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Modeling and Governance of the Country's Energy Security: The Example of Ukraine

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ABSTRACT

The research addresses the improvement of the methodology to evaluate the energy security through theoretical-methodological substantiation, development, and calculation of the integral index of its competitiveness for a country on the example of Ukraine. Establishing an efficient energy security (like a component of national security) system is a crucial issue in the current military-political situation in Ukraine. The global economic crisis and military aggression of the Russian Federation against Ukraine and the imposition of sanctions against it by European states have led to a deterioration in energy security of many energy-dependent EU countries. That is why the methodology of energy security calculations should be adapted to modern military-political instability conditions. The article aims to analyze active methods of state energy security in Ukraine and in the world. The authors' methodology to calculate the integral index of energy security is suggested. Indicators of energy security include energy production, energy export, domestic consumption, capital investment in energy, etc. Every component of energy security will have factors of Russia's war influence, which anyway in conclusion will correlate with the integral index of energy security. Integral indicators of energy security maintenance on the example of Ukraine.

Keywords: Energy Security, Integral Index, Competitiveness, Modeling, Public Policy and Governance, Economics
JEL Classifications: C1, O1, P18, P35, E6

1. INTRODUCTION

The International Energy Agency mentions that the nature of energy security lies in the maintenance of a consistent supply of energy resources at affordable prices. In the long run, energy security is mostly focused on timely investment in energy supply in compliance with economic needs and modern global economic challenges (International Energy Agency, IEA, 2022). Energy security is an area of interaction between national security and the availability of natural resources for energy consumption. Today, access to cheap energy has become crucial to the functioning of present global economies. Although the uneven distribution of energy between countries leads to their significant economic, political, and energy vulnerability. In this regard, the development of strong and stable international energy relations contributes to globalization, which increases the level of energy security and, above all, energy vulnerability.

Lately, substantial changes in the principles of energy sector management have been observed both in Ukraine and the world. The range of methods of the use of energy as a tool to achieve political goals has been expanding. In modern Ukraine, the activity in energy security has essentially evolved in time under the impact of the dynamics of socio-economic and scientific-technological development and transformation of energy market functioning models. It is impossible to develop a universal method of selecting the parameters to evaluate energy security since countries have different specific functioning conditions of their energy markets. Obviously, such an approach prevents strategizing in energy security because the changes in the course of selecting a set of parameters due to technological transformations and changes of energy model markets actually stipulate a new need to review the methodology of evaluating the energy security level, selecting modern evaluation indicators, and searching for new data for calculations (Energy security of Ukraine, 2020).

The dynamics of processes observed today on energy markets requires the use of system approaches. Energy security as a management object will be described following the conventional approach to the description of systems through the specification of the system components (or groups of parameters), namely the elements, links, structure, functions, processes, and materials. The requirement unifies the process of determining the parameters to describe energy security for any object (country, industry, supply system, etc.), its functioning, and development dynamics of various impact factors. A considerable number of energy security concepts are based on the claim that it consists of the following four elements: availability, accessibility, affordability, and acceptability (Cherp and Jewell, 2014).

Meanwhile, in the process of development and further implementation of state energy security policy, it is necessary to clearly understand its nature, factors, and components that create it, and have modern methods of analysis that can show a comprehensive picture of the state, level, trends, and structural features of state security. Of particular importance is the use of integrated approaches to analysis, which also include a system of indicators for the administrative territories of the country. It helps to comprehensively assess the state of energy security and its overall impact on the economy and identify interregional differentiations and energy imbalances.

The unreasoned energy, fiscal, and monetary policies and poor institutional framework of the energy industry in the past led to collapses on the macroeconomic level, which naturally turned into essential financial problems for all economic entities in terms of energy security-both state and private sectors. These circumstances require an adequate estimation of the current energy security condition based on consideration of the actual military, economic, and social situation in Ukraine.

