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STIMULATION OF DEVELOPMENT OF ALTERNATIVE ENERGY SOURCES AND MODERNIZATION OF CLASSICAL ENERGY

The article discusses the issue of actualization of alternative energy sources in connection with the deterioration of the situation in the energy sector caused by the military aggression of the Russian Federation.

Alternative sources of energy, both renewable and which can be included in secondary processing, are proposed as a factor of environmental security of the state. Current issues of the green development course of partner states and leader states in the field of alternative energy sources and increasing the impact of decarbonization on society are highlighted. Ways of supporting and rejuvenating the state's economy by loading free production capacities are considered

Key words: *alternative energy; traditional energy; renewable energy sources; investments; industry; international cooperation. consequences of armed aggression*

Unfortunately, on February 24, 2022, hostilities began as a result of an all-out attack by the Russian Federation on the territory of Ukraine, as a result of which the objects of various branches of infrastructure, bridges, buildings, factories, storage bases, schools, hospitals, roads, power plants, gas and water tanks, and other associated objects are related to life and vitality of cities and the country. But it should be noted that despite all the troubles and all the troubles that the war brings, the state leadership predicts and plans

plans for the restoration, reconstruction and formation of the state after hostilities and the consequences of hostilities. To date, the following types of problems that can be identified for the state from those that are relevant today are:

1. Recapture the captured territory and restore it to the state of the pre-war period

2. To provide the population that is forced to suffer from shelling and lack of money with decent support and work for the benefit of the state and the public.

3. Provide support and fighting spirit in the Army, which deters the attack and regains the territory of our state

4. Restoration of critical infrastructure and its modernization.

5. Reform all sectors and ratify agreements that were signed and could not be fully implemented.

That is, from all that was previously highlighted, the problem of energy dependence and the deterioration of ecology in our country against the background of the war took a back seat, but due to the fact that the Russian Federation pursues a policy of damage to energy infrastructure facilities and the danger of the accumulation of a large number of citizens and the danger of investments in the economy and enterprises of the state connected with hostilities, it is only possible to improve the theoretical basis and conduct an analysis of the works and practical experience of the leading countries and the application of innovations in this area. According to the Legislation of Ukraine on alternative energy sources, it is based on the Constitution of Ukraine and consists of this Law and other legal acts that regulate relations in this area. In Article 3 of the Law of Ukraine on "Alternative Energy Sources", the main principles of state policy in the field of alternative energy sources include the following

Analysis of literary data and problem statement: The main principles of state policy in the field of alternative energy sources are: increasing the volume of production and consumption of energy produced from alternative sources, with the aim of economical consumption of traditional fuel and energy resources and reducing Ukraine's dependence on their imports by restructuring production and rational energy consumption by increasing the share energy produced from alternative sources; maintaining environmental

safety by reducing the negative impact on the environment during the creation and operation of alternative energy facilities, as well as during the transmission, transportation, supply, storage and consumption of energy produced from alternative sources; compliance with safety for human health at alternative energy facilities at all stages of production, as well as during transmission, transportation, supply, storage and consumption of energy produced from alternative sources; scientific and technical support for the development of alternative energy, popularization and implementation of scientific and technical achievements in this field, training of relevant specialists in higher and secondary educational institutions; compliance with the legislation by all subjects of relations related to the production, storage, transportation, supply, transmission and consumption of energy produced from alternative sources; compliance with the conditions of rational consumption and saving of energy produced from alternative sources; attracting domestic and foreign investments and supporting entrepreneurship in the field of alternative energy sources, including through the development and implementation of national and local programs for the development of alternative energy.

Presenting main material: The controlling body is the Cabinet of Ministers of Ukraine or, on its behalf, a specially authorized central body of executive power in the relevant field in accordance with the procedure established by legislation. State regulation in the field of alternative energy sources is carried out by: development, approval and implementation of norms, rules of production, transmission, transportation, supply, storage and consumption of energy produced from alternative sources; comprehensive encouragement and support of research, research and development works, activities of inventors and rationalizers aimed at the development of production and use of alternative energy sources.

