

FOURTH ENERGY EFFICIENCY
ACTION PLAN OF THE REPUBLIC OF SERBIA FOR THE PERIOD UNTIL 31
DECEMBER 2021

Abbreviations:

EEAP – Energy Efficiency Action Plan
GDP – gross domestic product
CFL – compact fluorescent lamp
CHP – combined heat and power generation
EEDS – electric energy distribution system
EBRD – European Bank for Reconstruction and Development
EBRD - REEP – Regional energy efficiency project
EED – Energy Efficiency Directive - Directive 2012/27/EU
EE – energy efficiency
JSC EMS – Joint Stock Company "Elektromreza Srbije"
EC – Energy community
EPBD – Energy Performance of Buildings Directive - Directive 2010/31/EU
EPS – Public enterprise "Elektroprivreda Srbije"
ESCO – companies that provide energy services in accordance with the The Law on Efficient Use of Energy / Law on Energy Efficiency and Rational Use of Energy
ESD – Directive on energy efficiency of final energy consumption and energy services - Directive 2006/32/EC
EU – European Union
EURO 1-6 – European regulations on exhaust emissions from motor vehicles
EMIS – Energy management information system
LSGU – local self-government unit
PPP – public-private partnership
GHG – greenhouse gases
GIZ – German Agency for Technical Cooperation
GIZ/ORF – Open regional fund for Southeast Europe within GIZ
GGF – Green for Growth Fund
GEF – Global Environment Fund
IFI – international financial institutions
MoCTI – Ministry of Construction, Transport and Infrastructure of the Republic of Serbia
MSME – micro, small and medium enterprises
MoME – Ministry of Mining and Energy of the Republic of Serbia
MoE – Ministry of Economy of the Republic of Serbia
SME – small and medium enterprises
MTTT – Ministry of Trade, Tourism and Telecommunications of the Republic of Serbia
MRSD – million dinars
MEUR (M€) – million EUR
MVP - Information system for monitoring and verification of realized final energy savings, managed by the ministry in charge of energy affairs;
nZEB – building with near-zero energy consumption
DSO – distribution system operator
RES – renewable energy sources
TD – top-down energy saving calculation methodology
BU – bottom-up energy savings calculation methodology

POS – Program for the realization of the energy development strategy of the Republic of Serbia until 2025 with projections until 2030 for the period from 2017 to 2023

RS – Republic of Serbia

RSD – dinar

SORS – Statistical Office of the Republic of Serbia

DHS – district heating systems

SEI – Database "Serbian energy indicators"

EMS – Energy management system

TABULA – Typology of the construction fund for energy efficiency assessment

TFC – Total Final Consumption

TPES – Total Primary Energy Supply

PPO – Public Procurement Directorate / Public Procurement Office (starting from 1 July 2020)

UNDP – United Nations Development Program

SUMMARY

The fourth action plan for energy efficiency of the Republic of Serbia has been prepared for the period until 31 December 2021. In particular, the report contains the achieved results of final energy savings, the status of implementation of certain measures defined under the 3rd EEAP, targets for final energy savings in 2020 and 2021, measures to achieve them, as well as the status of implementation of measures defined by Directive 2012/27/EU on energy efficiency and taken over by the Energy Community by the Decision of the Council of Ministers (D/2015/08/MC-EnC).

The target of the projected total energy savings in 2018, as determined in the 1st EEAP, is 0.7524 Mtoe, which represents 9% of the reference energy consumption in 2008. The Ministry of Mining and Energy, according to all collected, processed and evaluated data, finds that 88% of the set target has been achieved, as shown in Table 1 of this document.

It is shown that systemic measures have the greatest impact on the results of savings, as in the previous EEAP, which cover a large part of sectoral spending such as, e.g., construction of facilities according to new regulations, promotion and sale of efficient devices; replacement of old vehicles with new ones, etc. In this reporting period, a significant novelty is the achieved energy savings based on the implementation of the Energy Management System, both in the public-commercial sector and in industry. Annex 4 lists all the measures.

As for the target for 2020, it was set in the POS as a cap-consumption for primary energy in the amount of 17.981 million toe of primary energy and 13.103 million toe for final energy. For 2021, the cap-consumption target remains at the same level as for 2020.

The institutional and legal framework for the implementation of measures, implementation monitoring and reporting has not changed significantly compared to the previous EEAP, while the legal framework has changed due to the adoption of the new Law on Energy Efficiency and Rational Use of Energy ("Official Gazette of RS", number 40/21 – hereinafter: LEERUE). Pursuant to Article 7 of the LEERUE, the basic acts determining the energy efficiency policy are: the Energy Development Strategy of the Republic of Serbia, adopted in accordance with the law governing the field of energy, the program which determines the conditions, manner, dynamics and measures for implementing the Strategy, which is adopted in accordance with the law governing the field of energy and the integrated national energy and climate plan adopted in accordance with the law governing the field of energy. Pursuant to Article 167, paragraph 1, item 1) of the LEERUE, on the day of entry into force of LEERUE, the Law on Efficient Use of Energy ("Official Gazette of RS", number 25/13 – hereinafter: LEUE) ceases to be valid, except for the provisions of Art. 7-9, relating to the Energy Efficiency Action Plan of the Republic of Serbia, which are valid until 31 December 2021.

The main institution responsible for controlling the implementation of the EEAP is the ministry in charge of energy affairs, in accordance with Article 9 of the Law on Efficient Use of Energy.

The financial framework was not significantly improved in the reporting period 2016-2018. The introduction of the fee for energy efficiency, through the Law on Fees for the Use of Public Goods ("Official Gazette of RS", No. 95/18 and 49/19), which was adopted at the end of 2018, should enable significant budget funds for the implementation of measures of energy efficiency. On the basis of the mentioned fee, funds in the amount of about 9 MEUR will be collected annually, and the fee represents the revenue of the budget of the Republic of Serbia.

More significant improvement of the implementation policy is expected through the establishment of the Directorate for Financing and Encouraging Energy Efficiency, as an administrative body within the Ministry of Mining and Energy, the establishment of which is envisaged on the basis of the LEERUE.

1. INTRODUCTION

In 2018, there were 6.98 million inhabitants in the Republic of Serbia. The number of inhabitants decreased by 2.1% compared to the report from 2014 given in the 3rd EEAP. The GDP of the Republic of Serbia was 5072932.2 MRSD (€42,855M) in 2018, which is about 76% more than the level in 2015 according to current prices. The positive trend of GDP growth was maintained throughout the implementation period of the 3rd EEAP (in the period from 2016 to 2018), so that in 2018, the GDP per capita in the Republic of Serbia amounted to €6,143, while in 28 European Union countries it amounted to €36,736. The unemployment rate, compared to the previous period, decreased, and in 2018 amounted to 11.3%.

Final energy consumption was reduced by 2% in the period from 2010 to 2018. Specifically, final energy consumption decreased in the period from 2012 to 2014, while the growth trend was recorded from 2015 to 2018, together with the growth of economic activities. Primary energy consumption decreased by 13% in the period from 2010 to 2014, while in the period from 2014 to 2018 there was an increasing trend, which resulted in an increase of 15%¹.

For the reporting period from 2016 to 2018, when the 3rd EEAP was implemented, two important acts in the field of energy efficiency were adopted. The first is the Decree on determining the program for the implementation of the energy development strategy for the period from 2017 to 2023 ("Official Gazette of RS" number 104/17), which sets a target for 2020 for electricity, and the second act is the Law on Fees for the use of public goods ("Official Gazette of RS" No. 95/18 and 49/19), which introduces the basis for the establishment of sustainable financing of energy efficiency through the introduction of an energy efficiency fee.

Problems in the implementation of the three adopted energy efficiency plans of the Republic of Serbia, in the period from 2010 to 2018, concerned largely the slow recovery of the economy, after the recession associated with the World Economic Crisis, and the catastrophic floods of 2014. After the achieved fiscal stability in the previous three years and the establishment of dynamic rates of economic growth, the Government is focused on intensifying the initiated systemic reforms, in order to ensure the structural balance of the economy².

The Fourth Energy Efficiency Action Plan of the Republic of Serbia has been prepared for the period until 31 December 2021 (hereinafter: 4th EEAP). The 4th EEAP contains a report on the results of energy savings so far on the side of final consumption and the degree of realization of the goal set in the 1st EEAP; the results of energy savings on the side of primary consumption and the status of implementation of certain technical measures defined within the 3rd EEAP; review of activities carried out for the purpose of transposition and implementation of Energy Efficiency Directive 2012/27/EU (hereinafter: EED); and provides plans for further alignment with EED requirements and an indicative target until 2021.

The indicative target of total final energy savings in 2018, as determined in all three energy efficiency action plans, was 0.7524 Mtoe, which represented 9% of the reference final energy consumption in 2008. The 1st EEAP was established in accordance with Decision 2009/05/MC-Enc dated 18 December 2009 of the Council of Ministers of the Energy Community and Directive 2006/32/EC of the European Parliament and the Council on energy efficiency in end-users and energy services; while later documents, 2nd and 3rd EEAP were created in accordance with the same decision of the Council of Ministers and adopted on the basis of the Law on Efficient Use of Energy ("Official

¹ Annual report for the Energy Development Strategy and the Strategy Implementation Program for the period 2017-2018. Energy Planning Capacity Development Project in the Republic of Serbia, EuropeAid/135625/IH/SER/RS

² Fiscal strategy for 2019 with projections for 2020 and 2021

Gazette of RS", number 25/13), in a format prepared by the Energy Community (the so-called NEEAP template).

As Directive 2006/32/EC in the European Union ceased to be valid and Directive 2012/27/EU on energy efficiency entered into force instead, the Energy Community, by Decision of the Council of Ministers (D/2015/08/MC-EnC) of October 2015, adopted the binding application of Directive 2012/27/EU for the signatories of the Energy Community Treaty, starting from 2017. Thus, the 3rd EEAP was the last EEAP to be conducted in accordance with the requirements of Directive 2006/32/EC (hereinafter: the ESD Directive), but it already contained some elements related to the Directive 2012/27/EU. The said decision also established new indicative targets for energy efficiency, for the signatory countries of the Energy Community Treaty, expressed through the set value of the maximum consumption of final and primary energy for 2020.

In 2018, the Energy Community adopted Recommendation 2018/01/MC-EnC on the preparation and development of integrated national energy and climate plans; also, the process of negotiations within the Energy Community on the establishment of new targets for EE, RES and GHG emissions for 2030 is underway, in the manner in which it is already regulated in the EU, through the so-called "Clean Energy for all Europeans package", which is in force since June 2019. With this "package", the EU has committed itself to reduce GHG emissions by 40% compared to 1990 by 2030, to increase energy efficiency by 32.5% and to achieve a 32% share of RES at the EU level, with each of the EU member states setting their own goals that should contribute to the overall goal of the EU.

According to the estimates, which were made on the basis of collected data on the achievement of the goal for the period from 2010 to 2018, the Republic of Serbia has successfully implemented action plans, i.e., achieved 88% of the set goal for 2018. It is also on track to achieve the goal expressed in the form of maximum allowable consumption for primary and final energy set for 2020 in the POS.

2. OVERVIEW OF NATIONAL ENERGY EFFICIENCY GOALS AND SAVINGS ACHIEVED

The total final energy savings in 2018, according to the estimates of the Ministry of Mining and Energy (hereinafter: the Ministry) is 0.661Mtoe, which represents 88% of the set indicative target for the period from 2010 to 2018, in accordance with the requirements of the ESD Directive . Table 1 shows the assessment of the achieved results by final consumption sectors.

Table 1. National indicative target for 2018 and its achievement

National indicated goal for 2018		0,7524 (Mtoe)
Division of goals by sectors	Sector objective	Achieved savings in 2018
	Mtoe	Mtoe
Household sector	0.2776	0.2487
Public and commercial sector	0.1581	0.097
Industry sector	0.1227	0.0736
Transport sector	0.1940	0.2417
Total (Mtoe):	0.7524	0.661
Total (GWh):	8,750	7,687.44
Percentage (%) (compared to ESD reference consumption of 8,411 Mtoe)	9%	7.91%

As can be seen from Table 1, in relation to the goals set in the 3rd EEAP, the Transport sector showed the best results in the realization of final energy savings, followed by the Household sector, Public and commercial and the Industry sector. We explain this fact by the fact that during the evaluation of the results, in this EEAP, the most complete data were collected and analyzed for the Transport sector.

The Ministry estimates that the savings are even higher than shown in this table, but the Ministry still does not have full data on activities related to energy efficiency on the part of households, the Public and commercial sector and the Industry sector. The problem of data collection, processing and verification, which accompanied all three previous action plans, has not yet been completely overcome. Submission of data on projects and measures regarding the EE in the Public sector continued to be performed through the BU forms, e-mails, and MoME employees would enter and process this data. The new Law on Energy Efficiency and Rational Use of Energy envisages a mechanism for automating the monitoring of savings through the MVP information system, where users, especially from the Public sector, have the obligation to enter data on implemented measures and achieved energy savings, while the MoME manages the information system. Penal provisions have also been introduced for responsible persons in the Public sector who do not submit data, and mechanisms for monitoring law enforcement have been improved.

The data required for the calculation of energy savings, which refer to the Household sector, are still not monitored by the Statistical Office of the Republic of Serbia in a way that they can be used directly as an input for the TD methodology; while in the Industry sector, the improvement of reporting through further implementation of the Energy Management System is still expected.

MoME received the most complete data within the transport sector, through developed cooperation with other institutions of the system.

In reporting on energy savings, in this document, the BU methodology was used for the estimate of savings, while for the Energy Management System, the differences in the measured values of primary energy consumption were used.

2.1. Overview of final energy savings

2.1.1. Household sector

In determining the final energy savings in the Household sector, the following sources were used to evaluate the results of the proposed measures given in the 3rd EEAP:

a) data from International Financial Institutions that have placed loans through banks;

b) from the Statistical Office of the Republic of Serbia, data on the number of newly built and extended residential buildings, from the Table, the distribution of buildings by type and year of construction was used, data on building consumption taken from <http://webtool.building-typology.eu>, engineering assessment of the efficiency of thermotechnical systems of 70%, and the value of the maximum allowed annual final energy required for heating was also used, prescribed by the Rulebook on conditions, content and manner of issuing certificates of energy performance of buildings ("Official Gazette of RS" No. 69/12 and 44/18 – other regulation);

c) data on the number of sold devices that affect energy consumption and energy efficiency class and the estimated consumption of these devices, were obtained from several different authorized importers.

Table 2. Review of measures in Households with assessment of their implementation

No.	Name of the measure	Planned savings for the 3rd EEAP	Realized savings in 2018
		[Mtoe]	[Mtoe]
D1	Energy efficiency measures in residential buildings	0.0586	0.0242
D2	New construction regulations and certificates on energy performance of buildings – Household sector	0.1021	0.1405
D3	Promoting the use of energy efficient appliances in the household	0.1169	0.0840
Households in summary		0.2776	0.2487

- Measure D1 referred to financial incentives of the IFIs that contributed to energy savings through the reconstruction and rehabilitation of residential buildings.

- The most significant savings were realized on the basis of measure D2 – New construction regulations, and a significant trend of growth in the number of newly built residential buildings is noticeable, which in the period of the previous EEAP amounted to about 1,000,000 m² per year, while in the last three years it ranged from 1,500,000 to 2,200,000 m².

- Then they are followed by savings achieved on the basis of measure D3 – Promoting the use of energy efficient appliances in the household, where the measure of labeling products that affect

energy consumption significantly affects the growth of the use of more efficient products. By the way, data on savings upon this measure were collected in a mini-survey, based on data obtained from authorized representative offices of producers, conducted by the Ministry.

Estimates of savings in this sector were made in cooperation with GIZ/ORF consultants (MVP Plus Project).

2.1.2. Public-commercial sector

Table 3. Review of measures in the Public-commercial sector with an assessment of their implementation

No.	Name of the measure	Planned savings for the 3rd EEAP	Realized savings in 2018
		[Mtoe]	[Mtoe]
JK1	Improving the energy efficiency of buildings in the public and commercial sector	0.0474	0.0087
JK2	New construction regulations and certificates on energy performance of buildings	0.0819	0.0807
JK3	Modernization of public lighting systems in LSGUs	0.0089	0.0057
JK4	Introduction of an energy management system (EMS) in the public and commercial sector	0.0130	0.0016
JK5	Minimum criteria regarding the energy efficiency in the public procurement of goods procedure	Not assessed	Not assessed
JK6	Incentive measures for highly efficient power plants for combined heat and power production using natural gas (CHP)	Not assessed	Not assessed

JK7	Control of heating systems and air conditioning systems of buildings and application of alternative measures	0.0070	Not assessed
Public-commercial sector in summary		0.1581	0.0967

When determining the final energy savings in the Public-commercial sector, the following sources were used to evaluate the results of the proposed measures given in the 3rd EEAP:

a) data from International Financial Institutions that have placed loans through banks.

b) from the Statistical Office of the Republic of Serbia, data on the number of newly built and upgraded public commercial buildings, from the SEI database of estimated consumption values in public commercial buildings of various types, Rulebook on conditions, content and manner of issuing certificates on energy performance of buildings and the engineering assessment of efficiency of thermotechnical systems of 70%.

c) data on projects entered in the BU database of projects.

The collected data were processed using the BU methodology, except in the case of the Energy Management System, where normalized differences in energy consumption were used in the two years of application of the EMS.

- Measure JK1 refers to domestic and international financial incentives for the reconstruction and rehabilitation of buildings and thermotechnical systems, and savings under this measure were collected from LSGUs using the BU forms.

- In the Public-commercial sector, the most significant savings were realized on the basis of the measure JK2 New construction regulations, and the growth trend in the number of newly built facilities is noticeable, just as in the case of households. The estimated savings in this sector have been revised compared to the 3rd EEAP, because the results of the survey (conducted through the IPA 12 project) on final energy consumption in Public-commercial sector buildings gave significantly lower values of energy consumption compared to theoretical values of energy consumption used in the calculations under previous action plans. Due to the lack of data needed to estimate savings in all reconstructed buildings in this sector, only data from the BU forms were taken into account in the calculation of savings, and the savings were given under measure JK1.

- Measure JK3 refers to the modernization of energy efficiency of public lighting. In the future, public lighting will be significantly affected by the introduction of eco-design products.

- Measures JK4, JK5, JK6 and JK7 are dealt with in Chapter 3.

In this sector, there is still a problem of collecting data under BU forms, which has already been pointed out, because the situation on the ground and the activities carried out are insufficiently presented, especially at the level of LSGUs. The Ministry will continue to improve the reporting system on EE projects and measures, especially due to the obligation it will have in the coming period to monitor and verify savings under Article 7 of the EED.

Estimates of energy savings in this sector were made in cooperation with GIZ/ORF consultants.

2.1.3. Transport sector

Table 4. Review of measures in the Transport sector with an assessment of their implementation

No.	Name of the measure	Planned savings for the 3rd EEAP	Realized savings in 2018
		[Mtoe]	[Mtoe]
T1	Implementation of EC 443/2009 on CO2 reduction of new passenger cars	0.0599	0.1447
T2	Eco-driving	0.0022	Not assessed
T3	Mobility management	Not assessed	Not assessed
T4	Improving energy efficiency in the public passenger transport system	Not assessed	0.0114
T5	Improving energy efficiency in the system of transport of goods	Not assessed	Not assessed
T6	Regulation of EURO standards regarding emission levels for imported passenger cars	Not assessed because the results of the measure were covered by measure T1	Results of the measure covered by measure T1
T7	Efficient tires for road vehicles	0.0100	Not assessed
T8	Improving the quality of regular (annual) technical inspections of vehicles	Not assessed	Not assessed
T9	Modernization of the vehicle fleet in order to meet the technical conditions for performing domestic and international transport	0.0819	0.0856
T10	Fuel marking and fuel quality monitoring	0.0300	Not assessed

T11	Mandatory replacement of summer tires	0.0100	Not assessed
	Introduction of incentive mechanisms for the replacement of the existing vehicle fleet ³	Not assessed	Does not count towards realized savings because it is covered by measure T1
Transport in summary		0.1940	0.2417

The Ministry has given up on evaluating a number of measures from the 3rd EEAP in the Transport sector, due to missing data or the lack of an adequate methodology for estimating savings. The following measures were assessed:

- Measure T1 – Implementation of Regulation (EC) 443/2009 on limiting CO² emissions of new passenger cars and Regulation (EU) 510/2011 on limiting CO² emissions of new light commercial vehicles, relating to the emission standards for new passenger cars and light commercial vehicles. It is identical as in the 2nd and 3rd EEAP, and updated to include changes in the placing of vehicles on the market of the Republic of Serbia either by selling new or importing used passenger cars and light commercial (delivery) vehicles.

- For measure T4 aimed at improving energy efficiency in public transport, it is necessary to further introduce a systematic and generally accepted approach. So far, it has been realized primarily through the individual efforts of some major carriers (GSP Belgrade, Arriva Litas d.o.o.).

- The results of measure T6 are presented within measure T1. The T6 measure is being abandoned for the period after 2018 because it has become obsolete, considering that this standard has been valid in the Republic of Serbia for more than ten years, and in the EU it has long been obsolete.

- Measure T9 – Modernization of the vehicle fleet in order to meet the technical conditions for performing domestic and international transport refers to the modernization of the vehicle fleet of category N2 and N3 cargo vehicles in order to meet the technical conditions for enabling domestic and international traffic.

- The measure Introduction of incentive mechanisms for the replacement of the existing vehicle fleet was part of the 2nd EEAP (measure T3 in the 2nd EEAP) and was implemented in the period 2010-2012. The implementation of the measure was canceled due to lack of financial resources. However, the realized savings were valid until 2018, having in mind the usual operating (working) life of a vehicle.

Energy efficiency measures in the Transport sector show significant potential for further improvement and savings. The collection and assessment of savings was realized in cooperation with the Ministry of Interior (Sector for analytics, telecommunications and information technology), the Road Traffic Safety Agency of the Republic of Serbia and consultants from the Faculty of Transportation, using the BU methodology. In this sector, the broadest analysis of data was possible with regard to all the data available to the previously mentioned institutions.

2.1.4. Industry sector

Table 5. Review of measures in the Industry sector with an assessment of their implementation

³ Measure from the 1st and 2nd EEAP, the effects of which still exist in 2018

No.	Name of the measure	Planned savings for the 3rd EEAP	Realized savings in 2018
		[Mtoe]	[Mtoe]
I1	Introduction of the Energy Management System in large industrial consumers	0.0369	0.0182
I2	Energy efficiency improvement program in industry	0.0726	0.0554
I3	Incentive tariffs for highly efficient CHP in industry	0.0132	Not assessed
I4	Minimum energy efficiency requirements for new and renovated electricity and heat generation plants, or combined heat and power generation systems	Not assessed	Not assessed
Industry in summary		0.1227	0.0736

- Measure I1 – Pursuant to the Law on Efficient Use of Energy, as well as under LEERUE, large industrial enterprises with annual energy consumption greater than 2500 toe, are required to establish an Energy Management System, and achieve savings in the current year of 1% compared to the primary energy consumption from the previous year. Starting from 2017, until the end of 2018, 47 energy managers have been appointed in the Industry sector. 28 annual reports (hereinafter: AR) for 2017 and 76 AR for 2018 were collected. For the purposes of determining savings under this measure, the analysis included 13 ARs from the Industry sector, excluding the Sector of electric power generation, transmission and distribution. The reported reduction in final energy consumption for obligors who reported a reduction in primary energy consumption in the range of 1% to 23%, and for whom there was a reduction in relevant energy indicators, is 18.2 ktoe for 2018.

In order to assess the value of savings that arise primarily as a result of the implementation of EE measures in the future, work will be done on improving the monitoring of savings and the analysis of energy indicators for EMS obligors.

- Measure I2, which relates to Energy Efficiency Improvement Programs in industry, monitors energy savings based on reports from international financial organizations such as the EBRD, GGF and KfW.

