Significance of energy efficiency for energy security

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Energy security of the European Union is one of the most important parameters that determine the present and the future on the world's geopolitical scene. EU countries are characterized by: insufficient fossil fuels from their own sources, continuous increase in consumption and strict environmental regulations (which limit the use of coal and oil). From all of the above, it follows that the long-term energy security of the European Union can be ensured by increase of gas supply capacity and diversification of sources of supply. The main objective of the paper is to analyze the situation and perspective of optimizing energy efficiency in the countries of the European Union through the application of resource of energy saving and new and innovative technologies of renewable resources.

Key words: energy security; energy efficiency; diversification of energy sources; optimization of energy efficiency.

Introduction

Energy is fundamental to the economy, but also to life. As much as 95% of energy resources depend on energy input [34]. During the 20th century, the global population increased 3.7 times, while demand for final energy increased more than 30 times. This means that, with the intense exponential growth of the world's population, especially expressed in the second half of the 20th century, the consumption of energy per capita was much more pronounced. Although the exponential trend of population growth has been diminished at the end of the century, energy consumption per capita continues to grow. For three decades at the end of the 20th century, the global population increased at a rate of 1.6%, the world's gross domestic product (GDP) grew at a rate of 3%, while primary energy consumption grew at an average annual rate of 2.1%. This speaks of the fact that, regardless of the decrease in energy intensity, primary energy consumption continues to grow faster than the population.

The development of industrialization at the global level, the world today faces two dominant and closely related

problems, on the one hand, a lack and uncertainty in energy supply and, on the other hand, environmental pollution and climate change as a result of excessive energy consumption. One way to reduce the negative impacts of these phenomena, and to positively influence sustainable development, is the efficient use of energy.

Energy efficiency is the sum of measures and actions in all areas of life with the ultimate goal of minimizing energy consumption, provided that the level of work and life remains the same or improves. It is not energy saving that implies renunciation, but its efficient use that contributes to improving the quality of life and work, as well as greater competitiveness of production. Almost all the governments of the world face climate change and energy security dilemmas (in correlation with public support), especially in times of economic hardship [5].

And in those countries that rapidly advance technologically and generate the highest income per unit of energy consumed, thus becoming more and more energy efficient, production and consumption per capita increase. According to the International Energy Agency (IEA), in the period from 2005 to 2025, primary energy consumption is

expected to increase by 40%. Therefore, it is necessary that the development of energy is strategically planned and thoroughly analyzed from all aspects, such as those of general-development, technical-technological, economic, as well as social, ecological and other.

Diversification of energy sources and optimization of energy efficiency

Oil, gas and coal are still the three major energy sources in the world. If we want to mitigate the effects of climate change, we need to reduce the dependence on fossil fuels. The technologies that can do this are the wind, wave and sun energy, hydropower and heat energy [5].

Since the 70s, the European Union has approved over 200 regulations in the field of environmental protection. The European Council confirmed in December 2009 that "according to the Treaty of Lisbon, sustainable development remains a fundamental objective of the European Union."

The countries of the European Union (as well as Europe as a whole) depend to a great extent on the import of energy of all kinds, where natural gas is of paramount importance because it is a "clean" fuel, and as such is more environmentally friendly in comparison with other kind of fuels. Natural gas generates less carbon dioxide by combustion (compared to coal) and has a lower price (compared to oil). The recent data stated that the European Union imports more than half of energy products for the needs of industry, transport, and energy supply of residential buildings. Import dependence is particularly high when it comes to crude oil (more than 90%) and natural gas (about 66%).

An enormous problem, from the aspect of security of supply, is the fact that many countries of the European Union depend on the import of natural gas from only one supplier - the Russian Federation. The dependence on imports of natural gas from the Russian Federation varies in scope among EU countries. Finland and the Baltics states are 100% dependent on Russian gas imports. Only five countries are energy independent from Russian Federation: Spain, Portugal, Denmark, Sweden and Ireland. In other EU countries, the dependence on natural gas imports varies from 5% (the Netherlands) to 90% (Bulgaria).

