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DEVELOPMENT OF THE ENERGY SECTOR IN UKRAINE: SPECIFICS OF FUNCTIONING AND STRATEGIC GUIDELINES FOR IMPROVEMENT AND RECOVERY

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РОЗВИТОК ЕНЕРГЕТИЧНОГО СЕКТОРУ В УКРАЇНІ: СПЕЦИФІКА ФУНКЦІОНУВАННЯ
ТА СТРАТЕГІЧНІ ОРІЄНТИРИ ВДОСКОНАЛЕННЯ Й ВІДНОВЛЮВАННЯ

The war unleashed in Ukraine by the russian aggressor has exacerbated the financial crisis in the country's energy sector. The lack of sufficient capital to continue operations has become an urgent problem faced by all sectors of the Ukrainian energy system. However, it has been particularly painful for the power sector. The domestic energy sector is facing the question of survival in the country. First of all, this can be explained by the fact that in the first days of the war, the state's efforts to ensure the stable operation of basic power generation and reliable operation of the power system were nullified. The Ukrainian energy system is in isolation... russian troops are massively shelling not only Ukrainian cities and towns but are also trying to destroy critical energy infrastructure: high-voltage networks, transformer substations, control centers, as well as power plants, including renewable energy facilities. Thanks to this bloody war, the value of renewable energy sources has been transformed from environmental to security and economic.

The article is devoted to the study of the current state of the electric power industry in Ukraine and the prospects for its development through the introduction of new instruments of state regulation to ensure positive changes in the structure of energy resources.

The dynamics of electricity consumption in Ukraine are analyzed. It is established that the social benefits of developing renewable energy sources are undeniable; no sector of the economy can develop steadily without appropriate government incentives and an attractive business climate in the country.

The author emphasizes the controversial issue of the expediency of state support for the energy sector of Ukraine. The author concludes that under current conditions, the Government of Ukraine faces a single task — to retain those national and international investors in renewable energy sources that have already invested in the Ukrainian economy and to ensure conditions for their further business activities in the post-war period. And also, to increase the importance of nuclear energy in Ukraine after the loss of most coal resources as a result of the war with russia and a significant lag in the implementation of state plans for the development of renewable energy.

Війна, розв'язана в Україні російським агресором, загострила фінансову кризу енергетичного сектору країни. Відсутність достатнього капіталу для продовження діяльності стала нагальною проблемою, з якою наразі стикаються всі сектори української енергетичної системи. Однак особливо болісно це позначилося на секторі енергетики. Вітчизняний енергетичний сектор стоїть перед питанням виживання в державі. Перш за все, це можна пояснити тим, що в перші дні війни зусилля держави щодо забезпечення стабільної роботи базової генерації електроенергії та надійної роботи енергосистеми були зведені нанівець. Українська енергосистема в ізоляції... російські війська масовано обстрілюють не лише українські міста і селища, але й намагаються знищити критичні об'єкти енергетичної інфраструктури: високовольтні мережі, трансформаторні підстанції, диспетчерські пункти, а також безпосередньо електростанції, включно з об'єктами відновлюваної енергетики. Завдяки цій кривавій війні, цінність відновлюваних джерел енергії трансформувалась з більш екологічної на безпекову та економічну.

Статтю присвячено дослідженню сучасного стану електроенергетики в Україні та перспективи її розвитку завдяки запровадження нових інструментів державного регулювання для забезпечення позитивних змін у структурі енергетичних ресурсів.

Проаналізовано динаміку споживання електроенергії в Україні. Встановлено, що суспільні переваги розвитку відновлюваних джерел енергії є беззаперечними; жоден сектор економіки не зможе стабільно розвиватись без відповідних державних стимулів та привабливого бізнес-клімату в державі.

Закцентовано увагу на дискусійності питання щодо доцільності державної підтримки енергетичного сектору України. У підсумку зроблено висновок, що за сьогоdnішніх умов, перед Урядом України стоїть єдине завдання — зберегти тих національних та міжнародних інвесторів в ВДЕ, які вже інвестували в економіку України і забезпечити умови для їх подальшої бізнес-діяльності в післявоєнний період. А також, посилення в Україні ваги ядерної енергетики після втрати більшості вугільних ресурсів внаслідок війни з росією та суттєвого відставання в реалізації державних планів щодо розвитку відновлювальної енергетики.

Key words: Renewable Energy Sources, Wind and Solar Generation, Nuclear Generation, Feed-in Tariff, Power System, Electricity Generation, Power System Modernization, Energy Sector, Technological Processes.

Ключові слова: Відновлювані джерела енергії, вітрова та сонячна генерація, атомна генерація, "зелений" тариф, енергосистема, електрогенерація, модернізація енергетичної системи, енергетичний сектор, технологічні процеси.