Within the WeBSEFF I and WeBSEFF II programs (EBRD credit lines), in the period from 2009 to 2018, 50 million euros were placed through more than 160 energy efficiency and renewable energy projects in the Republic of Serbia. Only in the period from 2015 to 2018, four loans to local self-government units and 41 loans to the Industry sector were placed for energy efficiency measures. The Southeast European Green for Growth Fund (GGF) has placed 1093 loans for projects in the area of energy efficiency. Loans were placed through six domestic banks for measures to procure more efficient equipment in the Agriculture sector and energy efficiency measures in Construction. Only one loan was placed for the energy efficiency measure in the industry. The German Development Bank (KfW) is one of the largest foreign banks which, in cooperation with our banks, provides favorable loans in the Republic of Serbia and approves loans for companies by financing energy efficiency measures. KfW made 40% of its investments in the Energy sector and the same amount in the Financial sector, through support to small and medium enterprises. The remaining 20% was used in the field of environmental protection. In the Energy sector, KfW, in addition to financing energy supply projects, in 2014 started financing projects focused on savings in final consumption, which enabled the financing of energy efficiency measures in public buildings. In addition, KfW has approved credit lines to banks in Serbia for refinancing projects in the field of energy efficiency and renewable energy sources, intended for companies and private households. Additional credit lines, which were made available in 2015, enabled the financing of programs focused on municipal investments in energy efficiency and environmental protection projects.

Based on the reports on energy savings in Industry, received from the EBRD, GGF and KfW, it was noticed that GGF and KfW, in the period from 2016 to 2018, did not report investments in energy efficiency projects in industry. The EBRD reported that the energy savings obtained from the implemented energy efficiency projects in 2018 are ten times lower than in 2015, so it can be concluded that investments in energy efficiency projects are significantly lower.

- Measures I3 and I4 – not assessed because appropriate monitoring mechanisms have not been introduced. They are described in more detail in Chapter 3.

2.2. Overview of primary energy savings ⁴

2.2.1. DHS sector

In the Republic of Serbia, a district heating system – DHS, has been introduced in 60 cities and municipalities, which are mainly managed by public companies. The own capacity of the production system is 5960.68 MW, and the capacity of the production system used by DHSs and owned by other legal entities is 1048.46 MW. The length of the distribution system is 2393 km; there are 24196 heat transfer stations to supply end customers with thermal energy. The total area of buildings heated by DHSs is 43,209,704.69 m², which represents 26% of the total number of households in the Republic of Serbia. Total produced thermal energy in DHSs in the Republic of Serbia in the period 2014-2018 is shown in Table 6.

Table 6. Produced thermal energy entering the distribution system 2014-2018

Year	GWh	TJ
2014	6,024.05	21,686.59

⁴ Measures on the side of primary energy were processed and submitted to the Ministry by authorized representatives of the Business Association Toplana Srbije, that is, PE Elektroprivreda Srbije

2015	6,229.86	22,427.49
2016	6,889.70	24,802.93
2017	6,894.37	24,819.73
2018	6,926.56	24,935.61

The specific heat consumption at the annual level of apartments connected to a DHS during 2018 was 130.3 kWh/m². The degree of efficiency of the DH production system is 89.41%, the distribution system 84.80%, and the overall efficiency is 75.82%⁵. The share of heat from cogeneration in the total energy input in the DHSs is about 12%.

The main characteristics of DHSs in the Republic of Serbia that lead to low energy efficiency are the following: obsolescence of the district heating network system, heating plants and heat transfer substations, and low share of recycled heat (heat from CHP and waste) in total energy input in DHSs. Because of these problems, several DHS reconstruction and modernization projects have been implemented over the past decade.

Table 7. Overview of measures in the DHS sector with an assessment of their implementation

No.	Name of the measure	Planned savings for the 3rd EEAP	Realized savings in 2018
SDG1	Reconstruction of the DH thermal energy distribution system	14.3	
SDG2	Reconstruction and modernization of the DH production systems	12.2	11.4
SDG3	Control of gaseous fuel combustion in heating plants	4.8	Not assessed
SDG4	Control of liquid fuel combustion in heating plants	1.1	Not assessed
SDG5	Control of solid fuel combustion in heating plants	1.3	Not assessed
SDG6	Control of thermal energy distribution	14.3	0.8
SDG7	Reconstruction of thermal power plant Nikola Tesla A for cogeneration		Not assessed
SDG8	Minimum energy efficiency requirements for new and reconstruction of electricity and heat production plants for CHP plants	Not assessed	Not assessed
District heating in summary		47.9	12.2

The average age of the production part of the DH system is 27 years. More than 60% of DH pipes are older than 20 years. The average age is 22 years (data from TOPS 2018)

a) Measure SDG1 – reconstruction and modernization of the system for distribution of thermal energy of district heating is realized by replacing the existing old pipes and insulation with pre-

⁵ Source: Report on the operation of the district heating systems in the Republic of Serbia for 2018, PU "Toplane Srbije"

insulated pipes, replacing fittings and replacing other equipment for measurement and regulation of heating pipelines. Losses on heat release through insulation are reduced, and losses caused by leakage of hot water from the heating pipeline are reduced, and energy consumption for district heating is reduced. These measures were implemented as part of the Project "Rehabilitation of the DH system in Serbia - Phase IV", which is co-financed by KfW Bank and the Republic of Serbia. The project was implemented in 21 LSGUs, in which over 200 km of heating pipelines were rehabilitated or built and the main heating pipeline over the Gazela Bridge in Belgrade was replaced.

b) Measure SDG2 refers to the reconstruction and modernization of heating plants via:

- replacement of boilers, replacement of burners,
- reconstruction of existing boilers, installation of economizers for the use of waste heat from flue gases,
- improving insulation,
- replacement of shut-off valves and other equipment in heating plants,
- improvement of equipment for measurement and regulation (monitoring and control) and installation of SCADA systems for monitoring and control of boilers and burners.

The measures taken reduce the temperature of flue gases, leakage of hot water in boilers and heat dissipation through insulation while increasing the quality of combustion, leading to reduced energy consumption and reduced operating costs of chemical water treatment and other plants.

c) Measures SDG3, SDG4, and SDG5 refer to the installation of equipment for controlling the composition (O₂, CO, SO_x, NO_x) and flue gas temperature, controlling the composition and temperature of flue gases and adjusting the operation of burners and boilers – continuous combustion regulation and reconstruction of burners and boilers in order to be able to continuously regulate combustion. The measures taken reduce the flue gas temperature and increase the quality of combustion and lead to reduced fuel consumption, but there is no assessment of energy savings.

d) Measure SDG6 refers to the installation of equipment for monitoring and managing the distribution of thermal energy and measuring and processing operational parameters within the hot water network of the DHS. The measures taken reduce losses in the distribution of thermal energy. Energy consumption for thermal energy production is decreasing.

e) Measure SDG7 was not implemented.

f) Measure SDG8 was implemented in PUC "Novosadska toplana" during 2015 - 2016. The installation of a CHP plant with a capacity of 10 MW of electricity + 10 MW of heat was performed, using funds from the KfW program for rehabilitation of district heating systems in RS, Phase 4. In August 2016, heating plant Novi Sad acquired the status of a privileged producer of electricity for highly efficient cogeneration. The value of the investment is €6.5M. PUC "Belgrade Power Plants" implemented a similar project, of the same capacity, also within the mentioned KfW program, Phase 4 at the location of heating plant Vozdovac, which was completed in April 2019. PUC "Novosadska toplana" built a plant within heating plant South, with a capacity of 4 MW of electricity + 4 MW of heat at the end of 2019; the value of this investment is around €4M and it is financed from own funds. The status of a privileged electricity producer was obtained in April 2020.

Within EMS, the Ministry collected eleven ARs from five heating plants. At the locations in PUCs in Jagodina, Pancevo and Kraljevo, in addition to the reduction of primary consumption, there was also a reduction of energy indicators, so the total measured reduction of primary energy consumption was in the amount of 1,112.86 toe.

2.2.2. Electric energy sector

Table 8. Overview of individual measures in the Electrical energy system

No.	Name of the measure	Planned savings from the 3rd EEAP (ktoe)	Realized savings in 2018 (ktoe)
E1	Improving boiler efficiency	37.2	69
E2	Coal quality management system	10.7	-
E3	Improving the efficiency of steam turbines	16.2	75
E4	Reduction of own energy consumption in thermal power plants	10.5	-
E5	Distribution network reconfiguration	1.4	0.35
E6	Distribution network voltage regulation	1.2	1.6
E7	Strengthening the distribution network	5.9	-
E8	Installation of smart meters	19.1	Not assessed
E9	Minimum EE requirements for new and reconstructed plants for the production of heat and electricity or <i>CHP</i> plants	Not assessed	Not assessed
	Total	102.2	146

a) Measure E1 – Boiler plants in thermal power plant blocks in EPS are mostly older than 30 years. The degree of usefulness and reliability of the block is reduced. Ongoing maintenance, annual overhauls, adaptations and repairs increase the efficiency of boiler plants by 1.5% compared to the situation before the overhaul. Reconstruction of boiler plants with the application of new technologies would achieve: an increase in the degree of efficiency of boiler plants by 1 ÷ 1.5% (percentage points) in relation to the projected degree of efficiency and reduction in the consumption of coal - lignite for electricity production. Therefore, it is necessary to overhaul the boiler plants in order to improve the current condition of the boiler plants to the projected values.

b) Measure E2 – Measure not fully implemented.

c) Measure E3 refers to improving the efficiency of steam turbines. The goal is to reduce the gross specific heat consumption by 80 ÷ 100 kJ/kWh. By carrying out activities in annual overhauls, the efficiency of turbine plants is increased by 1% compared to the situation before the overhaul. The calculation of savings is based on the assumption that the average efficiency improvement of the plants is 0.5%.

d) Measure E4 – Technological processes in thermal power plants "participate" in the block's own energy consumption with about 5.8-12% of gross electricity produced. By applying modern technologies and optimizing the work of large consumers, own energy consumption in EPS thermal power plant blocks can be significantly reduced. On the other hand, an increase in the own consumption of blocks is expected due to the construction of new plants with the aim of protecting the environment, eg: flue gas desulphurization plants, wastewater treatment plants, plants for condensed ash transport and temporary landfills within the TPP.

e) Measure E5 – Reconfiguration of the distribution network is realized by changing the switching condition of the network. The measure results in a reduction in energy losses, an increase in system capacity and the possibility of delaying or eliminating capital expenditures to improve the system and expand. Reconfiguration of the distribution network is a permanent activity carried out by control centers within the Directorate for EEDS Management, in order to balance the load of power transformers in EEDS, as well as the optimal load of lines, whether in normal or in disturbed operating modes.

f) Measure E6 – Conservative voltage regulation (CVR) must achieve the goal of minimizing energy losses while maintaining acceptable voltage profiles on distribution feeders. Distribution network voltage regulation is a permanent activity carried out by control centers within the Directorate for EEDS Management, in order to ensure optimal operation of the electricity distribution system as a whole. Distribution network voltage regulation (E6) is carried out in coordination with the distribution network reconfiguration measure (E5), so it is very difficult to separate these measures, and thus the savings achieved by their application.

g) Measure E7 – Strengthening the distribution network, not implemented (strengthening the distribution network in order to reduce losses). The distribution system operator (DSO) was not able to implement the measures because it was limited in terms of investments in the previous period. The price of access to the distribution system did not change for four years, and then there were restrictions imposed by the parent company, so the priority was to invest in projects of importance to the Republic of Serbia, in projects for revitalizing existing electricity facilities (EF) due to their obsolescence, as well as projects that allow the use of EEDS to new system users in parts of the system where there are congestions or the network is not sufficiently developed.

h) Measure E8 – Energy savings could not be estimated. In the reporting period from 2016 to 2018, the following number of "smart" meters were installed on the consumption of EPS Distribution: single-phase meters 30,000 pieces, three-phase meters 105,000 pieces, direct measuring groups 6,500 pieces, semi-indirect measuring groups 3,940 pieces, indirect measuring groups 1,820 pieces.

i) For measure E9, energy savings have not been estimated.

A special place is occupied by a measure that is not listed in the table of technical measures – a systemic regulatory measure of the introduction of an EMS in the EPS Serbia. Only on the basis of that measure, savings in primary energy of 191 ktoe were reported. In order for the measured savings reported within the submitted annual reports not to be double-counted through the implemented technical measures as well, it is not shown separately in Table 8.

2.3. The national energy efficiency goal that was set for 2020

With the EED Directive, the European Union has set a common goal for member states, that energy consumption in the EU in 2020 must not exceed 1474 million toe of primary energy, or 1078 million toe of final energy. When setting the goal, the PRIMES program was used to determine the projection of future energy consumption without EE measures, and in relation to such a development scenario, the goal of reducing consumption by 20% in 2020 was set.

Table 9. Estimates of energy production and consumption for 2020

Estimation of energy consumption in 2020	Unit (ktoe)
Total primary energy consumption in 2020	14,614.871

Fuel consumption for electricity production (main activity is electricity production)	4632.294
Gross electricity production (main activity is electricity production)	1671.138
Fuel consumption for electricity generation for CHP plants	1814.352
Gross heat production for CHP plants	213.586
Gross electricity production for CHP plants	556.692
Distribution losses	317.965
Total final energy consumption	9057.181
Final energy consumption – Industry	2446.649
Final energy consumption – Transport	2224.661
Final energy consumption – Households	2778.026
Final energy consumption – Public-commercial sector	821.394
Final energy consumption – Agriculture and forestry	186.480

For individual member states of the European Union, individual goals are not defined in the EED, but instead, countries are recommended to review their national goals in order to fit into the common goal.

As part of the implementation of the mentioned directive at the level of the signatories of the Energy Community Treaty, the goal was defined that energy consumption should not exceed 187 million toe of primary energy, that is, 133 million toe of final energy, which would achieve the energy efficiency target of 20% at the level of EC by 2020. The contracting parties were asked to set their indicative national energy efficiency targets and determine the path towards their achievement through their energy efficiency action plans. The initial "implementation" of the distribution of the 2020 targets at the national level was offered by the Energy Community Secretariat in order to support the contracting parties and simplify the process of monitoring and maintaining consumption below the upper limit.

In accordance with this goal, and the same applied methodology, an indicative goal for the Republic of Serbia for 2020 was set, which defined that primary energy consumption should not exceed 17.981 million toe of primary energy, and final energy consumption for energy purposes 13.103 million toe. The goal for the Republic of Serbia was set in 2017 in the POS.

The goal for 2021 is to maintain the same maximum level of consumption of primary, that is, final energy, which is defined for 2020, in other words, the consumption should not exceed 17.981 million toe, that is, 13.103 million toe, respectively.

Based on the results of the IPA 13 project "Development of energy planning capacity in the Republic of Serbia" and unofficial assessments of the results of different scenarios on projected energy consumption in 2020, which the MoME has at its disposal, it can be concluded that both final and primary energy consumption will meet the conditions set through the maximum allowed values of consumption - "cap consumption", i.e., that the Republic of Serbia will meet the set goal.

2.4. Additional energy efficiency targets

The Law on Efficient Use of Energy introduced, and the Law on Energy Efficiency and Rational Use of Energy, Art. 10-34, further develops the Energy Management System. The LEERUE defines the obligors of the Energy Management System (hereinafter: system obligors), which include: large energy consumers (companies and public enterprises) from the production sector and the trade and services sector that use more energy than the amount prescribed by the Government, LSGUs and city municipalities with over 20,000 inhabitants, as well as state administration bodies, other bodies of the Republic of Serbia, bodies of the autonomous provinces and organizations for obligatory social insurance, as well as publicly owned institutions. According to the law, the Government, at the proposal of the Ministry, determines the annual planned goals of energy savings for system obligors. In accordance with that, on the basis of the Law on EUE, the Decree on determining the limit values of annual energy consumption was adopted, on the basis of which it is determined which companies are to be the obligors of the energy management system, subject to the annual energy saving targets and the realized energy consumption report form ("Official Gazette of RS", number 18/16). The decree formulates an annual savings target for system obligors at the level of 1% in relation to the energy consumption they achieved in the previous year. LEERUE also defines the obligation for system obligors to adopt energy efficiency programs and plans in which, in accordance with the objectives prescribed by the Government, they plan measures for the improvement of energy efficiency and submit an annual report to the Ministry on their implementation, as well as the annual savings achieved. The Minister in charge of energy affairs issued the Rulebook on the form of the annual report on the achievement of energy saving goals ("Official Gazette of RS", No. 32/16 and 65/18), according to which system obligors, in accordance with the law, reported to the Ministry on achieved energy saving goals, by the end of March of the current year for the previous year. The part of the EMS relating to the Industry sector and the Public-commercial sector has already been identified as an alternative measure to Article 7 of the EED, while the part relating to the energy production, transmission and distribution sectors can be considered as an additional objective.

3. EED IMPLEMENTATION MECHANISMS

3.1. Horizontal measures

3.1.1. EEO scheme and alternative measures (Article 7 of the EED)

The Republic of Serbia reported to the Energy Community the adoption of the Notice on the application of Article 7 of the EED in January 2020. The Notice states that in the period from 2017 to 2020, the Republic of Serbia should realize cumulative savings of 317.5 ktoe, taking into account the basic cumulative savings goal with additional allowed reductions. Notice, i.e., the Notification was prepared with technical assistance within the EBRD REEP project.

The Notice analyzes in detail the possibility of achieving cumulative savings of 317.5 ktoe by applying primarily alternative measures. Three basic alternative measures have been identified and the associated savings are shown in Table 10.

The savings presented here, allocated by measures, are primarily based on engineering estimates.

Data on savings resulting from the application of EMS are based on the legal obligation to realize savings of 1% of annual primary energy for system obligors. The Republic of Serbia has introduced a binding system of energy management for large energy consumers and the public sector, which have the obligation to achieve a certain level of energy savings through the application of energy efficiency measures, as well as the obligation to periodically conduct energy audits. This regulatory measure exceeds the requirements of Article 8 of the EED, and is implemented on the basis of Article 15, paragraph 1 of the LEERUE and the Regulation on setting limit values for annual energy consumption, which determine which companies are the obligors of the energy management systems, annual energy savings and the application form for the realized energy consumption ("Official Gazette of RS", number 18/16).

International financial institutions (IFIs), such as the EBRD, the World Bank, KfW, etc. provide financial support to accelerate the entry of energy efficient technologies through loans to the Republic of Serbia, grants and credit lines that are further implemented through local financial institutions. Financial assistance is accompanied by technical support, which affects market development and awareness raising. Data on the support of international financial institutions were obtained from the institutions themselves, which apply their own methodological approaches in estimating savings, which are verified by the *ECA* as legitimate for calculation.

Since 2014, the MoME has been conducting periodic public calls for support in the implementation of energy efficiency measures in the public sector – in local self-government units. Until the end of 2020, the funds were allocated from the budget of the Republic of Serbia through the Budget Fund, and in 2021 they are allocated from the budget of the Republic of Serbia through incentives for energy efficiency improvement, based on the Law on Budget of the Republic of Serbia for 2021 ("Official Gazette of RS", No. 149/20 and 40/21), through the Program activity Incentives for Improving Energy Efficiency, within the Energy Efficiency Program. Data on savings realized on the basis of projects financed from the Budget Fund for improving energy efficiency are based on the calculation of savings using the BU methodology, defined in the Rulebook on the manner and deadlines for submitting data necessary for monitoring the implementation of the Energy Efficiency Action Plan in Serbia and methodology for monitoring, verification and evaluation of the effects of its implementation ("Official Gazette of RS", number 37/15). The lifespan of the applied EE measures is defined in the mentioned rulebook, and for measures that are not listed in it, the lifespan is determined in accordance with the practice applied in the EU.

Table 10. Overview of measures and their expected contribution to achieving the required savings in accordance with Article 7 of the EED expressed in ktoe⁶

Measure	Year of start of application	2017	2018	2019	2020	Total	Percentage relative to goal
Mandatory energy management system (JK4/I1)	2017	24.95	24.95	24.95	24.95	99.80	31.4%
	2018		24.95	24.95	24.95	74.85	23.6%
	2019			20.07	20.07	40.13	12.6%
	2020				20.07	20.07	6.3%
Support from international financial institutions (D1/JK1/I2)	2017	12.93	12.93	12.93	12.93	51.72	16.3%
	2018		13.30	13.30	13.30	39.91	12.6%
	2019			12.99	12.99	25.97	8.2%
	2020				12.99	12.99	4.1%
Budget fund for energy efficiency improvement	2017	0.57	0.57	0.57	0.57	2.28	0.7%
	2018		0.20	0.20	0.20	0.59	0.2%
	2019			0.51	0.51	1.03	0.3%
	2020				0.51	0.51	0.2%
Total						369.85	116.5%

In addition to the three basic regulatory measures given in Table 10, which should contribute to the achievement of the objectives set out in Article 7, the Notice lists three other measures from the 3rd EEAP that are already in place or planned to be implemented and which are considered eligible in terms of the savings they make: Measures of public lighting JK3, Measure to reduce CO₂ emissions from new passenger vehicles T1 and Application of regulations on eco-design H3. It is expected that the savings resulting from the implementation of this last measure will be modest in the relevant period for the obligation of the Republic of Serbia in accordance with Article 7 of the EED, but will increase significantly in the period from 2021 to 2030.

Table 11 shows the estimated total savings that will be achieved in the relevant period by applying additional qualified regulatory measures.

Table 12 shows the results achieved by 2019, based on the application of Article 7 defined in this way.

The results of savings reported per EMS were obtained on the basis of physically measured savings expressed in primary energy and calculated in final energy. The table of primary conversion factors from primary into final energy, from the Rulebook on the amendments to the rulebook on the form of annual report

⁶ The table is taken from the Notice on the application of Article 7, page 7 of the document

on achieving energy saving goals ("Official Gazette of RS", number 65/18), is incorporated into the EMIS database and is given in Annex 1. Results in 2017 are not shown because it is the first year of reporting when the reporting system was just being established, so not all obligors reported savings and in the meantime the values in the converter have changed.

The results of savings realized on the basis of loans from international financial institutions were calculated on the basis of the methodologies applied by the mentioned institutions, on which they report to the Ministry upon the submitted request.

Table 11. Overview of additional qualified regulatory measures expressed in ktoe

Measure	Year of application of the measure	2017	2018	2019	2020	Total	Percentage in relation to target values
Public lighting JK3	2017	1.05	1.05	1.05	1.05	4.20	1%
	2018		1.05	1.05	1.05	3.15	1%
	2019			-	-	-	-
	2020				-	-	-
Regulation on CO ₂ emissions from new passenger cars T1	2017	9.33	9.33	9.33	9.33	37.33	12%
	2018		9.33	9.33	9.33	28.00	9%
	2019			9.33	9.33	18.67	6%
	2020				9.33	9.33	3%
Eco-design regulations H3	2017	-	-	-	-	-	-
	2018		-	-	-	-	-
	2019			-	-	-	-
	2020				5.60	5.60	1%

Table 12. Overview of realized savings listed in accordance with Article 7, expressed in ktoe and percentages

Measure	Year of start of application	2017	2018	2019	2020	Total	Percentage in relation to the 2020 target
EMS	2017	No assessment	No assessment	No assessment	No assessment		
	2018		19.968	19.968	19.968	59.9	18.9%
Support from international financial institutions	2017	0.414	0.414	0.414	0.414	1.656	0.52%
	2018		0.67	0.67	0.67	2.01	0.63%
Budget fund	2017	0.4	0.4	0.4	0.4	1.6	0.5%
	2018		0.154	0.154	0.154	0.462	0.15%
Measure T1	2017	29.5	29.5	29.5	29.5	118	37.16%
	2018		29.5	29.5	29.5	88.5	27.87%
Total						272.128	85.73%

Within the Budget Fund, collectively, in the period 2017-2019, 36 projects were completed. The savings were calculated on the basis of the BU methodology, based on the forms submitted by the beneficiaries of funds themselves in accordance with the requirements to report on the realized savings, which were an integral part of the public calls.

