

REFERENCES:

1. Czibula, Oliver. G., Hanyu Gu, & Zinder Y. (2018). "Planning personnel retraining: column generation heuristics." *Journal of Combinatorial Optimization*, 36, 3, 896–915. <http://dx.doi.org/10.1007/s10878-018-0253-2>.
2. Denysenko M.P., Budiakova O.Yu. (2018). Personnel policy as a basis for the formation of innovative strategy of personnel management of enterprises. *Scientific notes of the university «KROK» Series: Economics*, 4, 231–238.
3. Duda T.S., Popivniak S.V. (2013). Labor potential of the enterprise: evaluation and means of improving efficiency. *Scientific Bulletin of UNFU*, 23.3., 370–375.
4. Pitsur, Ya. S., Hobela, V. V. (2018). Teoretyko-metodolohichniy analiz protsesu formuvannia optymalnoi systemy upravlinnia ekonomichnoiu bezpekoiu subiektiv hospodariuvannia [Theoretical and methodological analysis of the process of forming the optimal management system of economic security of economic entities]. *Scientific Bulletin of Lviv State University of Internal Affairs*, 1, 227–235.
5. Zakabluk, H. (2015). Ekonomichna efektyvnist udoskonalennia systemy upravlinnia personalom pidpriemstva [Economic efficiency of improving the personnel management system of the enterprise]. *Economics and Entrepreneurship*, 2, 33–41.

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WAYS TO ENSURE ENERGY SECURITY OF UKRAINE: DIVERSIFICATION OF THE ENERGY MARKET**Petrochenko O.,***Candidate of Technical Sciences, Associate Professor, Director of the Institute Separate structural subdivision «Institute of Innovative Education of Kyiv National University of Construction and Architecture»***Zinich P.,***Candidate of Technical Sciences, Associate Professor, Head of the Department of Civil Engineering Separate structural subdivision «Institute of Innovative Education of Kyiv National University of Construction and Architecture»***Kubanov R.,***Candidate of Pedagogical Sciences, Associate Professor, Associate Professor of the Department of Economics, Management and Territorial Management Separate structural subdivision «Institute of Innovative Education of Kyiv National University of Construction and Architecture»***Kushnir S.,***Candidate of Economic Sciences, Associate Professor of Economics, Management and Territorial Management Separate structural subdivision «Institute of Innovative Education of Kyiv National University of Construction and Architecture»***Nischuk V.***Candidate of Technical Sciences, Associate Professor, Associate Professor of Construction and Information Technology Separate structural subdivision «Institute of Innovative Education of Kyiv National University of Construction and Architecture»*DOI: [10.24412/3453-9875-2021-74-2-21-23](https://doi.org/10.24412/3453-9875-2021-74-2-21-23)**Abstract**

The place and role of diversification of energy supply in the modern system of energy security of Ukraine are determined. It is noted that diversification is a broad concept that provides for an even distribution of risks in order to reduce their negative potential impact. Diversification can concern types of energy resources, sources of energy resources, types of energy technologies. Based on the main priorities of Ukraine's economic development and in order to ensure its energy independence, the main directions of development of the domestic energy sector have been identified. According to the authors, in order to ensure the energy development strategy, an appropriate system of state regulation of the economy should be formed, which will allow for optimal interaction between all elements of the economy and the state as a whole, and will be able to regulate and maintain the economy.

Keywords: energy security of Ukraine, energy sphere of Ukraine, diversification of energy supply, reduction of energy dependence of the country, economy.

Introduction. Ensuring energy security through energy diversification, optimization of energy consumption, as well as the widespread introduction of energy-efficient technologies and innovative developments in the field of renewable energy in all spheres of

human life is becoming a central issue in national strategies for economic development and programs of global management institutions. In particular, with regard to the gas sector, a strategically important task facing the industry today is to reduce energy dependence

and guarantee Ukraine's national security. Its solution requires research on diversification of energy supply sources, study of the potential of the domestic gas transportation system, assessment of the potential of energy production and production, search for ways to increase energy efficiency and achieve energy efficiency in society.

Problems of energy security, its main components, determining the role and place of diversification policy in the energy security system are the subject of research by such scientists as: V. Barannik, S. Bevz, M. Brown, G. De Vries, D. van Wuren, I. Gaidutsky, G. Grenenberg, K. Denchev, J. Jewell, D. Johnson, O. Beak, Y. Dzyadykevich, M. Zemlyany, B. Johansson and others.