STATEMENT OF THE PROBLEM IN GENERAL AND ITS CONNECTION WITH IMPORTANT SCIENTIFIC OR PRACTICAL TASKS

In today's society of rapid development of technologies and ideas, the importance of the electricity sector is increasing as one of the fundamental sectors to meet the growing needs of society, which are driven by the dynamic development of the automated production of goods and online services and, as a result, growing energy needs. It is worth noting that despite the decline in production due to the COVID-19 pandemic and the war, this situation is temporary if we look at it from a 10—20-year perspective, and for more innovative sectors of the economy where companies are implementing automation of production, the pandemic provides an incentive to increase efficiency and automate processes to reduce human involvement in technological processes.

The effective development of the Ukrainian economy is driven by the integrated growth of the sectoral market system, the key of which is the energy market, the most important component of which is the electricity market.

The importance of solving electricity market problems for the economies of the states and their territories is based on: the specificity of the current level of development of society and technology. The need to meet the growing energy demands of production and consumption. Given the economic, technological, and social importance of electricity, the reliability of electricity supply is a very serious issue, and energy security (state and local) must be met first and foremost by national policy. This is the main criterion to aim for.

Solutions and prioritization for the effective development of electricity markets cannot be based solely on economic indicators. The issue of the social dimension in the development of this market segment is today more important than ever. In global practice, social and environmental projects are carried out and a targeted projection of social management knowledge is formed in the context of industry. The studied area of the Ukrainian market supplies energy to all regional enterprises and households on its territory, and exports Ukrainian electricity to the territory of certain countries, thus its sustainable features and the market in other sectors

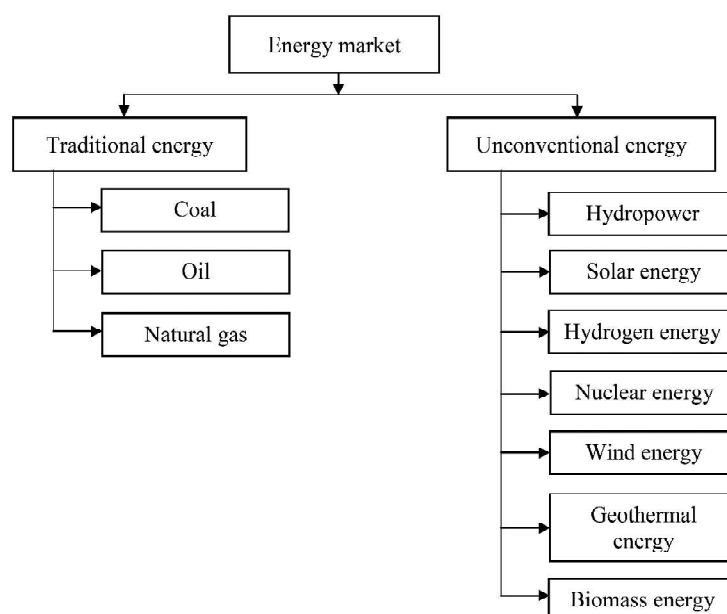


Fig. 1. Structure of the energy market

formed by the authors using [12, p. 30].

Coordinated and targeted development is a top priority for selected societies — National economic strategy.

In the process of these transformations, one of the key tasks of the national energy policy is to solve the problems of improving the Ukrainian energy market and introducing effective state regulatory mechanisms in line with international practice. Currently, the Ukrainian domestic energy market is uncompetitive, as there is no market with a free choice of trading partners. At the same time, the improvement and restructuring of energy markets should be considered from the perspective of both economic efficiency and energy security, taking into account the details of their functions and global development trends.

ANALYSIS OF RECENT RESEARCH AND PUBLICATIONS, WHICH INITIATED THE SOLUTION OF THIS PROBLEM AND ON WHICH THE AUTHOR RELIES, THE SELECTION OF PREVIOUSLY UNSOLVED PARTS OF THE GENERAL PROBLEM, WHICH IS THE SUBJECT OF THIS ARTICLE

At the current stage of development of the global energy market, energy demand tends to change constantly. This is by replacing depleting resources with alternative renewable energy sources. It's worth noting that, according to experts, energy efficiency strategies will replace petroleum products with other types of energy sources in the next 15 to 20 years. This reveals the ever-increasing role of renewable energy sources. As a result, competition in the global energy market is constantly increasing, requiring participants to devise more attractive investment projects for capital inflows and to incorporate new technologies into production that reduce environmental pollution increase.

The relevance of the issues raised in the research of domestic and foreign researchers who thoroughly analyze the trends and factors due to the growing attention to global and regional energy market issues, and national economic energy security issues, will be able to talk about

However, the issue of energy security needs further development.

