

Renewable energy and green market development in Russia

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Abstract. The paper discusses the possibilities of green energy in improving the economic growth of regions, the development of the green market and its importance in implementing environmental protection policy. The author considers the premises for the formation of a market of renewable energy sources in developed countries, studying world trends, as well as the conditions and factors affecting the development of the ecological market of green goods and services in modern Russia. The paper analyzes legislative initiatives to develop an alternative energy market, taking into account Russia's accession to the Paris climate agreement. The author gives examples of regional experience in Russia that are already implementing projects for the installation of alternative energy generators, wind and solar. The conditions and factors for the energy capacities development based on renewable sources in the Arctic territories are also considered. The author concludes that the development of renewable energy sources must be considered in the line of the energy strategy of Russia, as well as with issues of digitalization of the industry, microgeneration, the introduction of energy storage systems.

1 Introduction

Biological diversity is priceless for our planet; it produces oxygen and reproduces numerous natural resources. Food and medicinal plants have economic value, and specially protected natural areas are characterized by huge potential in the provision of ecosystem services and the development of ecological tourism. Therefore, environmental protection is an important component of government policy aimed at preserving biodiversity and creating the conditions for ensuring safe human life. In this regard, the development of the ecological market of goods and services allows changing the consumption model that led to the degradation of natural resources, the inefficient use of which is a brake on economic development.

An environmentally friendly business that produces green goods and services is becoming increasingly popular in the world amid growing discussions among scientists and politicians about the catastrophic effects of climate change. World trends indicate an increase in political support for green business and consumption, as well as continuous

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improvement of economic mechanisms for the development of the ecological market for goods and services.

A study of Russian and foreign business experience taking into account modern realities suggests that environmental factors play an increasingly important role in decision-making management. Environmental protection is also an economic task, as the mechanisms that are being created to support environmentally oriented businesses are aimed at stimulating environmentally friendly goods and services based on natural resources. The environmental and economic regulation of the green goods and services market has opened up new directions for investment and development of innovative technologies for the processing and production of materials based on bio-raw materials. The popularity of these types of products is growing every year, and the business not only reduces costs, but also significantly increases profits, successfully responding to consumer requests for environmentally friendly products (food, clothing, medicine, cosmetology, etc.).

However, in Russia, unlike the EU and North America, the concept of “market of environmental goods and services” is used to a lesser extent, and “environmental services” are even enshrined in law. From an economic point of view, it is more expedient to combine the system of legal relations between entities in the field of environmental protection, mechanisms and approaches to the production of environmentally friendly goods and services with the concept of the market for environmental goods and services. Such an approach makes possible its scientific analysis, institutional structuring, as well as the development of improvement measures. Moreover, the amount of research in the field of environmental and economic activity will increase due to the growing interest of businesses and consumers in environmentally friendly products. Thus, the development of the market for environmental goods and services is part of environmental measures that are aimed at maintaining biodiversity and rational nature management. The Russian Federation is currently on the path to its formation, which requires the development of legislative frameworks, as well as effective economic mechanisms.

2 Modern trends in renewable energy development and environment policy in Russia

The decreasing of the hydrocarbon prices only temporarily delayed the active introduction of renewable technologies. According to the experts, coal consumption will reach its maximum by the end of 2020, and society will reach a peak in oil and gas demand in the thirties and forties of the XXI century [1]. Therefore, the dominance of renewable energy is easily predictable by the middle of the century. In this regard, modern Russian energy policy should be directed, inter alia, at the effective inclusion of alternative sources in the overall energy system of Russia.

The success and fast pace of renewable sources in the EU can be explained by the high energy prices. The wind and solar energy are actively developed, fig.1 [2]. The leaders in alternative energy innovations implementation are Sweden, Finland, Latvia. Since 2015, Sweden has implemented a program to completely abandon fossil fuels [3]. However, some experts believe that a complete rejection of traditional fuels is impossible, since the conditions for the universal implementation of solar and wind energy throughout the country have not been created. There is a real threat to the implementation of large projects due to lack of energy capacity.

In Russia, the situation is reversed: the relatively cheap price of electricity does not encourage consumers to look for alternative sources. This is associated with low rates of introduction of alternative energy production and households into the turnover. The share of thermal power plants in the total volume of all energy capacities of the country is about

75%, and their production of electricity ranges from 65%. In comparison with these data, green energy gives only 0.3% of power.