Scientific and literary base The source base consists of the publications of domestic scientists who study the impact of energy potential on the energy security of Ukraine - Ye. Shevtsov, A. Shidlovskyi, V. Lira, S. Denisyuk. and on the other hand, the annual reports of the country's gas transportation system operators and official statistics of state agencies. Also taken to y weight of coverage of assessments of the fuel and energy

complex of Ukraine in the domestic mass media, the Ukrainian energy market is one of the largest in Europe. However, despite the presence of a sufficient raw material base, Ukraine today remains a country with an energy-deficit, energy-consuming and energy-dependent economy, as it meets its own needs in energy resources only half and in the conditions of hostilities, the facilities of the infrastructure and the fuel-energy complex suffer from constant destruction and damage to the material base due to shelling from the armed aggression of the Russian Federation. At the International Conference on the Recovery of Ukraine, which took place in Lugano (Switzerland) on July 4-5, the Ukrainian delegation presented a large-scale Recovery Plan. According to the calculations of the Ukrainian side, over the next 10 years, Ukraine will need 750 billion US dollars to restore the country. At the same time, about 130 billion US dollars will be needed to strengthen energy independence and implement the "Green" course. Among the main principles of the future recovery, President Volodymyr Zelensky singled out compliance with environmental standards and the use of "green" technologies.

Specifying measures for the future "green" reconstruction in the Recovery Plan, the state proposes to build 3.5 GW of hydroelectric power plants and pumped hydroelectric power plants, to localize the production of RES equipment, such as wind towers, transformers, cables, electrolyzers, batteries. In addition, there are plans to build more than 30 GW of RES capacity for hydrogen production and develop biofuel production. Also, one should not forget about new approaches to the use of nuclear energy, namely fast isotope reactors. Modern fast neutron reactors. The world's most powerful reactor plant BN-600 has been operating since 1980 as part of the 3rd block of the Biloyarsk NPP (a branch of the Rosenergoatom concern ", Russian Federation).

The first industrial fast neutron reactor BN-800 was launched in December 2016. In Russia, 70 km from Yekaterinburg at the Beloyarskaya NPP. BN-800 is the only fast neutron reactor that supplies electricity to the grid.

Fast neutron reactors are called a key technology that will help close the nuclear cycle[1]. In 2017, the Third International Conference on Fast Reactors was held in Yekaterinburg (before that, conferences were held in Paris in 2013 and Kyoto in 2009).

During the Atomexpo-2017 forum, it was noted that in the near future the most promising will be the use of new generation power units with fast neutron reactors. Oleksandr Shutikov, First Deputy General Director of JSC "Concern Rosenergoatom", called this model a two-component energy system that allows you to use all the advantages of a closed nuclear fuel cycle. He emphasized that they have all the necessary technologies and sufficient experience in the operation of such reactors to start the construction of a two-component nuclear power system.[2] Russia also has plans to build a fast reactor with a higher capacity BN-1200: Rosatom has announced its intention to build and introduce a 1,200 megawatt fast neutron reactor to the country's energy system by 2020. [3]. France has a project for a fast neutron reactor. ASTRID, which was planned to be built in 2019. But the state leadership decided to freeze the project.

China has a project of a closed nuclear cycle, which should be launched by 2023, and developments in the field of fast reactors are also actively underway in India[4].
The company "AEM-technologies" (a part of the machine-building division of Rosatom - Atomenergomash) has completed the stamping of the bottoms of the housing and protective casing of the multipurpose fast neutron research reactor (MBIR). The operations took place in the thermopress section of the Volgodon branch of "Atommash" on special presses with a maximum capacity of up to 15,000 ton-forces. The diameter of the bottom of the reactor body is 2.2 meters, the protective casing is 2.4 meters, the thickness of the parts is 2.5 centimeters.[5].

On June 8, construction of the BREST-OD-300 power unit of the new generation began in Siviersk, Russia. Construction started at the site of the Siberian Chemical Plant (SHC) of the state corporation Rosatom. BREST - the prototype of the BR-1200 fast neutron reactor. The new reactor with a lead coolant and a new mixed uranium-plutonium nitride fuel, optimal for fast neutron reactors, will have an installed capacity of 300 MW and will be part of the research and demonstration energy complex (ODEK), which is being built as part of the "Breakthrough" project.[2] This cluster of nuclear technologies will contain three interconnected objects: a module for the production (fabrication / refabrication) of uranium-plutonium nuclear fuel, the BREST-OD-300 power unit, as well

as a module for the processing of irradiated fuel. Thus, for the first time in world practice, a nuclear power plant with a fast reactor and an in-station closed nuclear fuel cycle will be built on the same site. [3] BREST-OD-300 is expected to start operating in 2026.