FORMULATION OF THE GOALS OF THE ARTICLE (TASK STATEMENT)

The purpose of the study is to determine the functioning of the electricity market in Ukraine and to substantiate the theoretical and methodological aspects of the feasibility of using and introducing new instruments of state regulation to ensure positive changes in the structure of energy resources.

PRESENTATION OF THE MAIN MATERIAL OF THE STUDY WITH A FULL JUSTIFICATION OF THE OBTAINED SCIENTIFIC RESULTS

The unified energy system is the backbone of Ukraine's electricity economy. The unified energy system of Ukraine provides a centralized power supply to consumers, imports, and exports of electricity, and is connected to the energy systems of neighboring countries.

The integrated power system of Ukraine is a collection of power plants, electricity, heat networks, and other electrical equipment united by a common mode of generation, transmission, and distribution of electricity and heat under the central management of Ukraine. center of this method. It combines the power generation capacity and distribution network of the regions of Ukraine, interconnected by main power transmission lines from 220 to 750 kV. The schematic structure of the energy market is shown in Fig. 1.

Wind, solar, bio, small hydro, and hydrogen power are now key to energy security and national independence, and their costs are significantly lower than fossil fuels. In 2021, Ukraine's renewable energy sector fought for the right to work under state-guaranteed fair conditions and is now one of the cornerstones of Ukraine's post-war recovery, further strengthening the country's energy independence. We are preparing.

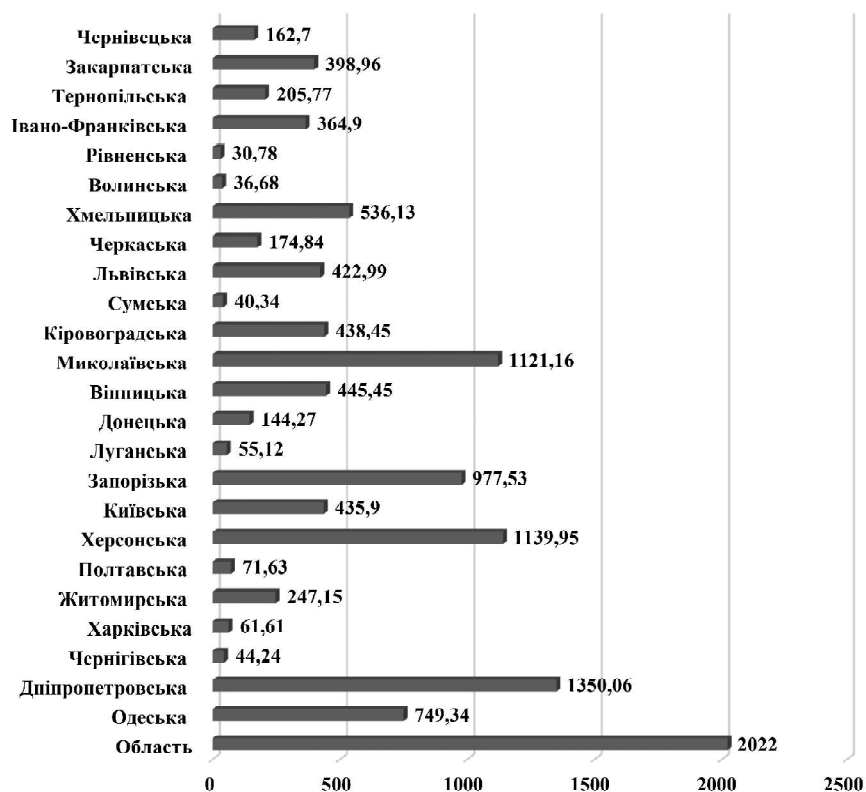


Fig. 2. Installed RES capacity by regions of mainland Ukraine as of 2021, MW

formed by the authors using [13].

In 2019, Ukraine entered the TOP-10 countries in the world in terms of renewable energy development, and in 2020 — the TOP-5 European countries in terms of solar energy development. In the same 2019, in the Climatescope [6] rating by Bloomberg New Energy Finance (Bloomberg NEF), Ukraine took an honorable 8th place (up from 63rd) among 104 countries in terms of the country's investment attractiveness in the development of low-carbon energy sources and the construction of a green economy. In 2021, Ukraine was ranked 48th in terms of the country's overall investment potential [6] among 136 countries in the BloombergNEF ranking.

