model which is necessary for the operationalisation and improvement of energy services (e.g. energy efficiency, demand response, supplier switching). A centralized- data hub aggregating energy data (market data, network data, other data) from both transmission and distribution would be preferable. Data operations within the energy data hub would include reading, validation, storage and exchange of relevant data between stakeholders.		
Implementation Timeframe	2021-2030		
Type of measure	Reform		
Sectors covered/affected	Electricity		
Implementing Entity	▪ AERS ▪ Ministry of Mining and Energy		
Monitoring Entity	▪ AERS		
Progress indicators	Level (%) of energy metering data integration from both the TSO and DSO, number of supplier switches executed within the given timeframe		

Other relevant Energy Union dimension(s) affected	▪ Energy efficiency ▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Directive (EU) 2019/944 ▪ Regulation (EU) 2019/943
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy
Implementation cost	0.4 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_IEM14	Title:	Promotion of demand response for the end-users by use of the dynamic tariff system
Main objective:	Increased system flexibility and quality of electricity supply, in particular through policies and measures related to market-based price formation in compliance with applicable law; market integration and coupling, aiming to increase the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment and real-time price signals,		
Quantified objective:	Increased quality of supply indicators, deployment smart grids, aggregation, demand response services as well as storage and distributed generation		
Description:	PM_IEM14 comprises a policy measure aiming to align consumption patterns of electricity end-users in order to enable wider flexibility and optimal use of the electricity system. This measure (policy) is tightly associated and with the use of smart-meters and IoT as these are necessary in order to send real-time (or close to real-time) price signals and incentives end-users for demand response.		
Implementation Timeframe	2021-2030		
Type of measure	Reform		
Sectors covered/affected	Electricity		
Implementing Entity	▪ AERS		
Monitoring Entity	▪ AERS		
Progress indicators	Percentage (%) of annual peak demand shifted to off-peak hours		
Other relevant Energy Union dimension(s) affected	▪ Energy Security		
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Directive (EU) 2019/944 ▪ Regulation (EU) 2019/943		

Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_IEM15	Title:	Equipping gas distribution systems with metering and data collection devices (measuring equipment, measuring and operational platform, SCADA) necessary for the functioning and development of the gas market
Main objective:	Consumer protection and improvement of competition, Enable EE at the supply side (i.e. through the reduction of losses)		
Quantified objective:	Number of smart meters at distribution level		
Description:	Prior to the decision on introduction of smart meters at gas distribution, a cost-benefit analysis will be conducted to show whether the introduction of smart meters is economically sound especially for households. The analysis to be done should be economic, not financial, that is, to provide data on benefits and costs for the whole society, and not only for the system operator. If the analysis shows that the introduction of smart meters is worthwhile, only than the plan for the introduction of smart meters should be made. This is in accordance with Directive 2009/73/EC		
Implementation Timeframe	2024-2030		
Type of measure	Investment		
Sectors covered/affected	Gas		
Implementing Entity	▪ Gas distribution system operator		
Monitoring Entity	▪ AERS		
Progress indicators	Number of smart meters installed subject to a positive CBA		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law		
Implementation cost	3.5 M€		
Financing source(s)	own funds		

Policy measure code:	PM_IEM16	Title:	Appointment of the Nominated Electricity Market Operator (Article 183a in accordance to the amendments of the Energy Law)
Main objective:	Increased system flexibility and quality of electricity supply, in particular through policies and measures related to market-based price formation in compliance with applicable law; market integration and coupling, aiming to increase the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation,		

	mechanisms for dispatching, re-dispatching and curtailment and real-time price signals,
Quantified objective:	Implementation of Energy Community Acquis Communautaire, increased market use of the interconnectors, price convergence with the neighbouring bidding zone, increased market-based integration of RES in the electricity mix
Description:	PM_IEM16 is a precondition for the market coupling activity which is further detailed in PM_IEM32 and PM_IEM33. It corresponds to a legal/regulatory action which implements Articles 4, 5 and 6 of Capacity Allocation and Congestion Management (CACM) Regulation. The CACM articles in concern determine the designation of Nominated Electricity Market Operators (NEMOs). According to this provision each Member State (and thereby Serbia on the adoption of CACM in the Energy Community) needs to ensure that at least one NEMOs is designated in order to perform the single day-ahead and single intraday coupling. Each NEMO designated in a territory of one and Member State and Energy Community Contracting Party (CP) has the right to provide its services in other Member States (i.e. by way of so called “passporting"). Exceptionally Energy Community CPs and Member States may refuse the trading services by a NEMO designated in another Energy Community CP and Member State only in specific, well-defined cases, as stated in Article 4(6) of the CACM Regulation. Moreover, the Energy Community CP and Member States have the right to revoke the designation of a NEMO, in case the NEMO fails to maintain compliance with the criteria set in Article 6 of the CACM Regulation.
Implementation Timeframe	2021-2030
Type of measure	Reform
Sectors covered/affected	Electricity
Implementing Entity	▪ Government ▪ Ministry of Mining and Energy ▪ AERS
Monitoring Entity	▪ AERS
Progress indicators	Issuing of a relevant decision by AERS, agreements and MoUs with neighbouring stakeholders
Other relevant Energy Union dimension(s) affected	▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Directive (EU) 2019/944 ▪ Regulation (EU) 2019/943
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_IEM17	Title:	Development of the regulatory framework for the operation of the “producer-consumer” (prosumer) (Article 169 in accordance to the amendments of the Energy Law and Article 58 to 61 of the Law on the use of RES)
Main objective:	Increased system flexibility and quality of electricity supply, in particular through policies and measures related to market-based price formation in compliance with applicable law; market integration and coupling, aiming to		

	increase the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment and real-time price signals,
Quantified objective:	Increased quality of supply indicators, deployment smart grids, aggregation, demand response services as well as storage and distributed generation
Description:	PM_IEM17 concerns acting on regulatory, financial, technical and policy barriers that currently prevent the market update of self-consumption in Serbia. In light of changes introduced by new legislation bylaws need to be produced in order to implement the recent legal authorisation on prosumers. These shall include technical/quality standards, network connection conditions, tax regime, permitting process and complement and batteries implementation of the net-metering bylaws
Implementation Timeframe	2021-2030
Type of measure	Reform
Sectors covered/affected	Residential, public, commercial, industrial
Implementing Entity	▪ Ministry of Mining and Energy ▪ DSO ▪ EMS ▪ AERS ▪ EPS
Monitoring Entity	▪ AERS
Progress indicators	Number of connection applications by "producer-consumer" (prosumer) to the DSO
Other relevant Energy Union dimension(s) affected	▪ Energy efficiency ▪ Decarbonization
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Directive (EU) 2019/944 ▪ Regulation (EU) 2019/943
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy ▪ Law on RES
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_IEM18	Title:	Development of the regulatory framework for the operation of the "electricity storage" (Article 169 in accordance to the amendments of the Energy Law)
Main objective:	Increased system flexibility and quality of electricity supply, in particular through policies and measures related to market-based price formation in compliance with applicable law; market integration and coupling, aiming to increase the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment and real-time price signals,		

Quantified objective:	Increased quality of supply indicators, deployment smart grids, aggregation, demand response services as well as storage and distributed generation
Description:	PM_IEM18 regards the regulatory framework of electricity storage as a whole. The European CEP, approved in May 2019, allows transmission and distribution operators to own and operate storage only under exceptional circumstances, which have yet to be codified in national legislation. Electricity storage can provide services to electricity grids, including transmission and distribution deferral, together with flexibility and energy and capacity services in balancing markets.
Implementation Timeframe	2021-2030
Type of measure	Reform
Sectors covered/affected	Residential, public, commercial, industrial
Implementing Entity	▪ Government ▪ Ministry of Mining and Energy ▪ EMS ▪ Distribution System Operator EDS ▪ EPS
Monitoring Entity	▪ AERS
Progress indicators	Storage capacity (MWh) added at both the transmission and distribution grids as well as behind the meter.
Other relevant Energy Union dimension(s) affected	▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Directive (EU) 2019/944 ▪ Regulation (EU) 2019/943
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_IEM19	Title:	Development of the regulatory framework for the operation of the "aggregator" (Article 169 in accordance to the amendments of the Energy Law)
Main objective:	Increased system flexibility and quality of electricity supply, in particular through policies and measures related to market-based price formation in compliance with applicable law; market integration and coupling, aiming to increase the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment and real-time price signals		
Quantified objective:	Increased quality of supply indicators, deployment smart grids, aggregation, demand response services as well as storage and distributed generation		

Description:	PM_IEM19 the new Electricity Directive in the Clean Energy Package requires that all Member States (and Serbia once the Energy Community Treaty adopts the CP) should make sure that Independent Aggregators, which in turn comprise Market Participants with balance responsibility, operate in fair and equitable terms in the electricity market. This necessarily leads to the implementation of a balancing and settlement mechanism that involves two BRPs in one connection point. To role and function of the aggregator needs to be appropriately reflected in the market rules and network codes pursuant to the evolving EU experience and practices in regard of this aspect.
Implementation Timeframe	2021-2030
Type of measure	Reform
Sectors covered/affected	Residential, commercial
Implementing Entity	▪ Ministry of Mining and Energy ▪ AERS ▪ EMS ▪ Distribution System Operator EDS
Monitoring Entity	▪ AERS
Progress indicators	Number of licensed (or commercially active) aggregators & percentage of consumption and RES production (MWh) they represent in the electricity market
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Directive (EU) 2019/944 ▪ Regulation (EU) 2019/943
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_IEM20	Title:	Development of the regulatory framework for the operation of the Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs) (Article 62 to 66 and Article 77 of the Law on the use of RES)
Main objective:	Increased system flexibility and quality of electricity supply, in particular through policies and measures related to market-based price formation in compliance with applicable law; market integration and coupling, aiming to increase the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment and real-time price signals,		
Quantified objective:	Increased quality of supply indicators, deployment smart grids, aggregation, demand response services as well as storage and distributed generation		
Description:	PM_IEM20 concerns the preparation of the relevant framework should unlock the collective participation and share of energy and financial benefits of consumer categories at a community level where energy carries and services may be locally optimized and the excess or surplus is exchanged on		

	a market-based framework with the wholesale and/or retail electricity markets. Under the current framework, the community may acquire the status of a temporary privileged producer, i.e. the status of an privileged producer and the status of a producer of electricity from renewable energy sources and incentive measures in the field of heat energy. The community can be a participant in the electricity market as a producer of electricity from RES in the incentive system or within the role of prosumer. The challenges are related to the integration of RES into the system, in terms of expansion, network upgrades and modernisations. The above need to appropriately reflected in the market and network operation rules.
Implementation Timeframe	2021-2030
Type of measure	Reform
Sectors covered/affected	Residential, public, commercial, industrial
Implementing Entity	▪ Ministry of Mining and Energy
Monitoring Entity	▪ AERS
Progress indicators	Number of licensed (or commercially active) RECs and CECs & percentage of consumption and RES production (MWh) they represent in the electricity market
Other relevant Energy Union dimension(s) affected	▪ Energy Efficiency ▪ Decarbonisation ▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Directive 2012/27/EU ▪ Directive 2018/2002/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy ▪ Law on RES
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_IEM21	Title:	Implementation of EU Network Codes and Guidelines on electricity through appropriate amendments of the secondary legislation and adoption of additional rules, decisions and acts, where applicable.
Main objective:	Increased system flexibility and quality of electricity supply, in particular through policies and measures related to market-based price formation in compliance with applicable law; market integration and coupling, aiming to increase the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment and real-time price signals,		
Quantified objective:	Implementation of Energy Community Acquis Communautaire, increased market use of the interconnectors, price convergence with the neighbouring bidding zone, increased market-based integration of RES in the electricity mix		
Description:	PM_IEM21 aims at continuation of work towards the implementation of EU network codes and guidelines which in turn comprise the EU framework conditions of ensuring competition, affordability and security. They aim at the improvement electricity security and quality of supply while harmonizing		

	system operators to market mechanisms. The EU Network Codes and Guidelines in conjunction with the Electricity Directive and Regulation under the CEP aim to deliver on Europe's clean energy transition through better and market-based integration of renewables. The Energy Community and the amendments to the Energy Law have currently set forth the requirement of the CACM, which it would also advisable be advisable to Serbia to voluntarily also adopt the EBGL (Article 93a) in accordance to the amendments of the Energy Law)
Implementation Timeframe	2021-2030
Type of measure	Reform
Sectors covered/affected	Electricity
Implementing Entity	▪ AERS ▪ EMS ▪ Ministry of Mining and Energy ▪ DSO ▪ SEEPEX
Monitoring Entity	▪ AERS
Progress indicators	New legal and regulatory framework adopted including through amendments to the existing network codes and market rules
Other relevant Energy Union dimension(s) affected	▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Directive (EU) 2019/944 ▪ Regulation (EU) 2019/943
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_IEM22	Title:	Unbundling and Certification of Transmission System Operators
Main objective:	Infrastructure, policies and measures related to market-based price formation		
Quantified objective:	Certification decisions issued		
Description:	Transportgas Srbija, is unbundled from Srbijagas but not yet certified. Yugorosgaz Transport's certification was revoked and its unbundling is still pending. Only Gastrans has been certified as an Independent Transmission Operator (ITO) with a 2020 decision of AERS. Overall, the unbundling and certifications of Srbijagas and Yugorosgaz are still pending while the Energy Community Secretariat challenges the certification of Gastrans. The issue of unbundling and certification shall need to be addressed		
Implementation Timeframe	2022		
Type of measure	Reform		
Sectors covered/affected	Gas		
Implementing Entity	▪ Srbijagas ▪ Transportgas ▪ Jugorosgaz ▪ AERS		

Monitoring Entity	▪ Ministry of Mining and Energy ▪ AERS
Progress indicators	Certification decision
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law ▪ Action Plan for Implementation of Activities for the Restructuring of PE Srbijagas and Yugorosgaz Transport
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_IEM23	Title:	Implementation of Regulation (EU) 2017/459
Main objective:	Infrastructure, policies and measures related to market-based price formation, market integration aimed at increasing the tradeable capacity, Consumer protection and improvement of competition, regional integration		
Quantified objective:	Adoption of Regulation		
Description:	As an Energy Community Contracting Party, Serbia was obliged to implement the Regulation by 28 February 2020. Implementation is still pending. The policy refers to the implementation of the regulation. Transposition and Implementation are still pending.		
Implementation Timeframe	In the course of 2022		
Type of measure	Reform		
Sectors covered/affected	Gas		
Implementing Entity	▪ AERS ▪ Transport system operators ▪ Ministry of Mining and Energy ▪ Government		
Monitoring Entity	▪ AERS		
Progress indicators	Transposition of Regulation, offer of capacity through auctions in a capacity booking platform		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Regulation (EU) 2017/459		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law ▪ Action Plan for the Implementation of Activities aimed at Reorganizing PE Srbijagas		
Implementation cost	0.2 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_IEM24	Title:	Implementation of Regulation (EU) 2017/460
Main objective:	Infrastructure, policies and measures related to market-based price formation, market integration aimed at increasing the tradeable capacity, Consumer protection and improvement of competition, regional integration		
Quantified objective:	Transposition of Regulation		
Description:	As an Energy Community Contracting Party, Serbia was obliged to implement the Regulation by 28 February 2020. The policy refers to the implementation of the regulation. Transposition and Implementation are still pending. it is necessary to continue work on the process of implementing grid codes implementation		
Implementation Timeframe	In the course of 2022		
Type of measure	Reform		
Sectors covered/affected	Gas		
Implementing Entity	▪ AERS ▪ Transport system operators ▪ Ministry of Mining and Energy ▪ Government		
Monitoring Entity	▪ AERS		
Progress indicators	Transposition of regulation, development and adoption of new tariff methodology, approval of tariffs based on new methodology		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Regulation (EU) 2017/460		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law ▪ Action Plan for the Implementation of Activities aimed at Reorganizing PE Srbijagas		
Implementation cost	0.2 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_IEM25	Title:	Implementation of Regulation (EU) 2014/312
Main objective:	Infrastructure, policies and measures related to market-based price formation, market integration aimed at increasing the tradeable capacity, Consumer protection and improvement of competition, regional integration		
Quantified objective:	Transposition of Regulation		
Description:	As an Energy Community Contracting Party, Serbia was obliged to implement the Regulation by 12 December 2020. Implementation is still pending. The policy refers to the implementation of the regulation. Transposition and Implementation are still pending. It is necessary to continue work on the process of implementing grid codes implementation		
Implementation Timeframe	2023		

Type of measure	Reform
Sectors covered/affected	Gas
Implementing Entity	▪ AERS ▪ Transport system operators ▪ Ministry of Mining and Energy ▪ Government
Monitoring Entity	▪ AERS
Progress indicators	Transposition of regulation. Operation of a balancing platform (if interim measures are to be applied)
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Regulation (EU) 2014/312
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law ▪ Action Plan for the Implementation of Activities aimed at Reorganizing PE Srbijagas
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_IEM26	Title:	Reform of the Wholesale market to foster competition
Main objective:	Policies and measures related to market-based price formation, Consumer protection and improvement of competition		
Quantified objective:	Reduction in the spread between TTF and the import price of natural gas to Serbia		
Description:	A virtual trading point exists in theory but is not operational. AERS reports that the greatest share of natural gas, i.e. 1,691 million m3 (81%) of total quantities was sold to customers by PE Srbijagas in 2019. The second greatest share was sold by DC Novi Sad Gas and Yugorosgaz JSC. Liquidity in the market shall need to be created to foster competition. Under this task, measures to enhance competition shall be explored and implemented. Implications from the implementation of **PM_IEM25** on balancing and its impact on competition development shall be considered		
Implementation Timeframe	2021-2030		
Type of measure	Reform		
Sectors covered/affected	Gas		
Implementing Entity	▪ Energy entities ▪ AERS ▪ Ministry of Mining and Energy ▪ Government		
Monitoring Entity	▪ AERS		
Progress indicators	Number and diversity of supply sources, concentration in supply (HHI), residual supply index		
Other relevant Energy Union dimension(s) affected			

Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_IEM27	Title:	Further development of Retail market opening
Main objective:	Consumer protection and improvement of competition		
Quantified objective:	Consumer switching rates are improved		
Description:	The vast majority of the market is supplied at non-regulated prices. All customers are eligible, yet the retail market is dominated by Srbijagas as noted under item M27. Customer protection measures are implemented.		
Implementation Timeframe	2021-2030		
Type of measure	Reform		
Sectors covered/affected	Gas		
Implementing Entity	▪ Energy entities ▪ AERS ▪ Ministry of Mining and Energy ▪ Government		
Monitoring Entity	▪ AERS		
Progress indicators	Customer witching rates		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law		
Implementation cost	0.2 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_IEM28	Title:	Development of the Grid Code of Transportgas Serbia. Development of a grid code for Yugorosgaz Transport
Main objective:	Consumer protection and improvement of competition, Enable EE at the supply side (i.e. through the reduction of losses		
Quantified objective:			
Description:	The Code of Transportgas Serbia needs to be developed and the code of Yugorosgaz Transport needs to be updates to align with all provisions of		

	Regulation (EU) 715/2009 and also transpose Regulations (EU) 459/2017 and 312/2014.
Implementation Timeframe	2021-2022
Type of measure	Reform
Sectors covered/affected	Gas
Implementing Entity	▪ Transportgas ▪ Jugorosgaz Transport
Monitoring Entity	▪ AERS
Progress indicators	Adoption of a Code for Transportgas Serbia and an updated code for Yugorosgaz Transport
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Regulation 2009/715 ▪ Regulation (EU) 2017/459 ▪ Regulation (EU) 2014/312
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law ▪ Grid Code of Srbijagas
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_IEM29	Title:	Intensify gasification efforts in Serbia
Main objective:	Infrastructure at distribution level		
Quantified objective:	Gasification at the south west part of Serbia, decrease of the use of other fuels in the southern part of the republic of Serbia		
Description:	Three IPs are foreseen along the Gastrans pipeline to provide gas to the south-east areas of Serbia which currently have no access to gas infrastructure. The purpose of this measure shall be to develop a gasification plan for these regions		
Implementation Timeframe	2022-2025		
Type of measure	Reform		
Sectors covered/affected	Gas		
Implementing Entity	▪ Transportgas ▪ PC Srbijagas ▪ Jugorozgas		
Monitoring Entity	▪ Ministry of Mining and Energy ▪ Ministry of Infrastructure/Local Self-Government ▪ AERS		
Progress indicators	Building and distribution licenses in new areas		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ The measure is generally aligned with all decarbonisation actions with natural gas being a transitional fuel		

Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law ▪
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_IEM30	Title:	Development of regulatory framework for biomethane
Main objective:	Consumer protection and improvement of competition, reduction of carbon footprint		
Quantified objective:	Production of biomethane and other gases of reduced carbon content		
Description:	In preparation to address the challenges of energy transition, legal and regulatory options to promote the injection of biomethane and other gases of reduced carbon content shall be considered. Such options may indicatively include support schemes, simplification of connection rules and costs, priority at injection, simpler balancing rules		
Implementation Timeframe	2021-2030		
Type of measure	Reform		
Sectors covered/affected	Gas		
Implementing Entity	▪ Ministry of Mining and Energy		
Monitoring Entity	▪ Ministry of Mining and Energy		
Progress indicators	Production of biomethane and other gases of reduced carbon content as a percentage of overall gas imports and national production		
Other relevant Energy Union dimension(s) affected	▪ Decarbonisation		
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/73/EC		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Energy Law		
Implementation cost	0.2 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_IEM31	Title:	Market coupling to the Single Day Ahead Market (SDAC)
Main objective:	Increased system flexibility and quality of electricity supply, in particular through policies and measures related to market-based price formation in compliance with applicable law; market integration and coupling, aiming to increase the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment and real-time price signals,		

Quantified objective:	Implementation of Energy Community Acquis Communautaire, increased market use of the interconnectors, price convergence with the neighbouring bidding zone, increased market-based integration of RES in the electricity mix
Description:	PM_IEM32 aims to further integrate the Serbian Day Ahead Market with the European Single Day-Ahead Coupling (SADC). SDAC is to create a single pan European cross zonal day-ahead electricity market. An integrated day-ahead market increases the overall efficiency of trading by promoting effective competition, increasing liquidity and enabling a more efficient utilisation of generation resources across Europe. Interim Coupling project aims to connect the 4M MC (Czech-Slovak-Hungarian-Romanian market coupling) with the Multi-Regional Coupling (MRC) by introducing Net Transmission Capacity (NTC) based implicit capacity allocation on six new borders: PL-DE, PL-CZ, PL-SK, CZ-DE, CZ-AT, HU-AT. The project represents an important step towards the extension of the European Single Day-Ahead Coupling foreseen by Regulation 2015/1222 (guideline on Capacity Allocation and Congestion Management/CACM).
Implementation Timeframe	2021-2030
Type of measure	Reform
Sectors covered/affected	Electricity
Implementing Entity	▪ SEEPEX ▪ AERS ▪ Transmission system operator EMS ▪ Ministry of Mining and Energy ▪ Government
Monitoring Entity	▪ AERS
Progress indicators	Day ahead market coupling go-live date
Other relevant Energy Union dimension(s) affected	▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Directive (EU) 2019/944 ▪ Regulation (EU) 2019/943
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_IEM32	Title:	Market coupling to the Single Intra Day Market (SIDC)
Main objective:	Increased system flexibility and quality of electricity supply, in particular through policies and measures related to market-based price formation in compliance with applicable law; market integration and coupling, aiming to increase the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment and real-time price signals,		

Quantified objective:	Implementation of Energy Community Acquis Communautaire, increased market use of the interconnectors, price convergence with the neighbouring bidding zone, increased market-based integration of RES in the electricity mix
Description:	PM_IEM33 can be regarded as a continuation of PM_IEM32. The Single Intraday Coupling (SIDC) creates a single EU cross-zonal intraday electricity market and complements the market coupling activities that may have been achieved under SADC. The measure is dependent on PM_IEM16 i.e. the appointment of the Nominated Electricity Market Operator (NEMO) in Serbia.
Implementation Timeframe	2021-2030
Type of measure	Reform
Sectors covered/affected	Electricity
Implementing Entity	▪ SEEPEX ▪ AERS ▪ Transmission system operator EMS ▪ Ministry of Mining and Energy ▪ Government
Monitoring Entity	AERS
Progress indicators	Day ahead market coupling go-live date
Other relevant Energy Union dimension(s) affected	▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ Directive 2009/72/EC ▪ Directive (EU) 2019/944 ▪ Regulation (EU) 2019/943
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Energy
Implementation cost	0.2 M€
Financing source(s)	EU and other funds, public funds

3.4.4 Energy poverty

A well-balanced mixture of policies and measures will be introduced to improve the alleviation of energy poverty. The official definition adopted will be reviewed to ensure the enhanced protection of the energy poor households, while an action plan will be prepared for the targeted and coordinated confrontation of energy poverty. The planned policies and measures will be specialised, while a holistic monitoring mechanism will be developed according to the adopted national definition including the required tools and indicators.

Specific regulatory measures will be adopted in order to protect energy poor households from potential disconnections from electricity and natural gas grids aiming at the short-term alleviation of the energy poverty. Moreover, additional financial incentives will be provided to energy poor households for purchasing the energy carriers, which will be consumed in order to cover their actual energy needs.

Targeted financial instruments will be designed so as to improve energy efficiency and foster the installation of RES in the buildings of the energy poor households contributing to the long-term alleviation of energy poverty. The access of energy poor households to alternative energy sources will be facilitated also for the considerable reduction of their energy expenses.

Finally, information, awareness-raising, guidance or training programmes will be carried out facilitating the implementation of the planned policies and measures and contributing to the effective alleviation of energy

poverty. Emphasis will be given on the conduction of simplified energy audits, the deployment of smart meters and the provision of guidance and targeted energy advices to energy poor households.

Policy measure code:	PM_IEM33	Title:	Preparation and adoption of an action plan to ensure achievement for energy poverty reduction
Main objective:	Alleviation of energy poverty		
Quantified objective:	Reduction of energy poverty		
Description:	PM_IEM35will lead to the preparation and adoption of the action plan for the confrontation of energy poverty. The action plan will specialize the policies and measures, which will be introduced until 2030 with quantified objectives and the expected impacts. Moreover, a holistic monitoring mechanism will be developed according to the national definition and the developed indicators within the framework of PM_M34Emphasis will be given on the continuous assessment of the planned policy measures so as to either improve them or to initiate new more effective. Finally, the responsible authorities will be appointed including detailed specification of their responsibilities and duties.		
Implementation Timeframe	2021-2030		
Type of measure	Reform		
Sectors covered/affected	Residential		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Finance ▪ Ministry of Health ▪ Ministry of Labour ▪ National coalition for reduction of energy poverty		
Monitoring Entity			
Progress indicators	Prepared action plan		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Directive 2019/944/EU		
Relevant National Planning Document (Legal, Regulatory Acts etc)			
Implementation cost	0.2 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_IEM34	Title:	Regulatory measures for the protection of energy poor households and provision of allowances for the short-term alleviation of the energy poverty (i.e. energy card or social tariff)
Main objective:	Alleviation of energy poverty		
Quantified objective:	Reduction of energy poverty		

Description:	PM_IEM36will foresee the adoption of regulatory measures for protecting the energy poor households from potential disconnections from electricity and natural gas grids. PM_IEM36 will target to the short-term alleviation of the energy poverty. Moreover, the reduction of the monthly obligation for certain quantities of electricity or natural gas will be examined in conjunction with additional financial incentives, such as the introduction of social tariff and the provision of energy cards providing the capability to energy poor households about the energy carriers which will be consumed in order to cover their actual energy needs. It should be noted that the provisions of Article 5, paragraph 4 of the Directive 944/2019/EU will be taken in into consideration in regards to the public interventions in the price setting for the supply of electricity during the design of the social tariff scheme. Finally, the deployment of smart meters can allow the consumption of predefined quantities of energy carriers.
Implementation Timeframe	2021-2030
Type of measure	Reform
Sectors covered/affected	Residential
Implementing Entity	Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	Number of affected energy poor households
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Directive 2019/944/EU ▪ Directive 2019/692/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Degree on energy vulnerable customer
Implementation cost	Under examination
Financing source(s)	Under examination

Policy measure code:	PM_IEM35	Title:	Preparation of special programs for the application of energy efficiency measures and the promotion of RES among energy vulnerable customers for the long-term confrontation of the energy poverty
Main objective:	Alleviation of energy poverty		
Quantified objective:	Reduction of energy poverty		
Description:	PM_IEM37will provide subsides for improving the energy efficiency and fostering the installation of RES in the buildings of the energy poor households so as to combat the energy poverty on long-term basis. The energy efficiency measures includes both interventions in the building envelop and the installation of energy efficient systems (heating, cooling and domestic hot water) and equipment (i.e. lamps, electric appliances etc.). Regarding the selected types of RES, emphasis will be given in the installation of photovoltaic panels and solar thermal heaters. Finally, the measure will be designed appropriately in order to maximize the synergies with other policy measures in the field of energy efficiency and RES such as renewable and citizen energy communities.		
Implementation Timeframe	2021-2030		

Type of measure	Reform
Sectors covered/affected	Residential
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Finance ▪ Ministry of Health ▪ Ministry of Labour ▪ National coalition for reduction of energy poverty
Monitoring Entity	
Progress indicators	Number of affected energy poor households
Other relevant Energy Union dimension(s) affected	▪ Energy efficiency ▪ Decarbonization
Union policy which resulted in the implementation of the PaM	▪ Directive 2019/944/EU ▪ Directive 2012/27/EU ▪ Directive 2018/2002/EU ▪ Directive 2018/2001/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	
Implementation cost	Under examination
Financing source(s)	

Policy measure code:	PM_IEM36	Title:	Facilitate access to alternative energy sources among energy vulnerable and other customers in order to reduce energy poverty
Main objective:	Alleviation of energy poverty		
Quantified objective:	Reduction of energy poverty		
Description:	PM_IEM38will facilitate the access of energy poor households to alternative energy sources so as to reduce considerably the related energy expenses and consequently to confront the energy poverty. The existing district heating and natural gas networks can be expanded providing the opportunity to energy poor households to consume cheaper energy carriers.		
Implementation Timeframe	2021-2030		
Type of measure	Investment		
Sectors covered/affected	Residential		
Implementing Entity	TBD with the Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Number of affected energy poor households		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Directive 2019/944/EU ▪ Directive 2019/692/EU		
Relevant National Planning Document (Legal, Regulatory Acts etc)			
Implementation cost	Under examination		

Financing source(s)	

Policy measure code:	PM_IEM37	Title:	Improvement of the tools and methodology for collecting data relevant to monitoring of energy poverty
Main objective:	Alleviation of energy poverty		
Quantified objective:	Monitoring of energy poverty		
Description:	PM_IEM39will foresee the specification of the required data collection procedure in order to apply the developed monitoring procedure. Furthermore, specialized tool will be developed facilitating the monitoring of the energy poverty and the evaluation of the implemented policies and measures. Finally, progress reports will be prepared providing valuable insights to all interested stakeholders in regards to the progress towards the alleviation of the energy poverty.		
Implementation Timeframe	2021-2030		
Type of measure	Investment		
Sectors covered/affected	Residential		
Implementing Entity	TBD with the Ministry of Mining and Energy		
Monitoring Entity			
Progress indicators	Developed tools and monitoring methodology		
Other relevant Energy Union dimension(s) affected			
Union policy which resulted in the implementation of the PaM	▪ Directive 2019/944/EU		
Relevant National Planning Document (Legal, Regulatory Acts etc)			
Implementation cost	1.5 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_IEM38	Title:	Awareness and information measures for the alleviation of energy poverty
Main objective:	Alleviation of energy poverty		
Quantified objective:	Reduction of energy poverty		
Description:	PM_IEM40will foster the conduction of information, awareness-raising, guidance or training programmes in order to facilitate the implementation of the planned policies and measures and to contribute to the effective alleviation of energy poverty. The designed measures will not focus only on energy poor households allowing the participation of all the interested stakeholders. The conduction of simplified energy audits will constitute as the main instrument for dissemination resulting to specialized energy advices, while the most effective low-cost interventions can be financed by a targeted financial instrument. The deployment of smart meters will facilitate the provision of guidance and targeted energy advices to energy poor households. Finally, emphasis will be given on the training of the energy professionals about several issues such as the identification of the		

	energy poor households, the avoidance of phenomena such as stigmatization, gender equality etc.
Implementation Timeframe	2021-2030
Type of measure	Reform
Sectors covered/affected	Residential
Implementing Entity	TBD with the Ministry of Mining and Energy
Monitoring Entity	
Progress indicators	Number of affected energy poor households
Other relevant Energy Union dimension(s) affected	
Union policy which resulted in the implementation of the PaM	▪ Directive 2019/944/EU
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ National Coalition for Energy Poverty Reduction
Implementation cost	0.7 M€
Financing source(s)	EU and other funds, public funds

Except the measures presented in the previous tables, the following measures related to the other dimensions also affect the internal energy market dimension and contribute to the achievement of the internal energy market targets:

- Dimension decarbonisation: PM_D20, PM_D23, PM_D37 and PM_D38
- Dimension energy security: PM_ES1 – PM_ES3, PM_ES3.1and PM_ES6
- Dimension research, innovation and competitiveness: PM_RIC1 – PM_RIC20

3.5 Dimension Research, Innovation and Competitiveness

It must be noted that, based on the forecasts for the GDP of the years 2020, 2025 and 2030 referred to in the 4thChapter of the NECP, after relevant calculations for the Gross Domestic Expenditure for Research and Technological Development (GDERTD) in the field "Energy - Environment" for the years 2020 , 2025 and 2030, and the assumption that GDERTD in the "Energy - Environment" sector in 2030 will remain stable at 2020 levels, i.e. will be of the order of 0.53% of GDP (source: Statistical Office of the Republic of Serbia), a total amount of 111.4 million Euros will be allocated for R&I activities / measures in the period 2022-2030.

i. Policies and measures including those to achieve the objectives set out in 2.5

Policies and measures to promote research and innovation

The current policy of the Republic of Serbia in the area of research and innovation aims to create incentives and support the adoption of new technologies with a view to achieving overall energy cost savings, introducing new energy efficiency standards and enabling the transition to lower and more sustainable energy consumption in the country.

The Republic of Serbia considers research and innovation as an opportunity to enhance the competitiveness of its national economy, transforming it into a driver for economic growth and job creation. The proposed

policy on research and innovation in the field of energy aims to promote, among others, the deployment of highly efficient energy technologies, the deployment of smart grids and energy storage technologies as well as the research into the possibilities to deploy rechargeable batteries, hydrogen and fuel cell technologies.

Regarding research and innovation, an indicative number of proposed policy measures is provided below in order to:

- increase the number of innovative start-ups, spin-offs/spin-outs, etc. in high-tech and intensive sectors in line with the Strategy for Smart Specialisation
- increase the effectiveness of research by placing an emphasis on results and providing incentives (such as international cooperation and mobility, cooperation with businesses, etc.) with a view to attract high-skilled research teams
- develop skills at the level of universities and research institutions that boost the commercial viability and market importance of their research projects and ability to participate in research consortiums
- support the cooperation between research institutes and businesses in the technology transfer and exploitation of research results

In the coming years, the Republic of Serbia is expected to focus on the implementation of new energy saving technologies with a significant contribution to lowering carbon emissions in the air, combating the greenhouse effect and preventing buildings from overheating. The aim is to significantly reduce energy costs ensuring a relatively rapid return on investment with a view to improving the living and working environment for Serbian citizens.

One of the key priorities of research and innovation for the coming period in the field of energy networks are the challenges of digitalisation and smart grids. In addition, innovative actions relating to electric vehicles and to the strategies for their recharging will be supported and emphasis will be placed on the fact that the electricity consumed should come from RES and hydrogen produced by various forms of energy.

Regarding energy storage, measures should be taken in order to strengthen the development of new or improved electricity or thermal energy storage technologies with higher efficiency, availability, durability and security, and at the lowest cost. Innovative applications will also contribute to mitigating the environmental impact of businesses and the impact of climate change on the urban environment, as well as promoting the circular economy, with an emphasis on the recycling of materials and the recovery and reuse of energy, and the innovative CO_2 capture and/or reuse techniques.

Tables for PM_RIC1 – PM_RIC16

Policy measure code:	PM_RIC1	Title:	Enhancement of the legal framework to encourage Research and Innovation
Main objective:	Regulatory amendment, promotion of research and innovation		
Quantified objective:	Increase the level of technological readiness in the field of energy (Qualitative objective)		
Description:	PM_RIC1 will improve legal framework in order to further promote Research and Innovation by ensuring that the new legislation is designed in a way that creates the best possible conditions for research and innovation to flourish.		
Implementation Timeframe	2023-2030		
Type of measure	Reform		

Sectors covered/affected	All NECP subject fields
Implementing Entity	▪ Ministry of Education, Science and Technological Development ▪ Ministry of Mining and Energy
Monitoring Entity	▪ Ministry of Education, Science and Technological Development
Progress indicators	New laws and amendments of existing
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market
Union policy which resulted in the implementation of the PaM	▪ EU acquis Communautaire ▪ European Strategic Energy Technology Plan (SET Plan)
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research ▪ Strategy of Scientific and Technological Development of the Republic of Serbia for the period from 2021 to 2025 "The power of knowledge" ▪ Smart Specialization Strategy of the Republic of Serbia (4S) for the period 2020-2027 ▪ Industrial Policy Strategy from 2021 to 2030
Implementation cost	0.1 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_RIC2	Title:	Establishment of a Joint State Aid Action on Research and Innovation in the field of Energy
Main objective:	Regulatory amendment, promotion of research and innovation		
Quantified objective:	Increase the level of technological readiness in the field of energy (Qualitative objective)		
Description:	PM_RIC2 will promote the establishment of a Joint State Aid Action on Research and Innovation that aims at connecting R&I with entrepreneurship and strengthening the competitiveness, productivity and openness of enterprises towards international markets, with a view to transitioning to quality innovative entrepreneurship and increasing domestic added value. The more specific interventions of the Action include: (a) R&D by SMEs, which support broad-based industrial research, innovation promotion and business networking, (b) Business partnerships with research organisations where collaboration on R&I projects between businesses and research institutions is promoted and (c) Exploiting research results produced from previous research projects.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Finance ▪ Ministry of Education, Science and Technological Development		
Monitoring Entity	▪ Ministry of Education, Science and Technological Development		
Progress indicators	New regulations and/or Normative Acts, establishment of the Joint State Aid Action, operation over the years		
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market		

Union policy which resulted in the implementation of the PaM	▪ EU acquis Communautaire ▪ European Strategic Energy Technology Plan (SET Plan)
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research
Implementation cost	2.7 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_RIC3	Title:	Establishment of a Multiannual Investment Plan for the strengthening of R&I infrastructures
Main objective:	Regulatory amendment, promotion of research and innovation		
Quantified objective:	Increase the level of technological readiness in the field of energy (Qualitative objective)		
Description:	PM_RIC3 will promote the creation of a Multiannual Investment Plan to support R&I infrastructures, which aims at strengthening the strategic infrastructure in the field of energy R&I.		
Implementation Timeframe	2023-2030		
Type of measure	Reform		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Finance ▪ Ministry of Education, Science and Technological Development		
Monitoring Entity	Ministry of Education, Science and Technological Development		
Progress indicators	New regulations and/or Normative Acts		
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market		
Union policy which resulted in the implementation of the PaM	▪ EU acquis Communautaire ▪ European Strategic Energy Technology Plan (SET Plan)		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research		
Implementation cost	0.1 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_RIC4	Title:	Integration of Serbia into the European Research Area and enhanced participation in EU's funded Energy R&I Programs
Main objective:	Promotion of Research and Innovation		
Quantified objective:	Increase the level of technological readiness in the field of energy (Qualitative objective)		
Description:	PM_RIC4 will ensure Serbia's better position in the area of European R&I (e.g. in European Energy Research Alliance). For instance, in order to prepare for the country's participation in the Horizon Europe Framework Research and Innovation Programme, a number of working groups have to set up, involving the authorities and research operators, among others. The aim of these working groups is to improve the participation of Serbia		

	in the European framework research programmes so that it will be better integrated within the European dynamic and can improve its expertise and competitiveness, create synergies and gain access to wider markets.
Implementation Timeframe	2023-2030
Type of measure	Reform
Sectors covered/affected	All NECP subject fields
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Finance ▪ Ministry of Education, Science and Technological Development ▪ Chamber of Commerce and Industry of Serbia ▪ Center for Promotion of Science
Monitoring Entity	▪ Ministry of Education, Science and Technological Development
Progress indicators	Number of applications, projects, companies, consortia in Horizon Europe Program, involving teams from the Republic of Serbia on an annual basis
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market
Union policy which resulted in the implementation of the PaM	▪ European Strategic Energy Technology Plan (SET Plan)
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research
Implementation cost	0.1 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_RIC5	Title:	Development of Innovation Hubs / Clusters, Start-ups, Spin-offs/Spin-outs
Main objective:	Promotion of Research and Innovation		
Quantified objective:	Increase the level of technological readiness in the field of energy (Qualitative objective)		
Description:	PM_RIC5 will promote the establishment and development of knowledge-intensive start-ups from universities, technological educational institutes, research centres, enterprises and independent researchers, Spin-offs/Spin-outs, Innovation Hubs as well as Clusters for trading/commercialising mature research results and innovative ideas.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Education, Science and Technological Development ▪ Chamber of Commerce and Industry of Serbia ▪ Center for Promotion of Science		
Monitoring Entity	▪ Ministry of Education, Science and Technological Development		
Progress indicators	Number of Innovation Hubs / Clusters, Start-ups, Spin-offs/Spin-outs on an annual basis		

Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market
Union policy which resulted in the implementation of the PaM	▪ European Strategic Energy Technology Plan (SET Plan)
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research
Implementation cost	5.4 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_RIC6	Title:	Development of specialised Competence Centres
Main objective:	Promotion of Research and Innovation		
Quantified objective:	Increase the level of technological readiness in the field of energy (Qualitative objective)		
Description:	PM_RIC6 will promote the establishment of specialised Competence Centres with the aim to improve the analytical tools that can be applied to any policy area, including energy and environment, bringing together in one place extensive expertise in this field. They will offer training courses in the use of the tools for policy-making as well as advice on the choice of tools. The Competence Centres offer future clients, project planners and other interested parties comprehensive information about techniques, products, support and trends in the sector of R&I interest.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Education, Science and Technological Development ▪ Chamber of Commerce and Industry of Serbia		
Monitoring Entity	▪ Ministry of Education, Science and Technological Development		
Progress indicators	Number of specialised Competence Centres on an annual basis		
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market		
Union policy which resulted in the implementation of the PaM	▪ European Strategic Energy Technology Plan (SET Plan)		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research		
Implementation cost	3.6 M€		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_RIC7	Title:	Facilitation of the establishment of regional centres of research excellence
Main objective:	Promotion of Research and Innovation		

Quantified objective:	Increase the level of technological readiness in the field of energy (Qualitative objective)
Description:	PM_RIC7 will facilitate the establishment of research excellence centres. These centres are designed to encourage outstanding research by providing large-scale, long-term funding to designated research units. They provide funds for research and related measures, such as the improvement or extension of physical infrastructure, the recruitment of outstanding researchers from abroad, and researcher training.
Implementation Timeframe	2023-2030
Type of measure	Investment
Sectors covered/affected	All NECP subject fields
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Education, Science and Technological Development ▪ Chamber of Commerce and Industry of Serbia ▪ Center for Promotion of Science
Monitoring Entity	▪ Ministry of Education, Science and Technological Development
Progress indicators	Number of regional centres of research excellence on an annual basis
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market
Union policy which resulted in the implementation of the PaM	▪ European Strategic Energy Technology Plan (SET Plan)
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research
Implementation cost	3.4 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_RIC8	Title:	Establishment and networking of Technology Transfer Offices of research organisations / institutes and Science Technology Parks
Main objective:	Promotion of Research and Innovation		
Quantified objective:	Increase the level of technological readiness in the field of energy (Qualitative objective)		
Description:	PM_RIC8 will encourage the (further) establishment of Technological Transfer Offices and Science Technology Parks that will provide infrastructural and professional services to the subjects of the innovation activity, in terms of networking, as well as development, designing and fast utilization of new technologies. This could provide an opportunity to boost the competitiveness of the low-carbon technologies via technology transfer centres, which could enable networking and knowledge sharing between science, academia, and the business sector.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Education, Science and Technological Development ▪ Chamber of Commerce and Industry of Serbia		
Monitoring Entity	▪ Ministry of Education, Science and Technological Development		

Progress indicators	Number of new joint projects among Technology Transfer Offices of research organisations / institutes and Science Technology Parks on an annual basis
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market
Union policy which resulted in the implementation of the PaM	▪ European Strategic Energy Technology Plan (SET Plan)
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Science and Research
Implementation cost	15.3 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_RIC9	Title:	Support the cooperation between research institutes and businesses in the technology transfer and exploitation of research results
Main objective:	Promotion of Research and Innovation		
Quantified objective:	Increase the level of technological readiness in the field of energy (Qualitative objective)		
Description:	PM_RIC9 will encourage the cooperation between research institutes and the industry in order to maximize the use of the research results. This requires specialist staff to identify and manage knowledge resources with business potential, i.e. how best to take a new idea to market, ensure appropriate resources (funding, support services, etc.) to make it happen, and to obtain adequate buy-in by all stakeholders.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Education, Science and Technological Development ▪ Chamber of Commerce and Industry of Serbia		
Monitoring Entity	▪ Ministry of Education, Science and Technological Development		
Progress indicators	The increase of annual revenue achieved through: the licensing of patents, technology transfer, agreements on the use or development of technology, advisory services, etc.		
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market		
Union policy which resulted in the implementation of the PaM	▪ European Strategic Energy Technology Plan (SET Plan)		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on Science and Research		
Implementation cost	3.2 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_RIC10	Title:	Development of innovative energy-saving technologies
Main objective:	Promotion of Research and Innovation		
Quantified objective:	Increase the level of technological readiness per technology (Qualitative objective)		
Description:	PM_RIC10 will strengthen R&D activities in the field of buildings related to new materials, prefabricated active elements for facades & roofs, cost-effective, intelligent, flexible heat pumps and heat pumps for high temperatures and digital programming and optimization of buildings. In the industrial sector, energy efficient heating and cooling technologies, heating and cooling recovery and systems integration will be supported.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Energy efficiency, buildings, industry		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Education, Science and Technological Development ▪ Ministry of Finance		
Monitoring Entity	▪ Ministry of Education, Science and Technological Development ▪ Ministry of Mining and Energy		
Progress indicators	Number of research projects development on innovative energy-saving technologies on an annual basis		
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market ▪ Energy Security		
Union policy which resulted in the implementation of the PaM	▪ European Strategic Energy Technology Plan (SET Plan) ▪ Research and Innovation Strategies for Smart Specialisation (RIS 3)		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research		
Implementation cost	7.2 M€		
Financing source(s)	EU and other funds, public funds and own funds		

Policy measure code:	PM_RIC11	Title:	Development of innovative decarbonisation technologies, with emphasis on RES for electricity, heating/cooling production, hydrogen production, detection of emissions, carbon capture, storage and utilisation (CSUS) technologies
Main objective:	Promotion of research and innovation, Development of low carbon technologies		
Quantified objective:	Increase the level of technological readiness per technology (Qualitative objective)		
Description:	PM_RIC11 will strengthen R&D in solar energy for both centralized solar thermal systems and heating-cooling applications. For wind energy, actions related to the electrical equipment of wind farms, operation and maintenance of wind farms, small wind turbines and other issues, such as methodologies and tools for integrated recording and assessment of the environmental footprint of wind farms, end-of-life management system of wind farms, etc., will be promoted. R&D activities for solar PV concern the integration of PV systems in buildings and other infrastructure, the development of high-efficiency solar cells and systems for monitoring and		

	operation of solar PV installations. R&D actions for bioenergy concern the development of high-efficiency cogeneration of heat and power using biomass, as well as the development, demonstration and scaling up of solid, liquid and gaseous bioenergy/biochemical/chemical conversion from sustainable biomass. Actions related to geothermal heating in urban areas, materials, methods and equipment to improve its operation, improvement of the permeability of conventional geothermal reservoirs, improvement of conversion efficiency and direct use of heat, the development of new techniques for better identification of geothermal potential, the integration of geothermal heat and electricity in the system and the development of a zero-emission geothermal power plant, will be strengthened. R&D actions on low-carbon hydrogen that creates little to no greenhouse gas emissions will also be promoted. Furthermore, targeted R&D actions will be promoted in order to evaluate and implement carbon capture, utilisation and storage (CCUS) and Direct Air Capture (DAC) technologies, as well as ultra-supercritical technologies in thermal power plants that enhance their efficiency, while specific CO_2 emissions are significantly reduced. Finally, new specific technologies for emission detection and others focusing on natural gas facilities will also be examined.
Implementation Timeframe	2023-2030
Type of measure	Investment
Sectors covered/affected	RES, power generation by TPP, industrial processes (cement, chemical, iron and steel, pulp and paper, refineries, traffic, etc.),
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Education, Science and Technological Development ▪ Ministry of Finance
Monitoring Entity	▪ Ministry of Education, Science and Technological Development ▪ Ministry of Mining and Energy
Progress indicators	Number of research projects development on innovative decarbonisation technologies on an annual basis
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market ▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ European Strategic Energy Technology Plan (SET Plan) ▪ Research and Innovation Strategies for Smart Specialisation (RIS 3)
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research ▪ Law on Mining and Geological Research
Implementation cost	25.2 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_RIC12	Title:	Research on the digitization of energy networks and the development of smart grids
Main objective:	Promotion of Research and Innovation		
Quantified objective:	Increase the level of technological readiness per technology (Qualitative objective)		
Description:	PM_RIC12 will strengthen targeted research initiatives that aim at the digitization of energy networks and the development of smart grids and more specifically, (a) at the creation of an innovation environment for the		

	development of smart services, (b) at the development of an optimized electricity grid through the implementation of solutions in order to increase the visibility and controllability of the energy system for the better management of load profile through demand response in order to increase the flexibility of all types of production and to reduce the cost of all energy storage solutions by minimizing the total cost of the system and (c) the development of integrated local and regional energy systems through the integration of RES at regional and local level, including different energy operators and creating an innovation environment for smart services in collaboration with providers of ICT platform solutions.
Implementation Timeframe	2023-2030
Type of measure	Investment
Sectors covered/affected	Consumer-focused smart energy system
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Education, Science and Technological Development ▪ Ministry of Finance ▪ DSO EDS ▪ TSO EMS
Monitoring Entity	▪ Ministry of Education, Science and Technological Development ▪ Ministry of Mining and Energy
Progress indicators	Number of research projects development on digitization technologies on an annual basis
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market ▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ European Strategic Energy Technology Plan (SET Plan) ▪ Research and Innovation Strategies for Smart Specialisation (RIS 3)
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research
Implementation cost	9 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_RIC13	Title:	Development of innovative technologies in transport and applications for micro-mobility
Main objective:	Promotion of research and innovation, Development of low carbon technologies		
Quantified objective:	Increase the level of technological readiness per technology (Qualitative objective)		
Description:	PM_RIC13 will support innovative actions concerning electric vehicles as well as their charging strategies, while emphasis will be placed on the electricity consumed coming from RES. as well as for hydrogen produced from RES. Corresponding actions for the development of innovative technologies will be supported in the case of biofuels as renewable fuels for sustainable transport (fuels for road and air transport), namely: (1) development of advanced liquid and gaseous biofuels through biochemical or from autochthonous microorganisms and primary energy from RES, (2) demonstration of advanced liquid and gaseous biofuels through biochemical/thermochemical/chemical conversion from sustainable biomass and/or from autochthonous microorganisms and primary energy from RES, (3) development of other liquid and gaseous fuels (excluding		

	hydrogen) through thermochemical / chemical / biochemical / electrochemical conversion of energy neutral carriers with RES, (4) demonstration of other liquid and gaseous fuels (excluding hydrogen) through thermochemical / chemical/ biochemical / electrochemical conversion of energy neutral carriers with RES, (5) Production of renewable hydrogen from electrolysis of water and electricity from RES. Actions for the design of efficient LNG storage facilities for ship refuelling will also be supported.
Implementation Timeframe	2023-2030
Type of measure	Investment
Sectors covered/affected	Sustainable transport
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Construction, Transport and Infrastructure ▪ Ministry of Education, Science and Technological Development ▪ Ministry of Finance
Monitoring Entity	▪ Ministry of Education, Science and Technological Development ▪ Ministry of Mining and Energy
Progress indicators	Number of research projects development on transport technologies and applications for micro-mobility on an annual basis
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market ▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ European Strategic Energy Technology Plan (SET Plan) ▪ Research and Innovation Strategies for Smart Specialisation (RIS 3)
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research
Implementation cost	10.9 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_RIC14	Title:	Development of innovative energy storage applications
Main objective:	Promotion of research and innovation, Development of low carbon technologies		
Quantified objective:	Increase the level of technological readiness per technology (Qualitative objective)		
Description:	PM_RIC14 will aim at developing new or improving existing storage technologies with higher efficiency, availability, durability, safety and at the lowest possible cost. Electrochemical energy storage technologies will be supported, which will mainly concern RES applications for utilization in non-interconnected electricity grid or in remote parts of the electricity network.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	Sustainable transport, smart energy system, CCUS		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Education, Science and Technological Development ▪ Ministry of Finance		
Monitoring Entity	▪ Ministry of Education, Science and Technological Development ▪ Ministry of Mining and Energy		

Progress indicators	Number of research projects development on energy storage applications on an annual basis
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market ▪ Energy Security
Union policy which resulted in the implementation of the PaM	▪ European Strategic Energy Technology Plan (SET Plan) ▪ Research and Innovation Strategies for Smart Specialisation (RIS 3)
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research
Implementation cost	9 M€
Financing source(s)	EU and other funds, public funds and own funds

Policy measure code:	PM_RIC15	Title:	Promote the inter-sectoral and geographical mobility of researchers
Main objective:	Promotion of Research and Innovation		
Quantified objective:	Increase the level of technological readiness in the field of energy (Qualitative objective)		
Description:	PM_RIC15 will facilitate the knowledge and experience transfer among researchers from industry and academia, as well as the incoming and outgoing mobility needed to build internal capacities. For instance, at highest educational level, industrial doctorates can be promoted as a tool to support industry driven science.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Education, Science and Technological Development ▪ Chamber of Commerce and Industry of Serbia ▪ Center for Promotion of Science		
Monitoring Entity	▪ Ministry of Education, Science and Technological Development		
Progress indicators	Number of industrial doctorates on an annual basis		
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market		
Union policy which resulted in the implementation of the PaM	▪ European legislation		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research		
Implementation cost	1.6 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_RIC16	Title:	Enhancing education / training to support the energy transition
Main objective:	Promotion of Research and Innovation		

Quantified objective:	Increase the level of technological readiness in the field of energy (Qualitative objective)
Description:	PM_RIC16 will reinforce the promotion of the transition to a climate-neutral and circular economy by focusing on the necessary skills and quality jobs that create higher added value, significantly reduce adverse environmental impacts, provide adequate conditions for adequate pay and a quality working environment.
Implementation Timeframe	2023-2030
Type of measure	Investment
Sectors covered/affected	All NECP subject fields
Implementing Entity	▪ Ministry of Mining and Energy ▪ Ministry of Education, Science and Technological Development ▪ Chamber of Commerce and Industry of Serbia ▪ Center for Promotion of Science
Monitoring Entity	▪ Ministry of Education, Science and Technological Development ▪ Ministry of Mining and Energy
Progress indicators	Number of curricula for energy transition on an annual basis
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market
Union policy which resulted in the implementation of the PaM	▪ European legislation
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research
Implementation cost	2.2 M€
Financing source(s)	EU and other funds, public funds

Policies and measures to promote competitiveness

Promoting entrepreneurship is a priority by directly contributing to the competitiveness component. In this context, it is planned:

(a) to establish and operate special funds to promote research and innovation in SMEs, to co-operate with research centres and to ensure the conditions for successful investment, and

(b) to exploit patent rights, licensing, etc.

In addition, support should be provided to the creation of innovative clusters of companies and research entities to promote entrepreneurship and to the establishment of start-ups for the commercial exploitation of mature research results and innovative ideas, as well as for the development of entrepreneurship support structures, such as incubators, technology parks, co-working spaces, etc.

Enhancing competitiveness calls for improving the existing regulatory framework for the implementation of investments in industrial plants and in SMEs in order to create a stable and transparent framework of rules, procedures and administrative structures, with a view to completing smoothly large public and private projects. Moreover, in order to ensure additional private capital, the effectiveness of the existing private investment aid schemes will be assessed in order to continue implementing the most efficient among them and/or to attempt to implement new ones.

The role of special target funds will also be important for facilitating the provision of concessional financing to businesses (especially SMEs) and for undertaking part of the business risk, which is not undertaken by financing institutions, while providing the necessary guarantees.

The contribution of circular economy in order to improve competitiveness is considered as of high importance and it is, therefore, necessary to promote concrete actions focusing on the development of innovative technologies to achieve the objectives of the National Roadmap for Circular Economy.

Tables for PM_RIC17 – PM_RIC20

Policy measure code:	PM_RIC17	Title:	Promotion of entrepreneurship through research and innovation actions which are embedded in market functions
Main objective:	Improvement of competitiveness		
Quantified objective:	Increase the level of competitiveness in the field of energy (Qualitative objective)		
Description:	PM_RIC17 will aim at the establishment and operation of special funds in order to promote research and innovation in SMEs, to ensure the conditions for the creation of successful investments, the exploitation of patents, the assignment of rights, etc. It will also support the creation of innovative co-operative clusters of companies and research institutions in order to promote entrepreneurship. Finally, the establishment of knowledge-intensive start-ups for commercial use and commercialization of mature research results and innovative ideas will be strengthened, as well as the development of entrepreneurship support structures, such as incubators, technology parks, areas of cooperation, etc.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Ministry of Finance ▪ Commission for Protection of Competition ▪ Development Agency of Serbia ▪ Chamber of Commerce and Industry of Serbia ▪ Center for Promotion of Science		
Monitoring Entity	▪ Commission for Protection of Competition		
Progress indicators	Number of actions in the field of clean energy on an annual basis		
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market		
Union policy which resulted in the implementation of the PaM	▪ European legislation		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research ▪ Industrial Policy Strategy (2021-2030)		
Implementation cost	1.8 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_RIC18	Title:	Optimising support framework and schemes for promoting investments with a view to strengthening competitiveness
Main objective:	Improvement of competitiveness		
Quantified objective:	Increase the level of competitiveness in the field of energy (Qualitative objective)		
Description:	PM_RIC18 will improve the existing regulatory framework for investments in industrial units and SMEs in order to create a stable and transparent investment framework of rules, procedures and administrative structures with a view to the smooth completion of major public and private projects. In addition, in order to increase the leverage of private capital, the effectiveness of existing private investment support schemes will be assessed in order to continue the implementation of the most profitable and/or attempt the implementation of new ones.		
Implementation Timeframe	2023-2030		
Type of measure	Reform		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Commission for Protection of Competition ▪ Ministry of Finance		
Monitoring Entity	▪ Commission for Protection of Competition		
Progress indicators	New support schemes and amendments of existing		
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market		
Union policy which resulted in the implementation of the PaM	▪ European legislation		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research ▪ Industrial Policy Strategy (2021-2030)		
Implementation cost	0.1 M€		
Financing source(s)	EU and other funds, public funds		

Policy measure code:	PM_RIC19	Title:	Strengthening competitiveness through the establishment and operation of Special Target Funds
Main objective:	Improvement of competitiveness		
Quantified objective:	Increase the level of competitiveness in the field of energy (Qualitative objective)		
Description:	PM_RIC19 will strengthen the role of Special Target Funds through the establishment and operation of a new Fund for Entrepreneurship & Competitiveness, in order to facilitate the provision of favourable financing to SMEs and to take part of the business risk not borne by financial institutions, while providing the necessary guarantees.		
Implementation Timeframe	2023-2030		
Type of measure	Reform		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Commission for Protection of Competition ▪ Science Fund		

	▪ Innovation Fund
Monitoring Entity	▪ Commission for Protection of Competition
Progress indicators	New regulations and/or Normative Acts
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market
Union policy which resulted in the implementation of the PaM	▪ European legislation
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research ▪ Industrial Policy Strategy (2021-2030)
Implementation cost	0.1 M€
Financing source(s)	EU and other funds, public funds

Policy measure code:	PM_RIC20	Title:	Promoting innovative circular economy technologies to improve businesses competitiveness
Main objective:	Improvement of competitiveness		
Quantified objective:	Increase the level of competitiveness (Qualitative objective)		
Description:	PM_RIC20 will promote specific actions, which focus on the development of innovative technologies in order to achieve the objectives of the roadmap for circular economy in Serbia.		
Implementation Timeframe	2023-2030		
Type of measure	Investment		
Sectors covered/affected	All NECP subject fields		
Implementing Entity	▪ Commission for Protection of Competition ▪ Ministry of Finance ▪ Development Agency of Serbia ▪ Chamber of Commerce and Industry of Serbia ▪ Center for Promotion of Science		
Monitoring Entity	▪ Commission for Protection of Competition		
Progress indicators	Number of actions related to recycling and secondary raw materials use on an annual basis		
Other relevant Energy Union dimension(s) affected	▪ Internal Energy Market		
Union policy which resulted in the implementation of the PaM	▪ European legislation		
Relevant National Planning Document (Legal, Regulatory Acts etc)	▪ Law on the Science Fund ▪ Law on Science and Research ▪ Industrial Policy Strategy (2021-2030)		
Implementation cost	4.5 M€		
Financing source(s)	EU and other funds, public funds and own funds		

Except the measures presented in the previous tables, the following measures related to the other dimensions also affect the research, innovation and competitiveness dimension and contribute to the achievement of the research, innovation and competitiveness targets:

- Dimension energy efficiency: PM_EE38

ii. Cooperation with other Member States in this area, including information on how the SET Plan objectives and policies are being translated to a national context

In order to promote the cost-effective development of low-carbon technologies, the Republic of Serbia will rely on the SET Plan developed at EU level, which promotes cross-sector cooperation on innovation.

