

THE ENERGY SECTOR IN ENSURING RUSSIA'S ECONOMIC SECURITY: ANALYSIS OF THE PRIOD 2011-2023

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Abstract. The article is based on the results of research conducted by the staff of the Research Institute "New Economics and Business" of the Plekhanov Russian University of Economics. The purpose of the study was to identify and assess the degree of influence of the state of the Russian energy sector on the level of economic security of the country. When writing the article, the methodological apparatus (quantitative and qualitative methods) was used, the authors presented the results of the study in the form of theoretical and empirical data on the stated research issues and tasks within the framework of the problem using previously designated materials and methods. The article substantiates a set of indicators for assessing economic security based on the works of Russian and foreign economists, as well as Russian strategic planning documents. This system of indicators can be applied in practice. The analysis of the features and current state of the Russian energy sector, including the country's position in the world energy markets, is carried out. The main internal and external threats to Russia's economic security, which are formed under the influence of energy factors, are identified. Measures are proposed to improve the domestic and foreign energy policy of Russia, as well as the legal regulation of Russian energy in order to increase the level of economic security of the country.

Keywords: energy sphere; fuel and energy complex (fuel and energy complex); energy resources market; "green" energy; environmental risks; energy security; energy independence; internal and external threats; extremely critical values.

1. Introduction

The relevance of the research topic is due to the increasing role of the energy sector in the economies of developed and developing countries of the world. This trend is supported by the fact that ensuring constant economic growth requires increasing energy consumption. This is also facilitated by the deepening of the informatization of society. In these conditions, ensuring the security of the state's economy within the framework of the energy factor is important not only from the point of view of maintaining the progressive development of the economy, but also in general the possibility of functioning of modern society.

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Speaking about the Russian energy sector, it is impossible not to note that the fuel and energy complex of the Russian Federation not only provides domestic demand for energy resources, but is also an extremely important source of filling the federal budget, providing export revenues from the sale of energy carriers, which make up a significant part of all foreign exchange receipts to the budget.

The global world energy industry is currently at the beginning of the so-called fourth energy transition, which means the gradual abandonment of non-renewable primary energy sources in favor of renewable ones, in other words, the transition to "green" energy. These ideas and trends with varying degrees of acceptance by society are spread primarily in the leading countries of Europe – Germany, France and Great Britain. In the short term, changes in macroeconomic and political conditions lead to the fact that the popularity of the ideas of accelerated abandonment of fossil energy resources is constantly changing. Nevertheless, in the long term, the fourth technological transition seems inevitable due to the exhaustion and rise in the cost of coal, oil and natural gas. The changes considered will have an impact on the Russian energy sector, and whether the fuel and energy complex of Russia will be able to effectively integrate into the changing energy market will largely affect the energy and economic security of Russia in the country in the future.

Modern Russian energy scientists, Doctors of Technical Sciences and corresponding members of the Russian Academy of Sciences Trukhny A.D., Makarov A.A. and Klimenko V.V. define energy in a broad sense as a separate sphere of economic activity of mankind, which is a set of natural and artificial subsystems, the purpose of which is to ensure the processes of transformation, distribution and use of energy resources of any kind. (Trukhny et al, 2003). Scientists determine that the purpose of the energy subsystem is to ensure the conversion of primary (natural) energy into secondary (heat and electricity).

It is worth noting that in Russian science and law-making activities, instead of the term "energy" or "energy sphere", the term "fuel and energy complex" (fuel and energy complex) is often used. Indeed, this definition better describes Russian realities, since Russia's energy sector is not confined only to the production and distribution of electricity, but includes much more areas. So, Zuev V.A. defines the fuel and energy complex more specifically as a set of subsystems, in particular, including, at least, the extraction and production of fuel, the production of heat and electricity, as well as the infrastructure that ensures their transportation (Zuev, 2006).

It can be concluded that the country's fuel and energy complex, along with the conversion of primary energy into secondary energy, also includes such areas of activity as the extraction of minerals that are energy carriers (coal, oil, natural gas with their varieties, etc.), as well as the transportation of both already generated (secondary) electricity and thermal energy, primary energy carriers, including their export by road, rail, pipeline and sea transport. All of these types of economic activities are of exceptional importance in Russian realities due to the presence of significant reserves of the listed minerals on the territory of the country, as well as due to the large territory of the country and the remoteness of primary resource sources, that is, places of coal, oil, natural gas extraction, which are concentrated in the east of the country, from the main places of concentration of energy consumption in large cities and centers of energy-

intensive industry in the western part of the country.

The energy sector is one of the fundamental spheres of society's life, without it, the functioning of society itself in the modern form that we are used to observing is unthinkable. All industrial production, and hence the entire real sector of the economy today relies on the conversion of electrical energy into mechanical, thermal, etc. This, as well as the already mentioned environmental factor and the fact that the fuel and energy complex inherently contributes to the formation of natural monopolies in the fields of production, generation and distribution of energy, is associated with the rigidity of regulation of the energy sector, the need for its maintenance and provision by the state. Lee Hamilton, President of the W. Wilson MNC, justifiably notes that energy security is the second most important component of the economic security of any modern state after national defense (Lee Hamilton, President of the W. Wilson MNC, 2005). The previously justified exceptional importance of energy, in particular for ensuring the functioning of the economy, makes it necessary to include the energy factor, in other words, energy security, in the system of economic security of the state.

