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The Energy Aspect of the Development of the Construction Industry in Modern Conditions

Abstract. Introduction*. It has been studied that in order to ensure the stable and efficient functioning of the energy sector of Ukraine, it is necessary to give priority to increasing energy efficiency and using energy from renewable and alternative sources. One of the main ones in the modern world factors of economic growth of each country is the level of its provision energy resources, their effective use. From the state of energy depend on the rate of development of scientific and technical progress and production, standard of living of the population. Energy security plays an important role in ensuring the effective functioning and development of the state. she is integral component of the quality of life of the population, as well as one of the important ones criteria for the return of temporarily displaced persons. put Ukraine in front of new economic and technological challenges.*

Purpose. *The purpose of the article is to assess the energy aspect of the development of the construction industry in modern conditions.*

Results. *Energy needs are growing in the predominant environment of everyone's activities social and economic subjects (population, business, public sector). Today, the world is faced with a shortage of resources in some countries. It happened due to the uneven distribution of energy resources among the countries of the world, and also due to contradictions in the formation of the unified energy policy of the country the world. Ukraine produces about two-thirds of the necessary energy resources independently, however, to meet domestic demand, it continues to import gas, crude oil and petroleum products.*

Conclusions. *The right approach to improvement of the energy sector of Ukraine will allow it to make a significant contribution to ensuring the strategic autonomy of the EU and breaking dependence on external energy resources. Destruction and damage to critical energy infrastructure.*

Keywords: *energy; economy; factors; improvement; finance; risks; energy resources.*

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Енергетичний аспект розвитку будівельної галузі в сучасних умовах

Досліджено, що для забезпечення стабільного та ефективного функціонування енергетичного сектору України необхідно віддавати перевагу підвищенню енергоефективності та використанню енергії із відновлюваних та альтернативних джерел. Це ставить перед Україною нові економічні та технологічні виклики, але водночас відкриває нові можливості для пошуку та впровадження інноваційних розробок у галузі видобутку, переробки викопних видів палива, виробництва, трансформації, постачання і споживання енергії, що зумовлює потребу у формуванні нової енергетичної політики держави. Важливу роль у забезпеченні ефективного функціонування та розвитку держави відіграє енергетична безпека.

Обґрунтовано, що енергетична безпека є невід'ємною складовою якості життя населення, а також одним із важливих критеріїв повернення тимчасово переміщених осіб. Реформа енергоефективності в усіх інших сегментах (промисловість, транспорт, енергопостачання) знаходиться на початковому етапі та потребує політичного керівництва, комплексної та злагодженої роботи Уряду, донорів та міжнародних партнерів України.

Доведено, що результатом реформи має стати ефективна система нормативно-правових актів, інститутів та інструментів впровадження енергоефективності. Таким чином, для забезпечення стабільного та ефективного функціонування енергетичного сектору України необхідно приділити першочергову увагу підвищенню енергоефективності та використанню енергії з відновлюваних та альтернативних джерел.

Ключові слова*: енергетика; господарство; чинники; удосконалення; фінанси; ризики; енергоресурси.*

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Formulation of the problem. To date energy needs are growing in the predominant environment of everyone's activities social and economic subjects (population, business, public sector). Today, the world is faced with a shortage of resources in some countries. It happened due to the uneven distribution of energy resources among the countries of the world, and also due to contradictions in the formation of the unified energy policy of the country the world.

Analysis of recent research and publications. Scientific interest to problems of the functioning and development of the energy sector of Ukraine was manifested by such researchers as S. Datsiv, K. O. Kuznetsova, O. S. Chenusha, I. Kozynets, S. O. Bila, M. Butko, T. Gonchar, D. Kuzin, D. Lukyanenko and V. Cherevan, O. Yakymenko, I. Kostyuchenko. Energy security plays an important role in ensuring the effective functioning and development of the state. She is an integral component of the quality of life of the population, as well as one of the important ones criteria for the return home of temporarily displaced persons. It should be noted that in the process of Ukraine's recovery, energy should become one of the key branches of the national economy, which will provide export revenue and maintain the state's financial condition. The right approach to improvement of the energy sector of Ukraine will allow it to make a significant contribution to ensuring the strategic autonomy of the EU and reducing dependence on external energy resources.

Formulation of research goals. The purpose of the article is to assess the energy aspect of the development of the construction industry in modern conditions.