The European Commission has proposed ways of addressing integrated industrial development issues, energy procurement and adaptation to climate change. The European countries' summit approved the plan and adopted the Energy Policy for Europe by 2020: 20% of energy savings; 20% reduction of greenhouse gas emissions; 20% share of renewable sources in European energy consumption. It is planned to reach 10% of the renewable energy component in the transport fuel. European goal is an effort of all member states to achieve 20% energy savings.

The energy security of European countries depends not only on optimizing energy efficiency through the application of austerity measures and the introduction of renewable energy sources. Optimization of energy efficiency is achieved through different methods and technologies, depending on whether it is applied to transport, industry or construction.

Theoretically, the diversification of sources of supply is certainly the best way to increase energy security, but the realization of this idea in its practice is extremely complex. Hence, the role of science and innovation is one of the additional parts of the solution.

The development of technologies for the use of renewable energy sources is the main objective of the European Commission's energy strategy. Through its Energy Efficiency Commission, the European Union monitors and takes into account the overall global consumption of electricity and the share of renewable energy sources in the total consumption balance. The data shows that renewable energy sources currently account for 17.9% of the total global electricity production with a tendency for growth are stated in official reports:

- sustainable Development
- reduction of carbon dioxide emissions
- energy independence and security,
- a more favorable mix of energy products,
- competition with conventional energy sources -
- economy, new jobs.

The EU's intention is to remain a leader in the development and use of renewable energy sources and wants to achieve the planned share in this area. State governments, through their example and support, play a key role in achieving this goal, but each person can also make a contribution. In the countries of the European Union, as other countries, the processes of strategic positioning and the creation of the multinational companies' alignments, as well as other countries, lead to access to remaining natural resources, especially mineral and fossil fuels, such as oil, natural gas, coal, oil shale. In addition to this, there is a technological game for optimizing energy efficiency and more efficient systems of conversion and transfer of energy, especially with the help of innovative technological processes of application of renewable energy sources. And in this regard, multinational companies are also created.

The idea of the EU is to use 100% of its renewable energy sources based on installed capacities and to take part in the production of electricity. With the 2020 forecast, we see that the same starting points are based on real data from 2005 and that the expected results match the potentials of both the capacity and the share of electricity generation. For EU renewable energy sources are economically viable and competitive sources, as follows:

- wind Energy,
- small hydropower plants,
- biomass energy,
- geothermal sources,
- the use of solar energy in photovoltaic and thermal systems,
- municipal waste,
- fuel cells.

Increasing energy efficiency - EE is defined as a reduction in energy use per unit of production, without affecting the level of quality of products and services.

The benefits of this increase for the community are the rational use of natural resources, the reduction of energy dependence, the reduction of the need for the construction of new power plants, the reduction of energy costs, and the optimal use of energy devices.

By introducing numerous innovations, Germany is leading the way in the use of renewable energy sources and aims to have up to 80 percent renewable resources in the total energy consumption structure by 2050. Already now Germany has a capacity of about 200,000 megawatts of installed power, of which as much as 51,000 megawatts, or about 25 percent, is in wind farms. From 2013 to 2017,

9,300 megawatts of flexible power plants have been added to the network, and 6,600 megawatts of conventional power plants have been put into operation in the same period. Due to the expected cessation of the operation of 11,000 MW nuclear power plants and the announced extinguishing of conventional thermal power plants, a total of 24,000

megawatts or almost a quarter of the current installed capacity could disappear from the German network by 2022.

The construction of 1,800 megawatts of conventional capacities in this period will obviously not play a significant role, so wind farms are much more expected. German steam power plants operate with 20 percent of the used capacity, and those on the sea with slightly more than 40 percent.

Table 1 - Capacity of renewable energy resources in the world (GW)

	2008	2011	2014	2017
Hydro	961	1060	1175	1270
Wind	115	220	349	514
Solar	15	70	174	391
Bioenergy	54	73	90	109
Geothermal	9	10	11	13
Total RE	1057	1329	1692	2179
Total off-grid capacity	1910	3680	4764	6575

Compiled by the authors according to the data: Renewable Capacity Statistics 2018, International Renewable Energy Agency (IRENA), [28].

