

# SCIENTIFIC HORIZONS

Journal homepage: <https://sciencehorizon.com.ua>

*Scientific Horizons*, 26(2), 135-144



UDC 620.9

DOI: 10.48077/scihor.26(2).2023.135-144

## Energy and environmental security of the European Union in the context of russia's unstable military and economic policy

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### Article's History:

Received: 24.12.2022

Revised: 25.02.2023

Accepted: 15.03.2023

### Suggested Citation:

Semenenko, O., Dobrovolskyi, U., Tolok, P., Onofriichuk, A., & Onofriichuk, V. (2023). Energy and environmental security of the European Union in the context of russia's unstable military and economic policy. *Scientific Horizons*, 26(2), 135-144.

**Abstract.** The countries of the European Union are experiencing the first real global energy crisis in history, bearing in mind that reliability and the possibility of receiving the required amount of energy resources are the basis of full functioning and further sustainable social and economic development of countries. The purpose of the study is to analyse European Union energy and environmental security regulatory measures in terms of unpredictable actions of the main supplier of energy resources. A set of general scientific and special methods of scientific cognition was used: the historical method with a systematic analysis of energy law; the structural and functional method; synthesis; deduction and induction. As a result of the conducted study, the main areas of increasing energy security in the European Union were determined based on scientific programmes using renewable energy sources, which gradually reduce the demand for organic



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fossil fuels (natural gas, oil, coal, peat, oil shale). The situation of dependence of EU states on the export of Russian energy resources was also characterised and the process of changing the EU energy policy was illustrated. This research contains an analysis of the ecological aspect of the change in the situation with energy security in the EU, and forecasts regarding the situation on the international energy market of Russia. The primary theoretical principles, conclusions, and practical recommendations in the industry of the energy market would help accelerate the diversification of the natural gas market in Ukraine in terms of joining the European Union energy market.

**Keywords:** environmental risks; energy carriers; renewable energy; international security; energy market; environmental policy

## INTRODUCTION

Energy security is determined by the technical ability of energy industries to provide appropriate services at a reasonable price and to meet the current and prospective needs of energy consumers. The armed aggression of the Russian Federation against Ukraine has violated the global energy system and entails security risks due to high energy prices and excessive dependence on gas, oil, and coal imports. The Russian Federation remains one of the three largest worldwide producers of natural gas and oil, competing for first place with Saudi Arabia and the United States of America (USA). Two products the Russian Federation depends on income from are natural gas and oil. It could be seen from the 2021 budget report, that these two items represent 45% of GDP (gross domestic product). S. Ghaderi (2022) states that the scarcity of availability to robust and sustainable energy in the European Union (EU) is an obvious threat to the security of the entire European continent. According to data from the European Commission, the energy consumption of Russian electricity by EU member states was the biggest in the year of 2021. EU countries' energy dependence on supply from the Russian Federation became an additional impetus to the further search for ways, forms and means of diversifying the supply of liquefied natural gas (LNG) to the EU countries to maintain the reliability of natural gas delivery and energy security in general. With the beginning of the conflict, the EU began to conclude short-term agreements for the LNG supply to compensate for the sharp decrease in supplies through Russian pipelines (Fit for 55..., 2022).

According to G. Sgaravatti *et al.* (2022), the export of natural non-renewable energy resources to EU countries allows balancing the needs of the economy in energy resources in the winter period. Competition for LNG supplies and a decrease in Russian gas pipeline supplies have led to increase in prices on energy markets. In combination with increase in prices for food products, prices for other non-energy goods increased, and increase in prices for imported fuel led to a sharp increase in general consumer prices in many European countries and inflation reached double digits. In response, governments have taken a number of short-term actions to facilitate the pressure of rising prices on energy carriers for utilities and businesses. J.L. Iriarte Ángel *et al.* (2022) proves that since energy prices are

expected to continue to increase, and financial support will increase with a decrease in total national income, the development of cost-effective support policies will be a key policy task in EU countries.