2. LITERATURE REVIEW

The theoretical and methodological basis of the methodology of energy security evaluation has been defined by two aspects. The first one is that energy security has different meanings and is a complex term that includes political, economic, environmental, social, and technical spheres. The second one encompasses the available in economic literature different approaches to the analysis of global development and maintenance of energy security. Regarding the first aspect, according to researcher L. Chester, "energy security" is more a global idea than a specific term (Chester, 2010). In general, the concept of energy conservation and energy security depends on the entity that uses it and, according to scientists Benjamin K. Sovacool and Marilyn A. Brown, may differ in national, institutional, and personal elements (Sovacool et al., 2016). For the past few decades, scientists in these countries have been trying to develop an understanding of energy security in a universal sense. The term "energy security" appeared in the scientific literature suggested by the scientist H. Lubell in 1960 (Lubell, 1960). However, the concept of energy security emerged during the oil crisis of the 1970 s, when the relationship between energy, security, and foreign policy became apparent (Miller, 1977). Researcher M. Wilrich stressed the need to solve international energy problems in the development of energy security in terms of real analysis of the international energy sector and, consequently, the consequences of energy problems for each country, world economy, and global environment. M.Willrich separated "Security of Supply" and "Security of Demand" (Willrich, 1976). Energy policymakers have been concerned about diversification of supplies and uninterrupted supply and availability of energy, and security of supply has become and remains one of the key determinants of energy security. It is a necessity, which significantly intensified with Russia's military aggression against Ukraine in 2022 and the imposition of sanctions by leading countries to curb the Russian economy and energy. That is why it can be argued that today energy security research has moved away from the classical approach and has become an interdisciplinary field and a global issue. Climate change, military policy, globalization, and the uncertain future of fossil fuels have added new dimensions such as energy security, sustainability, energy efficiency, reducing greenhouse gas emissions, affordability of energy ambassadors, and more. Thus, the modern concept of energy security has become interconnected with other environmental, social, political, and security challenges. The current understanding of energy security is quite universal, covering concepts such as access to energy services, equal access to energy, energy efficiency, energy culture and education, and ensuring the transparency of various energy projects. In addition, the researcher Sovacool B. notes that there may be at least five different energy cultures such as national, economic, political, professional, and epistemic. The author demonstrates in his research the multidimensionality of understanding energy security. All this expands modern ideas about energy security, forms new requirements for it (Sovacool, 2016; Brown, Sovacool, 2010). Modern energy security requires adequate protection of critical infrastructure, in particular against cyberattacks.

European Energy Security Strategy adopted in 2014 is the main EU document in energy security, which is the component of the EU energy policy conducted in line with the following fundamental documents: Energy 2020-A Strategy for Competitive, Sustainable and Secure Energy and A Policy Framework for Climate and Energy in the Period from 2020 to 2030 (European Commission, 2019). The initiative of the Energy Union in the EU claims the transition to a comprehensive approach in the energy industry that stipulates the unity of all energy policy elements (energy security, domestic energy market, environmental protection, sustainable development).

The illegal annexation of Crimea by Russia in 2014 and the war that is now going on under the guise of special operation of Russia on Ukrainian territory have introduced a new dimension to energy issues that are addressed by NATO: the relationship between energy and hybrid war and introduction of powerful economic sanctions against the Russian Federation. In order to destabilize Ukraine, Russia increases gas prices, supports separatists with energy products, captures Ukrainian energy sources in Crimea and temporarily occupied territories, and invades several NPPs threatening global security. Therefore, the issue of protection of power supply networks from cyberattacks and military actions is very relevant nowadays. Moscow has been using energy as an instrument to destabilize Ukraine and manipulate leading countries for years. As NATO works on strengthening the collective defense of its eastern members, the energy issue appears in a different light: solution to energy issues of military strategy grounded on large reinforcements. Military energy needs have been analyzed to solve this new task, and NATO has started to include energy aspects in its military training. The smart energy-based approach developed to strengthen military energy efficiency also brings positive results: energy issues are included in the NATO Defence Planning Process as a precondition for determining the interoperability standards. In the coming years, increasing attention will be paid to education and training, especially working with partner countries. More energy scenarios will be included in NATO training, and their number and complexity of headquarters exercise with member countries and partners of the Alliance are bound to increase.