Romania remains one of the most attractive markets for renewable energy sources and has a good chance of becoming an important energy player in the region. The main objective of AFM is to develop and finance several categories of programs for the sustainable development of Romania, which can contribute to the improvement of environmental infrastructure. In recent years, AFM has funded projects from the Environmental Protection Fund program that have encouraged the implementation and use of renewable energy sources for the installation of solar panels, wind farms, solar, biogas or biomass power plants, hydro and geothermal power plants.

Six projects worth 30 million lei, or about 7.1 million euros, received funding for the renewable energy program RO06 -Rondin.

Considering that "the fight against climate change will be gained or lost in urban areas", as well as the fact that the vast majority of the European population lives and works in cities and consumes 80% of energy to the European Union, the European Commission launched in 2008 the Mayor Agreement. The initial goal of involving and supporting the mayors dedicated to meeting the climate and energy goals of the European Union soon exceeded expectations and continued to attract new local and regional authorities in Europe and beyond [8].

In 2014, the European Commission launched the Mayors Adapt initiative, calling on local authorities to take control of adaptation to climate change and support them in the development and implementation of local strategies. With the support of the European Committee of the Regions, the European Commission and the Mayor's Agreement have gathered views on the future of the Mayor's Agreement. Even 97% of the participants looked for new targets after 2020, and 80% sought longer-term goals. [8].

The agreement of the Mayor for climate and energy includes 7,181 signatories from the areas inhabited by 224,549,756 inhabitants. The Mayor's agreement is managed by the Association of Local and Regional Authorities led by Energy Cities, which consists of the Climate Alliance, the Council of European Municipalities and Regions (CEMR), the Eurocities Association and the European Federation of Regional Energy and Environmental Protection Agencies of Agencies and Regions for Energy and the Environment - Fedarene).

By abrogating the Mayor's agreement, municipalities, cities and regions are committed to reducing greenhouse gas emissions and reducing climate change through increasing energy efficiency, developing renewable energy sources and other actions related to energy efficiency at different levels of governance under the authority of local authorities. The signatories of the agreement undertake to develop a Sustainable Energy Action Plan (SEAP) for their area within one year after signing, as well as submit periodic implementation reports, reflecting the course of implementation of their action plan [23].

Wind Energy

The wind is an inexhaustible ecological source of energy whose global potential manifests itself beyond the global needs for electricity. Wind energy records the most dynamic annual increase in installed power, from all energy sources. Investing in wind energy brings great benefits to two fronts: economic and environmental - customers are provided with cleaner, renewable sources while continuing to deliver the reliable and cheap energy they need. With wind energy at historically low prices, you can provide savings that benefit customers now, as well as in decades to come. Wind farms are in operation in more than 90 countries of the world. In 2017, the strength of the newly installed wind farms in the world reached 60,000 megawatts. 169 208 MW were installed in the EU.

Various technological innovations are rapidly penetrating the sector of wind energy use. The Green Energy Package of the European Union, which comes into force in 2019, suggests the introduction of significant changes, which will mostly be related to the treatment of wind farms. The Council of European Energy Regulators (CEER) is already demanding the abolition of a priority access to the electricity network not only to new power plants using renewable energy sources but also to existing ones.

Now, the view is that all technologies should be fairly represented on the market and that the costs of using the transmission network must be properly distributed among all users. In late April this year, the first auction for the construction of wind farms in the North Sea was held in Germany. two companies, EnBW and DONG Energy, got the

job to build 1,400 megawatts of offshore offshore without any subsidies. The costs of transmission of this electricity will be paid by consumers, but the owners of wind farms can count only on the market price of the electricity so produced. These wind farms should start operating between 2023 and 2025 [30].