Overall, since 2019, investments in new renewable energy projects in Ukraine have been consistently higher than in fossil fuel projects. Over the past 10 years alone, leading international and Ukrainian renewable energy sources (RES) have attracted more than USD 12 billion in foreign direct investment into Ukraine's economy, and the share of foreign investors in the installed capacity of renewable energy sources reached more than 35% as of the end of 2021, which characterizes the Ukrainian renewable energy sector as quite competitive and open.

Today, the list of the largest international lenders and investors in the RES sector in Ukraine includes the European Bank for Reconstruction and Development, Black Sea Trade and Development Bank, American International Development Finance Corporation (DFC), BayernLB Federal Bank of Bavaria, Investment Fund for Developing Countries (IFU), Nordic Environment Finance Corporation (NEFCO) and many others. Thus, the geography of investments in the construction of Ukrainian RES power plants extends to organizations or individual investors from China, the United States, the United Kingdom, Germany, the Netherlands,

Sweden, Denmark, Norway, France, Luxembourg, Belgium, Spain, Canada, Turkey, etc [9].

The gas crisis of late 2021 and early 2022 confirmed the significant prospects for the development of Ukraine's bioenergy sector (bioenergy). Against the backdrop of record-high natural gas prices, it is bioenergy that can cover part of the natural gas shortage in terms of heat and electricity generation. In total, 21 MW (or 1.79%) of biogas plants were commissioned in 2021, which is twice as much as in 2020, and 43.1 MW (or 3.68%) of biomass plants, which is twice as much as the increase in bioenergy capacity in 2020. The share of small hydropower capacities commissioned in 2021 is 1.24% or 14.6 MW [13].

The geography of RES facilities differs by renewable energy source, which is natural and corresponds to the natural RES potential of a particular region. While wind power plants are located mainly in the southern and southeastern regions, primarily on the coasts of the Black and Azov Seas (approximately 85%), solar generation is much more widespread, but again, about 60% of industrial solar power plants are concentrated in the southern and southeastern regions of Ukraine.

As of the beginning of 2022, the leaders among all Ukrainian regions in terms of total installed renewable energy capacity are Dnipropetrovsk (1350.06 MW), Kherson (1139.65 MW), and Mykolaivska (1121.16 MW). All these regions account for more than 37.3% of all renewable energy capacities in Ukraine. In terms of annual growth, most new RES facilities were added in 2021 in Mykolaiv (168.7 MW), Odesa (149.1 MW), Kherson (145 MW), and Zaporizhzhia regions — 98.8 MW. It is interesting to note that these four regions, in particular, are also leaders in terms of installed wind power capacity (Fig. 2).

In 2021, all RES power plants generated 12804 million kWh [4] of clean electricity, which is 1941.9 million kWh or 17.8% more than last year:

- Ukraine's wind farms produced 3,866 million kWh or 614.4 million kWh more compared to 2020, which is 2.97% of total electricity production;

- SPPs generated 7670 million kWh or 4.8%, which is 1,065.4 million kWh more than the amount of electricity generated in the same period in 2020;

- generation of hydroelectric power plants increased by 56.1 million kWh, reaching 276 million kWh or 0.17% of the total balance;

- Ukraine's bioelectric power plants generated 992 million kWh or 0.6%, which is 206 million kWh more than the previous year.

At the same time, it should be noted that 2021 was a decisive year for the national RES sector, as on May 11, 2021, daily electricity generation from RES exceeded the level of generation by thermal power plants for the first time in the history of Ukraine — 79 million kWh versus 77 million kWh [13].

As for wind and solar generation by private households, only the small-scale solar energy sector, as mentioned above, can be characterized by positive development rates in 2021. Thus, from 2018 to 2022, the total capacity of private household installations generating energy from solar radiation increased more than fivefold and as of the beginning of 2022 amounted to 1205.1 MW (about 45 thousand units).

Currently, consumers are incentivized to install renewable energy generation using the feed-in tariff model. On the one hand, this has given a significant impetus to the development of RES generation for private households. At the same time, the current model has several limitations and drawbacks. First, the model of a fixed feed-in tariff for the private household sector stimulates not so much the development of their energy independence as the targeted sale of electricity generated by RES facilities to the grid. This is due to the high level of the "green" tariff for household RES systems (18.09-euro cents per kWh for solar generation and 16.26-euro cents per kWh for wind generation). Secondly, this model leads to several technical challenges and abuses related to the construction of solar power plants by private households without their electricity consumption, or manipulations related to increasing the capacity of such facilities. That is, de facto, industrial solar power plants are being built without applying the procedure for setting a "green" tariff by the current procedure [11] and without any responsibility for imbalances and the quality of the supplied electricity.