Sabadash argues that Ukraine's integration into the global (in the first place, European) energy security system on the condition of mutually beneficial cooperation and multi-vector nature is an urgent task of the national energy security of Ukraine. Ukraine can become an efficient actor in a collective energy security system (Sabadash, 2007). The countries are increasingly using energy leverages of impact for the implementation of their economic interests (Saprykin, 2004), sometimes dramatically changing the development vectors of countries/regions and economic unions (associations). The issue of maintaining energy security is of utmost importance for the Ukrainian economy as one of the most energy-intensive not only in the post-soviet space but also in the world (Korobko, 2007).

Nowadays, America and EU countries are negotiating with Asian countries about gas supply, which is the consequence of the Russian military invasion of Ukraine. European Union should help Ukraine to achieve complete energy security. It was mentioned by the High Representative of the European Union for Foreign Affairs Josep Borrell. The plans of the EU regarding the achievement of its energy and climate goals and improvement of energy resilience completely match Ukrainian ones. Modern Ukraine has proven the world its capacity to solve difficult tasks and fight off military attacks of the enemy, and it is better prepared for any conflict from the viewpoint of energy security. Josep Borrell specifies that full-fledged energy security in Ukraine can be developed only on condition of maximum investment in renewable energy sources and improvement of links with the EU market. There is close coordination of energy market reforms necessary for Ukraine to strengthen corporate management and transparency, which is very important on the verge of Ukraine's synchronization with the European power supply network planned for 2023. The reverse flows are being increased in the framework of existing gas transportation infrastructure. In conditions when gas prices in the EU are growing consistently and are 6-10 times higher than the year before, it creates significant burden on electricity prices. It has already caused growing inflation in late 2021. It is worth mentioning that if energy product prices remain high in 2022 and fuel higher inflation, they will seriously impact the post-epidemic recovery in the EU and Ukraine burdened with Russian military aggression (Borrell, 2022). The synchronization of the Ukrainian energy system with ENTSO-E is the most essential step that should be taken as soon as possible to avoid the collapse of the Ukrainian energy system. The expected capacity of energy supply in Ukraine is 2000 MW by 2023.

3. MATERIALS AND METHODS

To determine the energy security level, the research uses a taxonomic indicator. It constitutes a synthetic value that takes into account the impact of values of a set of parameters on the development level of an object under research. The parameters are arranged by the distance to a certain artificially constructed point called the development standard.

The taxonomic analysis is based on the observation matrix X of $m \times n$ dimension (m – number of features, n – number of periods) that contains the most complete characteristics of the object under research:

$$X = \begin{pmatrix} x_{11} & \dots & x_{1j} & \dots & x_{1n} \\ \dots & \dots & \dots & \dots & \dots \\ x_{i1} & \dots & x_{ij} & \dots & x_{in} \\ \dots & \dots & \dots & \dots & \dots \\ x_{m1} & \dots & x_{mj} & \dots & x_{mn} \end{pmatrix}$$

where i – parameter that characterizes the condition of the object under research (i=1,…,m);
j – serial number of a period (j=1,…,n);
xij – value of *i* parameter for *j* period.

The energy security of Ukraine is evaluated by the analysis of the framed system of indicators. The indicators were divided into stimulators and destimulators based on the nature of their impact on the energy security level in Ukraine.

Most indicators have a positive impact on energy security and are the stimulators: GDP per capita, energy production, energy export, energy consumption per capita, capital investment in energy. The destimulators are the following: the share of energy in GDP, energy import, energy use per unit of GDP, CO_2 emissions per unit of GDP.

The distance between the standardized values of energy security indicators in Ukraine for certain years and the reference vector is calculated by the formula:

$$C_{0j} = \sqrt{\sum_{i=1}^{m} (z_{ij} - z_{i0})^2} \quad (1)$$

where C_{0j} – the distance between the standardized values of energy security indicators in Ukraine for certain years and the reference vector;

z_{ij} - the standardized value of xij energy security indicator;
z_{i0} – the standardized value of i reference indicator;
i - the serial number of the indicator ($j = \overline{1,9}$);
j – the serial number of the research year ($i = \overline{1,12}$).