In addition to the political situation, issues regarding the deterioration of the environmental situation in the world and the issue of transition from renewable energy sources (oil, coal, gas) to renewable energy sources (RES) remained relevant. According to forecasts of J.D. Hughes (2014), in the 21st century, the reserves of hydrocarbon resources will be significantly depleted, and including the growth of the Earth's population, the level of energy consumption will increase.

Increase in prices on energy markets and the threat of instability in the energy resources supply led to a more active implementation of planned measures to ensure climate neutrality. What was previously planned for environmental concerns with the increase in energy prices, has gained economic advisability. Considering the challenges facing the global community and individual countries in connection with climate change (in particular, the summer drought in Europe), the issue of energy security is becoming increasingly relevant. And although it is difficult to deny the importance of transitioning to more ecological energy sources as soon as possible, states actually have to perform a difficult dual task: on the one hand, reducing the harmful influence on the climate, and on the other hand, continuously providing their countries with sufficient amounts of energy carriers and their maximum supply.

The main purpose of the study is to analyse the regulatory measures of the European Union energy system security in terms of unpredictable actions of the main supplier of energy resources.

## POSSIBILITIES AND RISKS OF EUROPEAN ENERGY AND ENVIRONMENTAL SECURITY

Energy security should be understood as the ability of the state represented by its governing bodies to provide end consumers with energy in the necessary amount and appropriate quality under normal conditions, including during the action of destabilising factors (emergency situations) of an internal or external nature within the guaranteed coverage of the minimum amount of the country's most important needs, its individual districts,

cities, villages or objects in fuel and power resources. The European energy security system is based on categories of availability and acceptable level of prices for energy resources. M. Stetsyuk (2021) suggests that the dependence on Russian energy could be reduced by diversifying energy carriers into alternative ways of supplying liquefied gas imported from Egypt, Israel and the countries of the Middle East and that are the components of energy security, such as consumption and supply. According to Z. Kovacic and L.J. Di Felice (2019), it is almost impossible to form a relevant picture of energy security based only on the analysis of scientific publications and documents. That is why the found data cannot be re-approved at the legislative level or agreed upon without partial loss of valuable information.

Based on the theory of resource dependence presented by J. Colgan (2013), the Russian-Ukrainian war from the perspective of energy and energy markets began as early as 2014. It was the deployment of hostilities on the territory of Ukraine and the annexation of the Crimean Peninsula by Russia that caused the energy confrontation. According to J. Johannesson and D. Clowes (2022), one cannot deny Russia's extreme dependence on profits from the export of energy products to Europe, and Ukrainian energy pipeline systems are a direct potential and competitive threat to Russian energy exports. V.S. Herindrasti (2022) suggests that at this stage of the transition of the EU countries from the usual energy resources to alternative ones, there is an emergence of inequality in the speed of transformation of energy systems. This phenomenon may leave a negative mark on the energy security of the European Union. The world population is constantly growing, leading to a rise in the global energy use carriers, according to G. Cotella and S. Crivello (2016), in the long-term perspective until around 2050, the growth of the world demand for energy is predicted by another 100%.

Trends in the global environmental situation are worsening, according to H. Ritchie *et al.* (2020), carbon dioxide emissions increased from 1.95 billion tonnes in 1900 to 36.44 billion tonnes in 2019. As of 2019, the largest emissions volumes were registered in the People's Republic of China – 10.17 billion tonnes, the USA – 5.28 billion tonnes, and also in the EU countries – 2.92 billion tonnes. P. Bórawski *et al.* (2022) notes that a comprehensive approach explains the need for legal regulation in conditions of limited resources, as well as the importance of introducing certain global management parameters to prevent conflict situations in achieving energy security of the EU countries. P. Kivimaa (2022), in the framework of studying the guarantee of energy security in the EU states, also considered the process of balancing between, on the one hand, new energy sources, and, on the other hand, the growing demand of consumers due to their imports. As R. Sakwa (2022) states in their publications, natural gas reserves in EU countries continue to grow and currently their amount are about 75%.