Measure T1, which includes measure T6 for the period up to 2018, and which is described in Chapters 2.1 and 3.5, was calculated using the BU approach, and based on available data on the number of purchased and replaced passenger vehicles, the average annual distance traveled for different categories of vehicles and the consumption defined by the EURO standard.

3.1.2. Energy audits and management system (Article 8 of the EED)

Based on the Law on Efficient Use of Energy, the introduction of the Energy Management System in the Republic of Serbia began in 2014. The energy management system is further developed through the current LEERUE. The system is binding for large energy consumers – companies and public enterprises from the production and trade and services sectors which consume more energy than the amount prescribed by the Government, as well as for state administration bodies, other bodies of the Republic of Serbia, autonomous province bodies and organizations for mandatory social security, as well as for local self-government units and city municipalities with more than 20,000 inhabitants and publicly owned institutions (hereinafter: energy management system obligors/EMS obligors). EMS obligors are obliged to achieve the goal of energy saving prescribed by the Decree on determining the limit values of annual energy consumption on the basis of which it is determined which companies are to be the obligors of the energy management system, subject to the annual energy saving targets and the realized energy consumption report form ("Official Gazette of RS", number 18/16), which for the current calendar year amounts to 1% of the primary energy consumption they realized in the previous calendar year. In addition, EMS obligors are required by law to appoint the required number

of energy managers and inform the ministry in charge of energy about it, to adopt a three-year program and annual energy efficiency plan, to implement measures to improve energy efficiency specified in the program or plan, to submit to the Ministry annual reports on the realization of the energy saving goals stated in the program and plan, to ensure the implementation of energy audits within the prescribed deadlines. EMS obligors appoint as an energy manager a person who has the appropriate education, work experience and who has passed the training, passed the exam and obtained the appropriate license of an energy manager. The Faculty of Mechanical Engineering of the University of Belgrade is authorized to train energy managers (hereinafter: EM).

Since the beginning of the implementation of the Law on EUE in the field of energy management system (EMS), 337 EMs have been licensed so far. 263 people passed the training in the field of energy industry and 199 people passed the exam, of which 176 people received an EM license. 51 people passed the training in the field of building energy, and 52 people passed the exam, of which 48 people received an EM license. 125 people passed the training in the field of municipal energy and 120 people passed the exam, of which 113 people obtained the license of energy manager.

So far, about 138 EMS obligors have been identified, of which 51 obligors from the industry sector, 80 obligors from local self-government units with over 20,000 inhabitants and seven obligors from the trade and services sector. Of these, 55 obligors in the public sector appointed 48 EMs, 38 obligors in the manufacturing sector appointed 51 EMs and seven obligors in the trade and services sector appointed 7 EMs. Annual reports on the achievement of energy saving goals for 2018 were submitted by 25 obligors from the public sector, all obligors from the trade and services sector, and 76 ARs were submitted from the economy sector.

Implementation of energy audits will begin after the licensing of energy advisors. Licensing of energy advisors in the previous period did not start because it was considered that for conducting energy audits it is necessary to provide different licenses of energy advisors depending on their education and previous work experience, as well as that energy audits, depending on the type of facility subject to an energy audit, should be performed by experts from different fields. LEERUE has defined new conditions for licensing energy advisors, by providing three types of energy advisors (for the field of mechanical engineering, for the field of electrical engineering and for the field of architecture); trainings are tailored to such licenses. In addition, in order for a person to become an energy advisor, it is necessary to first pass an exam for an energy manager. In the past three or four years, many people have passed the EM exam, which has only now created the precondition that there are any candidates at all who could become ECs. It was also considered that, due to the expected great expertise of energy advisors, it is necessary to give more weight to their previous experience, which is reflected in the requirement that the energy advisor must have an appropriate license in accordance with the Law on Planning and Construction. In accordance with that, it is planned to adopt bylaws which relate to the training of energy advisors and the manner of conducting an energy audit. After the adoption of the mentioned bylaws, trainings, exams and licensing of energy advisors should be conducted, so that the implementation of energy audits can begin. In order to ensure better data collection, its processing and reporting by EMS obligors in the coming period, as well as better analysis of the submitted data, the LEERUE envisages the obligation to use two information systems SEMIS and EMIS, that are already in use. SEMIS is intended for reporting in accordance with the requirements of the energy management system, while EMIS enables public sector beneficiaries to better understand and prioritize activities in the field of energy efficiency in facilities under their jurisdiction. LEERUE envisages automatic data entry by energy suppliers on energy consumption in public buildings in EMIS, which will significantly reduce the work of data entry by energy managers and allow them to devote more time to identifying priority measures and their implementation. Data from EMIS can be retrieved to SEMIS and be used for reporting.

In order to promote energy audits of small and medium-sized enterprises (SMEs), under the 2014 IPA project "Technical Assistance to the Ministry of Mining and Energy for the implementation of the new Law on Energy, the National Energy Efficiency Action Plan and the Directive on Renewable Energy Sources" EuropeAid/138041/IH/SER/RS, the implementation of which began in March 2019, it is planned to develop a methodology for energy audits for SMEs, to conduct a public call for SMEs for which energy audits would be performed, after which the results would be promoted through workshops. This activity is carried out in accordance with Article 8, paragraph 2 of the EED.

3.1.3. Measurement and calculation (Articles 9-11 of the EED)

In Article 52, paragraph 3, LEERUE prescribes the obligation of the supplier of thermal energy, when determining the monthly bill for delivered thermal energy to the end customer, to take into account the measured delivered thermal energy to the building, which is distributed on the basis of the registered consumption of devices for measuring the thermal energy delivered to the part of the building or the heat dividers on each radiator, or based on the surface of the part of the building. Article 51 of the LEERUE prescribes the obligation of heat distributors to install devices for measuring the delivered heat energy for new and existing facilities. The same article prescribes that the minister prescribes the methodological framework for determining the technical feasibility and cost-effectiveness of the installation of the mentioned devices.

In accordance with the Law on Energy, the Government adopted the Decree on determining the methodology for determining the price of supplying the final customer with thermal energy ("Official Gazette of RS", number 63/15), which determines the Methodology for determining the price of supplying the final customer with thermal energy. The methodology, among other things, envisages the determination of tariff elements, tariffs and the method of their calculation for the calculation of thermal energy that the energy entity delivers to end buyers of thermal energy.

According to Article 49, paragraph 1 of the LEERUE, the operator of the transmission, distribution and closed electricity distribution system, i.e., operator of the transport and distribution system of natural gas, is obliged, when replacing the metering device and installing a new metering device at all energy supply points at new and reconstructed connections, as well as at other points of delivery, to the extent to which it is technically possible and economically justified and in proportion to potential energy savings, to install a device to end customers for measuring the amount of energy delivered which provides data on the actual amount of energy delivered in the actual period of energy delivery, in accordance with the law governing the field of energy, that is, the law governing the pipeline transport and distribution of hydrocarbon.

Bills showing consumption data (informative billing)

In accordance with Article 53 of LEERUE, public companies and other companies engaged in the distribution and supply of electricity and thermal energy provide very detailed information once a month on the amount of electricity (thermal energy) delivered to customers, as well as measures for improving energy efficiency, separately from the bill or in the bill itself. The same obligation will apply to public companies and other companies engaged in the distribution and supply of natural gas.

Article 53 of the Law on EUE prescribes the following: Public companies and other companies engaged in the distribution and supply of electricity and thermal energy provide the following information to customers once a month, separately from the bill or in the bill itself, for delivered energy:

- the amount of energy that the customer took over during the previous month;

- the average energy price for that customer in that month;
- prices for each element on the basis of which the calculation of consumed energy was made;
- the total amount of energy delivered to the customer and the level of his monthly energy consumption during the past 12 months;
- the ratio of the amount of energy delivered to the customer during the previous month and the energy delivered to the customer in the same month of the previous year;
- the ratio of the amount of energy delivered to the customer and the average amount of energy delivered to customers of the same category;
- ways for customers to obtain information on available energy efficiency improvement measures;
- a list of measures that customers can take to save energy, as well as other information that may be relevant to the rational use and utilization of energy.

For thermal energy, the above obligations of informing customers apply only for the period of the heating season; they are also similarly applied to the delivery and supply of natural gas.

Some of the required data is already in the electricity bill.

Smart meters

“Elektrodistribucija Srbije” initiated the project "Smart Metering" for the procurement of advanced metering systems. The project includes the purchase and replacement of classic measuring devices with modern electronic measuring devices that have the ability to communicate (smart meters), as well as the purchase and establishment of systems (software and hardware) for their reading, management and data collection.

The most important goals of the application of advanced metering systems that are directly related to energy efficiency are as follows:

- reducing the cost of reading measuring devices and increasing the number of read measuring devices,
- greater measurement accuracy,
- reduction of non-technical losses,
- technological platform for the introduction of a more complex tariff system,
- better management of the distribution system,
- better use of network capacities,
- better planning of distribution network development,
- reduced maintenance costs,
- better network reliability,
- realization of the main assumptions for the application of smart grids.

The first phase of this project includes the procurement of IT and measuring infrastructure, devices and the installation of about 200,000 measuring devices. The project is planned to be financed from a loan from the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB).

In addition to technical and economic justifications for the introduction and application of such a system, it is expected that it will have a significant effect on market development, as well as that it will be useful for individual categories of system beneficiaries. Accurate and efficient reading of electricity consumption provides timely and reliable data on electricity consumption and production. Among other things, it is possible to provide end customers with daily insight (e.g. through a dedicated website) into the exact electricity consumption at their metering points, which can stimulate end customers to consume electricity more rationally, which, in accordance with EU directives, promotes energetic efficiency.

The project will represent the core of the future system for remote reading of measuring devices, which should gradually include about 80% of measuring devices in the category of mass consumption in the Republic of Serbia. Also, it is certain that such a system would become part of a broader system of advanced networks (SmartGrid), which is a trend in the world.

In addition to the introduction of smart meters, there is a constant activity of cyclic replacement of existing measuring devices.

3.1.4. Consumer information programs and training (Articles 12 and 17 of the EED)

As part of its activities, the Ministry of Mining and Energy implements projects and programs that include various information measures, awareness raising measures and trainings of end consumers and customers. Information and promotional activities for the next period are planned to be implemented through two IPA projects that are being implemented in parallel: IPA 14 project "Technical Assistance to the Ministry of Mining and Energy for the implementation of the new law on energy, national energy efficiency action plan and directive on renewable energy sources"(EuropeAid/138041/IH/SER/RS) and IPA 16 project "Establishing and strengthening of capacities of the conformity assessment bodies for the implementation of Energy Labelling and Eco-design" (EuropeAid/139199/DH/SER/RS).

The IPA 2014 project aims to harmonize regulations in the Republic of Serbia with EU regulations in the field of energy efficiency, to assist its implementation, but also to prepare a five-year awareness raising strategy, one part of which (in the value of €130,000) will be implemented through the project itself. The strategy and plan should cover all sectors of energy consumption, but it is envisaged that the main focus will be on the household sector. Considering that promotional activities are also planned for the IPA 2016 project, communication has been established between the projects in order to avoid overlapping activities, i.e., to achieve synergy of the effects of promotional activities.

The IPA 2016 project aims to establish a quality infrastructure system for the implementation of regulations on technical requirements for products that affect energy consumption. As one of the key factors for the adequate application of the above regulations is a broad and comprehensive knowledge of the issue of energy labeling and the recognition of the mark of conformity, the project provided €200,000 for awareness raising activities alone. Within these activities, a survey will be conducted on knowledge and information of citizens on the meaning and significance of energy labeling before and after the implementation of the IPA 2016 project, an action plan will be prepared to raise public awareness on the importance of energy efficiency with an emphasis on energy efficient devices, and the campaign developed through the plan will be implemented. This plan will be in line with the awareness raising strategy that will be prepared within the IPA 2014 project. Of particular importance in these activities will be the national consumer organizations, which should recognize their role in requiring that products that affect energy consumption, and which are placed on the market, must comply with all relevant technical regulations. Part of the activities in establishing the quality infrastructure is carried out by the manufacturers of devices that affect the consumption of energy and conformity assessment bodies, which will undergo training in the preparation and application of regulations in this area. The project was started in September 2019 and will last for 30 months.

As far as training is concerned, systematic trainings, in accordance with the Law on Efficient Use of Energy, have started to be conducted for the needs of applying the energy management system at the Faculty of Mechanical Engineering of the University of Belgrade, and are expected to be continued in accordance with the LEERUE. More information on trainings in sections 3.12 and 3.1.5.

Within the project "Energy efficiency in public buildings" which the Ministry implemented in cooperation with the Ministry of Construction, Transport and Infrastructure, the Ministry of Education, Science and Technological Development, the Serbian Chamber of Commerce and the German Agency for International Cooperation – GIZ, training on efficient use of energy has been developed for caretakers and employees in public buildings. With the support in the form of mentorship of the German training institution, a training program was created for caretakers in schools and kindergartens. The Serbian Chamber of Commerce conducted trainings and included 320 caretakers from a total of 20 local self-government units. The Ministry plans to provide funds for caretaker trainings for those municipalities whose projects have been approved in the next calls for the use of funds from the Directorate for Financing and Encouraging Energy Efficiency. The Serbian Chamber of Commerce also organized trainings for four municipalities that are included in the project of the Swiss Government "The Municipal Energy Efficiency and Management Project (MEEMP) in Serbia".

3.1.5. Availability of qualification, accreditation and certification schemes (Article 16 of the EED)

Within the Energy Management System, the law provides for the training and licensing of energy managers and energy advisors. In 2015, the Ministry gave the authorization to the Faculty of Mechanical Engineering of the University of Belgrade to perform trainings of energy managers and energy advisors for a period of four years, and in 2019, the authorization was renewed for the period of next four years. So far, numerous trainings and exams for energy managers have been held. The Ministry issues an EM license to persons who pass the exam for energy manager upon the submitted request and after checking the fulfillment of the prescribed conditions. The conditions for training and licensing of energy advisors have been changed in the LEERUE, so after the adoption of bylaws related to the training and exam for energy advisors (hereinafter: EA), training and exams for EAs will begin, as well as their licensing.

The Law on Planning and Construction, Article 4, stipulates that a building that involves energy consumption for its operation must be designed, built, used and maintained in a manner that ensures the prescribed energy performance of buildings, and which are determined by issuing certificates of energy performance of buildings, issued by an authorized organization that meets the prescribed conditions for issuing certificates of energy performance of buildings, as well as that the certificate of energy performance of buildings makes up an integral part of the technical documentation attached to the application for a use permit. The Minister in charge of construction affairs determines with a special decision the fulfillment of the conditions of authorized organizations, as well as the licensing of the responsible engineer for energy efficiency. In order to define the issuance of certificates (energy passports) as well as the preparation of energy studies for buildings, the Rulebook on conditions, content and manner of issuing certificates on energy performance of buildings has been passed ("Official Gazette of RS", No. 69/12, 44/18 – other regulation).

The Serbian Chamber of Engineers (www.ingkomora.org.rs) organizes and conducts professional training of engineers in the field of energy efficiency in buildings.

The Ministry in charge of construction, spatial planning and urbanism keeps a register of licensed engineers, architects and spatial planners, a register of licensed contractors and a register of foreign persons performing professional activities.

3.1.6. Energy Services – ESCO (Article 18 of the EED)

The Law on EUE contained provisions related to the conclusion of energy service contracts, which were improved in the LEERUE. According to the LEERUE, the energy service contract is concluded in writing between the energy service provider (ESCO) and the energy service beneficiary. An energy service contract can be: an energy performance contract, a contract for the efficient supply of energy (thermal and/or electricity) or another contract whose objective is to achieve an increase in energy efficiency, i.e., the realization of primary energy or water savings. Under an energy performance contract, the energy service provider undertakes to partially or fully implement energy efficiency measures, using own means, that achieve energy and/or water savings in relation to the reference consumption, and the energy service beneficiary undertakes to pay a fee to the energy service provider for that, with funds generated from energy and/or water savings resulting from measures implemented by the energy service provider. In the case when the energy service is financed from the budget of the Republic of Serbia or the beneficiaries of the energy service are beneficiaries of public funds, the energy service contract is considered a public contract, so the rights and obligations of the contracting parties and the term of the contract must be in accordance with this law and the law that regulates the area of public-private partnerships.

On the basis of the Law on EUE, the Minister in charge of energy affairs adopted the Rulebook on determining the model contract for energy services for the application of energy efficiency improvement measures when beneficiaries are from the public sector (“Official Gazette of RS”, number 41/15 – hereinafter: ESCO bylaw). The mentioned rulebook prescribes two models of contracts, one for public buildings and the other for public lighting. Both model contracts represent a type of public-private partnership between a public partner (e.g. municipality, public enterprise, state) and a private partner (ESCO company), where the costs of implementing and managing energy efficiency measures by a private partner are financed from energy savings achieved through the application of measures. The mentioned contract models take into account the specifics of the contract facility and have attachments related to the determination of the reference condition, the method of measurement and verification of the achieved energy savings, as well as other forms required in the preparation and execution of the contract.

The LEERUE has introduced a new type of energy service contract – a contract for the supply of thermal energy (energy supply contracting) which obliges the energy service provider, along with improving energy efficiency and/or reducing CO₂ emissions, to deliver thermal energy to the energy service beneficiary and to exercise the right to an agreed fee for that. According to previous experiences in the European Union, a contract for the supply of thermal energy is a type of energy service contract that is most often concluded in practice.

With the entry into force of the ESCO bylaw in 2015, conditions were created for the development of the ESCO services market, primarily in the field of modernization of public lighting. Public lighting modernization projects by switching to more efficient light sources are a significant source of energy savings and one of the measures that supports the fulfillment of national goals in terms of energy efficiency. Out of a total of 161 public-private partnership projects approved by the Public-Private Partnership Commission (PPP), 43 are public lighting modernization projects in cities and municipalities, of which 23 projects have been contracted. The concluded contracts envisage the replacement of over 100,000 light sources. Through the Regional Energy Efficiency Program in the Western Balkans since 2013, the EBRD has been assisting the development of the ESCO market in Serbia by assisting in the preparation of bylaws, as well as working with pilot municipalities to identify and prepare tenders for ESCO services. There is currently technical assistance to support the preparation of ESCO projects by the EBRD throughout the entire region (including the Republic of Serbia).

3.1.7. Other horizontal energy efficiency measures (Articles 19 and 20 of the EED)

H1 – EE fee

At the end of 2018, through the Law on Fees for the Use of Public Goods ("Official Gazette of the RS", No. 95/18 and 49/19), a fee for improving energy efficiency was introduced. The obligors of the fee are the companies that deal with the supply of end customers with electricity and natural gas and the companies that place oil, oil derivatives and compressed natural gas on the market. The fee is calculated when issuing the bill for the delivered energy/energy source, and the amount of the fee is set at the level of 0.015 dinars/kWh of energy. In June 2019, the Ministry adopted the Rulebook on the application form for records of payers of the fee for energy efficiency improvement, the form of monthly and annual calculation of quantities of energy/energy products

delivered to consumers or placed on the market in the Republic of Serbia, or imported into the territory of the Republic of Serbia, the form for the monthly and annual calculation of the fee, the form for the report on payment, as well as the manner of submitting these forms ("Official Gazette of RS", number 41/19), which regulated the manner of calculating the fee and submitting the report to the Ministry. Revenues from this fee are not directly directed to the financing of energy efficiency measures, but it is expected that the collection of the fee will contribute to the increase of funds for that purpose. It is expected that the collection of these fees can enable the establishment of a sustainable financing mechanism for energy efficiency, which is the key to the successful implementation of policies and measures in this area. The expected annual income from fees is around €9 M.

H2 – Directorate for Financing and Encouraging EE

In the period from 2017 to 2019, the IPA 2013 Framework Project "Strengthening the capacity of the MoME in the implementation of the financing line to improve energy efficiency" was implemented, which aimed to improve the work of the Budget Fund for energy efficiency and to propose a new modality for establishing and the work of the fund in order to more efficiently and sustainably finance energy efficiency projects. The study considered three modalities for establishing a fund: a fund as a state administration body, a fund as a public agency and a fund as a sui generis legal entity. The challenge of providing financial support to individuals for the improvement of energy efficiency was especially pointed out, where, according to the experiences from Croatia, several thousand arrangements with citizens can be expected. The LEERUE envisages the establishment of the Directorate for Financing and Encouraging Energy Efficiency as an administrative body within the Ministry of Mining and Energy, but as a separate legal entity.

H3 – Eco-design requirements

The LEERUE stipulates that products that affect energy consumption for which general and/or specific eco-design requirements are prescribed may be placed on the market and/or put into operation only if they meet the prescribed requirements. In relation to the Law on EUE, the legal basis for the adoption of bylaws in the field of eco-design is precisely defined.

Directive 2009/125/EC should be transposed in the form of a regulation issued by the Government of the Republic of Serbia. The project of the Policy and Legal Advice Center, PLAC I and PLAC II, provided technical assistance to the Ministry, within which the first working version of the regulation was prepared, which would transpose Directive 2009/125/EC and 27 individual regulations for individual product groups. The Notice on the application of Article 7 recognized the

importance of the introduction of eco-design regulations, as an alternative measure that in the period from 2021 to 2030 should bring significant results of final energy savings among end consumers.

H4 – Energy efficiency awareness and education

Raising awareness about energy efficiency is an important prerequisite for reducing the consumption of all types of energy. It is necessary to develop awareness of the importance of energy, the need to achieve energy efficiency measures and the results that are achieved in that way. Raising awareness of the importance of energy efficiency is realized through various information campaigns, trainings at various levels (including the introduction of relevant subjects in the system of compulsory education, especially in specialized schools), organization of seminars, workshops and lectures. It is essential to include all target groups, especially persons in positions of responsibility who are in charge of energy consumption at all levels, as well as various social groups.

In March 2019, the implementation of the IPA project from 2014 "Technical assistance to the Ministry of Mining and Energy for the implementation of the new Law on Energy, the National Action Plan for Energy Efficiency and the Directive on Renewable Energy Sources" EuropeAid/138041/IH/SER/RS began. The project aims to harmonize the regulations in the Republic of Serbia with the EU regulations in the field of energy efficiency, to help its implementation through the development of certain tools, analyses and instructions, but also to carry out awareness-raising activities. As far as awareness raising is concerned, this project envisages the preparation of a five-year strategy for raising awareness in the field of energy efficiency, one part of which (worth € 130,000) will be implemented through the project itself, based on a plan which will be prepared based on the strategy. In addition, it is envisaged that a methodology for energy audits will be developed for small and medium enterprises, as well as that these audits will be conducted in ten small and medium enterprises and the results will be promoted in all small and medium enterprises. Promotional activities are also planned within the implementation of the IPA 16 project "Establishing and strengthening of capacities of the conformity assessment bodies for the implementation of Energy Labelling and Eco-design directives".

3.1.8. Savings from horizontal measures

In this EEAP, planned and calculated savings based on horizontal measures are given primarily in 3.1.1.

3.1.9. Financing horizontal measures

Under 3.1.1 and 3.1.7. H1 and H2 describe the financial mechanisms that should enable the financing of measures, both horizontal and others. H3 is a regulatory measure and does not require special funding.

3.2. Energy efficiency measures in construction

3.2.1. Measures related to the requirements of the innovated EPBD (2010/31/EU)

In 2018, the Law on Amendments to the Law on Planning and Construction was adopted ("Official Gazette of RS", number 83/18). These amendments stipulate that the issuance of certificates on energy performance of buildings – energy passports is mandatory through the Central Registry of Energy Passports (CREP), which introduced a single database of Energy Passports for the territory of the Republic of Serbia.