Regarding distributed RES generation, the state adopted a rather attractive legislative framework back in 2019. Thus, by the relevant amendments to the Law of Ukraine "On Alternative Energy Sources" [10], the capacity of small wind turbines for households eligible for the feed-in tariff was increased to 50 kW, while the feed-in tariff for such generation was set at 11.63-euro cents per kWh. The same law officially defined the concept of "combined wind-solar generating systems", which expanded the choice of Ukrainians to choose their type of generation. A year before the war, the

government began to prepare the ground for supporting distributed generation through mechanisms such as Net Billing or Net Metering [3].

However, at 4:00 a.m. on February 24, 2022, the implementation of all of the above solutions aimed at significantly improving the business climate in the RES sector and creating new opportunities for increasing the capacity of this sector was suspended due to Russia's full-scale invasion of Ukraine. Since then, the national renewable energy sector has faced a new reality in which it has been living for the past 17 months...

From the first hours after the invasion, Russian forces not only heavily bombed Ukrainian cities and towns, but also attempted to destroy critical energy infrastructure. Power plants include high-voltage transmission grids, substations, control centers, and renewable energy plants. In general, renewable energy power plants are the second highest priority for destruction by Russian aggressors after nuclear power plants and power lines.

According to the Ukrainian Wind Energy Association, since the beginning of the large-scale war in Ukraine, more than 3/4 of wind power capacities have been shut down, i.e., out of a total of 1,673 MW, about 1,462 MW of Ukrainian wind farms are currently not working, and 5 wind turbines in Kherson region, installed at the Myrnska, Syvash, and Novotroitska wind farms, are now destroyed.

Almost 600 MW of wind power capacity in the Zaporizhzhia region is also out of service due to damage to a 330-kW transmission line in Melitopol. 1.8 MW of bioenergy capacity in Chernihiv was damaged, while bioenergy plants with a total capacity of 2 MW were located in the occupied territories of the Donetsk region, namely in Volnovakha and Mariupol, meaning that 3.8 MW of the 245 MW installed at the end of 2021 are currently not supplying electricity to the grid [1].

In general, wind and solar energy generation has decreased by more than half compared to its pre-war level. This is mainly due to two factors:

- direct hostilities, or to prevent damage to electrical equipment;

- the growing problems associated with demand disruption and the high inflexibility of generation subject to dispatch, especially solar generation, given that the cumulative capacity of solar generation has now exceeded 6 GW.

According to the information, the total amount of solar generation restrictions from March to May 2022 is about 573 kWh, which, on average for the specified period, corresponds to 30% of the potentially possible amount of electricity (from 42% in March to 19% in April). The high level of reduction in March can be explained by the fact that the country's power system operated in emergency mode after the outbreak of war; April was somewhat stabilized by favorable hydrological conditions; and May saw an increase in the number of green curtailments along with an increase in solar exposure [1].

It is worth noting that the government has approved the Energy Strategy of Ukraine until 2050, which envisages

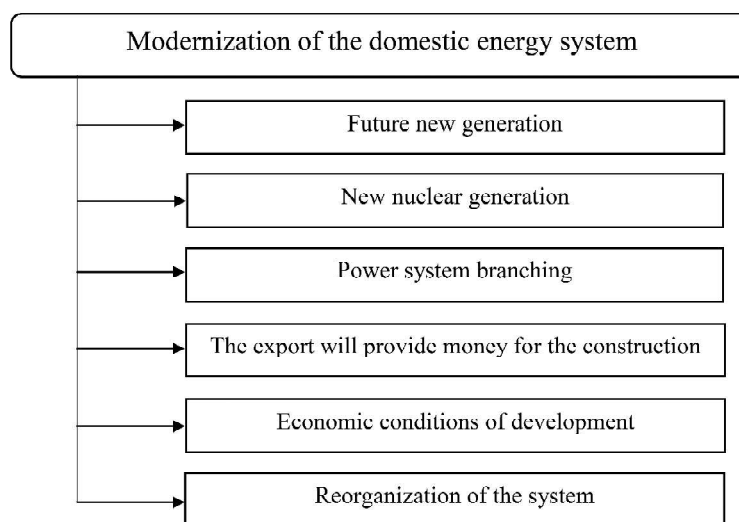


Fig. 3. Energy Strategy of Ukraine until 2050

formed by the authors using [8].

deep modernization and decentralization of the national energy grid (Figure 3).

Future new generation. The development and modernization of the energy system will depend on two factors:

1. What the country's electricity consumption will be and how fast it will increase in the medium term as the economy grows?

2. The fact that European countries, according to domestic experts, will be in an energy deficit in the next ten years, opens up a good opportunity for our country to sell excess energy.