In accordance with the conditions of the Renewable Energy Directive (2009), the diversification of resources of energy is planned in the EU until 2030, which involves the use of a combination of different energy sources, fuel cycles, energy resources types, relying not only on natural gas and nuclear energy, but also on coal, oil, sun, wind, biomass, geothermal energy sources, etc. T. Walde (1995) provides an evaluation of the Green Paper – A European Strategy for Sustainable, Competitive and Secure Energy (2006), which can accelerate the current situation, therefore, the European Commission introduced political support for an alternative energy transition aimed at building a climate-neutral continent in EU countries. The cooperation of the International Energy Agency (IEA) (2022) and the International Renewable Energy Agency (2022) will develop a global energy security, which would resolve the issue of gas and oil market dissonance, mitigate geopolitical tension and uncertainty to achieve reliability and availability energy in the context of environmental challenges. The activation of investment in alternative energy sources and the introduction of energy saving at the national level will be a logical result of the increase in the price of non-renewable types of energy. Meanwhile, the rise of the price of natural gas may trigger a switch to coal. An increase in tariffs for carbon emissions may also be applied to regulate the environmental situation at enterprises. However, global fossil fuel prices will decrease in the future. Renewable energy sources (RES) (solar, wind, marine, geothermal, and bioenergy) are considered as a “critical point” in interstate energy relations and are completely changing the landscape of international relations. The process of transition from one dominant type of energy to another is revealed in the most exciting way in the view of geopolitics in the global dimension. The fact is that fossil fuels will end one way or another, and then the question of using renewable types of energy will arise. Energy emphasis will be transferred from one country to another as soon as traditional types of energy are replaced by alternative ones. This process will also have an impact on the strategies and models of concluded energy relations between the countries (Ari *et al.*, 2022).

#### **CURRENT SITUATION OF DEPENDENCE OF EU COUNTRIES ON RUSSIAN GAS**

Today, the Southern Gas Corridor is the main project for the diversification of European energy security. The project will enable the countries of Central Asia and the Middle East to export such an important resource as natural gas to the member countries of the European Union. Statistics for 2022 from the International Energy Agency (2022) show that it is known that the Middle East has the largest share of natural gas reserves of more than 40%. In the recent 20 years, consumption of natural gas and oil reserves in the region has increased by 30%, mainly with the help of the discovery of new

fields in Qatar and Iran. The CIS countries rank second in terms of the volume of deposits, their share is more than 30% of the global stocks of natural gas, and the share of the Russian Federation is more than 20%. However, over the past two decades, the Russian Federation gas reserves have increased by 13% and reached 37.6 trillion m<sup>3</sup> compared to Iran's reserves of 32.1 trillion m<sup>3</sup> and Qatar of 24.7 trillion m<sup>3</sup>. The volume of deposits of the United States of America is 12.6 trillion m<sup>3</sup>, and Turkmenistan is 13.6 trillion m<sup>3</sup>. Other countries in the world do not have large deposits, the largest, for example, in Norway, but the main European gas producer has reserves of only 1.5 trillion m<sup>3</sup>. At the same time, natural gas reserves in the EU amount 0.4 trillion m<sup>3</sup> or only 0.2% of the global (EU gas storage..., 2022). According to the President of the European Commission, Ursula von der Leyen, due to the gradual rejection of Russian raw materials, the supply of liquefied natural gas from the USA to Europe increased by 75% compared to 2021.