Electricity companies are counting on it will manage to reduce production costs to such an extent that they pay off such a large investment without the incentive measures now being applied. A new such auction for the 1.610 megawatt capacity will be held next year, which proves that Germany counts on the wind as a reliable and cost-effective replacement for nuclear power plants and thermal power

plants that are largely closed in this country. www.renewableenergyworld.com

From all over the world there are good news about the application of wind energy and international cooperation in that area. Thus, the Tenet companies from the Netherlands and Germany and Energinet from Denmark signed a trilateral agreement that would speed up the development of the European electricity renewable energy system in the North Sea. "Tenet" presented its vision of the energy winds in the North Sea as early as June last year, and close cooperation with "Energinet" from Denmark is an important step towards achieving this vision and ambitious goals by 2050, defined at a conference in Paris.

Table 2 - Wind energy (MW)

CAP (MW)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Europe	63 865	75 786	84 872	94 662	107 141	118 216	130 047	142 973	155 958	171 244
Austria	988	994	981	1 080	1 316	1 645	2 110	2 489	2 730	2 926
Belgium	324	608	912	1 069	1 370	1 792	1 930	2 176	2 370	2 837
Bulgaria	114	333	488	541	677	683	699	699	699	699
Croatia	17	70	79	131	180	254	339	418	483	519
Cyprus			82	134	147	147	147	158	158	158
Czechia	150	193	213	213	258	262	278	281	282	308
Denmark	3 163	3 482	3 802	3 952	4 163	4 810	4 887	5 076	5 246	5 521
Estonia	77	104	108	180	266	248	275	300	310	310
Finland	143	147	197	199	257	447	627	1 005	1 565	1 995
France	3 403	4 582	5 912	6 679	7 517	8 202	9 068	10 217	11 467	13 113
Germany	22 794	25 732	26 903	28 712	30 979	33 477	38 614	44 580	49 592	55 876
Greece	1 022	1 171	1 298	1 640	1 753	1 809	1 978	2 091	2 370	2 652
Hungary	134	203	293	331	325	329	329	329	329	329
Iceland						2	3	3	3	3
Ireland	1 030	1 266	1 374	1 631	1 764	1 941	2 211	2 440	2 827	3 253
Italy	3 525	4 879	5 794	6 918	8 102	8 542	8 683	9 137	9 384	9 636
Latvia	28	29	30	36	59	67	69	69	70	66
Lithuania	54	98	133	202	275	279	288	436	509	509
Luxembourg	43	43	44	45	58	58	58	64	120	120
Netherlands	2 149	2 222	2 237	2 316	2 433	2 713	2 865	3 391	4 257	4 270
Norway	395	423	425	512	705	818	863	867	883	1 207
Poland	526	709	1 108	1 800	2 564	3 429	3 836	4 886	5 747	5 798
Portugal	2 857	3 326	3 796	4 256	4 412	4 610	4 856	4 937	5 123	5 123
Romania	5	15	389	988	1 822	2 773	3 244	3 130	3 025	3 030
Slovakia	5	3	3	3	3	5	3	4	4	4
Slovenia						4	4	5	5	5
Spain	16 555	19 176	20 693	21 529	22 789	22 958	22 975	22 943	23 003	22 988
Sweden	814	1 448	2 019	2 769	3 607	4 194	5 097	5 840	6 434	6 631
Switzerland	14	18	42	46	49	60	60	60	75	75
UK	3 447	4 420	5 421	6 596	9 030	11 282	13 074	14 315	16 217	20 488
EU	63 404	75 290	84 349	93 990	106 166	116 999	128 583	141 459	154 370	169 208

Talks with potential partners are ongoing and not only include other North Sea distribution system operators but other infrastructure companies. With the development of this network, "Tenet" and "Energinet" want to make the transmission of energy efficient. The plan foresees the construction of one or more islands in the North Sea with interconnections with neighboring countries from where energy will be distributed directly to countries that enter the North Sea: the Netherlands, Denmark, Germany, Great Britain and Norway.