The scientific community has not yet developed a unified approach to the definition of the concept of "energy security". Leading scientists from foreign countries belonging to the developed category focus only on the physical and economic availability of electricity. The leading American scientists studying the US energy sector, J. H. Kalicki and D. L. Goldwyn, define energy security as having access to energy resources that ensure the continuous development of the national economy (Kalicki & Goldwyn, 2005). Here, scientists operate with the concept of "energy" rather in a narrow sense, without highlighting such aspects as the mandatory increase in the level of energy independence of the country, and also do not associate energy with other spheres of society – politics, ecology, etc. Thus, in the USA, the approach to energy security is based on the role of energy in ensuring the progressive development of the economy. In European countries, on the contrary, they realize the importance of such an energy security factor as energy independence, especially after the deteriorating relations with Russia, which is the main supplier of energy carriers, in 2014 and again in 2022. Thus, British scientists Dr. R. Leal-Arcas, Juan A. Ríos, Dr. K. The Grasso claim in their 2015 study that "the already fragile position of the EU in the international energy arena in terms of security of supply is becoming more uncertain than ever after another quarrel with its historic energy supplier, Russia" (Leal-Arcas, Ríos & Grasso, 2015)

Russian scientists traditionally approach the definition of energy security somewhat more broadly, taking into account the specifics of the domestic energy industry. The basis of energy security, according to the former leading expert of RAO "UES of Russia" V. Ishkin, is the protection of citizens and the state from the threat of a shortage of all types of energy and energy resources, which can lead to both negative effects caused by macroeconomic, technical, natural events, and external and internal political factors (Ishkin, 2007). C.V. agrees with the above definition. Nadezhdin, Regional Energy Adviser of the UNECE, adding that energy security is a state of society that makes it possible to compensate for the negative impact of all these negative factors, thereby maintaining the necessary level of national energy security (Nadezhdin, 2001). In the light of recent geopolitical events, it is advisable to add to this definition the destabilizing role of global politics, since in many respects modern energy has ceased to

be a closed sphere of one state. Thus, in the context of the formation of global energy, the state should be able to independently provide its own energy sector for the purposes of.

The essence of energy security fits into the concept of economic security of the state. Thus, the Soviet and Russian economist, Doctor of Economics, Professor, Academician of the Russian Academy of Sciences L.I. Abalkin defined the economic security of the state as such a state of the state's economy provided by a set of conditions and factors and giving stability, stability and the possibility of its constant updating and improvement (Abalkin, 1994). Russian scientists-economists V.K. Senchagov, A.I. Gretchenko and A.A. Gretchenko somewhat expanded this concept, adding that the socially oriented development of the country should be ensured, as well as sufficient defense potential (Senchagov, 2007; Gretchenko & Gretchenko, 2022). In the context of definitions, energy security, which is essentially one of the elements of economic security, can be considered as one of the factors ensuring the state of the national economy, which scientists have talked about.

2. Materials and Methods

The article is based on the results of research conducted by the Research Institute "New Economics and Business" of the Plekhanov Russian University of Economics. The purpose of the study is to identify and assess the degree of influence of the state of the energy sector of Russia on the level of economic security of the country.

The authors in the presented article solve the following tasks:

- reveal the theoretical component of the energy sphere of the state, legal regulation and its relationship with the economic security of the state;
- substantiate the indicators for assessing the state of the energy sector in the context of ensuring Russia's economic security;
- analyze the features and current state of the Russian energy sector, including the country's position in the world energy markets;
- reveal the main internal and external threats to Russia's economic security, which are formed under the influence of energy factors;
- form a set of measures to improve Russia's domestic and foreign energy policy, as well as legal regulation of Russian energy in order to increase the level of economic security of the country;
- explore promising areas of Russian energy development in the context of the fourth energy transition.

The object of the study is the economic security of Russia.

The subject of the study is the role of the energy sector in ensuring the economic security of Russia.

When writing an article, methodological apparatus (quantitative and qualitative methods) is used, in particular:

1. General scientific methods: the method of observation, which is used to directly monitor changes in society, the socio-economic system during the introduction of international economic sanctions in order to further apply more modern digital methods and digital technologies that ensure the economic security of Russia; the method of description, which is a system of procedures for collecting, primary analysis and

presentation of data and their characteristics. In our study, this method is used following the method of observation, or the method of data analysis in order to generalize the description of the new economic reality and events taking place at the present time, or in historical retrospect, and visible socio-economic consequences; the analysis method is used to identify and study individual stages of the process of transformation of the socio-economic system in the context of their changes are influenced by the digitalization of the economy.

2. The use of the induction method as a process of logical inference based on the transition from a particular situation to a general one made it possible to form a unified model of transformation of the socio-economic system and transformational processes in the field of energy security, built under the influence of international economic sanctions based on data on changes in each stage of socio-economic dynamics, including changes in the structure of the energy resources market.

3. The historical and genetic method allowed us to take into account data on the patterns and specifics of the impact of the sanctions threat, as well as on the optimization of adaptive resources of the socio-economic system; on effective practices of blocking negative social consequences and risk management in the context of the global economy.