The Republic of Serbia has quadrupled since 2014 its performance in Horizon 2020 programme, being the most successful country from the region of the Western Balkans. Areas of particular success in Horizon 2020 include Information Communication Technologies (ICT) and agricultural research, as well as scientific cooperation in the area of energy. National efforts in supporting innovation have become highly successful and are complemented by a Smart Specialization Strategy.

Furthermore, the Republic of Serbia has developed intensive cooperation at several levels, especially in the energy sector with Joint Research Centre (JCR) of the European Commission, and it also demonstrates a high level of activity in EUREKA program.

iii. Financing measures, including EU support and the use of EU funds, in this area at national level, if applicable

The key financial instruments in energy research, innovation and competitiveness include:

- Available budget or own resources
- Operational programmes under the new programming period 2021-2027
- Specific operational funds with public and private capital
- National, European, transnational and international programmes to support research actions and the implementation of innovative and pilot applications.

SECTION B: ANALYTICAL BASIS

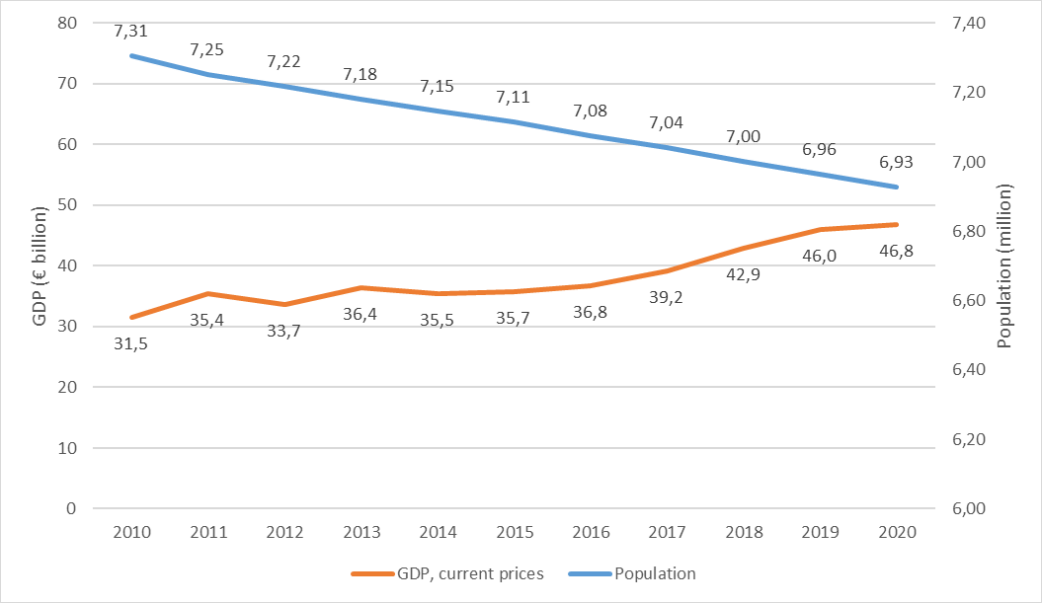
4 CURRENT SITUATION AND PROJECTIONS WITH EXISTING POLICIES AND MEASURES

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

i. Macroeconomic forecasts (GDP and population growth)

This chapter presents briefly the main input parameters and underlying assumptions, which are utilised in the formulation of the WEM scenario[81] for the energy system of the Republic of Serbia. The most crucial drivers for the energy demand are the evolution of the GDP and the population trend until 2050. As shown in the Figure 4.1, the population of the Republic of Serbia decreased steadily over 2010-2020 from 7.3 million in 2010 to 6.93 million in 2020, while the annual GDP, at current prices, increased during the aforementioned period from €31.5 billion in 2010 to €466.8 billion in 2020.

Figure 4.1: Historical data of GDP and population over 2010-2020 (Sources: Statistical Office of the Republic of Serbia, Ministry of Finance, National Bank)



The projection of population is shown in Figure 4.2 and Error! Reference source not found. based on the median scenario of the Statistical Office of the Republic of Serbia (SORS). The projection of the GDP for the short term (up to 2026) has been derived by the National Bank of Serbia, while the Shared Socioeconomic Pathways (SSP)[82]scenarios has been taken into consideration for the medium to long term projections of the GDP.

[81]The With Existing Measures (WEM) scenario does not include carbon prices, while there is a low-RES ambition (fixed capacities for projects), allowing of up to 200MW of wind and 200MW of PV additions per 5 years after 2030. It also includes low share of RES in district heating (about 3% of heat by RES in 2030) and low ambition of energy efficiency.
[82]These are long term socioeconomic projections (GDP projections) per country, performed by IIASA for the IPCC scenarios. Details can be found on the website https://iiasa.ac.at/models-tools-data/ssp

Figure 4.2: Evolution of GDP (in constant Euro 2015) and population until 2050 (Sources: Statistical Office of the Republic of Serbia, Ministry of Finance, National Bank, projections based on SSP)

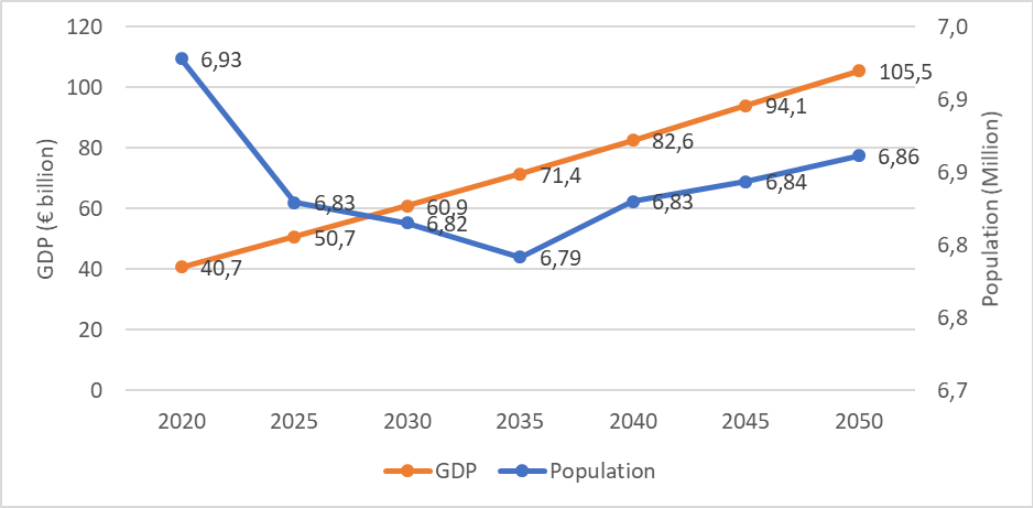
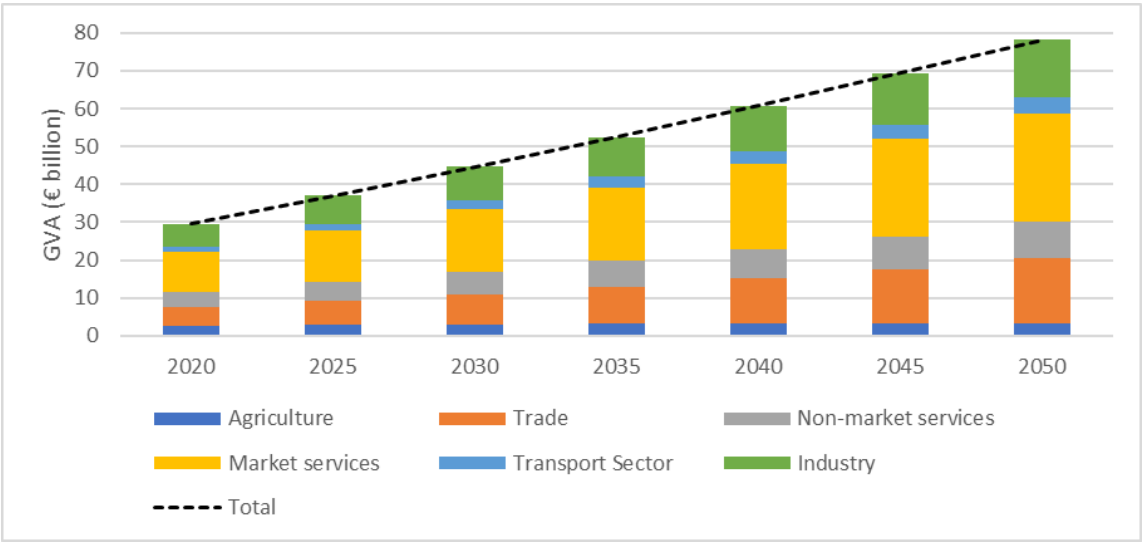


Table 4.1: Numerical evolution of GDP and population over 2020-2050 (Sources: Statistical Office of the Republic of Serbia, Ministry of Finance, National Bank, projections based on SSP)

	2020	2025	2030	2035	2040	2045	2050
Population (million)	6928,0	6829,2	6815,0	6791,7	6830,0	6843,6	6861,3
GDP (€ billion)	40676,2	50689,9	60866,5	71439,2	82595,9	94064,2	105515,0

Figure 4.3: Evolution of GVA for different sectors of economic activity until 2050 (Sources: Statistical Office of the Republic of Serbia, Ministry of Finance, National Bank, projections based on SSP)

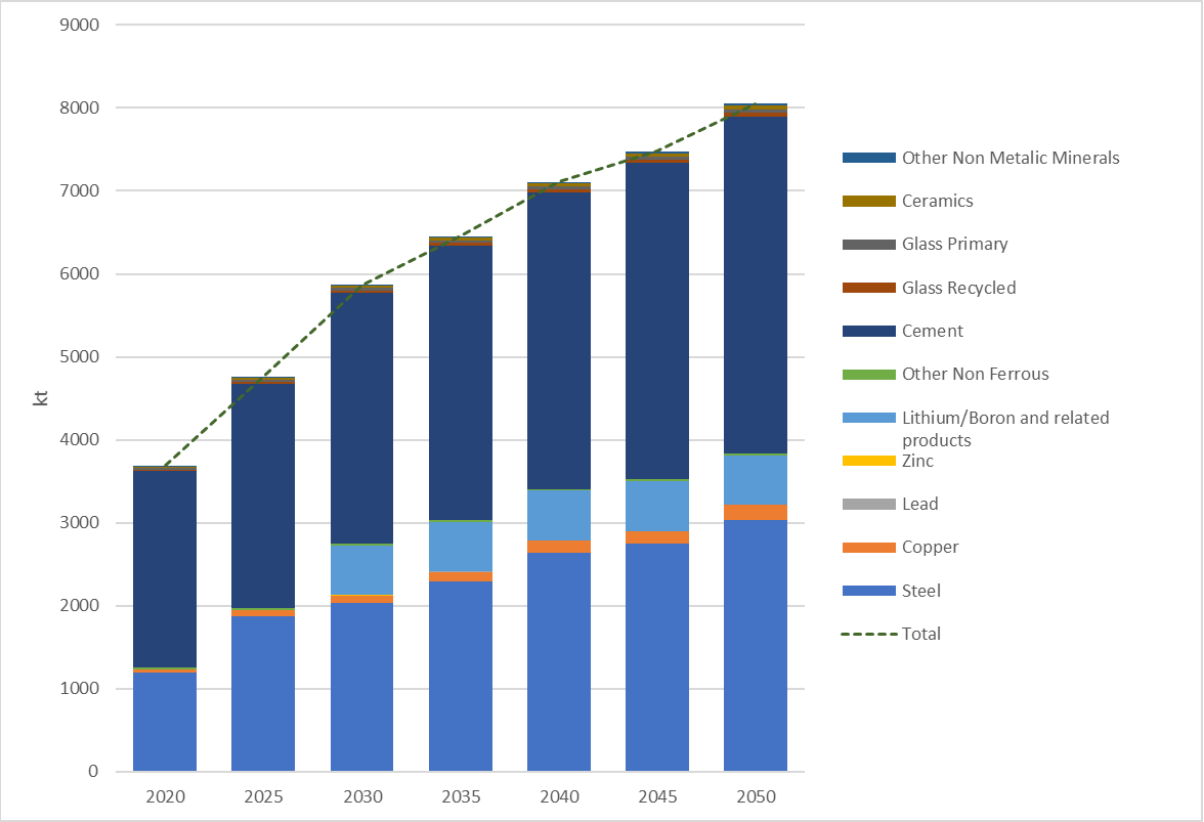


The projections of the Gross Value Added (GVA) per sector of economic activity, according to the output of the macroeconomic model for Serbia based on the MANAGE model, are displayed in the above Figure. It should be noted that there is a lack of macroeconomic analysis studies with a medium to long-term horizon in the Republic of Serbia. Furthermore, there is no relevant strategy for the medium-long term economic

development of the country, or a strategy for the development of the industrial sector. Therefore, the projections from the MANAGE model were used, together with the overall GDP projection trajectories discussed in the previous paragraph.

For the energy intensive sectors of cement, iron and steel, copper, lead, zinc, other non-ferrous metals, glass, ceramics and other non-metallic minerals, the physical outputs have been used as the driver for energy demand in each subsector, as can be seen in Figure 4.4 . The projection of physical output has been selected for the energy intensive sectors due to the fact that the physical quantity is considered as a more realistic driver for energy demand projections compared to the Value Added of the sector avoiding potential variation from other economic reasons (e.g. changes to the price of the product and not only to the actual change of the output).

Figure 4.4: Evolution of physical output of energy intensive industrial subsectors until 2050 (Sources: projections based on the SSP scenarios)



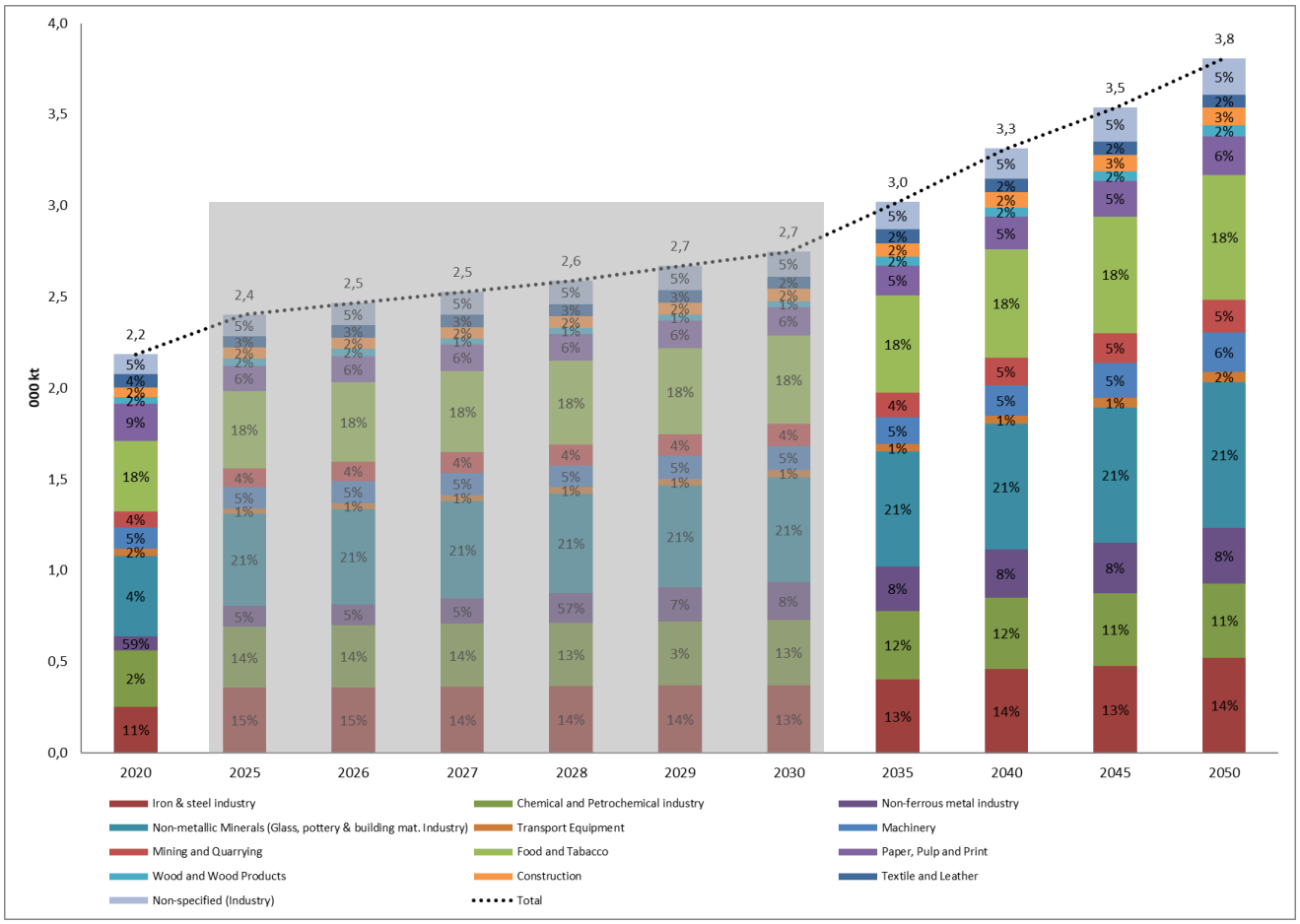


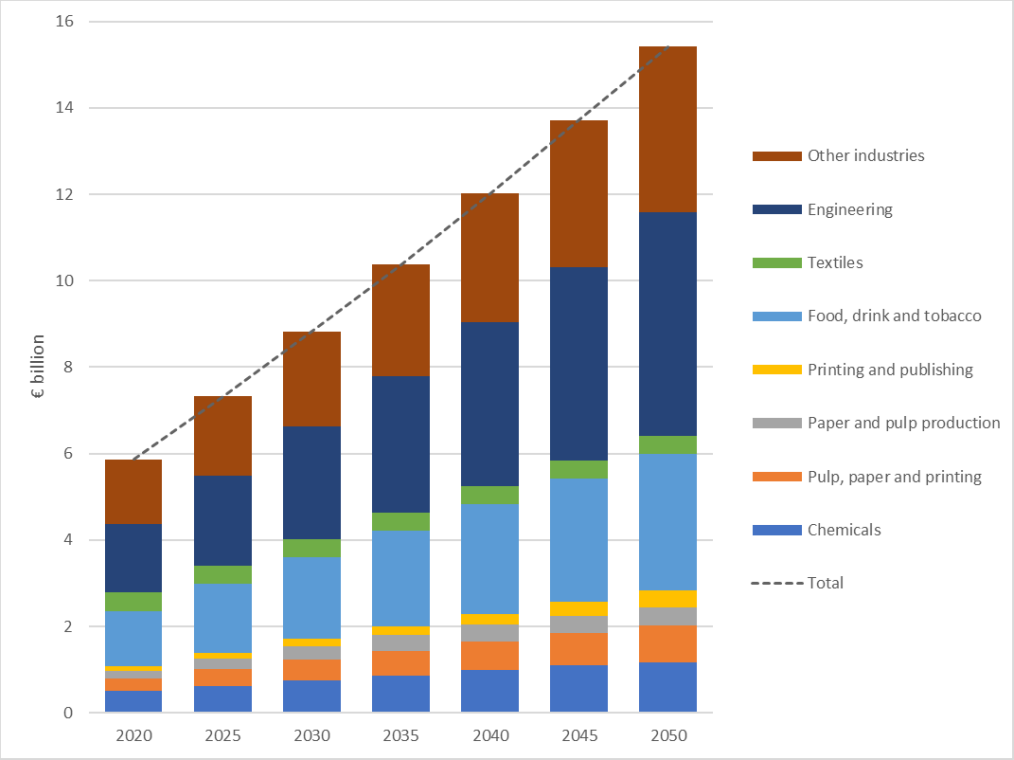
Table 4.2: Evolution of physical output of energy intensive industrial subsectors until 2050

kt	2020	2025	2030	2035	2040	2045	2050
Steel	1190	1871	2035	2290	2643	2748	3033
Copper	45	80	90	120	140	150	180
Lead	1	1	1	1	1	1	1
Zinc	1	1	1	1	1	1	1
Lithium/Boron and related products	0	0	600	600	600	600	600
Other Non Ferrous	21	22	22	23	24	25	25
Cement	2364	2695	3018	3302	3570	3809	4055
Glass Recycled	15	24	29	33	41	47	53
Glass Primary	25	33	35	36	38	37	35
Ceramics	17	21	24	28	32	36	41
Other Non Metalic Minerals	10	13	15	17	19	22	24
Total	3689	4761	5871	6451	7109	7476	8048

kt	2020		2025	2026	2027	2028	2029	2030	2035		2040	2045	2050				
Iron & steel industry	251		355					359	361		364	368	370	401	458	474	522
Chemical and Petrochemical industry	311		335					340	345		349	353	357	377	392	401	404
Non-ferrous metal industry	77		113					115	138		162	186	210	242	264	277	308
Non-metallic Minerals (Glass, pottery & building mat. Industry)	437		508					521	534		546	560	572	632	689	743	798
Transport Equipment	42	28	33					35	35			37	41	40	46	52	58
Machinery	117	117	121	123				120	123	131	147	168	191	216			
Mining and Quarrying	86	103	107	111				114	118	121	135	150	164	178			
Food and Tabacco	389	424	435	446				456	474	487	534	593	639	686			
Paper, Pulp and Print	204	139	143	147				150	152	155	164	179	193	210			
Wood and Wood Products	35		39					40	31	30 31	32	47	51	56	61		
Construction	51	59	61	63				64	66	67	75	82	89	96			
Textile and Leather	77	65	69	69				67	68	68	75	74	74	72			
Non-specified (Industry)	108		117					122	125		129	133	136	152	167	184	200
Total	2186		2402					2466	2526		2588	2669	2747	3020	3314	3537	3808

For the other industrial subsectors, the Value Added has been used as the demand driver and the corresponding projections areshown per subsector in the Figure 4.5.

Figure 4.5: Evolution of value added of other industrial subsectors until 2050 (Sources: projections based on the SSP scenarios)



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

As can been seen in the previous section the evolution of GVA per sector does not foresee any significant sectorial changes that could impact the energy system and the GHG emissions.

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

The latest developments within 2022 in the context of the war in Ukraine and the wider energy crisis in Europe make any price projection extremely uncertain. Within this uncertain situation, the NECP analysis was performed using the projections of international gas prices according to the study "Recommended parameters for reporting on GHG projections in 2023, EC DG Climate Action''which was provided by the EU in order to support Member States and other bodies in the EU (e.g. the EnC Secretariat) to revise their NECPs.

Table 4.3: International fuel prices projections to 2050**Euro2015/GJ**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Crude Oil	6.04	14.54	14.54	14.54	15.39	16.61	18.60
Natural Gas	2.93	12.46	10.67	10.67	10.67	10.67	11.14
Hard Coal	1.51	2.93	2.93	2.93	3.12	3.30	3.49

In the scenario analysis with existing measures (WEM) it is assumed that there are no carbon prices imposed in the Republic of Serbia.

iv. Technology cost developments

The projection of investment costs of RES technologies for electricity generation, which are expected to be the technologies with the largest potential for reduction of costs, are shown in the following table. Three cost levels have been included for wind installations to model a "supply curve" for the wind potential. The underlying assumption is that the first cost level corresponds to sites which have easy access for installation (close to roads and the transmission network) and the next two cost levels are further away and therefore require ten per cent higher investment costs compared to the previous cost level.

Table 4.4: Overnight investment costs projection for renewable energy technologies

Overnight Investment costs in Euro/kW	*2025*	*2030*	*2040*	*2050*
Solar PV – Plant size	575	550	500	350
Rooftop Solar PV	690	660	600	420
Wind plants Cost level 1	1150	1000	950	900
Wind Plants Cost level 2	1265	1100	1045	990
Wind Plants Cost level 3	1520	1320	1254	1188

4.2 Dimension Decarbonisation

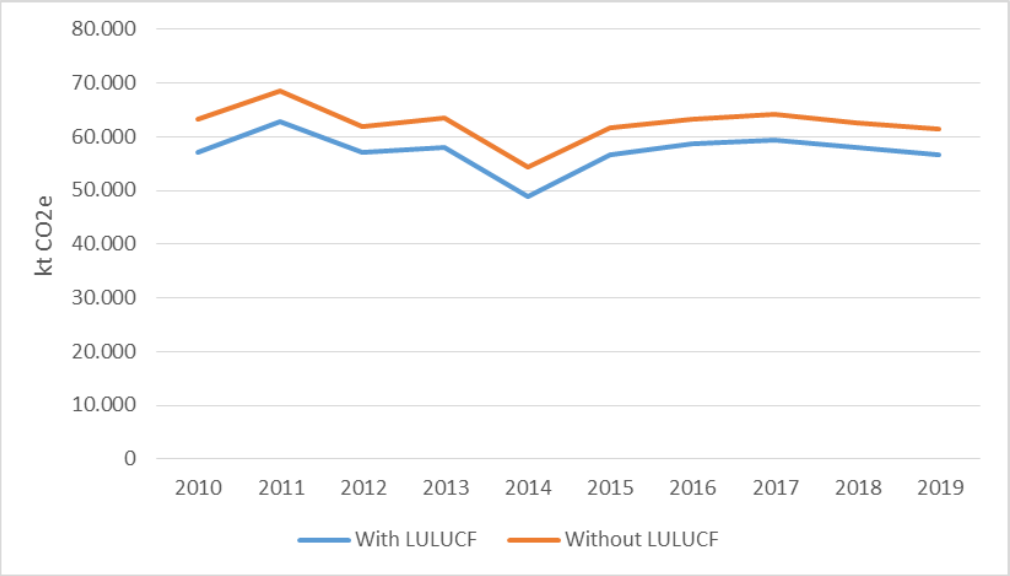
4.2.1 GHG emissions and removals

i. Trends in current GHG emissions and removals in ETS, Effort Sharing Regulation and LULUCF sectors and different energy sectors

The evolution of the total GHG emissions, with and without LULUCF, follows a similar trend in the period 2010-2019. Although several fluctuations have been recorded over this decade, the total GHG emissions stood at 56.6 Mt CO_{2e} (including LULUCF) and at 61.5 Mt CO_{2e} (without LULUCF) in 2019[83], which are similar to 2010 levels at 57.2 Mt CO_{2e} (including LULUCF) and at 63.3 Mt CO_{2e} (without LULUCF), respectively, as presented in Figure 4.6, despite the considerable increase of the GDP. The further utilization of natural gas and the promotion of energy efficiency and RES technologies in all end-use sectors managed to restrain the increase of the GHG emissions.

[83] The latest available data for GHG emissions are for 2019.

Figure 4.6: Total GHG emissions (with and without LULUCF) over 2010-2019



ii. Projections of sectorial developments with existing national and EU policies and measures at least until 2040 (including for the year 2030)

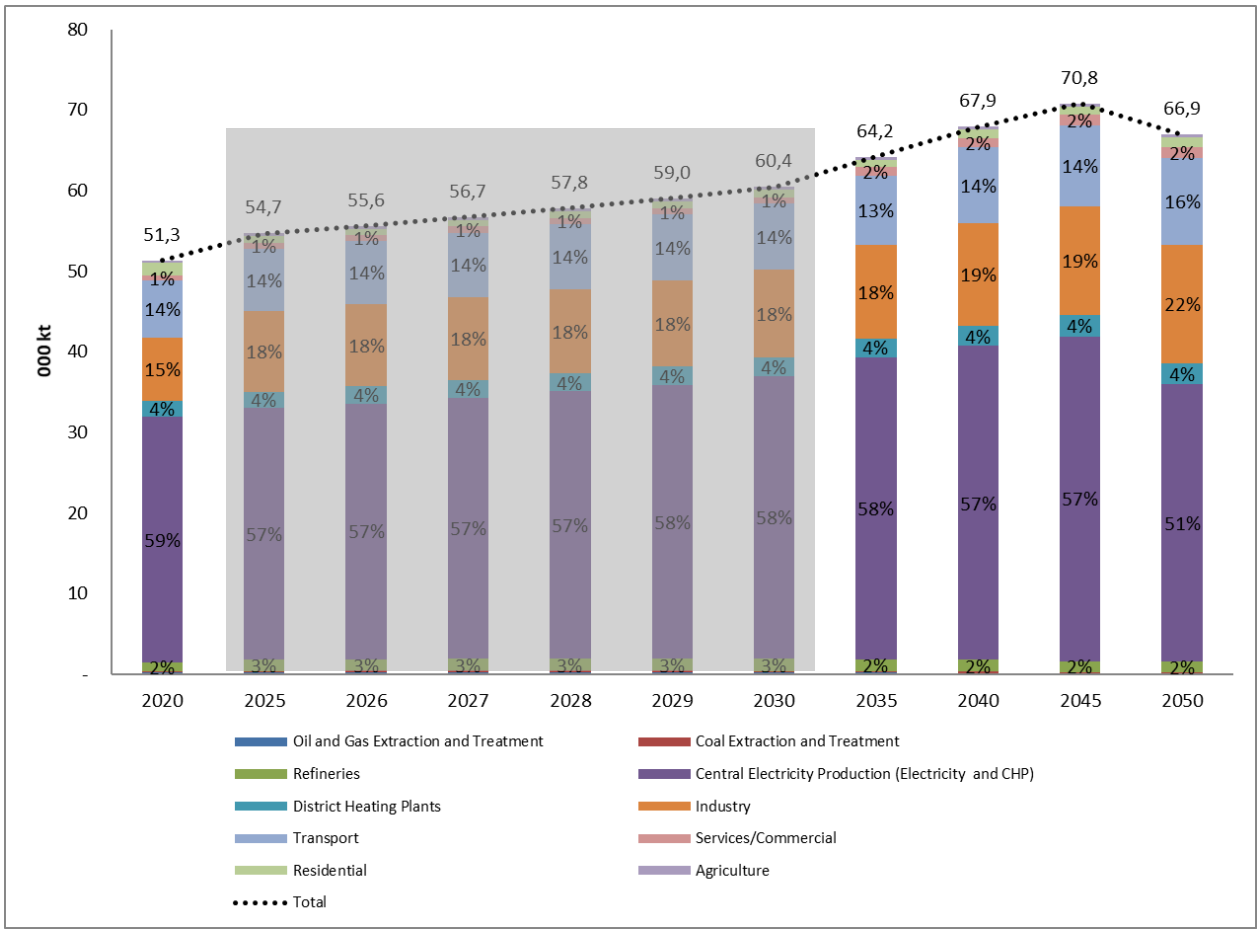
As presented in Figure 4.7, the CO_2 emissions from energy use are projected to increase by 17.7% at 60.44 Mt CO_2 in 2030, and by 32.3% at 67.9 Mt CO_2 in 2040, compared to 2020 levels. An upward trend is foreseen between 2025 and 2045 mainly due to the economic development as demonstrated by the increase of the various parameters such as GDP, sectoral GVA and GDP per capita and the continuation of the use of lignite fired power plants. The decline of CO_2 emissions from 2045 to 2050 is explained by the considerable deployment of improved and advanced technologies and energy carriers that are less or no carbon-intensive, such as renewables and natural gas as part of the overall technological replacement. Finally, the CO_2 emissions are projected to be stabilised at the level of 66.9 Mt CO_2 in 2050.

The electricity sector has the highest contribution to the CO_2 emissions, and its share is projected to increase significantly from 35.0 Mt CO_2 in 2030 to 38.9 Mt CO_2 in 2040, connected to the continuation of the use of lignite fired power plants. Nevertheless, the contribution of the electricity sector to the CO_2 emissions decrease at 34.4 Mt CO_2 by 2050 mainly due to the further deployment of RES.

The CO_2 emissions from the industry and transport sectors are projected to rise from 2020 to 2050. More specifically, the CO_2 emissions for the industry sector will be almost doubled; from 7.99 Mt CO_2 in 2020 to

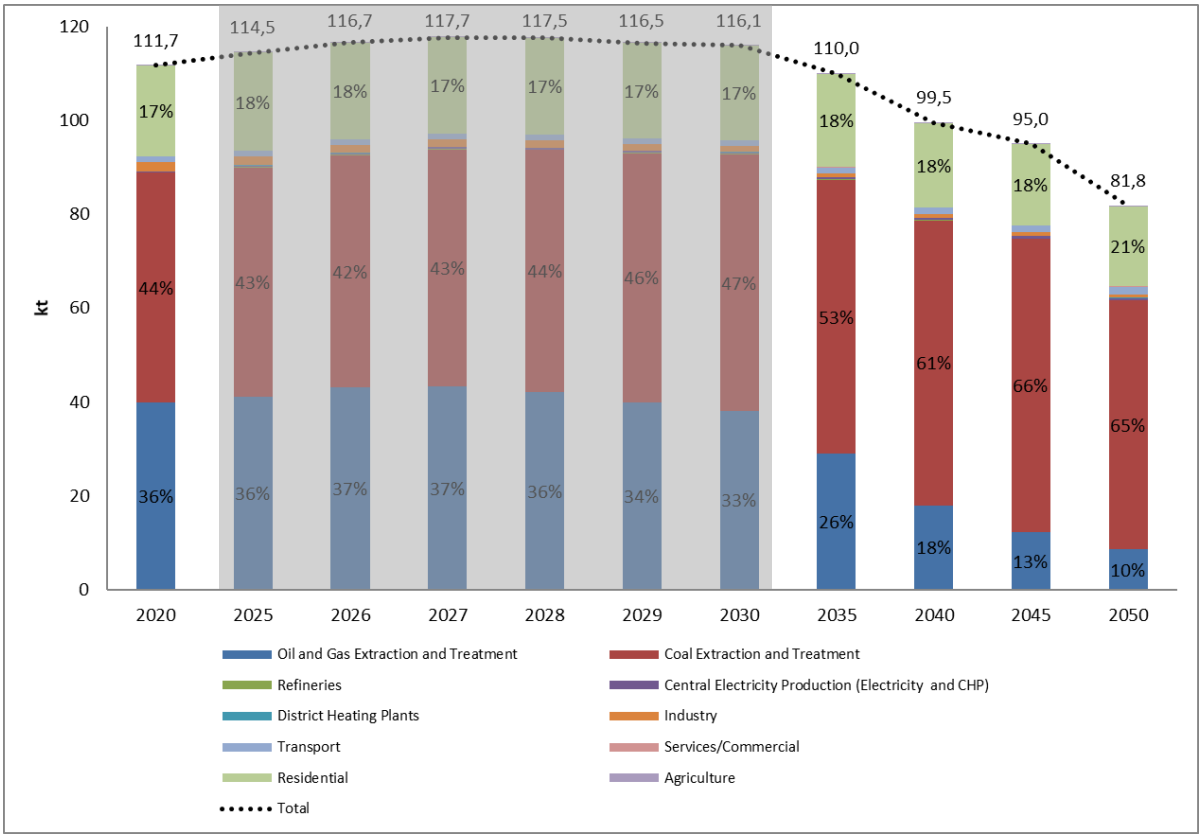
14.77 Mt CO_2 in 2050 and the same trajectory roughly stands for the transport sector; from 7.00 Mt CO_2 in 2020 to 10.77 Mt CO_2 in 2050. The CO_2 emissions of the industrial sector will increase, mainly due to the rise of the industrial sectors' output and subsequently its increased activity. Similarly, the foreseen increase of the GDP will increase considerably also the transport activity. The implementation of energy efficiency measures and the utilization of environmentally friendly fuels, at the level considered in WEM, are not capable of restraining the increase of the CO_2 emissions.

Figure 4.7: CO2 emissions by sector over 2020-2050



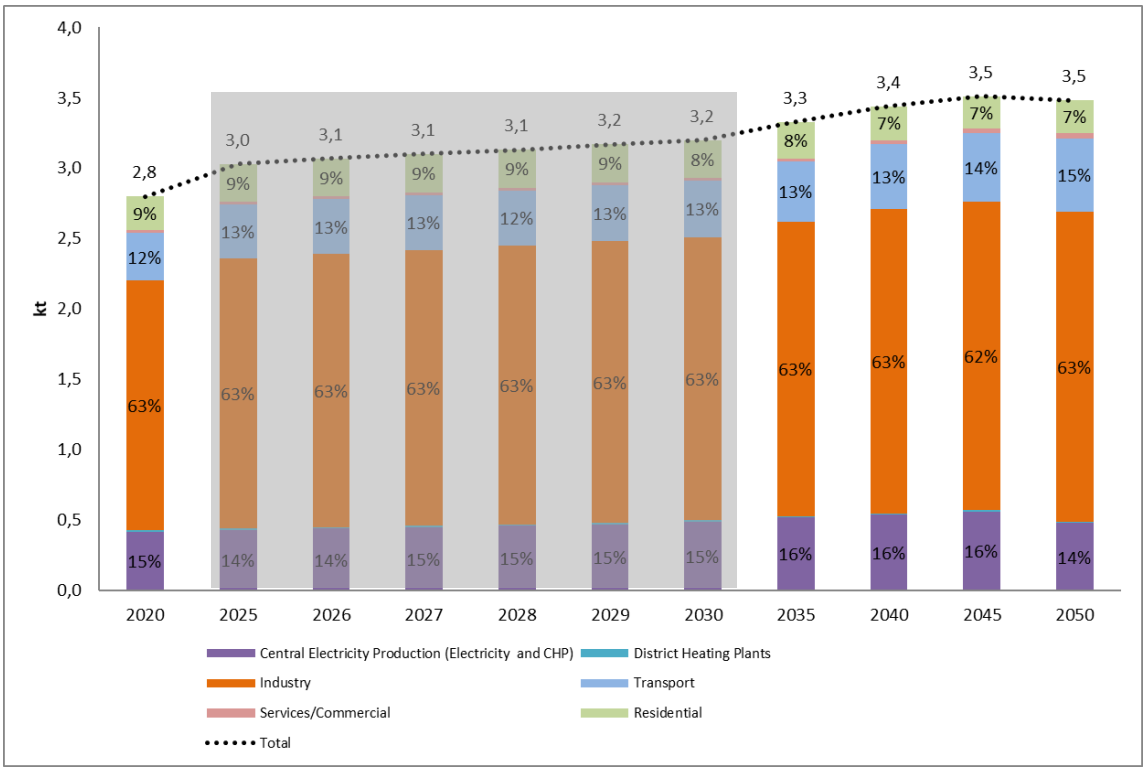
As presented in Figure 4.8, CH_4 emissions are expected to decrease considerably after 2027 due to the decarbonisation process, exhibiting an increase of 3.9% in 2030 and a reduction equal to 10.9% and 27% in 2040 and 2050 respectively, compared to 2020, resulting in 116.11 kt CH_4 in 2030 and 81.88 kt CH_4 in 2050. The coal extraction and treatment have the highest contribution to the CH_4 emissions (methane is released as a direct result of the physical process of coal extraction as layers of the coal face are removed), ranging from 48.9 kt CH_4 in 2020 to 53.088 kt CH_4 in 2050, followed by the oil and gas extraction and treatment, which presents a decrease from 39.9 kt CH_4 in 2020 to 8.55 kt CH_4 in 2050.

Figure 4.8: CH4 emissions by sector over 2020-2050



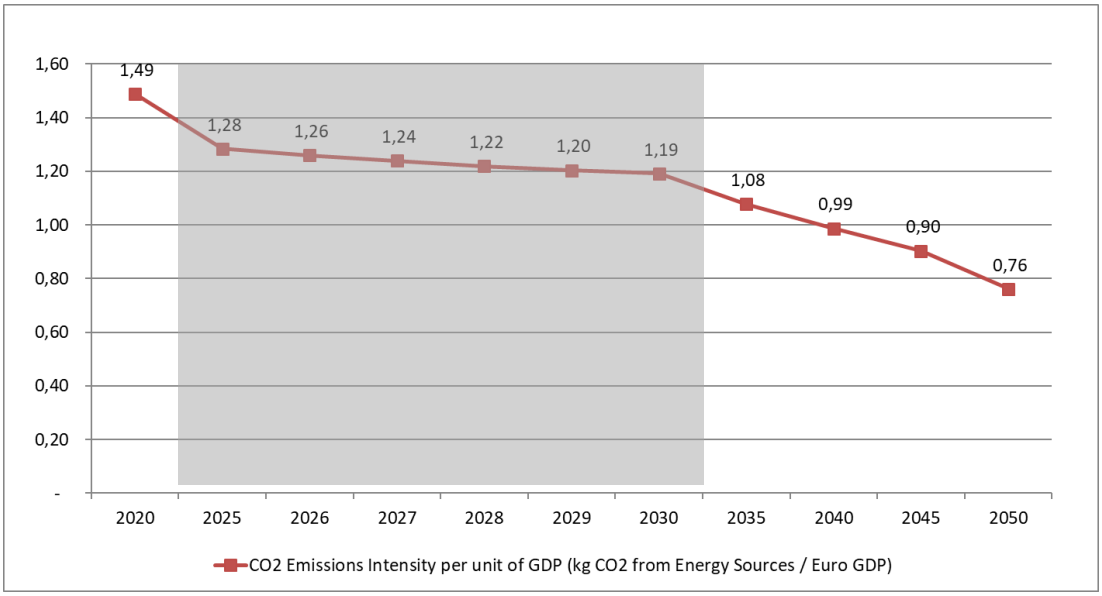
The N_2O emissions are anticipated to increase considerably in WEM, demonstrating a rise equal to 14.3%, 22.9% and 24.3% in 2030, 2040 and 2050 respectively, compared to 2020, resulting in 3.2 kt N_2O in 2030 and 3.5 kt N_2O in 2050, as shown in Figure **4.9**. The N_2O emissions of the industrial, transport and electricity production sectors appear the highest shares to the overall N_2O emissions in 2050 (63%, 15% and 14% respectively) presenting a constantly increasing trend.

Figure 4.9: N2O emissions by sector over 2020-2050



As shown in Figure 4.10, the CO_2 emissions intensity, which is the volume of CO_2 emissions per unit of GDP, is projected to decline considerably until 2050, as it is decreased by 20% in 2030, 34% in 2040 and 49% in 2050, compared to 2020. The CO_2 emissions intensity will be improved demonstrating that the energy system of the Republic of Serbia is gradually cleaner and efficient, at a relatively low pace, due to the technological progress andand the deployment of energy efficiency and RES technologies in all end-use sectors.

Figure 4.10:CO2 emissions intensity per unit of GDP (kg CO2 from energy sources / € GDP) over 2020-2050

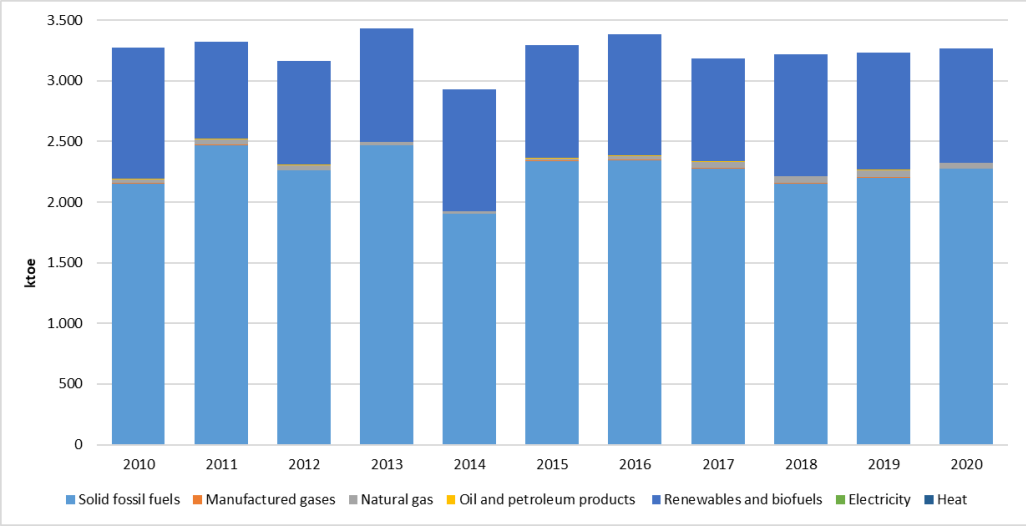


4.2.2 Renewable Energy

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

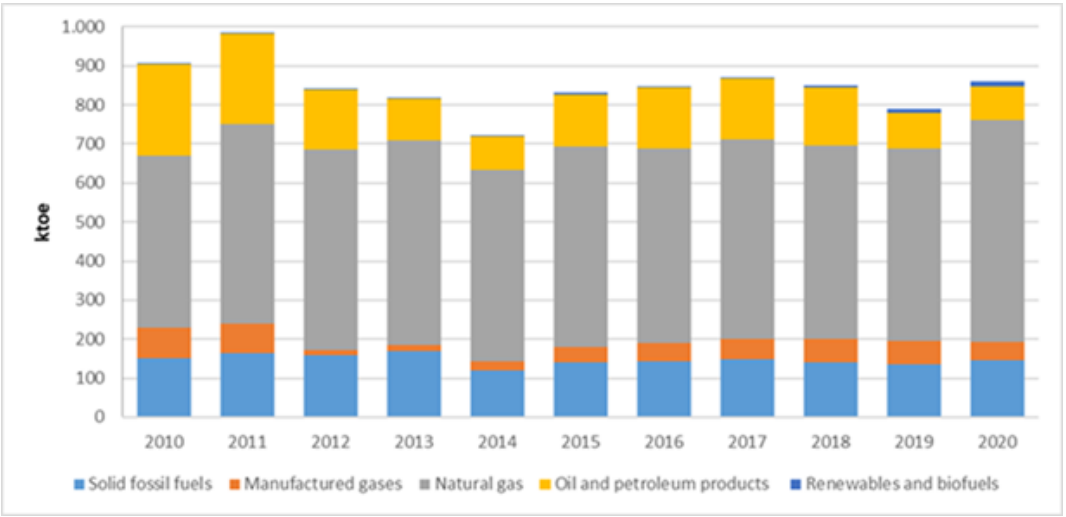
As presented in Figure 4.11, the gross electricity production remained almost stable in 2020, compared to 2010 at about 3.3 Mtoe, despite several fluctuations within the period. Solid fossil fuels and RES (mainly hydro power) are the major sources contributing substantially to the gross electricity production over the last decade, by 65.7% and 33% in 2010 and by 70% and 29% in 2020, respectively.

Figure 4.11: Gross electricity production over 2010-2020 (Source: Eurostat, 2023)



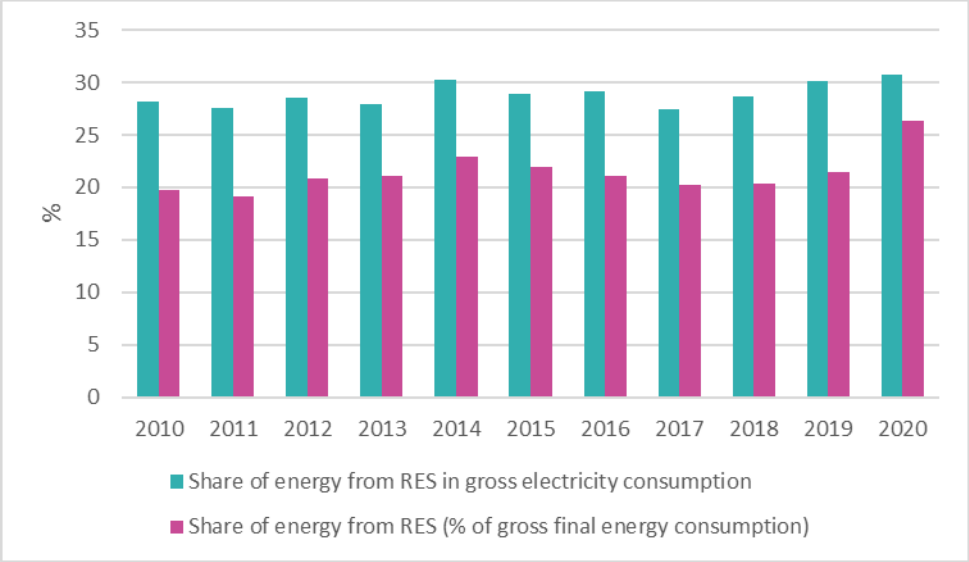
Furthermore, the gross heat production declined by 4.8% between 2010 and 2020; from 905.0 ktoe in 2010 to 861.1 ktoe in 2020, as shown in Figure 4.12. Natural gas and solid fossil fuels contributed substantially to the gross heat production over the last decade, by 48.88% and 16.88% in 2010 and by 66.09% and 17.01% in 2020, respectively.

Figure 4.12: Gross heat production over 2010-2020 (Source: Eurostat, 2023)



As illustrated in Figure 4.13, the share of RES in gross electricity consumption was increased over 2010-2020 from 28% in 2010 to 31% in 2020, while the share of energy from RES as a percentage of gross final energy consumption also increased from 19.8% in 2010 to 26.3% in 2020.

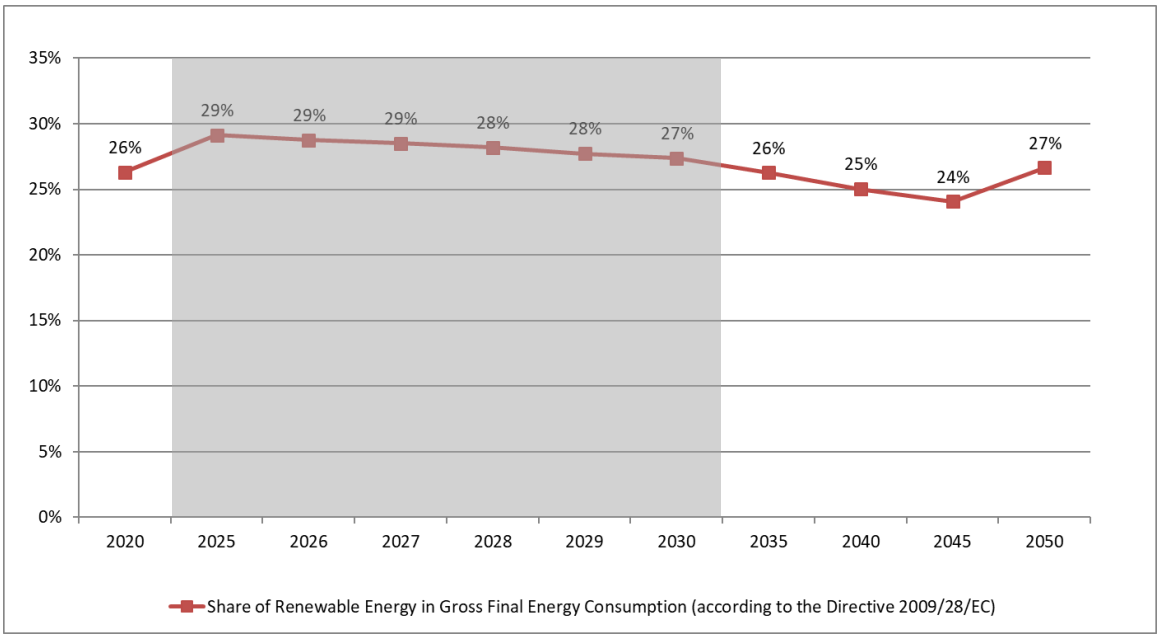
Figure 4.13: Shares of energy from RES over 2010-2020 (Source: Eurostat, 2023)



ii. Projections of development with existing policies and measures at least until 2040 (including for the year 2030)

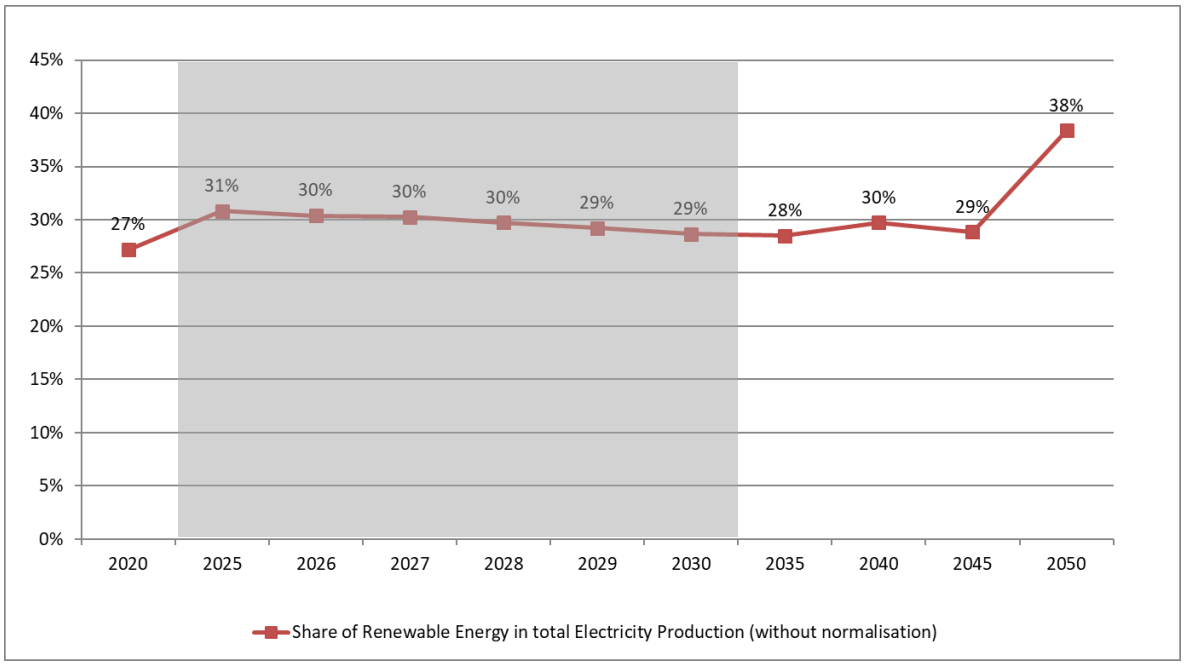
The share of RES in the gross final energy consumption (according to the Directive 2009/28/EC on the promotion of the use of energy from renewable energy sources) is expected to remain relatively constant between 2020 and 2050, ranging from 26% in 2020 to 27% in 2050, while a temporary decrease is expected between 2030 and 2045 (from 27% in 2030 to 24% in 2045), as presented in Figure 4.14.

Figure 4.14: Share of RES in gross final energy consumption over 2020-2050



As shown in Figure 4.15, the share of RES in the total electricity production is projected to increase almost from 27% in 2020 to 38% in 2050 indicating the contribution of the existing policies and measures. Nevertheless, the penetration of RES will remain relatively stable approximately at 30% on average over 2025-2045.

Figure 4.15: Share of RES in total electricity production over 2020-2050



The total installed capacity for electricity production is projected to increase from 8.2 GW in 2020 and 9.3 GW in 2030 to 10.4 GW in 2040 and 13.4 GW in 2050, as presented in Figure 4.16. The expected increase is mainly attributed to the penetration of RES technologies for electricity generation, which generally have a lower utilization or capacity factor than conventional technologies and therefore require more capacity installed than conventional power plants for the same electricity production.

It is worth noting a greater transformation of the power sector will be exhibited with considerable reduction of conventional power plants and significant increase of renewables. More specifically, the installed capacity of electricity coming from lignite fired power plants is expected to increase at a low extent from 3.6 GW in 2020 to 4.5 GW inin 2050 demonstrating the largest contribution in the overall installed capacity for electricity.

The contribution of RES technologies to the total installed capacity of the Republic of Serbia is projected to amount to 43% in 2030 and 54% in 2050 compared to 40% in 2020. The installed RES capacity is expected to increase from 3.55 GW in 202020 to 4.22 GW in 2030 and to 7.3 GW in 2050 (

Figure 4.17). A small additional investment in hydro plants is foreseen during the examined period, with their installed capacity to be increased from 2.55 GW in 2020 to 2.9 GW in 2040 remaining relatively constant until 2050 (3.3 GW). Moreover, the installed capacity of wind and solar PV stations is projected to be about 1.8 GW each in 2050 compared to the very low level of 2020.