Returning to the problem of recovery where rust and the construction of energy independence and modernization of the energy sector of Ukraine by putting into operation and the production cycle of products of secondary processing of resources, attention should be paid to the fact that the problems of utilization of resources in our country have not been dealt with in the practical sphere, because referring to literary sources as of 23.02.2022 In 2018, only about 100 waste processing plants carried out recycling activities in the country, reports the head of the Waste Management Association, Nicole Danilova. They appear all over the country, in particular, they work in the Kyiv, Kharkiv, Lviv and Rivne regions, but it should be noted that the main obstacle in the creation and attraction of capital and the search for raw materials is weak awareness and a low level of sorting of raw materials for processing, and an insufficient level of preparation of legislation to this activity. In order to get to waste processing, it is necessary to first separate useful raw materials. It is not cost-effective to sort garbage after collection, because raw materials such as paper or cardboard that end up in a general tank will almost certainly be spoiled by organic matter and not suitable for further processing. Other waste can also spoil. Therefore, sorting should start with households based on the analysis and the authors of the idea of creating and spreading the popularization of the idea of building garbage processing plants and plants for the processing of secondary raw materials that the best idea would be to create and start spreading sorting technologies and the construction of recycling plants in territorial communities and near populated areas with a population of from 5 to 20 thousand inhabitants, which will give an opportunity to hone technology and practical experience in this area and introduce sorting into two fractions, namely recyclable and non-recyclable raw materials, and in the future, along with the modernization of production and its expansion, add new categories for sorting in communities . Taking into account the experience of the leading countries of the world, namely Sweden, Germany, the USA, the percentage of secondary raw materials in which

is more than 50% and in which the levers of actualization of secondary processing of raw materials and large costs for not processing it and its disposal are applied by law, it should also be noted that during construction plants for the secondary processing of raw materials in each territorial community will have the opportunity to create autonomy from sources of fuel and heat, attract additional subsidies and investments to the community, create new jobs, and improve the environmental friendliness of the region and the business suitability of the region.

One of the obstacles that suspends the development of such a relevant topic for our country is conflicting situations in legislative acts;

Separation of powers when responsibility lies within two different ministries, departments, communities;

Obsolescence of material and production resources due to insufficient funding, industry;

The influence of stereotypes and the reluctance of the population to make adjustments to their lifestyle and everyday life;

Also, one of the obstacles that we need to solve in the future is the system of waste processing enterprises in Ukraine, which is actively planning to expand. Last year, a modern waste processing complex appeared in Kharkiv region. It is planned that within the next 4 years new waste processing plants are also planned to be built in Kyiv, Lviv, Khmelnytskyi and Poltava. Similar construction, but with an unknown completion date, is planned in 11 other regional centers. At the same time, it is very important that the construction of waste processing plants is not a point solution, but a part of a single system that works for one goal - reducing the amount of buried waste. For this, it is necessary to actively develop the sorting system and work with the culture of waste management. Otherwise, new factories risk, at best, "being dependent" on imported garbage. And in the worst case, repeat the fate of the Rivne plant for the production of RDF fuel, which was never able to receive a flow of waste of the appropriate quality and stopped working.

It is also necessary to single out a problem of general importance in the territories that were under occupation and in the territories of hostilities. After all, according to

forecasts and agreements, our state will completely abandon the use of coal in energy by 2035 - this is the promise Ukraine made at the climate conference in Glasgow. This means that no new TPPs or mines will be built, and old state-owned facilities will be gradually closed. According to the estimates of the Ministry of Energy, only a few of the three dozen state-owned mines are profitable. For the rest, the state spends more than 5 billion hryvnias per year just to support their existence and pay off the miners' debts. If such mines are not gradually closed, then, according to analysts' estimates, another 710 million euros will have to be spent in the next decade to support the industry. Therefore, the transition to green energy, although it requires significant investments at the beginning, is still an economically more profitable way, experts say. The total production of thermal coal in 2021 reached 22.14 million tons, which is 0.7% more than in 2020." Private enterprises of the industry provided 76% of production - 16.83 million tons, which is 10.6% lower than last year's volume, while state enterprises provided 24% of coal - 5.31 million tons, which is 1.7 times higher than the results of 2020" But it should also be noted that Russia arranged the biggest energy crisis in 40 years, curtailing gas supplies in the EU. This has rippled across the world and forced a choice between environmental principles and warm homes in winter.