Methods. Methods of analysis and synthesis were used to solve the set tasks (to highlight the main contradictions in the energy sector); causation (to identify interdependencies in the energy sector); method of analogies (for the formation of promising areas of energy supply); generalization (to highlight the main problems and prospects for the development of Ukraine's energy sector).

Aim. The purpose of the study is to clarify the place and role of diversification of energy supply in the modern system of energy security of Ukraine.

Presenting main material. Modern researchers define «energy security» as an integral part of national security, which is expressed in the ability to provide access to vital energy resources at affordable prices. The following factors are of key importance in energy consumption: diversification of supplies, security of transit, availability of reserves, high-quality and timely information, security of infrastructure, increase of energy efficiency, protection of the environment, etc. [5; 6]. To ensure the stability of the national energy economy with a reasonable combination of market relations with government regulation, including long-term planning of its industries and the formation of strategic reserves of fuel and energy resources created in case of various crises and force majeure studies indicate different authors [7; 8].

A. Gilardoni notes that over the next 20 years, natural gas will obviously be a key energy vector [1, p. 8]. Ukraine ranks third in the world in terms of imports of natural gas, but, unfortunately, with clear signs of gas dependence in the country, almost nothing is being done to increase its own gas production or reduce its excessive consumption.

The main directions of reducing the country's energy dependence in modern conditions: diversification of types and sources of energy; increasing the transparency, predictability and stability of external energy sources; improving the investment climate in the energy sector; increasing energy efficiency and energy saving through the introduction of innovative equipment and technology; ensuring high-quality and safe physical condition of energy infrastructure; solving environmental problems of energy use and ensuring sustainable development [3, p. 176].

In our opinion, diversification is a possible way out of the crisis for Ukraine. Diversification is a broad concept that provides for an even distribution of risks

in order to reduce their negative potential impact. Diversification can concern types of energy resources, sources of energy resources, types of energy technologies. It is believed that diversification of energy supply by type and origin provides a higher level of energy security. However, diversification in itself does not lead to a positive impact on energy security, if it concerns the use of additional less reliable energy sources [4, p. 65-67].

In general, diversification covers three main aspects: diversification of energy sources (energy resources); diversification of energy suppliers; diversification of locations of separate energy objects according to the spatial (geographical, territorial) principle [6; 9].

Diversification of energy sources requires the use of a combination of different energy sources, types of energy resources, fuel cycles (based not only on nuclear energy or natural gas, but also on such types of energy resources as coal, oil, wind, biomass, geothermal energy sources, etc.). Diversification of energy suppliers involves the use of several energy production points so that one company or energy supplier cannot fully control the energy market. Spatial (geographical, territorial) diversification involves the spatial distribution of locations of individual energy facilities so that their functioning could not be disrupted due to a single event, malfunction or failure. Ensuring the diversification of energy sources by investing in many alternatives serves the interests of both consumers and producers, as this guarantees the independence of the energy supply chain from any single energy source. The geographical distribution of the locations of individual energy facilities not only increases their overall safety and reliability, but also makes the entire energy distribution network safer and more resistant to accidental failures and failures of energy systems or intentional actions. Geographical diversification contributes to the creation of several conditional goals that cannot be violated simultaneously, and thus prevents the possibility of a general collapse of the energy system.

In modern conditions, an important factor influencing the development of Ukraine's economy is the dependence on energy resources imported from abroad at certain prices. The aggravation of the problem with gas imports due to price inconsistencies increases the need to use its own energy resources. However, the problem of reliable energy supply is due to the fact that the country has insufficient own energy resources for consumption and production, which is why the country is forced to buy them from abroad.

Ensuring the energy security of Ukraine today is one of the main issues of political and economic development of the state, which affects the vital interests of every citizen, every enterprise, regardless of its form of ownership. There are active discussions among scientists and government officials about energy security and, accordingly, the diversification of sources and routes of gas supply to Ukraine, as well as ways to ensure them. According to many experts, the energy security of the state is determined by its ability to meet its current and future needs for quality and affordable energy, taking into account the likelihood of special re-

gimes of the economy in emergencies. The deep penetration of energy into all sectors of the economy and social sphere determines its special role in ensuring the security of development of modern society.

When formulating a new policy to ensure Ukraine's energy security, it is important to take into account international aspects including investments, equipment, etc. on national security and stability of economic and political relations between states, implementation of the Energy Charter and its treaty, international emergency response; the need to develop economic, legal and organizational mechanisms to ensure energy security of the state. It is important that Ukraine has become a full-fledged subject of the world energy market, the system of European and world energy security.