But with Europe on track to cut emissions to near zero by 2050, Western neighbors are expected to be wary of 'dirty' electricity. The only problem today is that old coal production remains inefficient and has been severely damaged by war. Against this background, we need to focus on developing renewable energy sources. First, it will be able to sell electricity to Europeans. Secondly, such a decision takes into account Europe's plans to reduce greenhouse gas emissions and, given Ukraine's proximity to the EU, to quickly adapt the domestic energy sector to new standards in the future. No need. Moreover, if the market is well organized, this energy will be the most affordable for consumers. Third, the power system produces the cheapest electricity when the generation balance is 83% renewable and 17% shunt generation. There are two types: gas stations and battery stations [2].

New nuclear generation. As for the development of nuclear generation, it currently covers most of the country's electricity needs. It also generates a small amount of carbon dioxide, and can also be developed in our country, which has significant uranium deposits. However, it will require a lot of money. Power units need expensive modernization, as most of them are approaching the time of replacement and a lot of work will need to be done by 2050.

A new nuclear power unit costs billions of dollars. In terms of savings, we can focus on the latest small modular power units. They generate less electricity but also cost much less. Energoatom has recently confirmed its readiness to build a new power unit at Khmelnytsky NPP,

although no concrete steps have been taken to date that is known to the public.

Power grid diversification. Domestic power engineers and government officials will have to make a lot of effort in the coming years to improve the safety and reliability of the power system. And the course towards the development of renewable generation will contribute to this.

Most gas plants, solar and wind parks are small in size. These are power plants with a capacity of 20 to 80 megawatts. For example, to replace the capacity of the coal-fired Kryvyi Rih thermal power plant, about 50 such facilities will have to be built. This means that the future plants will be very widely distributed across the country, and it will be almost impossible to seriously disrupt the entire national power grid with missile strikes [5].

Experts say the country could build such an energy system within the next decade. But only if you have enough money. European countries and international funds are expected to participate in funding projects to build energy plants with low greenhouse gas emissions.

Exports will provide money for construction. Ukraine's power grid has been heavily damaged by Russian attacks. About half of the system was put out of commission. Ukraine's Energy Ministry estimates that about \$11 billion needs to be allocated for its restoration. One billion dollars is needed for superficial repairs by next winter.

Ukraine has traditionally exported electricity abroad. However, strong sales of electricity to European countries became possible after the national grid joined the European network of electricity transmission system operators ENTSO-E in March last year. Ukraine plans to increase the current limit of 400 megawatts for exports and 850 for imports.

The Ministry of Energy plans to create an "energy hub" in the country that will allow the production and storage of electricity. The energy sector wants to build a highway crossing and increase its capacity to 6 gigawatts. Experts assure us that this is a feasible task, but it requires sufficient surplus power capacity.

But sustainable exports require more than sufficient surplus generation and the required number of trans-

mission lines. At a minimum, an auction mechanism for interstate access must be established in place. Developing exports is important. Because this will provide additional funding for the restoration and modernization of the destroyed power system. It will also ensure foreign currency inflows into the country, which will have a positive impact on the hryvnia exchange rate.

Economic conditions for development. To restructure the energy system, proper economic conditions need to be created. For example, the government could end the fixed electricity tariff for households (UAH 1.44 per kilowatt up to 250 kWh and UAH 1.68 for more) and businesses (UAH 3.3 per kilowatt) and allow free pricing, as is the case in Europe. As a result, electricity prices for ordinary Ukrainians will be able to rise [7].

Increasing tariffs along with strengthening social protection for low-income citizens will bring several strategic benefits:

- Encouraging the private sector to invest in the construction of new power plants;

- an opportunity to live in a country with a powerful and reliable energy system that will generate fewer harmful emissions.

The current tariff on the electricity market is too low to encourage entrepreneurs and foreign investors to invest in new power plants in Ukraine, so it is crucial to reform pricing.

Reorganization of the system. Particular attention should be paid to reforming the electricity sales market so that private entrepreneurs have incentives to invest in building new types of power plants. They don't invest in projects unless they are confident that the investment will pay off over time. For Ukrainians, restructuring the energy system could lead to a slight increase in electricity bills. But this is the price of the privilege of living in a stable environment with electricity, communication, running water, and heat. This could hurt low-income citizens. However, governments can devise effective mechanisms to compensate such people and reduce social tensions.