In order to improve the current regulations on energy efficiency of buildings from 2011 and 2012: Rulebook on the conditions, content and manner of issuing certificates of energy performance of buildings ("Official Gazette of RS", No. 69/12 and 44/18 – other regulation) and the Rulebook on energy efficiency of buildings ("Official Gazette of RS", number 61/11), at the request of the Ministry of Construction, Transport and Infrastructure (hereinafter: MoCTI), in 2018 the EBRD hired an expert team within the Regional Energy Efficiency Program for Western Balkan – REEP Plus project, to assist in the full transposition of the provisions of Directive 2010/31/EU on the energy performance of buildings. The assistance is reflected in the development of minimum requirements in terms of energy performance of buildings, national methodologies for calculations of this performance, energy certification, and the cost-optimality analysis of residential buildings.

For the purpose of drafting regulations and monitoring technical assistance from the EBRD REEP plus project, the MoCTI has established an inter-sectoral technical working group in the work of which recognized experts in this field participate. The task of the technical working group is to make decisions during the project implementation. So far, the project has partially prepared: the Draft National Calculation Methodology (NCM) and the Draft Cost-optimality analysis for the residential buildings. With the support of the GIZ DKT EE project, the Cost-optimality analysis for the nonresidential buildings was completed.

What remains is for the engaged expert team to prepare a proposal for the improvement of the existing minimum energy performance standards (MEPS) and a proposal for the improvement of the existing Energy Performance Certificates (EPCs).

Alternative heating and cooling measures (Art. 14(4) and 15(4) EPBD)

The Republic of Serbia has decided to implement the obligations from the EPBD Article 14(4) and 15(4) through mandatory regular inspections of heating systems and air-conditioning systems, and not through alternative measures. For that purpose, two rulebooks regulating these issues have been adopted, namely:

- Rulebook on the control of heating systems and on closer conditions that must be fulfilled by authorized legal entities for the control of heating systems ("Official Gazette of the RS", number 58/16) and;
- Rulebook on the control of air-conditioning systems ("Official Gazette of the RS", number 82/16)

In the LEERUE, it is envisaged that the control of the heating system is performed in the case when the power of the system is 70 kW and more instead of up to the current 20 kW. Also, the control of the heating system is performed when the power of the system is 70 kW and more (so far 12 kW).

3.2.2. Building renovation strategy (Article 4 EPBD)

During 2019, the Ministry of Construction, Transport and Infrastructure (MoCTI) started work on a “Long-term strategy for encouraging investments in the renovation of the national building stock”, in accordance with Article 2a of Directive 2010/31/EU, and in conjunction with Article 53 of Regulation (EU) 2018/1999 on the management of the Energy Union and actions in the field of climate, based on the terms of reference prepared by the international consultant BPIE (Buildings Performance Institute Europe), with the support of GIZ (DKTI EE). For the development of the Long-Term Strategy, the MoCTI has formed a working group that monitors its development. Completion of work on the Strategy is planned for 2021. The content of the Strategy will be harmonized with the requirements of EU directives.

3.2.3. Additional energy efficiency measures and savings in the field of buildings and devices that affect energy consumption in the Household sector

The energy efficiency measures shown in Table 13 relate primarily to measures under Article 4 of the ESD Directive. The Ministry recognized these measures in the 3rd EEAP, and here it proposes their further monitoring, with a report on the status of the measure and the expected savings in 2021. Otherwise, these measures directly affect the fulfillment of the target set by Article 3 of the EED "cap consumption".

Table 13. Overview of measures in Households with implementation status and expected savings in the period 2019-2021

No.	Name of the measure	Measure status	Expected savings for the period 2019 – 2021
			[Mtoe]
D1	Energy efficiency measures in residential buildings	Retained measure. Continuation of activities from the 3rd EEAP	0.0081
D2	New building regulations and certificates on energy performance of buildings – Household sector	Retained measure. Continuation of activities from the 3rd EEAP	0.053
D3	Promoting the use of energy efficient appliances in the household	Retained measure. Continuation of activities from the 3rd EEAP	0.0279
Households in summary			0.089

Measure D1 refers to the reconstruction and rehabilitation of residential buildings and thermotechnical systems in buildings, implemented through financial incentives of IFIs, placed through domestic banks, and enters into alternative measures under Article 7 of the EED;

Measure D2 refers to the application of the Rulebook on the conditions, content and manner of issuing certificates on energy performance of buildings ("Official Gazette of RS", No. 69/12 and 44/18 – other regulation) and the Rulebook on energy efficiency of buildings (Official Gazette of RS", No. 61/11). This measure achieves energy savings based on better energy performance of newly constructed buildings in relation to the average thermal energy consumption in existing buildings.

Measure D3, which in the previous period referred only to the promotion of EE through regulations on the labeling of products that affect energy consumption, will be supplemented by eco-design. With this measure, savings are made by replacing household appliances with more efficient ones.

The Law on Energy Efficiency and Rational Use of Energy, Article 63, introduced the obligation to label products that affect energy consumption with the energy efficiency label. Energy labeling has already been introduced in the Law on EUE, on the basis of which the Directive on types of products that affect energy consumption for which labeling of energy consumption and other resources is necessary was adopted ("Official Gazette of RS", No. 92/13, 80/16 and 41/21), as well as 12 rulebooks prescribing the requirements regarding the energy labeling of individual types of devices. With the mentioned directive and rulebooks, the relevant EU regulation in this area was transferred to the legal system of the Republic of Serbia. For the same reason, in order to harmonize with the EU law, the following regulations ceased to apply: the rulebook on energy efficiency labeling of electric ovens (replaced by the Rulebook on EE labeling of ovens for the household) and the Rulebook on energy efficiency labeling of vacuum cleaners (given that according to the judgment of the European Court of Justice, the regulation on the labeling of vacuum cleaners ceased to apply in the EU). The mentioned directive and rulebooks are harmonized with the European Directive 2010/30/EU. The Rulebook on energy efficiency labeling of electric light bulbs and lamps has been amended in order to achieve partial compliance with the relevant EU regulation, which repealed the labeling of EE lamps in the current way. Through the IPA project "Technical Assistance to the Ministry of Mining and Energy and relevant public bodies for the implementation of the new Law on Energy, NEEAP, and the RES Directive" from 2014 (IPA 14 project), further harmonization of domestic regulations with the Regulation (EU) 2017/1369 will be performed, the adoption of which repealed Directive 2010/30/EU in the EU.

Annex 4 lists in more detail the individual descriptions of all measures.

3.2.4. Financing energy efficiency in building construction (in the Household sector)

At the moment, EE measures in the Household sector are financed by investments of homeowners, that is, apartment owners, or from IFI funds through banks that place commercial loans to natural persons. It is planned that after the establishment and start of work of the Directorate for Financing and Encouraging Energy Efficiency, co-financing will be provided in this sector, among other things, on the basis of funds from the EE fee (Chapter 3.1.7.)

3.3. Energy efficiency measures in the public sector (Articles 5 and 6 of the EED)

3.3.1. Central government buildings (Article 5)

The application of Article 5 of the EED for the Republic of Serbia as a signatory to the EC Treaty means that the Republic of Serbia has the obligation, starting from 1 December 2017, to rehabilitate (improve energy efficiency) of 1% of the total area of administrative buildings owned by the Republic of Serbia, and used by central government bodies, i.e., bodies and organizations that have jurisdiction over the entire territory of the Republic of Serbia. The obligation of energy rehabilitation refers to central government buildings that individually have a total heated/cooled area of more than 500 m², that is, from 1 December 2019, an area of more than 250 m². Energy rehabilitation should be carried out in such a way that the buildings after remediation reach the minimum energy performance defined in accordance with Article 4 of Directive 2010/31/EU on the energy performance of buildings.

In July 2016, an inter-ministerial working group was formed for the implementation of Article 5 of the Energy Efficiency Directive, in accordance with the Decision of the Ministerial Council of the Energy Community D/2015/08/MC-EnC, with the task of considering possible modalities for implementing Article 5 of the EED. The working group had technical assistance from GIZ through the project "Energy efficiency in public buildings in the Republic of Serbia". After getting acquainted with the possible modalities (approaches) for the application of Article 5 of the EED – with the main and alternative approach, the working group opted for the main approach in fulfilling the obligations arising from Article 5. The created list of central government buildings includes 57 buildings whose area was estimated based on available data and amounts to about 405,000 m². The list was adopted by the Government in the form of a Conclusion on 9 August 2018.

In March 2019, a national consultant was hired, who, with the support in the form of mentorship and supervision of the European Buildings Performance Institute (BPIE), prepared the Central Government Building Renovation Program. The program was accepted by the Ministry and the working group in October 2019.

In order to define the minimum requirements for energy performance of buildings, a cost-optimization study for non-residential buildings was conducted. After a series of consultations at the level of an expert working group managed by the Ministry of Construction, Transport and Infrastructure, the study was finalized by the WG, i.e., the Ministry, and adopted in May 2019. The study will be the basis for the development of the National Program for the Renovation of Central Government Buildings (obligations under Article 5 of the EED), and the minimum requirements are an important input for improving the existing regulations on energy performance of buildings.

In order to implement the obligations under Article 5 of the EED, a program loan of the Council of Europe Development Bank (CEB) in the amount of 40 million euros was provided for the implementation of the project "Energy efficiency in central government buildings". It is planned that the program will rehabilitate up to 28 central government buildings. For technical assistance for the realization of the mentioned loan, donations in the amount of 900,000 euros have been provided so far, but in the next period it will be necessary to provide additional funds for these purposes.

The basic type of works that will be implemented in connection with energy efficiency will include: insulation of the thermal envelope of the building (rooms/floors, facades); replacement of old carpentry (windows and doors) with more efficient ones; switching to another fuel, where applicable; repair or replacement of heating, ventilation and air-conditioning systems (HVAC-heating, ventilation and air-conditioning); replacing lighting with a more efficient system; introduction of systems for automatic management of HVAC systems or integrated building management systems (BMS); the use of renewable energy sources where possible, in particular biomass, solar energy, combined heat and power generation and heat recovery systems, heat pumps from soil, air or water sources. The project is expected to achieve primary energy savings of about 30% per year with a reduction in CO₂ emissions of about 20% and a reduction of costs of energy and energy products of about 29%. The realization of the project will also improve the working conditions for the employees in these buildings.

3.3.2. Buildings of other public bodies (Article 5)

The budget fund for the improvement of energy efficiency of the Republic of Serbia was established in 2013 on the basis of the Law on Efficient Use of Energy. In the period from 2014 to 2019, six public calls for (co)financing of energy efficiency improvement projects were conducted in local self-government units (LSGUs), with funds for improving energy efficiency of the Republic of Serbia, and 91 contracts were concluded. The projects primarily included measures to improve energy efficiency of the building's thermal envelope (replacement of carpentry and installation of thermal insulation) and measures to improve thermotechnical systems (installation of biomass boilers,

installation of thermostatic valves, electronically regulated circulation pumps and devices for measuring the amount of heat transferred). Projects are most often implemented in public facilities such as: preschools, health centers, primary and secondary schools and administrative buildings of the LSGUs.

Also, the Public Investment Management Office is a body of the Government of the Republic of Serbia, established by the Decree of the Government of the Republic of Serbia in 2014, whose job is to manage reconstruction and assistance projects after natural and other disasters, primarily renovation projects, which include energy renovation of buildings such as kindergartens, schools, health and social care institutions, etc.

Within the Energy Management System, the bodies of the autonomous province, local self-government units and city municipalities with more than 20,000 inhabitants are EMS obligors, as well as institutions that use publicly owned facilities. As EMS obligors, they have the obligation to realize the planned savings goal prescribed by the Government, to appoint the required number of energy managers and inform the Ministry about it, to adopt an energy efficiency program and plan, implement measures for efficient energy use, submit an annual report to the Ministry on the achievement of the savings objectives contained in the program or plan and ensure the implementation of energy audits and perform other obligations in accordance with the law. Based on the legally established criteria, 80 municipalities and cities are subject to the EMS, and the number of city municipalities that are subject to the EMS has yet to be determined.

In addition to the projects implemented within the Budget Fund and the project Energy Efficiency in Central Government Buildings, the implementation of the following projects is also planned:

Energy efficiency in public buildings and renewable energy sources in the district heating sector ("Public sector greening") of the MMA. The project refers to the rehabilitation of the most important health institution in the Republic of Serbia, the hospital of the Military Medical Academy. The implementation of the project is planned within the Serbian-German financial cooperation and is divided into three phases. The total preliminary estimated value of all three phases of the project is 203 million euros, while the first phase of rehabilitation is estimated at 110 million euros. The main goal of the Project is to reduce energy consumption by up to 40% of natural gas and up to 30% of electricity in relation to the current consumption of the facility. In absolute values, energy savings should amount to over 58 GWh/a, which would result in a reduction of CO₂ emissions by 24,000 tons per year. It is estimated that the energy rehabilitation of the hospital would achieve energy savings and reduction of CO₂ emissions that would be equal to the results of energy rehabilitation of 170 public buildings under the jurisdiction of local self-governments in the Republic of Serbia.

The Municipal Energy Efficiency and Energy Management Project (MEEMP) in Serbia (SECO). The significance of the project is reflected in the realization of systemic and comprehensive energy management at the local level through the introduction of the European Energy Award certificate, implementation of energy rehabilitation and improvement of energy efficiency of public buildings in Krusevac (6 buildings), city of Uzice (4-5 buildings), Vrbas municipality (6 facilities) and the municipality of Paracin (2 facilities), which will encourage an increase in living standards and economic development and mitigate climate changes. The project also includes capacity development. This project will reduce energy consumption by 609 MWh/year, and reduce the CO₂ emissions by 210 t/year.

3.3.3. Public procurements (Article 6)

In the previous Law on Public Procurements ("Official Gazette of RS", No. 124/12, 14/15 and 68/15), one of the principles of public procurement was the principle of environmental protection and

ensuring energy efficiency (Article 13). According to this principle, the contracting authority is obliged to procure goods, services and works that do not pollute, i.e., minimally affect the environment, i.e., that provide adequate reduction of energy consumption – energy efficiency and, when justified, to determine the environmental benefits of the subject of public procurement as an element of the criterion of the most economically advantageous bid, that is, the total life cycle costs of the subject of public procurement. Article 85 states energy efficiency as one of the criteria for evaluating the most economically advantageous offer.

According to the current Law on Public Procurements ("Official Gazette of RS", number 91/19), which entered into force on 1 July 2020, energy efficiency is not explicitly stated among the principles of public procurement, which is a step back from previous solution. In the part of the mentioned law that refers to the criteria for awarding a contract, one of the criteria is the life cycle costs, which, among other things, include the costs of use, such as the consumption of energy and other resources.

The Strategy for the development of public procurements in the Republic of Serbia for the period 2014-2018 ("Official Gazette of the RS", number 122/14) recognized green procurements, whose basic feature is that the purchasing power of the state can be used to achieve environmental protection goals, as well as for the implementation of the energy saving policy. The strategic goal of the Republic of Serbia is to further promote "green procurements". To achieve this goal, the following activities are planned:

- promoting energy savings in the Public Transport sector and buildings at the disposal of the state, in order to achieve two groups of goals: cost-effectiveness achieved through lower energy consumption and an environmental goal reflected in the reduction of gas emissions and lower carbon dioxide emissions;
- development of guidelines for contracting authorities and bidders;
- development of methods for calculating the life cycle costs of the subject of procurement;
- development of models of standard "environmental" technical specifications for certain products.

The Public Procurement Directorate was established on the basis of the Law on Public Procurements ("Official Gazette of RS", number 39/02) and from 1 July 2020, on the basis of the new Law on Public Procurements ("Official Gazette of RS", number 91/19), it is called the Public Procurement Office. The PPO is a special organization with the task of working on the establishment of a public procurement system that will be economical, efficient and transparent and that will enable the strengthening of competition, equal treatment of all bidders and the fight against corruption. By performing its tasks, such as participation in the preparation of regulations in the field of public procurements, providing advisory assistance to contracting authorities and bidders, monitoring public procurement procedures and a range of other activities in accordance with the law, the PPO ensures that the energy efficiency criterion is implemented in the public procurement procedures.

Article 69 of the Law on EUE stipulates that the contracting authority in the process of public procurement of goods, services and works, takes into account aspects of energy efficiency during the preparation of tender documentation and in the technical specification of goods, services and works, and the minister responsible for energy affairs prescribes the minimum criteria in terms of energy efficiency in the public procurement of goods. According to the mentioned law, the contracting authority in the public procurement procedure had to, in the process of preparing the tender documentation, take into account the energy efficiency of the goods it procures.

Article 70 of the Law on EUE provided that when deciding on the procurement or a lease of real estate or parts of buildings for the needs of state bodies and organizations from the public sector, including public companies, the criteria for energy efficiency should be taken into account.

Based on the Law on EUE, at the end of 2015, the Minister of Mining and Energy adopted the Rulebook on Minimum Criteria for Energy Efficiency in the Public Procurement Procedure ("Official Gazette of RS", number 111/15), which entered into force in early 2016. This Rulebook includes the minimum criteria in terms of energy efficiency in a public procurement procedure. Obligations from the Rulebook referred to all contracting authorities from the public sector, i.e., to state bodies, bodies of the autonomous province and bodies of the local self-government that conduct the public procurement procedure.

The minimum criteria in terms of energy efficiency prescribed by the mentioned Rulebook were applied to small value procurements (from 500,000 to 5,000,000 RSD) and large value procurements (over 5,000,000 RSD). The amount of funds for large and small public procurements was prescribed by the Law on Public Procurements and the amounts prescribed are in accordance with Article 6 of the EED (which refers to the application of Article 7 of Directive 2004/18/EC).

The Rulebook covers the following types of products:

- 1) office IT equipment;
- 2) refrigerators and refrigerators with a freezer compartment;
- 3) air conditioning devices;
- 4) indoor and outdoor lighting,

which is in line with Annex 3 of the EED, which defines energy efficiency requirements for products and services and buildings purchased by the central government.

The application of Article 6 of the EED has been recognized as a measure in the public commercial sector entitled Minimum Criteria for Energy Efficiency in a Public Procurement Procedure.

In the period from 2002 to 2009, as part of the early measures, local self-governments have organized a procurement of energy efficient vehicles in the public transport. The modernization of the vehicle fleet was performed in Belgrade, Nis and Novi Sad. Newly purchased vehicles meet the latest standards regarding exhaust emissions, or they have a low fuel (energy) consumption and low CO₂ emissions.

During this period, the activity of signing voluntary agreements with municipalities for the modernization of the public lighting system was realized. This measure ordered the replacement of existing street lamps in the public lighting system with energy-efficient light sources with improved optical characteristics, as well as the introduction of a street lighting control system.

In the period from 2012 to 2013, the MoME participated in the project "EFFECT", which was implemented within the South East Europe Transnational Cooperation Programme, with the aim of improving energy efficiency criteria in public procurements in the region of Southeast Europe, SEE. Through cooperation with numerous partners from the region, experience has been gained in establishing and implementing energy efficiency criteria in public procurements.

The "Guide for local self-governments to include the aspect of energy efficiency in the public procurement criteria" was published within the project "Raising awareness of energy efficiency of local decision makers in Serbia", which was implemented by the SCTM and with the technical support of UNDP.

The assessment of the achieved savings realized for different types of products to which energy efficiency criteria are applied in public procurements is still not possible to determine, due to the lack of information on the scope of such procurements and the status of the criteria setting process. However, the existence of a procurement registry and the presence of authorized public procurement officers, who can also be trained in reporting, provide a good basis for data collection and future assessments.

3.3.4. Additional measures and savings in the Public-Commercial sector

Since the energy balance of the Republic of Serbia follows the unified consumption in the Public-Commercial sector, and since the Energy Management System, according to the Law on EUE, as well as the LEERUE, included obligors from both the public and the commercial sectors, savings expected in the coming period, showing the status of the measure in relation to the 3rd EEAP, are given in Table 14.

Table 14. Overview of measures in the Public-Commercial sector with the status of implementation and expected savings in the period 2019-2021

No.	Name of the measure	Measure status	Expected savings for the period 2019 – 2021
		[Mtoe]	[Mtoe]
JK1	Improving the energy efficiency of buildings in the public and commercial sector	Retained measure. Continuation of activities from the 3rd EEAP	0.0029
JK2	New building regulations and certificates on energy performance of buildings	Retained measure. Continuation of activities from the 3rd EEAP	0.0303
JK3	Modernization of public lighting systems in LSGUs	Retained measure. Continuation of activities from the 3rd EEAP	0.0019
JK4	Introduction of energy management system (EMS) in the public and commercial sector	Retained measure. Continuation of activities from the 3rd EEAP	0.0049
JK5	Minimum criteria regarding energy efficiency in the public procurement procedure	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
JK6	Incentive measures for highly efficient combined heat and power generation plants on natural gas (CHP)	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed

JK7	Control of heating systems and air conditioning systems of buildings and application of alternative measures	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
Public-commercial in summary			0.04

Measures that have already been described in detail previously in the 3rd EEAP have been retained in this sector as well.

Thus, measure JK1 refers to savings resulting from domestic and/or international projects of reconstruction and rehabilitation of buildings and thermotechnical systems.

Measure JK2 (as with measure D2) refers to the application of the Rulebook on conditions, content and manner of issuing certificates on energy performance of buildings ("Official Gazette of RS", no. 69/12 and 44/18 – other regulations) and the Rulebook on energy efficiency of buildings ("Official Gazette of RS", number 61/11). This measure achieves energy savings based on better energy performance of newly constructed buildings in relation to the average thermal energy consumption in existing buildings.

Measure JK3 monitors the energy savings resulting from the replacement of lamps with new efficient lamps within public lighting.

Measure JK4 described in 3.1.2, JK5 described in 3.3.3. and JK7 described in 3.2.1.

The law governing energy prescribes incentive measures for highly efficient plants for combined heat and power generation on natural gas with a capacity of up to 10MW. The criterion for these plants is that they have an annual efficiency rate of 75% and more.

Annex 4 lists individual descriptions of all measures.

3.3.5. Financing of EE measures in the Public sector

Based on the Law on EUE, the Budget Fund for improving energy efficiency of the Republic of Serbia was established, as an efficient way to collect and place funds for the purpose of financing or co-financing projects, programs and activities aimed at a more efficient use of energy. Based on the LEERUE, the Directorate for Financing and Encouraging Energy Efficiency is established, one of whose main tasks is the preparation and implementation of energy efficiency projects.

Within the Budget Fund in the period from 2014-2019, 6 public calls for (co)financing of energy efficiency improvement projects in local self-government units (LSGUs) were conducted, using funds for energy efficiency improvement of the Republic of Serbia, and 91 contracts were concluded. The projects primarily included measures to improve energy efficiency on the building's thermal envelope (replacement of carpentry and installation of thermal insulation) and measures to improve thermotechnical systems (installation of biomass boilers, installation of thermostatic valves, electronically regulated circulation pumps and devices for measuring the heat transfer). They were most often realized on public facilities such as: preschool institutions, health centers, primary and secondary schools and administrative buildings of the LSGUs.

The implementation of 11 projects from the first public call, which was announced in 2014, was completed during 2015 and 2016. The total value of all works for those 11 projects was around 80 million dinars. The total savings in energy consumption for heating in relation to the situation before the energy rehabilitation is about 40%, or about 2.7 million kWh, and the reduction of CO₂ emissions is about 1120 t/year. Projects have been implemented in the following LSGUs: Zagubica, Babusnica,

Mali Zvornik, Dimitrovgrad, Ljubovija, Kikinda, Kula, Priboj, Gadzin Han, Bor and Gornji Milanovac.

At the end of December 2017, all projects in the LSGUs were completed, through which funds were awarded on the basis of the first public call for funds from the Budget Fund for improving energy efficiency, to finance projects in the field of efficient energy use in 2016. Annual energy savings amount to about 4.5 million kWh and the CO₂ emissions reduction are about 1550 t/year. Public facilities have been energetically rehabilitated in: Mionica, Boljevac, Becej, Krusevac, Kragujevac, Svilajnac, Razanj, Novi Becej, Doljevac, Zagubica, Backi Petrovac, Gadzin Han, Uzice, Babusnica and Novi Sad.