Measures are being taken against the Russian Federation in the form of an antimonopoly process against Gazprom to eliminate obstacles in the natural gas flow to EU countries. According to EU statistics, an average of 43% of all gas brought to the European Union in 2020 came from the Russian Federation. However, as of mid-2022, the EU countries most dependent on pipeline gas supplies from the Russian Federation are: Germany, Italy, Poland, Bulgaria, and Austria (Khattak *et al.*,

2018). First, the countries that are members of the European Union plan to significantly reduce (by a third) the consumption of Russian gas by the end of 2022. In August 2022, an unusually rapid reduction in gas flows could be observed. Some of them were reduced by the states, others were stopped by Gazprom. It is worth noting that some countries of the European Union have completely abandoned the consumption of electricity from Russia. Among such countries are Estonia, Lithuania, and Latvia, which completely cut off the supply of Russian gas in April. Bulgaria, Poland, and the Netherlands also announced their lack of intention to extend gas supplies from Russia. In total, due to the refusal of countries to cooperate in energy or due to the cessation of supplies to the Russian Federation, Finland, Denmark, the Netherlands, Bulgaria, and Poland stopped energy consumption from Gazprom. As for the decisions made by Gazprom, in June-July 2022, gas supplies by the company to Italy were reduced by 15% and to Germany by 60%. The situation with gas supplies to Moldova remains unclear. Slovakia also supported the initiative to reduce the consumption of Russian gas, reducing supplies in 2022 by 66%. The supply of energy resources is used by Russia as a weapon to punish the European Union for imposing sanctions and to put more pressure on European countries. Data for August 2022 show that gas consumption from Russia by EU countries decreased by 42% (Table 1) (EU gas storage..., 2022).

**Table 1. Features of agricultural organisation transactional expenses accounting**

Countries	Russian Federation' gas import in 2020, in TJ	Russian Federation' gas production in 2020, in billion m <sup>3</sup>	EU countries dependence on Russian energy carriers, %	EU countries dependence on the Russian Federation' gas in 2020, in billion m <sup>3</sup>	Stopped in 04-08, 2022 (in relation to 2020)
Austria	305.616	8.0	76	6.1	
Belgium	633.872	16.6	8	1.3	
Bulgaria	102.234	2.7	73	2.0	2.7
Greece	206.346	5.4	39	2.1	
Denmark	86.828	2.3	-	0	2.3
Estonia	14.376	0.4	46	0.2	0.4
Iceland	190.695	5.0	-	0	
Spain	1.168.586	30.6	11	3.23	
Italy	2,448,407	64.0	41	26.2	54.4
Latvia	38.111	1.0	100	1.0	1.0
Lithuania	82.553	2.2	50	1.1	2.2
Luxembourg	26.011	0.7	25	0.2	
Malta	12.820	0.3	-	0	
Netherlands	1.316.248	34.4	36	13.36	34.3
Germany	3.118.859	81.6	46	37.3	32.6
Cyprus	-	0	0	0	
Poland	715.468	18.7	46	8.69	18.7
Portugal	216.612	5.7	10	0.55	
Romania	382.802	10.0	9	0.86	

Table 1, Continued

Slovakia	170.552	4.5	88	3.94	2.0
Slovenia	30.795	0.8	12	0.09	
Hungary	366.421	9.6	111	10.6	
Finland	87.792	2.3	68	1.6	2.3
France	1.463.842	38.2	20	7.7	
Croatia	100.733	2.6	0	0	
Czech Republic	304.646	8.0	86	6.9	
Sweden	52.459	1.4	14	0.19	
Total		356.9		139.9	152.9

**Source:** EU gas storage and LNG capacity as responses to the war in Ukraine (2022)

Compared to the average norms for the supply of natural gas to the EU from Russia in 2021 (3 billion m<sup>3</sup> per week), at the beginning of August 2022, there was a positive trend in reducing imports of energy resources (1 billion m<sup>3</sup> per week). Moreover, the supply of Russian gas through the Yamal-Europe pipeline was completely stopped. Because of this, Russia used only 40% of the transit capacity of the Ukrainian transit system, which was previously paid for and reserved. In addition, Russia completely stopped the supply through "Nord Stream-1". Gas prices have more than tripled since the start of 2022, with serious consequences for commercial and retail customers. The reduction in supplies has significantly raised the European gas price. To increase the reliability of energy supply in the EU, its member states agreed on July 26, 2022 to voluntarily reduce gas consumption by at least 15% (drawing a parallel with the average amount of consumption over the past five years). The established changes entered into force from August 1, 2022 to March 31, 2023 (Member states commit..., 2022).