As part of the research, the following special legal methods of scientific cognition were used:

1. Dialectological method: analysis, synthesis (the use of these methods is due to the need to separate complex legal phenomena in the field of legal regulation of the energy resources market into separate elements and study them in interrelation);

2. Logical method: deduction, induction, analogy (legal regulation of the energy resources market, legislative methods of regulating this market have been studied most effectively using formal logic);

3. System-structural method – helps to carry out the study of digital employment in the conditions of the imposed international economic sanctions against Russia as a certain system interconnected with the surrounding legal reality;

4. Hermeneutical method – allowed to interpret the norms of law contained in the sources of law regulating the process of building the energy sphere of society, determining the true meaning of the legal phenomenon;

5. Functional method – allowed to identify the functions, methods, trends inherent in the processes of ensuring economic security in society and affecting the energy sector, as well as their social purpose;

6. The comparative legal method made it possible to identify Russian sources of law regulating the ongoing changes in the energy sector under the conditions of the anti-Russian sanctions imposed with foreign sources of law regulating similar objects; to study the changes in the legal regulation of the Russian energy sector caused by the introduction of economic sanctions by performing a synchronous comparison, by comparing their characteristic features, qualities with the criteria of the same type, simultaneously existing phenomena abroad, or by conducting a diachronic comparison, in which these phenomena are compared at different time stages of their development;

7. The scientific method of extrapolation made it possible to extend the conclusions of one part of the analysis of trends inherent in the processes of ensuring the economic security of the country and affecting the energy sector to the other,

contributing to the prediction and prediction of future changes in the studied phenomena in society.

The research results presented in the article were carried out using methods of literature analysis and statistical material, comparison, construction of tables, graphs and diagrams, mathematical calculations, the method of extremely critical values, the index method, as well as the method of regression analysis.

The information and methodological basis of the research was the works of leading Soviet and Russian scientists, economists, as well as research by foreign scientists, domestic and foreign Internet resources and static databases, including Rosstat and UNCTADstat.

3. Results

Using the previously given methodological apparatus, the article presents the results of the study in the form of theoretical or empirical data on the stated research issues within the framework of the problem and using previously designated materials and methods.

So the method of critical indicators (threshold values), in other words, the indicative method at the moment seems to be the most relevant and appropriate method for assessing the level of economic security of the country, as well as its various components. The use of this method in domestic science began relatively recently with the sphere of social sciences. So, in 1994, the Institute of Socio-Political Studies of the Russian Academy of Sciences came up with the idea of developing a scale of 20 indicators in order to apply the method in question to study the state of Russian society.

The list of indicators together with the evaluation scale was developed in 1995 by Academician of the Russian Academy of Sciences V.V. Lokosov (Osipov & Lokosov, 1995). Later in 1996, the method of extremely critical values was adapted to economics by developing and approving a system of indicators of Russia's economic security by the Economics Department of the Russian Academy of Sciences. Academician of the Russian Academy of Sciences S.Yu. Glazyev took an active part in the development of this system (Glazyev, 1996). The method under consideration was further developed in the works of many Russian scientists-economists, political scientists, sociologists, including repeatedly in the works of V.K. Senchagova, V.V. Lokosova, S.Yu. Glazyeva, A.I. Gretchenko, A.A. Gretchenko, etc. (Senchagov, 2007; Glazyev & Lokosov, 2012; Gretchenko & Gretchenko, 2019).

S.Yu. Glazyev defines the extremely critical value as the boundary value of the indicator, the output of which indicates the occurrence of a threat in the relevant area due to a violation of the normal flow of processes reflected by this indicator (Glazyev & Lokosov, 2012). When using the threshold values method, a single number is used as the so-called "threshold", the failure (with a stimulator indicator) or exceeding (with a destimulator indicator) of which indicates that the system is entering the risk zone. In addition, there are also such indicators for which it is advisable to establish an interval of normal values. In other words, a risk, challenge or threat occurs both when the upper threshold value is exceeded and when the value becomes less than the lower limit. Glazyev cites inflation as an example of such an indicator. Indeed, when the threat posed by hyperinflation is obvious, we often forget that a drop in the inflation value below

zero, that is, deflation, is fraught with a decrease in the attractiveness of consumption and a slowdown in economic growth.

The advantages of the considered method are the ability to see the situation both in general and in individual areas and indicators, which in turn makes it possible to comprehensively assess the level of economic security of the country or the impact of a separate factor on it, as in our case. In addition, most economists agree that it is not the fact of reaching or not reaching the threshold value at a particular time that is important, but the dynamics of indicators, since only through the prism of dynamics can changes in the development of the system be observed and prospects assessed. The threshold values are determined directly based, first of all, on the national interests of the country, although it is also possible to adapt the indicators of the development of the economies of third countries, to the level of development of which the state aspires.

In connection with the above, this study attempts to offer an approximate list of such indicators and thresholds for assessing the energy component of Russia's economic security. The system of indicators and their corresponding threshold values proposed by S.Yu. Glazyev and V.V. was taken as a basis. In the article "Assessment of the extremely critical values of indicators of the state of Russian society and their use in the management of socio-economic development" (Glazyev & Lokosov, 2012), the authors separately identify indicators characterizing the reproduction of the economic potential of Russia, a number of which relate to the totality of economic activities. By adapting these threshold values to the energy sector of the state, taking into account the indicators of Russia's Energy Strategy for the period up to 2035, a list of critical values was obtained, which was used to assess the state of the energy factor of the economic security of the Russian Federation within the framework of this study (Table 1). Relative indicators were mainly used, because for a number of indicators, extremely critical values in absolute terms are not informative, due to the fact that they are significantly tied to changes in economic conditions both in the country and in the world and are strongly tied to the dynamics of macroeconomic indicators.