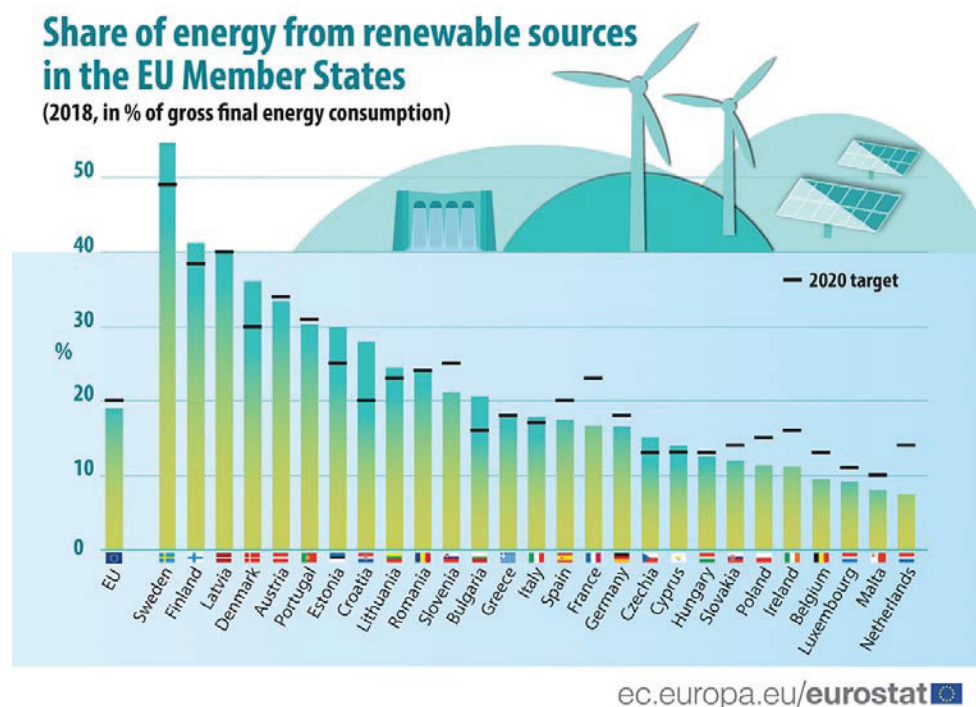


Fig.1. Share of energy from renewable source

In 2019, the Russian Government approved the main directions for increasing energy efficiency through renewable energy sources [4]. The implementation of the federal program will allow:

- maintain the emerging Russian industrial potential for the production of renewable energy-based energy equipment;
- integrate into global trends in the development of energy systems;
- reduce the anthropogenic pressure on the environment and use significant Russian natural and climatic resources.

It should be noted that the specifics of the renewable energy market in Russia are large hydropower plants of very high power. Small-capacity hydro power plants in the country are very poorly developed. This is explained by the historical approach used in the state energy policy of the Soviet period when hydroelectric power plants of macro regional significance were built.

In Russia, the need for alternative energy sources is especially significant in the northern regions of the country, where diesel fuel for heating stations is delivered in the summer season, during navigation by river transport. Logistics of the northern delivery is very complicated. The life of people in remote villages depends on the timely supply of energy resources. In such conditions, to ensure sustainable heat supply and high quality of life for the local population, the most promising is a combination of sources of electricity based on diesel, wind or solar energy. For example, in northern Yakutia in the village of Tiksi, the Russian-Japan project was completed to build three 900 kW wind generators. According to the indicators in 2018–2019, the temperature in the region dropped to -42 °C,

and the wind speed reached 30 m / s. Despite the impact of extreme factors, the installed wind farm was operating normally.

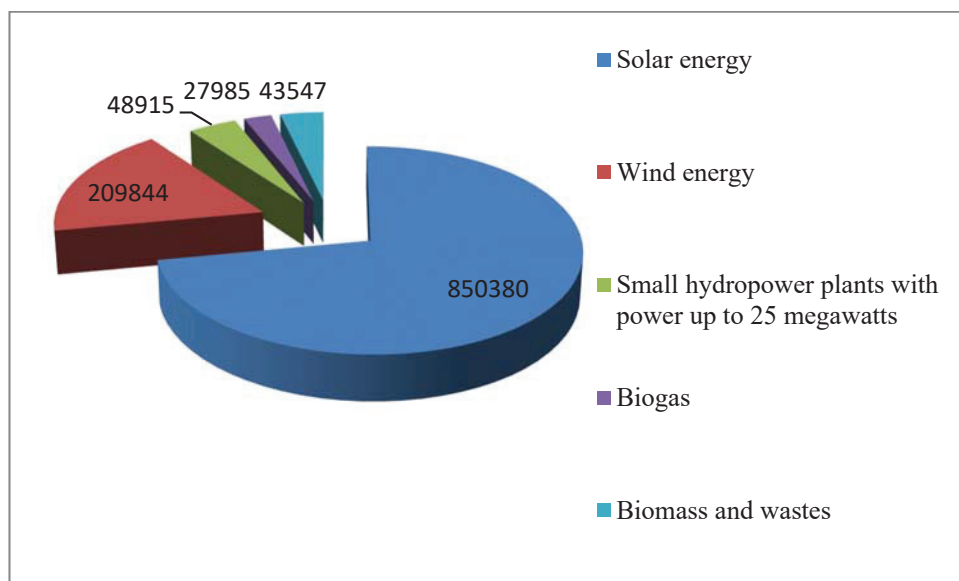


Fig.2. Renewable energy production in Russia in 2019, thousand kilowatt hours, *Source:* Ministry of energy of Russian Federation, 2019