Germany, seeking to contribute to global climate change, has implemented a strategy of refusal of nuclear energy and coal by 2022, so as of August 13, 2022, it was particularly dependent on Russian natural gas inflows. However, at the national level, Energy Security Act press release called for a 20% reduction in natural gas consumption to prevent gas shortages in winter. Specific energy-saving measures were indicated: lowering the minimum heating temperature in work places, population, administrations and companies to 19°C. In addition, gas suppliers and landlords should inform customers and tenants of their expected gas consumption and associated with its costs from the perspective of potential savings. Specific energy-saving measures were suggested: a ban on heating private swimming pools, aesthetic lighting of residential buildings, shops and advertising at night. Germany will additionally need to purchase about 10 GW of liquefied gas from the USA to compensate for the missing supplies from the Russian Federation.

Italy's strategy to reduce dependence on the Russian Federation is based on efforts to replace non-renewable

energy resources and gradually abandon the import of Russian natural gas. In particular, the Italian government plans to reduce the volume of gas imports from the Russian Federation from 40% to 25%, respectively. It is also necessary to accelerate investments in renewable energy sources without specifying unforeseen circumstances, plans to increase the storage level of this energy. Moreover, Italy introduced certain measures in May that relate to the temperature in public buildings. Compared to Italy and Germany, France's dependence on gas supplies from Russia is much less. For this reason, France presented an "energy sobriety" plan, according to which the country will achieve energy savings of more than 10% in 2 years (compared to 2019). Spain, which is even less dependent on Russian supplies, has already adopted a number of measures, such as limiting the temperature of cooling, heating, and electric lighting in public places. Implementation of the programme to promote investments in alternative kinds of energy and energy savings would lead towards 7% of the total energy savings by March 2023.

Exports of Russian oil and energy raw materials to Europe, the United States of America, Japan, and South Korea have decreased since the beginning of the war, but losses in production have been reduced due to the diversion of flows from other countries like India, China, and Turkey, and domestic demand in Russia itself. In July, oil production in Russia was just 3% of pre-war levels, and oil exports also fell by less than 2%. Income from Russian oil exports decreased from USD 21 billion to 19 USD billion in June 2018. However, according to Russian customs, the total amount of 10 incomes for the full year of 2021 is USD 111 billion. Oil exports were also reduced inertially, by 115,000 barrels per day (BPD), to 7.4 million BPD.

The International Energy Agency (2022) notes that Western sanctions have so far had only a limited impact on Russian oil production: an embargo on sea imports of Russian crude oil (about 90% of oil imports into the EU), a ban on the import of oil products, except for pipeline oil. Temporary measures on the consumption of oil and petroleum products were provided for contracts

execution on global market and existing contracts, six months for marine crude oil and eight months for petroleum products, which are not expected to take full effect until December 2022 and February 2023, respectively. A further reduction in the supply of russian oil is

the desired result of the EU ban on its imports from the russian federation. It is associated because the russian federation will definitely have to find new sales markets for 1 million barrels per day of oil products and 1.3 million barrels per day of crude oil (Table 2).

**Table 2.** russian oil export, mbpd

Oil consuming states	08. 2021	01. 2022	02. 2022	03. 2022	04. 2022	05. 2022	06. 2022
EU oil	2.1	2.3	2.4	2.1	2.1	2.0	1.8
EU petroleum products	1.3	1.5	1.6	1.3	1.4	1.3	1.1
USA + Great Britain	0.7	0.6	0.9	0.2	0.1	0	0
China	1.6	1.7	1.6	1.8	1.8	2.0	1.8
India	0.1	0.1	0.1	0.5	1.0	1.0	0.8
Turkey	0.2	0.2	0.2	0.4	0.4	0.3	0.4
Central Asian countries	0.4	0.4	0.3	0.3	0.3	0	0.1
Other states	1.2	1.1	0.9	1.0	0.9	1.0	1.4
Total	7.5	8.0	7.9	7.7	7.9	7.6	7.4