Although coal is the dirtiest energy source, it can help survive the most difficult next winter. In order not to make concessions to the aggressor, countries will have to postpone their own "green" aspirations. The "green" energy transition had one critical flaw: it relied on importing Russian gas. Fuel from the aggressor country was to become a reliable shoulder until renewable sources took the leading place in the European Union. In 2021, the EU was particularly vulnerable. At this time came the recovery after the pandemic and the gradual abandonment of nuclear energy and coal. In Russia, they took advantage of this and started blackmail. The supply of gas was limited, and the Kremlin set a condition: if you want to continue the "green" course, make political concessions.
To compensate for the losses, the EU began to concentrate energy carriers from around the world, which led to an increase in prices. At the same time, another event took place in 2021. China imposed a number of quotas on mines to reduce production. Incorrect

calculation of electricity consumption led to a severe shortage of coal and the need to import more energy carriers. World prices rose even higher. Coal mining and the production of energy from it have become profitable again, because the cost of electricity in the EU countries has increased three to four times, and regulations for the industry have begun to loosen. High prices will continue for at least a few more years as long as the gas shortage in the European Union continues.[4].

Asian countries, despite their agreement with the provisions of the Paris Agreement, are rapidly increasing their own coal production. For them, this is an opportunity to maintain the pace of economic growth against the background of the global energy crisis. After the autumn blackouts, the Chinese authorities decided to play it safe. In the first half of 2022, the country increased solid fuel production by 11% compared to the same period in 2021. Pyndebesna opens abandoned mines and begins to massively build coal-fired power plants. Due to the heat wave, India deconserved 20 mines at once, increasing coal production by 33% compared to 2021. EU countries are grasping for coal plants as a weapon in the confrontation with Russia. The need for energy security forced a step back in plans to "green" the economy.

The Netherlands, Austria and Germany have lifted all restrictions on coal-fired power plants. They can now operate at full capacity until 2024, although capacity was previously limited to 35%. It is significant that in the Netherlands these restrictions came into force only a few months ago.Germany included 16 coal-fired power plants in the list for deconservation. The government is now scrambling to get as many of them up and running as possible. France previously committed to shutting down coal-fired generation in 2022, but has also shelved those plans. Now the authorities want to bring into operation the large 600 MW station in St. Avold, which was recently closed.

Great Britain also joined the revival of coal energy. The country's authorities have urged five coal-fired power plants to be on a "low start" due to possible power shortages in winter.

Despite all the problems, coal will still become a shoulder during the energy crisis and help reduce dependence on the Russian Federation. For Ukraine, focusing on coal is

an opportunity to survive the winter. Zaporizhzhia NPP in Energodar and a large part of renewable energy facilities remain under Russian occupation, European gas prices are at record highs, and Ukrainian gas production infrastructure is located in dangerous areas close to the front lines. Because of this, the successful passage of the heating season will depend on the stable operation of coal generation. Restrictions on the export of energy carriers from Ukraine and the drop in demand for electricity in industry give Ukrainian thermal power companies a reason to rely on their own coal production. Companies have the potential to export current to EU countries, where prices exceed Ukrainian prices by four to six times. Prime Minister Denys Shmyhal is sure that if the transmission capacity is increased to 2.5 GW across the western border, Ukraine can earn up to UAH 70 billion from the export of electricity every year. Infrastructure expansion will take place gradually. According to Olena Zerkal, adviser to the Minister of Energy, the department is currently counting on 800 MW by the end of 2022. But based on the shortage of production capacity and the volume of reserves for the winter period of Ukraine, unfortunately, our state does not have the opportunity to export coal, although this way would bring friendly nations closer together in the fight against Russian aggression.[7].

Conclusion. Taking into account the listed issues that our state is solving and which are relevant every day, it should be recognized that, unfortunately, our state has big problems that it is unable to solve both internally and externally. More in general, attention is paid to the ways of protection, support and development of critical infrastructure from armed attacks from the side of the Armed Forces of Russia, which are trying to enforce the requirements. After all, according to the analysis of the state of the Critical Infrastructure of Ukraine in relation to February 24, the volume and efficiency of the entire energy system of Ukraine fell by 30-50%, which is a negative result of the shelling, which forced the leadership of Ukraine to introduce limits on energy consumption and blackouts. That is, the introduction of new ways that will not only be able to reduce the load on the energy system and support it, but also be able to influence the negative state of the environment and launch mechanisms for stimulating the internal market for the production of materials and raw materials, stimulating the economy and creating jobs, and

modernizing production through the support and assistance of international companies and friendly relations with sister countries in this difficult time.

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