Figure 4.16: Installed capacity per technology in the power sector over 2020-2050

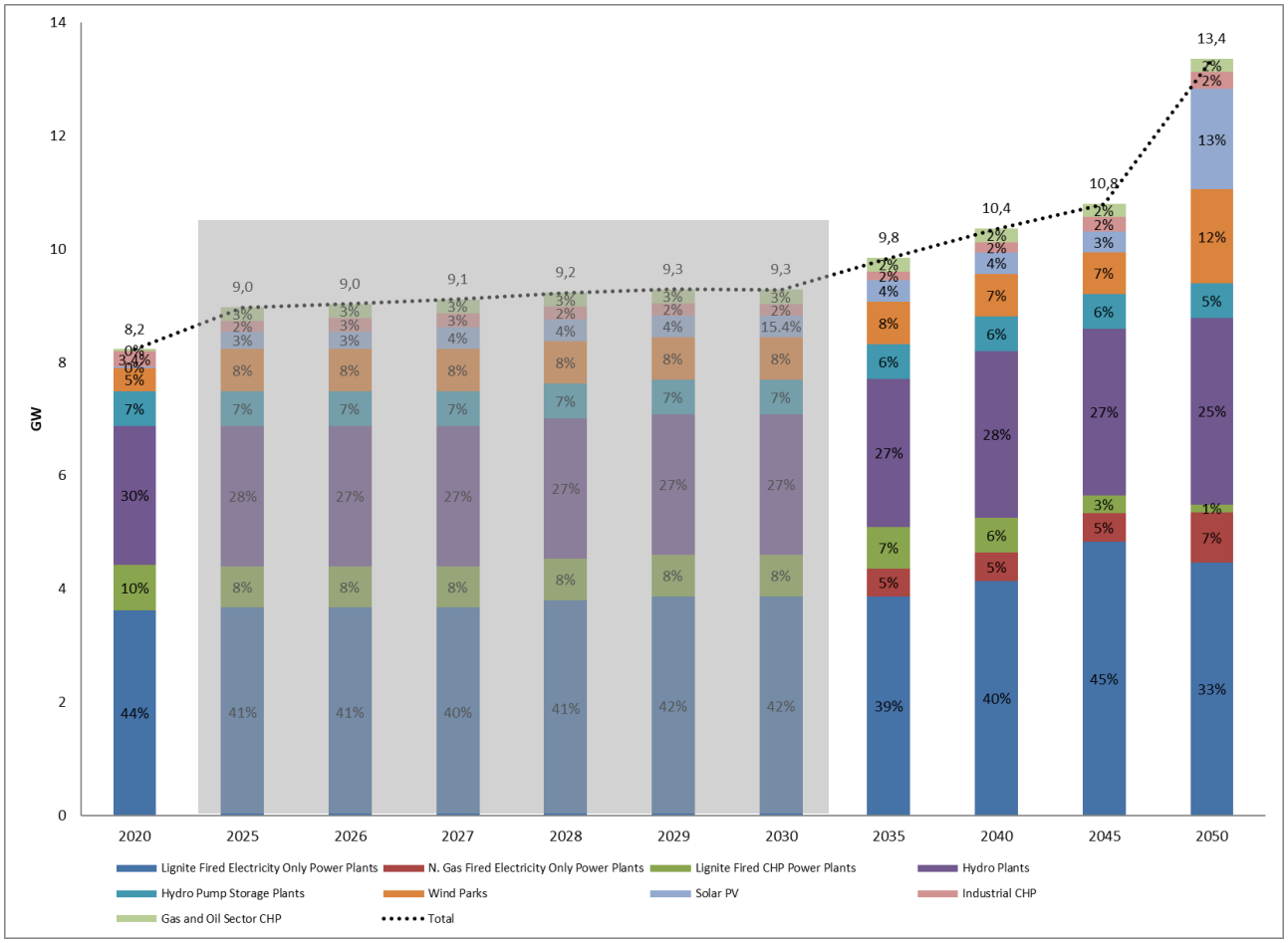
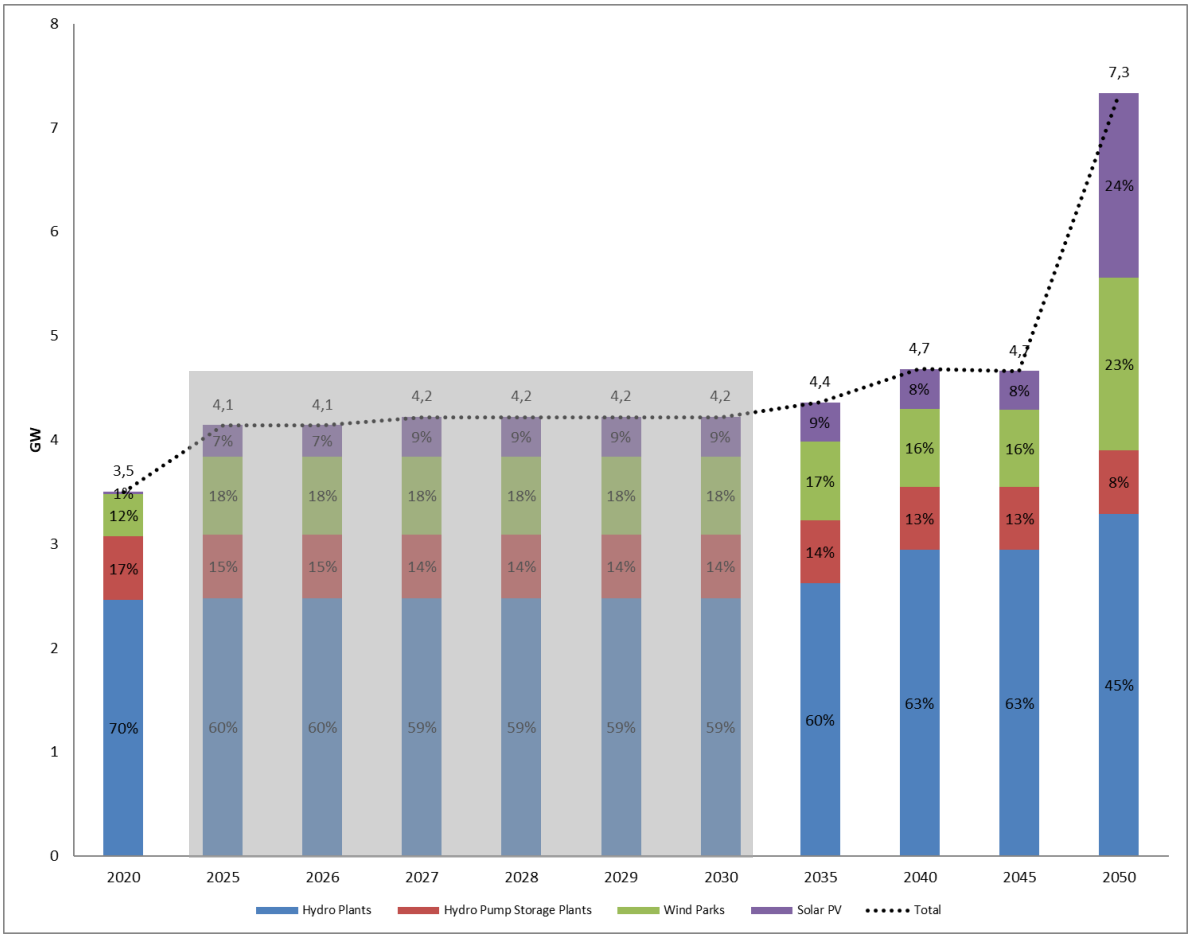


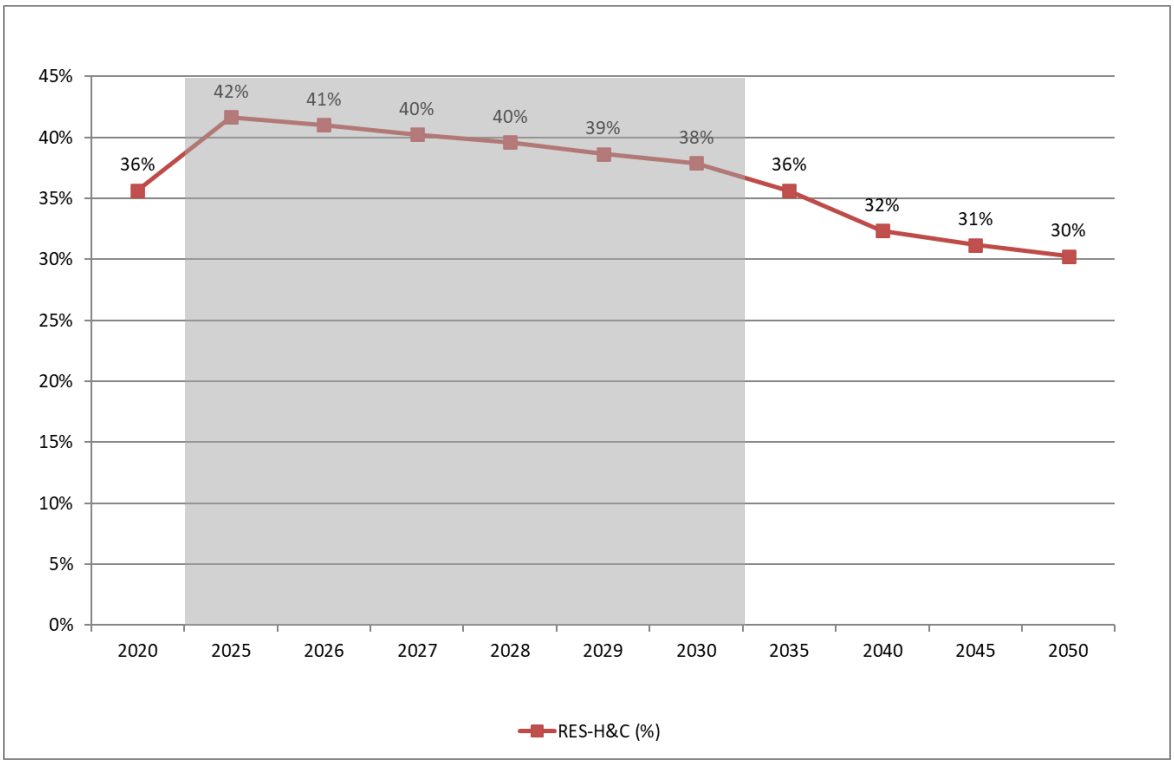
Figure 4.17: Installed RES capacity per technology over 2020-2050



In addition, the share of RES in the heating and cooling sector is projected to increase from 35.7% in 2020 to 37.9% in 2030, before reaching to 30.3% in 2050, as presented in

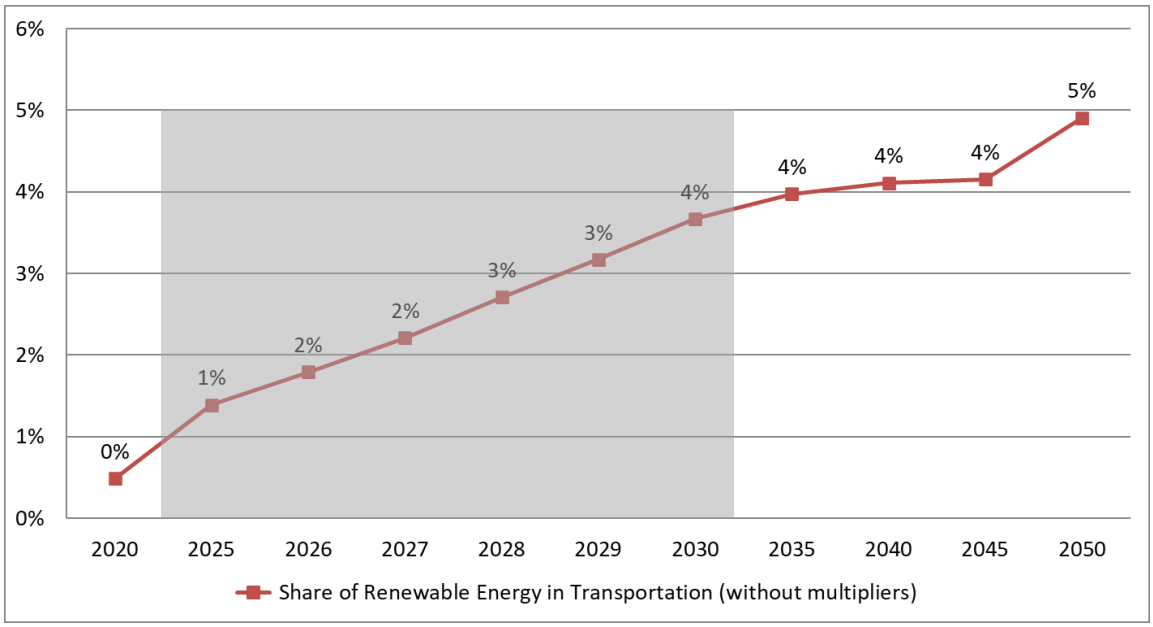
Figure 4.18, mainly due to the considerable exploitation of biomass for heating. In the WEM scenario there are no new measures foreseen after 2030 so the projected increase in the heating demand is covered by conventional fuels, leadinging to a decrease in the percentage of RES in heating.

Figure 4.18: Share of RES in Heating and Cooling over 2020-2050



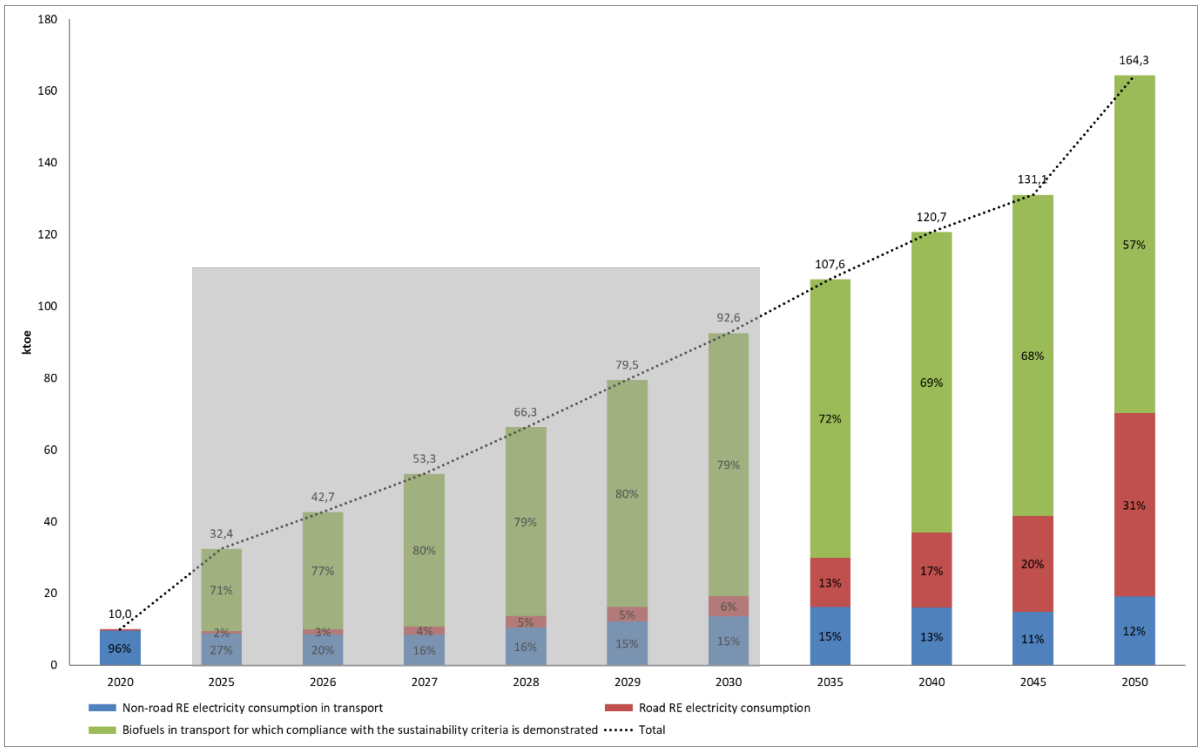
As presented in Figure 4.19, the share of RES in transportation (without multipliers) was negligible in 2020, before increasing at 3,7% in 2030, remaining stable at this level by 2045, reaching 5% in 2050. The electrification of the transport sector contributes to the increase of the share of RES in conjunction with the increase of the share of RES in electricity generation, which affects the electricity used in transport.

Figure 4.19: Share of RES in transportation (without multipliers) over 2020-2050



Moreover, the introduction of biofuels in transport sector will increase up to 2050 demonstrating a penetration equal to 73.33 ktoe in 2030 and 94.11 ktoe in 2050, compared to zero levels in 2020, as illustrated in Figure 4.20. The non-road RES electricity consumption in transport is expected to rise from 9.6 ktoe in 2020 to 13.6 ktoe in 2030 and to 19.2 ktoe in 2050, connected with the the partial electrification of rail.

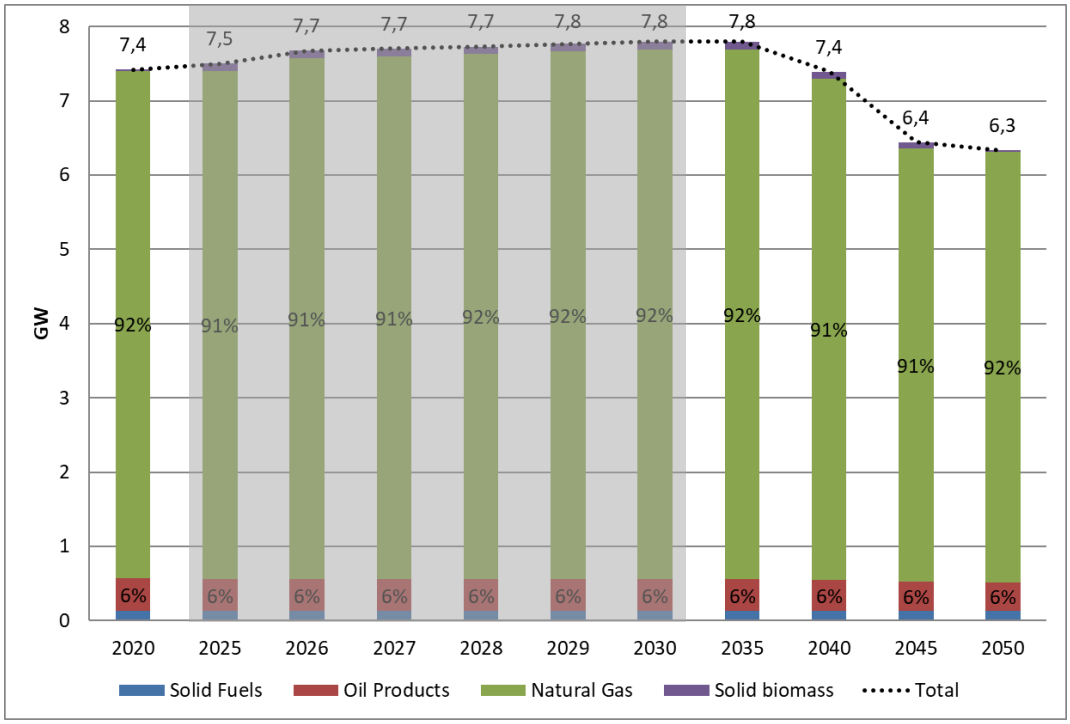
Figure 4.20: Electricity consumption from RES in transport over 2020-2050



As regards the installed capacity per fuel source in district heating plants,

Figure 4.21 shows that the natural gas will remain the dominant fuel throughout the examined period (2020-2050). More specifically, the share of natural gas in the installed capacity of district heating plants is expected to remain stable at 92% in 2020, 2030 and up to 2050. Similarly, the shares of oil products and solid fuels will remain unchanged from 2020 to 2050 at 6% and 2% respectively.

Figure 4.21: Installed capacity per technology in the district heating sector over 2020-2050



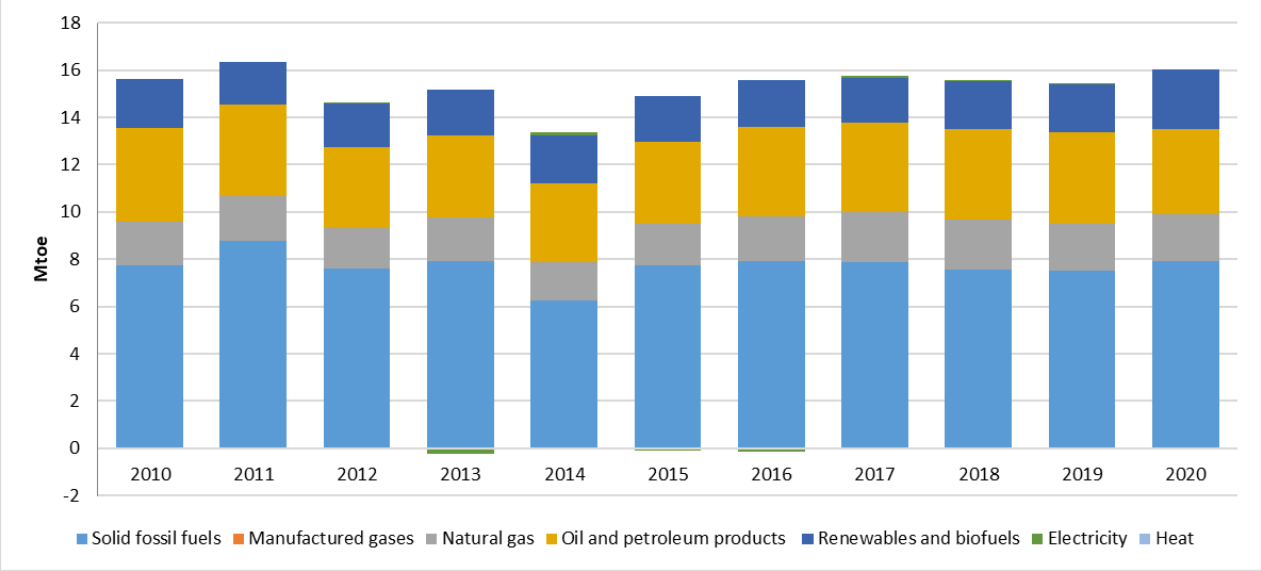
4.3 Dimension Energy Efficiency

i. Current primary and final energy consumption in the economy and per sector (including industry, residential, service and transport)

Over 2010-2020, the gross inland energy consumption remained almost constant (from 15.6 Mtoe in 2010 to 15.99 Mtoe in 2020), recording only a sharp and temporary reduction in 2014 due to the temporary GDP decline. As presented in

Figure 4.22, the solid fossil fuels and oil and petroleum products had a dominant role in the gross inland consumption, with respective shares of 50% and 25% in 2010 and 50% and 23% in 2020, while the penetration of RES and biofuels, as well as natural gas was lower at about 16% and 12% in 2020 correspondingly.

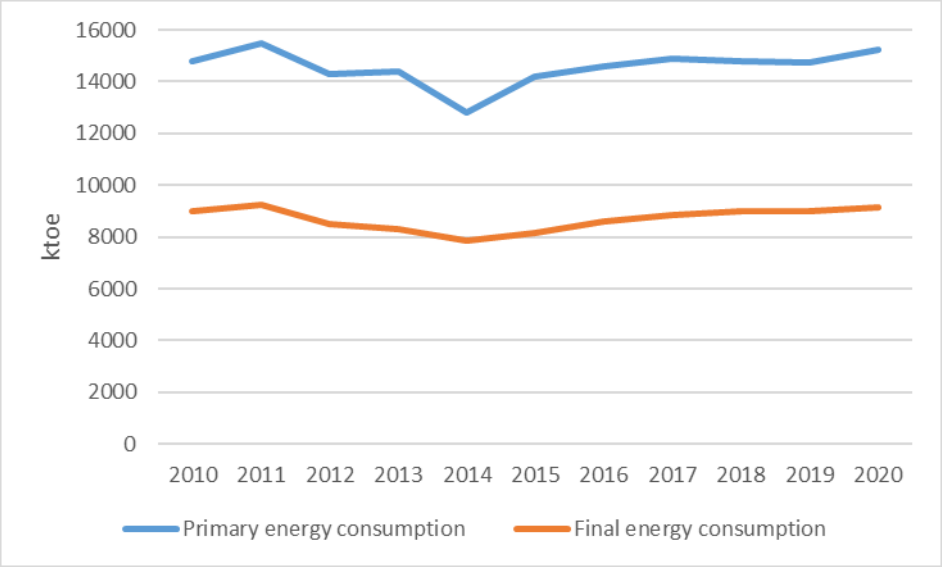
Figure 4.22: Gross inland consumption over 2010-2020 (Source: Eurostat, 2023)



The primary and final energy consumption were stable at about 15.0 Mtoe and 9.0 Mtoe respectively during 2010-2020, as presented in Figure 4.23. More specifically, the primary and final energy consumption increased

from 2010 to 2011 and then a downward trend was recorded by 2014. Since 2015, a slight increase was experienced until 2020; from 14.2 Mtoe in 2015 to 15.2 Mtoe in 2020 for primary energy consumption and from 8.2 Mtoe in 2015 to 9.110 Mtoe in 2020 for final energy consumption. It should be noted that the primary energy consumption is derived from the gross inland consumption, excluding all non-energy use of energy carriers (e.g. natural gas used not for combustion but for producing chemicals).

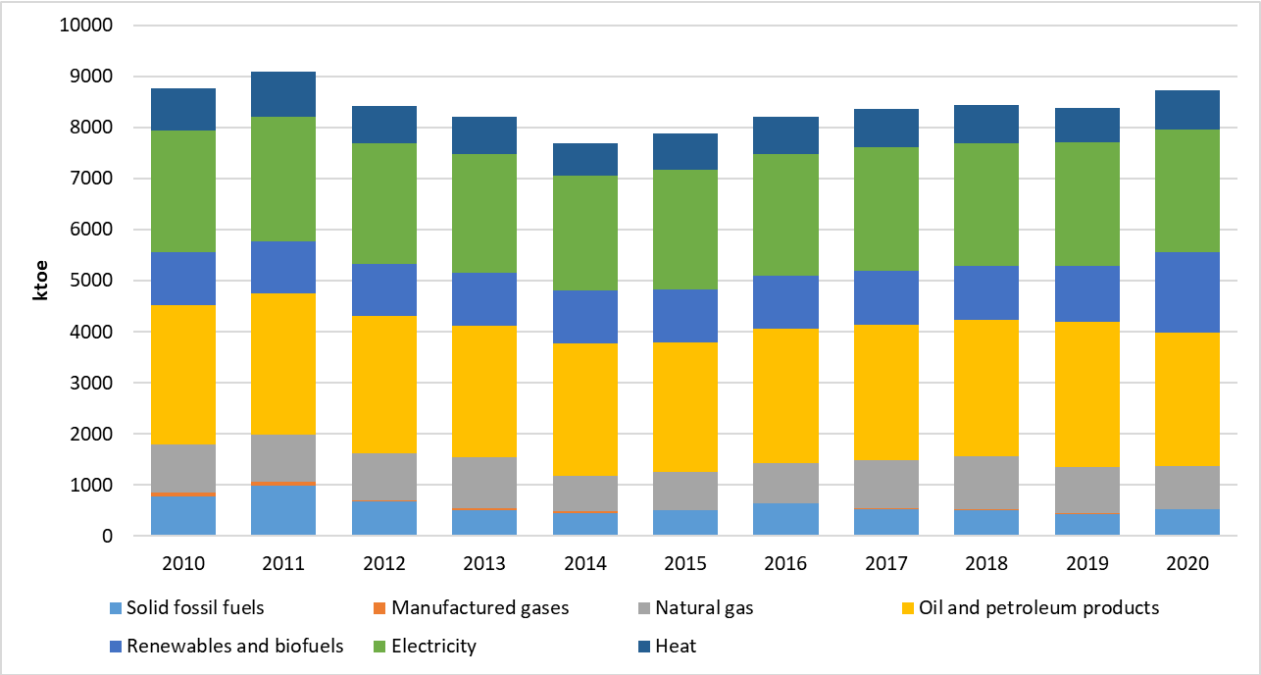
Figure 4.23: Primary and final energy consumption over 2010-2020 (Source: Eurostat, 2023)



As shown in Figure 4.24, the final energy consumption decreased by 0.5% in the period 2010-2020. More specifically, the final energy consumption was reduced in the period 2012-2014 after a temporary increase in 2011, while an increasing trend has been observed from 2015 to 2020. The shares of the different energy carriers remained almost identical in 2020 in comparison with 2010.

The fact that the primary and final energy consumption remained relatively constant despite the considerable increase of the GDP is an indication for the contribution of the promoted energy efficiency technologies and equipment in all end-use sectors.

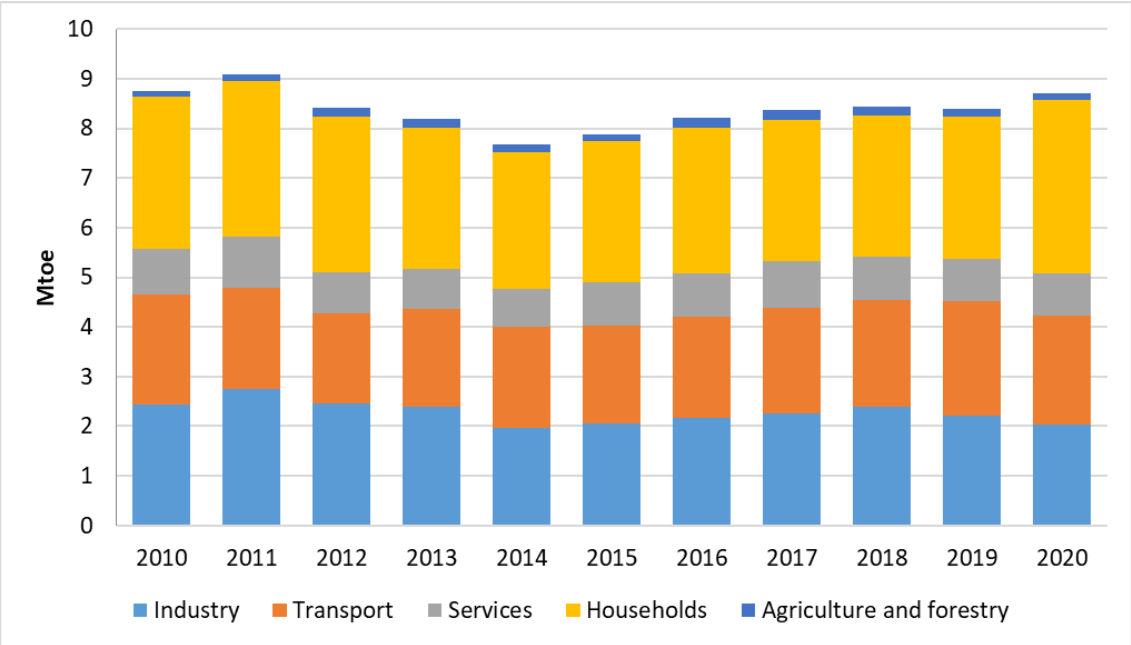
Figure 4.24: Final energy consumption by fuel over 2010-2020 (Source: Eurostat, 2023)



In 2020, the residential sector was responsible for 40% of the final energy consumption, while the industrial and transport sectors had shares equal to 23% and 25% respectively, as presented in

Figure 4.25. The final energy consumption of the industrial and transport sectors decreased in the period 2010-2020 by 17% and 1.5% respectively, while the final energy consumption of the residential sector increased by 13.3% over the same period. The contribution of the services and agricultural sectors to the final energy consumption was considerably lower in the period 2010-2020 compared to the other end-use sectors.

Figure 4.25: Final energy consumption by end-use sector over 2010-2020 (Source: Eurostat, 2023)



ii. Current potential for the application of high-efficiency cogeneration and efficient district heating and cooling

The district heating network losses will remain the same at the level of 9.4% in 2030 and 2050. District cooling is not considered as an option in the period until 2030.

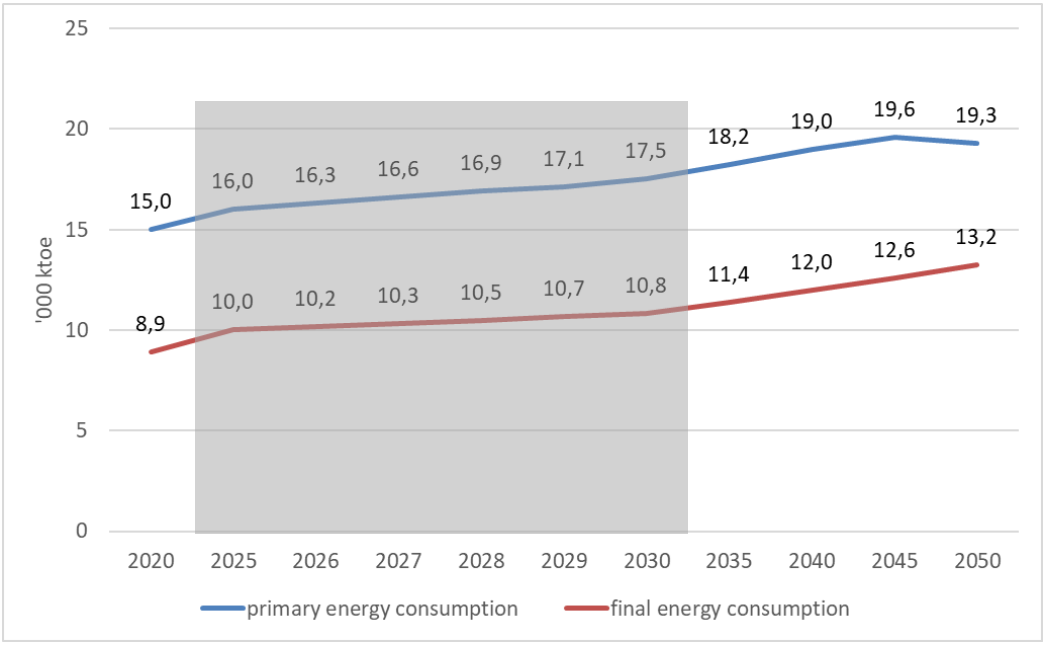
High efficiency gas-fired cogeneration units are considered as an option for the district heating systems together with biomass and biogas fired units. The penetration in the WEM scenario is expected to be limited but in the scenario with addition measures, there is a potential of gas fired CHP covering up to 3% of total district heat production and a potential of heat produced in bioenergy CHPs to cover up to 5% of the total heat generation in DH systems.

iii. Projections considering existing energy efficiency policies, measures and programmes as described under 1.2. ii) for primary and final energy consumption for each sector at least until 2040 (including for the year 2030)

As presented in Figure 4.26, both primary and final energy consumption are expected to follow almost the same upward trend in the period 2020-2050. More specifically, the final energy consumption is projected to increase from 8.99 Mtoe in 2020 to 10.8 Mtoe in 2030 and to 13.22 Mtoe in 2050, exhibiting a more stable upward trend, compared to the primary energy consumption, which will be characterized by a reduction from 19.6 Mtoe in 2045 to 19.3 Mtoe in 2050. However, the primary energy consumption is anticipated to rise from 15.0 Mtoe in 2020 to 17.55 Mtoe in 2030 and to 19.3 Mtoe in 2050 to cover the increased FEC. The slight

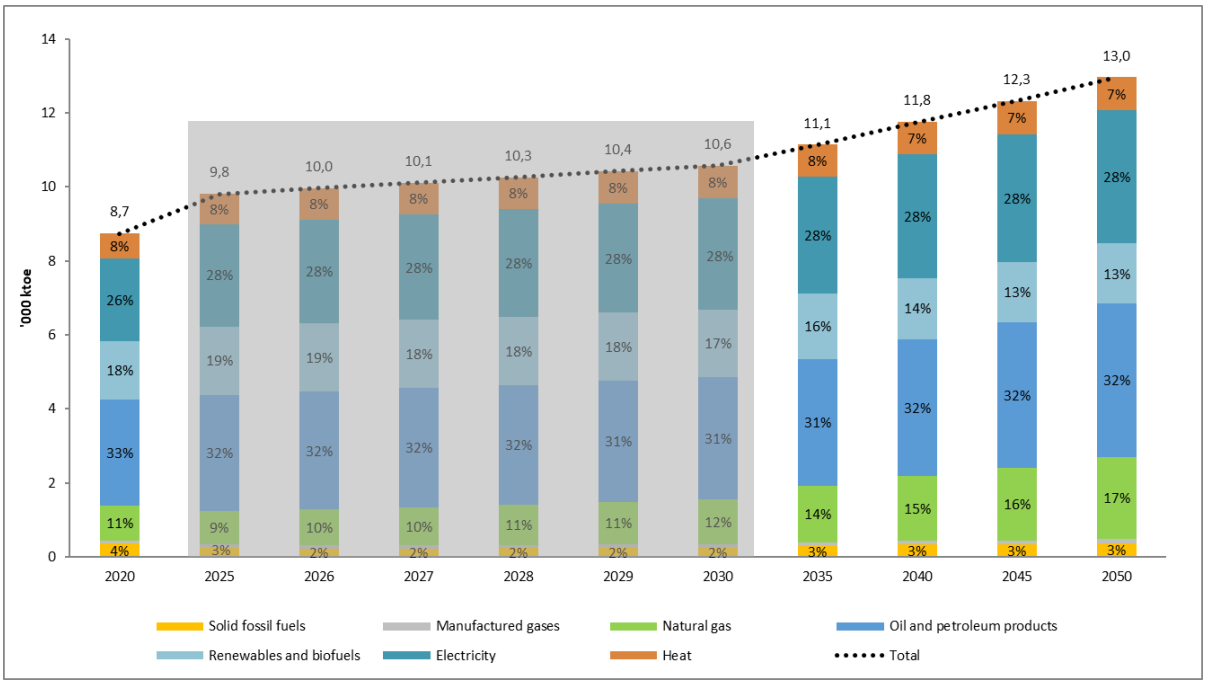
reduction between 2045 and 2050 is mainly due to the penetration of RES for electricity production. Obviously, the implementation of the existing energy efficient policies and measures is not capable of restraining the impact of the increased GDP to the energy consumption, which is expected until 2050.

Figure 4.26: Primary and final energy consumption over 2020-2050



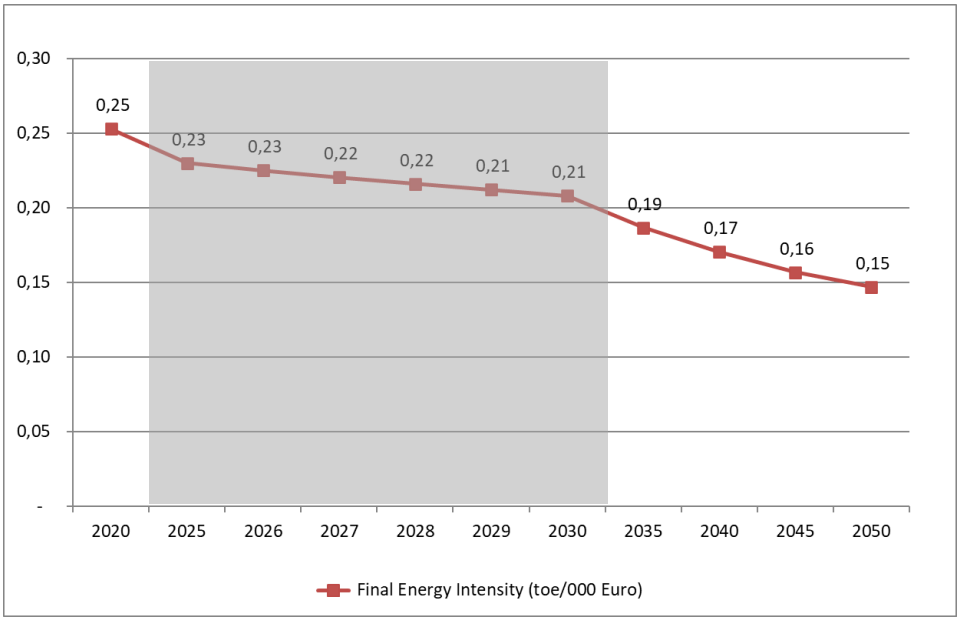
The final energy consumption is currently dominated by oil and petroleum products, which satisfy 33% of the total demand, followed by electricity that covers 26% in 2020 (Figure **4.27**). The consumption of oil and petroleum products is expected to steadily rise from 2.9 Mtoe in 2020 to 3.33 Mtoe in 2030 and to 4.11 Mtoe in 2050 representing a slightly reduced share (2%). Similarly, the electricity consumption is expected to increase from 2.22 Mtoe in 2020 to 3.0 Mtoe in 2030 and to 3.6 Mtoe in 2050 leading to a 28% share. The share of RES in the final energy consumption remains relatively constant (around 17% on average) reaching to 1.6 Mtoe in 2050. Finally, the consumption of natural gas will increase from 938 ktoe in 2020 to 1.22 Mtoe in 2030 and to 2.2 Mtoe in 2050 reaching a 17% share in the final energy consumption in 2050.

Figure 4.27: Final energy consumption by fuel over 2020-2050



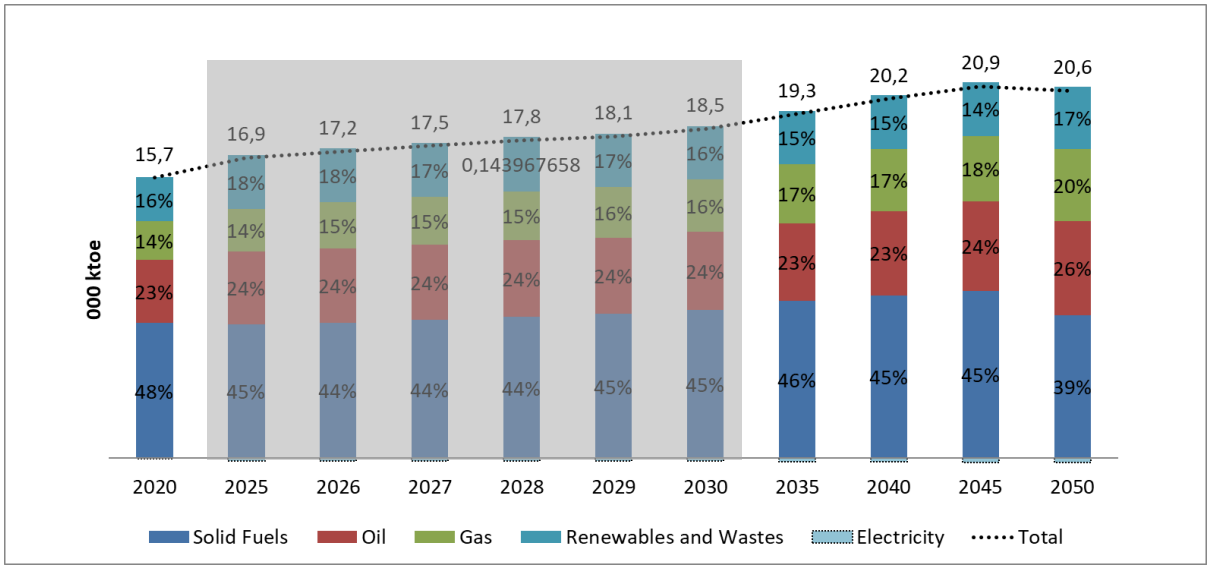
The final energy intensity is projected to decrease until 2050, as it will be reduced by 18% in 2030, 33% in 2040 and 42% in 2050, compared to 2020, as presented in Figure 4.28, highlighting the essential contribution of the existing energy efficiency policies and measures.

Figure 4.28: Final energy intensity over 2020-2050



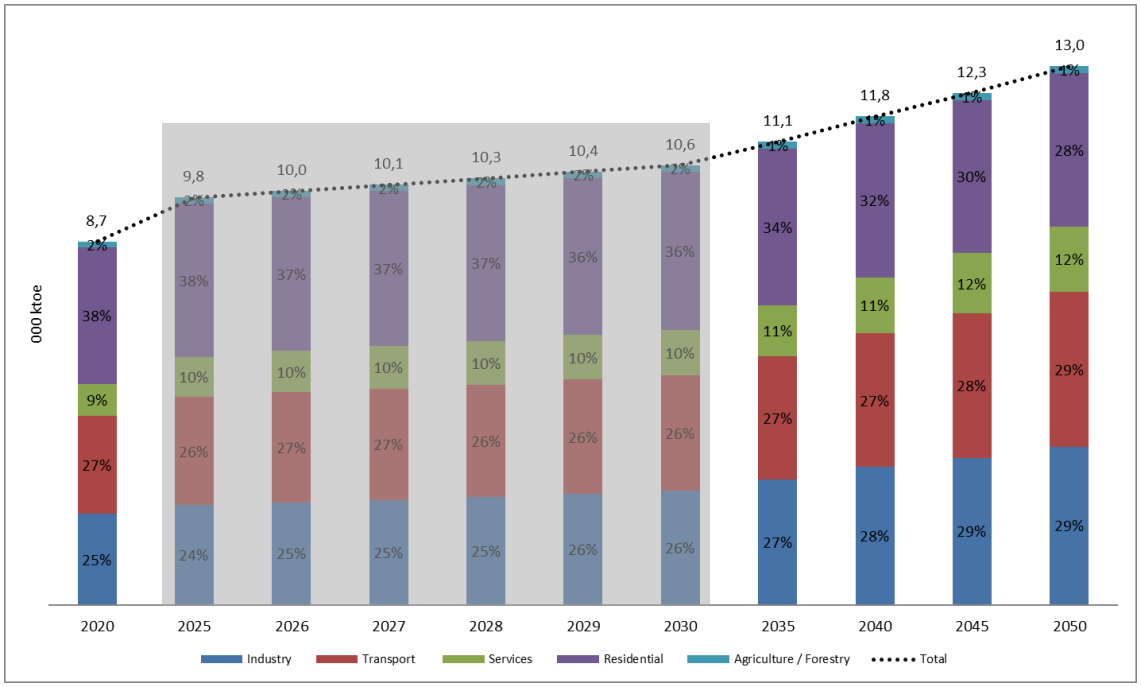
As illustrated in Figure 4.29, the gross inland consumption is expected to increase by 31% at 20.6 Mtoe by 2050, compared to 2020, recording only a temporary reduction between 2045 and 2050; from 20.99 Mtoe in 2045 to 20.6 Mtoe in 2050. Solid fossil fuels and oil and petroleum products have a dominant role in the gross inland consumption, with respective shares of 48% and 23% in 2020, 45% and 24% in 2030, 45% and 23% in 2040 and 39% and 26% in 2050. The penetration of natural gas as well as RES and Wastes is also anticipated to increase throughout the examined period; from 14% and 16% correspondingly in 2020 to 20% and 17% in 2050.

Figure 4.29: Gross inland consumption by fuel over 2020-2050



The final energy consumption per end-use sector will increase (21% in 2030, 35% in 2040 and 48% in 2050, compared to 2020), resulting in approximately 12.9 Mtoe in 2050, as shown in Figure 4.30. Transport, residential and industrial sectors retain the highest contribution the whole period 2020-2050 in the final energy consumption, reaching the levels of 3.77 Mtoe, 3.7 Mtoe and 3.8 Mtoe in 2050, respectively. It should be noted that the respective shares of the examined end-use sectors remain relatively constant.

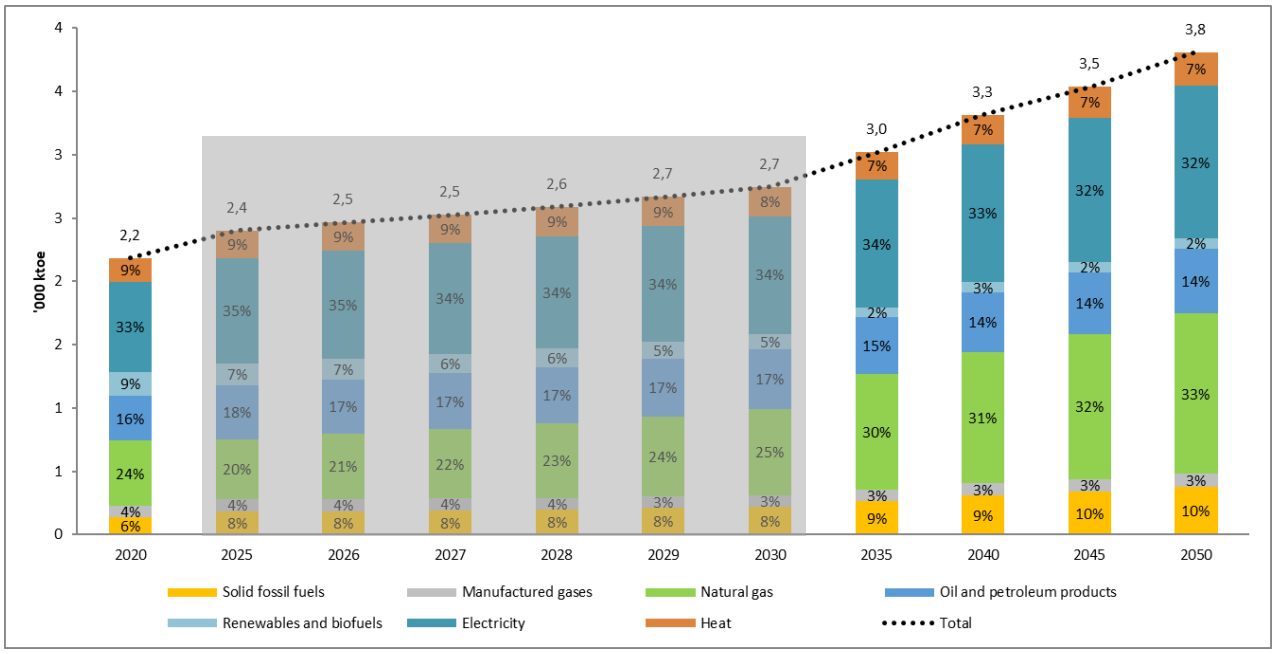
Figure 4.30: Final energy consumption by end-use sector over 2020-2050



As presented in

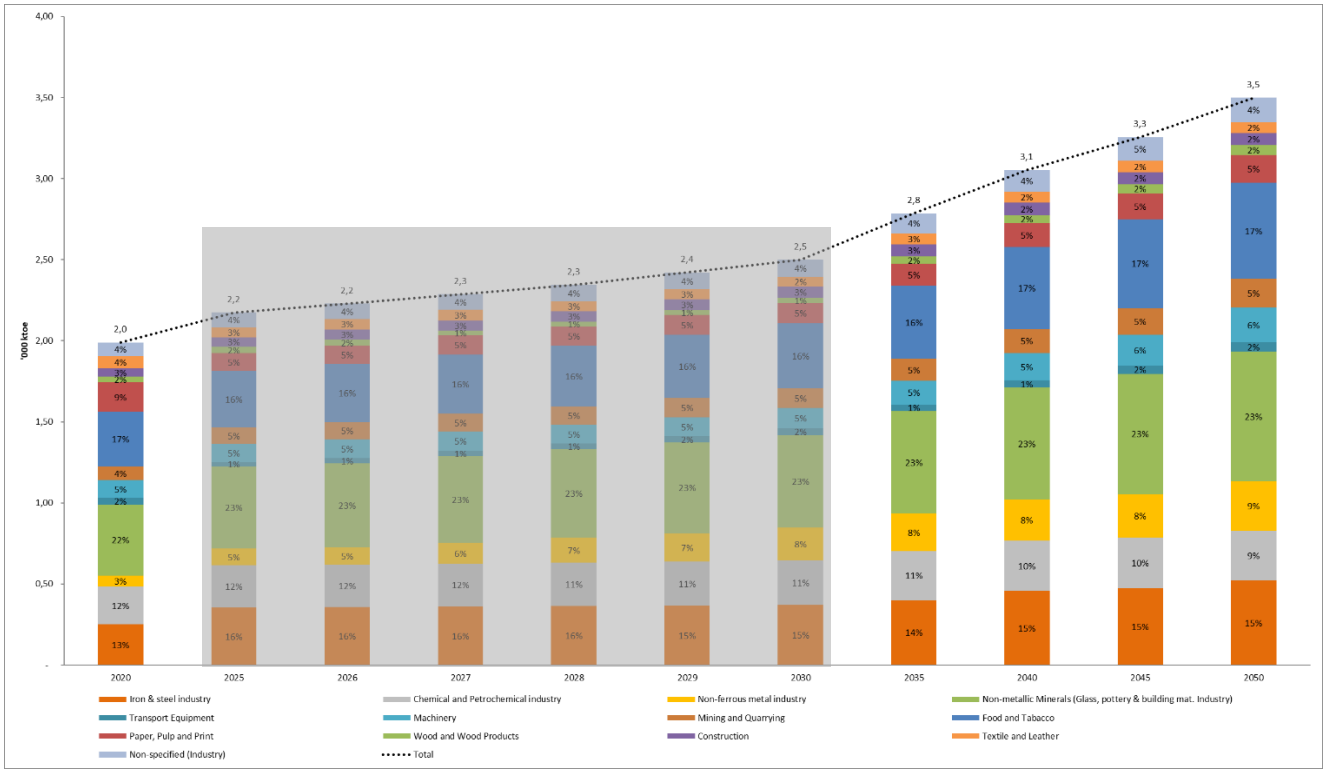
Figure 4.31, the final energy consumption by fuel in the industrial sector is expected to increase until 2050; from 2.22 Mtoe in 2020 to 2.77 Mtoe in 2030 and to 3.8 Mtoe in 2050. No significant differentiations are observed in the individual shares of most of the utilised fuels. Nevertheless, both natural gas and electricity increase their shares, being the most dominant fuels in industry. More specifically, the observed level of consumption of natural gas and electricity is 687 ktoe and 1.0 Mtoe in 2030 and 1.3 Mtoe and 1.2 Mtoe in 2050 respectively.

Figure 4.31: Final energy consumption by fuel in the industrial sector over 2020-2050



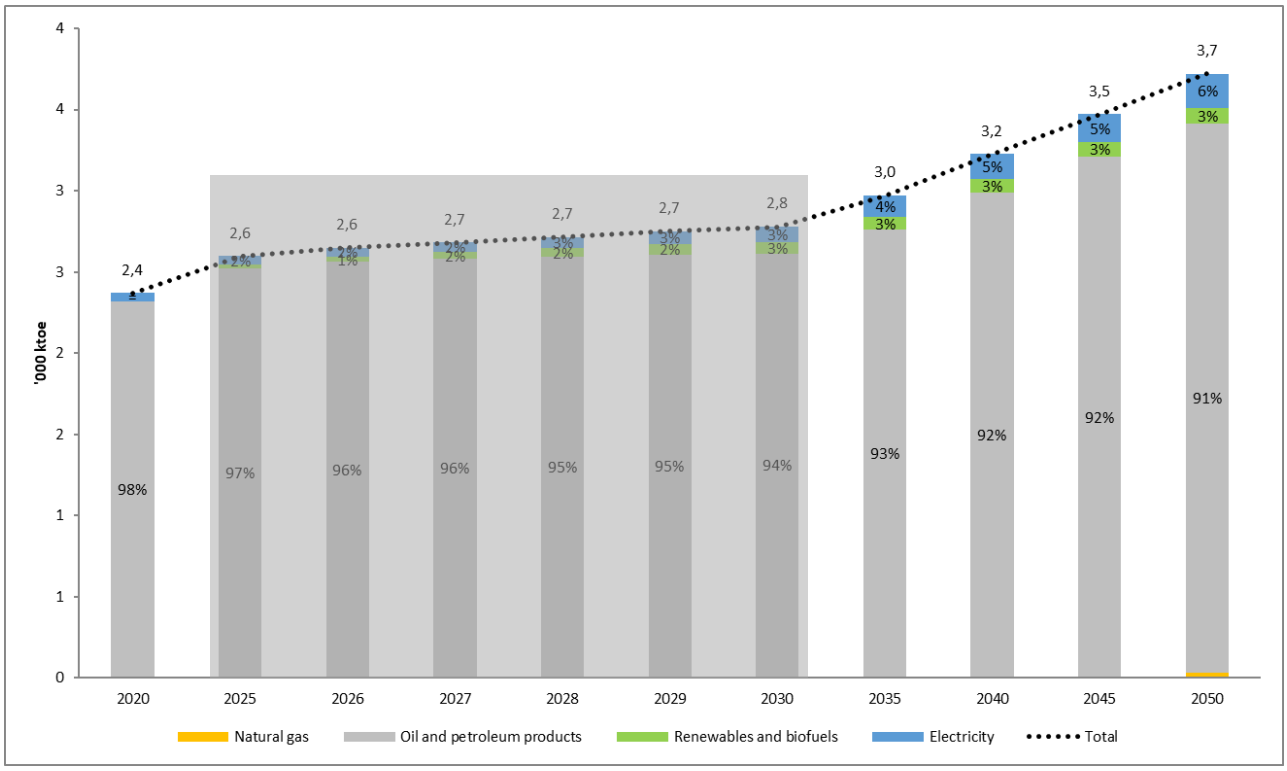
The final energy consumption of the different sub-sectors in the industrial sector is expected to increase until 2050, while the individual shares are expected to remain relatively stable until 2050, as presented in Figure 4.32. The largest share of the final energy consumption in the different sub-sectors stands for non-metallic minerals, including cement, glass, pottery and building materials, which stood at 436 ktoe in 2020 and are expected to almost double at 7988 ktoe in 2050.

Figure 4.32: Final energy consumption per sub-sector in the industrial sector over 2020-2050



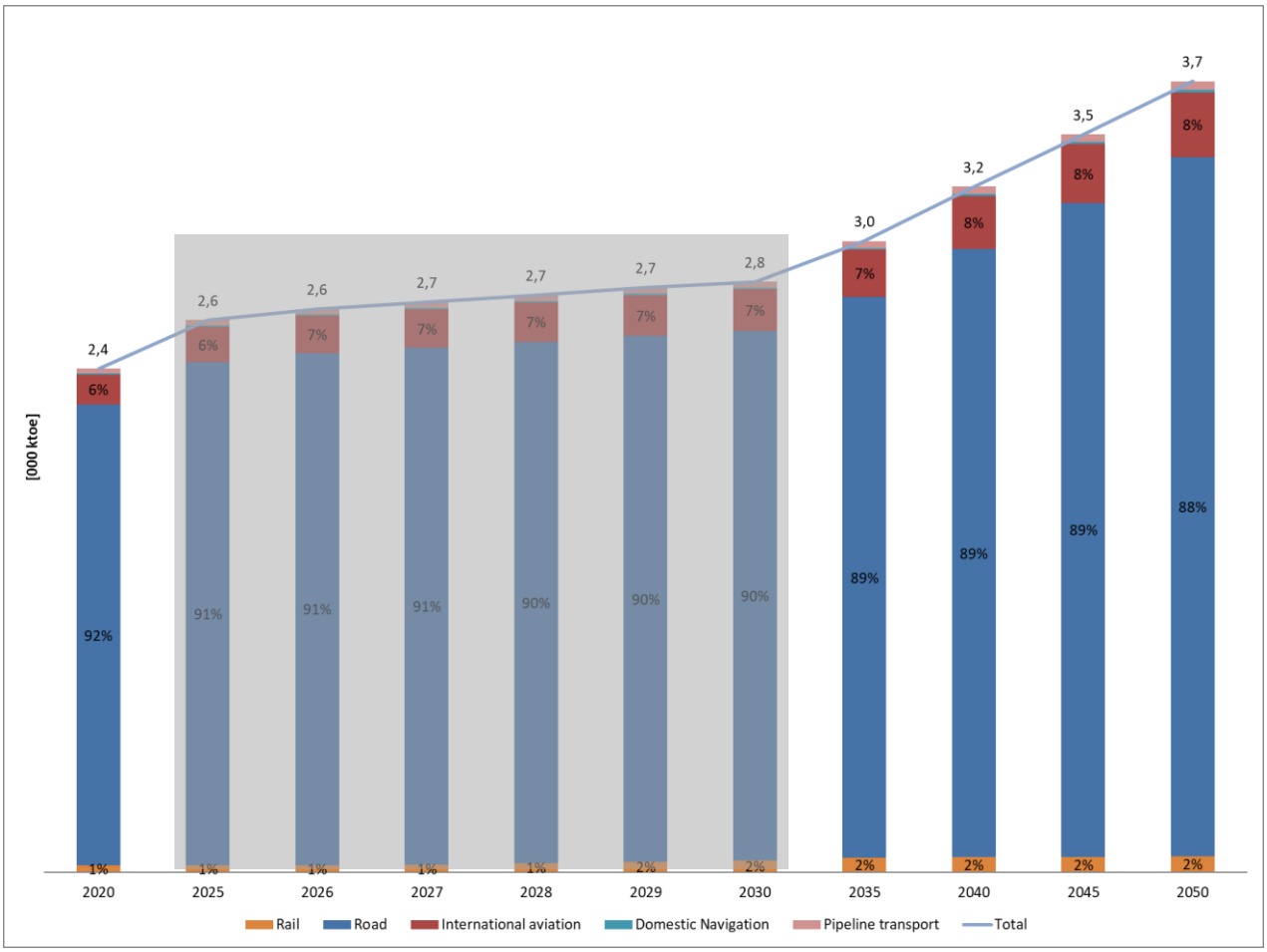
As presented in Figure 4.33, the final energy consumption of the transport sector by fuel is also expected to increase throughout the examined period; from 2.44 Mtoe in 2020 to 2.88 Mtoe in 2030 and to 3.77 Mtoe in 2050. The dominant consumption of oil and petroleum products, among other fuels, is observed in Figure 4.33 and is anticipated to increase substantially; from 2.33 Mtoe in 2020 to 2.66 Mtoe in 2030 and to 3.44 Mtoe in 2050. The penetration of natural gas is rather low without managing to restrain the increased transport activity due to the continuous increase of the GDP until 2050. The same conclusion can be derived also for the new purchased vehicles, which are not capable of reducing considerably the final energy consumption.

Figure 4.33: Final energy consumption by energy source in the transport sector over 2020-2050



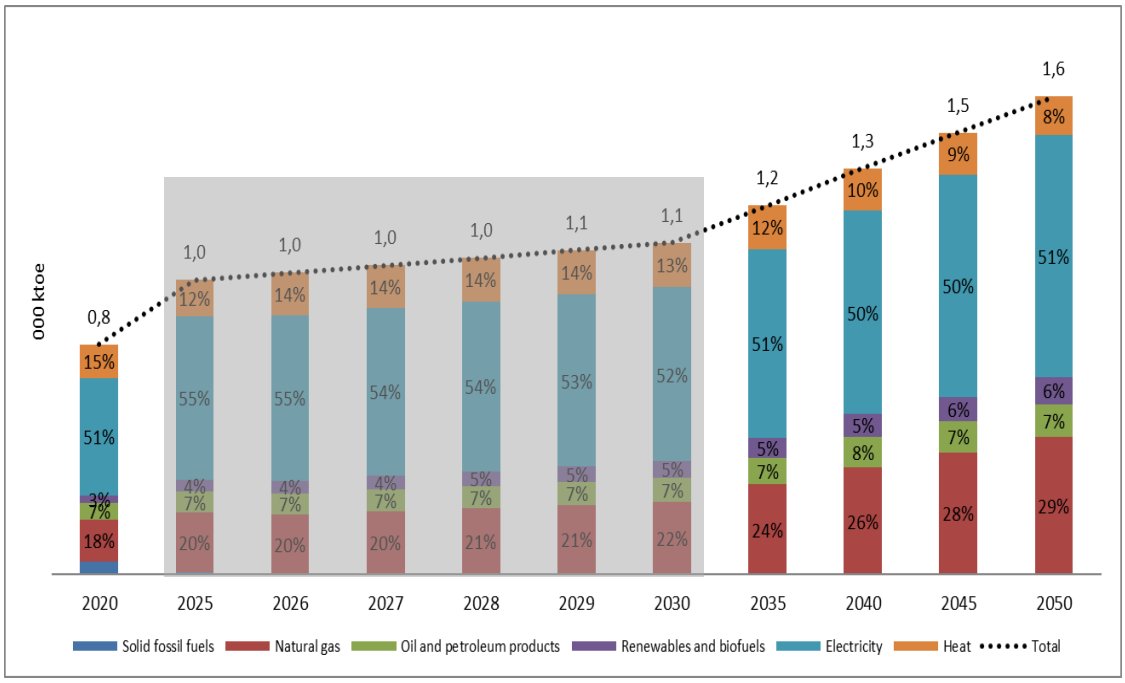
The final energy consumption of all transport modes is expected to increase significantly until 2050, compared to 2020, as shown in Figure 4.34; from 2.44 Mtoe in 2020 to 2.88 Mtoe in 2030 and to 3.77 Mtoe in 2050. The share of road transport, which is by far the largest contributor in the total final energy consumption, is expected to rise from 2.22 Mtoe in 2020 to 2.55 Mtoe in 2030 and to 3.33 Mtoe in 2050. However, in terms of its share in the total final energy consumption, road transport is anticipated to decline from 92% in 2020 to 90% in 2030 and to 88% in 2050.