**Source:** National Policies to Shield Consumers from Rising Energy Prices (2022)

The lowest level of crude oil exports in the russian federation fell on August 2021. Then the total volume of external supplies amounted to 7.4 million barrels per day, which is 250,000 barrels less than usual. However, in the case of the export of petroleum products, the situation remained stable: 2.4 million barrels of products were exported per day. Meanwhile, export income increased by USD 700,000 per day up to USD 20.4 billion per month, which is 40% higher than the previous year's average due to increasing crude oil prices (International Energy Agency, 2022).

Low level of taxation of the oil and gas sector: the russian budget for July underestimated additional tax income from this economical sector by RUB 74.7 billion (USD ~1.3 billion) (that is, the actual tax income turned out to be lower than expected by the Ministry of Finance). According to the Ministry of Finance, total income from the oil and gas sector in July amounted to RUB 770.5 billion, down 22.5% compared to July 21. For example, revenue from export duties was down by a third compared to the previous year. Oil and gas income in June amounted to RUB 138.9 billion (USD ~2.4 billion), higher than the forecast of the Ministry of Finance. Oil and gas income in May amounted to RUB 263.7 billion (USD ~4.2 billion), higher than the forecast of the Ministry of Finance. In April, the russian budget showed that tax income amounted to RUB 1.3-3.1 billion. In the russian budget as of March, tax income from the oil and gas economical field were short-received by RUB 302 billion (USD ~2.9 billion) In the russian budget as of February, tax income from the oil and gas sector were short-received by RUB 216.4 billion (USD ~2.8 billion), but for January income were short-received by RUB 74.8

billion (USD ~1 billion) deficit (Energy Security: Reliable..., 2022). The diversification of the energy supply sources of the EU countries can be determined both by the consequences of energy cooperation and by various political aspects. In the context of business relationships the states of the European Union with russia, it is necessary to focus on the following directions: military aggression of the russian federation against Ukraine, which endangers the reliability of the energy security system in EU countries; ensuring stable energy supplies; reducing the energy dependence of the European Union on russia through cooperation with third countries; diversification of transport routes, suppliers; RES.

#### DYNAMICS OF DEVELOPMENT ENERGY SYSTEM IN EU COUNTRIES

Currently, the most progressive in the advance of alternative energy are the USA and the countries of the EU. Their mission is to minimise the number of pollutions from energy enterprises. In the event of minimising Europe's energy dependence on russian resources, the issue of guaranteeing the EU's energy security system can be solved. Decreasing consumption of energy and rising the overall level of energy efficiency can also have a positive effect. Implementation of the plans is possible with the use of RES that have sufficient potential to ensure the energy consumption of the European Union countries.

Therefore, in the course of the study, it was established that EU countries operate in two dimensions of energy security: external and internal. The internal dimension takes place in the EU itself and includes the implementation of energy security measures between

member states, regulated by the Lisbon Convention standards. As for the external dimension, it includes the relations normalisation in the area of energy security between the EU and partner countries. Legal regulation of these relations is also carried out in accordance with the security criteria of supply, secondary legal criteria set forth in proposals, agreements with third countries participating in the energy supply chain. Providing energy security suggests that the EU member states implement a coordinated policy in the foreign policy arena. The European plan to ensure sustainable, competitive and secure energy system is defined by general instruments of foreign energy policy. However, T. Lan *et al.* (2022) suggest a quick resumption of work in accordance with the Green Book of the European Commission, which includes partnership relations with manufacturers, countries of transit, and other international entities.