Outline of the main research material. In the modern world, it is one of the main ones factors of economic growth of each country is the level of its provision energy resources, their effective use. From the state of energy depends on the rate of development of scientific and technical progress and production, standard of living of the population. Energy needs are increasing in the vast majority of all activities social and economic subjects (population, business, public sector)

Today, the world is faced with a shortage of resources in some countries. It happened due to the uneven distribution of energy resources among the countries of the world, and also due to contradictions in the formation of a unified energy policy of the countries of the world. According to the forecast of the International Energy Agency (International Energy Agency), by 2040 energy consumption will increase even more by 30% due to a significant increase in energy consumption in developing countries.It will remain an advanced center for the implementation of energy efficiency European Union [1].

Energy sources are divided into renewable and non-renewable. To renewables include sea tides, solar energy, hydropower year, wind energy, internal heat of the Earth. And non-renewable -it is fossil fuel, nuclear energy. The energy industry of Ukraine is a set of branches of the country's economy, which study and use energy resources for production, transformation, transmission and distribution of energy.

Electricity is a basic branch of the economy of Ukraine. She is one of the oldest in the country. Electricity production is based on combustion coal, fuel oil, natural gas, use of atomic energy, and also renewable energy: river energy, solar energy, wind energy, biogas and biomass, geothermal energy. Ukraine has significant reserves of hard rock (Donetsk and Lviv Volyn basins) and lignite (Dnieper basin); small oil and natural gas deposits located in the Carpathians and in the north the east of the country. These energy resources can be used at TPP, (Vuglegirska, Kryvorizka, Burshtynska, Zmievska, Kurakhivska and others). A hydroelectric cascade was built on the Dnieper (Kakhovska, Dniprovska,Kanivska, Kyivska, etc.).

On average, more than 55% of electricity in Ukraine is generated by nuclear power plants (Rivnenska, Khmelnytska, Zaporizhzhya, South Ukrainian). Own fuel resources provide only 58% of Ukraine's needs, the rest their part is imported. The collapse of the Soviet Union in 1991 caused significant political upheaval economic instability, which was reflected in the energy sector of Ukraine. The decrease in the population and the size of the GDP was reduced general demand, and improper management of state institutions, rigid regulation of activity in the sector and obsolescence of technologies are negative affected energy efficiency.

Despite some improvements, Ukraine had one of the most energy-intensive economies in the world: energy resource costs per unit of its GDP were approximately three times higher than the average in OECD countries. At the end of the 90s years of the last century in the structure of energy resources of Ukraine the largest part was natural gas - 27 million tons, with a share of coal accounted for 18.2 million, nuclear energy 17.3 million tons, fuel oil 9.2 million tons, of hydropower 2.4 million tons. These numbers show that the main energy resources are non-renewable sources - gas and coal. Ago there is an urgent need to replace these resources with other - renewable, more over are also environmentally safe. After the Euromaidan events of 2013–2014, the Ukrainian authorities began promote reforms in the energy sector. Russian annexation of Crimea peninsula in 2014 and the conflict with Russian-backed separatists in Donbas led to supply disruptions and energy shortages. Most these problems affected the coal sector. At the same time as taking measures to ensure energy security and stability, to perform obligations to the EU and the IMF, the authorities of Ukraine were forced to implement changes in various subsectors, including tariff deregulation, privatization and improvement of corporate governance. To ensure compliance EU standards and stimulating the market unification process were adopted natural gas and electricity market laws, liquidation started or privatization of state coal mines. In addition, Ukraine has started work

in the direction of separation of state-owned enterprises (in particular, oil and gas of NJSC «Naftogaz») and increasing the share of renewable sources in structure of energy resources [2].

Ukraine has demonstrated its desire to reform the energy sector sector, which will allow it to get on the path to sustainable growth. After signing the Association Agreement with the European Union (EU) in 2014 and assuming international obligations (including to the IMF) Ukraine began work on reforms to stimulate energy efficiency. In 2015 In 2016, the authorities carried out partial deregulation of pricing at the wholesale and natural gas retail markets and raised tariffs for consumers. Household consumers are the main final consumers in total final consumption, followed by industry and transport and others industries (in particular, public service, agriculture and non-energy use).

In 2017, the total supply of primary energy in Ukraine equaled only 89.6 million tons. The largest shares in its structure had coal (29%), natural gas (27%) and nuclear energy (25%). The largest consumer of energy is the household sector and industry - 17.6 million tons (or ~35%) and 15.0 million tons (or ~29%), respectively. Key sources supply of primary energy - coal (~33%), natural gas (28%) and nuclear energy (23%).

Ukraine produces about two-thirds of the necessary energy resources independently, however, to meet domestic demand, it continues to import gas, crude oil and petroleum products. Natural gas remains the main fuel in the structure of final consumption, where the share consumption in the household sector equals about 59%. Electric and thermal energy is consumed in the household sector and industry, and crude oil and oil products — mainly in the transport sector. Although a significant share of coal is used for the production of heat and of electric energy, its main final consumers are industrial enterprises.