In the long term (from a post-war point of view), large-scale development of "green" power generation and the creation of a new model for the Ukrainian energy sector will be possible if the following conditions are met:

- Adoption of a clear national strategy for the development of renewable energy sources, renewable hydrogen production, and offshore wind energy;

- Revision of the energy strategy to 2035, taking into account the replacement of decommissioned generation capacity with new generation capacity and the consequent increase in energy storage capacity;

- Adoption of Ukraine's energy strategy up to 2050;

- Set ambitious targets for renewable energy development in line with current EU energy policy. That is, by 2030, the share of renewable energy in Ukraine's electricity budget (including large-scale hydropower plants) should be at least 50% and zero carbon should be achieved. Economic growth to 2050;

- Conduct international communication campaigns to encourage international strategic and financial investors to enter the Ukrainian renewable energy market;

- Introduce new market mechanisms to promote renewable energy development, including green auctions, corporate PPAs, and contracts for difference;

- Investigation and development of a legal framework suitable for the construction of hybrid power plants using renewable energy;

- Local energy initiatives, especially energy cooperatives, development of small and medium-sized enterprises in the energy sector, generation and supply of electricity considering local characteristics, and promotion of the development of distributed generation.

CONCLUSIONS FROM THIS STUDY AND PROSPECTS FOR FURTHER EXPLORATION IN THIS DIRECTION

With the shift to renewable energy sources, energy itself ceases to be a tool of political or military influence from one country to another. Almost all the wars that have ever taken place in the world have been related to the scramble for energy and energy resources, oil, gas, coal, etc. Ukraine in particular is a country that has struggled to survive its independence for 31 years under constant energy threats and pressure from the Russian Federation. The availability of heat and electricity for Ukrainian consumers has long depended on Kremlin decisions and the attractiveness of Ukraine's domestic and foreign policies to Russian authorities. Russia is now using the same fuel tools to influence European countries that are providing large-scale humanitarian and military aid to war-torn Ukraine. By using renewable energy sources instead, countries do not have to fight because renewable energy sources are local energy resources that are available to everyone.

Renewable energy sources ensure the safety and health of society. The Chernobyl accident showed how dangerous nuclear energy is to mankind, and the current occupation of the Zaporizhzhia nuclear power plant by Russia shows how effective "nuclear terrorism" is for its interests. Neither Ukrainian nor European society knows how many bombs and shells hit wind farms and wind turbines. Because there is no danger to life or health. At the same time, the world's attention is focused on the situation at the Zaporizhzhia nuclear power plant and the activities of Russian terrorists on its territory. Against this background, the large-scale construction of new nuclear facilities and the extension of the service life of old nuclear facilities declared at the national level and included in Ukraine's economic stimulus package raises serious concerns. This kind of "nuclear terrorism" and our dependence. Let's save the country from nuclear fuel imports from other countries, if not from Russia.

Література:

1. Інформаційний портал новин "Економічна правда". URL: <https://www.epravda.com.ua> (дата звернення: 25.07.2023).

2. Інформаційний сайт "Управління проектами енергетики". URL: <https://iknet.com.ua/uk> (дата звернення: 25.07.2023).

3. Офіційна сторінка "Екоclub". Вигідно і корисно: чому Net Energy Metering необхідний громадам. URL: Вигідно і корисно: чому Net Energy Metering необхідний громадам — Екоclub — природоохоронна громадська організація (ecoclubrivne.org) (дата звернення: 25.07.2023).

4. Офіційна сторінка BP p.l.c. Statistical Review of World Energy. URL: <https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html> (дата звернення: 24.07.2023).

5. Офіційна сторінка Gas Transmission System Operator of Ukraine. Можливості ГТС. URL: <https://tsoua.com/gts-infrastruktura/mozhlyvosti-gts/> (дата звернення: 23.07.2023).

6. Офіційна сторінка Global Climatescope. Which emerging market is the most attractive for clean energy investment? URL: <https://2019.global-climate-scope.org/> (дата звернення: 23.07.2023).

7. Офіційна сторінка International Energy Agency. World Energy Investment 2019. URL: <https://www.iea.org/reports/world-energy-investment-2019> (дата звернення: 23.07.2023).

8. Офіційна сторінка LVIV.MEDIA. Кабмін затвердив Енергетичну стратегію України до 2050 року. URL: Кабмін затвердив Енергетичну стратегію України до 2050 року — LVIV.MEDIA (дата звернення: 26.07.2023).

9. Офіційна сторінка U.S. Energy Information Administration. The Most requested natural gas data. URL: <https://www.eia.gov/naturalgas/data.php> (дата звернення: 23.07.2023).

10. Про альтернативні джерела енергії: Закон України від 25.09.2008 р. № 555-IV. Дата оновлення: 09.07.2023. URL: <https://zakon.rada.gov.ua/laws/show/555-15#Text> (дата звернення: 24.07.2023).