The third public call was conducted at the end of 2016. The total available non-refundable funds awarded by this public call amount to up to 500 thousand USD, a donation from the UNDP (GEF) and up to 25 million dinars from the Budget Fund. At the end of April, on the basis of this public invitation, contracts were concluded with 13 LSGUs. The total investment value of the selected projects is around 136 million dinars. Of the 13 selected projects, as many as 6 relate to the installation of biomass boilers with a total capacity of 2.5 MW. The estimated energy savings are about 2.1 million kWh per year, and the reduction in CO₂ emissions is about 1,500 tons per year. Co-financing of energy efficiency projects has been approved in: Zagubica, Raska, Knjazevac, Lapovo, Sabac, Medvedja, Ljubovija, Lucani, Pecinci, Svilajnac, Zabari, Krusevac and Velika Plana.

In the middle of May 2018, a public call was announced for the allocation of funds from the Budget Fund for the improvement of energy efficiency in order to finance projects in the field of efficient use of energy in 2018 in the LSGUs. The total available non-refundable funds that were awarded in the public invitation amounted to 125 million dinars. The call ended on 4 July. At the end of October, a decision was published on the allocation of funds, which allocated funds for projects in 14 LSGUs, namely: Osecina, Krupanj, Ljubovija, Irig, Kragujevac, Cuprija, Kraljevo, Gadzin Han, Bosilegrad, Velika Plana, Svilajnac, Kanjiza, Bela Palanka and Knjazevac. The grant agreements were signed on 8 November. The estimated energy savings are about 2.3 million kWh per year, and the reduction of CO₂ emissions is about 1800 tons per year.

At the end of February, i.e., on 26 February, a public call was announced for the allocation of funds from the Budget Fund for improving energy efficiency in order to finance projects in the field of efficient energy use in 2019 in local self-government units and city municipalities. The invitation lasted until 27 March. The total available funds under this invitation amounted to 325 million dinars. By the decision of the Ministry of Mining and Energy, funds were allocated for projects in 24 local self-government units/city municipalities, namely: Kikinda, Trgoviste, Surdulica, Subotica, Bela Palanka, Majdanpek, Alibunar, Zemun, Svilajnac, Raska, Kanjiza, Irig, Petrovac na Mlavi, Cacak, Mionica, Valjevo, Despotovac, Lucani, Malo Crnice, Krusevac, Ljubovija, Cuprija, Nis, Knic. The agreements for the allocation of funds were signed on 17 June. The total value of the project is 490,628,865.92 dinars, and the contribution of LSGUs is 165,628,865.92 dinars (about 33.8%). The estimated energy savings are about 8.2 million kWh per year, and the reduction of CO₂ emissions is about 3300 t/year.

At the end of October 2019, a public call 2/19 was announced for the allocation of funds from the Budget Fund for improving energy efficiency in order to finance projects in the field of efficient use of energy in 2019 in local self-government units and city municipalities. Funds were provided for financing 14 projects.

Sources of financing certain energy efficiency measures in 2021 are financed from the budget of the Republic of Serbia, through incentives for energy efficiency improvement (before 2021 through the Budget Fund for energy efficiency improvement of the Republic of Serbia), bearing in mind that since the adoption of the Budget Law of the Republic of Serbia for 2021 ("Official Gazette of RS",

No. 149/20 and 40/21) the manner of presentation of budget funds was changed, namely, through program activities within a particular Program at the ministry.

Energy efficiency measures in Industry

3.3.6. Main policy measures related to Industry

Industrial production in the Republic of Serbia in the period from 2016 to 2018 recorded an increase, so in 2016, it was 4.7% higher than in 2015, in 2017 it was 3.9% higher than in 2016 and in 2018 it was 1.3% higher than in 2017⁷. The following had the largest impact on the growth of industrial production in 2016, compared to 2015: Production of food products, Production of chemicals and chemical products, Production of electricity, Production of rubber and plastic products and Production of tobacco products. Observed by sectors, in 2016, compared to 2015, the following trends were recorded: Manufacturing industry sector – growth of 5.3%; Mining sector – growth of 4.0%; and Supply of electricity, gas, steam and air conditioning sector – growth of 2.7%. The following had the largest impact on the growth of industrial production in 2017 compared to 2016: Manufacturing of rubber and plastic products, Manufacturing of machinery and equipment not specified elsewhere, Manufacturing of chemicals and chemical products, Manufacturing of metal products, except machinery and Manufacturing of petroleum products. Observed by sectors, in 2017, compared to the previous year, the following trends were recorded: Manufacturing industry sector – growth of 6.3%, Mining sector – growth of 2.2% and Supply of electricity, gas, steam and air conditioning sector – a drop of 6.2%. The following had the largest impact on the growth of industrial production in 2018, compared to 2017: Manufacturing of petroleum products, Manufacturing of basic metals, Manufacturing of machinery and equipment not specified elsewhere, Manufacturing of non-metallic mineral products and Production of electricity. Observed by sectors, in 2018, compared to the previous year, the following trends were recorded: Manufacturing industry sector – growth of 1.9%, Supply of electricity, gas, steam and air conditioning sector – growth of 1.2% and Mining sector – a drop of 4.8%.

The strategy and the policy of the development of industry of the Republic of Serbia from 2011 to 2020 ("Official Gazette of RS", number 55/11) aims to ensure a safe energy supply, by increasing the efficiency of energy companies and the economy in the period from 2011 to 2020. In the Industrial Policy Strategy from 2021 to 2030, energy efficiency is recognized as measure 5.3 – Encouraging more efficient use of material resources and energy efficiency in industrial processes with the aim of achieving goal 5. – Transformation of industry from a linear to a circular model while reducing CO2 emissions.

In March 2015, the Government of the Republic of Serbia adopted the Strategy for the support of development of small and medium enterprises, entrepreneurship and competitiveness, for the period from 2015 to 2020, with an Action Plan, which sets out the framework, goals, priorities and measures for improving the development of micro, small and medium enterprises and entrepreneurship in the medium term. One of the goals of this strategy is to improve the support for highly innovative small and medium-sized enterprises (SMEs), eco-innovations, improvement of energy efficiency and the efficient use of resources.

⁷ Statistical Yearbook of the Republic of Serbia 2017, Statistical Yearbook of the Republic of Serbia 2018 and Statistical Yearbook of the Republic of Serbia 2019, Statistical Office of the Republic of Serbia, <https://www.stat.gov.rs/oblasti/industrija/>

The Law on Efficient Use of Energy introduced, and the Law on Energy Efficiency and Rational Use of Energy further develops the obligation to implement the energy management system (EMS) among large energy consumers in the industrial sector. The Decree on determining the limit values of annual energy consumption, on the basis of which it is determined which companies are to be the obligors of the energy management system, subject to the annual energy saving targets and the realized energy consumption report form ("Official Gazette of RS", number 18/16), defines that EMS obligors are companies and public enterprises whose predominant activity is in the manufacturing sector and which at the site achieve an annual primary energy consumption of more than 2,500 toe.

Pursuant to Article 80 of the Law on Energy, the Decree on incentive measures for the production of electricity from renewable energy sources and highly efficient combined heat and power generation ("Official Gazette of RS" number 56/16) was adopted, which encourages the construction of highly efficient plants for combined heat and power generation.

Based on the Law on Efficient Use of Energy, the Decree on minimum energy efficiency requirements that must be met by new and revitalized plants ("Official Gazette of RS", number 112/17) and the Rulebook on the content of studies on energy efficiency of plants for the production of electricity, plants for the combined heat and power generation, systems for transmission and distribution of electricity, plants for the production and distribution of thermal energy ("Official Gazette of RS", number 30/18). The mentioned acts prescribe minimum energy efficiency requirements for new and reconstructed plants for the production of electricity and thermal energy, as well as for plants for combined heat and power generation, i.e., systems for the transmission of electricity and systems for the distribution of electricity and thermal energy, as well as the content of the study which proves the fulfillment of the prescribed minimum energy efficiency requirements, in order to obtain an energy/construction permit for new and reconstructed plants.

3.3.7. Expected measures and savings in the Industry sector

Measures to be implemented in industry in the next three years are measures which are already identified in the 3rd EEAP and given in Table 15.

Table 15. Overview of measures in the Industry sector with the status of implementation and expected savings in the period 2019-2021

No.	Name of the measure	Implementation status	Expected savings in the period 2019-2021
			[Mtoe]
I1	Introduction of the Energy Management System in large industrial consumers	Retained measure. Continuation of activities from the 3rd EEAP	0.0546
I2	Energy efficiency improvement program in industry	Retained measure. Continuation of activities from the 3rd EEAP	0.0089

I3	Incentive tariffs for highly efficient <i>CHP</i> in industry	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
I4	Minimum energy efficiency requirements for new and renovated plants for the production of electricity and thermal energy, or combined heat and power generation systems	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
Industry in summary			0.0635

Savings under measure I1 result from the application of the Law on EUE, and are estimated on the basis of previous implementation.

For measure I2, it was taken into account that the reported savings in the last three-year period are lower compared to the period before 2015, so they are projected at the level of values reported for the period 2016-2019.

Measure I3 was prescribed by the law governing energy and refers to incentive measures for highly efficient plants for combined heat and power generation using natural gas with a capacity of up to 10MW. The criterion for these plants is that they have an annual efficiency of 75% and more. Through amendments to the Law on Energy and a new law which will regulate energy efficiency, these provisions will be revised in accordance with EU regulations and restrictions imposed under state aid regulations.

I4 measure is described in chapter 3.4.1.

Annex 4 lists in more detail the individual descriptions of all measures.

3.3.8. Financing of EE measures in Industry

International financial institutions, through direct financing or through commercial banks, invest funds in private companies that are interested in investing in modern technologies that reduce energy consumption or CO2 emissions, in the rehabilitation and optimization of buildings and independent renewable energy projects. These investments result in cost reduction and better competitiveness, replacement of old equipment and modernization of production, increase in production volume, improvement of quality standards and export market. The measure of financial support to the industrial sector is recognized within the Industry Sector as I2, and at the same time belongs to the alternative measures under Article 7 of the EED.

Out of international financial institutions and funds, we single out the following:

- WeBSEFF – Western Balkans Sustainable Energy Financing Facility is a credit line under which the European Bank for Reconstruction and Development (EBRD) provides funds to partner banks, which further lend these funds to companies and local self-governments that want to invest in energy efficiency and smaller renewable energy sources projects. WeBSEFF is part of the EBRD's SEFF family (Sustainable Energy Finance Facility).

- GGF (Green for Growth Fund): The fund invests in energy efficiency, renewable energy and technical assistance. The fund is based on a public-private partnership model. The investors are the European Commission, the German Federal Ministry for Economic Development, together with the European Investment Bank, KfW, the European Bank for Reconstruction and Development and the International Finance Corporation.

- KfW is Germany's leading financial institution for the domestic economy, as well as for developing and transition countries. The Federal Republic of Germany has an 80% share in the founding capital, while the German provinces have a share of 20%. With a balance sheet of around 500 billion euros, the German development bank KfW is one of the largest banks in Germany. Since 2001, the KfW Group has also included the Cologne-based German Investment and Development Organization (DEG). DEG invests in private companies that are profitable and environmentally and socially sustainable, with the aim of supporting the private sector in developing and transition countries.

3.4. Energy efficiency measures in Transport

3.4.1. The main policy measures related to Transport

The measures mentioned here are primarily related to increasing the energy efficiency of road and city traffic in the Republic of Serbia. Strategic documents dealing with the improvement of energy efficiency in transport and the impact on the environment can be of international character, national character and at the level of LSGU.

Action plan for the implementation of the Road Safety Strategy of the Republic of Serbia for the period from 2015 to 2020 ("Official Gazette of RS", number 1/17), within pillar 3 – Safer vehicles, goal 3 – technological improvement of vehicles and stimulation of use of ecological fuels and ecological vehicles, for the period from 2018 to 2020, envisages the following activities:

- a) defining regulations for new and used vehicles in accordance with UN/EU standards in the field of environmental protection,
- b) stimulating the use of ecological fuels and ecological vehicles and monitoring CO₂ emissions,
- c) wider implementation of vehicles that use ecological fuels (drives), RES and flexible vehicles (in terms of fuel mixture),
- d) application of UNECE regulations, monitoring of vehicles in traffic that meet the required criteria and
- e) introduction of customs/tax reliefs for vehicles using alternative drives.

The first of these activities should improve the regulations concerning the import of used and new vehicles on the market of the Republic of Serbia. Regarding the import of used vehicles, in the last five years there has been a growing trend of imports from the European Union of used motor vehicles with emission standards of at least EURO 3, in accordance with the Regulation on Import of Motor Vehicles ("Official Gazette of RS", No. 23/10 and 5/18). Given that the mandatory application of EURO 3 standards began in 2001 and lasted until 2006, in the EU, the age of potentially oldest vehicles whose import is allowed today is 18 years, so the T6 measure that accompanied the savings in the previous period is now abandoned until a new minimum standard, better than EURO 3, is introduced.

The activity given under point e) is described in chapter 3.5.3.

As for the international requirements governing the transport sector, access to the transport market of goods of the European Union is achieved by obtaining bilateral or multilateral permits (CEMT), which are distributed on the basis of vehicle fleet quality, i.e., for some EU countries, it is

conditioned by the possession of a certain percentage of vehicles that meet the strictest regulations on the standard of harmful gas emissions and vehicle safety.

LSGUs also participate in the planning of strategic documents that regulate the field of transport. The city of Belgrade should get its first plan of sustainable urban mobility – a strategic document that plans the city's transport and urban system in an innovative way, and which in a sustainable way, primarily, meets the needs of its inhabitants. Regarding the popularization of bicycles, the Decision on setting up bicycle rental stations on the territory of the City of Belgrade was adopted at the session of the Belgrade City Assembly on 28 April 2016, which was published in the "Official Gazette of the City of Belgrade", number 37/16. This decision prescribes the conditions and manner of setting up and using stations for renting public bicycles, and during 2017, the submission of applications for the public competition for setting up stations for renting about 750 public bicycles at 150 stations was completed. During 2017, in the city of Belgrade, the following was realized: "Project for reducing the exhaust emissions of public transport vehicles on the territory of Belgrade by introducing the ECO-DRIVING system". Research is currently being conducted on the impact of driving style on energy efficiency in electric powered buses. The private carrier in the public city, suburban and intercity passenger transport "Arriva" has installed in each of its buses devices for active assistance and assessment of the drivers in terms of their energy efficiency, and the driver reward system is based on that. The current problem in the public passenger transport is a significant lack of professional drivers and their fluctuation, so carriers rarely opt to invest in their training and in their consistent sanctioning in the case of energy inefficient driving. In June 2019, drafting of a study was launched, which is entitled "Traffic management in Belgrade through the model of charging access to the central zone", which was supposed to be a prerequisite for the introduction of access control systems, i.e., for reducing visits to the center and critical zones of the city using individual passenger vehicles, and for the introduction of the so-called *Congestion charging*, which is known in many world capitals.

3.4.2. Expected measures and savings in the Transport sector

Table 16 shows the measures taken from the 3rd EEAP that can be relatively easily monitored, which are not obsolete and remain legitimate until 2021 for calculating primary energy savings. Better savings results are expected from the moment when the new Regulation on the import of motor vehicles with a standard stricter than the currently set EURO 3 standard is adopted, which is expected at the beginning of 2021.

Annex 4 lists in more detail the individual descriptions of all measures.

Table 16. Overview of measures in the Transport sector with the status of implementation and expected savings in the period 2019-2021

No.	Name of the measure	Implementation status	Expected savings in the period 2019-2021 [Mtoe]
T1	Implementation of EC 443/2009 on the reduction of CO ₂ emissions of new passenger cars	Retained measure. Continuation of activities from the 3rd EEAP	0.011

T2	Eco-driving	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
T3	Mobility management	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
T4	Improving energy efficiency in the public passenger transport system	Retained measure. Continuation of activities from the 3rd EEAP	Assessment included within T1
T5	Improving energy efficiency in the freight transport system	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
T6	Regulation of EURO standards regarding emission levels for imported passenger cars	The measure was abandoned. It will be re-established after the adoption of a stricter EURO standard for imported vehicles	
T7	Efficient tires for road vehicles	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
T8	Improving the quality of regular (annual) technical inspections of vehicles	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
T9	Modernization of the vehicle fleet in order to meet the technical conditions for performing domestic and international transport	Retained measure. Continuation of activities from the 3rd EEAP	0.0342
T10	Fuel marking and fuel quality monitoring		Not assessed
T11	Mandatory replacement of summer tires	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
	Introduction of incentive mechanisms for the replacement of the existing vehicle fleet	The measure is not active. If there are new incentives, it will be reintroduced.	

Transport in summary		0.0452
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3.4.3. Financing of EE measures in the Transport sector

There are three current packages of affirmative measures in the European Union:

- green (public) procurement and giving a "personal" example (good practice) through the procurement of more energy efficient and environmentally friendly utilities and official vehicles of local self-government and state bodies, public companies and state institutions;
- subsidies and customs/tax reliefs for individual procurements of more energy efficient, environmentally friendly vehicles or vehicles powered by renewable energy sources (RES) and
- special benefits or rights when using more energy efficient, environmentally friendly vehicles or vehicles powered by RES (use of free or reserved parking spaces, free supply of propulsion energy, the right to use special reserved traffic lanes for public transport, the so-called yellow lanes, etc.).

As an illustration of the first package of affirmative measures, a Donation Agreement was signed in March 2014 between the Government of the Republic of Serbia and the Government of Japan, on the basis of which a donation of 100 million yen was made for the purchase of 33 new hybrid passenger cars.

In the spirit of the second package of affirmative measures, owners of motor vehicles whose drive is exclusively electric, i.e., whose one of the drives is electric (hybrid vehicles) do not pay tax on the use of motor vehicles according to Article 5, item 6) of the Law on Taxes on Use, Holding and Carrying of Goods ("Official Gazette of RS", No. 26/01, 80/02, 43/04, 31/09, 101/10, 24/11, 68/14 – other law, 112/15 and 86/19).

The third package of affirmative measures is covered by free electricity supply stations. There are currently over 30 public charging stations in the Republic of Serbia. All the necessary information about the locations, characteristics (types of connectors, power, number of places) and functionality (correctness) of the chargers can be found on the charger maps or in related applications for smartphones.

3.5. Promotion of energy efficiency in heating and cooling (Article 14 of the EED)

The Law on Energy Efficiency and Rational Use of Energy regulates financial and non-financial incentives for highly efficient combined production of electricity and thermal energy: Financial incentives include: incentives through a system of market premiums (for capacities from 500kW to 10 MW) that will be acquired through auctions, incentives through the system of feed-in tariffs (for capacities up to 500 kW) and incentives granted by the Directorate for Financing and Encouraging Energy Efficiency (microgeneration, unless other incentives are realized in accordance with the law). Non-financial incentives include: priority access to the system for high-efficiency cogeneration and individual participants in the energy market, conditions for connection to high-efficiency cogeneration, guarantees of origin for high-efficiency cogeneration.

For new and reconstructed energy facilities with a capacity of 1 MW and more, LEERUE prescribes the obligation to prepare a study on energy efficiency. It is also envisaged that in case of construction of new or reconstructed energy facilities for production of electricity or thermal energy, or the combined heat and power generation with a capacity of 5 MW and more, the report on thermotechnical tests is to be submitted with the application for obtaining a use permit, in order to

prove the compliance with minimum energy efficiency requirements prescribed in accordance with the law, during the operation of these plants. For new and reconstructed plants for the production of electricity or thermal energy with a capacity above 5 MW, there is also an obligation to prepare a cost-effectiveness analysis of the application of the combined production of electricity and thermal energy. The request refers to new and reconstructed energy facilities, which use fossil fuels and/or biomass as fuel.

LEERUE also envisages the development of a potential analysis for highly efficient cogeneration and the possibility of using efficient district heating/cooling in accordance with Article 14 of the EED.

3.6. Energy conversion, transmission, distribution and consumption response (Article 15 of the EED)

3.6.1. Criteria related to energy efficiency in network charges and regulations

The price of electricity is relatively low, which contributes to the use of electricity for heating purposes. Regardless of the level of electricity prices, the tariffs in the Methodology for determining the price of electricity for guaranteed supply ensure that heating with electricity using boilers and heaters (direct heating) is among the most expensive. Heating using electricity is more favorable if TA furnaces are used and only in the period of low consumption (night). However, heating with TA furnaces also becomes expensive if energy is used inefficiently and if a lot of energy is consumed in the red zone (monthly, this is all energy over 1,600 kWh).

The Regulation on the conditions and procedure for acquiring the status of a privileged electricity producer also obliges transmission and distribution system operators to meet the conditions and requirements prescribed, inter alia, by technical regulations, regulations on energy efficiency and environmental protection.

The supplier and the guaranteed electricity supplier shall provide the consumer with information on the share of individual energy sources in the total amount of electricity sold by that supplier in the previous year, which shall be information that is understandable and easily comparable at the national level.

Also, the Law on Energy prescribes the requirement that in order to issue an energy permit, it is necessary to meet the conditions related to energy efficiency.

In order to increase the efficiency of electricity production and supply through market mechanisms, competition was introduced in the electricity sector, with the adoption of the Law on Energy in 2014. The full opening of the market followed, after the ratification of the Energy Community Treaty in January 2015.

The Energy Agency of the Republic of Serbia (AERS) adopts the Methodology for determining the price of electricity for guaranteed supply with the main tariff incentive for more efficient use of energy based on consumption (progressive tariff block). The tariff system for households is applied by modulating the components used for paying network charges. A progressive tariff structure was introduced on 15 April 2001 to protect the network from congestion. The tariff for "rational consumption" (green zone) includes monthly consumption of up to 350 kWh; and that threshold changed over time. "Moderate consumption" (blue zone) means consumption between 350 kWh and 1,600 kWh, while "high consumption" (red zone) means consumption which is greater than 1,600 kWh.

According to the Tariff System for the calculation of electricity to tariff customers ("Official Gazette of RS", No. 1/07, 31/07, 50/07, 81/07, 21/08 and 109/09, 100/10 and 96/11), the tariff is tied during use, with four times higher prices during the period of higher loads compared to "night" consumption. The difference is four times, because the lower tariff lasts only during the night, which

stimulates the use of electricity outside the peak load, thus reducing the need to increase the installed capacities in the networks. Such a charge according to the time periods given in relation to the current load sends a good signal to consumers. In accordance with the Methodology for determining the tariff elements for calculating the price of access and use of the system for the distribution of electricity (“Official Gazette of RS”, No. 68/06, 18/07 and 116/08), the second incentive (for consumers with measuring peak load) is the penalty for the peak load higher than the agreed one (four times higher price for the difference between the agreed and measured active power). This stimulates customers to ask when connecting to be allowed to use the actual necessary power, and that exceeding it means an additional cost.

Another obstacle to a more active participation of consumers in the signal given by the demanding side is the participation of representatives or associations of consumers (aggregators) in the services market. The EED, Article 15(8), implies that member states must require from national regulatory authorities, TSOs or DSOs, where it is required by national regulatory systems, to promote access to and participation of consumption responses in balancing, reserves and other ancillary services markets.

The current national electricity market framework does not mention aggregators for the ancillary services market and the balancing market. Aggregators only have the role of submitting day-ahead market offers and offers for the sale of irrelevant generating units, that use renewable energy sources in order to adequately allocate costs in the event of a system imbalance. The Law on Energy from 2014 mentions the role of distribution system operators in demand management (Article 139), but not explicitly.

3.6.2. Measures to facilitate and promote „demand response”

Developing a consumption response is only possible if smart meters are introduced, that will allow more freedom in defining tariffs. IFIs (International Financial Institutions) (e.g. EBRD, EIB) will allocate funds for the replacement of old meters with smart meters.

3.6.3. Energy efficiency in network model and management

Based on the project "Reduction of losses in the distribution network", five new projects were recently launched and a series of measures were suggested, in order to increase efficiency or reduce (i) technical losses, etc. which include: installation of transformers with reduced losses, optimal choice of transformers and conductors for lines (in accordance with the expected load), correction of power factors (reactive power compensation), load balancing by phases, voltage regulation, network reconfiguration (network type optimization) and other.