The first floating wind farm "Hywind Scotland" began to supply electricity to the Scottish energy network. Wind farm with a power of 30 megawatts, by which operated by Norwegian company Statoil in cooperation with Masdar, a renewable energy company from Abu Dhabi, is located 25

kilometers from the coast of Peterhead in Scotland. This wind farm will supply around 20,000 households with electricity.

The base to be maintained and managed by the wind farm is located in Peterhead, and the operational center is located in Veliki Jarmut. "Statoil" and "Masdar" will install a 1 MWh lithium battery for energy storage. This wind farm opens its way to new opportunities in the world market for floating wind farms located in the coastal belt. "Statoil" has the ambition to reduce energy costs from the floating wind farm "Hywind Scotland" by 60 euros per MWh by 2030. "Hywind Scotland" is confirmed by the strong presence of "Statoil" in the UK, which already manages the British wind farms "Sheringham Shoal" and "Dudgeon" offshore windfarm [31].

"Vatenfal" and BMW Group signed a contract for the delivery of 1,000 lithium-ion batteries. The first energy store with a BMW battery is being built at the Land Cruiser "Princess Alexia" near Amsterdam. With a 3.2 megawatt battery capacity, it is the first Vatenfal's large energy storage project in the Netherlands. Batteries are produced at BMW's Dingolfing plant in Bavaria. 33 kWh batteries are used in BMW's electric vehicle model I3. Energy storage and network stability are the main issues in new sustainable energy [32].

The US portal "Renewable Energy World" announced that the year 2017 is the global power of the world wind farm is increased and amounts to about 487,000 megawatts. Denmark has the largest share in electricity production (40 percent), followed by Portugal, Ireland and Uruguay (more than 20 percent), Spain and Cyprus (about 20 percent), Germany (16 percent), while in the big countries of the world this share is four percent in China, 5.5 percent in the US and six percent in Canada. These days, the American portal "Power Engineering International" has published news that the well-known German energy company E.ON is investing in the development of "flying wind farms", which he considers to be a turning point in the production of wind power. These are facilities that allow the conversion of kinetic energy of the wind into electricity and, in the meantime, fly by means of fixed wings at a height of up to 450 meters, and the ground is connected by cable.

EON believes that it is a solution that has the potential to change the entire wind power market, as "flying wind turbines" are cheaper to produce and maintain than the conventional ones. There are other studies related to "flying wind turbines" - using special balloons filled with helium, inside which the turbine is located, all with cable and cable connections connected to the ground. Already now it has been shown that "flying wind turbines" are much easier to install than wind turbines in deep seas in countries such as Portugal, Japan or the United States.

Researching new technologies that will reduce the production of electricity from the wind farm can yield the fruit of the next few years.

Application of wind energy in Serbia

In Serbia, there are suitable locations for the construction of wind generators, where about 1,300 MW of wind generating capacity could be installed in the future, and produce about 2,300 GWh of electricity annually. The analysis showed that there are a significant number of locations where the wind blows over 50% of the annual annually, with an average speed of more than 6 m/s.

The most favorable locations in Serbia, suitable for installing VTG, with a mean annual wind speed, determined on the basis of medium ten-minute speeds at a height of 50 m, are given in Table 3.

Table 3 - Overview of locations with the highest mean wind speed in Serbia (Ivanov et al., 2009).

Stanica	λ	ϕ	X	m/c
Midžor	22.62	43.41	2169	7.66
Suva Planina	22.15	43.19	1155	6.46
Vršački Breg	21.37	45.14	430	6.27
Tupižnica	22.16	43.71	1098	6.25
Krepoljin	21.53	44.27	679	6.18
Istočno od Tupižnice	22.41	43.71	1066	6.14
Deli Jovan	22.25	43.19	1005	6.13

According to the current world criteria, the wind is Serbia's energy resource. The application of wind energy through the construction of wind farms and wind farms could significantly reduce dependence on energy imports and increase the energy security of the country (Ivanov et al., 2009). The deficit in financial investments in the purchase of expensive wind turbines significantly slows down the development of wind power in Serbia.