In order to ensure the energy development strategy, an appropriate system of state regulation of the economy should be formed, which will allow for optimal interaction between all elements of the economy and the state as a whole, and will be able to regulate and maintain the state economy at a safe level.

Based on the main priorities of Ukraine's economic development and in order to ensure its energy independence, we can identify the main directions of development of the domestic energy sector: The second direction is the production of biofuels. Ukraine has all the necessary conditions for the production and sale of biodiesel, free space for growing cereals, oilseeds and special crops, scientific, technical and human resources for the production of biofuels, growing domestic demand for biodiesel and biogas. The third direction is to increase its own oil and gas production, as well as to establish shale gas production. The fourth direction of development of diversification energy projects in Ukraine is connected with the increase in the energy balance of Ukraine of the share of hydrocarbon fuel – composite artificial liquid fuel based on coal and water. As a type of highly concentrated hydrocarbon suspension, this type of fuel will not only replace natural gas and fuel oil in boilers, but also significantly reduce emissions of oxides of nitrogen, sulfur and carbon monoxide, ensuring the combustion of organic matter up to 99%. The fifth strategic direction of energy security of Ukraine is the dynamic development of solar and wind energy, as well as hydropower projects [2, p. 20].

Conclusions. It can be stated that diversification of energy supply is: a component of energy policy aimed at improving energy security in the long run; one of the key areas of energy security; characteristics of the state of energy security (the state is considered satisfactory if the supply of energy resources is diversified); one of the ways to ensure the state of protection in the energy sector from existing and potential threats of internal and external nature; component of energy security, which includes reducing the level of dependence on suppliers by diversifying imports; one of the main directions of reducing energy dependence; a tool for achieving uninterrupted energy supply standards;

one of the key driving forces of energy security; determining component of security of energy supply; a means of reducing risks and minimizing the consequences of accidents at energy infrastructure facilities; a means of developing competitive relations between exporters.

Today, the gas deficit in Ukraine is replenished by physical reverse flows, which are related to the import of natural gas from the West. Reverse gas flows to Ukraine are directed from Poland, Slovakia, Hungary, and Norway. Diversification of natural gas supply sources helps to reduce energy dependence by increasing the number of independent energy suppliers, and, consequently, increase the level of competition in the market and increase its efficiency. The principle of diversification of sources of energy supply to the country is applied by all developed countries of the world, along with the widespread implementation of the principle of energy efficiency and energy saving.

REFERENCES:

1. Gilardoni A. The World Market for Natural Gas. Implications for Europe. Berlin/Heidelberg: Springer, 2008. 210 p.
2. Поручник А. М., Кулаковський К. О. Енергетична безпека та диверсифікація енергоресурсів. Економіка та держава. 2017. № 8. С. 18-21.
3. Олексюк В. М. Енергетична диверсифікація як фактор економічного зростання. Mechanism of Economic Regulation. 2013. № 4. С. 174-182.
4. Van der Linde C., Amineh M. P., Correlje A. et al. Study Energy Supply Security and Geopolitics. Clingendael International Programme (CIEP). Hague: The Netherlands Institute of International Relations, 2004. 281 c.
5. Денисевич К. Б., Ландау Ю. О., Нейман В. О., І. Я. Сігал. Енергетика: історія, сучасність і майбутнє. Розвиток атомної енергетики та об'єднаних енергосистем / наук. ред. Ю. О. Ландау, І. Я. Сігал. Київ, 2013. 304 с.
6. Енергетична безпека України: методологія системного аналізу та стратегічного планування: аналіт. доп. / за заг. ред. О.М. Суходолі. Київ : НІСД, 2020. 178 с.
7. Бабець І. Г. Забезпечення енергетичної безпеки України в умовах геополітичних трансформацій. Актуальні проблеми міжнародних відносин. Збірник наукових праць. 2017. Вип. 132. С. 125–137.
8. Васильєва Т.А., Приймекно С.А. Еколого-економічне оцінювання енергетичних ресурсів у контексті забезпечення енергетичної безпеки. Актуальні проблеми економіки. 2014. № 10. С. 252–260.
9. Музиченко М. В. Місце і роль диверсифікації постачання енергоносіїв у системі забезпечення енергетичної безпеки ЄС. Причорноморські економічні студії. 2017. № 21. С. 15-18.