A separate direction in the alternative energy sources development is belonged to the production capacities. Energy-intensive production requires significant energy facilities. For example, oil and gas refineries. In Russia, there are examples of the green technologies implementation into the manufacturing industry. It also helps to protect the environment. For example, in Volgograd one of Lukoil’s solar power plants participates in oil refinery. It made possible to reduce carbon dioxide emissions by 10 thousand tons annually. The same stations are installed at the company's factory in Bulgaria.

3 The prospects of the renewable energy development for the economic needs.

According to statistic data, solar and wind energy on a global scale today provides about 8 percent of total electricity consumption. At the end of 2019, the share of renewable energy sources in energy supply to the leader of the European economy in Germany reached 46 percent of the country's electricity. In Russia, support measures are also being implemented for several consecutive years under a separate federal program. Over the years of its operation, several dozens of solar power plants have appeared on the Russian market of wholesale deliveries of electricity. The wind farms are developing in the Kaliningrad, Ulyanovsk and Rostov regions, as well as in the Republic of Adygea.

Moreover, as the result of the support program for renewable energy sources in Russia, the production of equipment for solar and wind energy has reached a high level of its development. Today the high export potential of the industry could be marked. The prospect of its further development is determined by the increasing spread of the ideology of decarbonization and reduction of the hydrocarbon footprint in the total volume of produced goods and services. Such an aspiration of the world economy in the coming years

will become one of the key conditions for its presence on world markets. Therefore, Russia needs to prepare for this and to develop tools to encourage the use of renewable energy.

This is all more relevant to the Russia's ratification of the Paris Climate Agreement. In addition, the performance of such facilities largely depends on state support measures and without them substantially loses in efficiency. To expand the capabilities of private households, the Parliament adopted an amendment to the Federal Law "On Electricity" regarding the development of micro-generation. Citizens will be able not only to independently provide residential buildings with electricity and optimize their costs, but also to supply its surplus to the potential consumers. First of all, the law establishes the very definition of "microgeneration facility", giving its owner - the consumer of electricity - the right to produce and to sell it. It also defines some aspects of the regulation of such activities. At the same time, the micro-generation facility can be anything - both on the basis of exclusively renewable energy sources, for example, wind turbines or solar panels, and on the basis of combined solutions of traditional energy sources (e.g. diesel engine), and renewable energy sources. At the same time, according to the law, the volume of unsold "surpluses" sold to a guaranteeing supplier at the weighted average price of the wholesale market cannot exceed 15 kW. This limit is due to the fact that the connection of small generation facilities to a common network is aimed at household consumption and should not threaten the safety of consumers themselves and the energy system as a whole. But the procedure for joining such facilities is promised to be significantly simplified, freeing the applicants from excessive bureaucracy.

We believe that the law on microgeneration should be strengthened by the adoption of the Strategy for the Long-Term Development of Russia with a low level of greenhouse gas emissions until 2050. Particular attention in the draft Strategy, in our opinion, should be paid to the renewable energy sources development. It is the increase in their share in generation that is one of the most effective measures leading to the reduction of greenhouse gas emissions.

Thus, the development of renewable energy sources must be considered in the line of the Russian energy strategy and could be connected with digitalization of the industry, microgeneration, the introduction of energy storage systems. Renewable energy sources can participate in ensuring long-term growth of the national economy if the cost of generating a kilowatt hour is reduced and green generation facilities are organically integrated into the energy system of Russia. The power industry will have a good level of investment attractiveness and at the same time a long-term development prospect, this will not only attract new investors to the industry, but also make it customer oriented.

4 Conclusions

The modern trends of the renewable energy development cover almost all countries of the world. These sources are becoming more and more popular. But without special support measures they are not yet competitive compared to traditional energy sources. This fact is fundamental for renewable energy sources development. Therefore, countries aimed at developing this industry need to continue the work on market mechanisms development to improve the efficiency of renewable energy sources. One of the main elements of the market mechanism for the functioning of the renewable energy market is the law on small generation. The interests of the consumer, supplier and investor are actually concentrated in one private household, which itself determines the optimal generation volumes. This allows using more efficient technologies related to the cheaper cost of kW / h to build more facilities.

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