The average distance between the standardized values of indicator and reference vector is calculated by the formula:

$$\overline{C_0} = \frac{1}{n}\sum_{j=1}^{n} C_{0j} \tag{2}$$

While the distance between the standardized values of energy security indicators and the reference vector is calculated year by year, the average distance between the standardized values of indicators and the reference vector will be a single one for 12 years.

The distance between the parameters and the reference value is:

$$C_0 = \bar{C}_0 + 2\sqrt{\frac{1}{n}\sum_{j=1}^{n}(C_{0j} - \bar{C}_0)^2} \tag{3}$$

The obtained distances are the foundation for the calculation of energy security level in Ukraine.

The deviation of the parameters of j year from the reference value is calculated by the formula,

$$d_j = \frac{C_{oj}}{C_0}, \tag{4}$$

and the security level parameter is:

$$K_j = 1 - d_j \tag{5}$$

Since the dimension of indicators and the need to secure its comparability is different, the authors of the research carry out the standardization of the values of indicators by the formulas (6) and (7).

For stimulating indicators:

$$z_{ij} = \frac{x_{ij} - \bar{x}_j}{\sigma_j} \tag{6}$$

For destimulating indicators:

$$z_{ij} = \frac{\bar{x}_j - x_{ij}}{\sigma_j}, \tag{7}$$

where z_{ij} – standardized value of the x_{ij} indicator;
$\bar{x}_j$ - average value of the j indicator;
σ_j - standard deviation of the j indicator.

4. RESULTS AND DISCUSSION

Based on the suggested methodology, the average values of integral energy security maintenance indices in Ukraine are identified. The values of energy security indicators in Ukraine in the period under research (2008-2019) are the elements of the observance matrix given in Table 1. The conducted analysis shows that the GDP per capita increased more than four times. The share of energy in GDP declined by 5 points in 2019 compared to 2018 and is about 84%. The energy production declined in Ukraine in the period under research by 24,000 toe, which is a considerable rate. Moreover, the amount of capital investment in energy in Ukraine increased 5 times in 2008-2019 and amounted to UAH 148.3 billion in 2019. The parameter of annual energy consumption per capita declined eight times. The energy export also declined 4.3 times and amounts to 1.8 million toe. The energy import also declined twice. CO_2 emissions per unit of GDP declined seven times.

Based on the nature of indicators' impact on the energy security level of Ukraine, the authors of the paper differentiate them into stimulators and destimulators, i.e. those that have a positive impact on integral energy security parameter and those that affect it. The research shows that most indicators positively impact energy security and are the stimulators, including GDP per capita, the share of energy in GDP, capital investment in energy, and energy production. The destimulators are the following: energy import, energy use per unit of GDP, energy consumption per capita, energy export in Ukraine.

After the standardization, the matrix Z of standardized values of energy security indicators of Ukraine was framed.

$$Z = \begin{pmatrix} -0.96 & -0.99 & -0.84 & -0.64 & -0.56 & -0.52 & -0.37 & 0.03 & 0.41 & 0.96 & 1.05 & 1.97 \\ -1.43 & -1.26 & -1.15 & -0.05 & -0.05 & -0.71 & -0.43 & 0.73 & 0.84 & 1.06 & 1.11 & 1.33 \\ 0.95 & 0.51 & 0.45 & 1.06 & 1.04 & 1.10 & 0.29 & -1.08 & -0.66 & -1.33 & -1.15 & -1.19 \\ 0.70 & 0.45 & 1.07 & 1.36 & 0.71 & 0.77 & 0.42 & -1.15 & -1.15 & -1.01 & -1.14 & -1.04 \\ 2.00 & -0.54 & -0.78 & -1.37 & -0.36 & 0.23 & 0.69 & 0.94 & 1.15 & 0.63 & 0.74 & 0.67 \\ 1.76 & 1.21 & 0.99 & 0.57 & 0.35 & 0.19 & -0.19 & -0.70 & -0.85 & -1.03 & -1.11 & -1.19 \\ -1.23 & -0.84 & -1.27 & -1.01 & -0.67 & -0.29 & 0.14 & 0.74 & 0.79 & 1.17 & 1.21 & 1.26 \\ -0.87 & -1.02 & -0.91 & -0.34 & 0.06 & 0.03 & -0.41 & -0.48 & -0.08 & 0.31 & 1.15 & 2.54 \\ -1.37 & -1.13 & -0.85 & -0.82 & -0.58 & -0.47 & -0.04 & 0.58 & 0.86 & 1.18 & 1.27 & 1.35 \end{pmatrix}$$