Justification of indicators and extremely critical values:

The growth rate of fossil energy production. Extraction, processing, and export of energy carriers remains an essential part of the Russian economy, therefore, in order to maintain the pace of economic growth corresponding to developed countries, Russia needs a stable growth in energy production (coal, oil, gas and their varieties). It is assumed that in the period up to 2035, the average growth rate of energy consumption of the Russian economy will be 0.3-0.6%. The global growth rate of energy consumption is projected to be within 1-1.2% per year (Decree of the Government of the Russian Federation, 2020). Taking into account the fact that in the medium term, the overwhelming volume of electricity generation both in Russia and in the world (mainly at the expense of developing countries) will be provided with fossil energy carriers, then in order to meet domestic needs and maintain a share in the world energy markets, the average annual growth in coal, oil, and gas production in Russia should be at least 1.8% per year.

The growth rate of the volume of electricity generation. With the growth of the state's economy, in particular the real sector – industry, electricity consumption is

growing. Thus, this indicator, correlating with the growth of the real economy, confirms the close relationship between energy and the energy security of the state. As already mentioned, the growth rate of energy consumption of the Russian economy will be 0.3-0.6% (Decree of the Government of the Russian Federation, 2020). Accordingly, the growth rate of electricity generation should fully ensure a possible increase in energy consumption and be at least 0.6%.

Table 1. Indicators for assessing the energy component of Russia's economic security and extremely critical values

Indicator	Extremely critical value	"Weight"
Growth rate of fossil energy production, % compared to the previous year	At least 1.8%	1
The growth rate of electricity generation, % compared to the previous year	At least 0,6%	1
The share of low-carbon sources of electricity among all sources of electricity generation, %	At least 37%	0,5
The share of natural gas among fossil primary sources of electricity generation, %	At least 50%	0,25
Depreciation of fixed assets of enterprises for a number of economic activities, %	No more than 40%	1
The volume of investments in fixed assets for a number of economic activities, % of the GVA generated by the industry	At least 25%	1
The growth rate (decrease) of the energy intensity of GDP, % compared to the previous year	At least -3,85%	0,75
The ratio of electricity production to consumption, times	Ranging from 1 to 1,015	1
Losses in the power grid during the transportation of electricity, %	No more than 7,3%	0,5
The rate of increase in the volume of emissions into the atmosphere of pollutants coming from stationary sources for a number of economic activities, %	No more than 0%	0,5
The growth rate of electricity and energy exports, % compared to the previous year	At least 1,2%	1
The share of natural gas in the structure of electricity and energy exports, %	At least 50%	0,25
China's share in Russian exports of electricity and energy carriers, %	No more than 25%	0,25

Source: Compiled by the authors. Weight= weithg of the indicator (0.25 – 1)

The share of low-carbon sources of electricity among all sources of electricity generation. About 37% of the world's electricity in 2019 was generated using low-carbon sources (IEA-International Energy Agency, 2022). Such sources are nuclear fuel, hydropower, geothermal, wind, solar energy and other renewable sources. Based on environmental considerations, as well as in connection with the trends of the new energy

transition, as well as based on the goals of diversification of primary sources of electricity generation, it is advisable to transfer at least 37% of Russian electricity generation to low-carbon sources. The share of natural gas among fossil primary sources of electricity generation. The current third energy system assumes the continuation of the transition from the use of coal and oil to gas energy generation. Natural gas is more efficient for a number of reasons: high energy efficiency, lower production costs, less negative impact on the environment. By 2020, in Europe, more than 50% of the energy generation in which fossil resources are used is carried out using natural gas. In the USA, this figure is even higher and reaches 67%. In this regard, Russia, as a country with significant reserves of natural gas, is quite capable of transferring at least 50% of electricity generation from fossil raw materials to more efficient gas fuel within the framework of the aforementioned third energy transition.

Depreciation of fixed assets of enterprises in a number of economic activities (mining, production and distribution of electricity). The extremely critical value of depreciation of fixed assets proposed by S.Yu. Glazyev and V.V. Lokosov for the economy as a whole, amounting to no more than 40% (Glazyev & Lokosov, 2012), can be applied to a separate type of economic activity.

The volume of investments in fixed assets for a number of economic activities (mining, production and distribution of electricity). S.Yu. Glazyev and V.V. Lokosov for the economy as a whole proposed a value of 25% of GDP (Glazyev & Lokosov, 2012). In the case of a particular industry, it is advisable to evaluate this indicator relative to the GVA (gross value added) generated by this industry. Thus, the extremely critical value is at least 25% of the GVA generated by the industry.

The growth rate (decrease) of the energy intensity of GDP. Energy intensity is the amount of energy and fuel consumption for the main and auxiliary technological processes of manufacturing products, performing works, rendering services based on the existing technological structure. Intensification of production and the economy as a whole is impossible without a stable reduction in the energy intensity of GDP. In 2008, the President of the Russian Federation set a goal to reduce the energy intensity of GDP by 40% by 2020 compared to 2007 (Decree of the President of the Russian Federation, 2008). This goal was not achieved, since the average annual rate of decline in the indicator value in this period was only 1.1% instead of the approximately 3.85% required to achieve the goal (Ministry of Energy of the Russian Federation, 2022). Thus, at the moment, the value of -3.85% can be set as extremely critical.

The ratio of electricity production to consumption. This indicator characterizes the sufficiency of electricity for the needs of the country and is fundamental in assessing the energy independence and security of the state. In this case, it is advisable to set the threshold value at least 1, that is, the possibility of full self-sufficiency in electricity. But if electricity generation significantly exceeds the amount of demand for it and losses in power grids, then this will indicate the presence of "extra" electricity that cannot be exported promptly (in 2020, only 0.7% of all electricity generation was exported (Federal State Statistics Service, 2022). Assuming that exports can be quickly increased by no more than twice, it is advisable to establish a corridor of acceptable values from 1 to 1.015.