Figure 4.34: Final energy consumption per sub-sector in the transport sector over 2020-2050



As reflected in Figure 4.35, the final energy consumption of the services sector by energy source is expected to increase from 760 ktoe in 2020 to 1.1 Mtoe in 2030 and to 1.6 Mtoe in 2050 despite the current energy efficiency policies and trends. The electricity consumption will continue to have the highest contribution by 2050 from 388 ktoe in 2020 to 584 ktoe in 2030 and 797 ktoe in 2050. Furthermore, natural gas remains the second most utilised fuel in the services sector until 2050, with a share ranging from 16% to 30% by 2050.

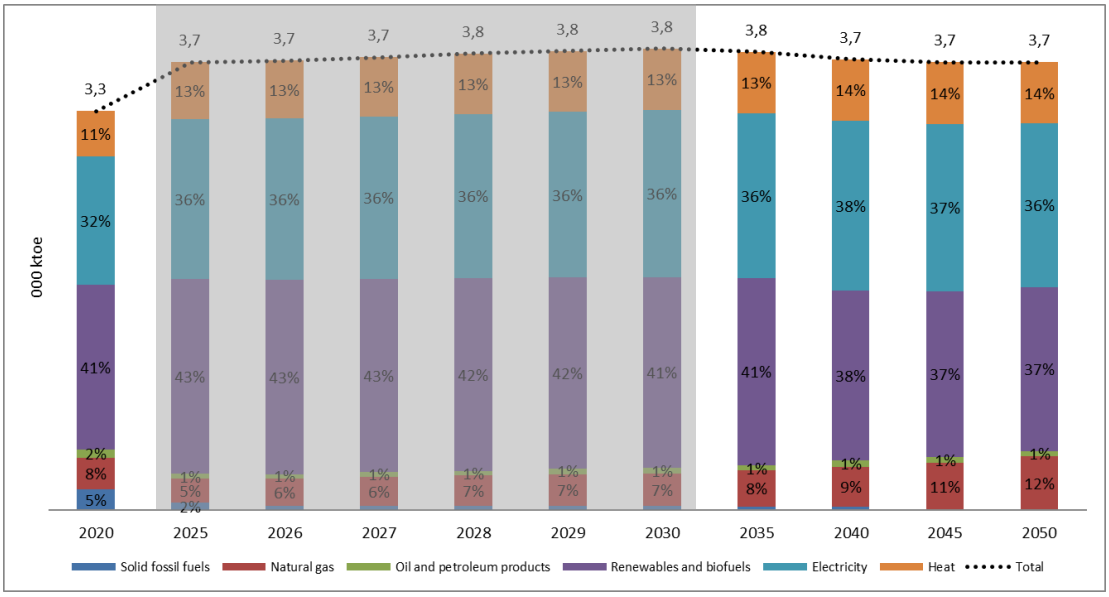
Figure 4.35: Final energy consumption by energy source in the services sector over 2020-2050



The final energy consumption by energy source in the residential sector is projected to increase throughout the analysed period from 3.3 Mtoe in 2020 to 3.7 Mtoe in 2050, as can be seen from

Figure 4.36, despite the substitution of old technologies by more efficient ones using electricity, the adoption of energy conservation behaviour and the limited renovation of the building envelope. As regards the electricity consumption, a significant increase is expected until 2050, leading to a consumption equal to 1.4 Mtoe in 2030 and 1.3 Mtoe in 2050. Similarly, the consumption of renewables and biofuels is expected to rise by 16% in 2030 and decrease by 0.5% in 2050, compared to 2020, being the most utilised fuel in the residential sector until 2050, followed by electricity and derived heat. The consumption of derived heat will grow until 2030, compared to 2020, reaching the level of 506 ktoe, while a reduction is observed during 2030-2050, mainly due to the increased deployment of RES and natural gas.

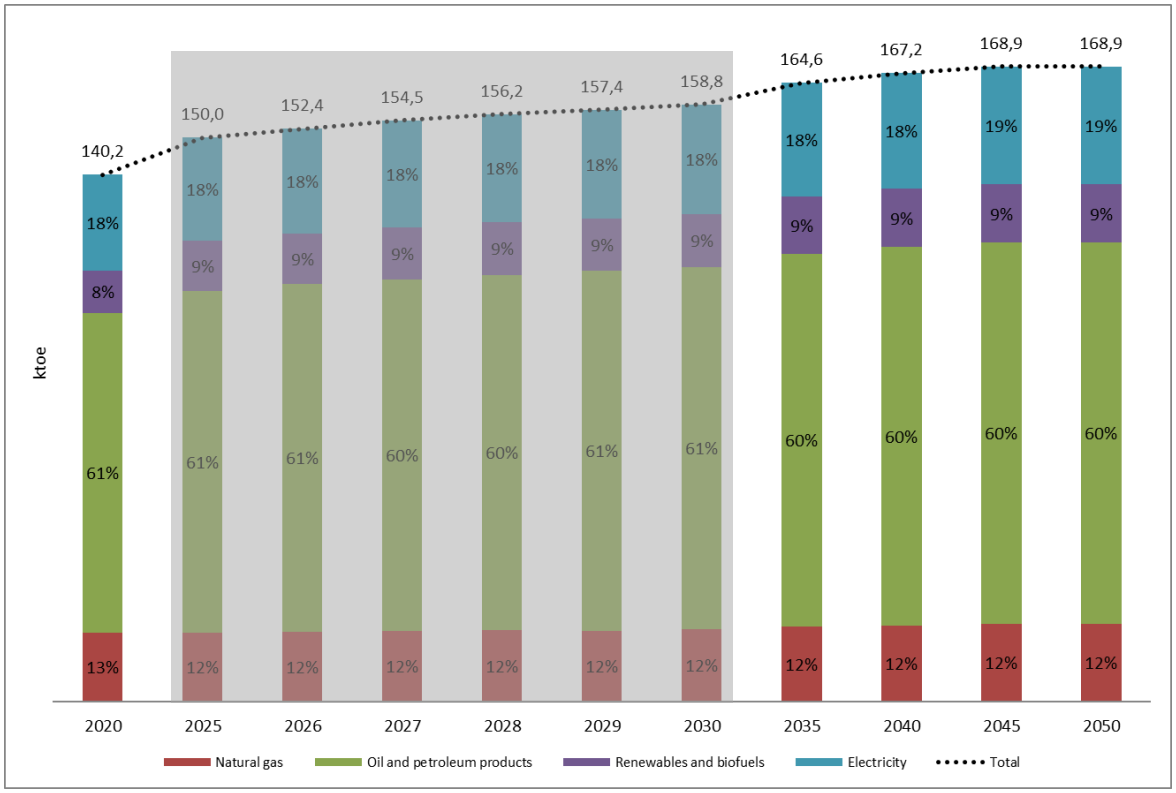
Figure 4.36: Final energy consumption by energy source in the residential sector over 2020-2050



The final energy consumption of the agricultural/forestry sector is projected to increase (13% in 2030, 19% in 2040 and 20% in 2050, compared to 2020), resulting in approximately 169 ktoe in 2050, as expected by the increase of demand due to economic development (

Figure **4.37**) and the lack of targeted policies and measures. Oil and petroleum products continue to have the highest contribution by 2050 in the agricultural/forestry sector reaching the level of 96 ktoe in 2030 and 101 ktoe in 2050.

Figure 4.37: Final energy consumption by energy sourcesource in the agriculture / forestry sector over 2020-2050



iv. Cost-optimal levels of minimum energy performance requirements resulting from national calculations, according to Article 5 of Directive 2010/31/EU

The Long-term Strategy for encouraging investments in renovation of the national building stock of the Republic of Serbia until 2050 aimed at defining energy efficiency measures and packages of measures for the renovation of buildings, based on the determined characteristics of the building stock, the defined reference buildings and the cost-optimal analyses performed for them.

The constitution of the Renovation Scenario was based on the cost-optimal analyses for residential and non-residential buildings, which were conducted during 2019–2020. In accordance with the methodological principles adopted in the EU, the following types of buildings were defined: family housing and multifamily housing as well as three commercial buildings as representatives of public and commercial buildings for three different construction periods until 1960, the period between 1961 and 2012, and as the last, the construction period after the introduction of regulations on energy efficiency of buildings, starting in 2013.

The determination of the reference buildings was based on their construction material, physical and architectural characteristics. Moreover, energy efficiency measures were defined for all examined buildings and packages of measures that were identified. Five possible renovation scenarios were prepared, the first of which, the basic scenario, implied unsubsidised renovation and construction according to current regulations, and the last, most advanced one envisaged renovation of buildings at the level of nearly zero-energy buildings (not defined by valid regulations on energy efficiency).

The analysis of the examined scenarios was conducted through the calculation of various figures including also the effects on CO2 emissions and primary energy consumption until 2050. It was concluded that only scenarios 4 and 5 led to a simultaneous reduction of CO2 emissions and a reduction of primary energy consumption. Taking into consideration the economic analysis, scenarios 4 and 5 were resulted in the most considerable economic benefits, noting that the economic costs for Scenario 5 are significantly higher compared to Scenario 4. Excluding Scenario 5, Scenario 4 foresaw an increased exploitation of the adopted packages of measures leading to an increased reduction of CO2 emissions equal to 31% compared to 2020, while the reduction of primary energy consumption in 2050 amounted to 38% compared to 2020.

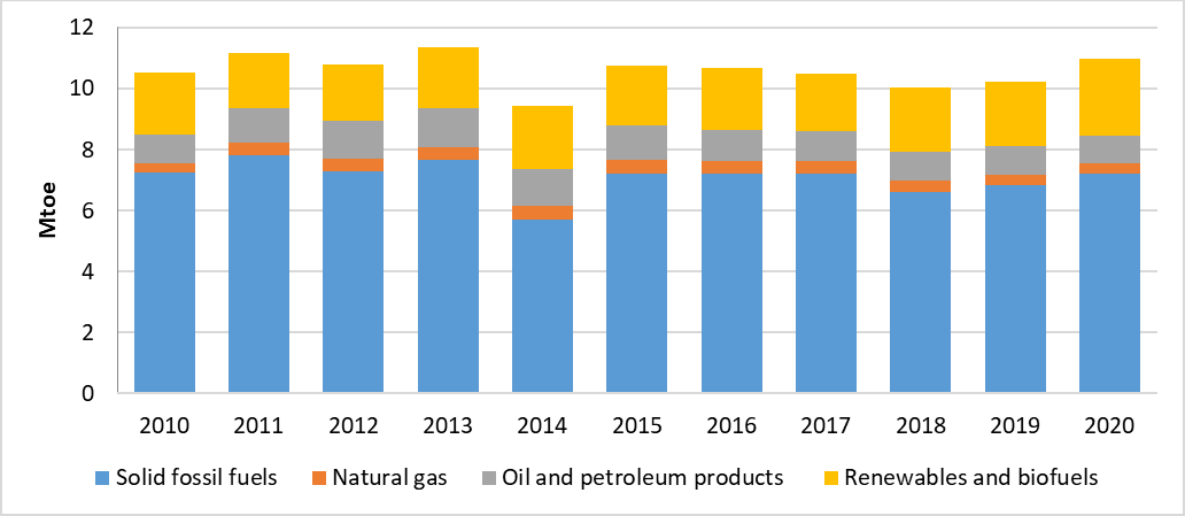
Finally, Scenario 4 was proposed as the basis for the Strategic Goal of the Republic of Serbia. In order to achieve the level of savings envisaged by Scenario 4, it is necessary to facilitate the renovation of the existing building stock at the level of 4.1-6.0 million m², while the contribution of the expected floor area of newly constructed buildings has to reach the level of 2.2 million m² annually.

4.4 Dimension Energy Security

i. Current energy mix, domestic energy resources, import dependency, including relevant risks

Over 2010-2020, the primary production remained almost stable at about 10.5 Mtoe, apart from 2014, where a sharp and temporary decline was recorded, as shown in Figure 4.38. Solid fossil fuels, mainly lignite, constituted the prevailing fuels for primary production, with a minor decline of their share from 68.5% in 2010 to 65.7% in 2020. RES and biofuels possess an important role in primary production, while their contribution increased from 19.66% in 2010 to 22.9% in 2020.

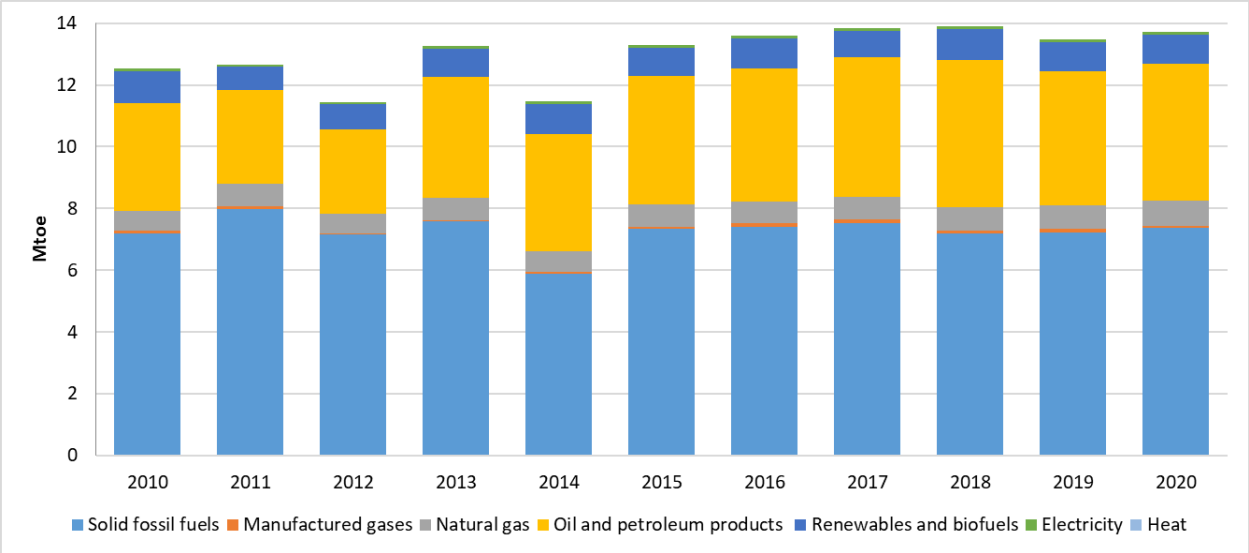
Figure 4.38: Primary production over 2010-2020 (Source: Eurostat, 2023)



In 2020, the total transformation input in terms of energy use stood at 13.7 Mtoe, about 9.6% higher, compared to 2010 level (12.5 Mtoe), as illustrated in. Solid fossil fuels and oil and petroleum products were the prevailing fuels in terms of transformation input (7.444 Mtoe and 4.4 Mtoe in 2020 respectively). In

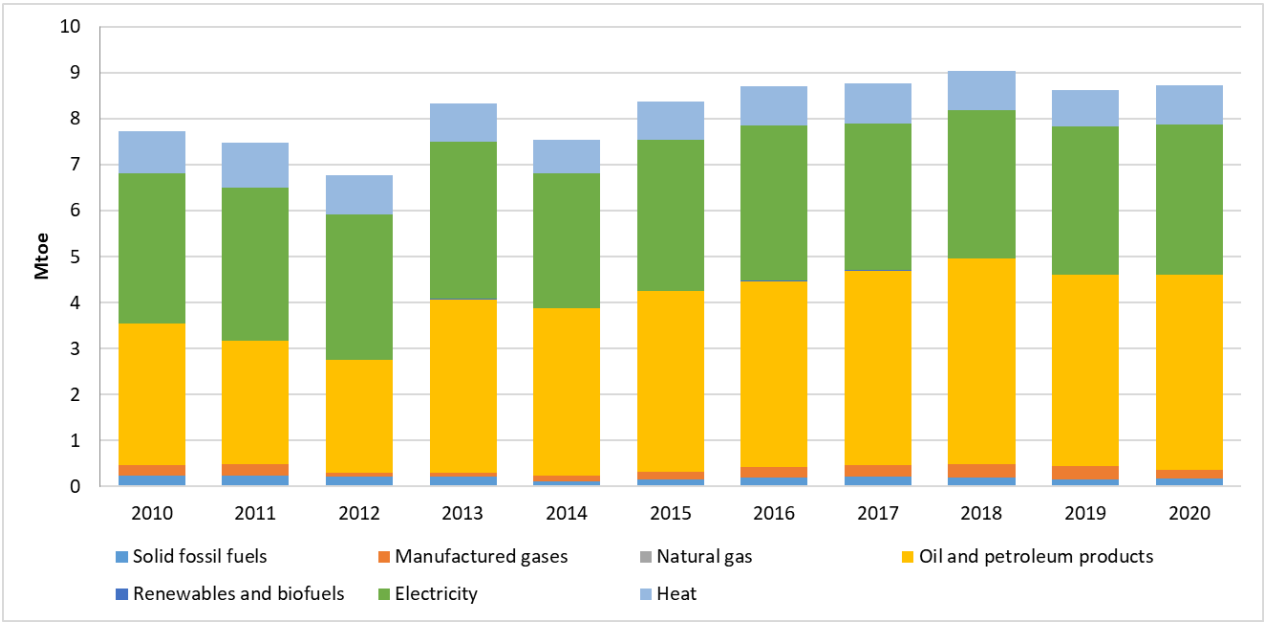
addition, the share of solid fossil fuels declined from 57.4% in 2010 to 53.7% in 2020, while the share of oil and petroleum products increased from 27.8% in 2010 to 32.44% in 2020.

Figure 4.39: Transformation input over 2010-2020 (Source: Eurostat, 2023)



The same tendency was recorded also for the case of the transformation output (generation of electricity, heat and oil products from refineries), as shown in Figure 4.40. In 2020, the total transformation output in terms of energy use stood at 8.7 Mtoe,about 13% higher, compared to 2010 level (7.7 Mtoe). Electricity and oil and petroleum products amounted to 3.33 Mtoe and 4.22 Mtoe in 2020, respectively. Moreover, the share of electricity was reduced from 42.4% in 2010 to 37.4% in 2020, while the share of oil and petroleum products grew from 42.4% in 2010 to 37.4% in 2020.

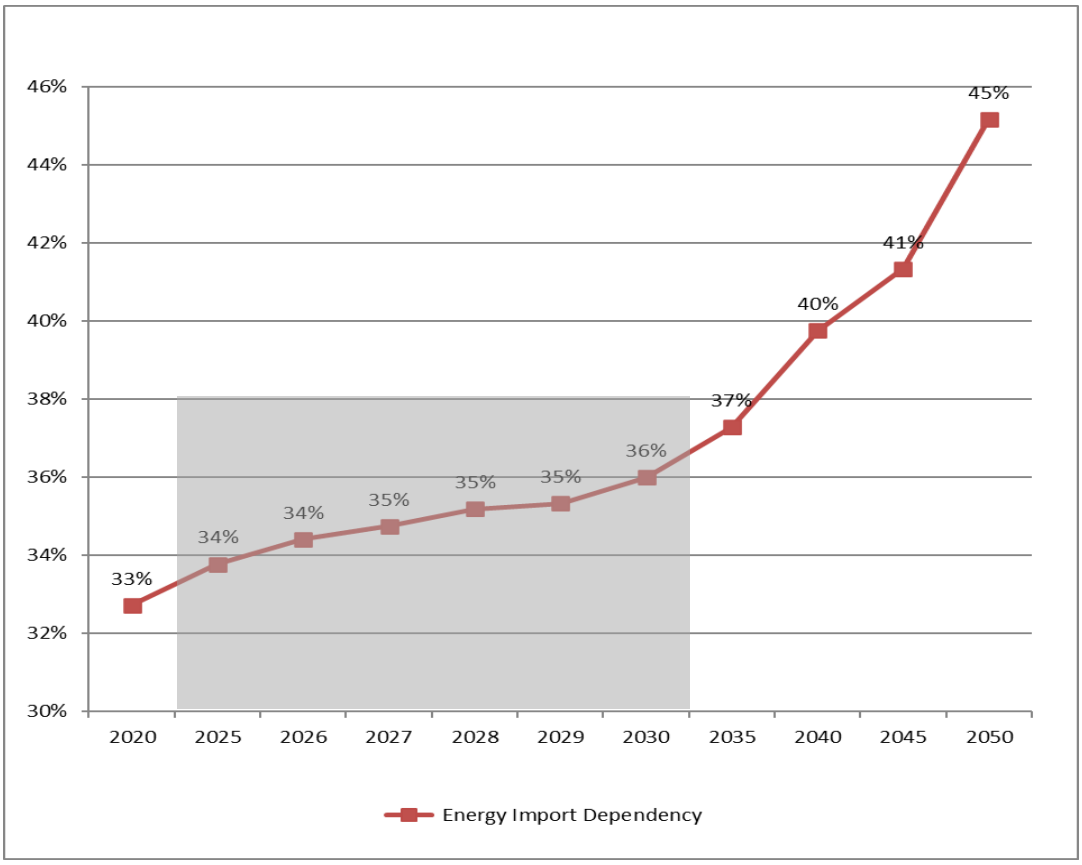
Figure 4.40: Transformation output over 2010-2020 (Source: Eurostat, 2023)



ii. Projections of development with existing policies and measures at least until 2040 (including for the year 2030)

As presented in Figure 4.41, energy import dependency exhibits an increasing trend towards 2050, compared to 2020. More specifically, while energy import dependency in 2020 was 33%, it is expected to increase up to 36% in 2030 and up to 45% by 2050, mainly due to the increased use of natural gas and petroleum products.

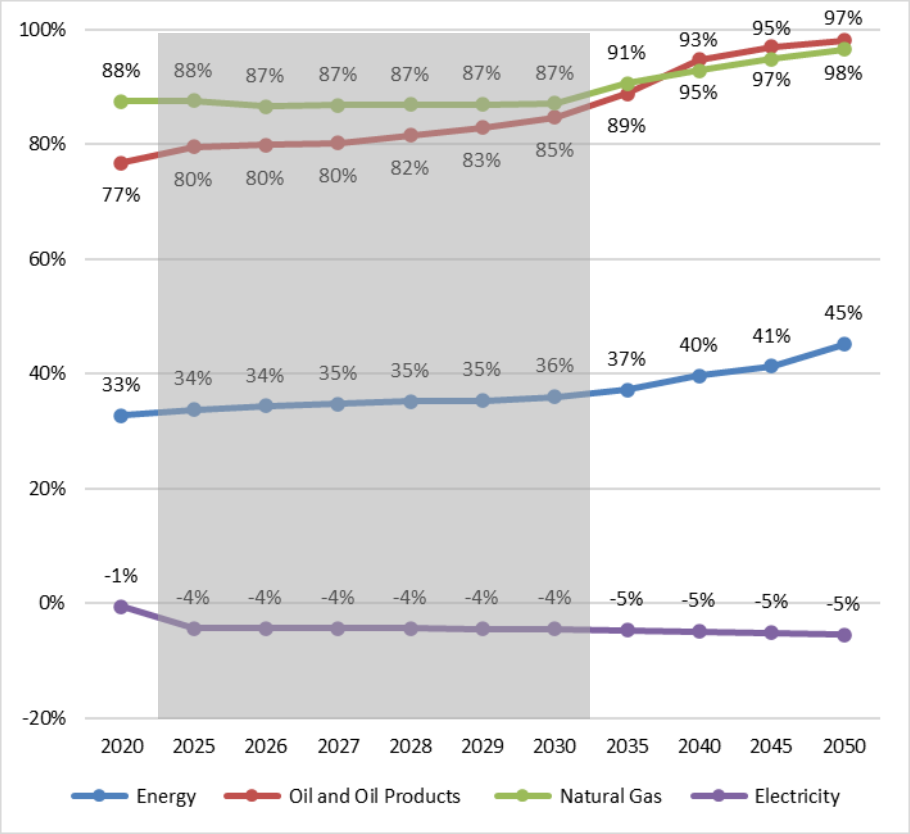
Figure 4.41: Energy import dependency over 2020-2050



The import dependency of both oil and oil products as well as natural gas is expected to follow almost the same upward trend, as shown in

Figure 4.42. However, the import dependency of electricity will move to negative percentages; from -1% in 2020 to -4% in 2030 and to -5% in 2050, indicating that the Republic of Serbia is expected to be a net electricity exporter by 2050.

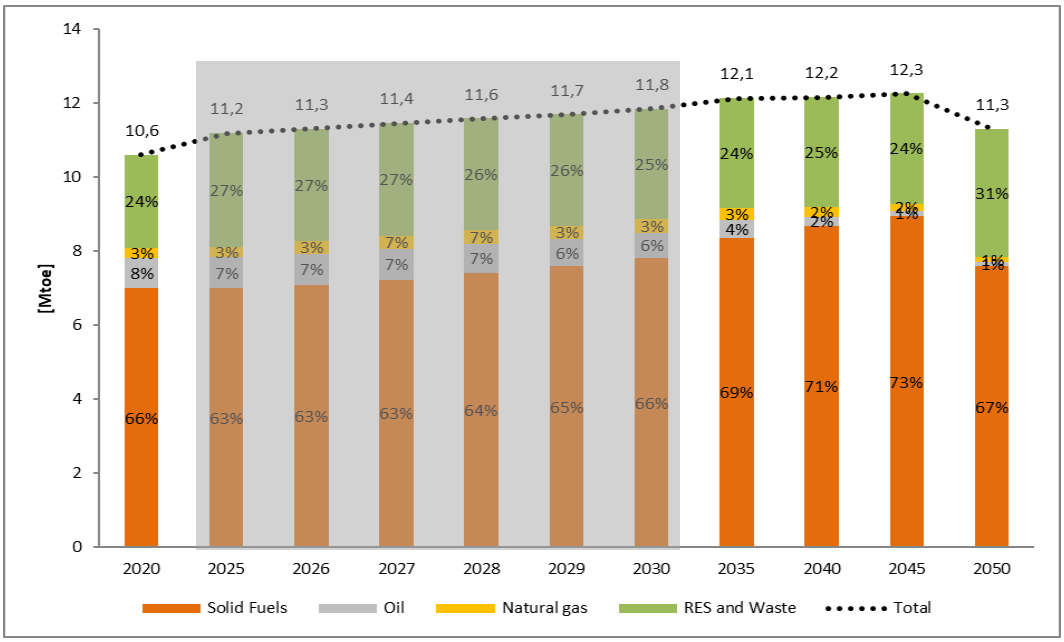
Figure 4.42: Import dependency of oil and oil products, natural gas and electricity over 2020-2050



The primary production is expected to increase by 2050; from 10.55 Mtoe in 2020 to 11.88 Mtoe in 2030 and to 11.3 Mtoe in 2050, as presented in

Figure 4.43. It should be noted that an increase is observed until 2045 (12.33 Mtoe), while a decline is foreseen until 2050. Solid fuels as well as RES and waste constitute the energy sources with the highest contribution by 2050 demonstrating a rise equal to 9% and 38% respectively compared to 2020.

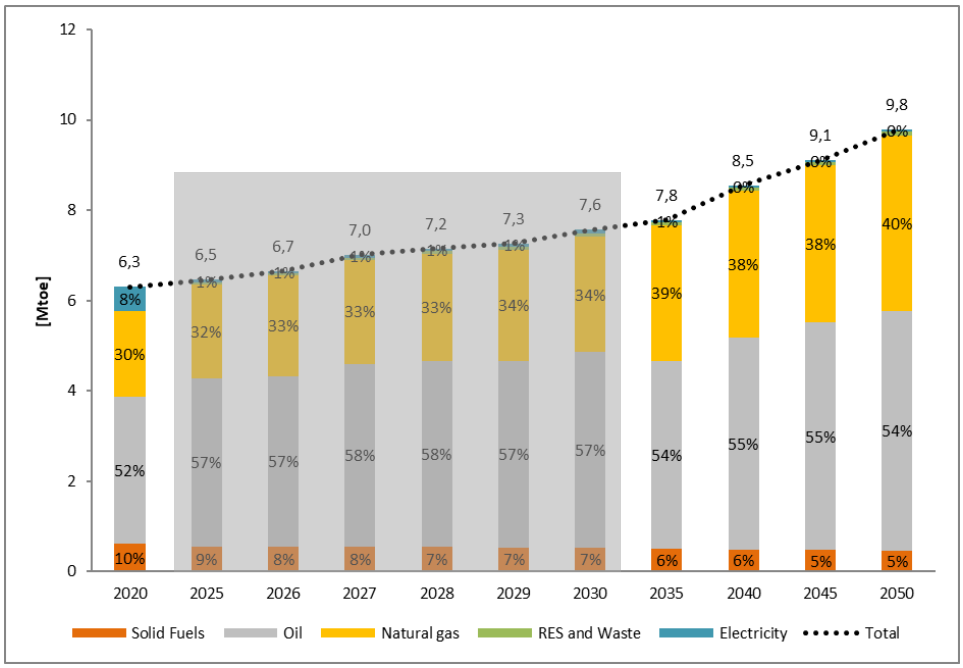
Figure 4.43: Primary production over 2020-2050



The domestic needs for energy supply will be supplemented by imported energy, considering also exports and stock changes. Generally, it is expected that energy imports will rise and energy exports will decrease, resulting to an overall increase of total net imports, to complement the decrease of inland production for covering gross

inland consumption. More specifically, imports of energy are projected to increase from 6.33 Mtoe in 2020 to 7.6 Mtoe in 2030 and at 9.8 Mtoe in 2050, as shown in Figure 4.44.

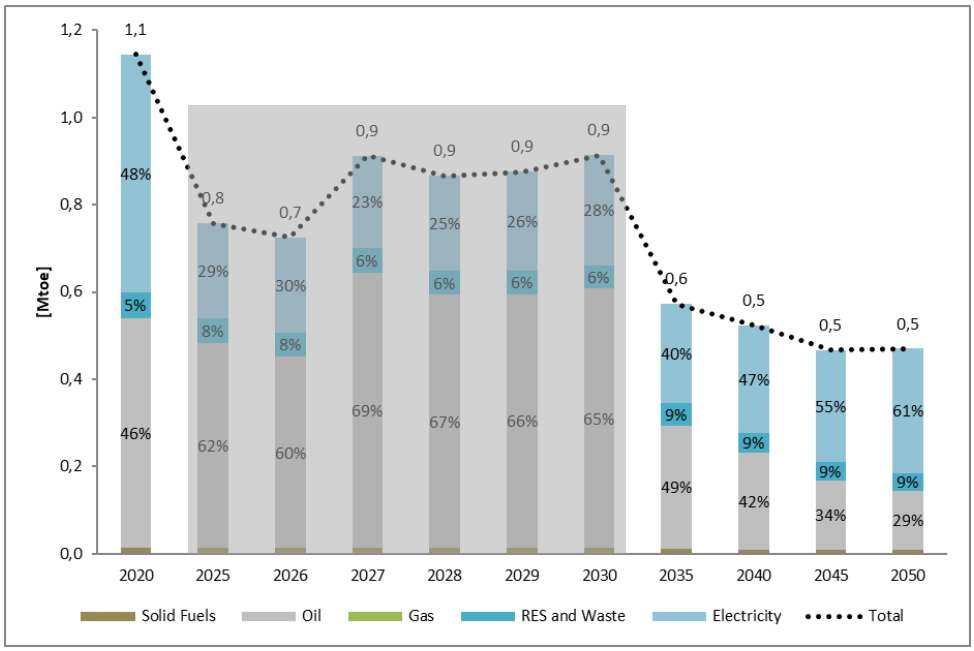
Figure 4.44: Energy imports per fuel over 2020-2050



On the other hand, exports of energy are expected to decrease from 1.11 Mtoe in 2020 to 0.99 Mtoe in 2030 and at 0.5 Mtoe in 2050, as presented in

Figure 4.45.

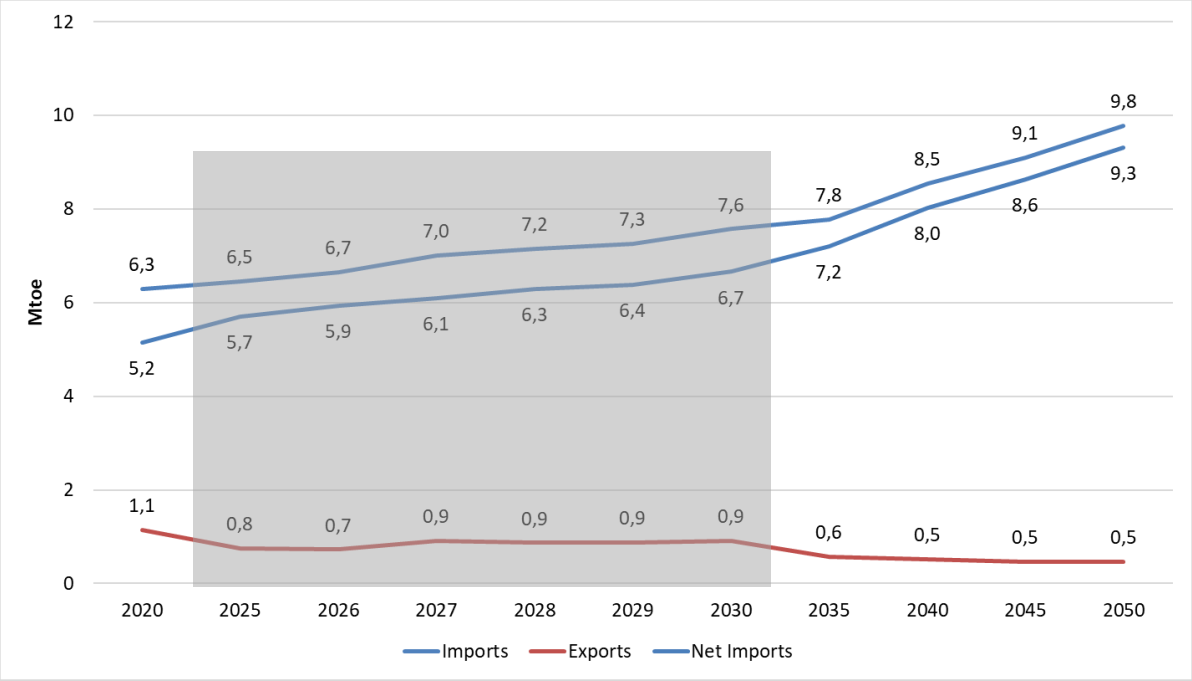
Figure 4.45: Energy exports per fuel over 2020-2050



Therefore, it is deducted that net imports of energy are expected to increase from 5.22 Mtoe in 2020 to 6.77 Mtoe in 2030 and to 9.3 Mtoe in 2050, resulting in a 81% increase in 2050, compared to 2020, as illustrated in

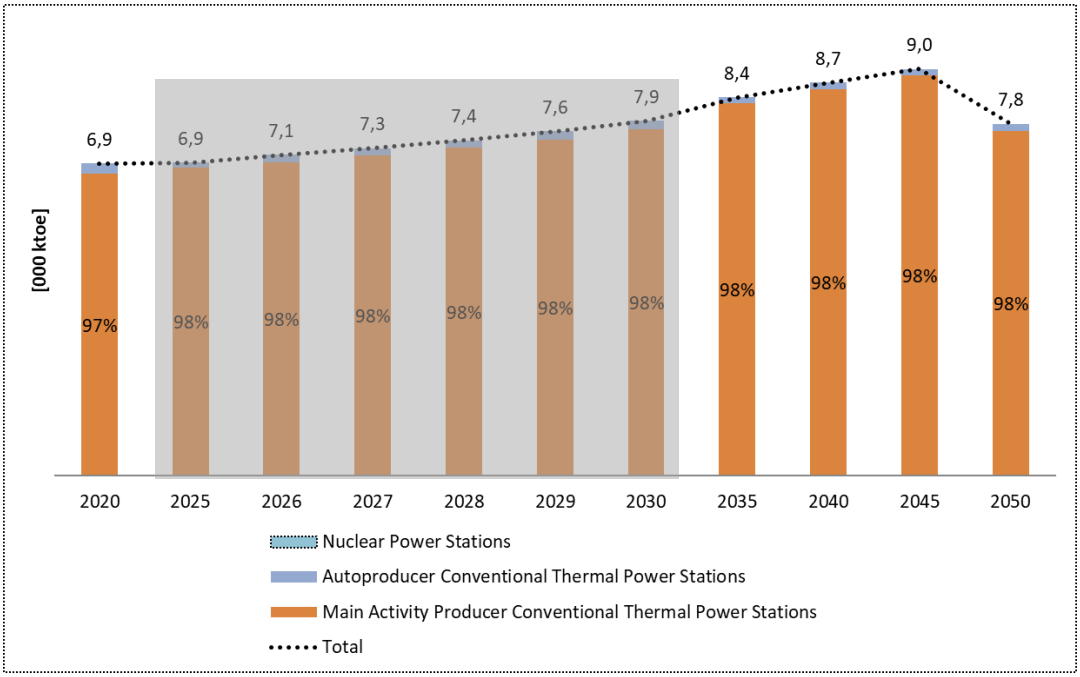
Figure 4.46.

Figure 4.46: Imports, exports and net imports over 2020-2050



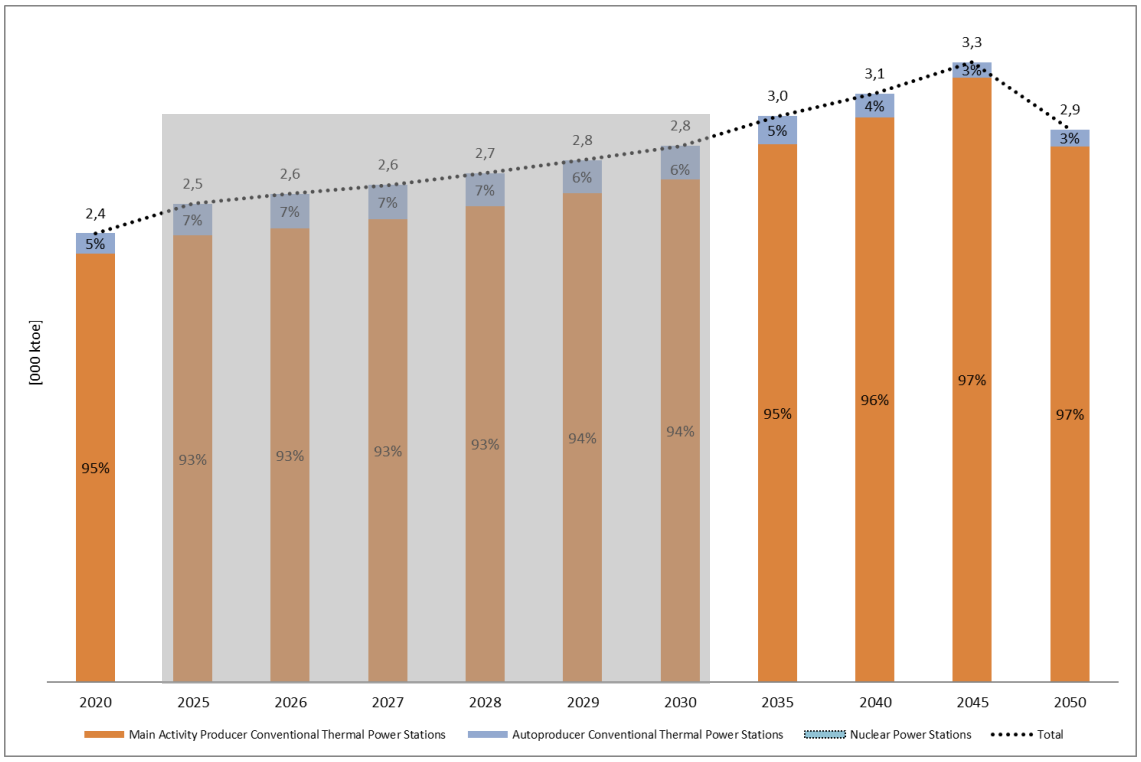
In 2020, the transformation input in electricity sector was equal to 6.99 Mtoe, while the respective figure will increase to 7.99 Mtoe in 2030 before reaching the level of 7.88 Mtoe in 2050. The share of Main Activity producers' conventional thermal power plants will remain stable at about 98% throughout 2050.

Figure 4.47: Transformation input in electricity sector over 2020-2050



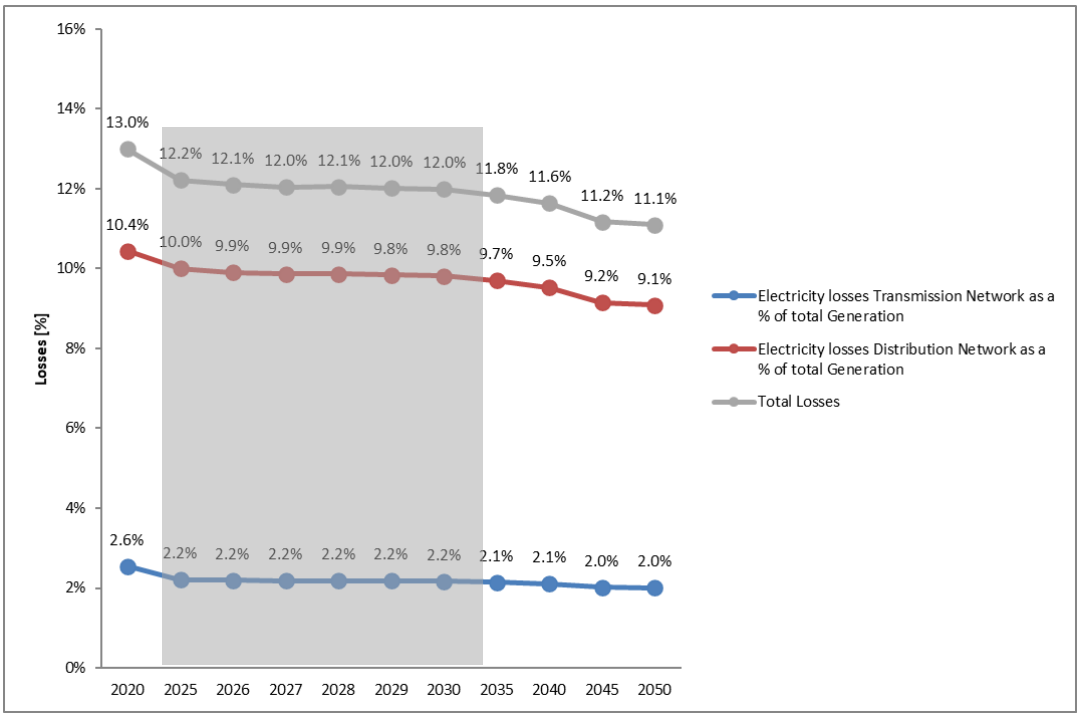
Similarly, the transformation output from the electricity sector was equal to 2.44 Mtoe in 2020, while it is anticipated to increase up to 3.3 Mtoe in 2045, before falling by 2050 at 3.0 Mtoe, as shown in Figure 4.48. The share of Main activity producers' conventional thermal power plants is expected to be reduced to 94% in 2030 from 95% in 2020, before its final growth to 97% in 2050.

Figure 4.48: Transformation output in electricity sector over 2020-2050



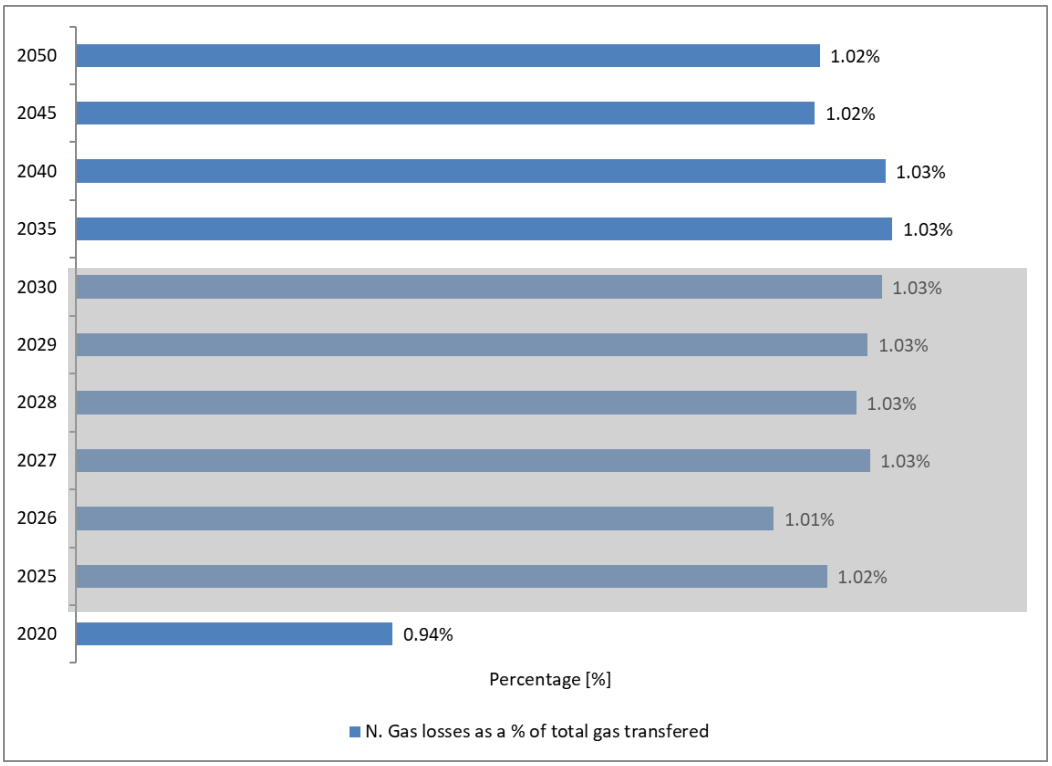
The efficiency of the national electricity grid is projected to be improved until 2050 through the implementation of projects for the enhancement of the electricity grid, as presented in Figure 4.49. More specifically, the electricity transmission network losses are anticipated to be slightly reduced by 0.1% in 2050 as a percentage of total generation, compared to 2020 (2.6%), while the electricity distribution network losses will be declined at 8.1% in 2050, compared to 2020 (11.%).

Figure 4.49: Total electricity network losses over 2020-2050



Similarly, the gas transportation network losses are expected to remain low as a percentage of total gas transferred, at a level close to 1% throughout the examined period.

Figure 4.50: Total gas network losses over 2020-2050



4.5 Dimension Internal Energy Market

4.5.1 Electricity interconnectivity

i. Current interconnection level and main interconnectors

The electricity transmission system network of the Republic of Serbia has a high interconnectivity level with all electricity systems of neighbouring countries. Serbia is connected with 400 kV, 220 kV and 110 kV cross-border overhead lines to all 8 neighbouring countries (Croatia, Hungary, Romania, Bulgaria, North Macedonia, Albania, Montenegro and Bosnia and Herzegovina). Due to its geographical position, the Serbian transmission system is a very important and integral part of the regional electricity system in the Balkans, and, as such the Serbian electricity market demonstrates a substantial activity bolstering the country as a key player for electricity trade in the region and supporting a gradually increasing electricity market integration.

Joint Stock Company "Elektromreza Srbije" (EMS) is the electricity Transmission system operator responsible for developing the transmission grid and manages four regional centres in order to assure the secure functioning of the entire electricity sector. EMS is also responsible for balancing the system and organising the provision of ancillary services for frequency and voltage regulation as well as for the coordination of cross-border power exchanges according to the ENTSO-E obligations.

The interconnectivity index of the Serbian transmission system (expressed as the ratio between the sum of

the maximum NTC values on the borders and the total installed generation capacity) is reported at 50%[84], i.e. much higher than the corresponding target of 10% for 2020 for EU member states. This high level of interconnectivity is expected to be utilized more efficiently as regional electricity market integration advances. Realised physical electricity transit in 2020 amounted to 4,532 GWh

In order to provide insight into the utilisation of interconnecting capacities, Table 4.5 provides an overview of capacities with every neighbouring electricity systems[85]. The capacities shown in this table represent the sum of the thermal limits of all transmission lines, and such, they differ for the winter and summer periods. It should be noted that the use of existing interconnecting transmission lines depends both on the limitations in the national transmission network and on the limitations set by the TSOs of neighbouring systems.

Table 4.5: Thermal capacities of interconnecting transmission lines by borders

Boarder	Summer capacity [MVA]	Winter capacity [MVA]
Albania -Serbia	1675	1675
Montenegro – Serbia	1874	2094
North Macedonia – Serbia	2424	2548
Hungary – Serbia	1206	1330
Bosnia and Herzegovina – Serbia	1456	1631
Romania – Serbia	901	1247
Bulgaria – Serbia	1206	1330
Croatia - Serbia	1206	1330

ii. Projections of interconnector expansion requirements at least until 2040 (including for the year 2030)

Projections of interconnector expansion requirements are performed every two years as a part of ENTSO-E planning studies and are included in the pan-European TYNDP in the form of identification of system needs. In the latest version of the TYNDP 2020, scenarios for 2030 and 2040 lead to a determination of potential needs related to the increase of interconnecting capacities within ENTSO-E over the given timeframe.

Figure 4.51 presents the outline of all system needs identified for years 2030 and 2040 in the Balkan region.

[84] Energy Community Secretariat, "Electricity Interconnection Targets in the Energy Community Contracting Parties", Feb. 2021

[85] Source: Ten Year Network Development plan 2021-2030 of the Republic of Serbia

Figure 4.51: ENTSO-e TYNDP 2020 identification of system needs for 2030 and 2040 (source: ENTSO-E)

Moreover, cross-border capacities expected to be commissioned by 2025 are presented in Figure 4.52 based on the ENTSO-E TYNDP 2020.

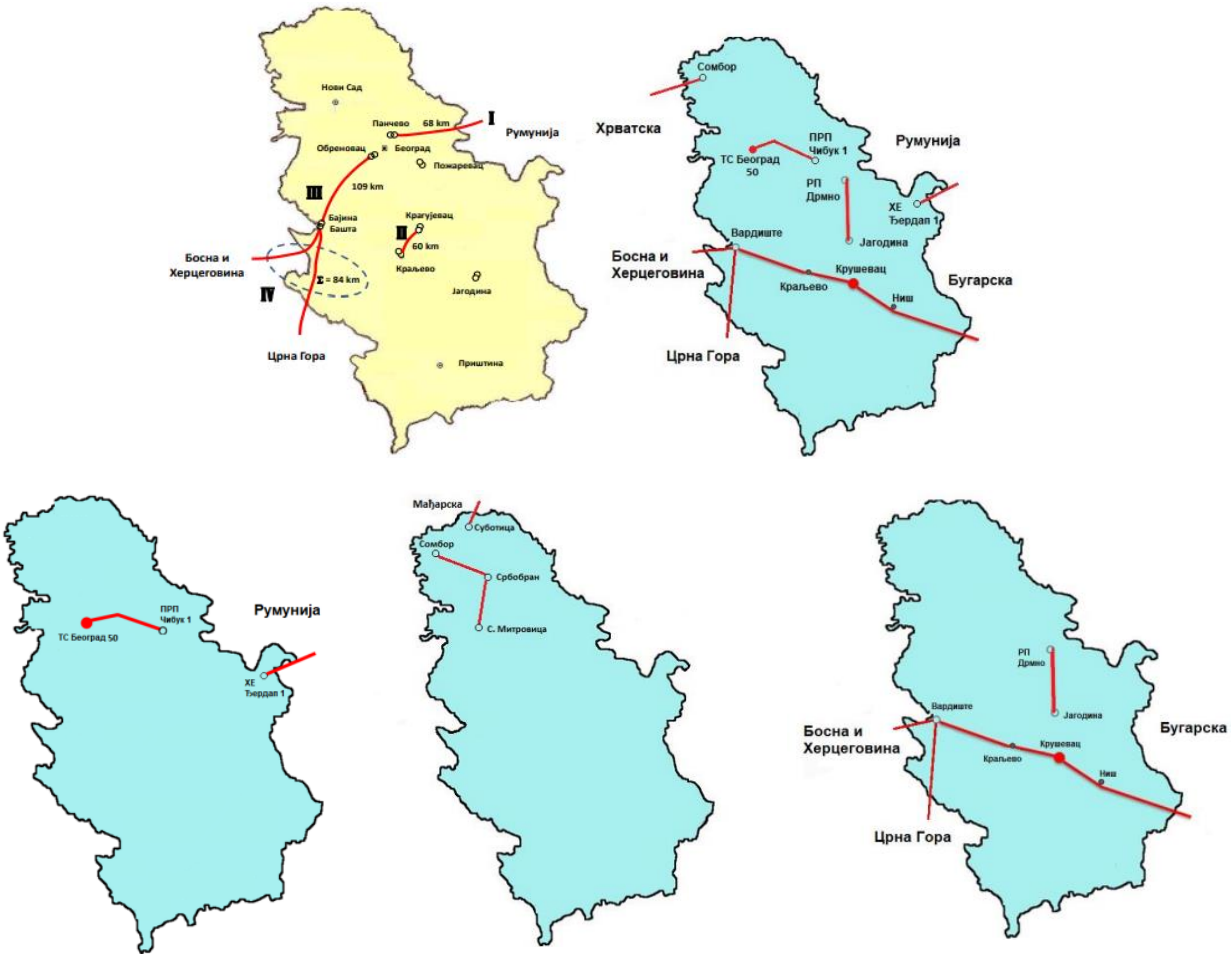
Figure 4.52: Cross-border capacities increases by 2025 (source: ENTSO-E)

Similarly, and in coordination to the planning studies performed by the ENTSO-E, TYNDP in Serbia contains project as they have identified taking into account the expected system needs for the upcoming period. Serbia plans 4 corridors of power interconnections with neighbouring countries:

- Transbalkan Corridor (phase 1 and 2),
- Pannonian Corridor,
- North CSE Corridor, and
- Central Balkan Corridor

Figure 4.53 shows the simplified grid topology of the electricity transmission network project corridors with all interconnections and transmission lines within the country.

Figure 4.53: Electricity transmission network project corridors (source: EMS)



4.5.2 Energy transmission infrastructure

i. Key characteristics of the existing transmission infrastructure for electricity and gas

Electricity transmission system network in the Republic of Serbia consists of lines, substations and other

voltage equipment that operate at voltage levels of 400 kV, 220 kV and 110 kV. Total length of all voltage level lines stands at 10866 km in 2019 and there are around 42 substations and 74 transformers.

An overview of the electric transmission system of Serbia is shown in

Figure 4.54. The total installed capacity of all substations and transformers was 17,624 MVA in 2019.

Figure 4.54: The Electric Power System of Serbia (source: EMS[86])

Reconstructions and adaptations of assets of the transmission network are constantly carried out for various reasons, such as the renewal of the useful life of the assets, increase in transmission capacity, increase in safety and reliability, as well as interoperability with other plant and apparatus of the grid. Evidently, based on the all key performing indicators, EMS carries out an adequate planning of the development of the transmission system leading to less faults and reduction of transmission losses.

The natural gas transmission network is operated by three transmission system operators. It is consisted of 2414 km of in north and central Serbia operated by the "Transportgas Srbija" and additional 125 km in southeast Serbia operated by the "Yugorosgaz transport". Total of 2,483 million m^3 of natural gas were

[86] "Elektromreza Srbije", transmission system operator of Serbia, website: https://ems.rs/page.php?kat_id=49

consumed in 2020 and 2,708 million m3 of natural gas were available from: import, local production and underground storage.

Gastrans d.o.o. is an independent transmission operator of the interconnection gas pipeline from Bulgaria to Hungary with a length of 402 km.

Figure 4.55: The Natural Gas network of Serbia (source: AERS)

ii. Projections of network expansion requirements at least until 2040 (including for the year 2030)

Until 2030 and beyond, the electricity transmission network has scheduled and carries outcome mayor investments involving strengthening and new interconnections. On individual interconnection lines, additional new interconnections are under consideration:

- Serbia - Bosnia and Herzegovina 110 kV SS Ljubovija – SS Srebrenica
- Serbia – Montenegro – Bosnia and Herzegovina 2x400 kV Serbia-BH-MNE
- Serbia – Croatia 400 kV SS Sombor 3 – SS Ernestinovo
- Serbia – Bulgaria 400 kV SS Leskovac – SS Bobov Dol
- Serbia – Romania 400 kV SS Djerdap 1 – SS Portile de Fier
- Serbia – Montenegro 110 kV SS Tutin – SS Rozaje
- Serbia – Hungary 400 kV SS Subotica 2 – TS Sandorfalva

Due to the expected increase of renewable energy sources generation capacities and an increased need of transmission capacity improvement within the territory of Serbia, the following three projects are identified as part of the existing Corridor projects:

- Implementation of Transbalkan Corridor: OHL SS Kragujevac (RS) - Kraljevo (RS)
- Implementation of Transbalkan Corridor: OHL Obrenovac (RS) - Bajina Basta (RS)
- Cluster of network infrastructure projects in the wider area of Belgrade (BEOGRID)

The implementation of the Serbia-Bulgaria gas interconnection project is one of the most recent investment projects in the natural gas transmission network which is currently under development. The following interconnection projects are seen in future projections to foster diversification of natural gas supply and allow wider interconnection with neighbouring systems:

- Project for Serbia-Romania gas interconnection 85.5 km (out of which 12.8 km is on the territory of the Republic of Serbia), with a capacity of 1.2 billion m3/year
- Project for Serbia-Croatia gas interconnection (95 km, with a capacity of 1.5 billion m3/year)
- Project for Serbia-BiH gas interconnection 90 km, with a capacity of 1.2 billion m3/year
- Gas pipeline - interconnection with Montenegro
- Project for Serbia-Macedonia gas interconnection 70.7 km, with a capacity of 0.8 billion m3/year
- Project for Nis-Pristina gas pipeline construction 65 km, with a capacity of 0.8 billion m3/year

Within the country boarders the main gas pipeline RG 11-02 Leskovac-Vladicin Han-Vranje of 71 km length and with a capacity of 1.5 billion m3/year, shall be to enable gasification of the south Serbia.

4.5.3 Electricity and gas markets, energy prices

i. Current situation of electricity and gas markets, including energy prices

In Serbia the electricity day-ahead market is operated by South-Eastern European Power Exchange (SEEPEX) which was established in 2015 on the basis of partnership between EMS JSC and EPEX SPOT in France as a joint stock company with the majority ownership of the Serbian side. It is licenced for the operation of organized electricity markets. In 2020, the day-ahead electricity market operated in the power exchange had 22 participants registered / which amounted three participants more than 2019. In both years of reference, an average 18 participants were actively involved in the day-to-day trade activities.

In 2020, suppliers mainly competed and traded amongst themselves in the wholesale electricity market because non-EPS generation which comprise existing wind parks operate as privileged producers and sell electricity to the guaranteed supplier at fixed feed-in tariffs. The suppliers' activity in the open market appears very active in the field of cross-border exchange, primarily with the purpose of enabling transit through Serbia. This opportunity appears as the dominant choice of suppliers organising transit exchanges due to central geographic position of the power system of Serbia in the region.As per Energy Agency Annual report[87] in 2020 , supplier activity amounted to around 14.7 TWh. There were 57 active market players and 11 suppliers dealing with final customers supply in the open market in 2020. The electricity supply activities are mostly related to the commercial consumers. There were 64 energy entities holding supply licences out of which 11 were active in supplying final consumers. The dominant electricity supplier is EPS with a market share corresponding to more than 95% of the electricity sold to final consumers. Figure 4.56 presents average retail prices in the competitive segment of the retail electricity market, net of VAT and duties. Households and small consumers are entitled to guaranteed supply which implies supply of electricity at regulated prices. Evolution of electricity prices for households is presented in Figure 4.57.