Currently, the International Energy Agency (2022) community ensures around 75% of the worldwide energy requirement for more than 5 billion users. On August 11, 2022, the IEA published the "Oil Market Report", which applies to the switching between gas and oil as well as to the rising usage of oil demand to produce more electricity. In July 2022, oil supplies reached their post-pandemic high, so the IEA revised its forecast for global oil supply towards higher consumption, indicating that the decrease in Russian supplies is more limited than previously expected. Recently, a bilateral Declaration of Association was signed between Ukraine and the IEA that will allow participation in the summits of the permanent groups and committees of the IEA, as well as in personal ministers meetings.

Analysis of the EU energy security structure allows stating the need to use a wide range of energy resources, such as: nuclear energy, natural gas, crude oil, coal, hydropower, biomass and waste, wind, solar radiation, geothermal energy, tidal energy, etc. Scientific progress based on the decarbonisation of the energy economy and the minimisation of harmful effects on the environment will allow the formation of the latest RES. This step will dramatically decrease the intake of fossil fuels within the European Union. Among the leading factors of the further alternative energy development within ensuring the energy security of the EU member states could be called: the ability to provide states with independence from the import of energy carriers and to positively influence global economic processes by establishing stable pricing.

The change of course in the energy security system of the EU member states due to the supply of liquefied natural gas, oil and coal, and the further course towards the RES development and the replacement of natural gas with other types of energy (for example, electricity) deserves special attention. In particular, for this purpose, Austria is introducing restrictions on electricity prices for the period from December 2022 to June 2024. I.V. Perevozova *et al.* (2022) emphasise the increase in

LNG supplies as of June 2022, where the USA delivered more LNG to the EU by tankers than was delivered by pipelines from the Russian Federation during the same period of time, but access to LNG requires the EU states to build special import terminals and integrate them to their gas networks.

In the area of energy security, an external dimension has been suggested between the relations of Ukraine and the EU, because Ukraine is taking all necessary measures before becoming a member of the EU. This is evidenced by the agreement signed on December 18, 2009, after which Ukraine became a full member of the Energy Community. Crises encourage the EU countries to take the discourse towards ensuring energy security more intensively. For example, during the previous energy crisis between Ukraine on the one hand and Russia on the other, the EU states were concerned about ensuring that Russian gas supplies were as intense as before. R. Kłaczyński (2022) suggests that the EU countries insist that gas transit from Russia should still take place through Ukraine as an important transit territory.

Renewable energy, which has huge potential in the EU countries, is gaining high popularity. The EU is building mechanisms aimed at developing an algorithm for the implementation of alternative energy sources. In addition, environmental and climate problems regarding CO emissions from burning natural gas are growing. European societies are ready for the transition from the generally accepted use of energy resources to "green" energy. The economy of the EU countries is energy-consuming, because electricity production, gas and water supply alone account for a third of total energy consumption. The implementation of big new investments in RES projects, exploration of new oil and gas deposits, construction of pipelines, new nuclear reactors is an urgent line of EU energy security. I.V. Yakovyuk and K.V. Tsypshchuk (2021) emphasise that, on the one hand, energy carriers from the Russian Federation solve in the long term the problems of outdated equipment and low energy and economic efficiency, and on the other hand, 60% of equipment is outdated, and in oil refining 80% of capacities are at a disappointing age from 30 to 60 years.

The EU states really depend on the gas of the Russian Federation. For this reason, one way or another, part of the system of energy security in the Europe is the stability of the supply of energy products from the Russian Federation. For example, Russia has positioned the South Stream 1 and Nord Stream 2 projects as options for strengthening energy security in European countries. However, with the beginning of Russia's aggression against Ukraine, the "REPowerEU" energy security plan was approved, which should reduce the EU's energy dependence on Russian gas to zero by 2027.