3.6.4. Expected energy saving measures and savings on the energy supply side

Table 17 provides an overview of measures on the energy supply side that will contribute to the savings in the period from 2019 to 2021. Table 17 refers to the measures envisaged in the DH sector, while Table 18 refers to the measures in the electricity generation, transmission and distribution sector.

Table 17. Expected measures and savings in the RHS sector for the period 2019 to 2021

No.	Name of the measure	Implementation status	Expected savings in the period 2019-2021 (ktoe)
SDG 1	Reconstruction of thermal energy distribution system of DH	Retained measure. Continuation of activities from the 3rd EEAP	7
SDG 2	Reconstruction and modernization of production systems of DH	Retained measure. Continuation of activities from the 3rd EEAP	2.38
SDG 3	Control of gaseous fuel combustion in heating plants	Retained measure. Continuation of activities from the 3rd EEAP	
SDG 4	Control of liquid fuel combustion in heating plants	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
SDG 5	Control of solid fuel combustion in heating plants	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
SDG 6	Control of thermal energy distribution	Retained measure. Continuation of activities from the 3rd EEAP	
SDG 7	Reconstruction of thermal power plant Nikola Tesla A for cogeneration	Retained measure. Continuation of activities from the 3rd EEAP	Not implemented
SDG 8	Minimum energy efficiency requirements for new and reconstructed plants for the production of electricity and thermal energy for CHP plants	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
District heating in summary			9.38

Regarding the Program "Rehabilitation of the district heating system in Serbia", the V phase of its implementation is in progress. The project envisages rehabilitation and modernization of the district heating system in up to eight heating plants, through the implementation of about 30 investments / sub-projects that will include:

- construction, reconstruction and/or replacement of thermal energy production plants,
- replacement and/or expansion of the heating pipeline,

- reconstruction, replacement and/or installation of substations,
- installation, upgrade and/or expansion of modern SCADA systems.

In addition to technical measures, the Project also envisages institutional measures, the aim of which is for the heating plants to operate according to economic principles. It is expected that within phase V, an increase in energy efficiency will be achieved, i.e., the reduction of heat losses of at least 15% per year, an annual reduction of greenhouse gas emissions expressed as CO₂ equivalent of 70.000 tons of CO₂/year (at least 22%). In addition, increased security of energy supply and economic stability of heating plants are expected.

Table 18. Expected measures and savings in the Electricity sector for the period 2019 to 2021

No.	Name of the measure	Measure status	Expected savings in the period from 2019 to 2021 (ktoe)
E1	Improving boiler efficiency	Retained measure. Continuation of activities from the 3rd EEAP	70
E2	Coal quality management system	Retained measure. Continuation of activities from the 3rd EEAP	10
E3	Improving the efficiency of steam turbines	Retained measure. Continuation of activities from the 3rd EEAP	76
E4	Reduction of own energy consumption in thermal power plants	Retained measure. Continuation of activities from the 3rd EEAP	5.9
E5	Distribution network reconfiguration	Retained measure. Continuation of activities from the 3rd EEAP	1.1
E6	Distribution network voltage regulation	Retained measure. Continuation of activities from the 3rd EEAP	4.83
E7	Strengthening the distribution network	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
E8	Installation of smart meters	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed

E9	Minimum EE requirements for new and reconstructed plants for the production of electricity and thermal energy or CHP plants	Retained measure. Continuation of activities from the 3rd EEAP	Not assessed
	Total		167.83

ANNEX 1 ENERGY AND ENERGY PRODUCTS
CONVERSION TABLE

Energy / fuel		Unit	Density	Final energy (MJ / unit)	Final energy (kWh / unit)	Final energy (toe / unit)	Primary energy (toe / unit)	CO ₂ factor (kgCO ₂ / kWh)	CO ₂ (kgCO ₂ / unit)
				A	B=A/3,6	C=B/11630	D=C / efficiency	E	F=E*B
Fuel	Lignite	t	1.35 t/m ³	7.523	2.090	0,1797	0,1797	0,36	752
	Lignite Kolubara	t	1.35 t/m ³	7.500	2.083	0,1791	0,1791	0,36	750
	Lignite Kostolac	t	1.35 t/m ³	8.500	2.361	0,2030	0,2030	0,36	850
	Dried lignite	t	1.35 t/m ³	17.600	4.889	0,4204	0,4204	0,36	1.760
	Brown coal	t	1.55 t/m ³	15.988	4.441	0,3819	0,3819	0,35	1.554
	Stone coal	t	1.35 t/m ³	26.900	7.472	0,6425	0,6425	0,34	2.541
	Coking coal	t	0.50 t/m ³	29.300	8.139	0,6998	0,6998	0,38	3.093
	Blast furnace gas	1000 m ³	1.25 kg/m ³	4.212	1.170	0,1006	0,1006	0,21	246
	Refinery gas	1000 m ³		36.950	10.264	0,8825	0,8825	0,21	2.155
	Gasoline (motor gasoline)	1000 L	0.71 t/kl	31.807	8.835	0,7597	0,7597	0,25	2.209

Biodiesel	1000 L	0.88 t/kl	32.600	9.056	0,7786	0,7786	0,252	2.282
Primary gasoline	t		44.938	12.483	1,0733	1,0733	0,25	3.121
Primary gasoline/Pyrolysis oil	t	1.057 t/m3	41.000	11.389	0,9793	0,9793	0,20	2.278
Primary gasoline/Fuel gas (RG)	t	0.680 t/m3	52.080	14.467	1,2439	1,2439	0,28	4.051
Primary gasoline/Raffinate II	t	0.680 t/m3	44.000	12.222	1,0509	1,0509	0,215	2.628
Aircraft gasoline and jet fuels (Kerosene)	1000 L	0.80 t/kl	34.722	9.645	0,8293	0,8293	0,26	2.508
Diesel fuel – Gas oil 0.1	1000 L	0.86 t/kl	36.800	10.222	0,8790	0,8790	0,27	2.760
Gas oil extra light euro el	1000 L	0.87 t/kl	37.334	10.371	0,8917	0,8917	0,28	2.904
Fuel oil medium S – Fuel oil medium	t	0.95 t/m3	40.872	11.353	0,9762	0,9762	0,28	3.179
Fuel oil medium euro S	t	0.95 t/m3	40.872	11.353	0,9762	0,9762	0,28	3.179
Low sulfur fuel oil	t	0.95 t/m3	41.302	11.473	0,9865	0,9865	0,28	3.212
Petroleum coke	t	0.98 t/m3	38.000	10.556	0,9076	0,9076	0,35	3.694
Liquefied petroleum gas	t	0.558 t/m3	46.340	12.872	1,1068	1,1068	0,23	2.961
Propane-butane in a bottle	t	0.558 t/m3	46.080	12.800	1,1006	1,1006	0,227	2.906
Natural gas	1000 m ³	0.68 kg/m3	33.338	9.261	0,7963	0,7963	0,20	1.852

		Compressed natural gas - CNG - methane	1000 m ³	0.68 kg/m ³	33.338	9.261	0,7963	0,7963	0,22	2.037
		Biogas	1000 m ³	1.22 kg/m ³	26.500	7.361	0,6329	0,6329	0,20	1.472
		Firewood	spatial m ³	0.40 t/m ³	6.624	1.840	0,1582	0,1582	0,0098	18
		Wood pellet	t	0.64 t/m ³	17.640	4.900	0,4213	0,4213	0,0267	131
		Wood briquette	t	1.025 t/m ³	16.560	4.600	0,3955	0,3955	0,0294	135
		Wood chips	loose m ³	0.362 t/m ³	2.695	749	0,0644	0,0644	0,0212	16
		Charcoal	t	0.60 t/m ³	25.900	7.194	0,6186	0,6186	0,35	2.518
		Sunflower husk	t	0.10 t/m ³	17.500	4.861	0,4180	0,4180	0,04	194
		Straw	t	0.17 t/m ³	14.500	4.028	0,3463	0,3463	0,04	161
		Biomass 1	t			0	0,0000	0,0000		0
		Biomass 2	t			0	0,0000	0,0000		0
		Other 1				0	0,0000	0,0000		0
		Other 2				0	0,0000	0,0000		0
		Other 3				0	0,0000	0,0000		0
Other 4				0	0,0000	0,0000		0		
Thermal	purchased	Steam	1000 kWh	-	3.600	1.000	0,0860	0,1344	0,287	287
		Hot water	1000 kWh	-	3.600	1.000	0,0860	0,1344	0,287	287

Electricity	own production	Solar energy	1000 kWh	-	3.600	1.000	0,0860	0,0860	0,00	0
		Geothermal energy	1000 kWh	-	3.600	1.000	0,0860	0,0860	0,00	0
		Other 1	1000 kWh	-	3.600	1.000	0,0860	0,0860		0
		Other 2	1000 kWh	-	3.600	1.000	0,0860	0,0860		0
	purchased	EPS supply	1000 kWh	-	3.600	1.000	0,0860	0,2593	1,099	1099
		Other suppliers	1000 kWh	-	3.600	1.000	0,0860	0,2593	1,099	1099
	own production	Solar energy	1000 kWh	-	3.600	1.000	0,0860	0,0860	0,00	0
		Geothermal energy	1000 kWh	-	3.600	1.000	0,0860	0,0860	0,00	0
		Wind energy	1000 kWh	-	3.600	1.000	0,0860	0,0860	0,00	0
		Other 1	1000 kWh	-	3.600	1.000	0,0860	0,0860		0
Other 2		1000 kWh	-	3.600	1.000	0,0860	0,0860		0	

ANNEX 2 ANNUAL REPORT ACCORDING TO THE EED

A1 National target according to the EED for 2020

In accordance with this target, and the same applied methodology, an indicative goal for the Republic of Serbia for 2020 was set, which defined that the consumption of primary energy should not exceed 17.981 million toe of primary energy, and the consumption of final energy for energy purposes 13.103 million toe. The goal for the Republic of Serbia is defined in the POS.

A.2 Key statistics for 2018

Table A2. Estimated values of key statistical data related to energy consumption in 2018⁸

Total primary energy consumption	15.527 Mtoe
Total final energy consumption	8.470 Mtoe
Final energy consumption – Industry	2.397 Mtoe
Final energy consumption – Transport	2.138 Mtoe
Final energy consumption – Households	2.872 Mtoe
Final energy consumption – Services	0.891 Mtoe
Gross value added – Industry	9,008.5 MEUR 589,486.9 MRSD
Gross value added – Services	1,805,238.9 MRSD
Household income	59198 RSD
Total number of households	2,487,886
Gross domestic product	3,737,370.6 MRSD
Electricity generation from thermal power plants	2.147 Mtoe
Production of electricity from thermal power plants – heating plants	0.024 Mtoe
Thermal energy production from thermal power plants	0.516 Mtoe
Thermal energy production from thermal power plants – heating plants	
Consumption for production by transformation in thermal power plants	6.273 Mtoe
Consumption for production by transformation in thermal power plants – heating plants	0.092 Mtoe
Losses	0.554 Mtoe
Passenger kilometer (pkm) for 2015	7752 mil
Ton-kilometer (tkm) for 2015	8014 mil

⁸ More information in the Energy Balance of the Republic of Serbia for 2020 and on the website of EUROSTAT and the Statistical Office of the Republic of Serbia

Total kilometres (if pkm and tkm are not available) ⁽³⁾	
Total population	6,982,604
Heat generated in DHSs	
Consumption for production by transformation in heating plants	

A.3 Energy consumption trend analysis

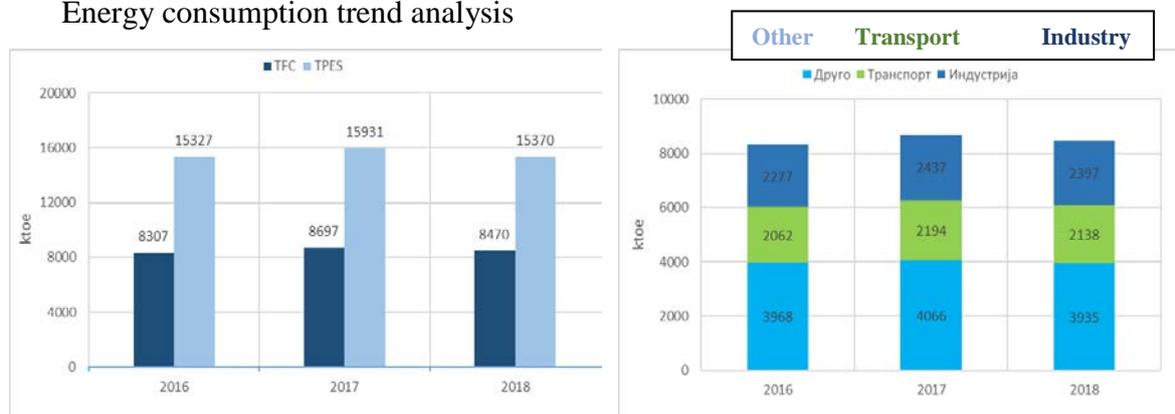


Figure 1. Final and primary energy consumption (left) and final energy consumption by sectors (right) for the period 2016 to 2018

Total Final Consumption (TFC) decreased by 2% in the period 2010-2018. Specifically, TFC decreased in the period 2012-2014, while in the period 2015-2018 there was a certain increase after the growth of economic activities. Primary energy consumption (TPES) decreased by about 13% in the period 2010-2014, while in the period 2014-2018 there was an increase of 15%.

A.4 Main measures adopted in 2019

Regulatory measures

Below are the bylaws of this ministry that were passed during 2019:

- Decree on determining the program of financing activities and measures to improve the efficient use of energy in 2019 ("Official Gazette of RS", number 4/19),
- Rulebook on conditions for distribution and use of funds of the Budget Fund for the improvement of energy efficiency of the Republic of Serbia and criteria for exemption from the obligation to perform energy audits ("Official Gazette of RS", number 12/19),
- Rulebook on the termination of the Rulebook on labeling of energy efficiency of vacuum cleaners ("Official Gazette of RS", number 20/19),
- Rulebook on the application form for the register of obligors of the fee for energy efficiency improvement, the form for monthly and annual calculation of quantities of energy/energy products delivered to consumers or placed on the market in the Republic of Serbia, or imported into the territory of the Republic of Serbia, the form of monthly and annual calculation of the obligation to pay the fee, the form for the report on payment, as well as on the manner of submitting these forms ("Official Gazette of RS", No. 41/19),
- Decision authorizing the Faculty of Mechanical Engineering of the University of Belgrade to perform trainings of energy managers and authorized energy advisors ("Official Gazette of RS", No. 84/19).

Non-regulatory measures

- Budget Fund, i.e., the Directorate for Financing and Encouraging Energy Efficiency

Chapter 3.3.5.

- Energy management system

Chapter 3.1.2.

- Investment projects

Project Energy efficiency in public buildings and renewable energy sources in the district heating sector ("Public sector Greening") of the MMA (*KfW*) (Chapter 3.3.2),

Program "Rehabilitation of district heating systems in Serbia" – phase V (*KfW*) (Chapter 3.6.4),

Project "Energy efficiency in central government buildings" - (CEB) (Chapter 3.3.1),

"The Municipal Energy Efficiency and Management Project (MEEMP) in Serbia" *SECO* (Chapter 3.3.2).

A.5 Central government buildings

The list of central government buildings that has been made includes 56 buildings whose area is estimated on the basis of available data and amounts to about 405,000 m². The list was determined by the Government of the Republic of Serbia, in the form of the Conclusion, dated 9 August 2018.

Improving energy efficiency in these buildings is realized within the Project "Energy efficiency in central government buildings" - (CEB) (Chapter 3.3.1).

A.6 Binding energy efficiency scheme

The obligation under Article 7 of the EED is explained in detail in the Notice on the application of Article 7 and in Chapter 3.1.1. as well as the realized savings in the period from 2017 to 2019 by measures, for which there were data available.

ANNEX 3 BUILDING RENOVATION PLAN

The plan will be given within the document "Long-term strategy to encourage investments in the reconstruction of the national building fund", which is in the status of development.

ANNEX 4 LIST OF EE MEASURES THE IMPLEMENTATION OF WHICH CONTINUES UNTIL 2021

HOUSEHOLD SECTOR

Name of the measure	Energy efficiency measures in residential buildings
Measure designation	D1
Category	2. Information and mandatory information measures (2.4. Energy audits) 3. Financial instruments (credit lines, subsidies, loans),
Time frame	Start date 2010, extended until 2021 There were no early measures
Objective / brief description	Improving the energy efficiency of buildings: reducing the energy required for heating and cooling by applying measures to the thermal envelope of the building and improving the thermotechnical system of the building
Target end consumers	Existing buildings (thermal envelope of the building, thermotechnical systems in buildings)
Target group	Household sector – residential buildings
Regional application	National, regional, local
Implementation information	
List and description of activities for implementation of measures	<p>Energy savings will be achieved by reducing the energy required for heating and cooling through following activities:</p> <ul style="list-style-type: none"> • By replacing exterior windows and doors; • By improving other elements of the thermal envelope of the building (adding thermal insulation) • By reducing energy consumption in the building's thermotechnical system by using: <ul style="list-style-type: none"> ○ HVAC equipment of higher energy efficiency class with electronic control of work; ○ High efficiency biomass combustion boilers; ○ Solar collectors; ○ Heat pumps; <p>Implementation will be led by the MoME, through public campaigns and promotions.</p> <p>The basis for implementation are: Law on Planning and Construction, Law on Energy, LEERUE, Rulebook on energy efficiency of buildings, Rulebook on conditions, content and manner of issuing certificates on energy performance of buildings and relevant bylaws.</p>

Name of the measure	Energy efficiency measures in residential buildings
Sources of funding	<ul style="list-style-type: none"> - Directorate for financing and encouraging energy efficiency / or other mechanism for financing energy efficiency of the RS, which is expected to provide funds for interest subsidies or funds for guarantees or some other type of subsidies that will enable funds to be available under more favorable terms in accordance with the annual financing program. Within the activities of the Directorate, activities will be carried out in the Household sector regarding the energy rehabilitation of residential buildings and houses. - The Directorate can provide incentives for the development of energy audits for larger facilities. - Credit lines with favorable repayment terms with the support of IFIs (KfW, WB, EBRD etc.) - Commercial banks (dedicated loans with favorable repayment terms). - Budget of AP Vojvodina - Budget of LSGUs - Budget of investors who invest in the reconstruction of the building. - Bilateral donations and funds intended for the fight against climate changes.
Institutions in charge of implementing activities	MoME, MoCTI, relevant institutions in AP Vojvodina, LSGUs
Institutions in charge of supervision	MoME
Energy savings	
Monitoring method Measurement of achieved savings	BU methodology: BU5, BU6, BU4, BU8, BU9, BU11. TD methodology
Realized savings in the period 2016 - 2018	4.78 ktOE
Expected savings in the period 2019-2021	8.1 ktOE
Overlaps, multiplied effects, synergy	No overlaps

Name of the measure	New building regulations and certificates on energy performance of buildings
Measure designation	D2
Category	<ol style="list-style-type: none"> 1. Regulations (1.1. Regulations, standards and application) 2. Information and mandatory information measures 2.2 Energy passport of the building (EE designation schemes)
Time frame	Start date 2011, extended until 2021 There were no early measures
Objective / brief description	Realization of energy savings in the construction of new buildings and reconstruction of existing buildings in the Household sector:

Name of the measure	New building regulations and certificates on energy performance of buildings
	- by applying new construction regulations that define the mandatory use of relevant standards (which define the minimum criteria for energy efficiency of buildings) - by drafting certificates on the energy performance of buildings.
Target end consumers	New buildings and reconstructed existing buildings
Target group	Household sector – residential buildings
Regional application	National, regional, local
Implementation information	
List and description of activities for implementation of measures	Regulations accompanying the Law on Planning and Construction related to energy efficiency are as follows: Rulebook on the energy efficiency of buildings, which prescribes the energy performance and the methodology for calculating the thermal performance of buildings as well as the energy needs of new and existing buildings. Rulebook on the conditions, content and manner of issuing certificates on the energy performance of buildings, which prescribes the conditions, content and manner of issuing certificates on the energy performance of buildings. Rulebook on taking the professional exam in the field of spatial and urban planning, preparation of technical documentation, construction and energy efficiency, as well as on issuing and revoking licenses for responsible urban planners, designers, contractors and responsible planners ("Official Gazette of the RS", No. 27/15 and 92/15), which ceased to be valid on 27 July 2019. These rulebooks transposed the provisions of the EPBD Directive, which relate to the energy efficiency of buildings, into the national legislation. The energy class of a new building, which is expressed by the energy passport of the building, must be at least "C" or higher. The energy class for existing buildings, after the execution of works on reconstruction, extension, renovation, adaptation, rehabilitation and energy rehabilitation, must be improved by at least one class.
Sources of funding	Funds of the investor who is building a new building, as well as building owners
Institutions in charge of implementing activities	MoCTI, Chamber of Engineers and authorized organizations for issuing certificates on energy performance of buildings, as well as design companies.
Institutions in charge of supervision	MoCTI, MoME
Energy savings	
Monitoring method	BU methodology: BU7
Measurement of achieved savings	TD methodology
Realized savings in the period 2016 - 2018	63 ktoe
Expected savings in the period 2019-2021	53 ktoe

Name of the measure	New building regulations and certificates on energy performance of buildings
Overlaps, multiplied effects, synergy	No overlaps. Reconstruction is taken into account only in D1, and here, new construction, extension and adaptation of non-residential space into residential

Name of the measure	Promoting the use of energy efficient appliances in the household
Measure designation	D3
Category	1. Regulation: standards for minimum energy performances of equipment 2. Information and mandatory information measures 2.1 Campaigns with the aim of promoting energy efficient products, 2.2 Rulebooks on labeling the energy efficiency of products 3. Financial instruments (subsidies, credit lines)
Time frame	Start date 2010, extended until 2021 Early measures: EM1, EM2
Objective / brief description	Reducing electricity consumption by using energy efficient products: light bulbs, lamps and other household appliances (refrigerators, ovens and hoods, washing machines, tumble dryers, dishwashers, televisions, air conditioners, vacuum cleaners, devices for heating space, devices for heating water.)
Target end consumers	Electricity consumers in households
Target group	Household sector
Regional application	National, regional, local
Implementation information	
List and description of activities for implementation of the measure	<p>The LEERUE defines the obligation to label energy efficiency on devices that consume energy, which is further regulated by:</p> <ul style="list-style-type: none"> - Regulation on the types of products that affect energy consumption for which it is necessary to indicate the consumption of energy and other resources ("Official Gazette of RS", number 92/13), - Regulation on the amendments to the regulation on the types of products that affect energy consumption for which it is necessary to indicate the consumption of energy and other resources ("Official Gazette of RS", number 80/16), - Regulation amending the Regulation on types of products that affect energy consumption for which it is necessary to indicate the consumption of energy and other resources ("Official Gazette of RS", number 41/21), - regulations on energy efficiency labeling that have been adopted individually for several types of products. <p>Product energy efficiency labeling is expected to change the market, as has been the case in many EU member states.</p> <p>The successful implementation of measures requires the organization of an information campaign for both the public (consumers) and sales employees. The first campaign, which involved the distribution of about a million notices, was organized in 2006. It is envisaged that the MoME, bodies of AP Vojvodina, the LSGUs, consumer associations and non-governmental organizations, will organize more similar campaigns.</p>