11. Про затвердження Порядку встановлення, перегляду та припинення дії "зеленого" тарифу на електричну енергію для суб'єктів господарської діяльності, споживачів електричної енергії, у тому числі енергетичних кооперативів, та приватних домогосподарств, генеруючі установки яких виробляють електричну енергію з альтернативних джерел енергії: Постанова національної комісії, що здійснює державне регулювання у сферах енергетики та комунальних послуг від 30.08.2019. № 1817. URL: Постанова № 1817 від 30.08.2019 Про затвердження Порядку встановлення, перегляду та припинення дії "зеленого" тарифу на електричну енергію для суб'єктів господарської діяльності, споживачів електричної енергії, у тому числі енергетичних кооперативів, та приватних домогосподарств, генеруючі установки яких виробляють електричну енергію з альтернативних джерел енергії. Редакція від 04.02.2021 | ZakonOnline — Право знати! (дата звернення: 24.07.2023).

12. Чернова О. В., Морозова І. В. Сучасний стан і проблеми світового енергетичного ринку. Бізнес Інформ. 2021. № 5. С. 29—34. DOI: <https://doi.org/10.32983/2222-4459-2021-5-29-34>

13. Щорічний Звіт УБЕА "Вітроенергетичний сектор України 2021. Огляд ринку". URL: УБЕА: темпи росту вітроенергетичних потужностей сповільнилися до рівня стагнації | Українська Енергетика (ua-energy.org) (дата звернення: 23.07.2023).

References:

1. Information portal of news "Economic Truth" (2023), available at: <https://www.epravda.com.ua> (Accessed 25 July 2023).

2. Information site "Energy Project Management" (2023), available at: <https://iknet.com.ua/uk> (Accessed 25 July 2023).

3. The official site of the Ecoclub (2021), "Profitable and useful: why Net Energy Metering is necessary for communities", available at: Вігдно і корисно: чому Net Energy Metering необхідний громадам — Екоклуб — природоохоронна громадська організація (ecoclub-rivne.org) (Accessed 25 July 2023).

4. The official site of the BP p.l.c. (2023), "Statistical Review of World Energy", available at: <https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html> (Accessed 24 July 2023).

5. The official site of the Gas Transmission System Operator of Ukraine (2020), "GTS capabilities", available at: <https://tsoua.com/gts-infrastruktura/mozhlyvosti-gts/> (Accessed 23 July 2023).

6. The official site of the Global Climatescope (2019), "Which emerging market is the most attractive for clean energy investment?", available at: <https://2019.global-climatescope.org/> (Accessed 23 July 2023).

7. The official site of the International Energy Agency (2019), "World Energy Investment 2019", available at: <https://www.iea.org/reports/world-energy-investment-2019> (Accessed 23 July 2023).

8. The official site of LVIV.MEDIA (2023), "The Cabinet of Ministers approved the Energy Strategy of Ukraine until 2050", available at: Кабмін затвердив Енергетичну стратегію України до 2050 року — LVIV.MEDIA (Accessed 26 July 2023).

9. The official site of the U.S. Energy Information Administration (2022), "The Most requested natural gas data", available at: <https://www.eia.gov/naturalgas/data.php> (Accessed 23 July 2023).

10. The Verkhovna Rada of Ukraine (2008), The Law of Ukraine "On alternative energy sources", available at: <http://zakon4.rada.gov.ua/laws/show/2404-17> (Accessed 24 July 2023).

11. National Energy and Utilities Regulatory Commission (2019), Resolution "On Approval of the Procedure for Establishing, Revising and Terminating the "Green" Tariff for Electricity for Business Entities, Electricity Consumers, including Energy Cooperatives, and Private Households Whose Generating Units Produce Electricity from Alternative Energy Sources", available at: https://zakononline.com.ua/documents/show/14159-7___667420#:~:text=%D0%9F%D0%BE%D1%81%D1%82%D0%B0%D0%BD%D0%BE%D0%B2%D0%B0%20%E2%84%96%201817%20%D0%B2%D1%96%D0%B4%2030.08.2019%20%D0%9F%D1%80%D0%BE%20%D0%B7%D0%B0%D1%82%D0%B2%D0%B5%D1%80%D0%B4%D0%B6%D0%B5%D0%BD%D0%BD%D1%8F%20%D0%9F%D0%BE%D1%80%D1%8F%D0%B4%D0%BA%D1%258 (Accessed 24 July 2023).

12. Chernova, O. V. and Morozova, I. V. (2021), "Current state and problems of the world energy market", *Biznes Inform*, vol. 5, pp. 29—34. DOI: <https://doi.org/10.32983/2222-4459-2021-5-29-34>

13. UWEA Annual Report (2021), "Wind Energy Sector of Ukraine 2021. Market Overview", available at: УБЕА: темпи росту вітроенергетичних потужностей сповільнилися до рівня стагнації | Українська Енергетика (ua-energy.org) (Accessed 23 July 2023).

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