Figure 4.56: Average annual retail prices in the competitive electricity, excluding VAT and duties free (source: AERS)

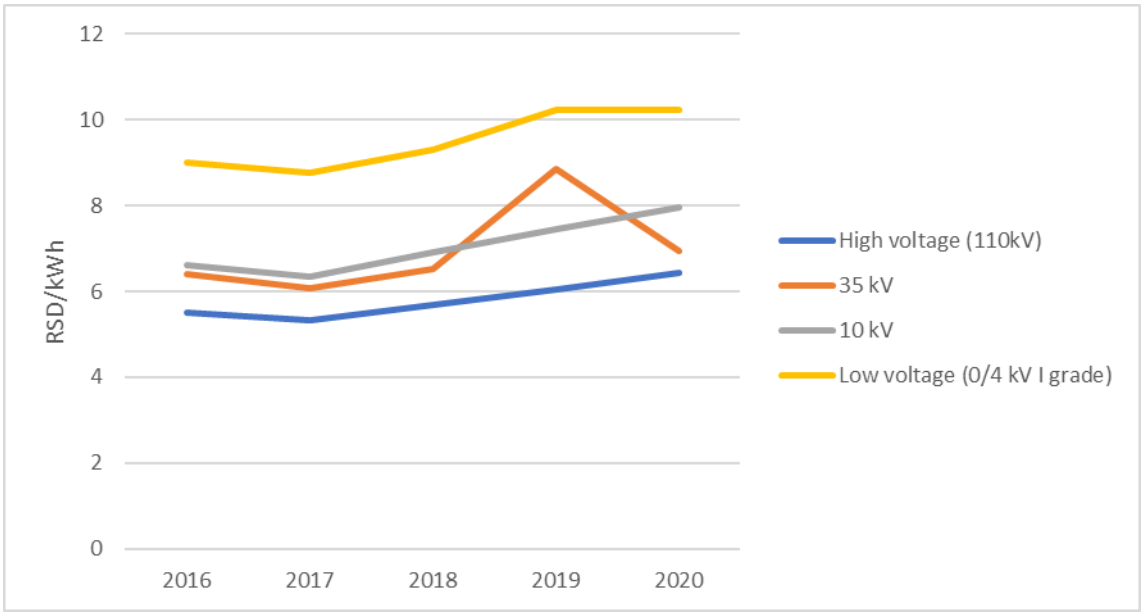
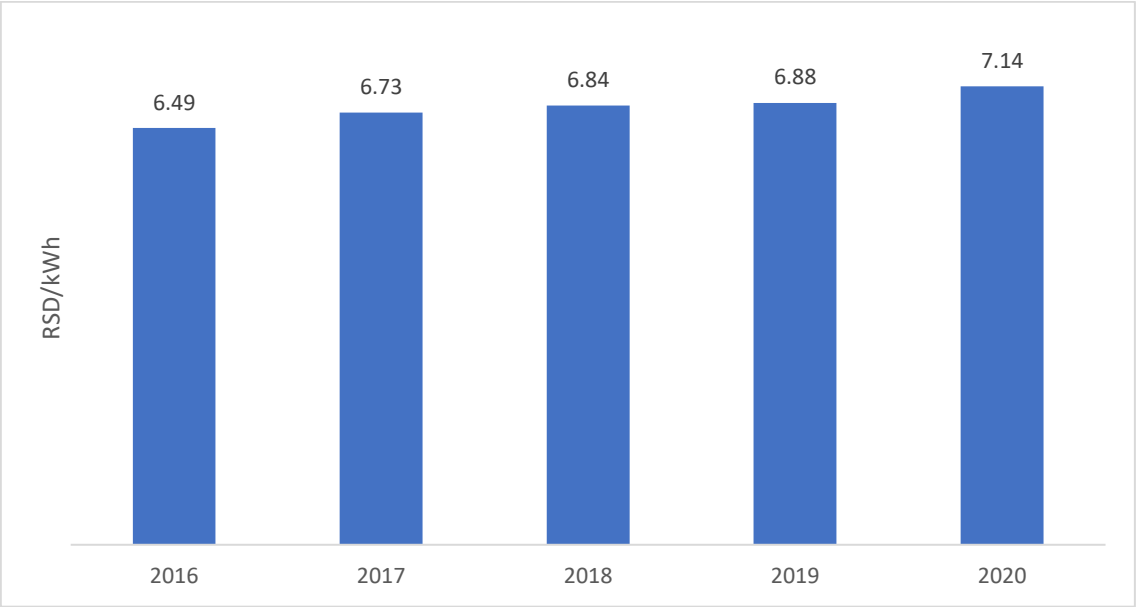


Figure 4.57: Average annual retail prices in the regulated market, excluding VAT and duties free (source: AERS)

[87] 2020 Energy Agency Annual Report, Belgrade, May 2021 (website: https://www.aers.rs/Index.asp?l=2&a=53)



In the natural gas wholesale market, there are three licenced natural gas suppliers and one producer which were active in 2020, while trading is carried out through bilateral contracts. Until a competitive natural gas market is established, the Government of the Republic of Serbia appoints the supplier of public suppliers. There were 26 active suppliers in the open market who dealt with retail in 2020 while there were 31 public suppliers who also acted as natural gas distributers. Historical data for natural gas public supply price and average weighted retail price in the regulated market are presented below.

Figure 4.58: Average approved natural gas public supply price in RSD/m^3 (source: AERS)

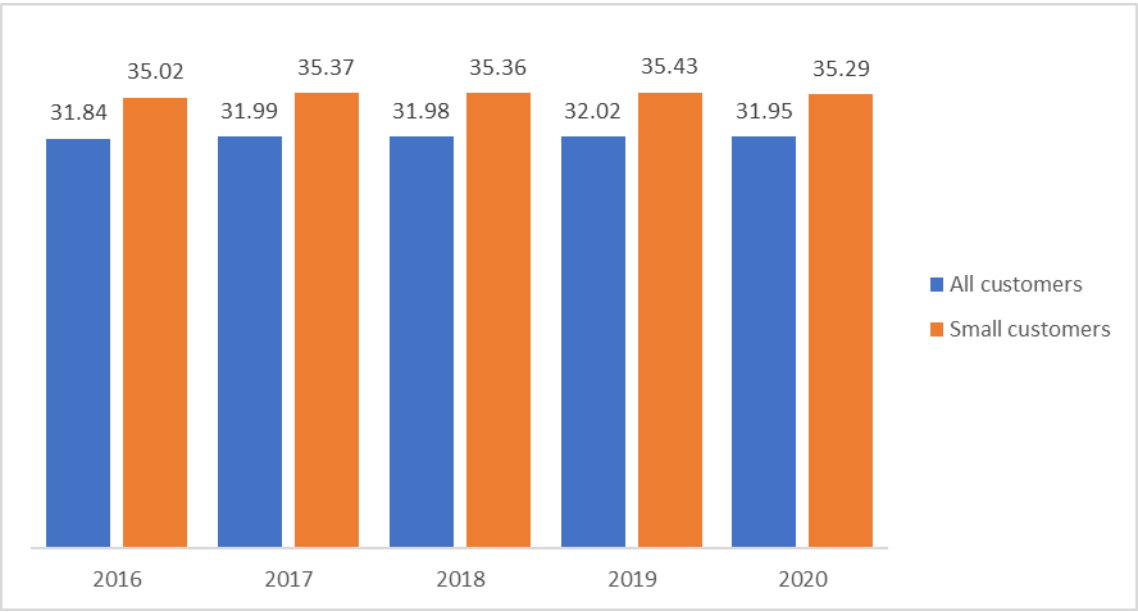
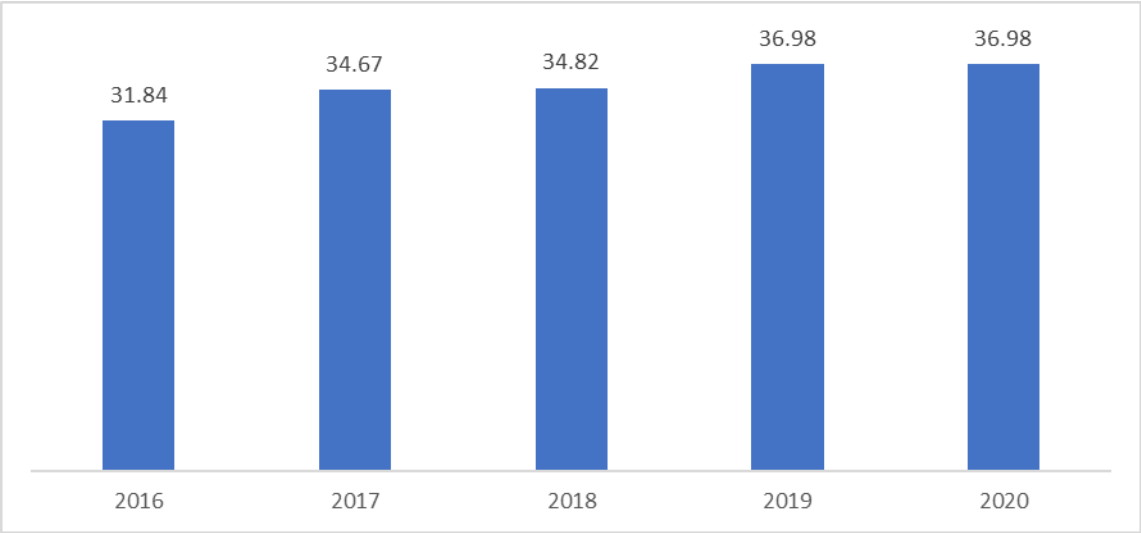


Figure 4.59: Average weighted retail price in the regulated market in RSD/m^3(source: AERS)



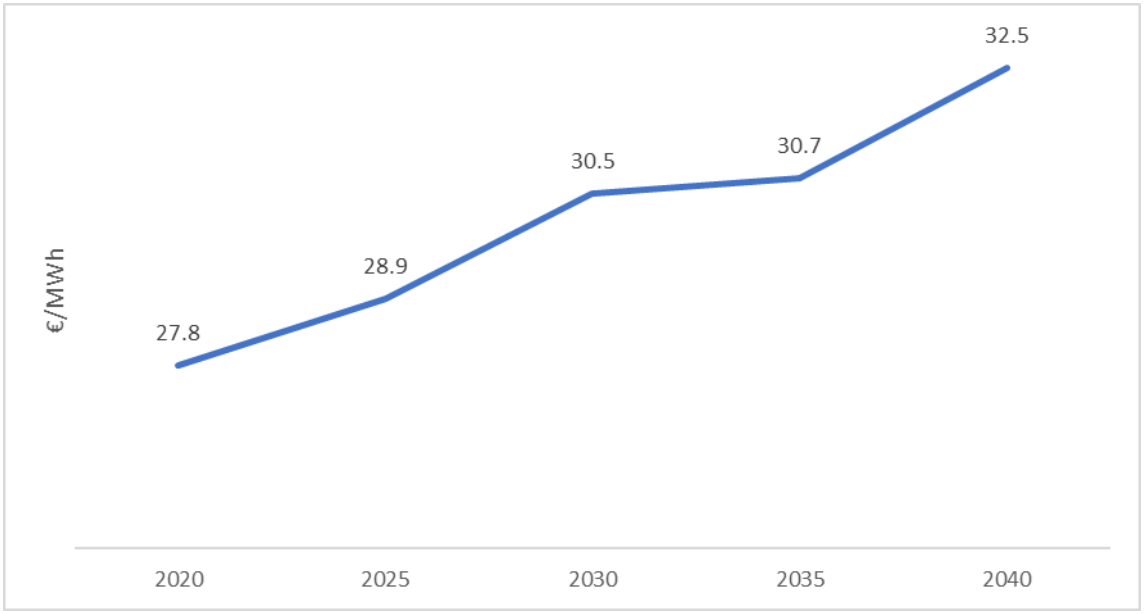
ii. Projections of development with existing policies and measures at least until 2040 (including for the year 2030)

The main goal of the SEEPEX development in the coming years relates to market coupling of the day- ahead and intraday markets with organised markets in the neighbouring countries. According to announced plans the following projects should be completed by 2025:

- Day ahead market coupling between Serbia and the markets of Hungary and Romania;
- Day ahead market coupling between Serbia with the markets of Croatia and Bulgaria;
- Day ahead market coupling between Serbia with the Montenegrin market (and, implicitly, with the Italian market).

The estimation of evolution of the average electricity supply cost for the scenario with existing measures based on the expected development is shown in Figure 4.60 The estimation of these costs involved an analysis of the foreseeable investments pertinent to the construction of new power plants, as well as projections and assumptions on the fuel costs and other operating costs of all power plants. The estimate does not include the annuities of plants that are already in operation and does not include any carbon price, since this is not considered in the WEM analysis.

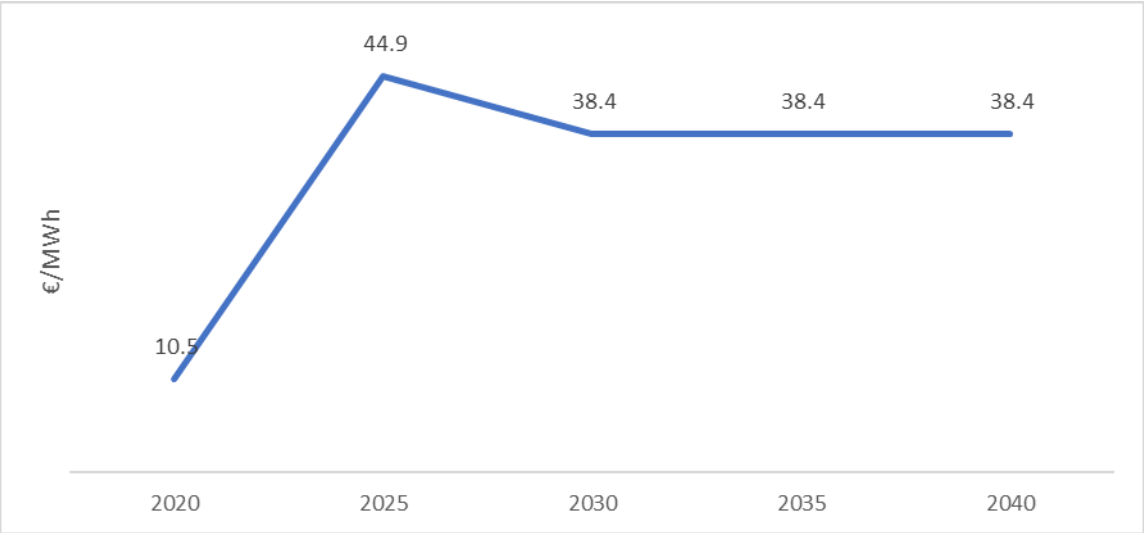
Figure 4.60: Estimated average electricity supply cost



Natural gas sector in Serbia is expected to undergo a reform of the wholesale market with a view to foster competition, establish of a natural gas exchange and unbundle the supply from distribution activities.

In respect to natural gas price development projections, the average annual import prices are shown in the following figure. The projections of international gas prices follows the "Recommended parameters for reporting on GHG projections in 2023" by EC DG Climate Action which was provided by the EC in order to support Member States and other bodies (e.g. the EnC Secretariat) to revise their NECPs.

Figure 4.61: Natural gas average annual import prices



4.6 Dimension Research, Innovation and Competitiveness

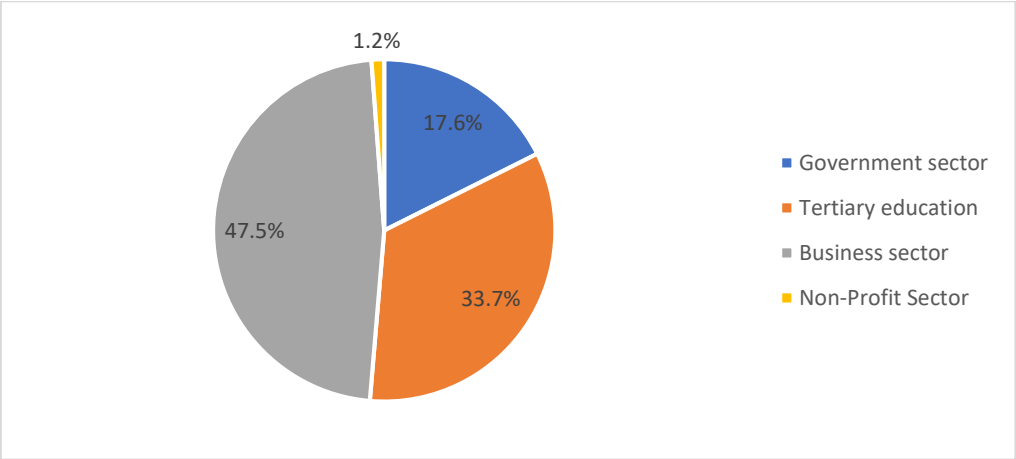
i. Current situation of the low-carbon-technologies sector and its position on the global market

Currently, in Serbia there are limited activities regarding R&D in the energy sector and limited number of producers of low-carbon technologies. In recent years, there has been a strong focus on more extensive use of alternative sources, partly driven by environmental obligations that have provided impetus for new technological demand. Current key priorities of energy research in Serbia are energy efficiency and renewable energy, smart cities and mobility, as well as energy storage, but still, most of the companies in the energy sector are service-orientated, mainly in RES and EE. Therefore, there is a significant potential for scaling up low-carbon and energy-efficient solutions, starting from the demonstration and pivotal stage up to the market of renewable energy technologies and achieving more significant energy savings.

ii. Current level of public and private research and innovation spending on low-carbon-technologies, current number of patents, and current number of researchers

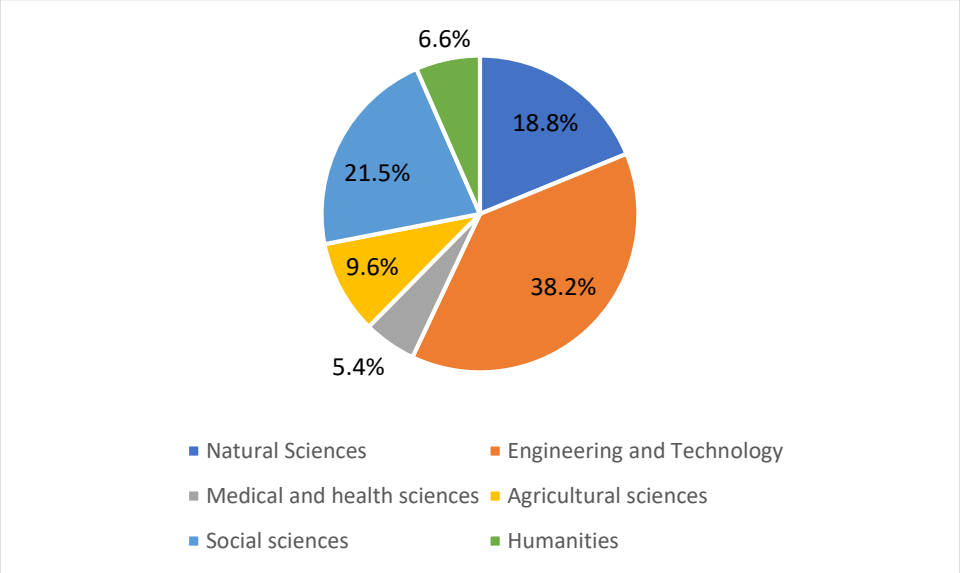
Total expenditures for research and development activities in 2020 amounted to 0.91% of GDP. The share of total budgetary funds for R&D in GDP reached 0.46% in 2020. The largest percentage of budget funds for R&D went to the government sector (64.4%), followed by the higher education sector (23%). Funds from international organizations participate with 9.3% in the total funds for financing scientific research work, the non-financial (business) sector participates with 2.1%, while 1.1% of funds were allocated for the non-profit sector. In 2020, Serbia had 335 organizations active in research and development, with majority operational within business sector, while one-third belongs to tertiary education sector.

Figure 4.62: Breakdown of R&D organizations per sector (source: Statistical Office of the Republic of Serbia)



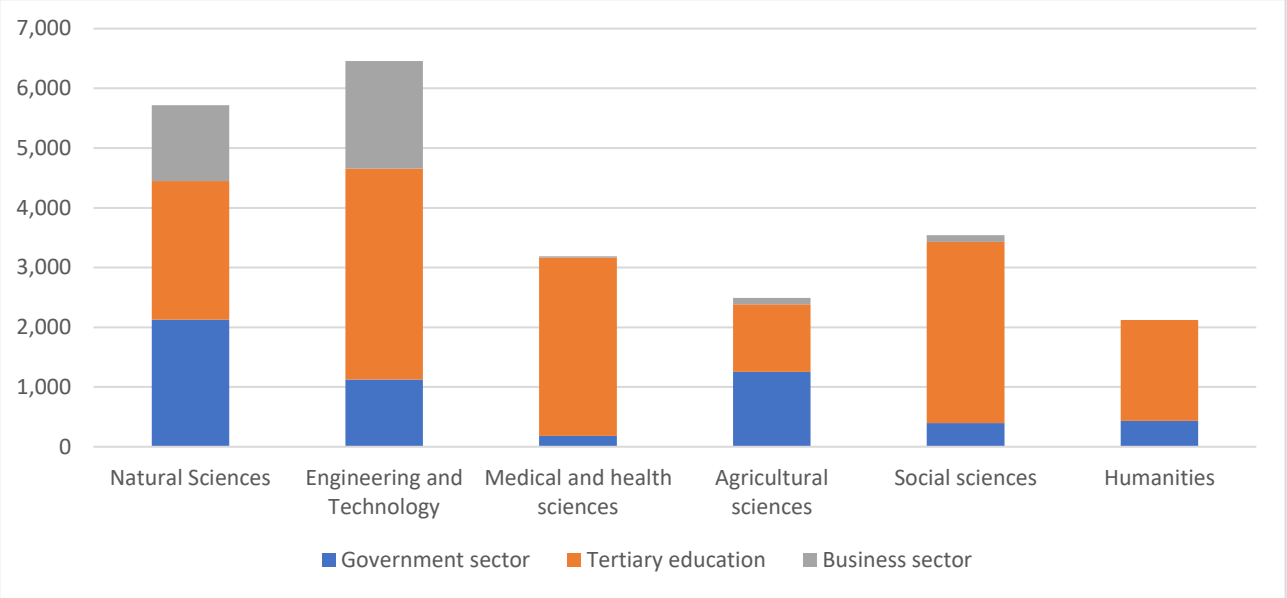
Looking at fields of science, most of organizations are focused on engineering and technology (128), together with social sciences (72) and natural sciences (63). Detailed breakdown is presented in Figure 4.63 below.

Figure 4.63: Breakdown of R&D organizations per fields of science (source: Statistical Office of the Republic of Serbia)



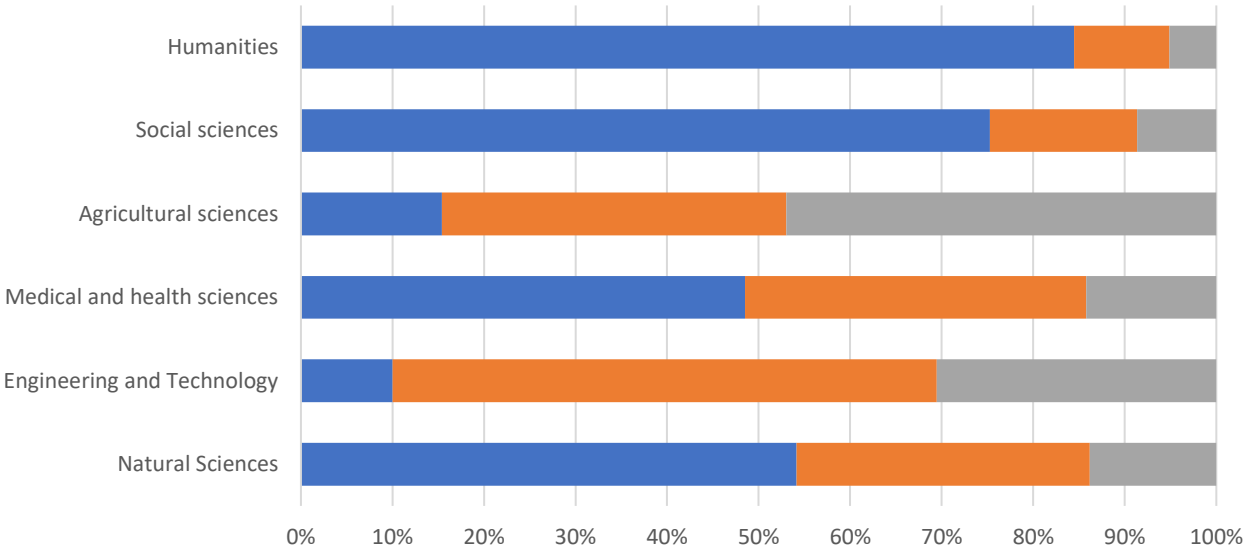
In 2020, Serbia had 23,524 full-time and part-time employees engaged in R&D activities, with 62.4% employed in tertiary education sector, 23.5% in government sector and 14.1% in business sector. Detailed breakdown of employees per sector and field is given in Figure 4.64below.

Figure 4.64: Number of employees engaged in R&D activities (source: Statistical Office of the Republic of Serbia)



In 2020, the basic research works have dominated (54.3%), while applied research works has significant share (29.8%), and development research works the lowest (15.9%). However, tertiary education sector has been the most productive in terms of number of research works performed (7,731 projects and studies), followed by the government sector (3,860 projects and studies). In both sectors, the basic research works were priority, 60.2% in government sector and 59.2% in tertiary education sector. Finally, business sector has been applied-focused, with 54.7% of applied research works and 34.9% of development projects and studies. Figure 4.65below presents country-level breakdown of research works per type and field.

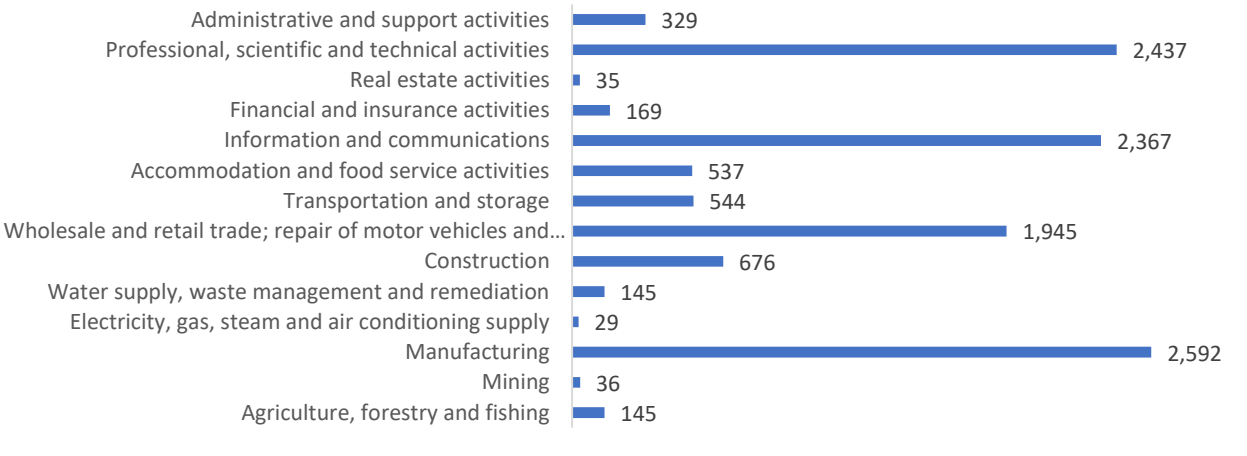
Figure 4.65: Breakdown of research works by fields of science and type (source: Statistical Office of the Republic of Serbia)



	Natural Sciences	Engineering and Technology	Medical and health sciences	Agricultural sciences	Social sciences	Humanities
Basic	1505	280	280	94	2950	1932
Applied	891	1662	215	230	630	238
Development	384	854	82	287	339	117

As per official statistics, there were 21,877 enterprises in 2020, of which 84% are large enterprises, 13% medium enterprises and 3% small enterprises. The share of those business entities with at least one type of innovation is 54.79%. More than 69% of large business entities are innovative, about 58% of medium-sized business entities and about 54% small business entities. Figure 4.66 below presents breakdown of innovative enterprises per sector.

Figure 4.66: Breakdown of innovative enterprises per industry (source: Intellectual Property Office of the Republic of Serbia)



In 2020, the total number of patents registered were 1,546 patents including 56 granted according to the national procedure, 28 entered into the Register on the basis of the Cooperation and Extension Agreement

with the European Patent Office and 1,462 on the basis of the law on the ratification of the Convention on the Grant of European Patents. Out of 56 granted patents, 52 were patents of residents and 4 of non-residents. Out of the total number of patents granted in the national procedure, 84.2% were those invented by natural persons and 15.8% those invented by legal entities.

iii. Some areas of technological development participate in the research financed through budget funds through projects of other ministries, such as the area of agriculture and environmental protection, energy, transport, urban planning and construction, defence, etc. The results of the research are mostly studies, research expertise or other required results. Current level of energy costs including in the international context

Electricity

Based on the Methodology for determining price of power for guaranteed supply from the Energy Agency of the Republic of Serbia, the structure of the price of electricity consists of the fixed part and the consumption-based part, varying depending on the consumer type and category. Electricity tariff for public supply prescribes three consumer categories – low voltage consumption, households and public lighting. In case of low voltage consumption category, consumers are obliged to pay public supplier charges which is fixed part, and consumption-based part for calculated and excessive power, reactive and excessive reactive energy, as well as active energy which are divided in high daily tariff and low daily tariff.

In case of households, the fixed part includes public supplier charges, while consumption-based part includes active energy and calculated power. Electricity consumed has several categories, based on metering principles - one-tariff metering, two-tariff metering, controlled consumption and controlled consumption with specific metering. The higher and lower tariff are differently calculated depending on part of country. Serbia is divided into three zones - Vojvodina, Belgrade and Central Serbia. Thus, the lower tariff applies in in period 22.00h – 06.00h for Central Serbia, in period 23.00h – 07.00h for Vojvodina, and in period 24.00h – 08.00h for Belgrade. Furthermore, electricity consumed is calculated as per three different pricing zones – green, blue and red. Those pricing zones define level of consumption, where green zone is up to 350 kWh, blue 351 - 1,600 kWh and red over 1,600 kWh.

When it comes to other elements, both fee for incentive of privileged electricity producers and fee for improvement of energy efficiency are applied as unit price in relation to consumption, as defined in Decree on the Amount of the Fee for Incentives for Privileged Electricity Producers and New Law on Fees for use of Public Goods. Finally, pricing includes excise tax (7.5%) and VAT (20%) as well.

In case of industry, pricing includes part for costs related to distribution system as defined per Pricelist for access to distribution system, electricity consumed, fees for privileged producers and energy efficiency, and excise tax and VAT. The electricity consumed for industry is calculated as per contracted price.

Natural gas

Transmission system connection costs are set by TSO on the basis of elements from the connection application and on the Methodology for Setting Costs of Connection to Natural Gas Transmission and Distribution System adopted by the AERS. Distribution system connection costs are set by DSO on the basis of elements from the connection application and on the Methodology for Setting Costs of Connection to Natural Gas Transmission and Distribution System adopted by the AERS. The variation in distribution use-of-system charges with different DSOs is the result of the size and features of the distribution systems, the structure and number of customers, the age of the distribution system and other factors.

iv. Projections of developments in i. to iii. with existing policies and measures at least until 2040 (including for the year 2030)

In Serbia, a system to encourage the use of renewable energy sources for the electricity production was introduced in 2009, enabling RES electricity producers to receive feed-in-tariffs for the kilowatt-hour of

electricity produced, depending on the renewable energy source used and technology. Since 2021, with adoption of the Law on the Use of Renewable Energy Sources, the Decree on Market Premiums and Feed-in Tariffs and the Decree on the Model for Market Premium Agreement, Serbia set up new incentive framework in the form of premium system. In addition to the market premium, the Law on the Use of Renewable Energy Sources also envisages feed-in tariff system remaining available only for small plants and demonstration projects. The same law introduced concept of prosumers as well, enabling consumers to act as a producer and stipulating to deliver surplus to network.

With aim to support energy transition through energy savings, Serbia introduced households-orientated mechanism, providing subsidies for increase of energy efficiency. In cooperation with local governments, by securing funds Government stimulates citizens to invest in replacement of doors and windows, the installation of insulation, the installation of boilers and stoves using cleaner fuels, as well as the installation of solar collectors and solar panels.

In 2021, Serbia adopted Decree on the conditions and the manner of carrying out a subsidized purchase of new electric and hybrid vehicles[88] which prescribes incentive scheme for purchase of new environmentally friendly vehicles - electric and hybrid, providing a subsidy which ranges from 250 euro to 5,000 euro depending on the type of vehicle. System includes five categories of vehicles, covering mopeds and light tricycles, motorbikes, passenger cars and light trucks exclusively electricity-powered, vehicles running on hybrid traction with the obligation that recharging must be carried out from an external source of electricity, as well as electric vehicles with integrated composition to extend their range with CO2/km emissions of up to 50 g/km, and vehicles with hybrid traction which have at least one electric motor in addition to the internal combustion engine and can drive without running the internal combustion engine for a certain time and exclusively on electric traction, whereby the generation of electricity to recharge the battery is carried out inside the vehicle.

[88] Official Gazette of RS, no. 132/21

5 IMPACT ASSESSMENT OF PLANNED POLICIES AND MEASURES

The scenario with the additional measures (WAM) aiming to reduce emissions and increase RES and EE by 2030, is denoted as ***Scenario S*** in the following sections. In this scenario, a number of measures are put into place until 2030, aiming at a gradual reduction of emissions until 2030, and the process of decarbonization is intensified, afterwards targeting at low emissions level by 2050. **Fossil fuel thermal power plants are expected to completely stop generation of electricity by 2050.**

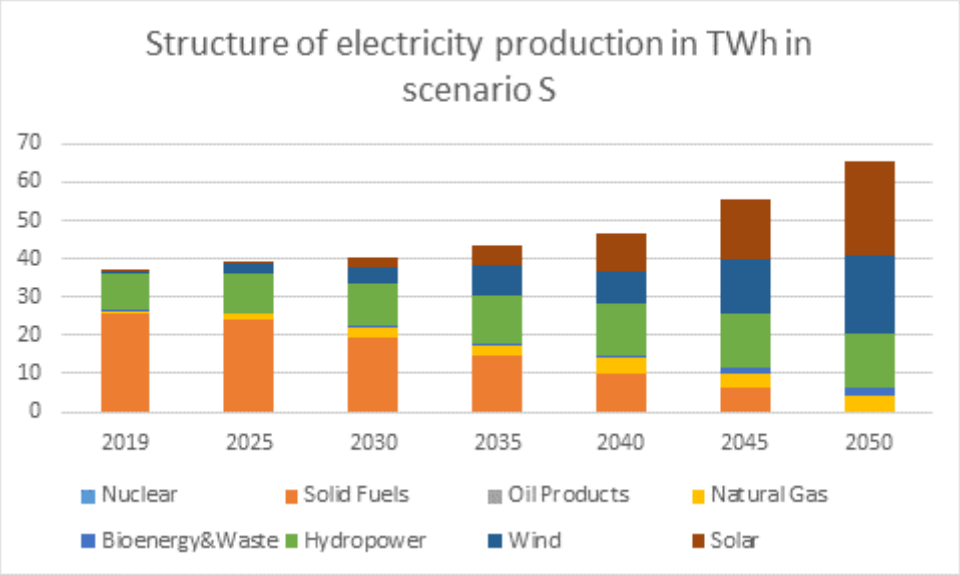


Figure:Structure of electricity production in TWh in scenario S

A variation of scenario S is denoted as S***cenario S-N*** and considers the introduction of Nuclear Power Plans of 1,000 MW capacity after 2040 in the Serbian power system, to support the decarbonisation pathway towards 2050.

Building renovations are actively promoted both for residential buildings (with 1% to 1.5% annual rate for multi-family buildings and 0.5% for single-family) and mainly public sector buildings (3.3% annual renovation rate until 2030) and other non-residential buildings (2.3% annual renovation rate until 2030) and is intensified toward 2050 by doubling the renovation rates. Electrification of heating and transport is coupled with increased share of RES in electricity generation, while green hydrogen is introduced initially in demonstration projects and after 2030 in larger quantities. Biomethane is gradually introduced in the thermal applications and included in blending with natural gas, together with green hydrogen after 2030.

Carbon pricing is included in this set of scenarios for the sectors which are identified in the EU-ETS scheme according to the values in the following table[89].

[89] The background assumption is that carbon tax is first introduced in 2027 at a low rate of 4€/ton, and is subsequently increased to 40€/ton in 2030, corresponding to half of the EU-ETS price projected in the document "Recommended parameters for reporting on GHG projections in 2023" by EC DG Climate Action, and reaching the full projected EU-ETS price, by 2045.

Table 5.1: Carbon pricing projections

	2030	2035	2040	2045	2050
Euro/tCO2	40	41	45	130	160

The assumptions regarding international fuel prices and evolution of costs of technologies are the same as those used in the WEM scenario , as shown in sections iii and iv of Chapter 4.1.

5.1 Impacts of planned policies and measures described on energy system and GHG emissions and removals

The overall GHG emissions, including agriculture, waste and LULUCF[90], present a different trend between WEM and scenarios S and S-N by 2050. More specifically, the overall GHG emissions in WEM are expected to increase from 2026 to 2045 before decreasing in 2050, while the total GHG emissions in scenarios S and S-N are moving constantly downwards over 2026-2050; at a lower pace by 2029 and at a higher one between 2030 and 2050.

The total GHG emissions, including agriculture, waste and LULUCF, stood at 47,765 ktons of CO2-eq in 2030 in both scenarios S and S-N (Figure 5.1). A reduction of 40% in 2030 has been recorded in scenarios S and S-N (Figure 5.2), compared to the 1990 levels due to the increased penetration of RES and the implementation of energy efficiency measures, while at the same time a reduction of 19% is recorded in 2030 in WEM scenario, compared to 1990.

In 2050, the total GHG emissions, including agriculture, waste and LULUCF, reach 21,330 ktons of CO2-eq in scenario S and 19,745 ktons of CO2-eq in scenario S-N. A reduction of 73% and 75% has been recorded in scenarios S and S-N respectively in 2050, compared to the 1990, while the corresponding decline in WEM scenario compared to 1990 is equal to 9% demonstrating the impact of the additional policies and measures.

[90] The projection of emissions from agriculture, waste and LULUCF are taken from scenario M2 of the Climate Strategy and Action Plan, elaborated by the Ministry of Environmental Protection.

Figure 5.1: Total GHG emissions (including agriculture, waste and LULUCF)

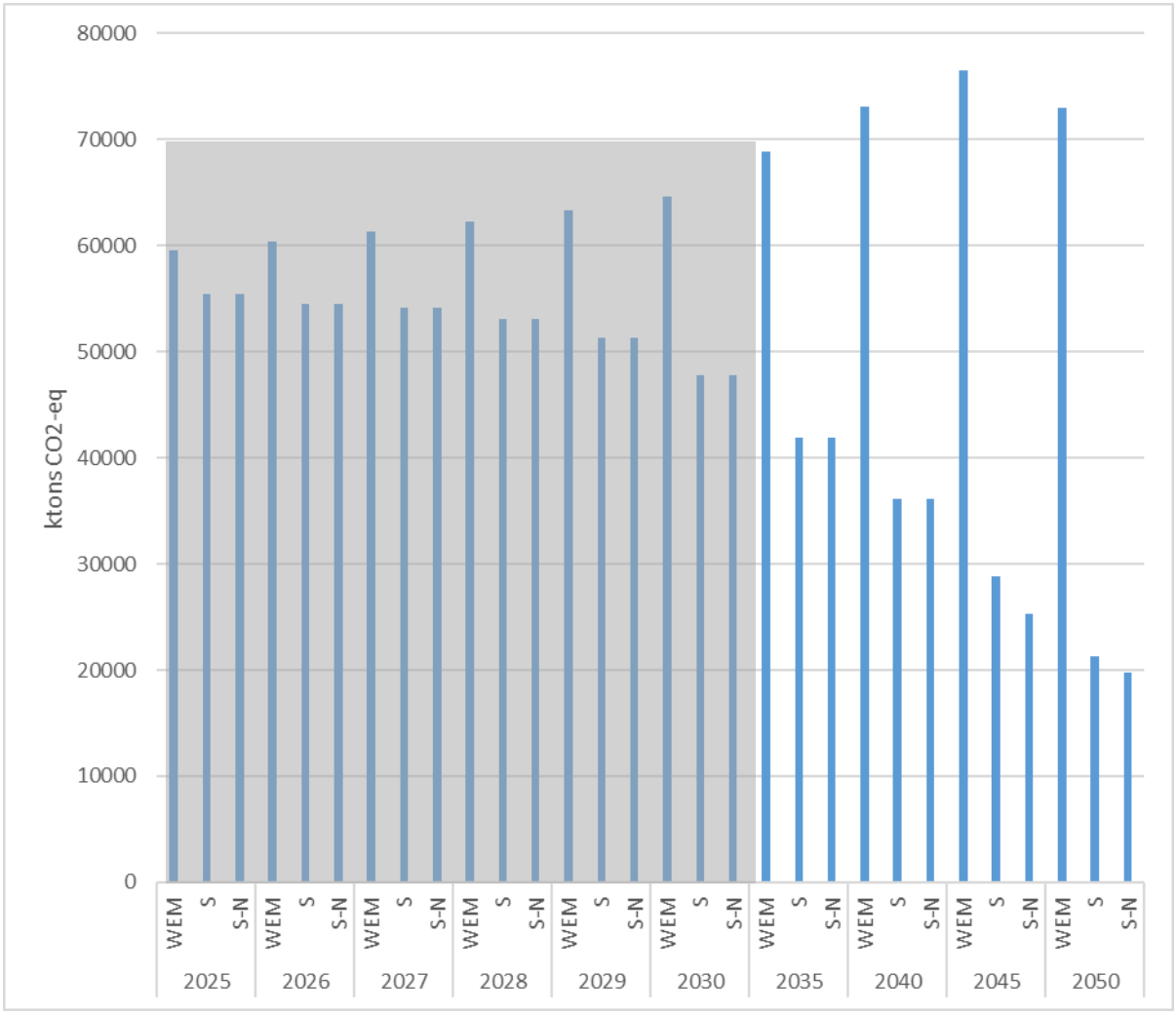
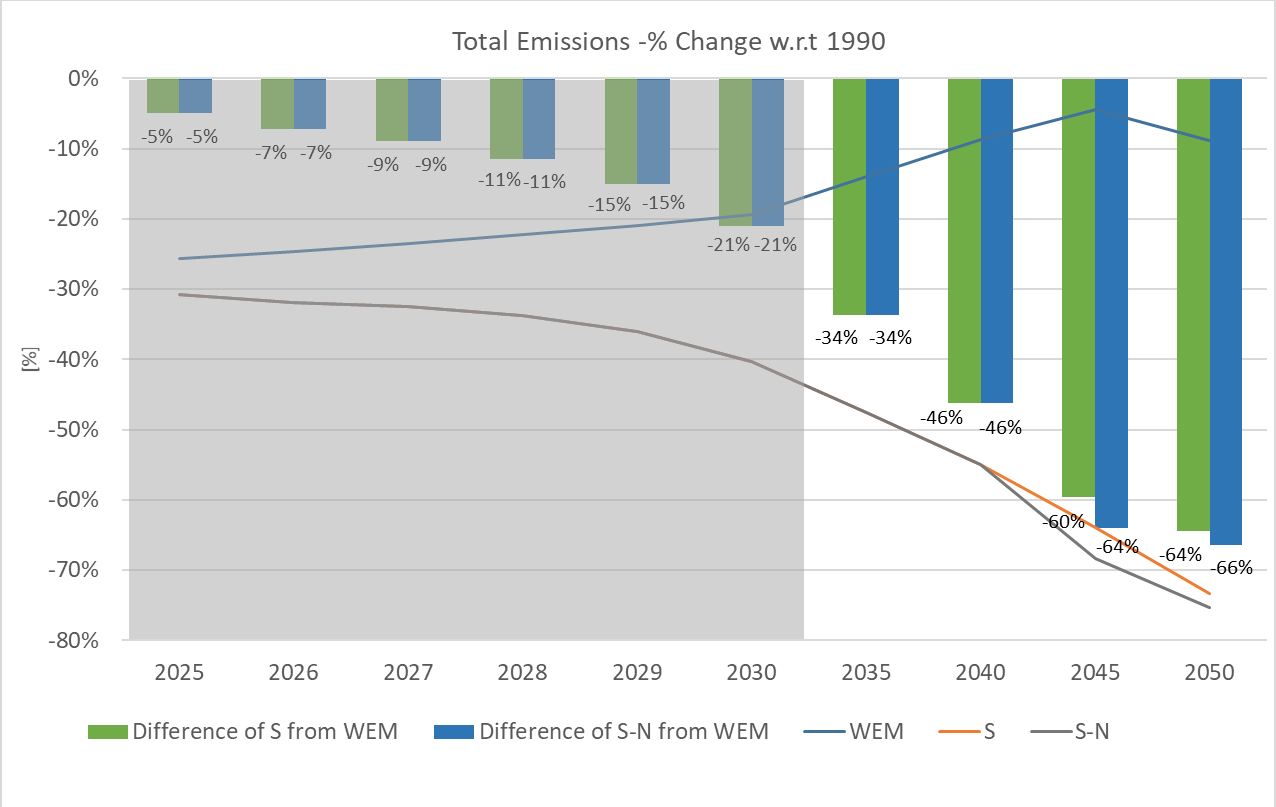
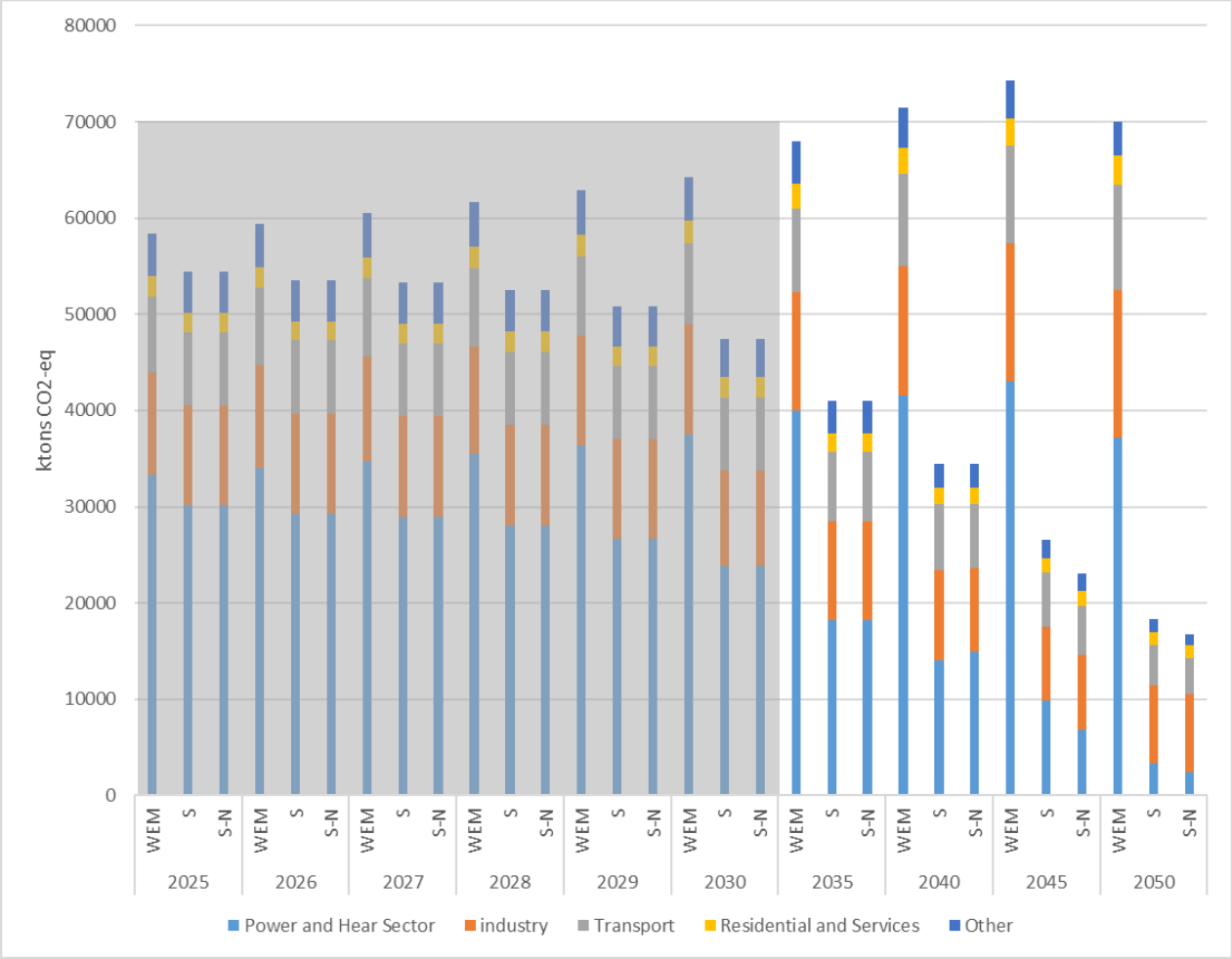


Figure 5.2b: Total GHG emissions (including agriculture, waste and LULUCF) reductions as percentages with respect to 1990



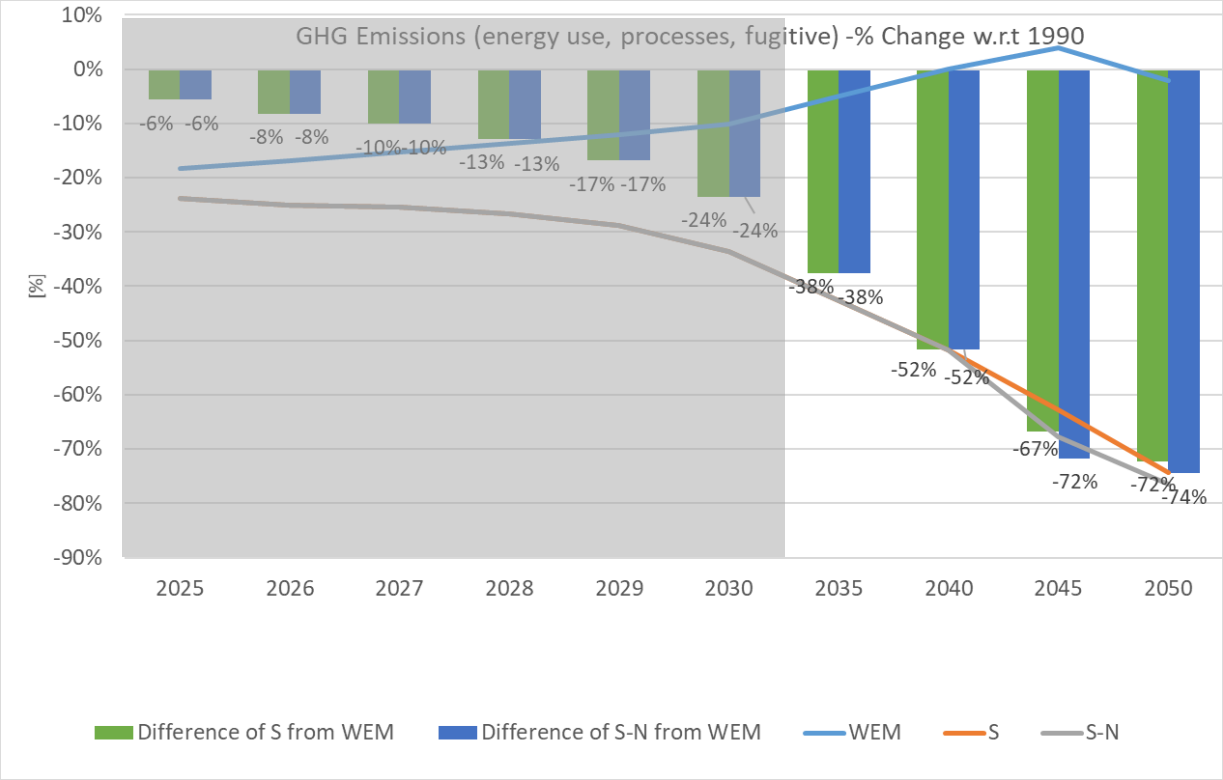
In scenarios S and S-N, the GHG emissions from energy use, processes, and fugitive emissions are equal to 47,477 ktons of CO2-eq in 2030 A reduction of 34% in 2030 has been noted in scenarios S and S-N, compared to the 1990 due to the increased penetration of RES and the implementation of energy efficiency measures, while at the same time a reduction of 10% is recorded in 2030 in WEM scenario, compared to the 1990.

Figure 5.3: GHG emissions from energy use, processes, and fugitive per sector



Although the projected GHG emissions from energy use, processes, and fugitive decrease by 52% in both scenarios S and S-N in 2040, compared to the 1990, they are differentiated in 2050 leading to 18,376 ktons of CO2-eq in scenario S and 16,791 ktons of CO2-eq in scenario S-N due to the introduction of the nuclear power plants in scenario S-N. A reduction of 74% and 77% has been recorded in scenarios S and S-N respectively in 2050, compared to the 1990, while the corresponding decline in WEM scenario compared to 1990 is equal to 2% demonstrating the impact of the additional policies and measures.

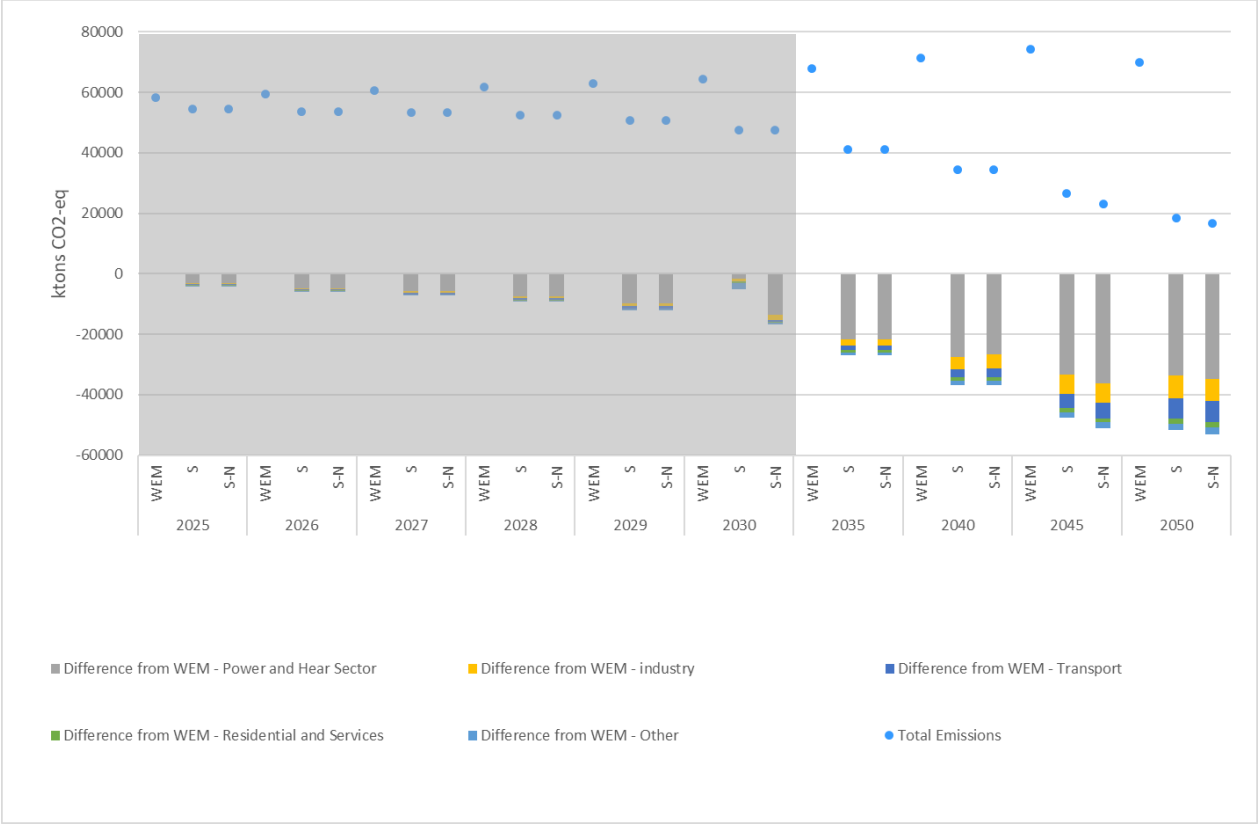
Figure 5.4: GHG emissions from energy use, processes, and fugitive reductions as percentages with respect to 1990



The total GHG emissions from energy use, processes, and fugitive for all sectors stand at 47,477 ktons of CO2-eq in scenarios S and S-N in 2030 (). More specifically, 23,865 ktons of CO2-eq are resulted by the power and heat sector, 9,858 ktons of CO2-eq by the industrial sector, 7,617 ktons of CO2-eq by the transport sector, 2,147 ktons of CO2-eq by the residential and services sectors and 3,990 ktons of CO2-eq by the other sectors. The total emissions from the above-mentioned sectors in scenarios S and S-N in 2030 are 26% lower, compared to the WEM scenario over the same year.

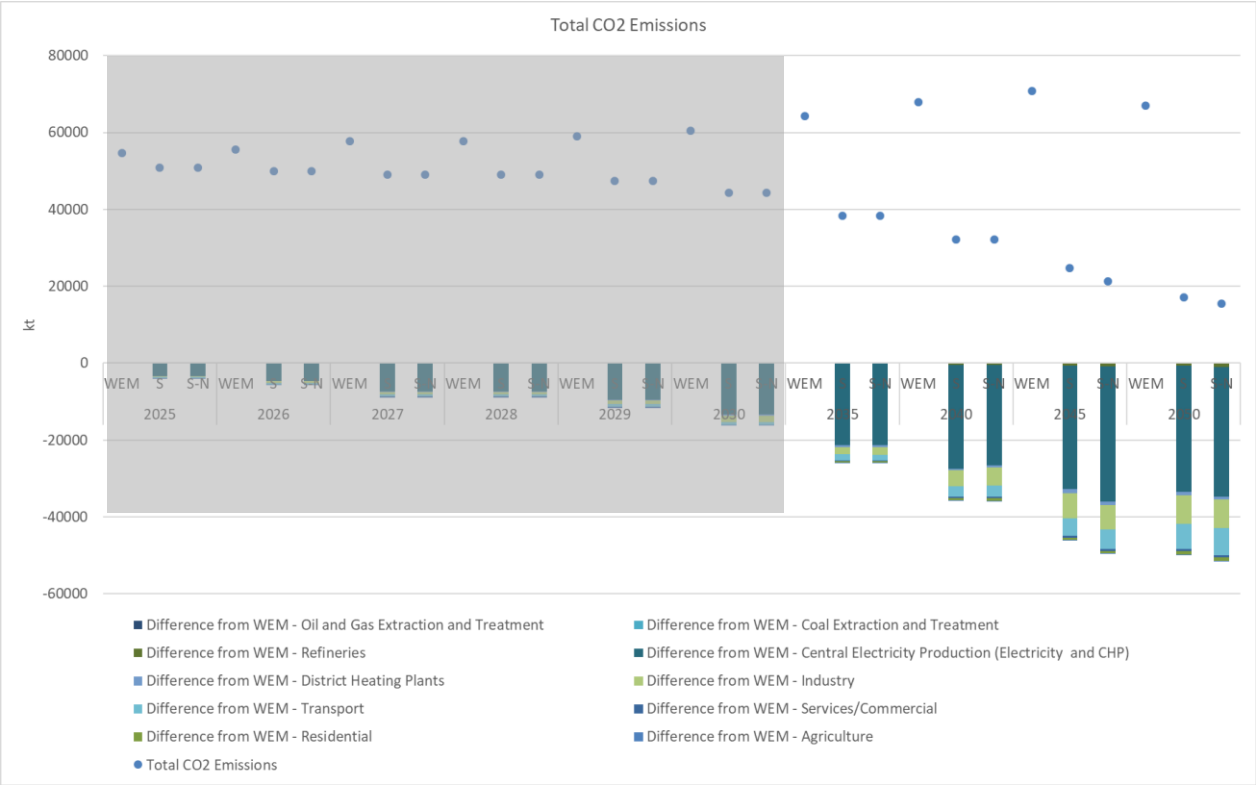
Similarly, in 2050, the total GHG emissions from energy use, processes, and fugitive for all sectors amount to 18,376 ktons of CO2-eq in scenario S and 16,791 ktons of CO2-eq in scenario S-N considerably less than the respective figures in 2040 depicting the intensification of the policies and measures for the promotion of decarbonization process. More specifically, 3,365 ktons of CO2-eq are derived by the power and heat sector, 8,045 ktons of CO2-eq by the industrial sector, 4,206 ktons of CO2-eq by the transport sector, 1,311 ktons of CO2-eq by the residential and services sectors and 1,448 ktons of CO2-eq by the other sectors for the case of scenario S. The respective figures for scenario S-N consist of 2,471 ktons of CO2-eq for the power and heat sector, 8,080 ktons of CO2-eq for the industrial sector, 3,736 ktons of CO2-eq for the transport sector, 1,300 ktons of CO2-eq for the residential and services sectors and 1,204 ktons of CO2-eq for the other sectors. The total emissions for the above-mentioned sectors in scenarios S and S-N in 2050 are 74% and 76% lower respectively, compared to the WEM scenario over the same year.