Geothermal energy

The wider use of this energy source is related to the outbreak of the first energy crisis of the 1970s. The potential of geothermal energy is huge and according to scientists' estimates, it is several thousand times more than the total energy that can be obtained from all known world oil and gas reserves.

Technological development has enabled, in addition to using geothermal energy to generate electricity, and its use for heating households and the operation of industrial plants. It can also be used for the production of paper, in the process of pasteurization of milk, for the heating of greenhouses, pool and for many other purposes. However, the heating of buildings and the exploitation of geothermal energy for the production of electricity are the main ways of

its use. There is no burning of fossil fuels, so there are no harmful emissions of gases into the atmosphere; only water vapor is released. An additional advantage is that such power plants can be implemented in a wide variety of environments, from farms, desert areas to forest reprocessing areas. There are three basic types of geothermal power plants in the world today.

The US-based Power Engineering International has announced that from 2016 to 2026, it is expected that the installed capacity of geothermal power plants in the world will increase by 30 percent. This means that their total power, with 12,500 megawatts in 2016, should have risen to 16,000 megawatts in 2026. The Italian company Enel and the Chilean ENAP have recently put into operation a geothermal power plant at an altitude of 4,500 meters. The power plant, which was a major technical and human challenge, is located in the most deserted desert in the world. It consists of two units of capacity of 24 megawatts.

Construction of a geothermal power plant of eight megawatts on the island of Lesbos began in Greece. The latest research shows that there is a potential for the construction of a 50 MW geothermal plant on the island of Nisira, which would be enough to supply the island's electricity and seven nearby ones.

Table 4 - Geothermal energy (MW)

CAP (MW)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Europe	1 275	1 304	1 337	1 429	1 433	1 446	1 485	1 487	1 489	1541
Austria	1	1	1	1	1	1	1	1	1	1 o
France				2	2	2	2	2	2	2 e
Germany	3	8	8	8	12	24	24	26	29	29 o
Hungary										3u
Iceland	575	575	575	665	665	665	665	665	665	710 e
Italy	671	695	728	728	728	729	768	768	767	767 e
Portugal	25	25	25	25	25	25	25	25	25	29 o
EU	715	744	777	779	783	796	832	837	839	846

Table 4. Compiled by authors based on the data of International Renewable Energy Agency (IRENA).

Application of geothermal energy in Serbia

Serbia is one of the countries with the greatest disproportion between potentials and exploitation of geothermal resources. Geothermal energy is one of the leading renewable resources in Serbia and its application is doubled or tripled every year. Thus, hundreds of facilities are transferred annually to or use of geothermal resources new buildings.

Up to now about 500 mineral, thermal and thermo-mineral springs have been registered in our country, from which 1.500 liters of water emitted every second, of which only about 3 percent is used, and the rest goes to rivers. So far, about 1,000 systems have been installed in Serbia with heat pumps using underground thermal waters, of which about 400 are in the area of Belgrade. Germany, for example, installs at least 70,000 such heat pumps a year. Based on the studies conducted, Serbia has a great potential of geothermal sources that has been used so far for heating purposes. However, there is much greater potential that could be used for the production of food, electricity and other purposes. It is certain that more serious studies of the deeper layers of the earth will show that our natural wealth is geothermal sources much larger than it is thought to be.

Construction of the first district heating system will begin soon in our country, which will be used by Macvan thermal springs. In the Municipality of Bogatić, eight facilities of public administration (schools, kindergartens, courts, sports hall and municipal buildings) will be heated to groundwater, whose temperature is 75 degrees Celsius. From this heating system they expect savings of about 100,000 Euros per year.

Conclusion

The environmental problem and the problem of exhaustion of fossil fuels on the one hand, and the increasing demands for energy on the other, have led the highly developed countries to invest huge capital and engage a great number of experts in the development of renewable energy technologies (wind farms, small hydropower plants, photovoltaic modules, fuel cells. ..) Increasing the share of renewable energy sources in the overall energy of EU countries can become the most productive energy alternative, with practically unlimited possibilities. In addition, energy savings significantly contribute to stimulating innovation, increasing employment and economic growth. With relatively small investments, better choice of technological equipment and energy, better

organization, and improved quality in exploitation, significant energy and financial savings can be achieved.