Name of the measure	Promoting the use of energy efficient appliances in the household
	In order to accelerate the transition to more efficient devices, some financial incentive measures should be considered.
Sources of funding	Campaigns related to effective lighting can receive support from budget funds and other sources of funding.
Institutions in charge of implementing activities under the measure	MoME, AP Vojvodina, LSGUs, EPS, MTTT Market Inspection, NGOs, consumer associations
Energy savings	
Monitoring method Measurement of achieved savings	BU methodology, method BU2 TD methodology TD indicator P4 for household appliances This measure is relatively difficult to monitor. On the one hand, the measure will be monitored TD, by monitoring the growth of sales of efficient household appliances and/or by surveying household consumption. On the other hand, BU will be monitored by collecting data on promotional activities and campaigns conducted by the public sector and public companies, but towards the end beneficiary, which enables the assessment of savings.
Realized savings in the period 2016 - 2018	23.6 ktoe
Expected savings in the period 2019-2021	28 ktoe
Overlaps, multiplied effects, synergy	No overlaps

PUBLIC AND COMMERCIAL SECTOR

Name of the measure	Improving the energy efficiency of buildings in the public and commercial sector
Measure designation	JK1
Category	2. Information and mandatory information measures (2.7 The public sector has a role to give an example) 3. Financial instruments (credit line, subsidy, loan)
Time frame	Start date 2010, extended until 2021 Early measures: EM4, EM6, EM7, EM8.
Objective / brief description	Improving the energy efficiency of buildings: reducing the energy required for heating and cooling by applying measures to the thermal envelope of the building and improving the thermotechnical system of the building
Target end consumers	Existing buildings (thermal envelope of the building, thermotechnical systems in buildings, lighting in buildings)
Target group	Public and commercial sector
Regional application	National, regional, local
Implementation information	
List and description of activities for implementation of the measure	<p>Energy savings will be achieved by reducing the energy required for heating and cooling through the following activities:</p> <ul style="list-style-type: none"> - By replacing exterior windows and doors; - By improving other elements of the thermal envelope of the building (adding thermal insulation) - By reducing energy consumption in the building's thermotechnical system by using: <ul style="list-style-type: none"> ● HVAC equipment of higher energy efficiency class with electronic control of work; ● High efficiency biomass combustion boilers; ● Solar collectors; ● Heat pumps; <p>By reducing electricity consumption for interior lighting: replacement of classic light bulbs (incandescent) with energy efficient light bulbs (CFL and LED) and other measures that improve the lighting system (advanced lighting plan, motion sensors, etc.).</p> <p>The implementation will be led by the MoME, with an accompanying public campaign and promotions.</p> <p>The basis for implementation are: Law on Planning and Construction, Law on Energy, LEERUE, Rulebook on energy efficiency of buildings, Rulebook on conditions, content and manner of issuing certificates on energy performance of buildings and other relevant bylaws.</p>

Name of the measure	Improving the energy efficiency of buildings in the public and commercial sector
Sources of funding	<ul style="list-style-type: none"> - Budget of the LSGUs - Budget of AP Vojvodina – Capital Investments Directorate, Provincial Secretariat for Energy, Construction and Transport - Energy Efficiency Budget Fund of the RS, i.e., the Directorate for Financing and Encouraging Energy Efficiency, or other sustainable mechanisms for financing energy efficiency, which are expected to provide funds for interest subsidies or funds for guarantees or some other type of subsidies, which will enable the funds to be available under more favorable conditions in accordance with the annual financing program, and can also finance the preparation of energy audits for larger projects. The requirement for the allocation of funds from the program is the completed energy audit of the building and the study on energy efficiency. - Credit lines with favorable repayment terms with the support of IFIs (KfW, WB, EBRD, etc.) - commercial banks (dedicated loans with favorable repayment terms). - the budget of investors who invest in the reconstruction of the building. - bilateral donations and funds intended to combat climate change.
Institutions in charge of implementing activities	MoME, MoCTI, SCTM Relevant institutions in AP Vojvodina and LSGUs
Institution in charge of supervision	MoME
Energy savings	
Monitoring method / measuring the realized savings	BU methodology: BU3, BU4, BU5, BU6, BU8, BU9, BU11.
Realized savings in the period 2016 - 2018	2.48 ktoe
Expected savings in the period 2019-2021	2.9 ktoe
Overlaps, multiplied effects, synergy	No overlaps. The measure is exclusively related to projects that are reported on according to BU forms

Name of the measure	New building regulations and certificates on energy performance of buildings
Measure designation	JK2
Category	<ol style="list-style-type: none"> 1. Regulations (1.1. Rulebooks, standards and application) 2. Information and mandatory information measures 2.2 Energy passport of the building (EE designation schemes)
Time frame	Start date 2011, extended until 2021 There were no early measures

Name of the measure	New building regulations and certificates on energy performance of buildings
Objective / brief description	Realization of energy savings in the construction of new buildings and reconstruction of existing buildings in the public and commercial sector: - by applying new construction regulations that define the mandatory use of relevant standards (which define the minimum criteria for energy efficiency of buildings) - by drafting certificates on the energy performance of buildings.
Target end consumers	Existing buildings under reconstruction and new buildings
Target group	Public and commercial sector
Regional application	National, regional, local
Implementation information	
List and description of activities for implementation of measures	The regulations accompanying the Law on Planning and Construction related to energy efficiency are as follows: Rulebook on the energy efficiency in buildings, which prescribes energy performance and the methodology for calculating the thermal performance of the building as well as the need for energy in new and existing buildings, Rulebook on energy certification of buildings, which prescribes the conditions, content and manner of performing the energy certification of buildings. These rulebooks have enabled the transposition of EPBD provisions related to energy efficiency in buildings into national legislation. In accordance with the requirements defined in these regulations, all new buildings and buildings that are being renovated must have energy passports and meet the minimum requirements of the "C" class of buildings.
Sources of funding	Budget of the Republic of Serbia. Funds of an investor who builds a new facility or reconstructs an old one.
Institutions in charge of implementing activities	MoCTI, Serbian Chamber of Engineers and other relevant institutions
Institutions in charge of supervision	MoCTI, MoME
Energy savings	
Monitoring method Measurement of achieved savings	TD methodology BU methodology (method BU7)
Realized savings in the period 2016 - 2018	33.6 ktoe
Expected savings in the period 2019-2021	30.3 ktoe
Overlaps, multiplied effects, synergy	All energy savings during the construction of new and upgrading of existing facilities are attributed to the JK2 measure.
Name of the measure	Modernization of public lighting systems in LSGUs
Measure designation	JK3

Name of the measure	Modernization of public lighting systems in LSGUs
Category	2. Information and mandatory information measures (2.7 Reputable example of the public sector) 3. Financial instruments (Directorate) 4. Voluntary agreements cooperative instruments (4.3 energy efficient public procurements)
Time frame	Start date 2010, extended until 2021 Early measures: EM5.
Objective / brief description	Energy savings are achieved by the following activities: 1) Replacement of existing street lamps in the public lighting system with modern lamps with energy-efficient light sources and better optical characteristics that enable greater efficiency of lamps. 2) Introduction of a regulation mechanism in the public lighting system. In the future, the improvement of energy efficiency in public lighting can be strongly encouraged by the horizontal measure H3 on the requirements of eco-design, which are expected to change the market of light sources.
Target end consumers	Public lighting systems in municipalities/cities
Target group	Companies in charge of public lighting at the level of the local self-government
Regional application	National, regional, local
Implementation information	
List and description of activities for implementation of measures	The costs of consumed electricity and maintenance of the public lighting system will be borne by the local self-governments. They will also decide on investments in the expansion and reconstruction of the system. Estimated energy savings after modernization are very high, averaging about 30%. Pursuant to the Law on EUE, the Rulebook on minimum criteria for energy efficiency in the public procurement of goods was adopted in 2015, which defines the criteria for energy efficiency in public procurement of more efficient public lighting systems.
Sources of funding	Budget of local self-governments and the autonomous province (donations from 2007), ESCO Subsidies, loans or credit lines on favorable repayment terms are provided through the Budget Fund for Energy Efficiency/Directorate for Financing and Encouraging Energy Efficiency and other favorable credit lines
Institutions in charge of implementing activities	Public companies in charge of public lighting; LSGUs; MoME, SCTM
Institutions in charge of supervision	MoME
Energy savings	
Monitoring method	BU methodology (method BU1)
Measurement of achieved savings	This measure showed weaker-than-expected results due to insufficient reporting according to BU forms
Realized savings in the period 2016 - 2018	0.72 ktoe

Name of the measure	Modernization of public lighting systems in LSGUs
Expected savings in the period 2019-2021	1.9 ktoe
Overlaps, multiplied effects, synergy	Not overlapping

Name of the measure	Introduction of energy management system (EMS) into the public and commercial sector
Measure designation	JK4
Category	1. Regulations (Decree on determining the limit values of annual energy consumption on the basis of which it is determined which companies are obligors of the energy management system, subject to the annual energy saving targets and the realized energy consumption report form and the rulebooks establishing the energy management system) 2. Information and mandatory information measures (2.7 Reputable example of the public sector)
Time frame	Start date: 2017 – Continuous activity There were no early measures
Objective / brief description	The measure was applied in accordance with the Law on EUE, and in the future it will be applied in accordance with the LEERUE: 1) By collecting and analyzing data on energy consumption, proposed measures and activities aimed at increasing EE, 2) by developing programs and plans for the efficient use of energy and informing the MoME, 3) By applying the proposed measures and activities, 4) By preparing and submitting periodic reports to the MoME (on energy consumption and achieved savings), 5) By conducting periodic energy audits. The activity is performed by an energy manager who possesses the appropriate license in accordance with the Law on EUE, i.e., the LEERUE.
Target end consumers	The obligors of the system are local self-government units with over 20,000 inhabitants, state administration bodies and other bodies of the RS and bodies of the autonomous province that use buildings over 2000 m ² , public services (public companies, schools, hospitals...), companies whose predominant activity is in the trade and services sector with an annual energy consumption of more than 1000toe
Target group	Services sector
Regional application	National, local: LSGUs with more than 20,000 inhabitants
Implementation information	
List and description of activities for implementation of measures	The Government has determined by a decree the limit values of annual energy consumption on the basis of which the obligors of the energy management system in the public commercial sector are determined, the annual energy savings targets and the realized energy consumption report. EMS obligors are required to appoint an energy manager (EM), with an appropriate license who is responsible for monitoring and analyzing energy consumption data, planning and implementing EE improvement measures.

Name of the measure	Introduction of energy management system (EMS) into the public and commercial sector
	<p>The EMS obligor prepares energy efficiency plans and programs and informs the MoME on the results of their implementation on an annual basis. The obligation of obligors from these two sectors is to perform an energy audit at least once every ten years.</p> <p>The system aims to prescribe obligations for the EMS to reduce energy consumption, but for the EMS to have the freedom to fulfill its obligations in the way that is most suitable for it. EMS can achieve its goals through organizational and investment measures.</p> <p>The measure also envisages encouraging the development of the energy management system for entities that are not obligors of the system.</p> <p>The establishment of the EMS was provided by the MoME from donations from Japan, Norway and UNDP. The Japanese project established three training programs for energy managers, preparation of bylaws, a training center for energy managers and energy advisors was established, as well as a database and an integrated platform for data collection and analysis of data submitted by selected organizations. The Norwegian donation helped finance the creation of a SEMIS database and an integrated platform for collecting data on energy audits performed. UNDP has donated an EMIS database for energy management at the local level, which monitors the consumption of different types of energy per facility.</p> <p>The first savings through this measure can be monitored on the basis of the submitted annual reports of the LSGU obligors for 2017 and 2018. 24 LSGUs submitted an annual report on the achievement of energy savings targets for 2018, of which 12 were not considered for energy savings due to an increase in consumption, for justified reasons, or they were rejected because there were no data for 2017. Observing the 12 annual reports in which there was a decrease in primary energy consumption, a total decrease in primary energy consumption of 2,894.03 toe and final energy of 1,495.75 toe was calculated.</p>
Sources of funding	<p>Funds of designated organizations, Energy Efficiency Budget Fund / Directorate for Financing and Encouraging Energy Efficiency, ESCO, Loans and favorable credit lines approved by IFI, Other sources of funding.</p>
Institutions in charge of implementing activities	MoME, obligors of the energy management system
Institutions in charge of supervision	MoME
Energy savings	
Monitoring method Measurement of achieved savings	Designated organizations send reports
Realized savings in the period 2016 - 2018	1.63 ktoe

Name of the measure	Introduction of energy management system (EMS) into the public and commercial sector
Expected savings in the period 2019-2021	4.8 ktoe
Overlaps, multiplied effects, synergy	-

Name of the measure	Minimum criteria regarding energy efficiency in the public procurement procedure
Measure designation	JK5
Category	1. Regulations 2. Information and mandatory information measures 2.7 Reputable example of the public sector
Time frame	Start date 2016, extended until 2021 There were no early measures
Objective / brief description	This measure includes minimum criteria regarding energy efficiency in the public procurement procedure in accordance with the Law on EUE/LEERUE and by-laws. The minimum criteria regarding energy efficiency prescribed by this rulebook shall apply to the procurement of: 1) office IT equipment; 2) refrigerators and refrigerators with freezer compartment; 3) air conditioning devices; 4) indoor and outdoor lighting. The minimum criteria regarding energy efficiency prescribed by the rulebook are applied regardless of whether the criterion of the most economically advantageous bid or the lowest offered price is determined for the evaluation of bids and award of contracts (in terms of the law governing public procurements). The public sector as a large buyer of services and goods can act to place more energy efficient devices on the market Energy savings result from the provision of energy efficient equipment, appliances and vehicles, buildings, rental of space and services
Target end consumers	Facilities and devices owned by the public sector
Target group	Public sector
Regional application	National, regional, local
Implementation information	

Name of the measure	Minimum criteria regarding energy efficiency in the public procurement procedure
List and description of activities for implementation of measures	In accordance with the Law on EUE / LEERUE and the EED, the public sector is required to ensure the proper implementation of energy efficiency policy by using energy efficiency criteria in the public procurement procedures. During the implementation of the public procurement procedure, when selecting bidders, public institutions should take into account the energy efficiency of the products and services to be purchased. It is recommended to purchase only those products that meet the criteria of the highest performance and that belong to the highest class of energy efficiency The implementation of this measure started with the adoption of the Rulebook on minimum criteria regarding energy efficiency in the public procurement procedure ("Official Gazette of RS", number 111/15) by the MoME.
Sources of funding	Funds of organizations conducting public procurements
Institutions in charge of implementing activities	MoME, PPO, LSGUs, public companies
Institutions in charge of supervision	MoME, PPO
Energy savings	
Monitoring method / Measurement of achieved savings	
Realized savings in the period 2016 - 2018	Not assessed
Expected savings in the period 2019-2021	Not assessed
Overlaps, multiplied effects, synergy	

Name of the measure	Incentive measures for highly efficient combined heat and power generation plants on natural gas (<i>CHP</i>)
Measure designation	JK6
Category	1. Regulations 3. Financial instruments
Time frame	Start date 2013, extended until 2021 There were no early measures
Objective / brief description	Increasing energy efficiency in public and commercial buildings by implementing combined heat and power generation projects
Targeted end use	Facilities owned by the public and commercial sector
Target group	Public-commercial sector
Regional implementation	National, regional, local
Implementation information	

Name of the measure	Incentive measures for highly efficient combined heat and power generation plants on natural gas (<i>CHP</i>)
List and description of activities for implementation of the measure	Decree on the conditions and procedure for acquiring the status of a privileged producer of electricity, a temporary privileged producer and a producer of electricity from renewable energy sources ("Official Gazette of RS", number 56/16) Decree on the contract on the purchase of electricity ("Official Gazette of RS", No. 56/16, 61/17 and 106/20) Decree on the fee for incentives for privileged electricity producers ("Official Gazette of RS", number 8/19) Incentive measures, i.e., incentive purchase prices of electricity are adopted by the Government through the Decree on incentive measures for the production of electricity from renewable sources and from highly efficient combined heat and power generation. Institutions and companies in the service sector, that deal with combined heat and power generation have the right to the status of a privileged producer of electricity and acquire the right to purchase electricity at incentive prices. Buildings in the service sector that have a significant and continuous demand for thermal energy (usually in the form of hot water) have the technical potential to implement CHP. Such buildings include clinical centers, main hospitals, social welfare buildings (nursing homes, special hospitals, etc.), sports centers, etc.
Sources of funding	EPS through the collection of bills for consumed electricity. Decree on the amount of the special fee for incentives in 2016 Decree on compensation for the incentives for privileged electricity producers
Institutions in charge of implementing activities	MoME
Institution in charge of monitoring	MoME
Energy savings	
Monitoring method / Measurement of achieved savings	BU methodology (method BU12)
Realized savings in the period 2016 - 2018	Not assessed
Expected savings in the period 2019-2021	Not assessed
Overlaps, multiplied effects, synergy	
Name of the measure	Control of heating systems and air conditioning systems of buildings and application of alternative measures
Measure designation	JK7
Category	1. Regulations 2. Information and mandatory information measures

Name of the measure	Control of heating systems and air conditioning systems of buildings and application of alternative measures
Time frame	Start date: 2016 – Continuous activity There were no early measures
Objective / brief description	Energy savings are achieved by periodic inspection of heating and air conditioning systems and the implementation of the proposed EE measures.
Target end consumers	Owners of heating systems with power of over 50 kW, as well as owners of air conditioning systems with power of over 12 kW.
Target group	Public and commercial companies, owners of heating systems and air conditioning systems.
Regional implementation	National
Implementation information	
List and description of activities for implementation of the measure	<p>Rulebook on control of heating systems and on closer conditions that must be met by authorized legal entities for control of heating systems ("Official Gazette of RS", number 58/16)</p> <p>Rulebook on control of air conditioning systems ("Official Gazette of RS", number 82/16)</p> <p>The Law on EUE prescribed the obligation of owners of boilers and other combustion plants with an installed capacity of over 50 kW to periodically control the combustion process while at the same time controlling the heating system in accordance with the requirements of the EPBD. This threshold has been raised in the LEERUE to 70 kW.</p> <p>The Law on EUE prescribed the obligation of owners of air conditioning systems with a power of over 12 kW to perform regular periodic inspections. This threshold has been raised in the LEERUE to 70 kW.</p> <p>In order to implement the measure, the LEERUE stipulates that the MoME will establish a procedure for authorizing legal entities/entrepreneurs that can exercise control.</p> <p>Implementation control will be performed by inspection services of the MoME.</p>
Budget and sources of funding	Owners of heating and air conditioning systems, with power of over 70 kW, within the funds allocated for regular repairs and maintenance of these systems.
Institutions in charge of implementing activities	MoME
Institution in charge of monitoring	MoME
Energy savings	
Monitoring method / Measurement of achieved savings	Audit reports prepared by authorized persons
Realized savings in the period 2016 - 2018	Not assessed
Expected savings in the period 2019-2021	Not assessed

Name of the measure	Control of heating systems and air conditioning systems of buildings and application of alternative measures
Overlaps, multiplied effects, synergy	

INDUSTRY SECTOR

Name of the measure	Introduction of the Energy Management System in large industrial consumers
Measure designation	I1
Category	1. Regulations 2. Information and mandatory information measures. 3. Financial instruments
Time frame	Start date: 2017 - Continuous activity - There were no early measures
Objective / brief description	The measure is implemented in accordance with the Law on EUE / LEERUE and includes the realization of energy savings through measures for EE improvement, in accordance with the target savings set by the state authorities. 1) Collection and analysis of data on energy consumption, proposing measures and activities aimed at increasing EE, 2) Development and submission of programs and plans for the efficient use of energy MoME, 3) Implementation of proposed measures and activities, 4) Preparation and submission of periodic reports of MoME (on energy consumption and achieved savings), 5) Conducting mandatory energy audits. This activity is performed by an energy manager who possesses the appropriate license in accordance with the law.

Name of the measure	Introduction of the Energy Management System in large industrial consumers
Target end consumers	<p>In accordance with the Decree on determining the limit values of annual energy consumption on the basis of which it is determined which companies are obligors of the energy management system, subject to annual energy savings targets and the the realized energy consumption report form ("Official Gazette of RS", number 18/16), companies are system Obligors if they have, at least on one location, which is at a separate address, facilities for performing activities whose annual primary energy consumption is higher than the following limit values of energy consumption:</p> <p>1) 2,500 toe (104.67 TJ or 29.08 GWh) per year for companies whose predominant activity is in the production sector and which perform activities listed in Sector A-F of the Regulation on the classification of activities ("Official Gazette of RS", number 54/10);</p> <p>2) 1,000 toe (41.87 TJ or 11.63 GWh) per year for companies whose predominant activity is in the trade and services sector and which perform activities listed in Sector G-N and P-S of the Regulation on the classification of activities.</p> <p>Companies whose predominant activity is in the production sector, which do not belong to the system Obligors referred to in paragraph 1, item 1) of this Article are system Obligors if their annual primary energy consumption in all facilities they have in total is greater than 1,000 toe (41.87 TJ or 11.63 GWh).</p> <p>For the purposes of this decree, the location consists of all facilities for performing the activities of the system Obligors which are located at the same address, and whose annual primary energy consumption in total exceeds the limit values of the prescribed energy consumption.</p> <p>The annual energy savings target for system Obligors for the current calendar year is 1% of the realized primary energy consumption in the previous calendar year.</p>
Target group	Companies in the Industry sector
Regional application	National
Implementation information	

Name of the measure	Introduction of the Energy Management System in large industrial consumers
List and description of activities for implementation of measures	<p>The Government has issued a decree determining the limit values of annual energy consumption on the basis of which the obligors of the energy management system in the industry sector are determined, as well as annual energy savings targets and the realized energy consumption report form.</p> <p>Activities are carried out by the Obligors of the EMS system in accordance with the law:</p> <ul style="list-style-type: none"> - realizing the planned goal of energy savings prescribed by the Government: <p>the annual energy savings target for system Obligors for the current calendar year is 1% of the realized primary energy consumption in the previous calendar year</p> <ul style="list-style-type: none"> - adopting a program and plan for the improvement of EE in the economic society, with EE measures to be implemented - appointing energy managers (EM) - implementing adopted EE measures, - collection and analysis of energy consumption data, - preparation of annual reports, Submission to the MoME: - plans for improving EE - periodic (annual) reports: report on annual primary energy consumption and calculation of annual primary energy consumption - conducting energy audits within the stipulated period. <p>The activity is performed by an energy manager who possesses the appropriate license in accordance with the law.</p> <p>The Ministry collected 76 annual reports for 2018 from obligors from the industry, which includes EPS and heating plants. 41 annual reports of EMS obligors from the industry were analyzed, showing a decrease in primary energy consumption from 1% to 23%. In 35 annual reports, there was an increase in primary energy consumption.</p> <p>The industry without EPS and heating plants has a reduction in energy consumption at 22 locations. In three locations, in addition to the reduction in primary energy consumption, there was an increase in energy indicators and annual reports were not taken into consideration for savings. Six annual reports were not considered for savings due to problems with parameters and energy indicators. In thirteen annual reports, there was a decrease in primary energy consumption and a decrease in indicators. The calculated reduction of primary energy consumption is 23,452.59 toe and final energy 18,173.39 toe.</p>
Budget and sources of funding	Funds for the implementation of investment measures are provided by the obligors from their own funds, through favorable loans granted by the IFIs, from the EE Budget Fund / from the funds of the Directorate, loans granted by commercial banks and other sources. The implementation of measures may also include an ESCO funding model.
Institutions in charge of implementing activities	EMS obligors MoME
Institutions in charge of supervision	MoME

Name of the measure	Introduction of the Energy Management System in large industrial consumers
Energy savings	
Monitoring method	Regular annual reports of EMS obligors
Measurement of achieved savings	Energy audit reports prepared by the energy advisor according to the methodology prescribed by the MoME in accordance with the law.
Realized savings in the period 2016 - 2018	18.2 ktoe
Expected savings in the period 2019-2021	54.6 ktoe
Overlaps, multiplied effects, synergy	All savings obtained through EE measures, implemented by EMS obligors, regardless of the funding sources will be shown through this measure.