The reference vector $P_0 = (z_{01}, ..., z_{0m})$ is determined by the selection of the maximum value for stimulating indicators and minimum values for destimulating indicators from the columns of the Z matrix.

$$P_0 = (1.97, -1.43, 1.10, 1.36, -2.00, 1.76, -1.27, 2.54, -1.37)$$

The taxonomic parameter of the energy security level in Ukraine is determined by calculation of additional parameters: distance between observances and reference vector, average and the maximum distance of deviation from the reference value, and security level. The distance between the standardized values of energy security indicators in Ukraine for several years and the reference vector is calculated by formulas (3)-(5). Table 2 presents the results of calculations 2.

The taxonomic parameter of the security level calculated in this manner synthetically characterizes the changes in the values of features of examined energy security indicators of Ukraine. Its essential advantage is that the taxonomic parameter is a single integral estimation that shows the direction and scales of changes in the processes described by a set of input data.

The taxonomic security level parameter comprehensively characterizes the impact of changes of indicator values on the general condition of energy security in Ukraine. The values of

Table 1: Major indicators that characterize the energy security of Ukraine

No.	Energy security indicators	Years											
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	GDP per capita, UAH	20502.8	19836.3	23603.6	28813.9	30912.5	31988.7	35834	46210.2	55853.5	70224.3	84192	96 346
2	The share of energy in GDP, % of GVA in GDP	88.9	88.6	88.4	86.4	86.4	87.6	87.1	85	84.8	84.4	84.3	83.9
3	Energy production, thous. toe	84260	79339	78712	85485	85247	85914	76928	61614	66323	58863	60883	60452
4	Energy export, thous. toe	7984	7081	9278	10303	8007	8213	6967	1447	1427	1944	1462	1841
5	Energy import, thous. toe	65263	48506	51260	58055	46520	39722	34437	31575	29152	35145	33795	34708
6	Energy consumption per capita toe/year	4062.03	3405.63	3135.28	2632.48	2364.97	2174.42	1715.13	1100.00	924.72	710.74	607.79	515.49
7	Energy use per unit of GDP, toe/thous.$.	0.205	0.196	0.206	0.2	0.192	0.183	0.173	0.159	0.158	0.149	0.148	0.147
8	Capital investment in energy, million UAH	27642	22336	26146	46404	60441	59354	43768	41437	55531	69416	99026	148318
9	CO_2 emissions per unit of GDP, kg/UAH	0.21	0.20	0.18	0.17	0.16	0.15	0.12	0.08	0.06	0.04	0.04	0.03

Source: Own research

Table 2: The results of calculation of energy security level taxonomic parameter in Ukraine

Year	Distance between the standardized values of indicators and reference vector, C_{0j}	Average distance between the standardized values of indicators and reference vector, $\overline{C_0}$	The total distance between the parameters and reference value, C_0	Deviation of the parameters of the *j* year from the reference value, d_j	Security level parameter, K_j
2008	4.55	5.74	8.37	0.54	0.46
2009	5.03			0.60	0.40
2010	4.77			0.57	0.43
2011	4.38			0.52	0.48
2012	4.53			0.54	0.46
2013	4.75			0.57	0.43
2014	5.61			0.67	0.33
2015	7.15			0.85	0.15
2016	7.05			0.84	0.16
2017	7.13			0.85	0.15
2018	6.99			0.83	0.17
2019	6.94			0.83	0.17

Source: Own research

the security level parameter ranged from 0 to 1. Therefore, the conditions within the interval are suggested to be divided based on the golden-section search technique. It stipulates that the section is divided into two unequal parts that the ratio of the length of the entire section to the length of the longer part is equal to the ratio of the length of the longer section to the length of the smaller section. Putting the obtained spots in the interval of security level parameter values we get the scale of determining the security condition that includes five intervals, each of which characterizes a certain security condition (Table 3).