Losses in the power grid (the share of electricity that is lost during delivery to end users). The goal of reducing the level of losses in the power grid is laid down in the Energy Strategy of Russia for the period up to 2035. Reaching the threshold value will increase the overall energy efficiency of the Russian economy. At the same time, the result depends mainly on the rate of renewal of fixed assets, due to the obsolescence of which a significant part of the losses occurs. In this case, the target value specified in the Strategy can be set as an extremely critical value – 7.3% (Decree of the Government of the Russian Federation, 2020). It should be taken into account that this value is acceptable only in Russian realities, taking into account the "discount" for a more severe climate on average and a larger territory. For example, losses in American power grids for 2020 were only 5%, despite the fact that the US power system is also characterized by a significant spatial distribution (Energy Information Administration (EIA), 2022).

The rate of increase in the volume of emissions into the atmosphere of pollutants coming from stationary sources for a number of economic activities (mining, production and distribution of electricity). The functioning of the fuel and energy complex is associated with a significant emission of greenhouse gases that negatively affect the state of the natural environment. This is especially true of the processes of extraction of energy-bearing minerals and subsequent generation of electricity and heat. In the latest Russian strategic documents, the target values for environmental indicators have been softened. Thus, the Energy Strategy of the Russian Federation until 2035 even includes the possibility of increasing greenhouse gas emissions (Decree of the Government of the Russian Federation, 2020). Nevertheless, in the current conditions, when the transition to environmentally friendly types of electricity generation is not a priority, and access to "green" technologies is difficult due to Western sanctions, it is necessary to ensure at least a stable amount of pollutant emissions without increasing it. Thus, the threshold value is 0%.

The growth rate of electricity and energy exports. As mentioned above, the global growth rate of energy consumption is projected to be in the range of 1-1.2% per year. In order to maintain its share in the global energy markets, the average annual volumes of Russian exports of coal, oil, gas, and electricity should grow by at least 1.2% per year, which will be established as an extremely critical value within the framework of this study.

The share of natural gas in the structure of electricity and energy exports. Within the framework of the current energy system, gas generation has a greater distribution potential compared to other fossil sources not only in Russia, but also in the world. For example, the Chinese energy industry has taken a course to reduce dependence on coal fuel in favor of gas generation (Yushkov & Perov A, 2020). Accordingly, an increase in the share of gas exports, as well as the development of gas transportation infrastructure, will allow Russia to remain a competitive supplier of energy carriers on the world market. The extremely critical value, by analogy with the indicator "The share of natural gas among the sources of electricity generation", can be set at a level of at least 50%.

The share of China (as the main buyer of raw materials exported by the Russian Federation) in the export of electricity and energy carriers. Taking into account the latest geopolitical realities, the obvious direction for the reorientation of Russian energy

exports is China, whose economy will be able to accept almost any volume of relatively inexpensive energy carriers from Russia. At the same time, supplies from Russia at the end of 2020 account for only about 13-14% of all Chinese energy imports (UNCTADstat, 2022). Even if we take into account the growth potential of up to 16-17%, this value can be called significant, but not critical for the Chinese economy, given that, for example, coal supplies from Australia to China are much more significant for the latter than those from Russia. In the current realities, it is impossible to talk about the existence of China's dependence on Russian energy carriers. In this case, if Russia continues to concentrate exports towards China, then there is a risk of making a significant part of budget revenues dependent on a single buyer in the person of China. This can give the partner not only the potential for economic pressure in order to obtain lower prices compared to market prices, but also geopolitical leverage. In this regard, it is necessary to diversify the export structure by trading partners. Thus, for this indicator, the threshold is set at no more than 25%.

The given indicators concerning the energy sector of the country and their corresponding extremely critical values, the excess or non-achievement of which (depending on the type of indicator) leads to the formation of threats to Russia's economic security, will allow in the next section not only to assess the current state of the Russian energy sector, but also to analyze how this state affects the country's economy and, consequently,, on its economic security.

The table also shows the conditional "weights" of indicators indicating the comparative degree of impact of a particular indicator on the final level of economic security of the country, according to the author. The introduction of this parameter will allow you to highlight and take into account the importance of individual indicators.

4. Discussion

4.1. Dynamics of development and current state of the Russian energy sector

The key feature of the Russian energy sector, as already mentioned, is the multidimensional nature and the exceptional importance of this area for the country's economy. Within the framework of the fuel and energy complex of Russia, not only the domestic needs of the national economy in electric and thermal energy are provided, but also the export of electricity and energy carriers is carried out. The Ministry of Energy of the Russian Federation emphasizes that the stability of the country's economy and the possibility of progressive development of the country are largely ensured and determined by the reliable functioning of the energy industry (Ministry of Energy of the Russian Federation, 2022).