Name of the measure	Energy efficiency improvement program in industry
Measure designation	I2
Category	2. Information and mandatory information measures. 3. Financial instruments
Time frame	Start date 2010, extended until 2021 There were no early measures.
Objective / brief description	Energy savings are achieved by applying EE measures in accordance with the recommendations of the energy audit: 1) Collection and analysis of energy consumption data, 2) Preparation of energy audits 3) Development of proposals for measures and activities aimed at improving EE 4) Implementation of the proposed EE measures and activities.
Target end consumers	Industrial companies
Target group	Industrial companies that are not EMS obligors
Regional application	National
Implementation information	

Name of the measure	Energy efficiency improvement program in industry
List and description of activities for implementation of measures	<p>LEERUE prescribes the conditions for performing energy audits, and the methodology will be regulated by the Rulebook.</p> <p>The Directorate for financing and encouraging EE will provide incentives for energy audits, which will aim to raise awareness of energy savings opportunities and stimulate the industry to invest in EE improvement measures.</p> <p>The Directorate will be able to provide incentives for the implementation of EE improvement measures proposed by the energy audit.</p> <p>IFIs and/or commercial banks will provide favorable conditions for loans for EE improvement measures and will apply their own procedures for assessing energy savings.</p> <p>Measures in accordance with the conducted audits can be financed from other sources of funding and the application of ESCO principles. Other sources of funding can be used.</p> <p>The Directorate will encourage the application of individual EE measures that do not require energy audits (e.g. replacement of electric motors, etc.).</p> <p>The key technical measures to improve EE are:</p> <ul style="list-style-type: none"> - Measures to improve EE in boilers and furnaces (optimization of combustion processes, utilization of waste heat, improvement of insulation), - Measures to improve EE in the steam distribution system and condensate recovery - Measures to improve EE in power plants, - Measures to improve EE in waste heat recovery, - Measures to improve EE in space heating, - Introduction of an integrated management system for energy consumption <p>Implementation of the above mentioned measures in industrial companies could reduce FEC in the industrial sector by 8% on average.</p> <p>IFIs will provide favorable credit lines for energy efficiency improvement within which they will apply their procedures for assessing energy savings.</p> <p>The savings from the period 2010-2012 were largely realized from the EBRD credit line.</p>
Sources of funding	<ul style="list-style-type: none"> - Directorate; The manner and amount of incentives provided by the Directorate for each year is determined by the Government through a funding program - IFI loans; EBRD Regional credit line that oversees the implementation of the EBRD-REPP project - Loans from commercial banks; - ESCO; - Industrial companies from own funds; - From other sources of funding.
Institutions in charge of implementing activities	<ul style="list-style-type: none"> - Industrial companies that are not EMS obligors <p>MoME</p>
Institutions in charge of supervision	MoME
Energy savings	
Monitoring method Measurement of achieved savings	Energy audit reports.

Name of the measure	Energy efficiency improvement program in industry
Realized savings in the period 2016 - 2018	8.9 ktoe
Expected savings in the period 2019-2021	8.9 ktoe
Overlaps, multiplied effects, synergy	The results of the achieved energy savings from all investments in the Industry sector until the introduction of the EMS are presented under this measure. After the introduction of the EMS, only the results of the achieved energy savings of industrial companies that are not EMS obligors will be presented here. This applies to savings that have been realized since 2017.

Name of the measure	Incentive tariffs for highly efficient CHP in industry
Measure designation	I3
Category	3. Financial instruments
Time frame	Start date 2010, extended until 2021
Objective / brief description	Improving EE in industrial companies by installing highly efficient combined heat and power generation plants (<i>CHP</i>) on natural gas
Target end consumers	Power plants in industrial companies
Target group	Industry sector
Regional application	National, regional and local level
Implementation information	
List and description of activities for implementation of measures	Industrial companies have a need for thermal energy throughout the year (steam or water for technological processes or for heating facilities). Industrial companies that install highly efficient combined heat and power generation plants (<i>CHP</i>) on natural gas up to 10 (MW) have the right to acquire the status of a privileged energy producer and to an incentive purchase price for the delivered electricity. There is great potential for the application of cogeneration – <i>CHP</i> plants in all industrial areas.
Sources of funding	
Institutions in charge of implementing activities	MoME
Institutions in charge of supervision	MoME
Energy savings	
Monitoring method Measurement of achieved savings	BU12
Realized savings in the period 2016 - 2018	Not assessed
Expected savings in the period 2019-2021	Not assessed

Name of the measure	Incentive tariffs for highly efficient CHP in industry
Overlaps, multiplied effects, synergy	

Name of the measure	Minimum energy efficiency requirements for new and renovated plants for the production of electricity and thermal energy, or combined heat and power generation systems
Measure designation	I4
Category	1. Regulations (standards and norms)
Time frame	Start date: 2016 – Continuous activity There were no early measures.
Objective / brief description	Improvement of EE for new and reconstructed plants for the production of electricity and thermal energy or for <i>CHP</i> plants will be achieved by applying minimum requirements in terms of energy efficiency, which will be a condition for obtaining energy and/or construction permits.
Target end consumers	Power plants in industrial companies
Target group	Industry sector
Regional application	National
Implementation information	
List and description of activities for implementation of measures	<p>The Law on EUE has introduced a requirement stating that for the construction of new and reconstruction of existing plants for the production of electricity and thermal energy or for <i>CHP</i> plants, minimum energy efficiency requirements need to be met.</p> <p>The condition for obtaining an energy and/or construction permit will include the obligation to prepare a study on the energy efficiency of the plant, in order to prove compliance with the minimum energy efficiency requirements.</p> <p>The Decree on the minimum requirements for energy efficiency that must be met by new and revitalized plants ("Official Gazette of RS", No. 112/17) prescribed the minimum requirements that must be met by plants for the production of electricity, as well as plants for the combined heat and power generation, systems for transmission and distribution of electricity, thermal energy production plants and thermal energy distribution systems. The Rulebook on the content of the study on energy efficiency of plants for the production of electricity, plants for combined heat and power generation, systems for transmission and distribution of electricity, plants for the production and distribution of thermal energy ("Official Gazette of RS", number 30/18) prescribed the content of the study on energy efficiency of plants for the production of electricity, plants for the combined heat and power generation, systems for transmission and distribution of electricity, plants for the production and distribution of thermal energy.</p>
Sources of funding	Industrial companies from own funds

Name of the measure	Minimum energy efficiency requirements for new and renovated plants for the production of electricity and thermal energy, or combined heat and power generation systems
	Other investors interested in building a plant for the production of electricity and thermal energy or a CHP plant.
Institutions in charge of implementing activities	Industrial companies MoME
Institutions in charge of supervision	MoME
Energy savings	
Monitoring method Measurement of achieved savings	BU-12
Realized savings in the period 2016 - 2018	Not assessed
Expected savings in the period 2019-2021	Not assessed
Overlaps, multiplied effects, synergy	

TRANSPORT SECTOR

Name of the measure	Implementation of EC 443/2009 on the reduction of CO2 emissions of new passenger cars
Measure designation	T1
Category	1. Regulations
Time frame	Start date 2011, extended until 2021
Objective / brief description	The implementation of stricter CO ₂ emission limit values for new passenger cars improves their fuel consumption compared to previous emission limit values. The EURO 5 level became a condition for new passenger cars and light delivery vehicles from 1 April 2011.
Target end consumers	Fuel consumption of passenger vehicles
Target group	Buyers of new passenger cars
Regional application	National
Implementation information	
List and description of activities for implementation of the measure	Rulebook on the division of motor and auxiliary vehicles and technical conditions for vehicles in road traffic ("Official Gazette of RS", No. 40/12, 102/12, 19/13, 41/13, 102/14, 41/15, 78/15, 111/15, 14/16, 108/16, 7/17-corrected, 63/17, 45/18, 70/18, 95/18, 104/18, 93/19, 2/20-corrected and 64/21) Harmonization of motor vehicle emission standards with EU standards
Sources of funding	Not necessary
Institutions in charge of implementing activities	Road Traffic Safety Agency, MTTT (Market Inspection Sector), Ministry of Finance - Customs Administration
Institutions in charge of supervision	MoME, Road Traffic Safety Agency
Energy savings	
Monitoring method / Measurement of achieved savings	Regular (annual) vehicle registration
Realized savings in the period 2016 - 2018	88.5 ktoe
Expected savings in the period 2019-2021	11 ktoe
Overlaps, multiplied effects, synergy	No overlaps. For the period from 2016 to 2018, the T6 measure is included in the savings, which is no longer taken into account after 2018. For the period from 2019 to 2021, the T4 measure is also included in the savings.

Name of the measure	Eco-driving
Measure designation	T2
Category	2.5 Training and education
Time frame	Start date 2016, date extended until 2021
Objective / brief description	Providing training in the field of eco-driving to periodic employees in government services who drive a lot and drivers of public transport buses

Name of the measure	Eco-driving
	and the integration of eco-driving in the requirements for passing the driving test.
Target end consumers	Fuel consumption of buses, passenger cars
Target group	Professional bus drivers of public regular and non-regular passenger transport and drivers of state-owned passenger cars Vehicle fleet managers
Regional application	National
Implementation information	
List and description of activities for implementation of the measure	Mandatory training for professional bus drivers and drivers employed or engaged in state institutions, which includes both civil servants and public passenger transport. Professional drivers should attend annual periodic trainings in which eco-driving could be integrated. However, not every driver needs training every year, but at intervals of 3-5 years, with regular monitoring and analysis of extreme values. Eco-driving could become part of the curriculum and training program conducted in driving schools and become part of the mandatory training program for taking the driving test.
Sources of funding	Budget of public transport companies There is no need for subsidies
Institutions in charge of implementing activities	Road Traffic Safety Agency Vocational schools and institutions for the education of professional drivers Driving schools
Institutions in charge of supervision	MoME
Energy savings	
Monitoring method / Measurement of achieved savings	Ministry of Finance/fuel consumption in annual reports of public institutions. Property Directorate/data from annual vehicle registrations
Realized savings in the period 2016 - 2018	Not assessed
Expected savings in the period 2019-2021	Not assessed
Overlaps, multiplied effects, synergy	No overlaps

Name of the measure	Mobility management
Measure designation	T3
Category	6. Transport measures : 6.1 Modal redistribution, 6.2 Fees
Time frame	Start date 2016, extended until 2021
Objective / brief description	Mobility management is a concept of promoting sustainable transport and managing the demand for the use of passenger cars by changing the attitudes and

Name of the measure	Mobility management
	behavior of passengers. At the heart of mobility management are "soft measures" such as information and communication, organizing services and coordinating the activities of different partners. "Soft measures" usually facilitate the effectiveness of "hard" (investment) measures in urban transport (e.g. new tram lines, new roads/streets and new bicycle paths). The activities proposed for the Republic of Serbia are described by the "List and description of activities".
Target end consumers	Fuel consumption of passenger vehicles
Target group	Vehicle owners, city administrations, employers, students
Regional application	National
Implementation information	
List and description of activities for implementation of the measure	<p>Parking</p> <p>Parking management is a way to reduce the use of passenger cars. Better opportunities for the "park and ride" concept, by providing parking space near important public transport hubs. In addition, cities can:</p> <ul style="list-style-type: none"> - introduce zones with limited parking time - reduce parking permits for tenants to a maximum of 3-4 surrounding streets, instead of the entire zone - increase street parking prices - reduce the prices of off-street parking (in parking lots and garages) in order to attract more users and increase the utilization of these facilities, and - introduce a more efficient information system on available parking spaces in order to reduce driving time in order to search for parking. <p>Employers (workplaces) can be encouraged to reduce the number of free parking spaces. However, this should not be done without simultaneous promotional measures for the use of public or non-motorized modes of transport.</p> <p>Increasing the share of non-motorized modes of transport in the total volume of transport</p> <p>Implementation of behavior change projects: information campaigns, thematic weeks, etc.</p> <p>Implementation of mobility plans in large organizations.</p> <p>Implementation of transport plans in all major municipalities.</p> <p>Infrastructure improvements: mandatory availability of bicycle parking spaces (preferably covered) in all public institutions (schools, universities, facilities for sports and recreation) and commercial facilities (shopping centers, etc.), as well as at bus and train stations and other public transport hubs. The measure can best be applied in lowland areas, as opposed to hilly areas or narrow city streets. Construction of bicycle paths. Maintenance of</p>

Name of the measure	Mobility management
	<p>pedestrian and bicycle infrastructure. Improvement of traffic safety in terms of vulnerable groups, especially near schools.</p> <p>Promoting the use of public passenger transport Ensure greater availability of timetable information. Improving intermodality, which means the unique use of several different modes of transport in one travel chain, for example with the "park and ride" variant or the transition from one mode of transport to another. Campaigns for car-free days with a possible discount for the use of the public passenger transport system.</p> <p>Driving together and pairing for the ride Government and public institutions to improve the situation with joint commutes and "pairing" of their employees for the rides with the help of appropriate information and tools based on the Internet.</p>
Sources of funding	<p>Public costs: Improvements in infrastructure in public passenger transport, bicycle paths and bicycle parking lots, construction of "park and ride" concept facilities, cost management within mobility management, information. Mobility management measures (compared to "hard measures") do not necessarily require large financial investments and can be very cost-effective.</p> <p>Costs for private individuals: the measure increases the costs for vehicle owners in urban areas. Car sharing, using the same car, can reduce employee transportation costs.</p> <p>Benefits: Reduces the use of motorized modes of transport, especially passenger cars, and thus reduces fuel consumption, pollution and traffic congestion. Properly used, it increases road traffic safety. Increased use of non-motorized modes of transport reduces the burden on public passenger transport and brings health benefits.</p>
Institutions in charge of implementing activities	City transport companies and parking services, Land management agencies
Institutions in charge of supervision	MoCTI
Energy savings	
Monitoring method / Measurement of achieved savings	
Realized savings in the period 2016 - 2018	Not assessed
Expected savings in the period 2019-2021	Not assessed
Overlaps, multiplied effects, synergy	No overlaps

Name of the measure	Improving energy efficiency in the public passenger transport system
Measure designation	T4
Category	4.3 Public procurements based on energy efficiency 6.1 Modal redistribution
Time frame	Start date 2016, extended until 2021
Objective / brief description	Energy savings from improving energy efficiency in public passenger transport by reusing kinetic energy.
Target end consumers	Fuel consumption of passenger vehicles Fuel consumption of public transport vehicles
Target group	Vehicle owners Vehicle fleet managers
Regional application	National
Implementation information	
List and description of activities for implementation of the measure	Energy savings from improving energy efficiency in public passenger transport vehicles by reusing kinetic energy. Introduction of kinetic energy recovery system (KERS) in all new buses in public urban passenger transport. Introduction of energy recovery systems in electric vehicles. Discount on electrified modes of public transport compared to buses that use fossil fuels. Reduced demand for energy consumption while vehicles are stationary (idling) by electrifying public passenger transport terminals and providing electric heating, cooling, air conditioning and start-up support.
Budget and sources of funding	
Institutions in charge of implementing activities	City authorities and bodies of public urban transport of passengers (Secretariat for Transport / Directorate for Public Transport in Belgrade)
Institutions in charge of supervision	MoCTI, MoME
Energy savings	
Monitoring method / Measurement of achieved savings	Reports on the realization of public transport of passengers
Realized savings in the period 2016 - 2018	8.54 ktoe
Expected savings in the period 2019-2021	Monitored for this period within T1
Overlaps, multiplied effects, synergy	No overlaps.

Name of the measure	Improving the energy efficiency of goods transport systems
Measure designation	T5
Category	6. Transport measures 6.1 Modal redistribution

Name of the measure	Improving the energy efficiency of goods transport systems
Time frame	Implementation could start in the period 2016-2020, but the savings will be realized only later due to long-term planning and the period of infrastructure implementation.
Objective / brief description	Improving logistics in the transport of goods to improve energy efficiency through better infrastructure and planning.
Target end consumers	Fuel consumption in the transport of heavy products
Target group	Exporters and importers of commercial goods Carriers Urban authorities
Regional application	National
Implementation information	
List and description of activities for implementation of the measure	Construction of unloading/reloading stations in cities to enable delivery of goods in off-peak periods. Delivery stations are transport hubs outside the most congested zones, where goods are delivered at peak hours or in larger quantities. The goods are reloaded into smaller vehicles and delivered in off-peak periods. Improving logistics to avoid empty runs, i.e., by designing intelligent transport systems (e-logistics). Corrections in urban/transport plans to allow for a modal redistribution between the following modes of transport: inland waterways, road, rail and air.
Sources of funding	Development loans / concessions NSV was not calculated
Institutions in charge of implementing activities	City of Belgrade, MoCTI
Institutions in charge of supervision	MoE, MTTT
Energy savings	
Monitoring method / Measurement of achieved savings	Transport statistics Import and export statistics
Realized savings in the period 2016 - 2018	Not assessed
Expected savings in the period 2019-2021	Not assessed
Overlaps, multiplied effects, synergy	No overlaps

Name of the measure	Regulation of EURO-standards regarding emission levels for imported passenger cars
Measure designation	T6
Category	Regulations
Time frame	Start date 2010, end date: 2018

Name of the measure	Regulation of EURO-standards regarding emission levels for imported passenger cars
Objective / brief description	Import of used passenger cars in the Republic of Serbia is a common occurrence. Most of the vehicles registered for the first time were used, not new passenger cars. Therefore, the minimum requirements for imported passenger cars greatly affect energy efficiency. It has been proposed to increase the minimum requirements regarding emission standards. The measure will then become active again
Target end consumers	Fuel consumption of imported vehicles
Target group	Vehicle importers (individuals and legal entities)
Regional application	In the entire country
Implementation information	
List and description of activities for implementation of the measure	Decree on import of motor vehicles ("Official Gazette of RS", number 23/10 and 5/18)
Budget and sources of funding	No impact on the budget
Institutions in charge of implementing activities	MoCTI, Road Traffic Safety Agency, MTTT (Market Inspection Sector)
Institutions in charge of supervision	Ministry in charge of trade affairs (Market Inspection Sector), Road Traffic Safety Agency,
Energy savings	
Monitoring method / Measurement of achieved savings	BU13 method based on the number of imported passenger cars.
Realized savings in the period 2016 - 2018	Not assessed because the results of the measure are covered by measure T1
Expected savings in the period 2019-2021	Not active
Overlaps, multiplied effects, synergy	No overlaps

Name of the measure	Efficient tires for road vehicles
Measure designation	T7
Category	2.2 Energy labeling programs 3.2 Tax return
Time frame	Start date 2019, extended until 2021
Objective / brief description	Introduction of a system of energy efficiency labeling of tires in order to promote low-profile fuel-efficient tires. Introduction of a temporary tax credit to encourage rapid market change.
Target end consumers	Fuel consumption of passenger cars
Target group	Vehicle owners, vulcanization shops, vehicle fleet managers
Regional application	National

Name of the measure	Efficient tires for road vehicles
Implementation information	
List and description of activities for implementation of the measure	Introduction of eco-labels for energy-saving tires. Introduction of a tax credit for the installation and use of fuel-efficient tires.
Sources of funding	No separate budget is required
Institutions in charge of implementing activities	MoME and MTTT (Market Inspection Sector)
Institutions in charge of supervision	MoME and MTTT (Market Inspection Sector)
Energy savings	
Monitoring method / Measurement of achieved savings	Annual registration, Technical inspections of vehicles
Realized savings in the period 2016 - 2018	Not assessed
Expected savings in the period 2019-2021	Not assessed
Overlaps, multiplied effects, synergy	No overlaps.

Name of the measure	Improving the quality of regular (annual) technical inspections of vehicles
Measure designation	T8
Category	6. Measures in the transport sector
Time frame	Start date 2019, extended until 2021
Objective / brief description	Better conduct of regular technical inspections, especially in terms of emission testing and adjustment of inspections to actual values of emission standards.
Target end consumers	Vehicle fuel consumption
Target group	Vehicle technical inspection lines
Regional application	National
Implementation information	
List and description of activities for implementation of the measure	Better conduct of regular technical inspections, especially in terms of emission testing and adjustment of inspections to actual values of emission standards.
Sources of funding	
Institutions in charge of implementing activities	MoCTI, MoI and the Road Traffic Safety Agency
Institutions in charge of supervision	MoI and the Road Traffic Safety Agency
Energy savings	

Name of the measure	Improving the quality of regular (annual) technical inspections of vehicles
Monitoring method / Measurement of achieved savings	Statistics of annual technical inspections of vehicles
Realized savings in the period 2016 - 2018	Not assessed
Expected savings in the period 2019-2021	Not assessed
Overlaps, multiplied effects, synergy	No overlaps

Name of the measure	Modernization of the vehicle fleet in order to meet the technical conditions for performing domestic and international transport
Measure designation	T9
Category	1.2 Minimum standards for energy performance of equipment
Time frame	Start date: 2011 – Continuous activity
Objective / brief description	Purchase of new vehicles that meet the latest EURO standards in terms of exhaust emissions or that have low consumption and low CO ₂ emissions, which includes: - New buses, and - New commercial vehicles.
Target end consumers	Fuel consumption in road transport
Target group	Companies engaged in the international road transport of passengers and goods.
Regional application	National
Implementation information	
List and description of activities for implementation of the measure	T4 in the 2nd EEAP One of the criteria for dealing with international road transport that Serbian carriers must meet is the quality of the vehicle fleet. Requirements are applied which commercial vehicles in international transport must meet (in accordance with EU Regulations), which, in addition to road traffic safety, also apply to the the emissions of gases and suspended vehicle particles (such vehicles have lower consumption and lower CO ₂ emissions). International transport, i.e., access to the international transport market in the EU is performed mainly by the permit regime (bilateral or multilateral) and is increasingly conditioned by the use of vehicles that meet the regulations on emissions and safety of vehicles (EURO 3, EURO 4, EURO 5 vehicles, etc.)
Sources of funding	Individual funds from transport companies.
Institutions in charge of implementing activities	MoCTI
Institutions in charge of supervision	MoCTI
Energy savings	

Name of the measure	Modernization of the vehicle fleet in order to meet the technical conditions for performing domestic and international transport
Monitoring method / Measurement of achieved savings	
Realized savings in the period 2016 - 2018	30 ktoe
Expected savings in the period 2019-2021	30 ktoe
Overlaps, multiplied effects and synergy	/

Name of the measure	Fuel marking and fuel quality monitoring
Measure designation	T10
Category	Regulations
Time frame	Continuous activity
Objective / brief description	In accordance with the Law on Energy ("Official Gazette of RS", number 145/14, 95/18-other law and 40/21 – hereinafter: the Law) petroleum products that are placed on the market must be marked. Also, in accordance with the Law, the ministry in charge of energy affairs monitors the quality of petroleum products. The control of the concentration of markers in petroleum products determines the legality of the flow of goods, i.e., mixing with non-excise products is prevented, and monitoring the quality of petroleum products controls whether the quality of the product complies with the technical requirements for that product. Both types of control contribute to the improvement of the quality of petroleum products placed on the market of the Republic of Serbia.
Target end consumers	companies, entrepreneurs, cooperatives and individuals.
Target group	
Regional application	National
Implementation information	
List and description of activities for implementation of measures	Activities are carried out in accordance with the Regulation on labeling (marking) of petroleum products and the Regulation on monitoring of petroleum products. - MoME selects persons on a public call who perform the marking or monitoring service - At the request of the energy entity, the marking service is performed and the necessary reports are issued - Inspection supervision is performed by the ministry in charge of trade affairs through market inspectors
Budget and sources of funding	Energy entities shall bear the costs of marking, i.e., monitoring at the price published by the person providing the service of marking or monitoring in the "Official Gazette of the Republic of Serbia".
Institutions in charge of implementing activities	MoME, MTTT

Name of the measure	Fuel marking and fuel quality monitoring
Institutions in charge of supervision	Supervision over the implementation of marking, i.e., monitoring is performed by the ministry in charge of energy affairs, the ministry in charge of trade affairs and the ministry in charge of finance affairs
Energy savings	
Monitoring method Measurement of achieved savings	
Realized savings in the period 2016 - 2018	Not assessed
Expected savings in the period 2019-2021	Not assessed
Overlaps, multiplied effects, synergy	-