The use of the suggested scale provides an opportunity for economic interpretation of the results of calculating the energy security level parameter in Ukraine and allows comparing the results of economic security management in the dynamics.

Table 3: The scale of determining the security condition

Security level value intervals	Security condition
0.855−1	Safe
0.619−0.854	Unstable
0.383-0.618	Crisis
0.147-0.382	Critical
0−0.146	Dangerous

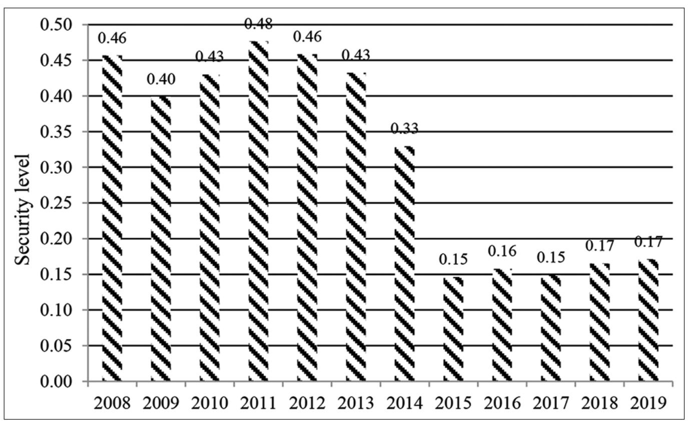
Meanwhile, the main designation of the scale of determining the conditions is that it contributes to decision-making on regulations in case that the current security condition does not correspond to the optimal one that is defined in respective management strategies and programs. The energy security level parameter was unstable in the analyzed periods and ranged from 0.15 to 0.48. It had the lowest rate in 2015 and the highest in 2011.

For clarity, the graph shows the energy security level parameter dynamics in Ukraine (Figure 1).

Having analyzed the calculated values of energy security level parameter in Ukraine and identified the corresponding conditions, one can argue that the country didn't manage to achieve the safe energy security condition in 2008-2019. In 2009-2011, the energy security level parameter in Ukraine had a slight growing dynamics, but in 2012-2014, the trend was downward, causing the transition of energy security from the crisis to critical condition. 2015 was characterized by a dramatic decline in the energy security of Ukraine to an actually dangerous level that has been consistent since 2019 with only a slight increase from 0.15 to 0.17.

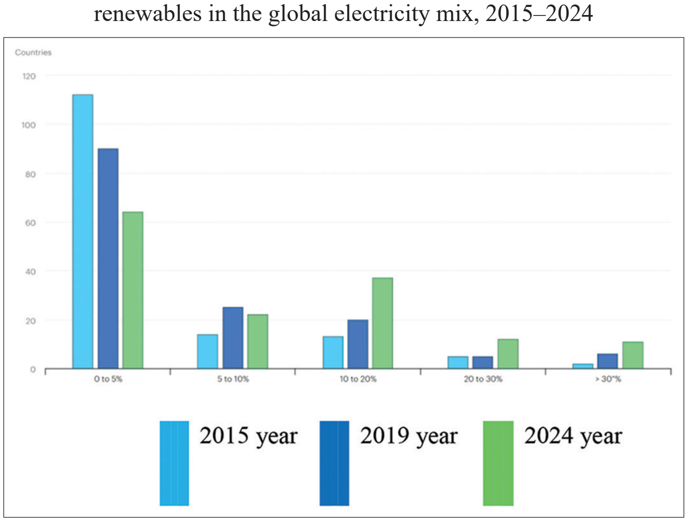
Implementation based on European experience but taking into account Ukrainian realities can increase the level of energy security with the help of renewable energy sources. According to specialists, developed countries will have increased renewable energy production by 30% in total energy production by 2030 (Figure 2). The analysis data shows that the volumes of renewable energy are growing consistently: Till 2015, they accounted for only