Figure 5.5: GHG emissions (from energy use, processes, and fugitive) per sector



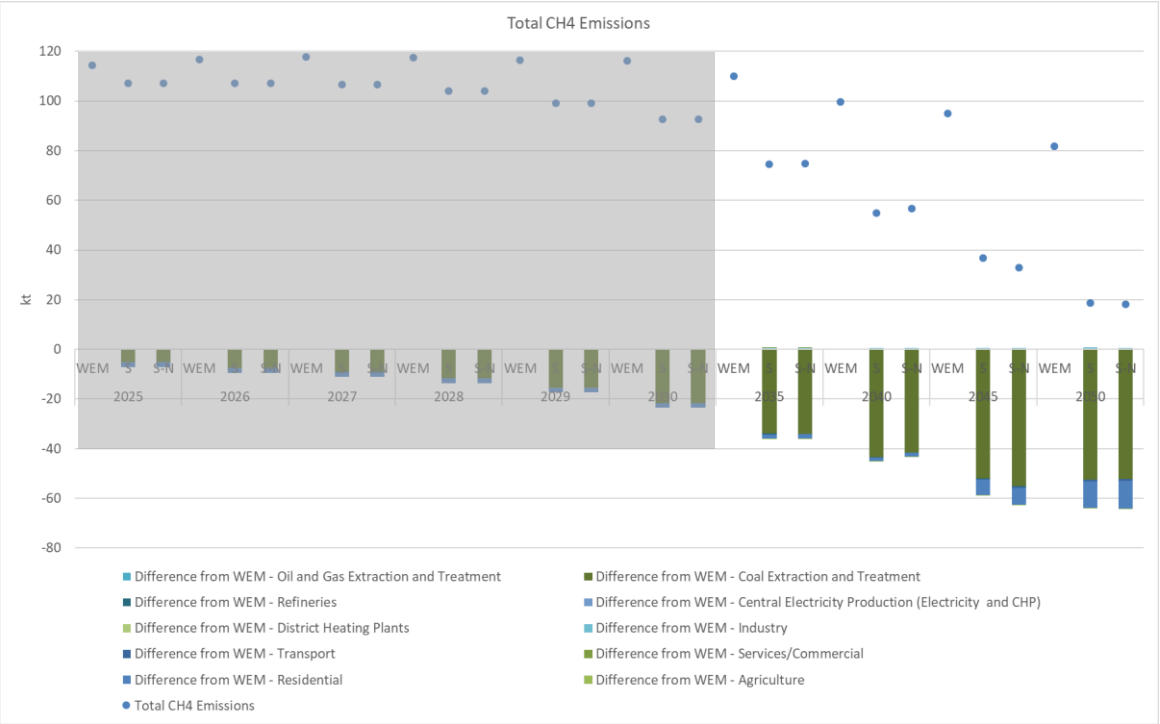
In WEM scenario, CO2 emissions are equal to 60.4 Mt in 2030, higher than 44.3 Mt in scenarios S and S-N over the same year (. In 2050, total CO2 emissions will increase only in WEM scenario by 10.7% at 66.9 Mt, compared to 2030 level, while a 61.3% decrease (at 17.1 Mt) in scenario S and a 64.9% fall (at 15.6 Mt) in scenario S-N are anticipated. Electricity and CHP as well as industry are the sectors with the highest CO2 emissions in both 2030 and 2050 in all scenarios, followed by transport.

Figure 5.6: Total CO2 emissions per sector



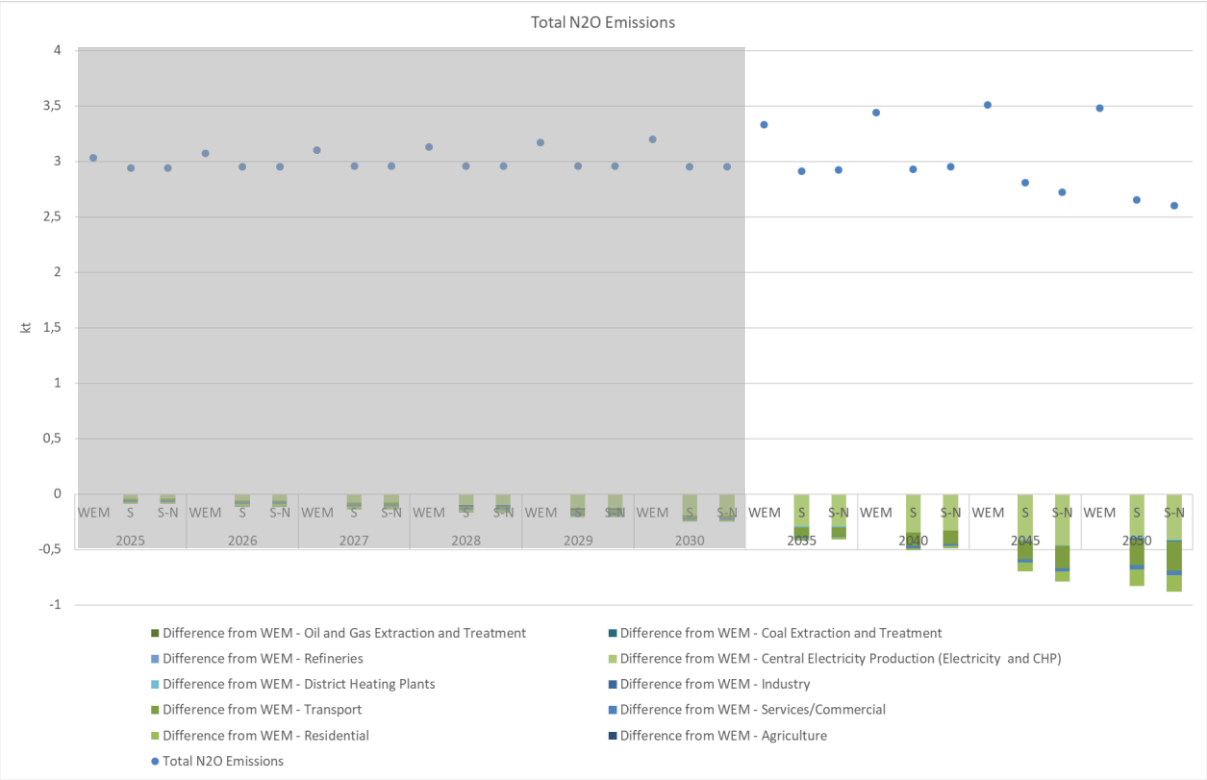
In WEM scenario, total CH4 emissions are equal to 116 Mt in 2030, higher than 93 Mt in scenarios S and S-N over the same year). In 2050, total CH4 emissions will decrease by 29.5%, 79.9% and 80.3% in scenarios WEM, S and S-N respectively, compared to 2030 level. Coal extraction and treatment as well as oil and gas extraction and treatment are the sectors with the highest CH4 emissions in both 2030 and 2050 in all scenarios, followed by residential sector.

Figure 5.7: Total CH4 emissions per sector



Similarly, total N2O emissions are equal to 3.2 kt in 2030 in WEM scenario, higher than 3.0 kt in scenarios S and S-N over the same year (. In 2050, total N2O emissions will increase only in WEM scenario by 8.8% at 3.5 kt, compared to 2030 level, while a 10.2% decrease (at 2.7 kt) in scenario S and a 11.9% fall (at 2.6 kt) in scenario S-N are anticipated. Industry and transport are the sectors with the highest N2O emissions in both 2030 and 2050 in all scenarios, followed by electricity and CHP.

Figure 5.8: Total N2O emissions per sector



The share of RES in gross final energy consumption in scenarios S and S-N is equal to 33.6% in 2030 and approximately 62% in 2050 for scenario S and about 60% for scenario S-N. This means a 35% in scenario S and a 33% in scenario S-N higher penetration of RES in 2050 respectively, compared to the WEM scenario and a respective 6% higher RES penetration in 2030 for both scenarios.

The penetration of RES in the three sub-targets is higher in 2030 for both the examined scenarios S and S-N compared to WEM scenario by:

- 45% in the electricity generation sector as the result of the installation of additional PV and wind power plants (
- 3.2% in the transport sector (without multipliers) due to the increased penetration promotion of electrification (
- 41% in the heating sector, mainly as the result of the installation of heat pumps and the promotion of other type of RES in buildings, such as solar thermal and geothermal energy (In 2050, the respective RES share in scenarios S and S-N is considerably higher than in the WEM scenario mainly due to the initiation of additional measures for the promotion of RES by:

- 94% and 87% in the electricity generation sector in scenarios S and S-N respectively.
- 45% and 49% in the transport sector (without multipliers) in scenarios S and S-N respectively.
- 39% in the heating sector in both scenarios S and S-N.

It should be noted that scenario S leads to higher deployment of RES in gross final energy consumption by 2050 due to the increased promotion of RES in electricity generation and transport sector.

Figure 5.9: Share of RES in GFEC

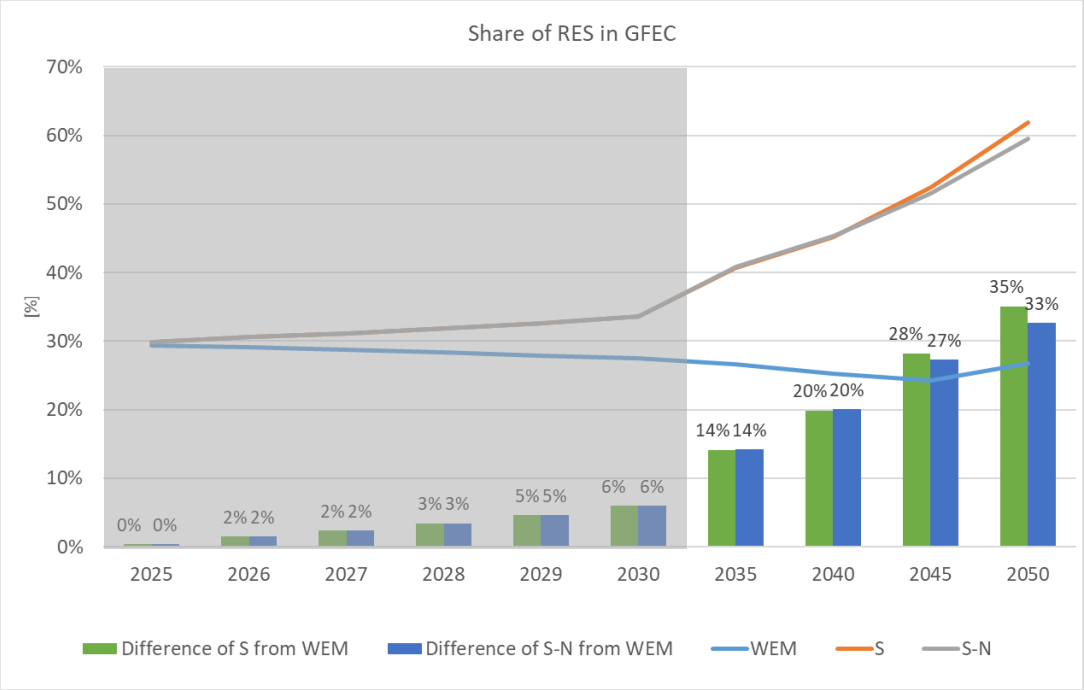


Figure 5.10: Share of RES in Electricity Generation

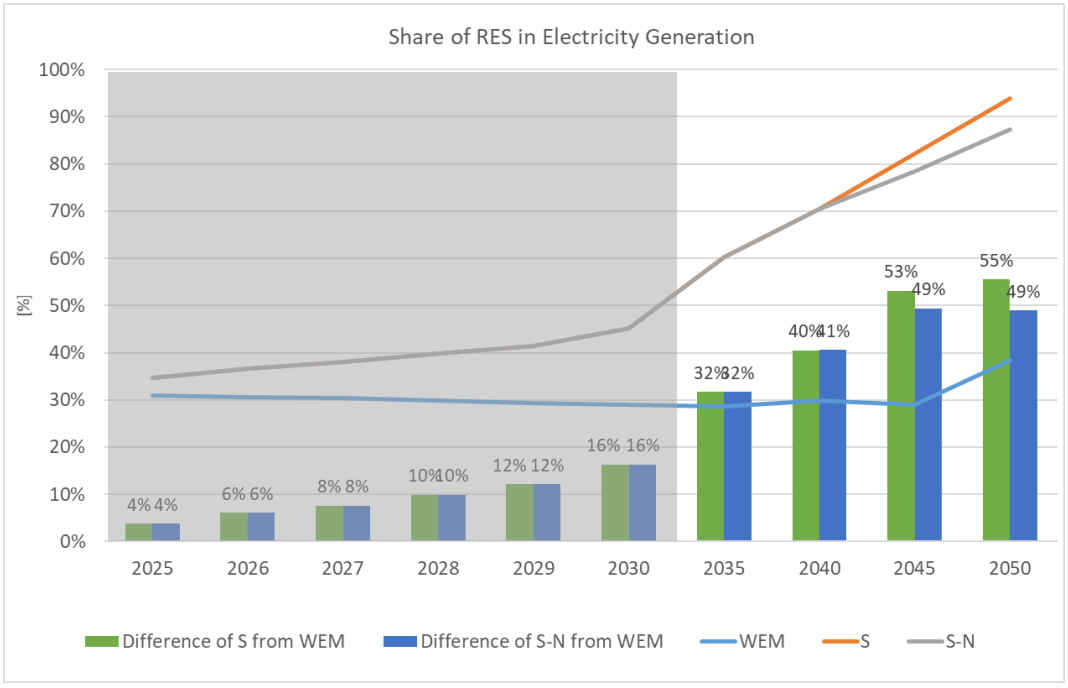


Figure 5.11: Share of RES in Transport (without multipliers)

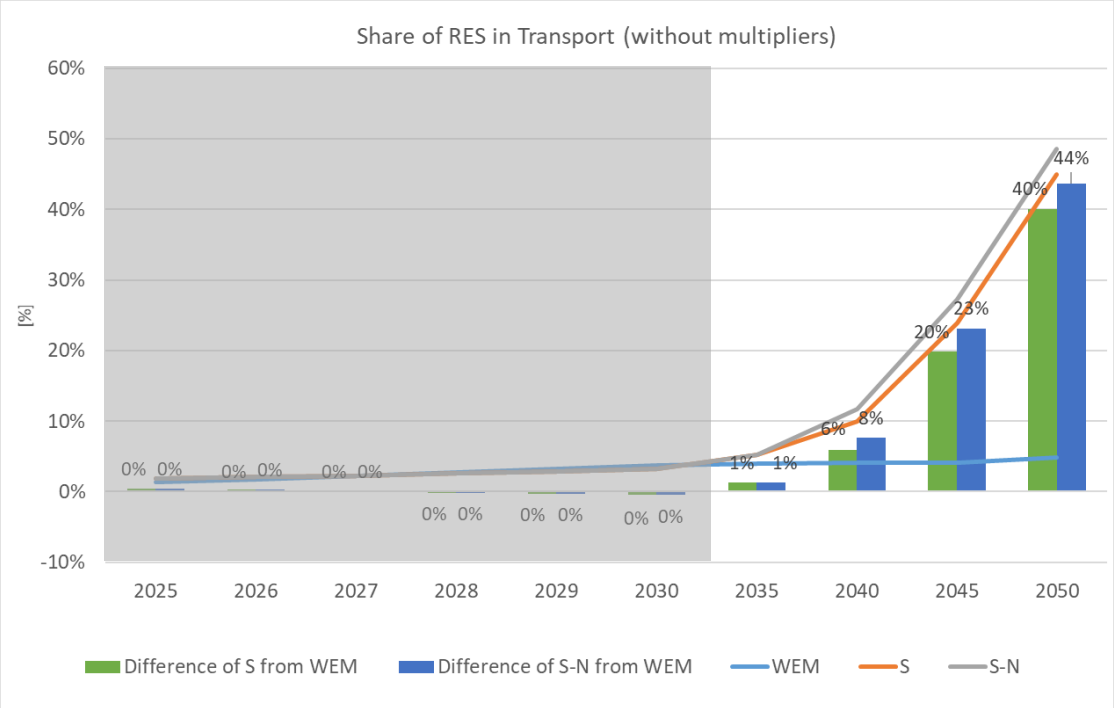
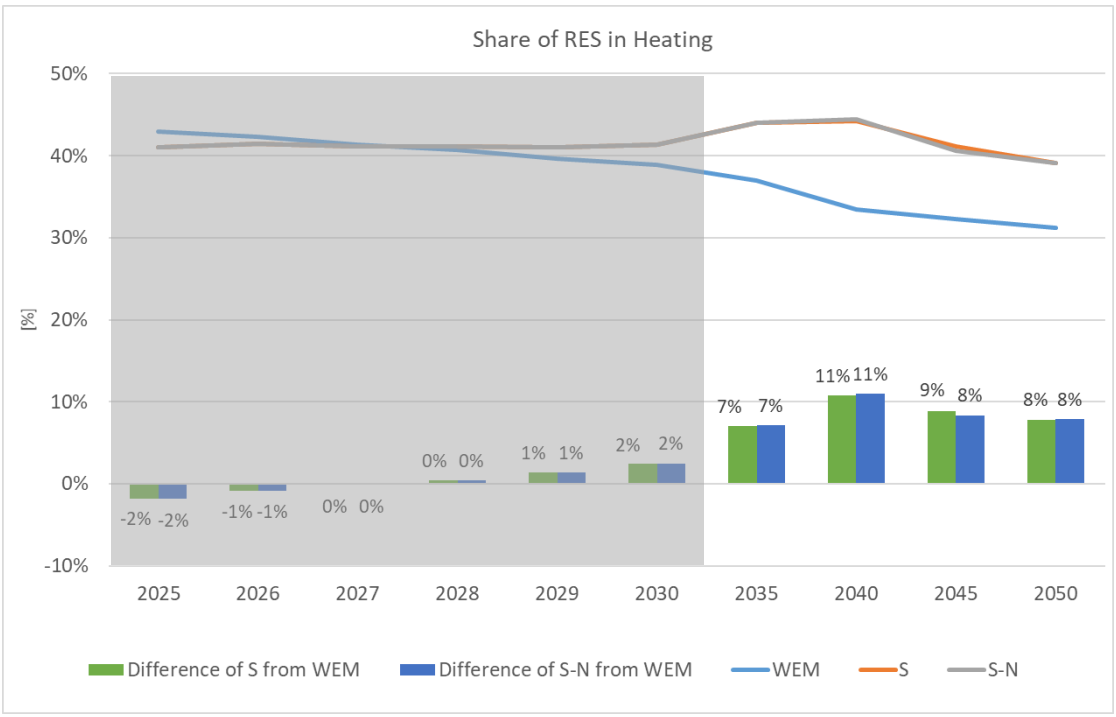


Figure 5.12: Share of RES in Heating



In WEM scenario, the total installed capacity for electricity production is projected to increase from 9 GW in 2025 and 10 GW in 2030 to 13 GW in 2050, as presented in Figure 5.13. The expected increase is mainly attributed to the penetration of RES technologies for electricity generation, which generally have a lower

utilization or capacity factor than conventional technologies and therefore require more capacity installed than conventional power plants for the same electricity production.

Similarly, in both scenarios S and S-N, the total installed capacity for electricity production is expected to rise from 10 GW in 2025 and 11 GW in 2030 to about 36 GW in 2050.

In WEM scenario, the total installed RES capacity is projected to reach 4 GW in 2025 and 2030 and 7 GW in 2050 (Figure 5.13). Similarly, in both scenarios S and S-N, the total installed RES capacity is expected to rise from 6 GW, excluding hydro pump storage plants, in 2030 to about 30 GW in 2050. Solar and wind are anticipated to have the largest contribution in all scenarios in 2030 and 2050.

Figure 5.13: Installed RES capacity per technology

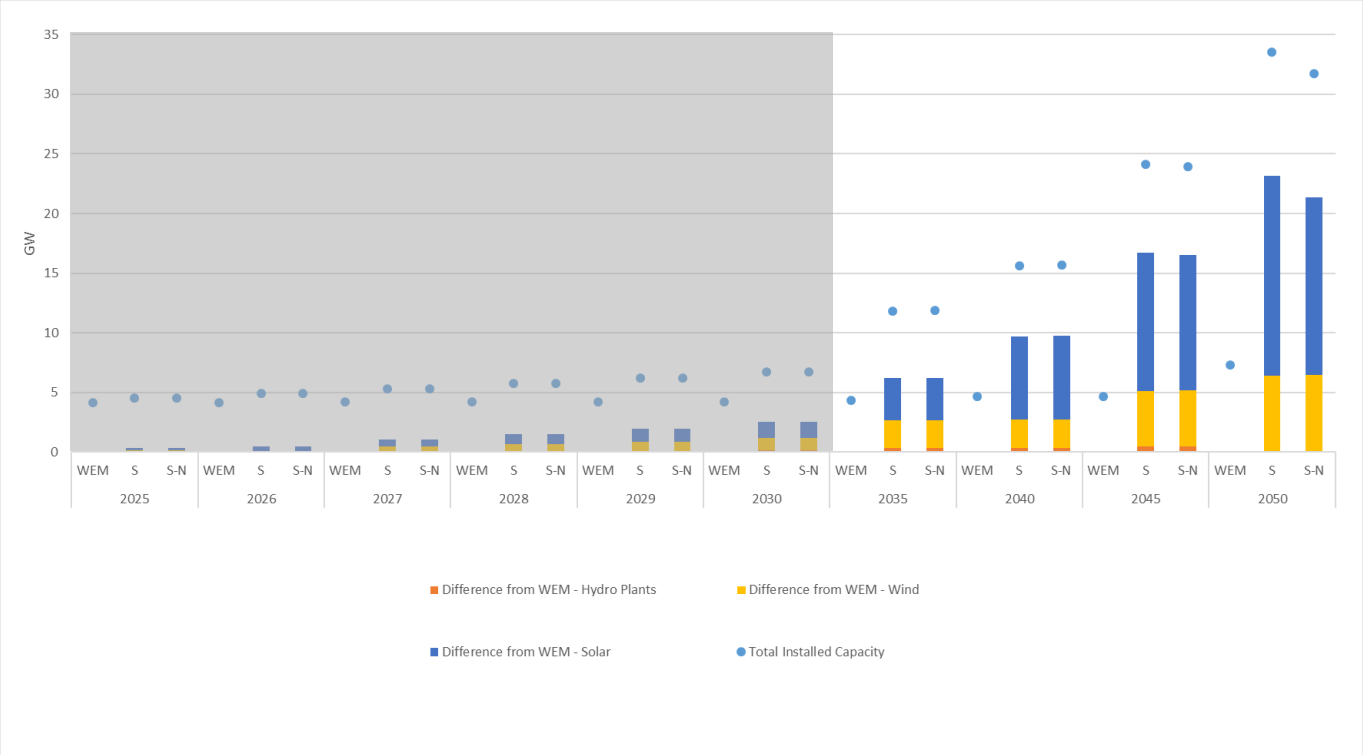


Table 5.2: Installed RES capacity per technology per scenario

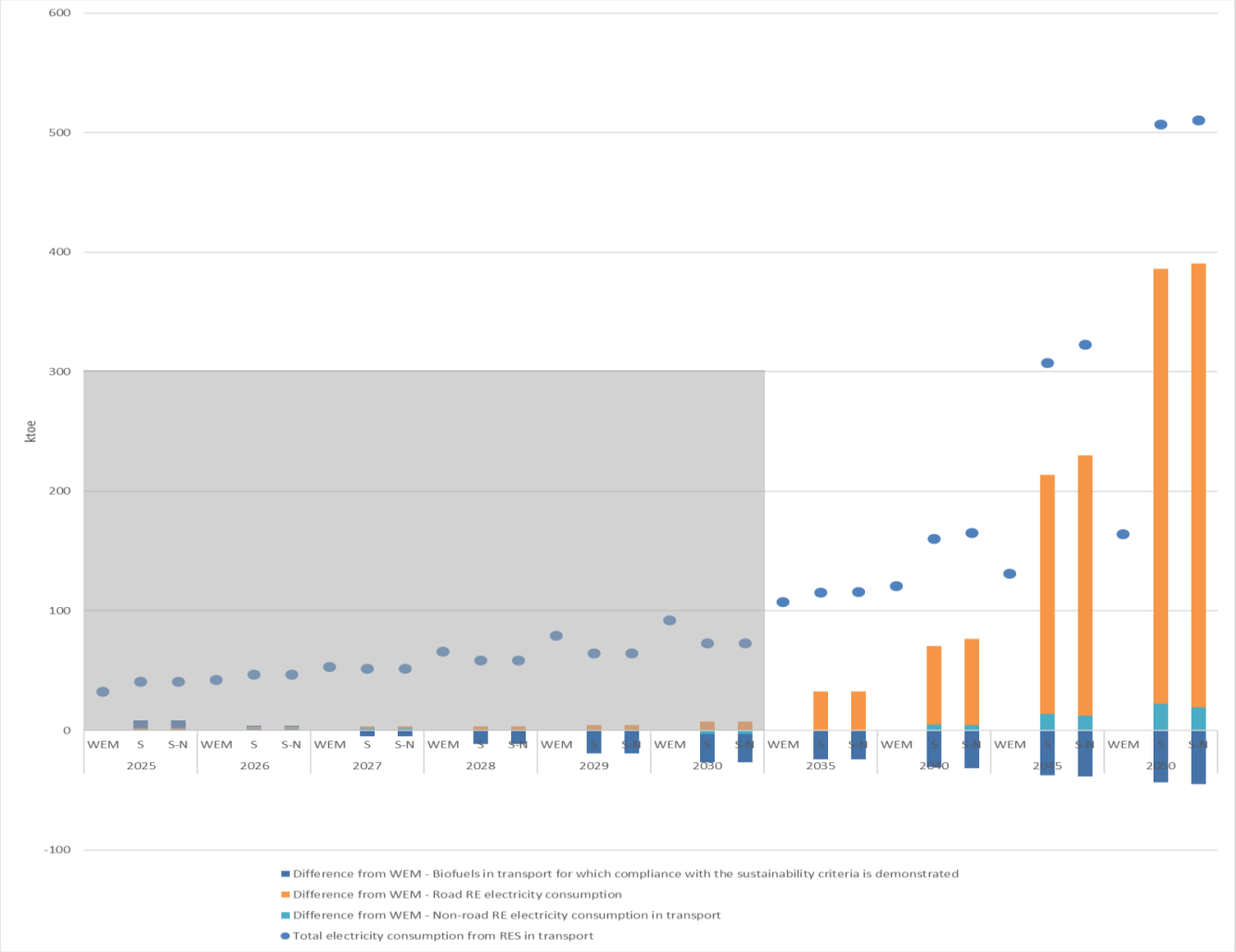
		Hydro Plants	Wind	Solar
2025	WEM	2,48	0,75	0,30
	S	2,48	0,90	0,51
	S-N	2,48	0,90	0,51
2026	WEM	2,48	0,75	0,30
	S	2,48	1,05	0,75
	S-N	2,48	1,05	0,75
2027	WEM	2,48	0,75	0,38
	S	2,48	1,21	0,99

	S-N	2,48	1,21	0,99
2028	WEM	2,48	0,75	0,38
	S	2,52	1,38	1,23
	S-N	2,52	1,38	1,23
2029	WEM	2,48	0,75	0,38
	S	2,52	1,57	1,48
	S-N	2,52	1,57	1,48
2030	WEM	2,48	0,75	0,38
	S	2,62	1,77	1,73
	S-N	2,62	1,77	1,73
2035	WEM	2,62	0,75	0,38
	S	2,95	3,07	3,93
	S-N	2,95	3,11	3,93
2040	WEM	2,94	0,75	0,38
	S	3,27	3,12	7,36
	S-N	3,27	3,16	7,37
2045	WEM	2,94	0,74	0,37
	S	3,39	5,42	11,98
	S-N	3,39	5,46	11,70
2050	WEM	3,29	1,66	1,77
	S	3,39	7,97	18,50
	S-N	3,39	8,01	16,66

A detailed analysis of the operation of the power system under the S scenario, on an hourly basis was performed for two milestone years (2030 and 2040) using the ANTARES software (Annex II). For 2030 the results indicate that the unsupplied energy is practically zero, which means that the generation adequacy of the system is robust. Furthermore, there is no spilled energy (no curtlaiment of electricity generation from variable renewables), therefore the system is flexible enough to accommodate the modelled variable RES capacities, at least at the Day-Ahead market level. The analysis for 2040, indicates that unsupplied energy is zero, signifying generation adequacy of the system. There is some spilled energy in 2040 but the level is negligible and does not exceed 0.01% of the total available wind and solar generation. This means that the system is flexible enough to accommodate the modelled variable RES capacitiesfor 2040, at least at the Day-Ahead market level.

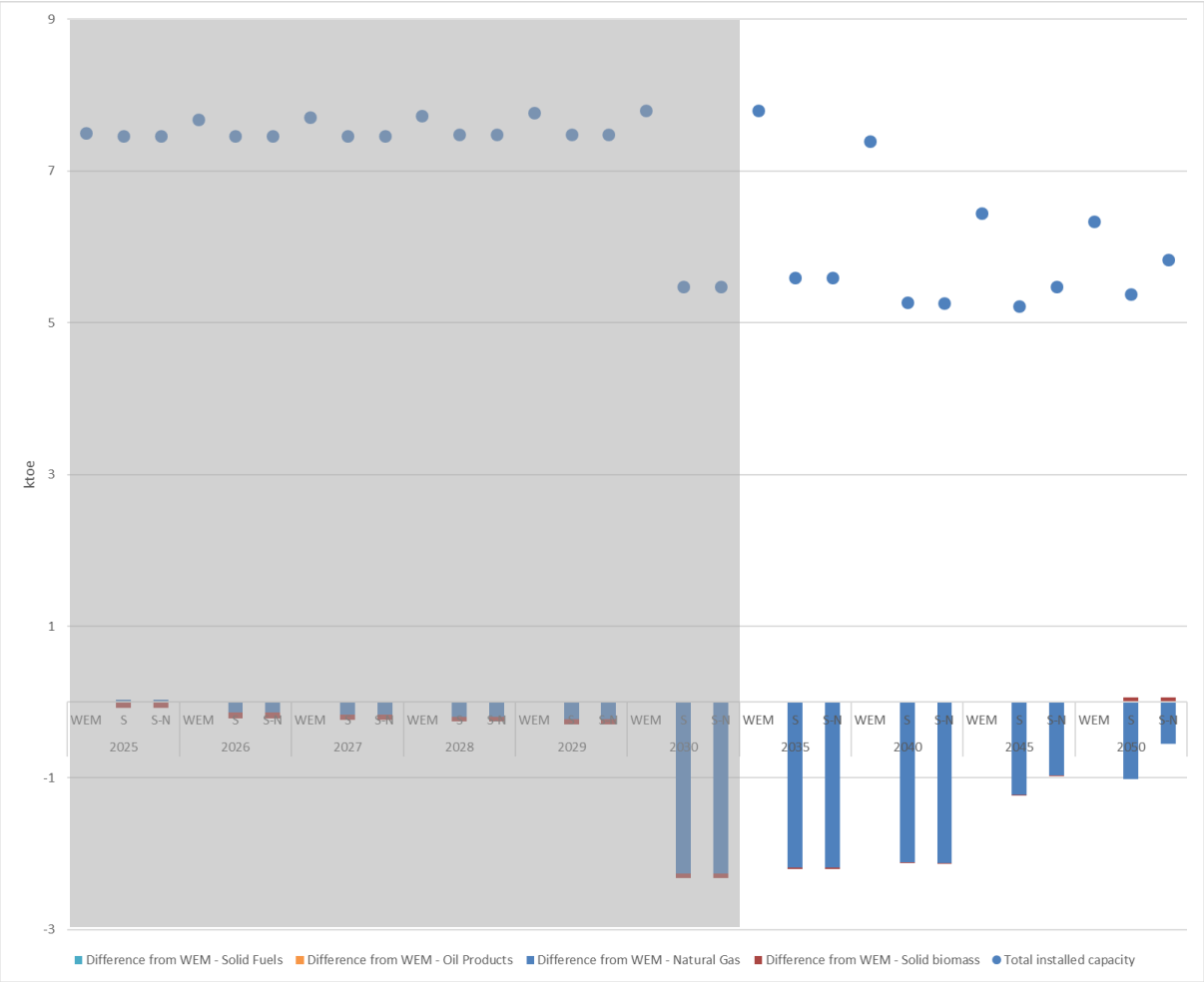
In WEM scenario, the non-road RE electricity consumption in transport is expected to reach 14 ktoe in 2030, while it will stand at 11 ktoe in both scenarios S and S-N over the same year (Figure 5.14). In 2050, an increase of the non-road RE electricity consumption in transport is anticipated in WEM scenario, reaching 19 ktoe, compared to scenarios S and S-N, where it will significantly rise to 41 ktoe in scenario S and 38 ktoe in scenario S-N respectively. The increase is even higher for road RE electricity consumption, especially for scenarios S and S-N, where a rise from 13 ktoe in 2030 to 415 ktoe in scenario S in 2050 and from 13 ktoe in 2030 to 422 ktoe in 2050 in scenario S-N is expected.

Figure 5.14: Electricity consumption from RES in transport



In WEM scenario, the total installed capacity in the district heating sector is projected to reach 8 GW in 2030 and 6 GW in 2050. Similarly, it will reach 7 GW in 2030 and about 6 GW in 2050 in scenarios S and S-N (Figure 5.15). Natural gas and oil products are anticipated to have the largest contribution in all scenarios in 2030 and 2050.

Figure 5.15: Installed capacity per technology in the district heating sector



In 2030, the primary and the final energy consumption are equal to 14.7 Mtoe and 9.7 Mtoe respectively in scenarios S and S-N leading to lower levels by 17% (**Error! Reference source not found.**) and 9% () compared t o the WEM scenario. The reduction in the primary and final energy consumption is mostly due to the implementation of additional policies and measures for the promotion of energy efficiency and RES. The difference in the final energy consumption among WEM and scenarios S and S-N is distributed on average among the residential (36%), industry (27%) and transport (26%) sectors in 2030.

In 2050, the primary energy consumption is equal to 11.5 Mtoe and 12.5 Mtoe in scenarios S and S-N respectively leading to reduced levels by 40% and 35% compared to the WEM scenario. The same tendency is observed for the case of final energy consumption leading to approximately identical level (9.5 Mtoe presenting 27% reduction compared to WEM scenario). The reduction in the primary and final energy consumption is mostly due to the intensified implementation of additional policies and measures for the promotion of energy efficiency and RES.

Figure 5.16: Primary Energy Consumption

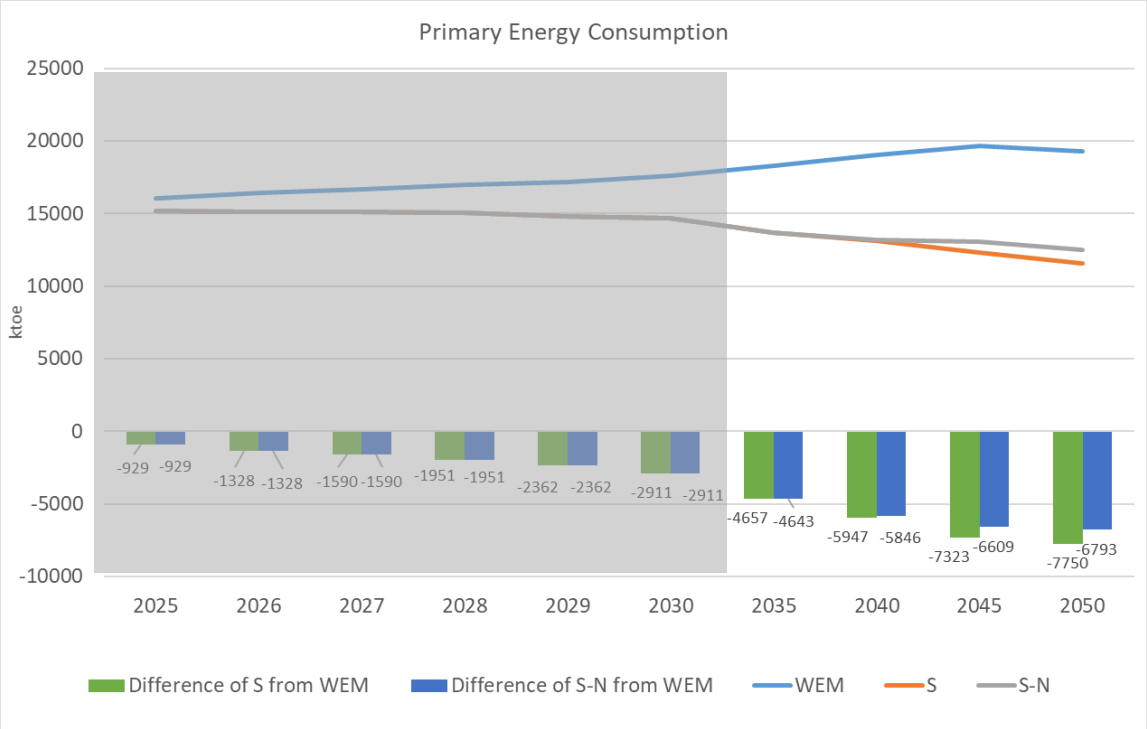
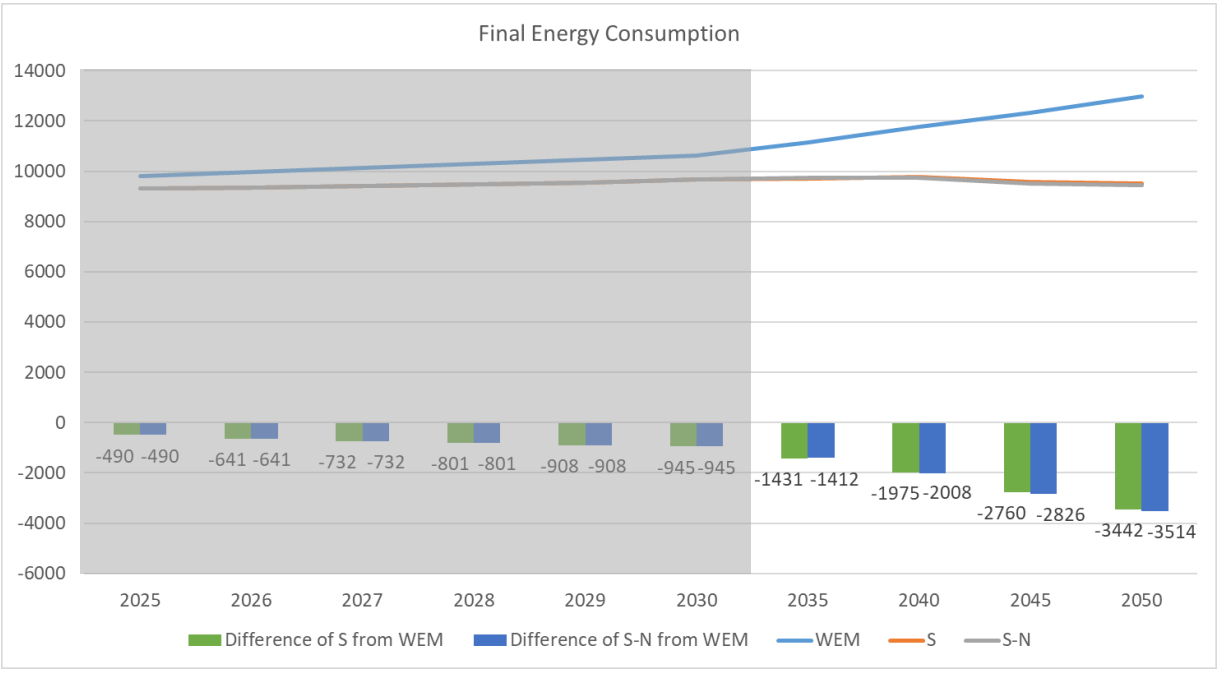


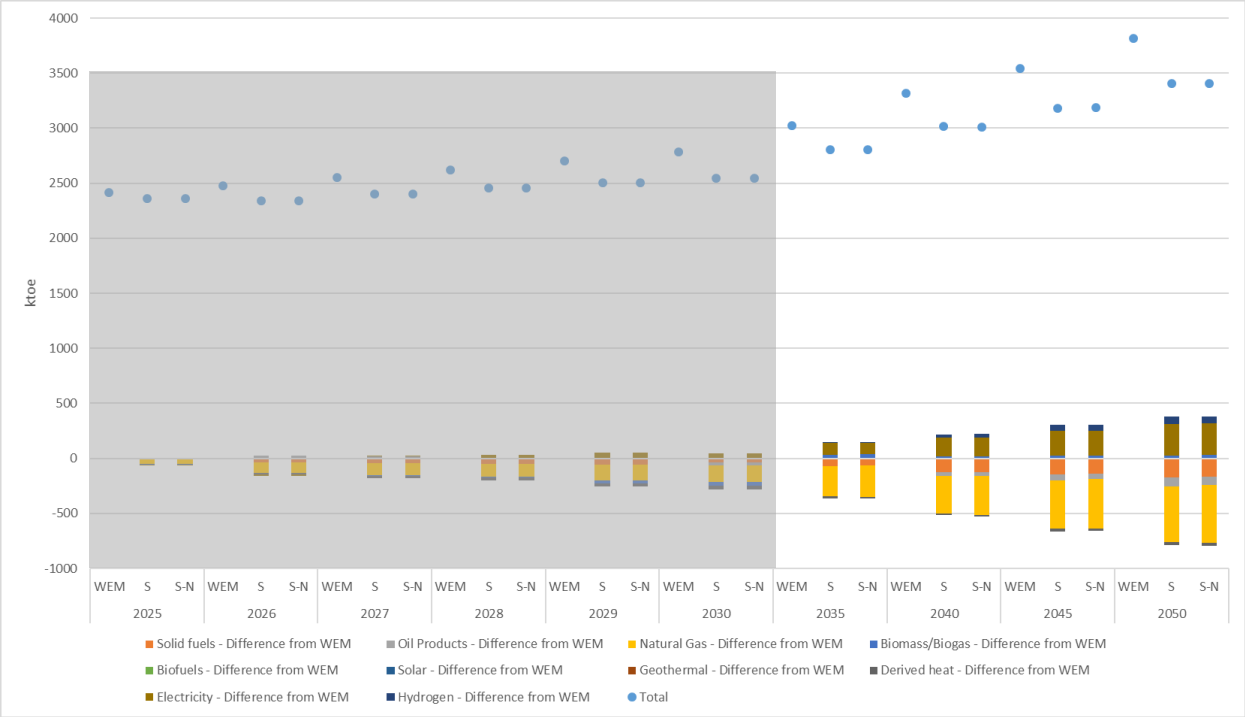
Figure 5.17: Final Energy Consumption



The final energy consumption of the industrial sector stands at 2,547 ktoe in 2030 in scenarios S and S-N leading to 9% lower consumption compared to WEM scenario due to the promotion of energy efficient equipment, the further development of energy management systems and the exploitation of the waste heat. The respective reduction will be increased to 11% in 2050 compared to WEM scenario as the final energy consumption will be equal to about 3.4 Mtoe due to the intensification of the energy efficiency measures

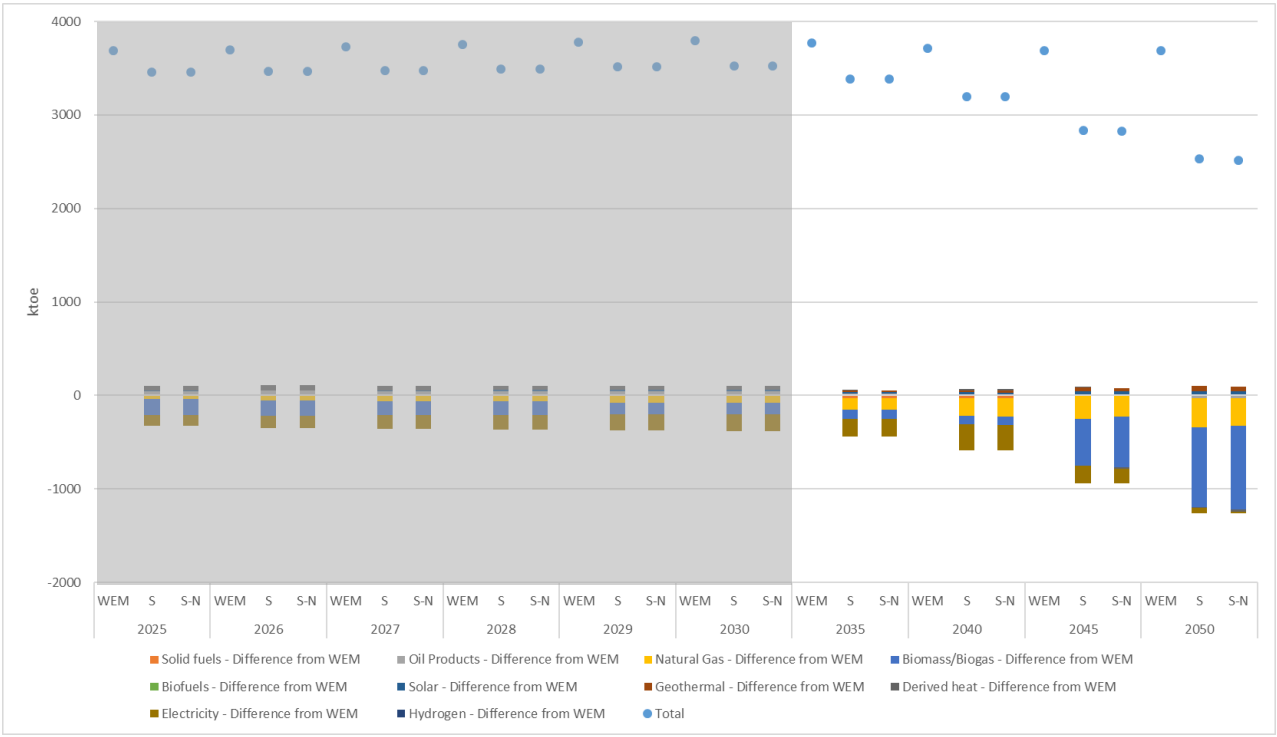
counterbalancing the increased industrial output due to the GDP's growth). Electricity, natural gas and oil products consist the fuels with the highest contribution in scenarios S and S-N for both 2030 and 2050.

Figure 5.18: FEC Industry by energy source



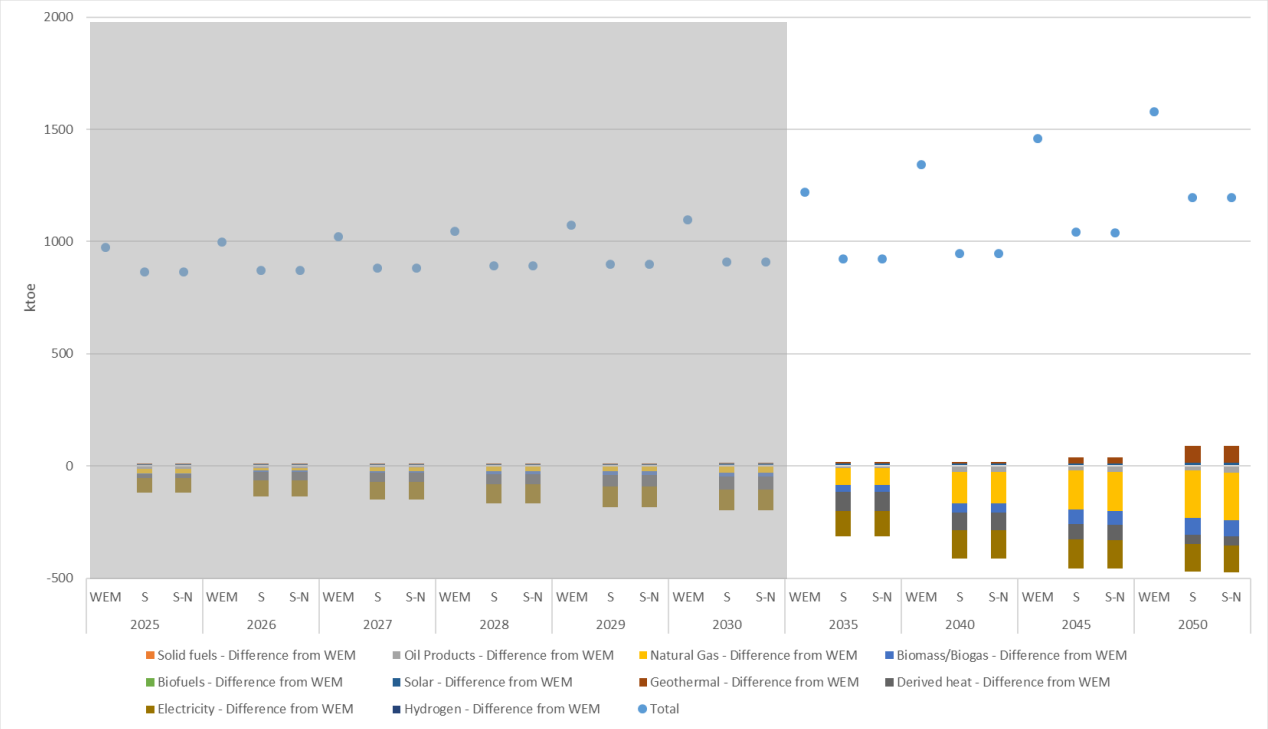
In residential sector, the final energy consumption amounts to 3,798 ktoe in WEM scenario and about 3,523 ktoe in scenarios S and S-N in 2030 mainly due to the increased energy renovation of the buildings, the installation of aerothermal heat pumps and the promotion of energy efficient appliances and lighting. The reduction of the final energy consumption is higher in 2050 for the case of scenarios S and S-N reaching 2.5 Mtoe compared to 3.7 Mtoe in WEM scenario due to the enhanced implementation of energy efficiency measures (**Error! Reference source not found.** Biomass/biogas, electricity and derived heat present the h ighest contribution in both 2030 and 2050.

Figure 5.19: FEC Residential by energy source



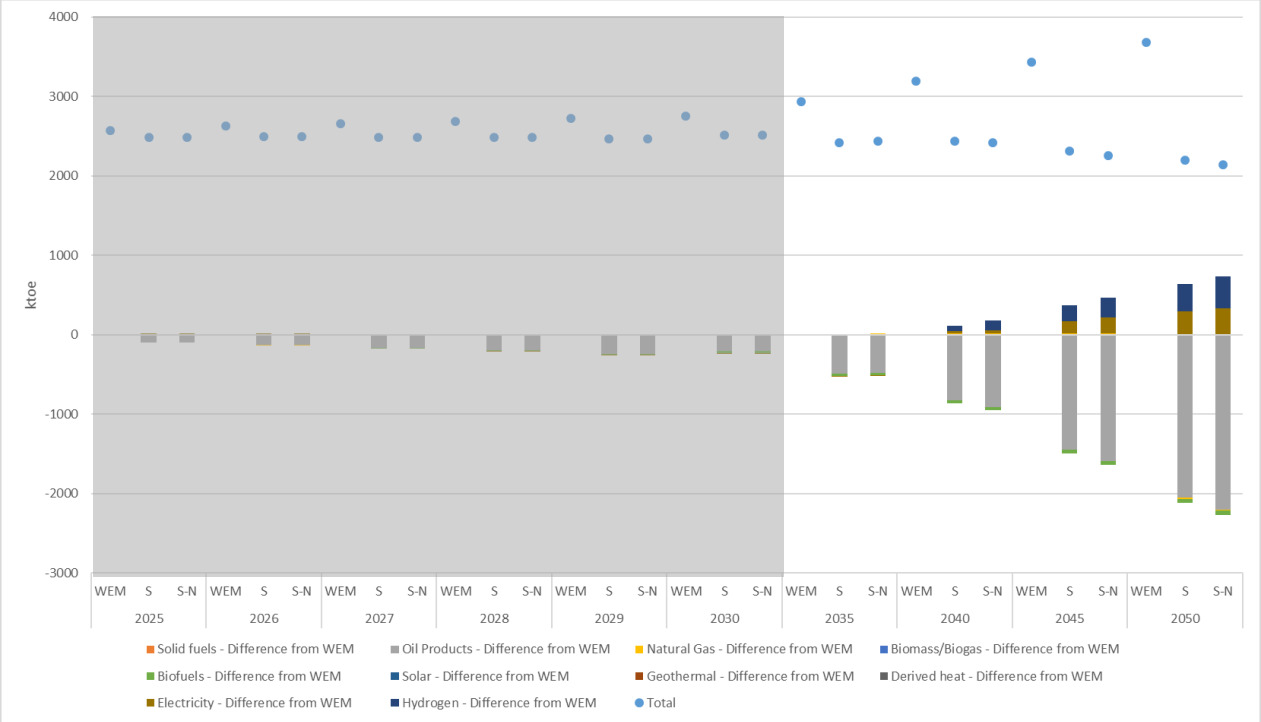
The final energy consumption of the tertiary sector is equal to 1,097 ktoe in WEM scenario, while a meaningful reduction up to 17% is observed in scenarios S and S-N reaching 910 ktoe in absolute levels due to the increased energy renovation of the buildings, the installation of aerothermal and geothermal heat pumps and the promotion of energy efficient appliances and lighting. The intensification of the energy efficiency measures leads to a 24% reduction in 2050, as the final energy consumption reaches 1,579 ktoe in WEM scenario and about 1,200 ktoe in scenarios S and S-N (**21**). Electricity and natural gas comprise the fuels with the highest contribution in both 2030 and 2050 retaining also almost identical shares in scenarios S and S-N.

Figure 5.20: FEC Services by energy source



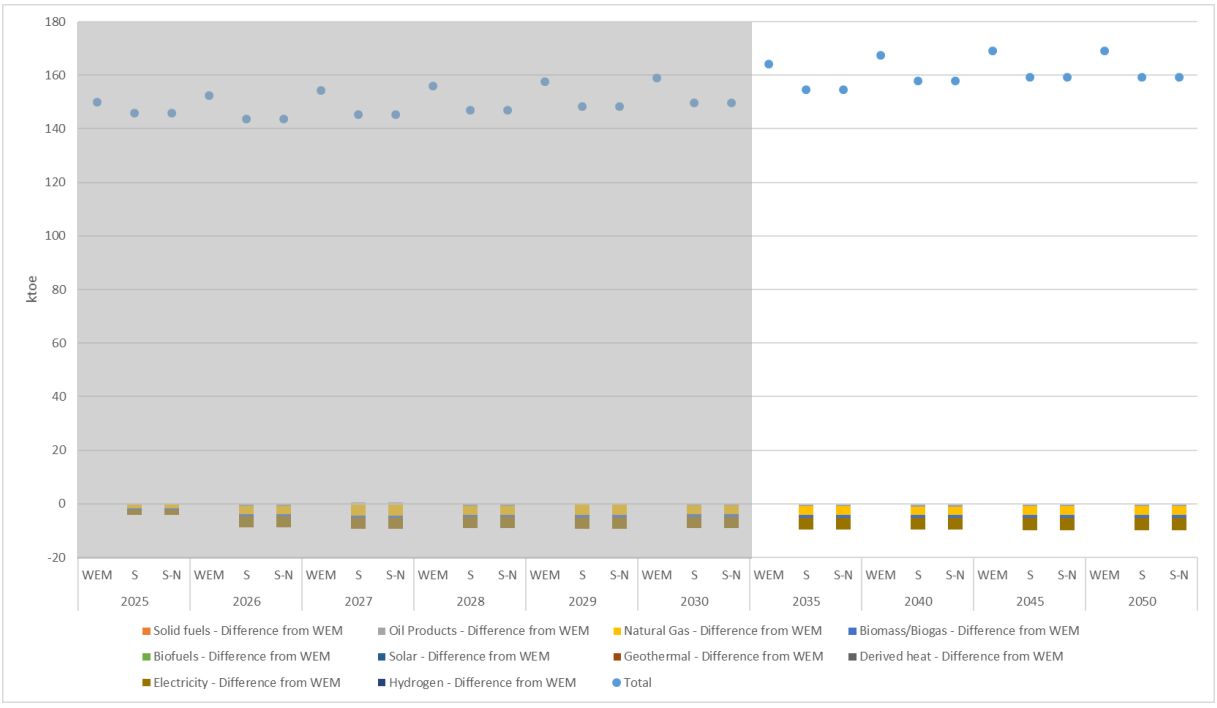
The final energy consumption of the transport sector in 2030 stands at 2,748 ktoe in WEM scenario, which is 9% higher compared to scenarios S and S-N (2,512 ktoe) due to the promotion of electromobility and the further penetration of hybrid diesel and gasoline vehicles in scenarios S and S-N. The final energy consumption is reduced by approximately 40% in 2050 for the case of scenarios S and S-N (about 2.2 Mtoe) compared to WEM scenario (3.7 Mtoe) due to the further deployment of electromobility and the promotion of hydrogen (**Error! Reference source not found.**22). Oil products is the most prevailing fuel in scenarios S and S-N for both 2 030 and 2050.

Figure 5.21: FEC Transport by Fuel



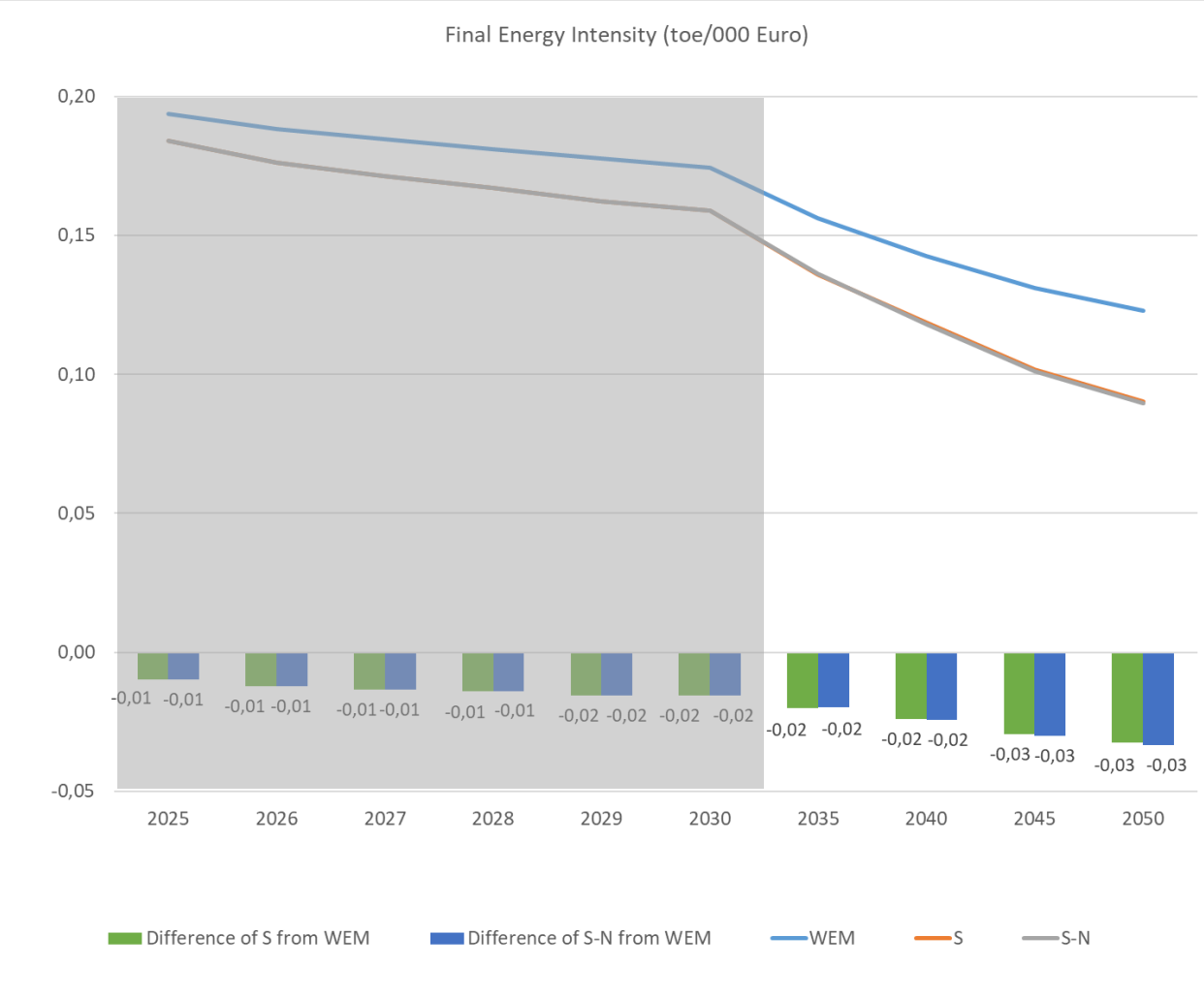
In agriculture sector, the final energy consumption amounts to 159 ktoe in WEM scenario and 150 ktoe in scenarios S and S-N in 2030 due to the promotion of energy efficient machinery and the installation of energy efficiency equipment in greenhouses and pumping stations. The final energy consumption is increased slightly in 2050, as it will reach 169 ktoe in WEM scenario and 159 ktoe in scenarios S and S-N (Oil products and electricity consist the fuels with the highest contribution in both 2030 and 2050 in scenarios S and S-N retaining identical shares.