The main competitive advantage of the Russian energy industry is the possibility of full self-sufficiency of the country's economy, even despite the huge area of Russia and the spatial remoteness of a number of territories. This advantage is provided by the presence of large reserves of fossil energy carriers, that is, the mineral resource base of the fuel and energy complex. Thus, as of 2020, as indicated in the Energy Strategy of the Russian Federation, the production of energy resources exceeds the domestic needs of the Russian energy sector for oil by more than 1.9 times, gas by 1.5 times, coal by 1.8

times (Decree of the Government of the Russian Federation, 2020). This, in addition to ensuring its own energy independence, allows the country to export a significant amount of energy resources, which will be analyzed in detail in the next paragraph of the study. However, despite Russia's global leadership in energy reserves, many deposits are being depleted and the exploration of new reserves has slowed down significantly over the past 25 years. According to experts of Rosgeologia JSC, if the production level is maintained at the current level, Russian natural gas reserves will last for 70 years of production, and oil for 30 years (EADaily, 2022). According to other data, for 2016, the values of the reserve multiplicity coefficient, that is, the time for which the proven reserves will last with the production growth rates unchanged, are 25.5 years for oil, 56.3 years for gas, 422 years for coal (BP global, 2022). Both sources predict a fairly rapid depletion of oil deposits, which is a significant potential challenge not only for the energy sector, but also for the Russian petrochemical industry.

Structure of Russian exports of energy and energy carriers in monetary terms at current prices by trading partners (2011-2020) (Table 2).

Table 2. Structure of Russian exports of energy and energy carriers in monetary terms at current prices by trading partners (2011-2020)

A country	Structure of Russian exports of energy and energy carriers in monetary current prices by trading partners (2011-2020)								
Other	61,4%	59,3%	61,7%	57,6%	61,0%	44,0%	42,4%	40,9%	41,4%
Great Britain	1,3%	1,3%	1,7%	0,8%	0,7%	1,0%	1,4%	0,9%	1,0%
Netherlands	12,9%	15,4%	12,9%	13,7%	11,5%	16,4%	15,7%	14,1%	14,8%
Republic of Korea	3,9%	3,6%	3,7%	4,7%	5,2%	7,0%	6,7%	7,5%	7,3%
Italy	6,8%	5,9%	6,4%	6,9%	5,3%	5,2%	5,3%	4,3%	4,5%
Germany	6,6%	6,5%	5,6%	5,4%	5,4%	8,3%	8,5%	8,1%	6,5%
China	7,1%	8,0%	8,0%	11,0%	11,0%	18,1%	20,0%	24,1%	24,5%

Source: Compiled by the authors based on Federal State Statistics Service: Official website (accessed: 09.07.2022); IEA – International Energy Agency (accessed: 09.07.2022); UNCTADstat (accessed: 09.07.2022).

The Russian energy sector is key for the country's economy not only in terms of covering domestic electricity and heat consumption, but also providing a significant part of the country's budget revenues. According to the Ministry of Finance of the Russian Federation, the share of oil and gas revenues of the federal budget of Russia in 2021 is estimated at 35.6% (Ministry of Finance of the Russian Federation, 2022). In addition, energy exports provide about 70% of all foreign exchange earnings. Russia ranks 1st in natural gas exports (16% of world gas exports); 2nd place in oil exports after Saudi Arabia (11% of world oil exports); 3rd place in coal exports after Australia and Indonesia (12% of world coal exports) (Negtefaz.RU, 2022).

The main export commodity for Russia remains gas, the second most important is oil. At the same time, as already mentioned, it is predicted that the oil reserves in Russia will soon be exhausted, at least those that have been explored at the moment. According to several sources, the current oil reserves will last for 25-30 years while maintaining the

current increase in production. Together with the fact that Venezuela's reserves, according to those sources, will last for 313.9 years, Saudi Arabia – for 60.8 years, Canada – for 107.6 years (all of these and a number of other countries are competitors of Russia in the world oil market), this may become a significant challenge for the Russian energy and economy in the future. The situation with natural gas is more favorable for Russia – its proven reserves in the country are projected to last for 55-70 years (BP global, 2022).

The key goal of Russia's foreign energy policy in the near future is to maintain its position in the world energy markets, since energy exports, with ever-growing global demand, provide and will continue to provide the opportunity to receive significant budget revenues. In addition, the presence in the energy markets of a number of regions of the world as an important, even irreplaceable supplier, strengthens the geopolitical weight of Russia.

It is advisable to start assessing the external aspect of the Russian fuel and energy sector by analyzing the dynamics of energy exports, since oil and gas revenues, which also include revenues from energy exports, make up a significant part of the consolidated budget of Russia. For the entire period under review 2011-2020, only the volume of coal exports in monetary terms increased, an increase of 54.3%. There is a significant decline in the remaining commodity groups: oil -34.9%, natural gas -87.54%, electricity -38.2%. This trend is also explained by the dynamics of prices on world energy markets, for example, significant declines in energy prices during the crisis periods of 2014-2015 and 2020.

A detailed examination shows that the annual growth rates in the period from 2011 to 2018 fluctuated, but generally remained in the zone of positive values. Since 2019, there has been an obvious downward trend in growth rates, which in 2020 led to a decrease in absolute production indicators. It can be assumed that this is largely due to the COVID-19 pandemic, which led to a decrease in both domestic demand for electricity, most of which is generated using fossil fuels, and demand abroad for the same reason.

Most of the income from the export of energy and electricity is provided by the sale of natural gas, in second place – electricity, in third – oil. A significant increase in the share of natural gas by 11.6% and electricity by 9.6% is a positive trend, since the transportation of these goods is safer from an environmental point of view, in addition, for the same amount of fuel equivalent, the revenue for the sale of natural gas is higher than for the sale of oil or coal. The electricity already generated includes not only the cost of primary energy carriers, but also an additional product of processing.