In recent years, the share in the structure of energy production has also increased renewable energy sources. They were used for energy production mainly biofuels and waste.At the same time, Ukraine continued install solar and wind power plants, increasing the volume solar energy production in 2018-2019 from 948.2 to 2,640.4 MW and the volume of wind energy production — from 515.4 to 776.4 Megawatts. Solar and wind energy are used for production electricity, and biofuels and waste are available for final consumption(mainly by household consumers).

According to the general director of DTEK, the development of Ukrainian it is important to synchronize the energy sector with the global demand of society, which defines a new energy transition. At its core is the need for clean, efficient, competitive energy. The key to Ukraine's opportunities to respond to this request - reforming the industry and integration into the European one energy market. All industry participants need to join forces to in the short term, prevent worst-case scenarios the passage of the heating season, in the long term - to produce strategy for the development of the Ukrainian energy industry, taking into account global ones climatic challenges. The domestic PEK has been in need of radical reform for a long time,since the Ukrainian energy sector, being an integral component of world energy markets, is under the constant influence of world energy markets integration processes. And so, in order not to remain an outsider, Ukraine in the near future should form a new effective energy policy, which would correspond to world and European trends, in particular in the legislative field sphere.

With the accession to the European Energy Community in 2011 Ukraine undertook to implement the European energy policy legislation into its legal system. This means coordination of climatic and energy policy: increasing the share of renewable energy sources (RES), increasing energy efficiency and reducing greenhouse emissions Gases .

This is how Ukraine showed that it is responsible for the transformation of the energy sector, the development of sustainable production and conservation environment. About the local victories of renewable energy energy industry in Ukraine, its challenges and recommendations for further development it is stated below. Renewable energy sources have gained considerable popularity in Ukraine. Only in 2020, the share of RES increased by 2.3 times compared to last year. By according to the data of the State Agency for Energy Efficiency and Energy Saving, In 2019, 3.5 times more capacity was commissioned of "green" generation than in the previous four years combined. It is not only contribution to the decarbonization of the economy, but also serious investments. Renewable energy industry attracted more than 10 billion dollars. in 5 years, such an achievement is not no other sector of the Ukrainian economy can boast.

More and more cities began to announce their intention to gradually transfer local energy systems on 100% renewable sources by 2050. First became Zhytomyr in 2018, followed by Chortkiv, Lviv, Kamianets-Podilskyi, Mykolaiv, Trostyanets and Baranivka. Another example of the local beginning of energy transformation is "Solar city" in Slavutych. Conscious citizens and local authorities founded there energy cooperative, having installed solar power plants. This the energy cooperative is an example of the solidarity of citizens for the sake of cleanness the environment In addition, this is an example of the possibility of using "green"technologies at the local level.[3]

In recent years, our mining towns have also begun to transform. Although this process does not currently involve a full transition to RES, nine cities, which are part of the Platform for Sustainable Development of Coal Cities of Donetsk Oblast, consider renewable energy as one of the opportunities for "greening" of cities. Renewable energy is not only and not so much about money, it is about clean energy environment and stable climate. This means the health and well-being of our native and future generations of Ukrainians. Because the country is not the

territory of certain people borders, and above all the community of people.

The next stage of implementation of the concept of demand development, which stimulating supply on the energy market is the development of alternative forms of resource provision. A vivid example is the experience of Denmark, which, according to according to the government's official plan, by 2050 it should be completely abandoned energy of fossil fuels. The transition to renewable energy sources will mean absolute energy independence of the country and improvement of ecology. Actually the state will turn into a closed energy system that does not need support from the outside.

The main idea for the development of alternative forms resource provision for Ukraine is the use of wind energy. For, so that the construction of the wind power plant turns out to be economically justified, it is necessary that the average annual wind speed in this area is no less than 6 meters per second. In our country, windmills can be built on the coasts of the Black and Azov seas, in the steppe areas, as well as in the mountains Carpathians. In the current era of high fuel prices, it can be assumed that wind turbines will be competitive in cost and will be able to take participation in meeting the country's energy needs.

The Sun has a huge reserve of energy, but its contribution to the modern energy sector is still insignificant, because giant solar power plants have not yet been created the photocells of which would be able to convert a large amount of solar energy energy to electric [4].