By limiting the EU's dependence on Russian oil and gas, the Russian Federation will lose its market, which will force it to export resources to China and other Asian

countries. According to L. Tichý (2020), it is established that from the supply side of oil and gas fields in Western Siberia, consumption there will definitely decrease. Thus, in the future, the energy sector of the Russian Federation should move to Eastern Siberia and the Arctic, requiring new infrastructure, the development and application of advanced technologies to strengthen the dependence of the Russian Federation on commercial partners from outside. The studied issues of energy security in the EU countries somehow collide with the Russian energy sector, and it will not be without negative consequences. The discussion of the consequences depends primarily on how far the Russian Federation will continue to monopolise the energy sector, without competition from private and foreign holdings. An important and urgent task of Ukraine today is to explore the relevant mechanisms of energy security and determine the EU strategy, as an import-dependent country to ensure resistance to possible energy shocks, interruptions in the supply of energy carriers in the short term, and to reduce dependence on specific fuel types.

### CONCLUSIONS

As part of this study, it was found that in order to ensure the energy security of the EU and reduce dependence on the Russian sources of energy, the values and standards of energy security are used. In order to successfully build new energy sectors in the EU countries, it is necessary to establish public and private ownership balance in the energy sector. In the case of energy security determination, it is not the problem of unifying approaches to defining its content that is much more important than the formation of an effective mechanism to ensure the security of the energy sector. One of the stages of Ukraine's integration process is the improvement of the

regulatory framework for regulating the energy sector. Therefore, it is necessary to agree on the positions of researchers and adopt important acts in this area, considering the conclusions of researchers. The study also determined that with the loss of Russia's permanent exporters of gas and oil products, the situation in the energy market of the Russian Federation may begin to develop towards the East, selling energy resources to China and other Asian countries. From the perspective of improving energy security in the European Union, it is important for countries to switch from non-renewable types of energy to alternative ones, as well as to reduce the total volume of energy consumption.

The price crisis in the energy market has shown that the EU is too dependent on carbon fuels. In the mid-term, biomethane and hydrogen will be the basis for decarbonisation in a wide range of sectors and increase EU autonomy through domestic production. According to experts' forecasts, in the future until 2040, there will be further steady growth of renewable energy. The course taken by the European states towards the alternative energy sources development of was once again confirmed by the dramatically changed circumstances in the energy area with the onset of the energy crisis in 2022, which was provoked by the Russian war aggression against Ukraine. Despite the fact that currently the studied issues are in a state of rapid dynamics, the methods and solutions determined during the study will not lose their relevance.

### ACKNOWLEDGEMENTS

None.

### CONFLICT OF INTEREST

None.

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## **Енергетична та екологічна безпека Європейського Союзу в умовах нестабільної військової та економічної політики росії**

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**Анотація.** Країни Європейського Союзу переживають першу в історії справжню глобальну енергетичну кризу, маючи на увазі, що надійність та можливість отримання необхідної кількості енергоресурсів є основою повноцінного функціонування та подальшого сталого соціально-економічного розвитку країн. Метою дослідження є аналіз заходів регулювання енергетичної та екологічної безпеки Європейського Союзу в умовах непередбачуваних дій основного постачальника енергоресурсів. Використано комплекс загальнонаукових та спеціальних методів наукового пізнання: історичний метод із системним аналізом енергетичного права; структурно-функціональний метод; синтез; дедукція та індукція. У результаті проведеного дослідження визначено основні напрями підвищення енергетичної безпеки Європейського Союзу на основі наукових програм з використанням відновлюваних джерел енергії, які поступово зменшують попит на органічні викопні види палива (природний газ, нафта, вугілля, торф, горючі сланці). Також охарактеризовано ситуацію залежності країн ЄС від експорту російських енергоресурсів та проілюстровано процес зміни енергетичної політики ЄС. Дослідження містить аналіз екологічного аспекту зміни ситуації з енергетичною безпекою в ЄС, а також прогнози щодо ситуації на міжнародному енергетичному ринку росії. Основні теоретичні положення, висновки та практичні рекомендації в галузі енергетичного ринку сприятимуть прискоренню диверсифікації ринку природного газу в Україні в умовах приєднання до енергетичного ринку Європейського Союзу

**Ключові слова:** екологічні ризики; енергоносії; відновлювальна енергетика; міжнародна безпека; енергетичний ринок; екологічна політика

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