Reduction of carbon dioxide emissions can be achieved in various ways: by improving energy efficiency, capturing CO₂ from emission gases and discharging it underground, replacing fuels with a lower carbon content, using nuclear energy. However, the only option that offers the possibility of reducing carbon dioxide emissions in line with long-term sustainability is the use of renewable energy sources.

In Serbia, three to five times more electricity is consumed per unit of product, than in EU countries, and two to three times more than in the environment. Additionally, due to poor isolation of installations, more than 50% of the energy consumed is lost. The annual loss exceeds half a billion euros due to energy inefficiency, and 60% of the population continues to use ugly quality (lignite) as the main source of energy for heating. The importance of optimizing energy efficiency is enormous, since energy savings are realized both on the producer's side (coal, oil, gas and production, transmission and distribution of electricity), as well as the injected users (use of energy in households, transport and production).

The condition for reaching the goals of EE is the conception and gradual implementation of institutional, legislative, structural and organizational and financial and economic reforms in the relevant segments of the energy sector of the Republic of Serbia. Energy-driven and economic incentive regulations, as well as financial support, would create a social environment for successful implementation of programs of rational use of energy.

Significant improvement in EE and increased use of renewable energy sources - RES is closely linked to general economic and social policies. There is a real potential for contributing to sustainable development and economic growth, which can affect all areas of economic activity. The implementation of EU norms and standards in the field of EE will have an impact on the integration of Serbia into the EU.

The Energy Efficiency Strategy of the Republic of Serbia was adopted by the Government in 2005. The EE strategy highlights the impact of efficient use of energy on security of supply, market competitiveness and environmental protection and confirms the significant role of EE in creating new business opportunities. The EE strategy represents the framework initiatives needed to promote EE in all energy sectors, especially in the area of final energy consumption, including initiatives for increased use of alternative and renewable energy solutions. The strategy identifies the key points of energy inefficiency in the entire energy chain and the activities needed for the improvement of EE in all sectors

of the Serbian energy sector. New possibilities for building plants based on renewable energy sources from the point of view of environmental protection show the optimal path of regional development.

The Ministry of Environment and Spatial Planning adopted in 2011 the Ordinance on Energy Efficiency of Buildings [24]. This Rulebook stipulates that each facility receives an "energy certificate" without which, practically, no new facility can be constructed to obtain a usable permit, to manage it in this way and to ensure the implementation of an energy-efficient policy. Energy-efficient measures include behavior that is used to reduce consumer energy. Regardless of technical or non-technical measures, or behavioral modifications, all measures involve the same or even higher, stepped-up comfort and standards.

The most common measures undertaken in order to reduce energy losses and increase energy efficiency are: zamena neobnovljivih energenata obnovljivim,

- replacement of non-renewable energy sources with renewable,
- replacing energy-inefficient consumers with more efficient,
- insulation of the space that is heated or cooled,
- replacement of worn-out or inefficient carpentry of rooms that are heated,
- installation of measuring and control devices,
- replacement or installation of efficient heating, air conditioning or ventilation systems.

Improving energy efficiency is an important element of the energy policy of the Republic of Serbia, which significantly contributes to the security of energy supply, increasing standards, reducing import dependency and reducing negative effects on the environment. Serbia has adopted the Law on Efficient Use of Energy, which gives municipalities the authority and obligations that need to be implemented in order to achieve energy efficiency. The Law on Efficient Use of Energy specifies the topics that local self-governments should take in planning the activities on efficient energy use, which include the reconstruction and maintenance of public facilities, institutions and institutions established by the local self-government.

Each country, depending on its natural resuscitations, should select sources of renewable energy resources, by which it can economically best advance with the preservation of the environment. For a Serbia that does not have enough money for wind farms or solar power plants, the most current option is the use of biomass.

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