At the time of 2020, Russia's key trading partner in energy and electricity was China (25.6%), significant shares were also held by European countries: the Netherlands (11%), Germany (8.9%), Italy (4.8%). In 2022, it became obvious that in the coming years this structure will radically change, forcing the Russian fuel and energy sector to reorient and redistribute exports in order to preserve not only budget revenues, but also a share in the world energy markets. At the same time, if the share of a number of Asian countries, including the largest markets of China, India, Pakistan, is likely to increase, then European countries and, probably, the Republic of Korea, on the contrary, in order to ensure their own energy security, will seek to reduce their dependence on Russian

energy carriers, which will lead to a decrease in the share of these countries in Russian exports. Whether the Asian market will be able to completely replace European demand may be seen only after some time, but it is already clear that the export component of the Russian fuel and energy complex is facing an unprecedented challenge.

The expected changes in the structure of the country's trading partners in energy and electricity will inevitably arise due to a new round of economic, trade and sanctions confrontation between Russia and Western countries.

Thus, today Russian foreign trade, as well as foreign policy relations with many countries, is experiencing a significant decline. This is especially true of key Russian export goods – energy carriers (coal, oil, natural gas). In addition, significant problems of the fuel and energy complex of Russia are created due to the listed Western sanctions. In this regard, it is of particular importance to find ways and opportunities to maintain the level of exports sufficient for the Russian economy, filling the budget and ensuring foreign exchange earnings, as a result – to ensure the economic security of the country.

4.2. Analysis of the impact of the state of the energy sector on Russia's economic security, the main internal and external threats

Internal threats to Russia's economic security, which are formed under the influence of energy factors, are:

- a decrease in the production of all major energy carriers, as well as electricity generation, due to a decrease in domestic and external demand during the COVID-19 pandemic due to the suspension of a number of industrial enterprises;
- a relatively high degree of depreciation of fixed assets in the fields of mining and electricity distribution;
- insufficient rate of reduction in the energy intensity of GDP, due to insufficient rates of intensive economic development;
- a relatively high proportion of electricity losses during transmission over networks, due to the depreciation of fixed assets of enterprises operating in the field of electricity distribution;
- environmental threat due to increased emissions of pollutants by enterprises operating in the field of mining, including energy carriers.

In addition, the external component of the Russian energy sector was analyzed, the basis of which is the export of energy carriers and electricity.

External threats to Russia's economic security, which are formed under the influence of energy factors, are:

- a decrease in the volume of energy and electricity exports in monetary terms, due to a decrease in demand in the world due to the COVID-19 pandemic, as well as a drop in market prices;
- separately, it can be noted that the share of the Chinese market in the export of Russian energy resources for the period from 2011 to 2020 increased sharply and even overcame the conditional critical mark.

The latter fact causes concern due to the fact that China can be called an ally of Russia only conditionally and with great reservations, especially given the fact that the United States and a number of countries of the "Western camp", which, of course, are disproportionately more important for the Chinese economy than the Russian market,

seek to put pressure on China in order to limit Russia's export opportunities. On the other hand, it is also obvious that our country currently has few alternatives in the world energy markets.

Turning to the general assessment of the energy component of Russia's economic security, it is necessary to introduce criteria for such an assessment based on the selected indicators, including their "weights". For 2011, the established threshold values corresponded to the values of 13 indicators (the level of economic security is below average), by 2020 the number of such indicators has decreased to 8 (low level of economic security). A decrease in the production of basic energy carriers in quantitative terms and a decrease in the volume of exports of oil, natural gas and electricity in monetary terms contributed to such negative dynamics.

Taking into account the "weights" of indicators for 2011, the level of the energy component of Russia's economic security can be conditionally estimated at 10.25 out of 16.5 points; for 2020 – only 5.25 points, which confirms the decrease in the level of the energy component of the country's economic security over the ten-year period considered in the study.

The relevance of the threats and challenges to Russia's economic security emerging in the energy sector identified during the study is confirmed by the fact that most of them are highlighted in strategic documents: the Energy Security Doctrine of the Russian Federation and the Economic Security Strategy of the Russian Federation for the period up to 2030. In addition, these acts highlight several other threats and challenges that were not addressed within the framework of this study:

- increasing the conflict potential in the territories belonging to the zones of economic interests of Russia;
- the impact of the internal demographic crisis on the potential volume of demand for electricity and energy resources;
- an increase in the number of offenses in the energy sector;
- establishment of excessive environmental requirements in the energy sector to the detriment of the activities of enterprises in this field.

One can only criticize the position of the developers of strategic documents in relation to the environmental situation, which consists in prioritizing maintaining the pace of energy production to the detriment of the environmental situation. It is impossible to give an unambiguous answer to the question of what should be given priority with limited resources and technologies: maximizing oil and gas revenues at the moment to the detriment of the natural environment or balanced development of environmental protection and fuel and energy industries, especially now when additional exports and threats to the country's energy industry arise. However, it is obvious that disregard for environmental standards and norms is unacceptable in any scenario.

Thus, the main threats to the energy component of Russia's economic security, consisting in a decrease in the level of production and export of energy carriers due to the crisis and a decrease in demand for electricity both domestically and abroad caused by the COVID-19 pandemic, are actualized by the need to immediately take measures

to minimize existing threats, as well as to respond to upcoming exports formed from- for the sanctions aggression against Russia and, in particular, the energy sector of the country by Western and a number of other countries.

5. Conclusion

The achievement of the research goal was facilitated by the solution of the tasks set at the beginning of the work. These tasks are solved as follows.

I. Study of the theoretical component of the energy sphere of the state, legal regulation and its relationship with the economic security of the state.