Figure 1: Dynamics of the integral parameter of energy security level in Ukraine in 2008–2019 years



Source: own research

Figure 2: Power Systems in Transition in the world. Share of variable renewables in the global electricity mix, 2015–2024



Source: IEA Renewable Energy Market Report, 2020

5% of the total structure, but in 2019–up to 10%. The countries' distribution is unequal: about 80 countries had the volumes of renewable energy up to 5% of the total energy production in 2015, while in 2019, only 20 countries had the volumes of renewable energy within 10-20% of the total energy production.

The study (Hryhoruk et al., 2021) presents statistical calculations and economic-mathematical modeling of the bioenergy sector in Ukraine, which helps to predict future development of renewable energy and bioenergy, highlight and choose the most appropriate factors to be stimulated by the government in order to achieve the goals of renewable energy development and energy security as a result.

The introduction of «green» (clean) energy will allow establishing electricity production worldwide. Over the last decade, variable generation from renewable sources has been growing significantly. This trend will continue in the future, as there is a significant reduction in costs and a favorable political environment. In addition, the introduction of renewable energy sources is in line with the concepts of sustainable development and reducing the negative effects of climate change. Having received target indicators in the form of 17 SDGs, it became clear that the traditional linear economic system is to be changed, and national strategies, business strategies, and tools to achieve them must be developed and implemented (Maksymiv et al., 2021), including to increase the level of energy security. While the right policies can secure access to energy during the transition period, the diffuse and decentralized nature of much of the renewable generation does increase the risk of cyberattacks, and many clean energy technologies rely on metals or minerals that are in tight supply or whose production is dominated by a limited number of nations (Energy Security, 2022). The IEA defines energy security as the uninterrupted availability of energy sources at an affordable price. That is why energy security has many aspects: long-term energy security mainly deals with timely investments to supply energy in line with economic developments and environmental needs. On the other hand, short-term energy security focuses on the ability of the energy system to react promptly to sudden changes in the supply-demand balance.

5. CONCLUSION

Based on the suggested analysis methodology, the integral energy security indices in Ukraine were evaluated. The taxonomic parameter of security level comprehensively characterizes the impact of indicator values' change on the general condition of energy security in Ukraine. Its essential advantage is that taxonomic parameter constitutes a single integral estimation that shows the direction and scales of changes in the processes described by a set of source data. The results of conducted analysis of the values of energy security level parameter in Ukraine for the entire period (2008-2019) and identification of the corresponding conditions show that the country didn't manage to achieve the safe energy security condition. In 2009-2011, the energy security level parameter in Ukraine had a slight growing dynamics, but in 2012-2014, it had a downward trend that caused the transition of the energy security from the crisis to critical condition. 2015 was characterized by a dramatic decline in the energy security of Ukraine to an actually dangerous level that has been consistent since 2019 with only a slight increase from 0.15 to 0.17. Renewable energy sources are quite prospective from the view point of securing energy resources for any country. According to specialists, developed countries will have increased renewable energy production by 30% in total energy production by 2030. This trend will continue in the future, as there is a significant reduction in costs and a favorable political environment. The introduction of renewable energy sources is in line with the concepts of sustainable development and reducing the negative effects of climate change.

Now, in the face of war and economic and social losses from Covid-19, the strategic goal of public policy should be to ensure an adequate level of energy security in Ukraine. The implementation of state policy is ensured by the established basic conditions and their coordination with further strategic priorities, as it works in the countries of the European Union. It is possible to achieve a safe energy security condition only in the case of growing values of indicators that characterize each component secured by public regulation mechanisms and participation in this process of business and citizens.

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