Figure 5.22: FEC Agriculture by Fuel



In WEM scenario, the final energy intensity is equal to 0.17 toe/000 Euro in 2030, almost similar to 0.16 toe/000 Euro, which corresponds to scenarios S and S-N over the same year (. Similarly, the final energy intensity is equal to 0.12 toe/000 Euro in 2050 in WEM scenario, compared to about 0.09 toe/000 Euro in scenarios S and S-N.

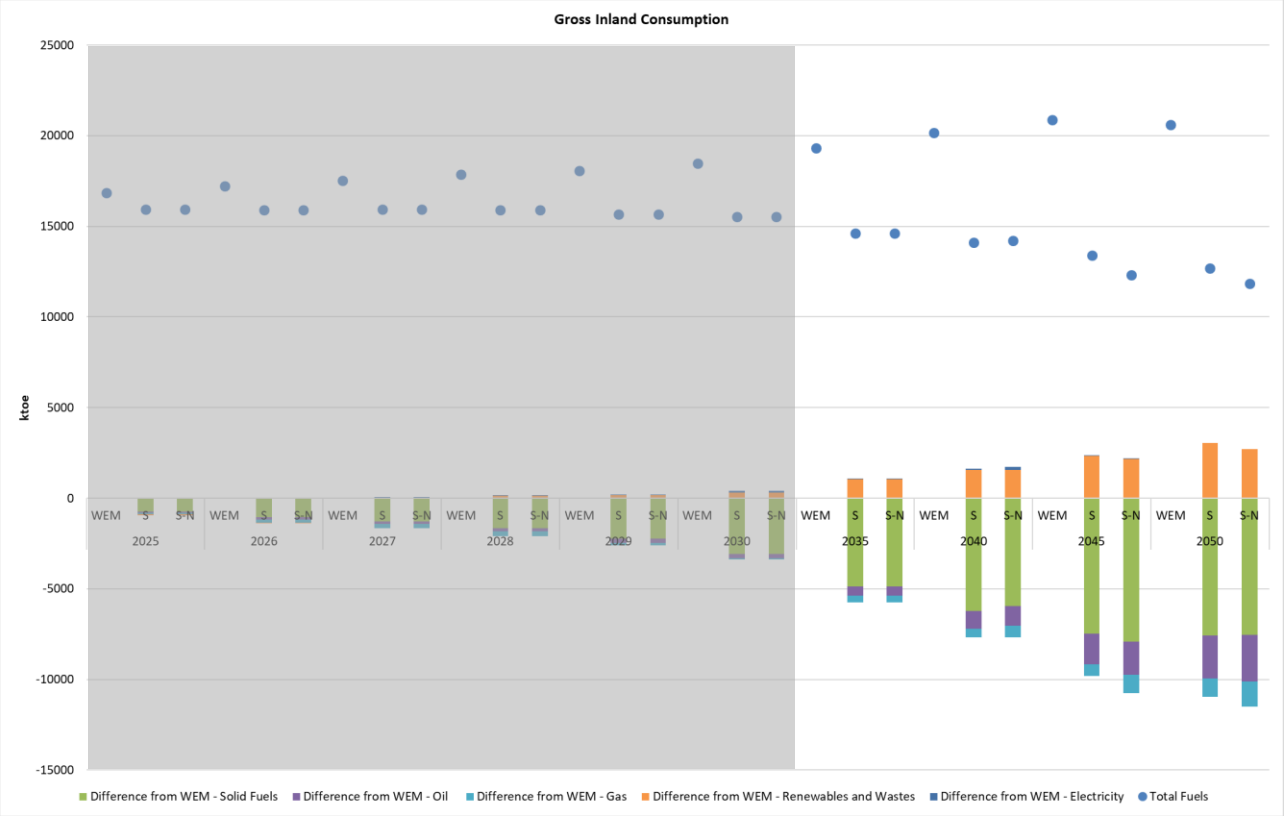
Figure 5.23: Final energy intensity[91]



In WEM scenario, gross inland consumption is equal to 18.5 Mtoe in 2030, higher than 15.5 Mtoe, which corresponds to scenarios S and S-N over the same year (Similarly, gross inland consumption is equal to 20.6 Mtoe in 2050 in WEM scenario, compared to 12.7 Mtoe in scenario S and 11.8 Mtoe in scenario S-N. Solid fuels as well as renewables and wastes comprise the fuels with the highest contribution in both 2030 and 2050.

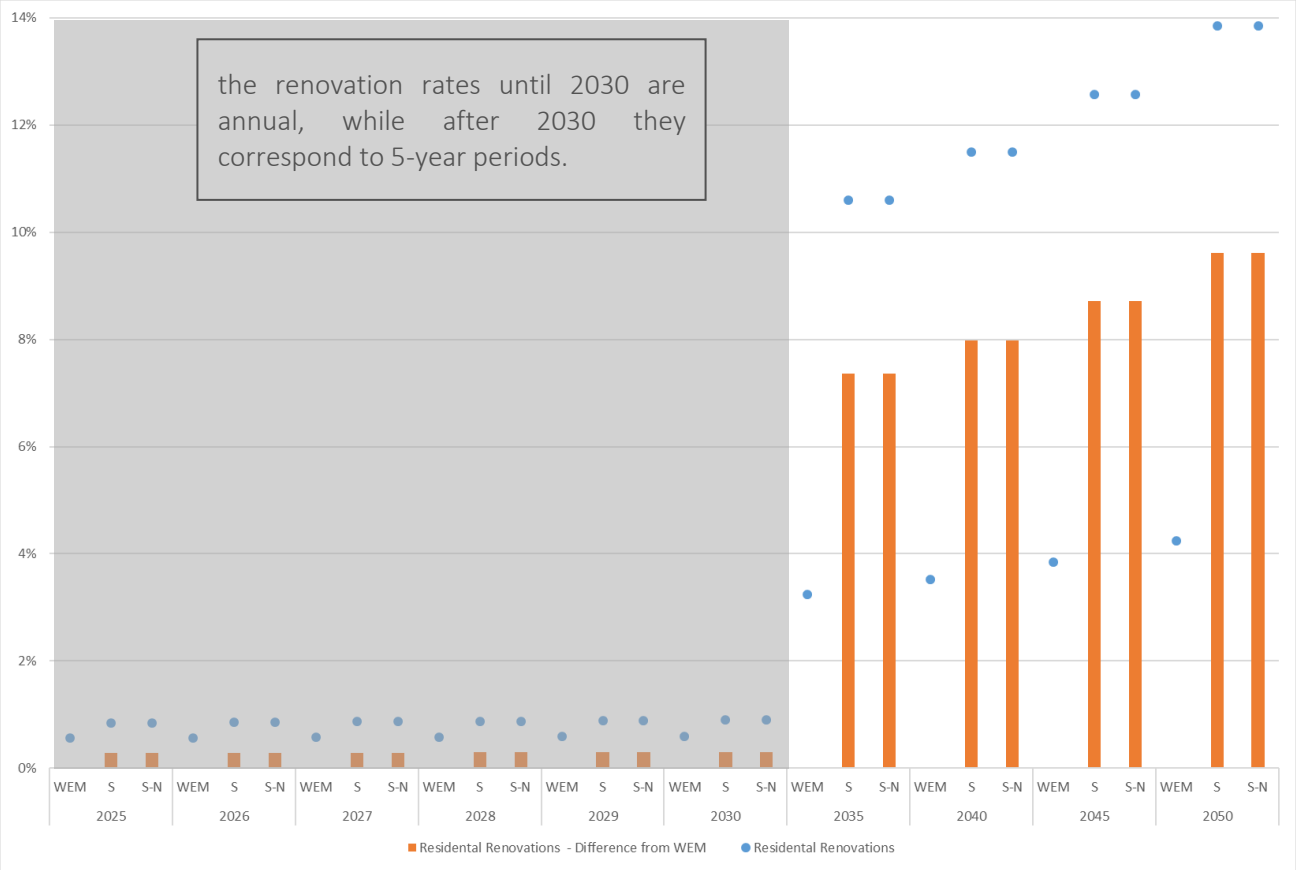
[91] Final energy intensity is the final energy consumption at a specific branch/variable per unit of activity level.

Figure 5.24: Gross inland consumption by fuel



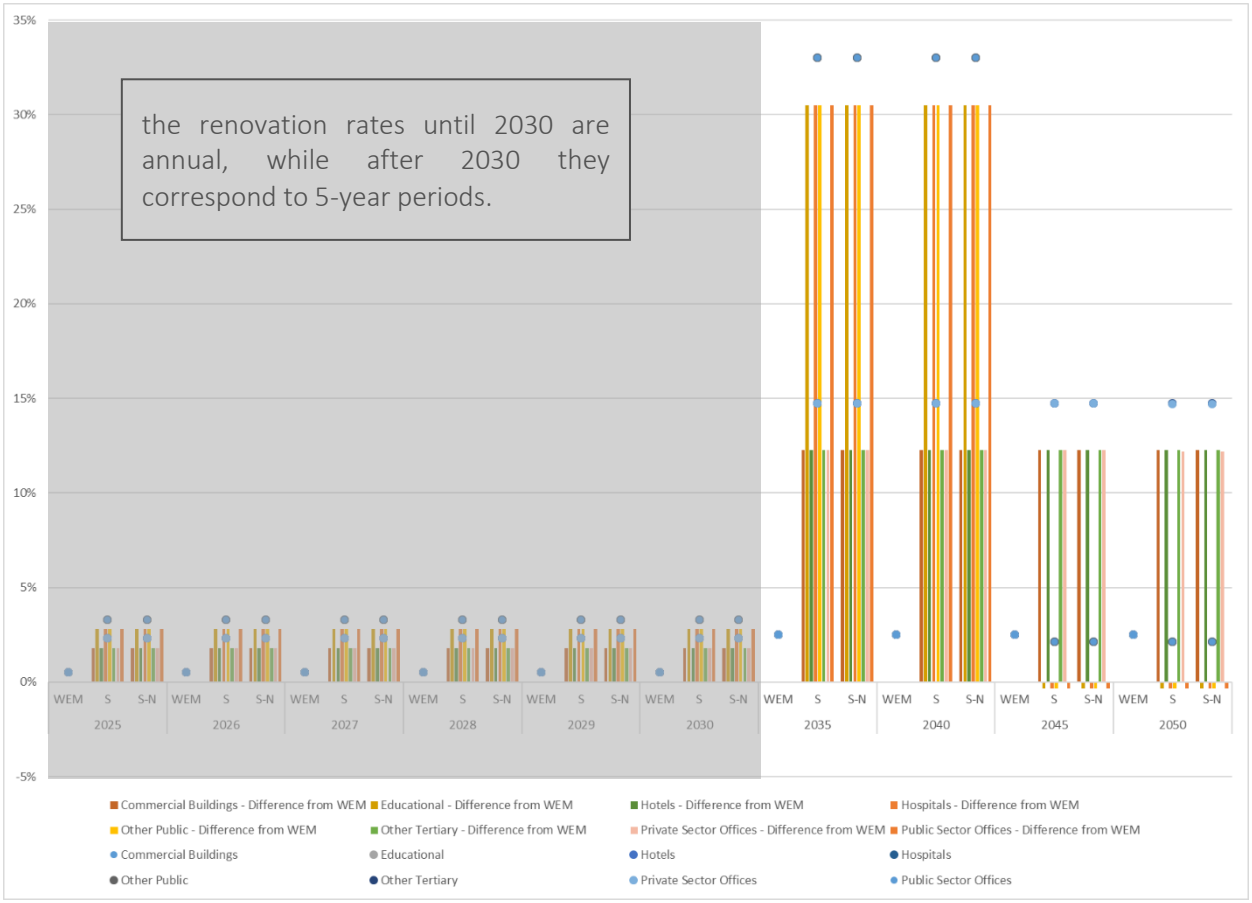
For the case of residential buildings, the renovation rate is similar and almost stable in all examined scenarios over 2025-2030 A doubling of the annual renovation rate is seen in scenarios S and S-N after 2030 towards 2050 It is important to note that in the figure until 2030 the renovation rates presented are annual, while after 2030 the renovation rates presented correspond to 5-year periods.

Figure 5.25: Refurbishment in residential buildings



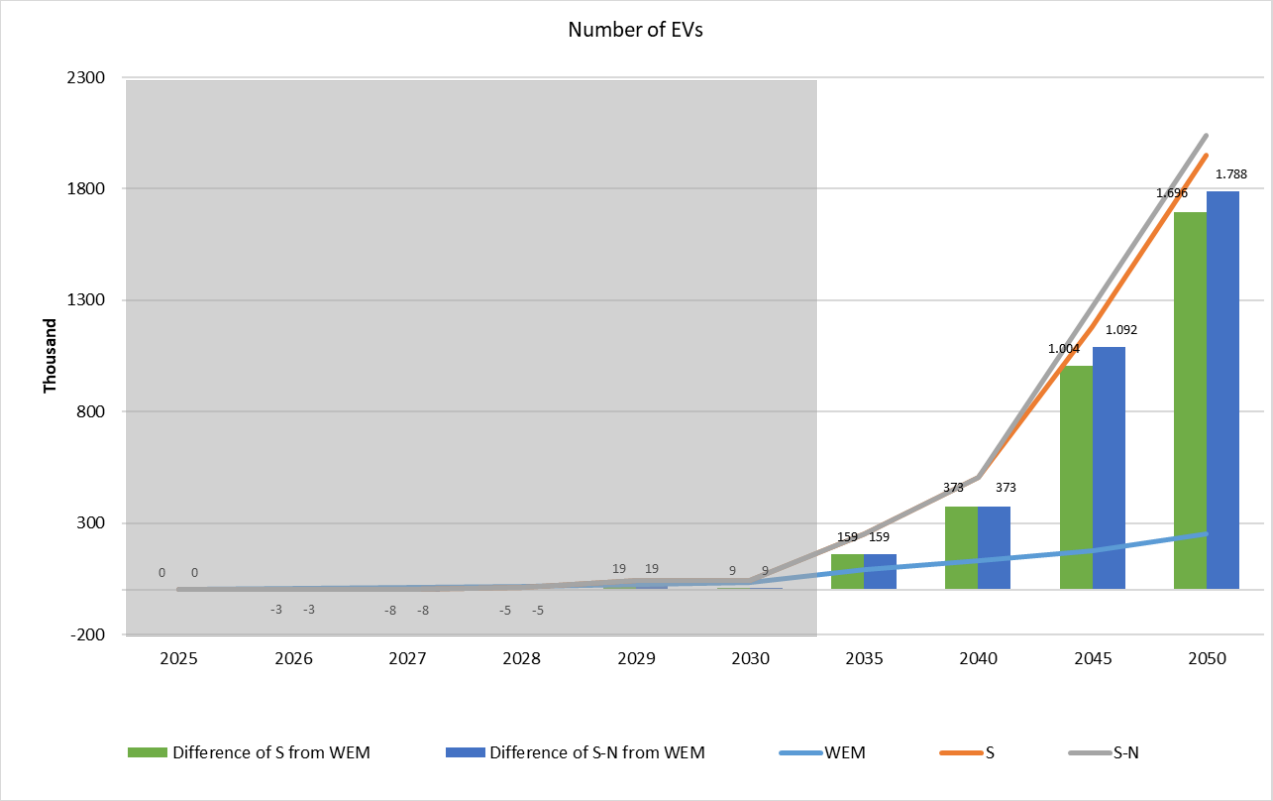
For the case of buildings in the tertiary sector, several variations in renovation rate for the different building types are observed. In WEM scenario, the renovation rate is stable at 0.5% for all building types over 2025-2030, while a renovation rate of 2.5% is expected between 2035 and 2050 (. In scenarios S and S-N, despite the fluctuations for the different building types, an intensification of the renovation rate is observed in the period 2035-2050 . As mentioned earlier, the renovation rates shown in the figure until until 2030 are annual, while after 2030 they correspond to 5-year periods.

Figure 5.26: Refurbishment in commercial buildings



The cumulative number of electric vehicles is equal to 45 thousand, 507 thousand and about 2,000 thousand in 2030, 2040 and 2050 respectively in both scenarios S and S-N indicating the impact of the targeted policies and measures for the promotion of electromobility (8). A huge deployment in EVs is anticipated from 2030 to 2050 in both scenarios S and S-N, compared to an insignificant one in WEM scenario.

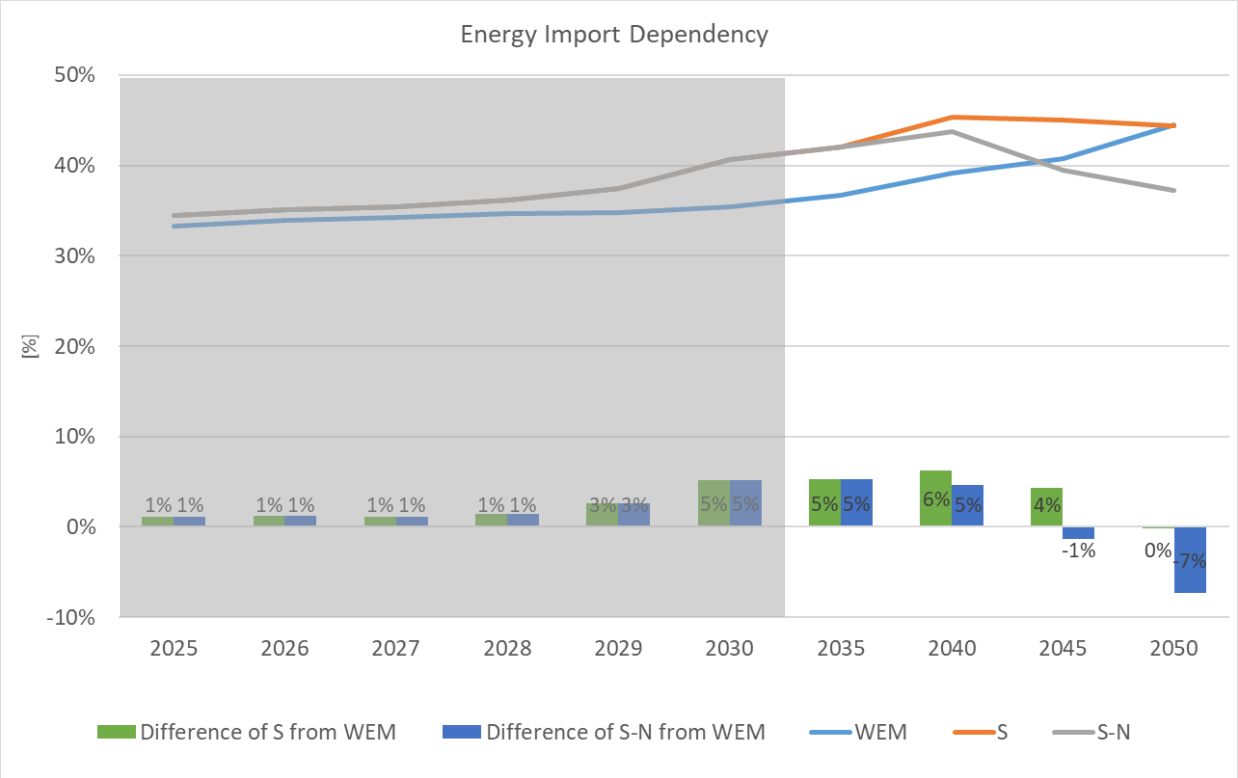
Figure 5.27: Number of EVs



Furthermore, the energy import dependency is equal in 2030 to 35% in WEM and 41% in scenarios S and S-N, depicting that the reduced utilization of lignite for electricity production is counterbalanced by the combination of the increased penetration of RES and the promotion of energy efficiency 29). In Scenario S energy import dependency is increased towards 44% in 2050. In Scenario S-N energy import dependency in 2050 remains at the level of 37% due to the introduction of the nuclear plants for electricity production[92].

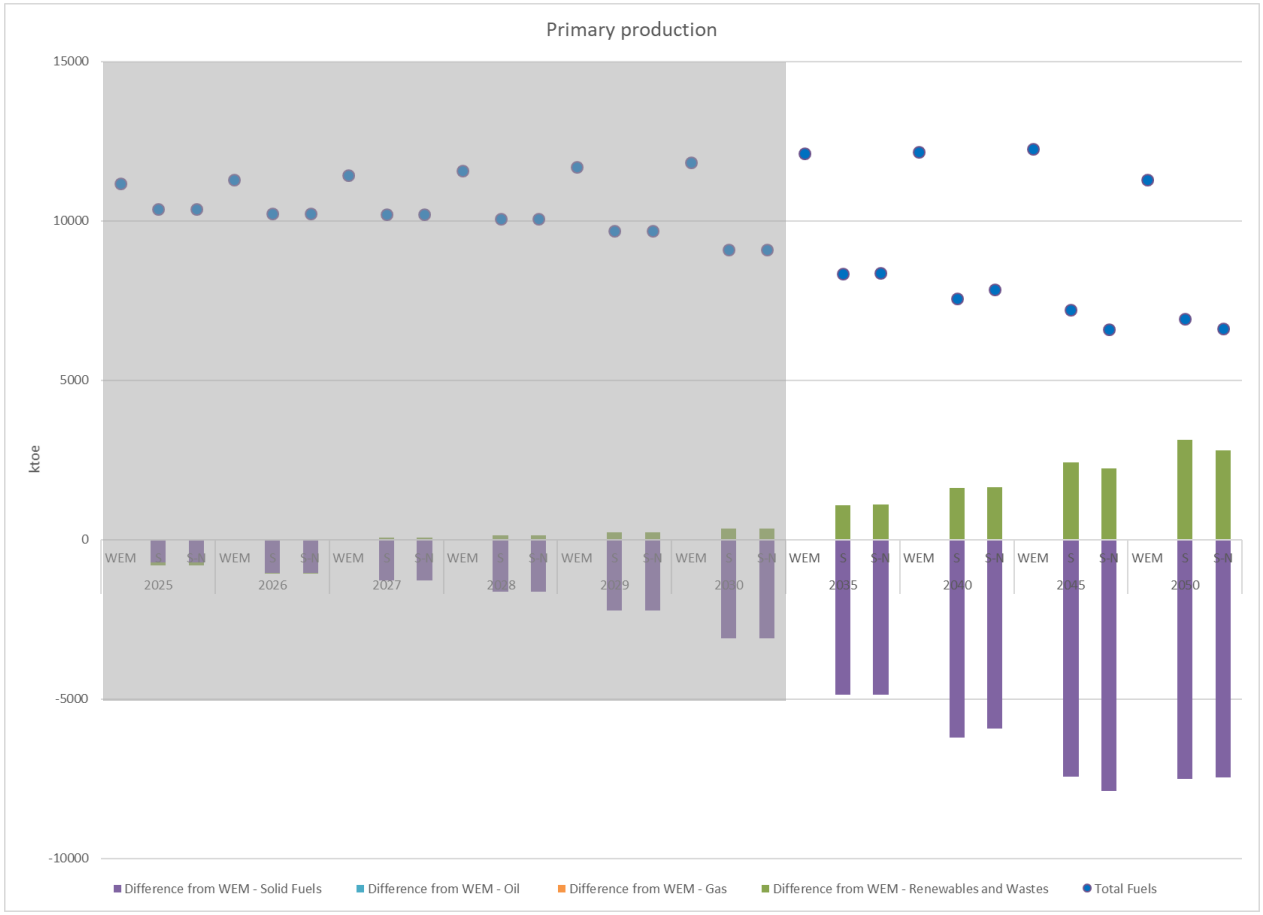
[92] According to the Eurostat energy balance reporting rules, nuclear heat used in electricity generation is not considered as import but as primary production (local production).

Figure 5.28: Energy Import Dependency



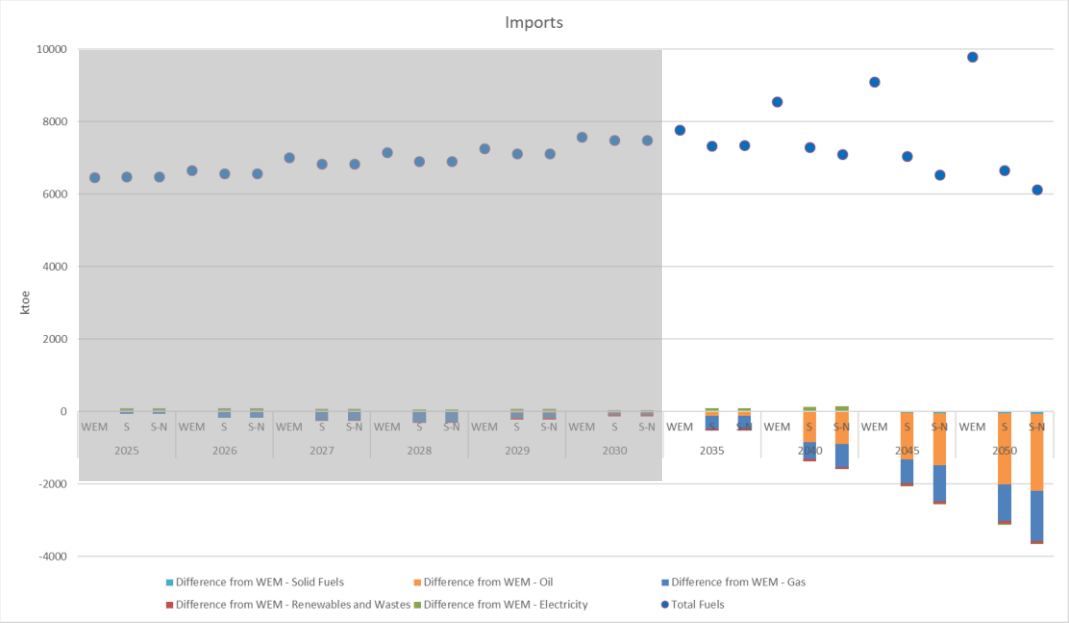
In WEM scenario, primary production is equal to 11.8 Mtoe in 2030, higher than 9.1 Mtoe, which corresponds to scenarios S and S-N over the same year (). In 2050, primary production will decrease by 4.5% at 11.3 Mtoe in WEM scenario, compared to 2030 level, while a 23.9% fall in scenario S at 6.9 Mtoe and a 27.1% decline in scenario S-N at about 6.6 Mtoe are anticipated. Solid fuels as well as renewables and wastes comprise the fuels with the highest contribution in both 2030 and 2050.

Figure 5.29: Primary production



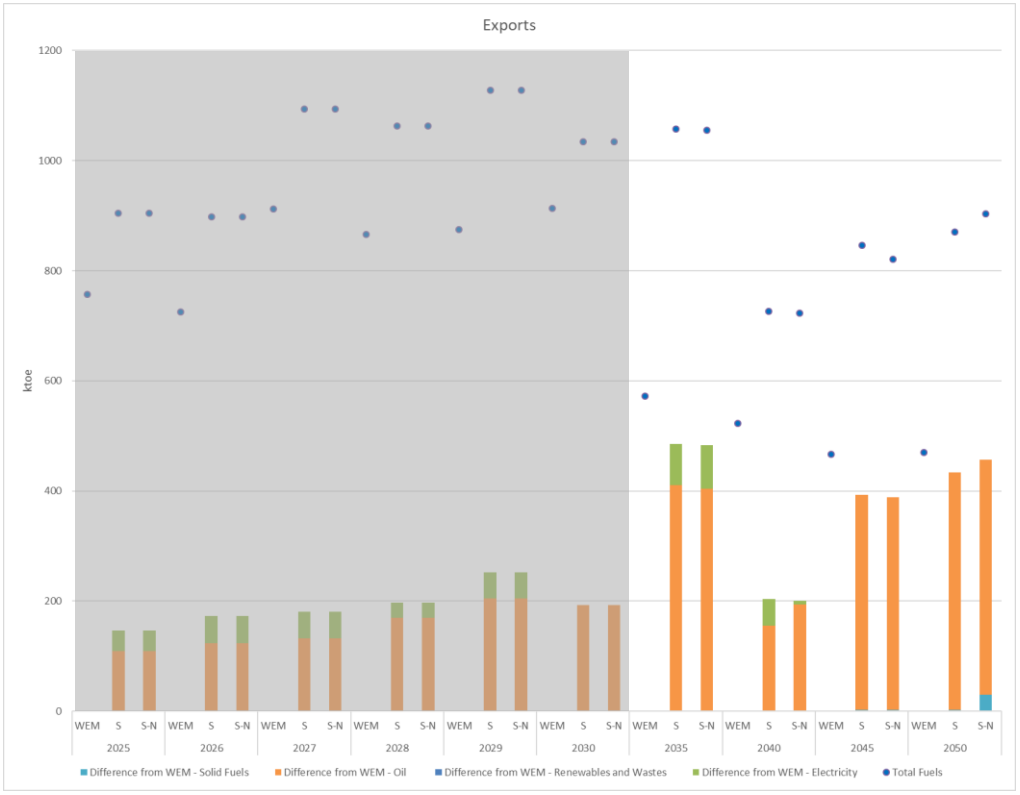
In all scenarios, total energy imports are equal to 7.6 Mtoe in 2030 (1). In 2050, total energy imports will increase only in WEM scenario by 29.2% at 9.8 Mtoe, compared to 2030 level, while a 11% fall (at 6.7 Mtoe) in scenario S and a 18.2% decline (at 6.1 Mtoe) in scenario S-N are anticipated. Oil and natural gas are the fuels with the highest contribution in both 2030 and 2050 in scenarios S and S-N.

Figure 5.30: Energy imports per fuel



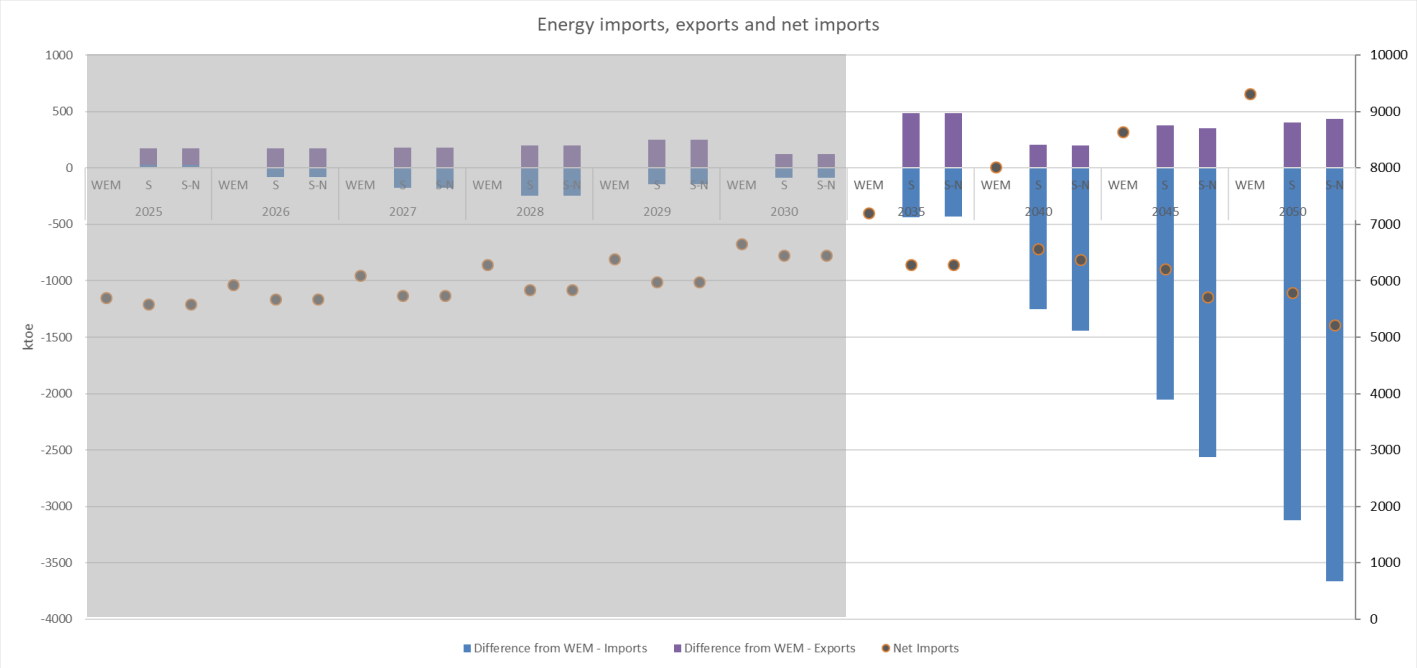
Similarly, in WEM scenario, total energy exports are equal to 914 ktoe in 2030, about 12% lower than 1,034 ktoe in scenarios S and S-N over the same year (). In 2050, total energy exports will decrease by 48.6%, 15.8% and 12.7% at 470 ktoe, 870 ktoe and 903 ktoe in scenarios WEM, S and S-N respectively. Electricity and oil are the fuels with the highest contribution in both 2030 and 2050 in all scenarios, while it is worth noting the increase of solid fuels in total energy exports in 2050 in scenario S-N.

Figure 5.31: Energy exports per fuel



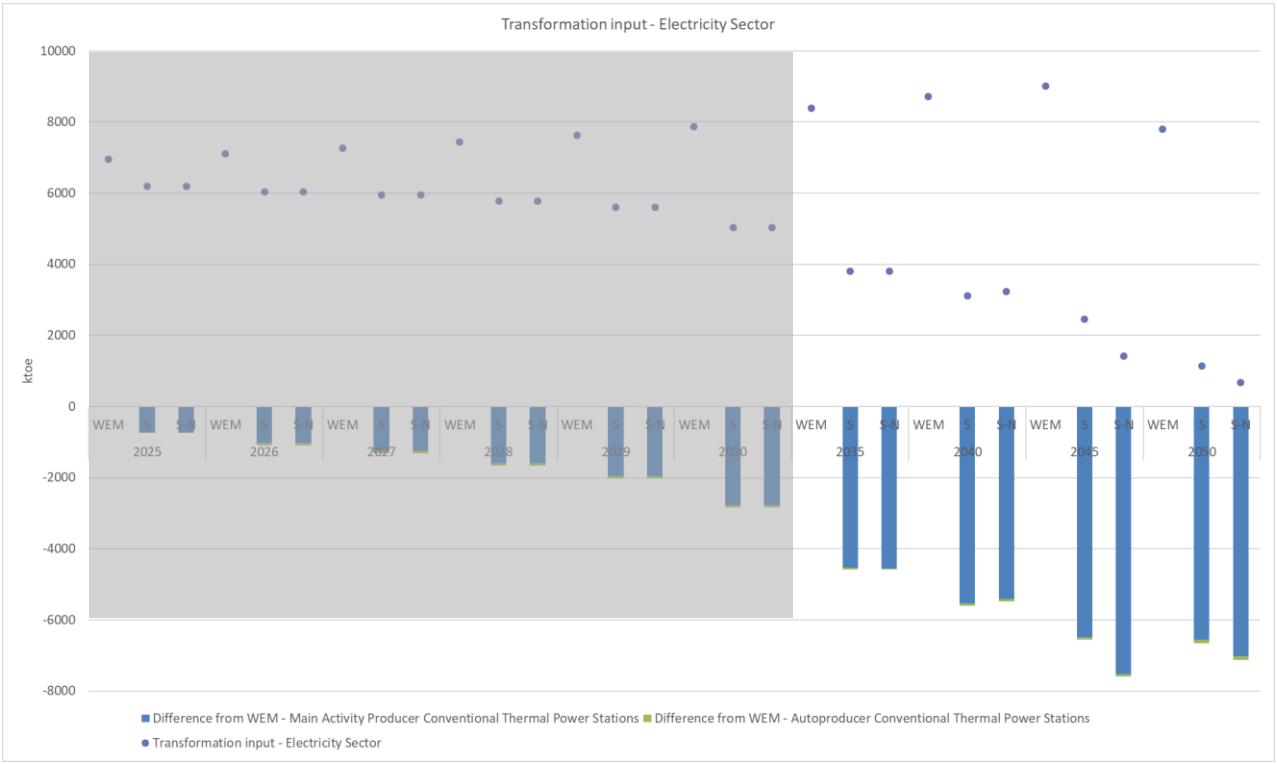
Total net energy imports in WEM scenario are equal to 6.7 Mtoe in 2030, almost the same, compared with scenarios S and S-N over the same year (. In 2050, total net energy imports will increase only in WEM scenario by 39.9% at 9.3 Mtoe, compared to 2030 level, while a 10.2% fall (at 5.8 Mtoe) in scenario S and a 19.1% decline (at 3.7 Mtoe) in scenario S-N are anticipated.

Figure 5.32: Imports, exports and net imports



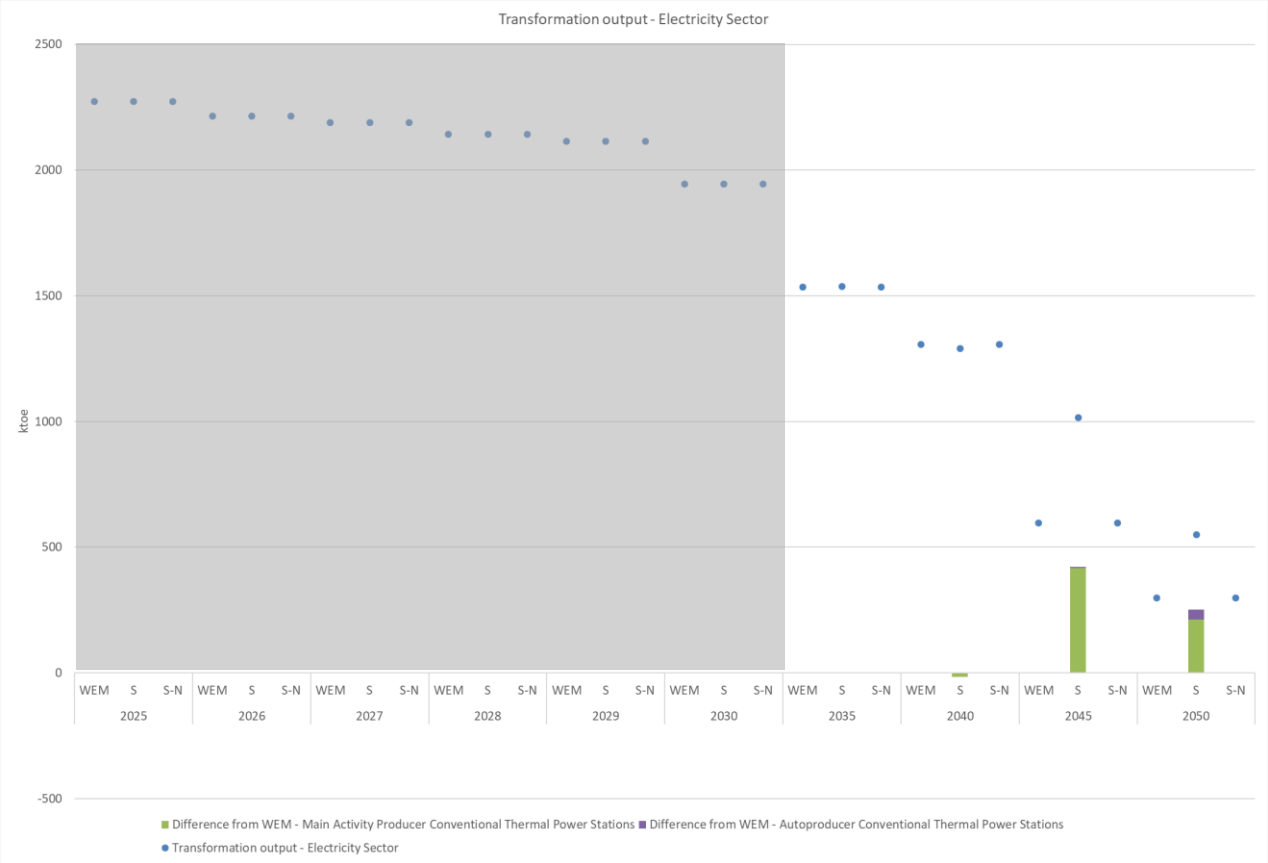
In WEM scenario, total transformation input in electricity sector reaches 7.9 Mtoe in 2030, decreasing by 0.9% at 7.8 Mtoe in 2050 (). By 2050, total transformation input in electricity sector decreases substantially in scenarios S and S-N by 77.5% and 86.7% respectively, reaching 1.1 Mtoe and 670 ktoe accordingly. Main activity producer' conventional thermal power stations contributes the majority of the transformation input in electricity sector throughout the projection period.

Figure 5.33: Transformation input in electricity sector



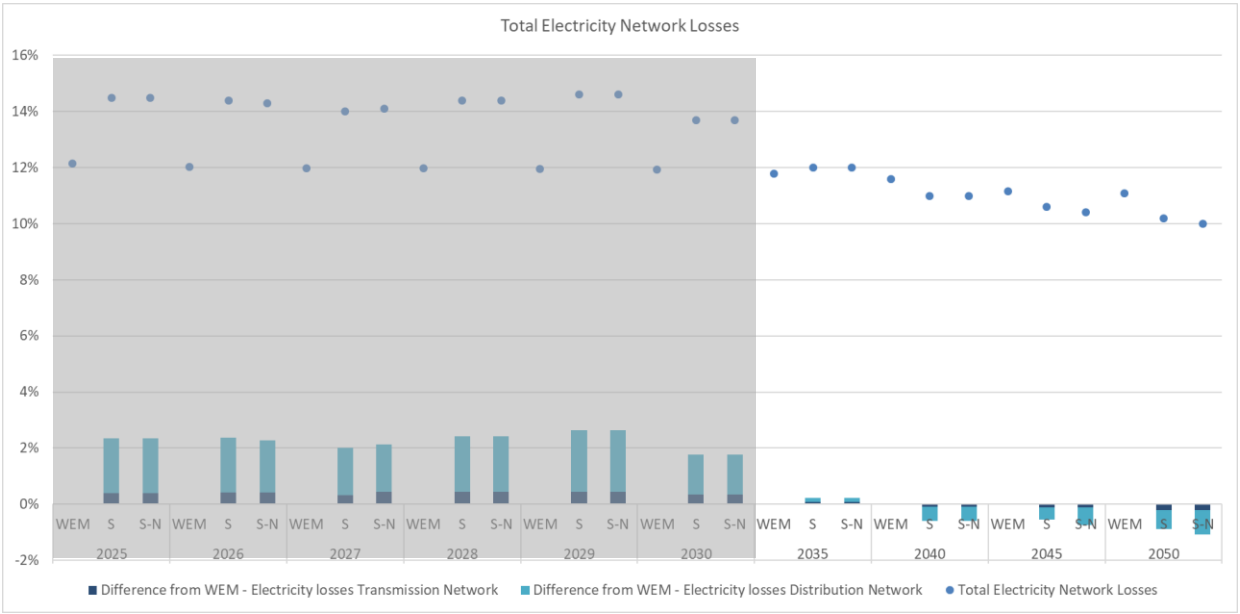
Similarly, total transformation output in electricity sector in WEM scenario reaches 1.9 Mtoe in 2030, decreasing by 84.6% at 300 ktoe in 2050 (). By 2050, total transformation output in electricity sector decreases substantially in scenarios S and S-N by 71.7% and 84.6% respectively, reaching 551 ktoe and 300 ktoe accordingly. Main activity producer' conventional thermal power stations contributes the majority of the transformation output in electricity sector throughout the projection period.

Figure 5.34: Transformation output in electricity sector



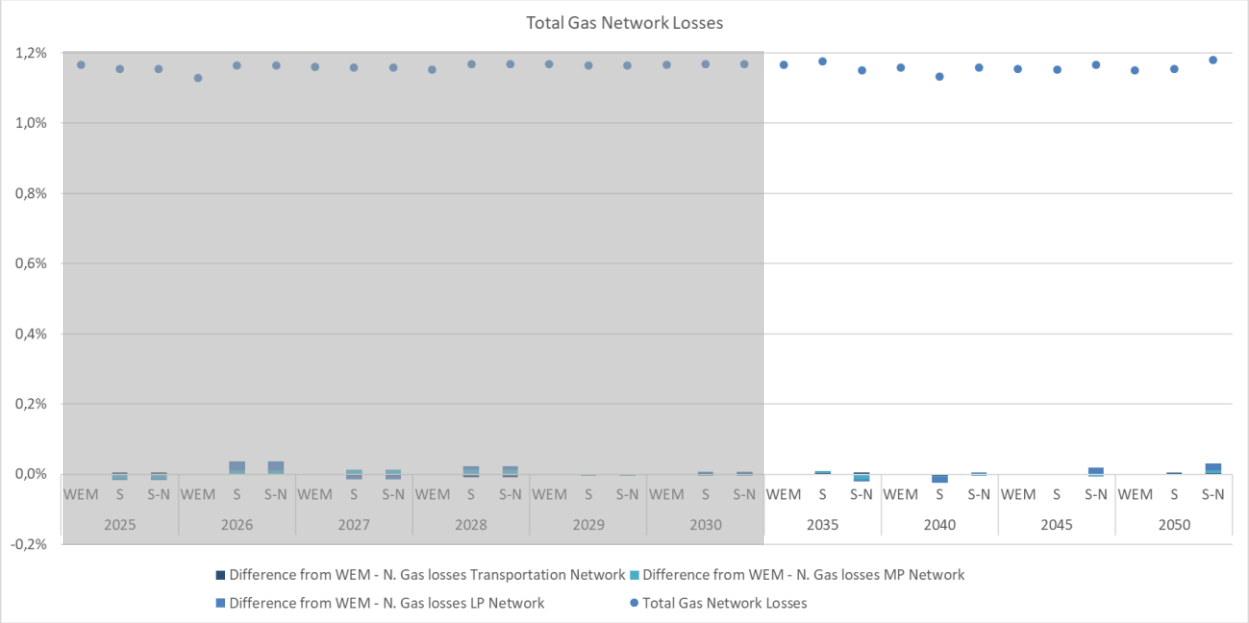
In scenarios S and S-N, total electricity network losses as a percentage of total electricity generation reach about 14% in 2030, while decreasing by 2050 at about 10% (). In WEM scenario, total electricity network losses remain stable at 12% in 2030, 2035 and 2040 and at 11% in 2045 and 2050. Distribution network losses contribute the majority of the total electricity network losses throughout the projection period.

Figure 5.35: Total electricity network losses



In all scenarios, total gas network losses as a percentage of total gas transferred reach 1% in 2030, remaining stable by 2050). Gas losses' LP Network contribute the majority of the total gas network losses throughout the projection period.

Figure 5.36: Total gas network losses



5.2 Macroeconomic and, to the extent feasible, the health, environmental, employment and education, skills and social impacts, of the planned policies and measures

As readily shown in Figure 5.37, until 2030, Scenario S (WAM) leads to a continuous increase of the GDP with respect to WEM. Then, the positive change becomes more aggressive by 2045 (slightly oscillating between +1.7% and +2.2%) and presents a negligible descent between 2045 and 2050. However, the change is always greater than +1.2%, with respect to the WEM scenario, through the whole-time horizon. This means that the policy and technology options included in the WAM scenario have a positive impact on the economy leading to higher GDP growth rates compared to the WEM scenario. In the post 2040 period, Scenario S-N (the nuclear option of Scenario S) leads to an almost constant moderate slow-down, due to the emerged costs of relying on the nuclear power technology in conjunction with the posed high mitigation targets.

The situation regarding GDP's growth rates is quite clear. The implementation of scenario S tends to increase GDP, with respect to the WEM scenario. On the other hand, the introduction of nuclear power generation leads to a moderate reduction in GDP, with respect to the WEM scenario, which follows a constant downward trajectory after 2040. In general, it is costlier to rely on nuclear power (including higher operational and construction costs) therefore, forcing to rely also on this more expensive technology, in conjunction with ambitious mitigation targets, restrains GDP's growth in some extent.

Figure 5.37: Impact of scenarios S and S-N implementation on the GDP of Serbian economy over the 2025-2050 period

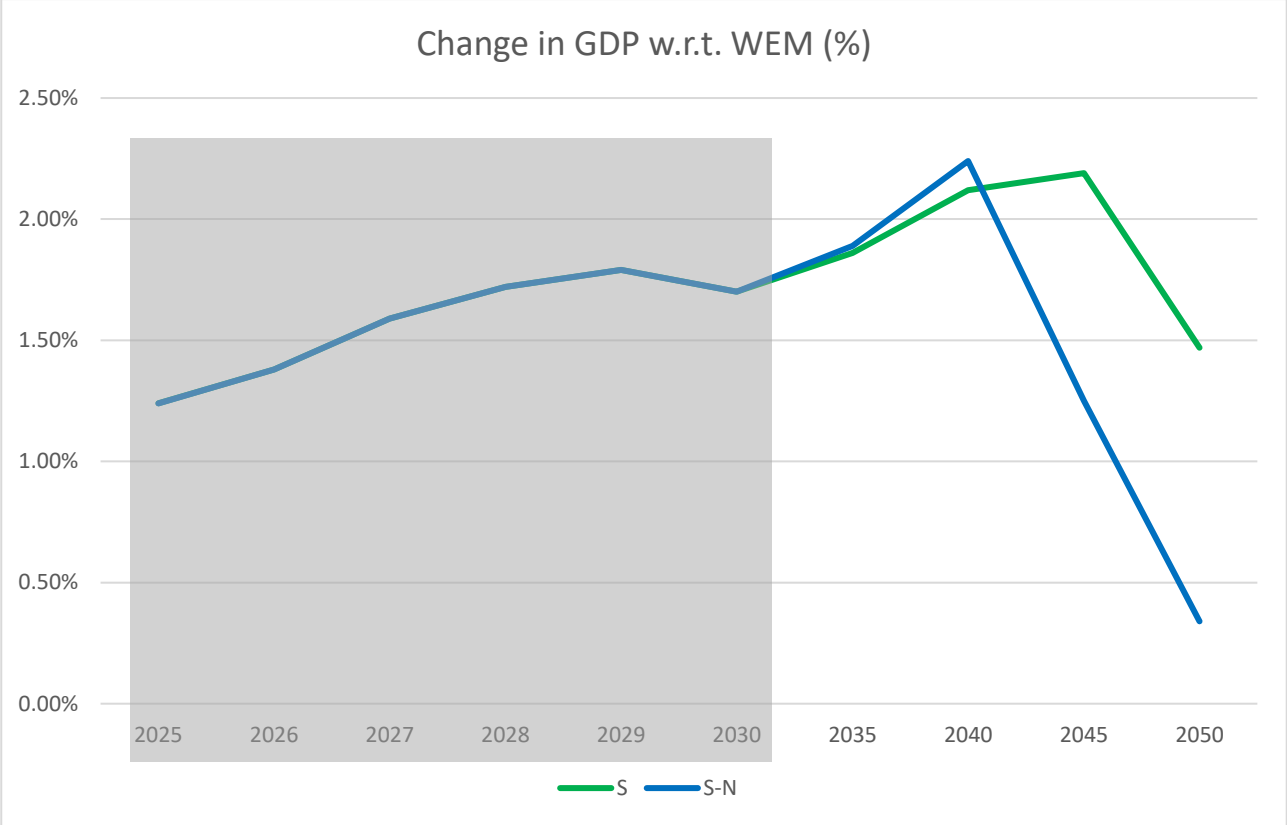


Figure 5.38 shows how the scenarios under consideration are projected to impact the unemployment levels of Serbian economy. In general, the impact on the aggregated unemployment is limited.

Regarding scenario S, the largest (relatively) impacts are observed prior to 2030, while unemployment returns to a normal level over time, when markets adjust. Regarding scenario S-N, we observe a slight increase in the unemployment in the medium to long term towards 2045 (less than 0.4% compared to WEM levels). This fact is somehow expected, since the present study relies on a computable general equilibrium framework, which is actually a demand-driven approach. Nuclear option constitutes an expensive alternative mainly due to the construction, operational, and maintenance costs. Under this situation, market clearing constraints of the modelling direct the demand to slow-down until the adjustment. The downward demand in conjunction with the high mitigation targets that have been set – thus causing recession to the carbon-intensive activities – and the fact that alternatives such as solar and wind power technologies are less labor-intensive, lead to a slight employment decrease. However, the overall impact is extremely small (less than 0.4%).

Figure 5.38: Impact of Scenarios' S and S-N implementation on the unemployment rate of Serbian economy over the 2025-2050 period

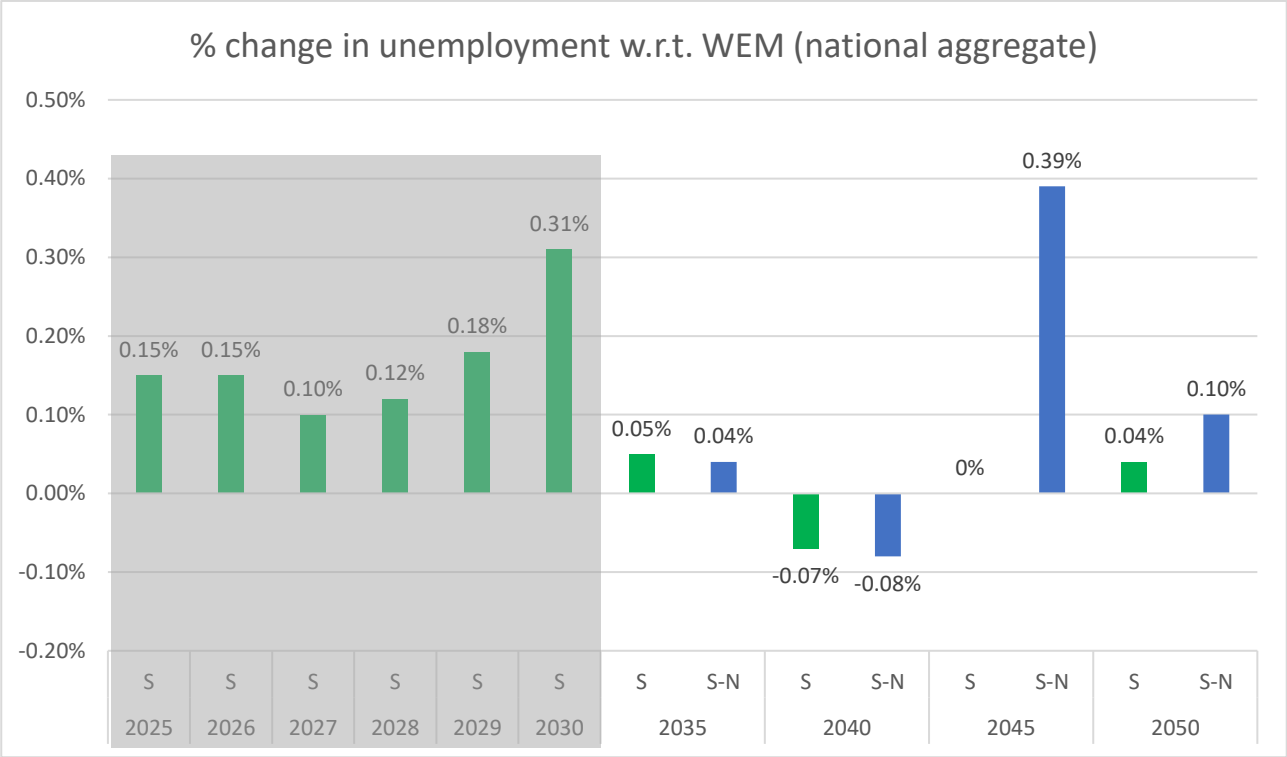
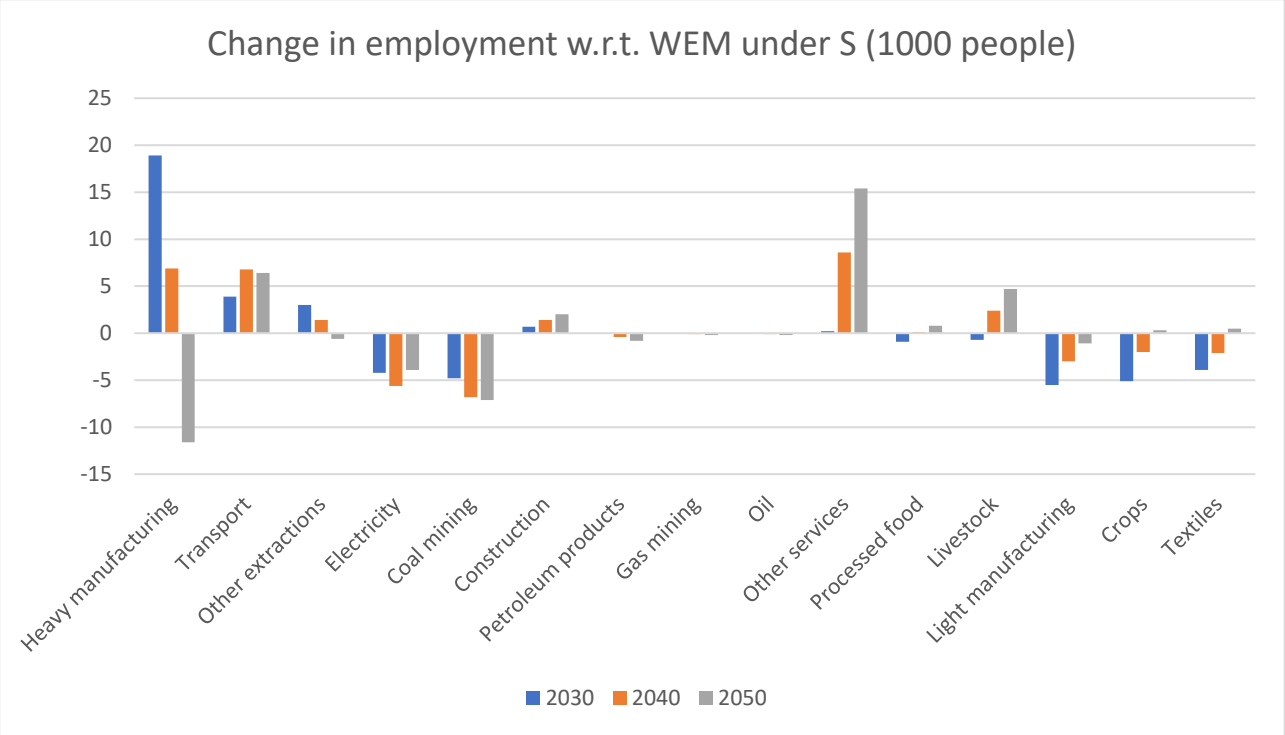


Figure 5.39 illustrates the estimated impact under scenario S on the employment of key sectors of the Serbian economy in terms of thousand employees. We observe that coal mining sector demands constantly less employees in the labor market, which is an expected result of the process of decarbonization. Petroleum products follow the pattern of coal mining, however, in a quite lower scale. Electricity sector also reduces its labor force, which is an impact of the change of the generation mix of electricity demand towards 2050, from labor intensite lignite fired power plants to less labor intensive renewable energy technologies. Heavy manufacturing is affected negatively only in the long term (2050). Based on the outcomes of the macroeconomic analysis tool, the greater part of lost jobs in sectors where employment is reduced moves towards the services sector.

Figure 5.39: Impact on employment by sector under the implementation of Scenario S.



It is also interesting to investigate the job creation specifically from power generation technologies. Those jobs are linked either to the manufacturing and installation of power generation technologies or to the O&M of the power plants. To this end, employment factors (Table 5.3) derived from the review of a number of studies focusing on EU countries having similar characteristics with Serbia have been used[93]. With the help of those, the jobs estimated to be created in scenario S due to the deployment of new RES capacity for solar PV, wind and biomass[94] have been calculated. The results are illustrated in Figure 5.40.