The energy sector of Russia, as it was found out, is not confined only to the production and distribution of electricity, but includes much more areas: the extraction of minerals that are energy carriers (coal, oil, natural gas with their varieties, etc.), transportation of both already generated (secondary) electricity and thermal energy, primary energy carriers, in particular including their export by road, rail, pipeline and sea transport.

Due to the multidimensional nature of the Russian energy sector, this area is regulated by several ministries and departments at once. The central link in the management of the Russian energy sector is the Ministry of Energy of the Russian Federation. In addition, regulation of certain aspects of the fuel and energy complex is carried out by: the Federal Agency for Subsoil Use, the Federal Service for Environmental, Technological and Nuclear Supervision, the State Atomic Energy Corporation Rosatom.

The ties between the fuel and energy sector and the national economy are very diverse and extensive and include the direct supply of electricity and heat to enterprises and households, ensuring budget revenues from energy exports, creating jobs and attracting investment.

The close relationship between the economy and energy has also been confirmed in practice with the use of the regression analysis method and the construction of regression models of the relationship of GDP with the main energy indicators, which revealed relatively high coefficients of dependence of GDP on changes in the values of the main energy indicators.

II. Substantiation of indicators for assessing the state of the energy sector in the context of ensuring Russia's economic security.

The article substantiates a set of indicators for assessing economic security based on the works of Glazyev and Senchagov, as well as Russian strategic planning documents. This system of indicators can be applied in practice, as it meets a number of requirements:

- indicators quantitatively reflect the processes taking place in the energy and economy;
- indicators have a high ability to adapt to the current situation;
- indicators make up a set, i.e. they have a fairly strong correlation between each

other.

III. Analysis of the features and current state of the Russian energy sector, including the country's position in the world energy markets.

The key feature of the Russian energy sector, as already mentioned, is the multidimensional nature and the exceptional importance of this area for the country's economy. The fuel and energy complex of the country not only provides electric and thermal energy to the domestic needs of the national economy and the population, but also exports electricity and energy carriers abroad.

The main competitive advantage of the Russian energy industry is the possibility of full self-sufficiency of the country's economy, which is provided by huge reserves of all fossil energy resources. It also makes it possible to export energy resources and fill the state budget.

IV. The main internal and external threats to Russia's economic security, formed under the influence of energy factors.

According to the results of the conducted research using the method of extremely critical values, the index method and the zoning method, it was revealed that the level of economic security in terms of energy was at a low level at the end of 2020 and, in addition, in the period from 2011 to 2020, there was a negative dynamics of the external aspect of the assessed situation. Internal and external threats formed under the influence of energy factors were also identified:

- reduction of production volumes of all major energy carriers, as well as electricity generation;
- a relatively high degree of depreciation of fixed assets in the fields of mining and electricity distribution;
- insufficient rate of reduction of energy intensity of GDP;
- a relatively high proportion of electricity losses during transmission over networks;
- environmental threat due to increased emissions of pollutants by enterprises operating in the field of mining, including energy carriers.
- decrease in the volume of energy and electricity exports in monetary terms;
- a sharp increase in the share of the Chinese market in Russian energy exports over the period from 2011 to 2020.

V. Proposal of measures to improve Russia's domestic and foreign energy policy, as well as legal regulation of Russian energy in order to increase the level of economic security of the country.

In the process of analyzing the results of statistical research and identifying threats, a number of proposals were put forward to improve Russia's domestic and foreign energy policy, as well as to solve the problems of regulating the energy industry. Thus, the main directions of energy policy development should be:

- development of energy-saving and energy-efficient technologies;
- decarbonization;
- diversification of energy and electricity export supplies in the product and geographical aspect;
- international cooperation aimed at the formation of an economic space based on the principles of fair competition of common energy markets.

The improvement of the legal support of the energy industry should be carried out in the following areas:

- prevention and suppression of criminal and illegal actions in the energy sector;
- further refinement of the norms contained in the Criminal Code of the Russian Federation and the Administrative Code of the Russian Federation concerning the energy sector, it is also possible to identify a number of "energy" offenses;
- improvement of the specialized regulatory framework in the field of energy and ecology, including the introduction of a ban on the production and use of energy-inefficient machinery, equipment, buildings and technological processes, the use of carbon tax, etc.;
- simplification of procedures for regulating the processes of development of deposits and deposits, including fossil energy carriers, which is designed to temporarily solve the problem of depletion of the current resource deposits and simplify the commissioning of new deposits.
- establishment of the Institute of Energy Attaches;
- Russia's participation in the international discussion of climate policy, as well as strengthening the contractual and legal framework for energy cooperation.

VI. Research of promising directions for the development of Russian energy in the context of the fourth energy transition.

The fourth energy transition, that is, the spread of renewable energy sources, is a challenge for the Russian energy sector due to natural climatic and geographical reasons. Nevertheless, taking into account the inevitable depletion of fossil energy resources, it is participation in the trends of the fourth energy transition that is a promising direction of energy development for Russia.

The most widespread renewable energy in Russia today is hydropower, a significant part of the potential of which has not yet been developed. The potential of using other renewable energy sources can be used only in the development of distributed (small) energy, but not as part of a centralized energy system.

According to the results of the conducted research, it can be stated that the purpose of writing this article has been achieved, the tasks set have been solved in full.

At the same time, there remains space for future research in this direction in terms of updating both the system of indicators for assessing the economic security of the country developed in this work and their extremely critical values. This need is due to

the dynamism of the current geopolitical and economic situation, as well as the instability of world energy markets.

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