In 2018, Ukraine and Iceland agreed to develop geothermal energy. Ukraine also has significant resources geothermal energy, the potential of which needs to be revealed. In this experts of the National Energy Agency of Iceland are convinced, who researched this industry in Ukraine. In general, the parties agreed to settle constant exchange of information about potential joint projects in geothermal energy industry. Energy efficiency reform in all other segments (industry, transport, energy supply) is at the initial stage and needs political leadership, complex and coordinated work of the Government, donors and international partners of Ukraine. The result of the reform should be effective system of regulations, institutions and implementation tools energy efficiency.

Fuel supply is one of the most urgent problems of the independent of Ukraine. Therefore, we have to count on the development of the energy industry of the big ones capacities, and in particular – atomic, thermal, hydropower [5].

Consequences of the invasion of 2022 for the energy industry of Ukraine. Russia's full-scale invasion of Ukraine on February 24, 2022 led to a 35% drop in electricity consumption. Russian troops captured Luhansk and Zaporizhia TPPs, occupied Zaporizhzhia NPP. Air strikes destroyed Okhtyrska and Kremenchuk CHPPs.

The current war, as an example Zaporizhzhia NPP revealed another shortcoming of nuclear energy - an opportunity one-time capture by the enemy of a significant power generation capacity. RES power plants due to greater dispersion across the territory significantly reduce this risk. In addition, the use of powerful nuclear blocks in the conditions of hostilities leads to a high risk of occurrence the new Chernobyl.

In the conditions of martial law, the energy system of Ukraine was under by the influence of a number of new challenges and risks. The risk of high energy prices. The price of natural gas on the EU exchanges is stable at a record high high level (about 1100 Euros/1000 m3). Stable high prices are maintained also on coal, oil and oil products. There are further risks increase in energy prices as significant volumes of Russian oil are withdrawn gas, oil and coal from EU markets due to a potential embargo.[6]

Prospects of energy industry of Ukraine. According to some international estimates experts, Ukraine ranks first in Europe in terms of the transit ratio. Due to its favorable geographical position in the center of Europe, as well as a sufficiently developed system of land and water ways of communication. In the perspective of creating the Baltic-Black Sea Union, using geographical location and opportunities, Ukraine could become a transit country for energy resources from Azerbaijan, Kazakhstan, Turkmenistan, Iraq and Iran to Central and Western Europe. Promising, in particular, considered the construction of gas pipelines, primarily from Iran and Iraq through Turkey, the Black Sea, Ukraine and further to Europe (in this case Turkey has more advantages (as a transit country) compared to countries South Caucasus, where Russia and its «Gazprom» have quite noticeable influence). Among promising large-scale Polish-Ukrainian joint projects, should be called the project of joining the Ukrainian HTS to the European gas network the «North-South» corridor, which would open Ukraine's access to the European corridor gas market, as well as to the capacities of the nearby Polish LNG terminal Swinoujscie [7].

The tasks of cardinal substitution should become no less important consumption of all imported energy resources at the expense of local ones energy resources (solid and liquid biofuels, biogas, green hydrogen, biomethane, solar and wind energy) and the use of modern innovative technologies of Ukrainian production (heat pumps, cogeneration, accumulators thermal and electrical energy, electrification of heat supply,introduction of distribution networks using artificial intelligence).[9]

As for natural gas of our own production, we are in favor it is necessary to assess the real and potential volumes of its production, considering the devastating consequences of the war in Ukraine. Under martial law Ukraine's energy system came under the influence of a number of new challenges and risks. The risk of high energy prices. The price of natural gas on EU exchanges is stable at a record high level (about 1100 Euros/1000 m3).

Stable high prices are also maintained for coal, oil and petroleum products [8].

There are risks of further increases in energy prices measures to withdraw significant volumes of Russian gas, oil and coal from EU markets because of a potential embargo.

We believe that Ukraine needs to develop an effective and ambitious one as soon as possible a program to refuse gas of Russian origin for several years, coal, oil and petroleum products.

I consider it real and economically justified. Such a program has to become the basis of the restoration of Ukraine's energy industry, including the program support for such recovery from the collective West. Destruction and damage to critical energy infrastructure. The hostilities led to significant destruction and damage to power plants, thermal power plants, boiler house, power grid, heating lines, gas networks, water supply systems, etc drainage Their priority restoration will require significant human and financial resources, which will also be needed for systemic reforms in of Energy of Ukraine [10].

Conclusions. Thus, to ensure stable and effective the functioning of the energy sector of Ukraine must be given priority increasing energy efficiency and using energy from renewable sources and alternative sources. This presents Ukraine with new economic and technological challenges, but at the same time opens up new opportunities for search and implementation of innovative developments in the field of extraction, processing of fossils types of fuel, production, transformation, supply and consumption of energy, which determines the need for the formation of a new energy policy of the state.

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