Table 5.3: Employment factors utilized in the study per technology

Technology	Installation (person-years/MW)		O&M (jobs/MW)	
Solar PV	10	15	0,2	0,4
Wind onshore	10	15	0,2	0,4
Biomass	15	20	0,2	0,4

[93] As per the draft version of the Just Transition Diagnostics study commissioned by EBRD

[94] It is assumed that the installation of a large-scale PV plant on average is 1 year, wind plant 2 years and biomass plant 2 years

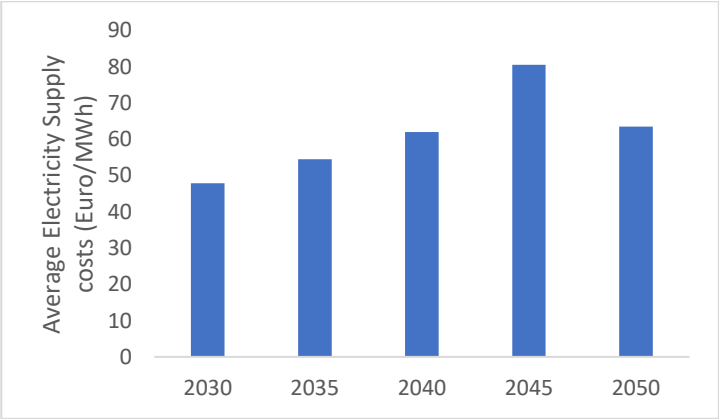
Figure 5.40: Estimation of the number of jobs created in scenario S due to the deployment of new RES capacity for solar PV, wind and biomass

It must be noted that the values presented in Figure 5.40 refer to the upper and lower limit of full-time jobs created in the entire country to install, operate and maintain new RES capacity until 2030 (from the beginning of 2023 until end of 2030). Out of these jobs, it is anticipated that a large number if not all of them for solar and biomass plants can be created in the impacted lignite territories, while jobs related to wind farms which will be deployed in areas with high wind potential. It is also anticipated that the jobs to be created in general and in the lignite regions specifically will be retained due to the constantly expanding RES sector. From the analysis it is derived that up to 3300 and 4900 jobs can be created in the region due to the deployment of new solar and biomass plants.

Scenario S will also impact the average generation (electricity supply) cost that includes the fuel, variable and fixed operating costs plus the annualised investment costs of new investments (after 2016) only. This influence is presented in

Figure 5.41 and it can be shown that scenario S will specifically lead to an overall increase in the costs towards 2050. It is important to note that average electricity supply cost is not equivalent to the wholesale electricity prices.

Figure 5.41: Evolution of the average electricity supply cost in scenario S

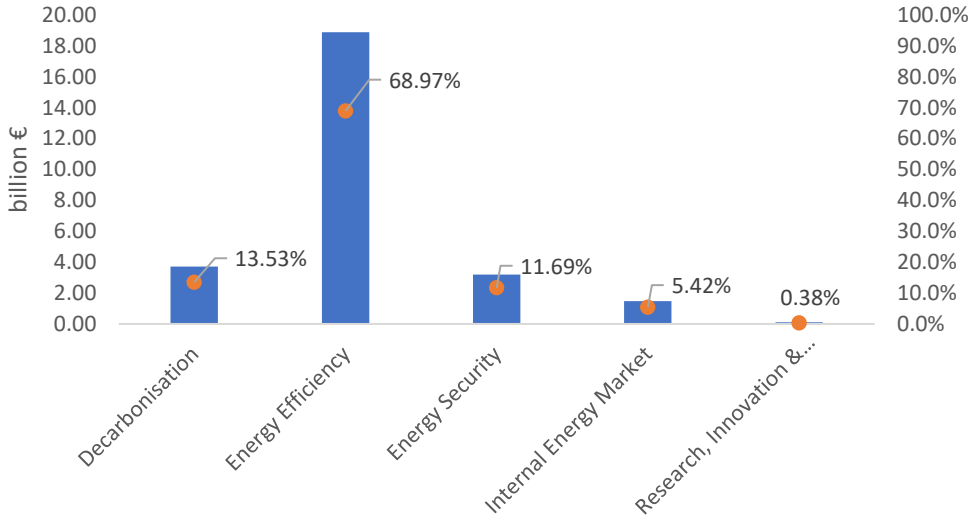


5.3 Overview of investment needs

The Serbian NECP includes bold efforts towards the decarbonization of the energy sector, associated as expected with high costs. The overall investment needs (referring both to public and own fund CAPEX needs) included under the WAM scenario amount to approximately 10.72 billion EUR until 2030. The deployment of new large-scale projects shall also create the respective OPEX needs which are however not included in the present analysis. Figure 5.42 illustrates the distribution of implementation costs per dimension.

As it can be obtained, the related measures included in the Energy Efficiency dimension account for the vast majority of the implementation costs representing around 68.97% of them. This is reasonable considering that projects categorized under this dimension are related to massive investments required for the promotion of energy efficiency in the industrial, transport sectors as well as the building sector. These sectors need intensive investments in the form of support schemes through subsidies for the energy renovation of existing commercial, public and residential buildings, as well as the construction of new ones, subsidies and tax advantages for the purchase of energy efficient commercial vehicles and financial/fiscal measures for the replacement of the conventional light-duty and heavy-duty vehicles for the freight transport as well as for the modernization of the existing railway infrastructure in the country. Investment needs related to Decarbonization, more specifically to GHG emissions and renewable energy amount to approximately 3.71 billion EUR until 2030.

Figure 5.42: Distribution of implementation costs per dimension



An overview of the individual measures listed under the 5 dimensions (i.e. Decarbonization, Energy Efficiency, Energy Security, Internal Energy Market, Research, Innovation and Competitiveness), alongside their implementation costs are summarized in Figure 5.43, while the detailed list of measures is included in Annex I. In the cases that the measure is implemented both under WEM and WAM scenarios, it has been assumed that implementation costs are split between WEM and WAM, according to the specific measure provisions. It can be obtained that in the WEM scenario approximately 16.68 billion EUR of investments are included, while under the WAM scenario 10.72 billion EUR.

This allocation essentially indicates that already under the WEM scenario considerable decarbonization efforts were included (**Figure 5.43**). It should be stressed also that large part of the costs of the WAM scenario shall come from private sector investments, implying that the feasibility of the scenario is strongly related to affordability for consumers and the ability of the private sector to deliver projects.

Figure 5.43: Distribution of implementation costs per WEM /WAM

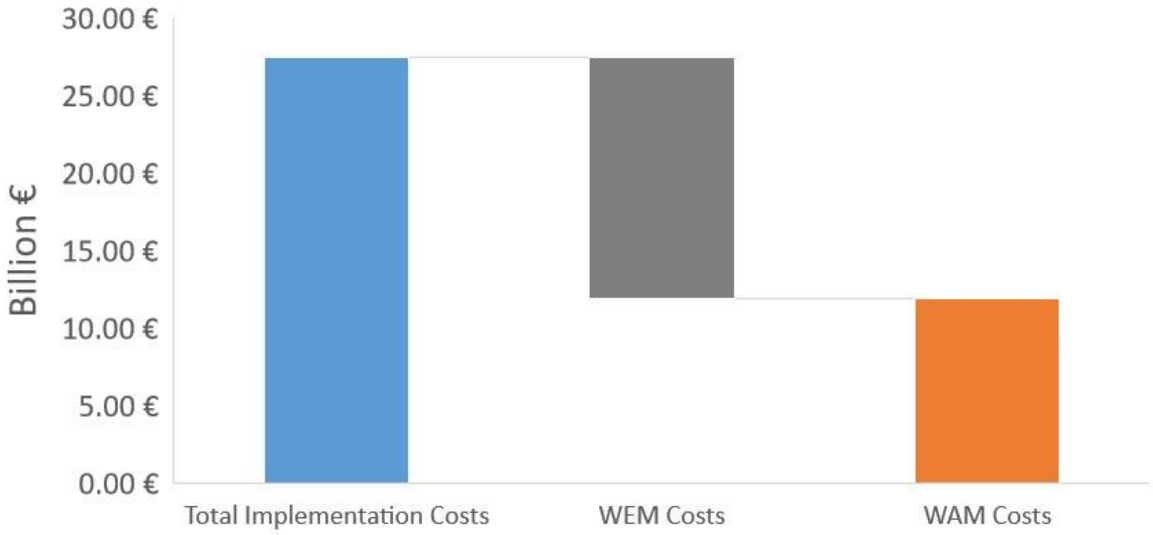
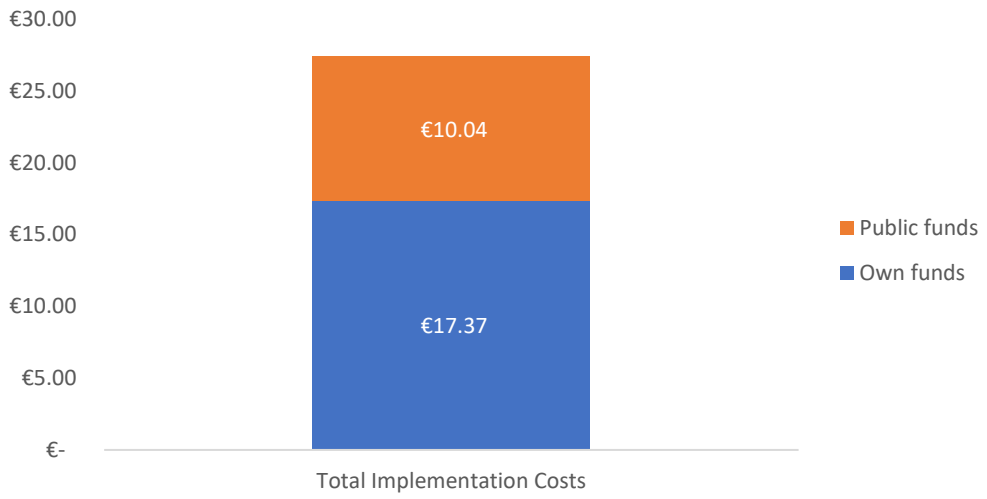


Table 5.4 Dimension of Measures and implementation costs[95]

Dimension of Measures	Implementation Cost (billion €)	Planned public aid (billion €)	Own funds (billion €)	Own funds over total implementation cost	CAPEX WEM (billion €)	CAPEX WAM (billion €)
Decarbonisation	3.71	0.87	2.84	76.5%	1.08	2.63
Energy Efficiency	18.90	7.56	11.34	60.0%	10.81	8.09
Energy Security	3.20	1.34	1.87	58.3%	2.07	1.14
Internal Energy Market	1.49	0.21	1.28	85.9%	1.48	0.00
Research Innovation and Competitiveness	0.11	0.06	0.05	45.7%	0.11	0.00
Total (billion €)	27.41	10.04	17.37	63.4%	15.55	11.86

Out of the cumulative investment needs of 27.41 billion EUR up to 2030, approximately 36.6% refers to public sector investments (**Figure 5.44**) The remaining almost 63.4% shall come from own funds investments including the projects promoted by the Transmission and Distribution System Operators that will be eventually socialized through the tariffs. Particularly, large scale transmission projects will be further assessed with respect to the financial capacity of the project promoters to implement them, as well as with respect to their stress on the transmission and distribution tariffs.

Figure 5.44: Distribution of implementation costs per for public and private (own resources) investments



The blending of private (own resources) and public funds will be the prevalent option for the financing of those measures subject to public budget and private sector affordability constraints. Part of the investment needs related to green transition can be covered by the earmarking of public revenues from the imposition of the CBAM tax. Also, the instrument of Public and Private Partnerships could be key to leveraging private sector investments.

In this context, the role of IFIs is critical to support the green transition of the Serbian energy sector. Whereas there is a number of green financing activities in terms of grants and loans, these are quite limited compared

[95] Extended table with measures and their respective costs included in in Annex I

to the overall investment needs. An overview of available green funding instruments for Serbia and the entire Western Balkans regions is presented in Table 5.5:

Table 5.5: Overview of Serbia's green transition support programs

Donor	Field	Description
WB,EBRD, KfW	Type of aid	Budget Fund for Energy Efficiency
	Amount	The fund is allocated from the central budget of the Government of Serbia, on an annual basis, in the approximate amount of EUR 20 million. As of 2019, an EE levy has been introduced on energy bills. $ 1.200.00,00
	Purpose	Support the implementation of EE measures in energy efficiency in public buildings, households and commercial facilities
	Duration	n.a
UNDP	Type of aid	Advancing Medium and Long-Term Adaptation Planning in the Republic of Serbia
	Amount	n.a
	Purpose	▪ Strengthening legal and institutional framework for climate change adaptation (CCA); ▪ Assessing and addressing immediate national and subnational CCA policy and institutional capacity gaps; ▪ Developing of the National Climate Change Adaptation Plan (NAP) and integration of the CCA into national and subnational planning processes; ▪ Improving of the Nationally Determined Contributions (NDC); ▪ Developing of web-based application and platform for Climate Change Vulnerability Assessments and Adaptation (CCA)
	Duration	Till2023
KfW	Type of aid	Supporting Sustainable National Guarantee Institutions
	Amount	uptoEUR50 million
	Purpose	UnlockingEUR140+ millions of financing, Reaching4700+MSMEs and Entrepreneurs and Investing in a sustainable recovery
	Duration	ongoing support
EC	Type of aid	Instrument for Pre-accession Assistance III (IPA III)
	Amount	UptoEUR9 billion
	Purpose	Reinforcing instruments to foster public and private- sector investment (support economic convergence with the EU through investments and support to competitiveness and inclusive growth, sustainable connectivity, and the twin green and digital transition)
	Duration	2021-2027
EC	Type of aid	Instrument for Pre-accession Assistance III (IPA III)
	Amount	OverEUR14billion
	Purpose	Increasing public and private investment in the region by the EIB, EBRD and other IFIs, DFIs, the Western Balkans governments and private investors, including foreign direct investment, as well as integrating markets
	Duration	2021-2027
EC	Type of aid	Facilitating the increase of energy efficiency - in the context of the EU Green Deal, *EU renovation wave* support will be extended
	Amount	so far enabled green investments of a total of EUR 700 million
	Purpose	Purpose is: transition from coal to sustainable and clean energy. Commission proposes to expand the "EU renovation wave" to the region of the Western Balkans. A refurbished and improved building stock will help pave the way for a decarbonized and clean energy system, as the building sector is one of the largest energy consumers in Europe. For this purpose, the EU will use, among others, the existing platforms such as Green for Growth Fund and Regional Energy Efficiency Programme
	Duration	4 years for contractual commitmentsand5-7yearsfor implementation

Donor	Field	Description
EC	Type of aid	Western Balkans Guarantee facility
	Amount	Mobilizing cca EUR 20 billion of investments
	Purpose	Improvement of the investment capacity of the region: reducing the cost of financing for both public and private investments and reducing the risk for investors, support the green and digital twin transitions; increase competitiveness of the private sector, boost innovation and development of social sectors, connecting economies through strengthened regional economic integration and integration with the EU.
	Duration	2022-2032
EIB	Type of aid	▪ €88million for the health and water sectors ▪ €761million for the socioeconomic recovery (€385 million from it to ensure survival in the short- term, and recovery in the medium-term of businesses in the private sector ▪ €750million macro-financial assistance (Western Balkan governments support in payment crisis) ▪ €1.7 billion of EIB investment (for additional loans for public sector investments, and further credit to enterprises, to help safeguard jobs for the many people working in SMEs in the region)
	Amount	over EUR 3.3 billion
	Purpose	Bringing under control coronavirus health crisis and post-pandemic socio- economic recovery
	Duration	Ongoing support
EBRD,KfW, EU	Type of aid	BOX 2: IFI/Donor programmes in the region of the Western Balkans (ECS Donor Coordination Platform) It is a regional programme blending IFI financing from the EBRD and KfW with EU grant financing to support an integrated package of targeted policy dialogue (transposition of the EU Energy Performance of Buildings directive), technical assistance, and financing with the aim to Stimulate sustainable growth
	Amount	EUR 45 million EBRD with EUR 6.7 million of EU grant co-financing; up to EUR 85 million KfW financing and EUR 15.6 million of EU grants
	Purpose	**Public Finance Window** finances EE renovations of public buildings owned by municipalities or governments (schools, hospitals, central and local administration offices). This window comprises of: up to EUR 45 million EBRD financing
	Duration	n.a.
EIB	Type of aid	BOX 2: IFI/Donor programmes in the region of the Western Balkans (ECS Donor Coordination Platform) It is a regional programme blending IFI financing from the EBRD and KfW with EU grant financing to support an integrated package of targeted policy dialogue (transposition of the EU Energy Performance of Buildings directive), technical assistance, and financing with the aim to Stimulate sustainable growth
	Amount	EUR 135 million EBRD credit line supported by technical assistance and incentives and provided through local financial institutions, EUR 35,1 million grants from donors
	Purpose	**Western Balkans Green Economy Financing Facility (WBGEFF I and II)** promotes EE renovations in the residential sector and the construction of new high performing buildings
	Duration	2021-2027
EIB,EC	Type of aid	n.a.
	Amount	EUR80million
	Purpose	**The Private Financing for Energy Efficiency (PF4EE)** is a joint initiative between the EIB and the European Commission. Through the LIFE Programme the instrument's credit risk protection and expert support services will be funded. The EIB leverages this amount, making a minimum of EUR 480 million available in long-term financing
	Duration	2021-2027
EC,EEFIG	Type of aid	n.a.
	Amount	Horizon EU's EUR 95.5 billion worth research and innovation programme in total
	Purpose	Through **EU Horizon 2020**, the Commission has setup a series of facilities funding Project Development Assistance (PDA) to support public authorities - regions, cities, municipalities and public bodies in developing bankable sustainable energy projects.

Donor	Field	Description
		The Commission, in collaboration with the Energy Efficiency Financial Institutions Group (EEFIG), has developed products that aim to inform financial institutions, investors and project promoters about the real benefits and risks of energy efficiency investments
	Duration	2021-2027
EC,EEFIG	Type of aid	n.a.
	Amount	n.a.
	Purpose	**The De-risking Energy Efficiency Platform (DEEP)** is a pan-EU open-source database containing detailed information and analysis of over 10,000 industrial and buildings-related EE projects. It builds performance track records and helps project developers, financiers, and investors better assess the risks and benefits of energy efficiency investments.
	Duration	n.a.

It is noted that as of today, a draft Just Transition Action Plan has been submitted to the Ministry of Serbia for review and approval. As regards to its development, the following principles are used to drive decisions under the assessment for infrastructures and interventions needed:

- Public infrastructure investment decisions will be aligned with the policies and strategies set by the government such as NECP, especially the major time milestones
- Only some economic inclusion problems can be effectively addressed by infrastructures, while targeted intangible interventions are being considered, although further reforms are being explored. Moreover, all actions are prioritized on the basis of just transition impacts especially to the affected population.
- Fit-for-purpose, accessibility and affordability are key variables in the assessment process for the selection of the actions.
- Individuals, enterprises and the community must have the capacity, capability and willingness to access/support the infrastructures and any interventions.
- Flexibility to meet the complex and changing nature of the impacts due to transition over the time schedule
- Infrastructure investments should leverage the comparative advantages of enterprises operating in the territories and support those that are required to transform their activities so that to demonstrate the potential to grow in the future

As a result of the aforementioned methodology, the proposed Action Plan encompasses actions across a number of pillars, such as Governance, Policy & Reforms (Laws/Regulations), Investments/Interventions and capacity building. Specifically with respect to investments, those are linked to infrastructure (e.g., energy transition, green transition, building of infrastructure, etc.), innovation &research, entrepreneurship, labour force skilling, social inclusion, as well as to regeneration of brownfields. According to the same Draft Action Plan, the modes of financing for those investments can be either of public or of private (own resources) origin or a combination of both.

5.4 Impacts of planned policies and measures on other Contracting Parties of the Energy Community and Member States of the European Union, and regional cooperation

i. Impacts on the energy system in neighbouring and other Member States in the region to the extent possible

The Serbian energy market is the largest in the Balkan region of the EnC. The energy sector is highly dependent on fossil fuels, which are mostly used in inefficient infrastructure, such as power plants, heat plants and passenger vehicles.

Nevertheless, Serbia has a well meshed Transmission System designed as the backbone of a much larger system. The Transmission System does not exhibit "structural constraints" and the fact that Serbia has 8 electrical Borders with a large interconnection capacity is a measure of how well the Serbian System can integrate a relatively large level of variable RES. On the other hand, the relatively inflexible generation fleet, calls for enhanced Flexibility solutions (like for example Energy Storage) in order to cope with increased capacity levels of variable RES.

EMS plans extensive investments for the upgrade of existing infrastructure as well as for new transmission capacities. Such infrastructure will improve the security of supply of the transmission system users and increase cross-border capacities. This is of great importance since Serbia is connected with eight neighbouring countries (Romania, Hungary, Croatia, Bosnia, Montenegro, Northern Macedonia, Albania, Bulgaria). The existing and the planned interconnectors, are highlighting the role of Serbia as an energy transit country in the Balkans and potentially energy hub.

ii. Impacts on energy prices, utilities and energy market integration

The import dependency of oil and oil products is projected to increase from 76% in 2019 to 97% in 2050, while the import dependency of natural gas is projected to follow a similar upward trend from 84% in 2019 to 94% in 2050. The import dependency of electricity is projected to be at the levels observed until now, ranging between 0% in 2019 to small negative numbers in the period until 2050, ensuring the self-sufficiency of the Republic of Serbia in electricity. This is achieved through the utilisation of the lignite fired power plants in the medium term until 2030 and the gradual shift to RES (mainly wind and solar PV) in the period until 2050.

Moreover, the organised day-ahead market/power exchange in Serbia (JSC "SEEPEX") (established in February 2016 on the basis of partnership between EMS and European Power Exchange), could play a significant role in further promoting regional market integration, particularly in the absence of exchanged in neighbouring markets.

iii. Where relevant impacts on regional cooperation

The importance of regional cooperation is emphasized throughout the NECP and reflected on a number of cross-border interconnection projects which will enhance the country's energy security and create new energy flows within the Balkan area. The development and implementation of such complex projects constitutes an excellent example of regional cooperation either at national or TSO level.

Table 5.6: List of most important regional cooperation-related projects

Policy Measure Code	Policy Measure Name
PM_IEM3	Transbalkan Corridor: OHL B.Basta (RS) – Visegrad (BA) – Pljevlja (ME)
PM_IEM4	Interconnection between Resita (RO) and Pancevo (RS)
PM_IEM5	Pannonian Corridor
PM_IEM6	Central Balkan Corridor

PM_IEM7	RES integration cluster of projects - North CSE Corridor
PM_IEM8	Regional connection through the implementation of interconnection projects
PM_IEM8.1	Serbia-Bulgaria gas interconnection project
PM_IEM8.2	Serbia-Romania gas interconnection
PM_IEM8.3	Serbia-Croatia gas interconnection
PM_IEM8.4	Serbia-BiH gas interconnection
PM_IEM8.5	Regional gas pipeline Leskovac-Vladicin Han-Vranje
PM_IEM8.6	Gas pipeline - interconnection with Montenegro
PM_IEM8.7	Serbia-Macedonia gas interconnection
PM_IEM8.8	Nisš-Pristina gas pipeline

Similarly, at market level, the South-East European Gas (SEEGAS) Initiative, launched by the Energy Community Secretariat in December 2020, is a response to stakeholders' increasing interest to establish organized gas exchanges and improve cross-border trading. The initiative aims to foster closer cooperation between national gas exchanges and TSOs in the region to enable further market opening, better services for traders and ultimately benefit end-consumers through increased competition in gas trading.

ANNEX I: SUMMARY TABLE OF MEASURES WITH IMPLEMENTATION COST

Dimension	PAM number	Name of policy or measure	Type of measure	Synergetic effects	Implementation Cost (million €)	Planned public aid (million €)	own Funds (million €)	Projections scenario in which the PAM is included	CAPEX WEM (million €)	CAPEX WAM (million €)
	PM_D1	Preparation for and Introduction of carbon tax	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_D2	Adoption, Implementation and monitoring of the Low-carbon Development Strategy and Action Plan for its implementation and developing an Adaptation Plan to Climate Change	Reform		1.40	1.40	0.00	WEM	1.40	0.00
	PM_D3	Promoting circular economy	Investment		4.50	4.50	0.00	WEM	4.50	0.00
	PM_D4	Organizing awareness campaigns for better information dissemination	Investment		3.00	3.00	0.00	WEM	3.00	0.00
	PM_D5	Establishment and operation of the National Climate Change Council, a Carbon Footprint Observatory for all sectors, and a National GHG inventory system	Reform		0.50	0.50	0.00	WEM	0.50	0.00
	PM_D6	Implementation and monitoring of Just Transition and related Action Plan	Reform		2.00	1.00	1.00	WEM	2.00	0.00
	PM_D5	Implementation of technological changes in production processes in specific industries	Investment		29.00	29.00	0.00	WEM	29.00	0.00
	PM_D6	Emission reduction measures in the refrigeration and air conditioning - fluorinated gas emissions	Investment		16.00	16.00	0.00	WEM	16.00	0.00
	PM_D14	Improvement of wastewater treatment and discharge	Investment		90.00	90.00	0.00	WEM	90.00	0.00
	PM_D15	Improvement of waste management practices, including a decrease of biodegradable components of waste disposed on landfills and increased recycling	Investment		80.00	80.00	0.00	WEM	80.00	0.00
	PM_D16	Higher percentage of municipal solid waste treated by biological treatment options	Investment		85.00	85.00	0.00	WEM	85.00	0.00
	PM_D17	Utilisation of the entire amount of methane (CH4) generated from all the dumped quantities of waste that end up in sanitary landfills	Investment		48.00	48.00	0.00	WEM	48.00	0.00
	PM_D18	Promotion of composting in both centralised and household perspectives	Investment		60.00	60.00	0.00	WEM	60.00	0.00
	PM_D7	Sustainable forest management (forest land remaining forest land)	Investment		354.00	354.00	0.00	WEM	354.00	0.00
	PM_D8	Land conversion to cropland	Investment		8.50	8.50	0.00	WEM	8.50	0.00
	PM_D9	Increase the tree-planted areas (groves / parks / green roofs)	Investment		6.50	6.50	0.00	WEM	6.50	0.00
	PM_D10	Measures for the reduction of CH4 emissions from the enteric fermentation of animals	Reform		0.50	0.50	0.00	WEM	0.50	0.00
	PM_D11	Improvement of manure management for the reduction of CH4 and N2O emissions	Investment		9.00	9.00	0.00	WEM	9.00	0.00
	PM_D12	Measures for the reduction of direct and indirect N2O emissions from managed soils	Investment		6.00	6.00	0.00	WEM	6.00	0.00
	PM_D13	Measures for reducing emissions from fertilizers use	Investment		28.00	28.00	0.00	WEM	28.00	0.00
	PM_D19	Support scheme based on tendering procedures (auction scheme) for commercially cost-effective RES technologies	Investment		2100.00	0.00	2100.00	WEM, WAM (enhancement, adjustment)	244.18	1855.82
	PM_D20	Application of the legislative framework for the participation of the RES producers in electricity market	Reform		0.20	0.20	0.00	WEM, WAM (enhancement, adjustment)	0.20	0.00
	PM_D21	Support RES technologies that will not participate into the tendering procedures	Investment		700.00	0.00	700.00	WEM, WAM (enhancement, adjustment)	0.00	700.00
	PM_D22	Provision of economic support to innovative and demonstration pilot RES projects	Investment					WAM		
Decarbonisation	PM_D23	Fostering the further utilization of guarantees of origin for energy from RES	Reform		0.10	0.10	0.00	WEM	0.10	0.00
	PM_D24	Updating, simplifying and optimizing the authorization, certification, permit-granting and licensing procedures - Establishment of One stop shop	Reform		0.20	0.20	0.00	WAM	0.00	0.20
	PM_D25	Updating, simplifying and optimizing the spatial planning framework	Reform		0.10	0.10	0.00	WAM	0.00	0.10
	PM_D26	Updating, simplifying and optimizing the grid connection procedures and setting detailed methodology and allocation rules for RES grid connection costs	Reform		0.10	0.10	0.00	WAM	0.00	0.10
	PM_D27	Fostering the self-consumption of the produced electricity	Investment	Be integrated into PM_D21				WAM		
	PM_D28	Establishing public accessible registry for RES electricity producers	Reform		0.50	0.50	0.00	WEM, WAM (enhancement, adjustment)	0.50	0.00
	PM_D29	Adaptation, enhancement and expansion of the grid networks for avoiding congestions and enabling the optimal penetration of RES	Reform		under examination			WAM	0.00	0.00
	PM_D30	Promotion of RES for heating and cooling in new and renovated buildings	Investment	be integrated into energy efficiency dimension				WAM		
	PM_D31	Provision of fiscal and economic incentives to foster RES in heating and cooling	Investment					WAM		
	PM_D32	Facilitating the penetration of RES into district heating networks	Investment		8.00	4.00	4.00	WAM	0.00	8.00
	PM_D33	Fostering the production of biofuels in transport sector	Investment		30.00	15.00	15.00	WAM	0.00	30.00
	PM_D34	Fostering the consumption of biofuels in transport sector	Reform		0.50	0.50	0.00	WAM	0.00	0.50
	PM_D35	Development of the required infrastructure for recharging electric vehicles	Investment	be integrated into energy efficiency dimension				WAM		
	PM_D36	Provision of fiscal and economic incentives to foster the further deployment of electric vehicles	Reform					WEM, WAM (enhancement, adjustment)		
	PM_D37	Promotion of renewable energy communities	Investment	Be integrated into PM_D21				WAM		
	PM_D38	Development of the legislative framework and provision of incentives for the promotion of energy storage technologies	Investment		1.00	0.00	1.00	WAM	0.00	1.00
	PM_D39	Supporting demonstration projects for the promotion of biomethane and renewable hydrogen	Investment		35.00	17.50	17.50	WAM	0.00	35.00
	PM_D40	Development of the required legislative framework and the required infrastructure for the deployment of biomethane and renewable hydrogen	Reform		0.80	0.80	0.00	WAM	0.00	0.80
	PM_D41	Development of effective supply chains for the exploitation of the available potential of biofuels, bioliquids and biomass	Investment	Be integrated into PM_D30 and PM_D34				WAM		
	PM_D42	Specification of the sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels including the required monitoring and verification activities	Reform		0.20	0.20	0.00	WEM, WAM (enhancement, adjustment)	0.20	0.00
	PM_D43	Conduction of information and training activities to all to all relevant actors for the use of RES including the development of a certification scheme for RES professionals	Investment	contrubution to all implemented measures	0.20	0.20	0.00	WAM	0.00	0.20
	PM_D44	Promotion of RES through green public procurements	Investment	be integrated into energy efficiency dimension				WEM		
		TOTAL FOR DECARBONISATION (INCLUDING RES)			**3.71**	**0.87**	**2.84**	**0.00**	**1.08**	**2.63**

Dimension	PAM number	Name of policy or measure	Type of measure	Synergetic effects	Implementation Cost (million €)	Planned public aid (million €)	own Funds (million €)	Projections scenario in which the PAM is included	CAPEX WEM (million €)	CAPEX WAM (million €)
Energy Efficiency	PM_EE1	Financing and fiscal measures for the renovation of residential buildings	Investment		1310.52	655.26	655.26	WEM, WAM (enhancement, adjustment)	832.07	478.45
	PM_EE2	Financing and fiscal measures for the renovation of public buildings	Investment		55.03	55.03	0.00	WEM, WAM (enhancement, adjustment)	2.86	52.18
	PM_EE3	Financing and fiscal measures for the renovation of non-residential buildings (not public)	Investment		2017.11	1008.55	1008.55	WEM, WAM (enhancement, adjustment)	1366.76	650.35
	PM_EE4	Completion of legislative framework in alignment with Directive 2018/844/EU and regulatory measures to promote near-zero energy buildings (nZEBs)	Reform	Contribution to PM_EE1-PM_EE2-PM_EE3				WEM		
	PM_EE5	Programs for the renovation of buildings exceeding minimum energy requirements (nZEBs)	Investment	Contribution to PM_EE1-PM_EE2-PM_EE3				WAM		
	PM_EE6	Mandatory installation of solar thermal systems in new buildings and in buildings undergoing major renovation	Investment		636.74	318.37	318.37	WAM	0.00	636.74
	PM_EE7	Enhancing the role of the energy performance certificates	Reform	Contribution to PM_EE1-PM_EE2-PM_EE3				WEM		
	PM_EE8	Overcoming split incentive barrier	Reform	Contribution to PM_EE1-PM_EE2-PM_EE3				WAM		
	PM_EE9	Promotion of energy efficient, lighting systems, electric appliances and office equipment	Investment		1493.81	373.45	1120.35	WEM, WAM (enhancement, adjustment)	0.00	1493.81
	PM_EE10	Promotion of energy efficient passenger and light-heavy duty vehicles	Investment		1713.00	0.00	1713.00	WEM	1713.00	0.00
	PM_EE11	Ensuring the energy efficiency in imported used passenger cars	Reform	Contribution to PM_EE10-PM_EE12-PM_EE14				WEM		
	PM_EE12	Financing programs for the promotion of energy efficiency passenger vehicles	Investment		570.23	142.56	427.68	WAM	0.00	570.23
	PM_EE13	Development of the required infrastructure for the promotion of alternative fuels	Investment	Contribution to PM_EE1210-PM_EE12-PM_EE14				WAM		
	PM_EE14	Promotion of energy efficiency of the freight transport	Investment		1596.00	399.00	1197.00	WEM, WAM (enhancement, adjustment)	596.41	999.59
	PM_EE15	Promotion of modal shift both for passenger and freight transport - Enabling 'Mobility as a Service' (MaaS)	Reform	Contribution to PM_EE10-PM_EE12-PM_EE14				WEM		
	PM_EE16	Promotion of energy efficiency in inland waterways transport	Investment		under examination			WAM	0.00	0.00
	PM_EE17	Promotion of energy efficiency in rail transport	Investment		255.77	255.77	0.00	WEM	255.77	0.00
	PM_EE18	Continuous enhancement and extension of the relative infrastructure for public transport	Investment		505.39	252.70	252.70	WEM	505.39	0.00
	PM_EE19	Development of sustainable regional or municipal mobility plans	Reform	Contribution to PM_EE10-PM_EE12-PM_EE14				WAM		
	PM_EE20	Supplementary actions for the promotion of energy efficiency in transport sector	Reform	Contribution to PM_EE10-PM_EE12-PM_EE14				WEM		
	PM_EE21	Support schemes for the promotion of energy efficiency in industrial sector	Investment		4366.00	1746.40	2619.60	WEM, WAM (enhancement, adjustment)	3835.64	530.36
	PM_EE22	Regulatory measures for the promotion of energy efficiency in industrial sector	Investment					WAM		
	PM_EE23	Supplementary actions for the promotion of energy efficiency in industrial sector	Investment					WAM		
	PM_EE24	Support schemes for the promotion of energy efficiency in agricultural sector	Investment		2678.00	669.50	2008.50	WAM	0.00	2678.00
	PM_EE25	Advisory services and energy audits for farmers	Investment					WAM		
	PM_EE26	Promotion of energy services and energy performance contracts through targeted financing programs	Reform	Contribution to all end-use measures				WAM		
	PM_EE27	Promotion of energy services and energy performance contracts through supplementary activities	Reform	Contribution to PM_EE1-PM_EE2-PM_EE3				WAM		
	PM_EE28	Mandatory conduction of energy audits and development of energy management systems	Reform	Contribution to all end-use measures				WEM		
	PM_EE29	Promotion of energy audits in SMEs and in households	Reform	Contribution to PM_EE1-PM_EE3				WAM		
	PM_EE30	Financing programs for the energy upgrading of street lighting	Investment		1668.81	1668.81	0.00	WEM	1668.81	0.00
	PM_EE31	Conduction of awareness raising activities	Reform	Contribution to all end-use measures				WEM		
	PM_EE32	Promotion of energy-efficient products through the implementation of energy labelling and eco-design Directives	Reform	Contribution to PM_EE1-PM_EE2-PM_EE3 and PM_EE10 and PMs of				WEM		
	PM_EE33	Promotion of green public procurements	Reform	Contribution to PM_EE2				WEM		
	PM_EE34	Regulatory measures and financing programs for promoting/modernizing high efficient CHP units and district heating/cooling networks	Reform		35.00	17.50	17.50	WEM	35.00	0.00
	PM_EE35	Development of a scheme for the qualification, accreditation and certification of energy efficiency professionals	Reform	Contribution to all end-use measures				WAM		
	PM_EE36	Promotion of energy efficiency in water supply, distribution and consumption	Investment		Under examination			WAM	0.00	0.00
	PM_EE37	Strengthening the technical and administrative capacity of the involved policy makers	Reform	Contribution to all end-use measures				WEM		
	PM_EE38	Development of sustainable and innovative financing of energy efficiency projects	Reform	Contribution to all end-use measures				WEM		
	PM_EE39	Improve the bankability of energy efficiency projects	Reform	Contribution to all end-use measures				WAM		
	PM_EE40	Deployment of smart meters (synergies with energy market dimension)	Investment	Contribution to all end-use measures				WAM		
	PM_EE41	Promotion of smart and carbon neutral cities	Investment	Contribution to all end-use measures				WAM		
	PM_EE42	Promotion of measures for improving energy efficiency in electricity infrastructure	Reform		under examination			WEM, WAM (enhancement, adjustment)	0.00	0.00
	PM_EE43	Promotion of measures for improving energy efficiency in natural gas infrastructure	Reform		Under examination			WEM, WAM (enhancement, adjustment)	0.00	0.00
	PM_EE44	Promotion of demand response and dynamic pricing and tariffs	Reform	Contribution to all end-use measures				WAM		
		TOTAL FOR ENERGY EFFICIENCY			**18.90**	**7.56**	**11.34**	**0.00**	**10.81**	**8.09**

Dimension	PAM number	Name of policy or measure	Type of measure	Synergetic effects	Implementation Cost (million €)	Planned public aid (million €)	own Funds (million €)	Projections scenario in which the PAM is included	CAPEX WEM (million €)	CAPEX WAM (million €)
Energy Security	PM_ES1	Gas interconnector Serbia Bulgaria (MG10)	Investment		82.95	12.44	70.51	WEM	82.95	0.00
	PM_ES2	Enhancement of regional electricity and gas interconnections	Investment		182.70	27.41	155.30	WEM	182.70	0.00
	PM_ES3	Building capacities for energy storage	Reform		1.00	1.00	0.00	WEM	1.00	0.00
	PM_ES3.1	Banatski dvor, natural gas storage	Investment		100.00	15.00	85.00	WEM	100.00	0.00
	PM_ES3.2	Creating mandatory reserves of oil and petroleum products	Reform		0.50	0.50	0.00	WEM	0.50	0.00
	PM_ES4	Creating operational reserves of oil, coal and other energy derivatives	Reform		0.50	0.50	0.00	WEM	0.50	0.00
	PM_ES5	Creating mandatory natural gas reserves	Reform		0.50	0.50	0.00	WEM	0.50	0.00
	PM_ES6	Electricity Risk Preparedness plan	Reform		0.50	0.50	0.00	WEM	0.50	0.00
	PM_ES7	Update in Security of supply regulation (at least at a national level)	Reform		0.50	0.50	0.00	WEM	0.50	0.00
	PM_ES8	Oil product pipeline from Pančevo refinery to Novi Sad, Sombor, Belgrade and Niš, through Smederevo and Jagodina	Investment		400.00	60.00	340.00	WEM	400.00	0.00
	PM_ES9	Development of a pumped storage project in Bistrica	Investment		835.00	417.50	417.50	WAM	other	835.00
	PM_ES10	Development of additional dispatchable generation from natural gas	Investment		300.00	150.00	150.00	WAM	other	300.00
	PM_ES11	Modernisation of the coal mining industry	Investment		1300.00	650.00	650.00	WEM	1300.00	0.00
		TOTAL FOR ENERGY SECURITY			**3.20**	**1.34**	**1.87**		**2.07**	**1.14**

Dimension	PAM number	Name of policy or measure	Type of measure	Synergetic effects	Implementation Cost (million €)	Planned public aid (million €)	own Funds (million €)	Projections scenario in which the PAM is included	CAPEX WEM (million €)	CAPEX WAM (million €)
Internal Energy Market	PM_IEM1	Implementation of Transbalkan Corridor: OHL SS Kragujevac (RS) - Kraljevo (RS)	Investment		26.90	0.00	26.90	WEM	26.90	0.00
	PM_IEM2	Implementation of Transbalkan Corridor: OHL Obrenovac (RS) - Bajina Basta (RS)	Investment		89.68	13.45	76.23	WEM	89.68	0.00
	PM_IEM3	Implementation of Transbalkan Corridor: OHL B.Basta (RS) – Visegrad (BA) – Pljevlja (ME)	Investment		52.32	7.85	44.47	WEM	52.32	0.00
	PM_IEM4	Interconnection between Resita (RO) and Pancevo (RS) (PCI 3.22.1)	Investment		0.00	None required	None required	WEM	0.00	0.00
	PM_IEM5	Pannonian corridor	Investment		108.00	16.20	91.80	WEM	108.00	0.00
	PM_IEM6	Central Balkan Corridor	Investment		214.07	32.11	181.96	WEM	214.07	0.00
	PM_IEM7	RES integration cluster of projects - North CSE Corridor	Investment		200.00	30.00	170.00	WEM	200.00	0.00
	PM_IEM8	Regional gas connection through the implementation of interconnection projects	Investment		224.00	33.60	190.40	WEM	224.00	0.00
	PM_IEM8.1	Implementation of the Serbia-Bulgaria gas interconnection project	Investment		85.50	12.83	72.68	WEM	85.50	0.00
	PM_IEM8.2	Project for Serbia-Romania gas interconnection 85.5 km (out of which 12.8 km is on the territory of the Republic of Serbia), with a capacity of 1.2 billion m3/year	Investment		16.00	2.40	13.60	WEM	16.00	0.00
	PM_IEM8.3	Project for Serbia-Croatia gas interconnection (95 km, with a capacity of 1.5 billion m3/year)	Investment		144.00	21.60	122.40	WEM	144.00	0.00
	PM_IEM8.4	Project for Serbia-BiH gas interconnection 90 km, with a capacity of 1.2 billion m3/year	Investment		47.00	7.05	39.95	WEM	47.00	0.00
	PM_IEM8.5	Main gas pipeline RG 11-02 Leskovac-Vladičin Han-Vranje 71 km.	Investment		50.00	7.50	42.50	WEM	50.00	0.00
	PM_IEM8.6	Gas pipeline - interconnection with Montenegro	Investment		60.00	9.00	51.00	WEM	60.00	0.00
	PM_IEM8.7	Project for Serbia-Macedonia gas interconnection 70.7 km, with a capacity of 0.8 billion m3/year	Investment		20.00	3.00	17.00	WEM	20.00	0.00
	PM_IEM8.8	Project for Niš-Priština gas pipeline construction 65 km, with a capacity of 0.8 billion m3/year	Investment		30.00	4.50	25.50	WEM	30.00	0.00
	PM_IEM9	Investments related to the digitalisation of the networks aiming at increasing RES integration and improvement of quality of supply	Investment		10.00	1.50	8.50	WEM	10.00	0.00
	PM_IEM10	Cluster of network infrastructure projects in the wider area of Belgrade (BEOGRID)	Investment		65.60	0.00	65.60	WEM	65.60	0.00
	PM_IEM11	Smart meters roll out in electricity DSO	Investment		32.20	0.00	32.20	WEM	32.20	0.00
	PM_IEM12	Studies for gas in smart meters roll out in natural gas distribution	Reform		1.00	0.00	1.00	WEM	1.00	0.00
	PM_IEM13	Design and implement market and network data management model	Reform		0.40	0.40	0.00	WEM	0.40	0.00
	PM_IEM14	Promotion of demand response for the end-users by use of the dynamic tariff system	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM15	Equipping gas distribution systems with metering and data collection devices (measuring equipment, measuring and operational platform, SCADA) necessary for the functioning and development of the gas market	Investment		3.50	0.00	3.50	WEM	3.50	0.00
	PM_IEM16	Appointment of the Nominated Electricity Market Operator (Article 183a in accordance to the amendments of the Energy Law)	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM17	Development of the regulatory framework for the operation of the "producer-consumer" (prosumer) (Article 169 in accordance to the amendments of the Energy Law and Article 58 to 61 of the Law on the use of RES)	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM18	Development of the regulatory framework for the operation of the "electricity storage" (Article 169 in accordance to the amendments of the Energy Law)	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM19	Development of the regulatory framework for the operation of the "aggregator" (Article 169 in accordance to the amendments of the Energy Law)	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM20	Development of the regulatory framework for the operation of the Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs) (Article 62 to 66 and Article 77 of the Law on the use of RES)	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM21	Implementation of EU Network Codes and Guidelines on electricity through appropriate amendments of the secondary legislation and adoption of additional rules, decisions and acts, where applicable.	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM22	Unbundling and Certification of Transmission System Operators	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM23	Implementation of Regulation (EU) 2017/459	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM24	Implementation of Regulation (EU) 2017/460	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM25	Implementation of Regulation (EU) 2014/312	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM26	Reform of the Wholesale market to foster competition	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM27	Further development of Retail market opening	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM28	Update of the Grid Code of Srbijagas. Development of a grid code for Yugorosgaz Transport	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM29	Intensify gasification efforts at the exit points of GASTRANS	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM30	Development of regulatory framework for biomethane	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM31	Market coupling to the Single Day Ahead Market (SDAMC)	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM32	Market coupling to the Single Intra Day Market (SIDC)	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM33	Preparation and adoption of an action plan to ensure achievement for energy poverty reduction	Reform		0.20	0.20	0.00	WEM	0.20	0.00
	PM_IEM34	Regulatory measures for the protection of energy poor households and provision of allowances for the short-term alleviation of the energy poverty (i.e. energy card or social tariff)	Reform		Under examination			WAM	0.00	0.00
	PM_IEM35	Preparation of special programs for the application of energy efficiency measures and the promotion of RES among energy vulnerable customers for the long-term confrontation of the energy poverty	Reform	PM_EE1	Under examination			WAM	0.00	0.00
	PM_IEM36	Facilitate access to alternative energy sources among energy vulnerable and other customers in order to reduce energy poverty	Investment		Under examination			WAM	0.00	0.00
	PM_IEM37	Improvement of the tools and methodology for collecting data relevant to monitoring of energy poverty	Investment		1.50	1.50		WAM	0.00	1.50
	PM_IEM38	Awareness and information measures for the alleviation of energy poverty	Reform		0.70	0.35	0.35	WAM	0.00	0.70
		TOTAL FOR INTEGRATION ENERGY MARKETS			**1.49**	**0.21**	**1.28**		**1.48**	**0.00**

Dimension	PAM number	Name of policy or measure	Type of measure	Synergetic effects	Implementation Cost (million €)	Planned public aid (million €)	own Funds (million €)	Projections scenario in which the PAM is included	CAPEX WEM (million €)	CAPEX WAM (million €)
Research, Innovation and Competitiveness	PM_RIC1	Enhancement of the legal framework to encourage Research and Innovation	Reform		0.10	0.10	0.00	WEM	0.10	0.00
	PM_RIC2	Establishment of a Joint State Aid Action on Research and Innovation in the field of Energy	Investment		2.70	2.70	0.00	WEM	2.70	0.00
	PM_RIC3	Establishment of a Multiannual Investment Plan for the strengthening of R&I infrastructures	Reform		0.10	0.10	0.00	WEM	0.10	0.00
	PM_RIC4	Integration of Serbia into the European Research Area and enhanced participation in EU's funded Energy R&I Programs	Reform		0.10	0.10	0.00	WEM	0.10	0.00
	PM_RIC5	Development of Innovation Hubs / Clusters, Start-ups, Spin-offs/Spin-outs	Investment		5.40	2.70	2.70	WEM	5.40	0.00
	PM_RIC6	Development of specialised Competence Centers	Investment		3.60	1.80	1.80	WEM	3.60	0.00
	PM_RIC7	Facilitation of the establishment of regional centres of research excellence	Investment		3.40	1.70	1.70	WEM	3.40	0.00
	PM_RIC8	Establishment and networking of Technology Transfer Offices of research organisations / institutes and Science Technology Parks	Investment		15.30	7.65	7.65	WEM	15.30	0.00
	PM_RIC9	Support the cooperation between research institutes and businesses in the technology transfer and exploitation of research results	Investment		3.20	3.20	0.00	WEM	3.20	0.00
	PM_RIC10	Development of innovative energy-saving technologies	Investment		7.20	2.16	5.04	WEM	7.20	0.00
	PM_RIC11	Development of innovative decarbonisation technologies, with emphasis on RES for electricity, heating/cooling production, hydrogen production, carbon capture,	Investment		25.20	12.60	12.60	WEM	25.20	0.00
	PM_RIC12	Research on the digitization of energy networks and the development of smart grids	Investment		9.00	4.50	4.50	WEM	9.00	0.00
	PM_RIC13	Development of innovative technologies in transport and applications for micro-mobility	Investment		10.90	5.45	5.45	WEM	10.90	0.00
	PM_RIC14	Development of innovative energy storage applications	Investment		9.00	4.50	4.50	WEM	9.00	0.00
	PM_RIC15	Promote the inter-sectoral and geographical mobility of researchers	Investment		1.60	1.60	0.00	WEM	1.60	0.00
	PM_RIC16	Enhancing education / training to support the energy transition	Investment		2.20	2.20	0.00	WEM	2.20	0.00
	PM_RIC17	Promotion of entrepreneurship through research and innovation actions which are embedded in market functions	Investment		1.80	1.80	0.00	WEM	1.80	0.00
	PM_RIC18	Optimising support framework and schemes for promoting investments with a view to strengthening competitiveness	Reform		0.10	0.10	0.00	WEM	0.10	0.00
	PM_RIC19	Strengthening competitiveness through the establishment and operation of Special Target Funds	Reform		0.10	0.10	0.00	WEM	0.10	0.00
	PM_RIC20	Promoting innovative circular economy technologies to improve businesses competitiveness	Investment		4.50	2.25	2.25	WEM	4.50	0.00
		TOTAL FOR RIC			**0.11**	**0.06**	**0.05**		**0.11**	**0.00**

ANNEX II: DETAILED ANALYSIS OF THE POWER SYSTEM OPERATION

The "High RES penetration market tool" (RES-Tool) developed in ANTARES has been used to verify the feasibility of system configurations according to scenarios developed with SEMS. Target Years are 2030 and 2040, with more emphasis on the former, as it is the final year of the INECP under development. The modelled perimeter in the RES Tool consists of the South-East Europe region. Such an extensive regional model allows for the adequate representation of the high interconnectivity of the Serbian electricity system and its participation in the European electricity market. The models of the market zones except Serbia are based on publicly available data of ENTSO-E for TYNDP 2020, NT (National Trends) scenario for target years 2030 and 2040. The following sections present the key results for Scenario S for 2030 and 2040.

i. Scenario-S analysis for 2030

Table II.1 shows the main input parameters to the RES Tool. The reported variable RES (wind and solar PV) capacities, lignite capacities and net annual generation of lignite plants are the results of SEMS. The annual generation of the lignite plants is reported for comparison with the RES Tool results.

Table II.1: Main input parameters for the hourly analysis in 2030

Title	Scenario S
CO_2 price [€/ton]	70
Wind Inst. Capacity [GW]	1.77
Solar PV Inst. Capacity [GW]	1.73
Lignite Plants Net Capacity [GW]	2.76
Lignite Plants Net Annual Gen. [TWh]	17.6

There is one Pump-Storage Plant (PSP) available:

- PHPP Bajina Basta (616 MW turbining capacity)

Based on the RES capacities and the recent study on RES integration in Serbia[96], the value of the hourly day-ahead reserves requirements provided to the model was 1250 MW.

The main results can be seen in Table II.2. All results shown refer to the Serbian power system, except for the total simulated region cost, which is also the target cost minimized by the simulation algorithm. Unsupplied energy is practically zero, signifying generation adequacy of the system. Annual lignite-based generation is 17 TWh. Note that hydro generation refers to generation from hydro inflows (pump storage hydro (PSP) is not included). It can be seen that no spilled energy occurs at all, therefore the system is flexible enough to accommodate the modelled variable RES capacities, at least at the Day-Ahead market level. Interconnectivity of the Serbian system provides important flexibility. On an annual basis, the Serbian system exports 0.6 TWh, or 73 MWh on average hourly.

Table II.3 shows average annual results for each thermal unit of Serbia, as well as for the PSP unit. It can be seen that the average utilization factor of the lignite units is 70%. For the new gas-fired CC the average utilization factor it is 59%. While the gas-fired unit has lower marginal cost that the lignite units, the higher

[96] D. Orlic et al. "Large-Scale RES Integration in Serbia", EKC, prepared for USAID and USEA, Jul. 2022.

utilization of the latter can be attributed to their lower flexibility. The utilization level of the CHP units is determined by their thermal load.

Table II.2: Scenario SG2N average general results for Target Year 2030

Title	Scenario S
	GWh
Demand	37,685.9
Lignite	16,832.9
Gas	2,679.5
Hydro	10,818.5
Wind	4,608.8
Solar	2,335.6
Small CHP, Biomas, etc.	1,058.7
	GWh
Spilled Energy	0.0
Storage losses	13.8
Unsupplied Energy	0.1
Net annual exports	634.2
	MW
Average Net Exports	72.6
	Tons
CO2 Emissions	20,146,493
	M€
Total simulated region annual Operational Cost	8,820

Table II.3: Scenario S thermal and PSP average annual results for Target Year 2030

Title	Scenario S		
	Net Max. Power [MW]	Annual Gen. [MWh]	Utilisatioin Factor [%]
Lignite			
TPP Nikola Tesla A3	300	1,729,213	66%
TPP Nikola Tesla A4	296	1,724,087	67%
TPP Nikola Tesla A5	304	1,852,532	70%
TPP Nikola Tesla A6	309	1,877,931	70%
TPP Nikola Tesla B1	607	3,883,346	73%
TPP Nikola Tesla B2	611	3,845,838	72%
TPP Kostolac B3	333	1,919,971	66%
Total Lignite	2760	16,832,918	70%
Gas			
EUGASNATCC101	333	1,725,154	59%
CHP Pancevo	183	954,306	60%
	Turbine Power [MW]	Annual turbining [MWh]	
PSP			
PHPP Bajina Basta	616	33,855	

ii. Scenario-S analysis for 2040

Table II.4 shows the main input parameters to the RES Tool for 2040. The variable RES capacities, lignite capacities and net annual generation of lignite plants are used as an input to the hourly model. The annual generation of the lignite plants is reported for comparison with the RES Tool results.

Table II.4: Main input parameters per scenario

Title	Scenario S
CO_2 price [€/ton]	90
Wind Inst. Capacity [GW]	3.12
Solar PV Inst. Capacity [GW]	7.36
Lignite Plants Net Capacity [GW]	2.15
Lignite Plants Net Annual Gen. [TWh]	9.5

There are three pump-hydro storage units available in the system in 2040:

- PHPP Bajina Basta (616 MW turbining capacity)
- PHPP Bistrica (680 MW turbining capacity)
- Djerdap 3 (600MW turbining capacity)

The main results can be seen in Table II.5. Unsupplied energy is zero, signifying generation adequacy of the system. The annual lignite-based generation is 10.6 TWh. It can be seen that the spilled energy is negligible (0.01% of the total available wind and solar generation), therefore the system is flexible enough to accommodate the modelled variable RES capacities, at least at the Day-Ahead market level. On an annual basis, the Serbian system exports 1.1 TWh, or 128 MWh on average hourly. Table II.6 shows the average annual results for each thermal and Pump Storage Plant (PSP) units. It can be seen that the average utilization factor of the lignite units is 57%. Again, the utilization factor of the gas-fired CC is lower (34%). This can be attributed to the lower flexibility of the lignite units.

Table II.5: Scenario S average general results for Target Year 2040

Title	Scenario S
	GWh
Demand	44,575.7
Lignite	10,630.9
Gas	2,837.7
Hydro	13,604.0
Wind	8,114.0
Solar	9,939.5
Small CHP, Biomas, etc.)	1,501.7
	GWh
Spilled Energy	2.5
Storage losses	929.4
Unsupplied Energy	0.0
Net annual exports	1,120.3
	MW
Average Net Exports	128.2
	Tons
CO2 Emissions	12,855,223
	M€
Total simulated region annual Operational Cost	7,523

Table II.6: Scenario S thermal and PSP average annual results for Target Year 2040

Title	Scenario S		
	Net Max. Power [MW]	Annual Gen. [MWh]	Utiliz. Factor [%]
Lignite			
TPP Nikola Tesla A3	300	1141299	44%
TPP Nikola Tesla A4	296	1168889	45%
TPP Nikola Tesla B1	607	3,352,552	63%
TPP Nikola Tesla B2	611	3,338,852	63%
TPP Kostolac B3	333	1,629,354	56%
Total Lignite	2147	10,630,946	57%
Gas			
CHP Pancevo	183	693,099	43%
PUGASNAT101	141	331,335	27%
EUGASNATCC101	612	1,813,268	34%
	Turbine Power [MW]	Annual turbining [MWh]	
PSP & BESS			
PHPP Bajina Basta	616	721,320	
PHPP Bistrica	680	998,582	
PSPP Djerdap 3	600	905,672	

ABBREVIATIONS AND ACRONYMS

AERS	Energy Agency of the Republic of Serbia
AFOLU	Agriculture, Forestry and Other Land Use
AL	Albania
ASEAN	Association of Southeast Asian Nations
BA	Bosnia and Herzegovina
BG	Bulgaria
BUR	Biennial Update Report
CACM	Capacity Allocation and Congestion Management
CBAM	Carbon Border Adjustment Mechanism
CCGT	Combined cycle power plant
CCUS	Carbon capture, storage and utilisation
CEKOR	Center for ecology and sustainable development
COP21	Paris climate conference
CP	Contracting Party
DSO	Distributed System Operator
EBRD	European Bank for Reconstruction and Development
EE	Energy Efficiency
EEFIG	Energy Efficiency Financial Institutions Group
EnC	Energy Community
ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSOG	European Network of Transmission System Operators for Gas
EPEX SPOT	European Power Exchange
EMS	"Elektromreža Srbije"
EPS	"Elektroprivreda Srbije"
ESCO	Energy Service Companies
ETS	Emissions Trading System
EU	European Union
GDP	Gross Domestic Product
GFEC	Gross Final Energy Consumption
GHG	Greenhouse Gas

GVA	Gross Value Added
GWP	Global warming potential
HR	Croatia
IAEA	International Atomic Energy Agency
ICT	Information and Communication Technology
IFI	International Financing Institution
INDC	Intended National Determined Contribution
JCR	Joint Research Center
JSC	Joint Stock Company
LDV	Light Duty Vehicle
LULUCF	Land Use, Land-Use Change and Forestry
MaaS	Mobility as a Service
MC-EnC	Ministerial Council - Energy Community
MK	North Macedonia
MN	Montenegro
MoCTI	Ministry of Construction, Transport and Infrastructure
MoME	Ministry of Mining and Energy
INECP	Integrated National Energy and Climate Plan
NEEAP	National Energy Efficiency Action Plan
NEMO	Nominated Electricity Market Operators
NIS	NIS a.d. Novi Sad
NREAP	National Renewable Energy Action Plan
NTC	Net Transfer Capacity
nZEB	Near-zero energy buildings
O&M	Operation and maintenance
OHL	Overhead line
ORF-EE	Open Regional Fund for South East Europe – Energy Efficiency
PCI	Project of Common Interest
PF4EE	Private Finance for Energy Efficiency
PLIMA	Project Library and Interactive Map Application
PM	Policy measure
RES	Renewable Energy Sources
RS	Republic of Serbia

SADC	Single Day-Ahead Coupling
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SANU	Serbian Academy of Sciences and Arts
SEE	South-East Europe
SEEPEX	SEEPEX a.d. Belgrade
SET	Strategic Energy Technology
SIDMC	Single Intraday Market Coupling
SME	Small and medium-sized enterprises
SMR	Small Modular Reactors
SORS	Statistical office of the Republic of Serbia
SS	Sub-station
SSP	Shared Socioeconomic Pathways
TRINITY	TRansmission system enhancement of regIoNal borders by means of IntelligenT market technologY
TS	Transformer Substation
TSO	Transmission system operator
TYNDP	Teen Year Network Development Plan
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WAM	Scenario with the additional measures
WEM	Scenario with the existing measures
WG	Working Group

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