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DIRECTIONS OF REALIZATION OF THE ORGANIZATIONAL AND ECONOMIC MECHANISM OF FORMATION OF THE ENERGY SECURITY SYSTEM OF UKRAINE: THE ELECTRIC POWER ASPECT

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The process of reforming the electricity market has been underway for a long time. The European market liberalization guidelines encourage changes in Ukraine. However, internal contradictions of the domestic market slow down these changes. The basis for these changes is the Law of Ukraine, "On the Electricity Market," adopted in 2017, which lays the foundation for deep reform. This is manifested in the following: all enterprises (producers and suppliers) in the electricity market must operate on separate, self-organized principles; openness and transparency, and free access to the use of networks of all business entities based on public contracts; the law provides for and creates several electricity markets: the intraday market, the balancing market, and the ancillary services market. Each has a separate operating procedure, electricity purchase and sale system, pricing, and the establishment of sales volume standards and quotas.

The purpose of the article is to determine the priority areas for implementing the organizational and economic mechanism for the formation of Ukraine's energy security system in the context of the electricity sector.

The situation in the electricity market requires significant investments (about USD 25 billion over ten years) to ensure the reliability and continuity of electricity supply. Reform of the electricity market should be based on the following principles: efficiency and transparency of the National Commission for State Regulation of Energy and Public Utilities; separation of electricity generation from distribution; certification of the transmission system operator; updating system, technical, software and information software; optimization of measures and reform of the retail market to meet the needs of consumers; economic justification of pricing to meet the needs and capabilities of consumers, including changes in the cross-subsidization mechanism. Implementing the planned goals and priority areas will help reduce risks in reforming the electricity market, intensify the competitive basis between market participants (entities), create conditions for improving service quality, and limit negative factors' impact on the environment with an incentive pricing policy. The structured structure of the organizational and economic mechanism will allow us to systematize the understanding of the stages of the electricity market functioning. Thus, a unified system of interrelations between the goals of reform, the search for reform methods, sources of financial support, subject and object positions, principles, and methods of their regulation, which directly or indirectly affect the efficiency of the electricity market, will be formed.

Key words: energy security system, electrical energy security, energy sector of Ukraine, organizational and economic mechanism, formation of the energy security system of Ukraine.

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INTRODUCTION

The electricity market in Ukraine has been undergoing a long process of transformation. The European directions of market liberalization encourage Ukraine to adopt changes. However, the domestic market's internal conflicts hinder the pace of these changes. An essential foundation for these changes is the Law of Ukraine, "On the Electricity Market," passed in 2017, creating a platform for fundamental reform. This is manifested in the following aspects:

- all enterprises (producers and suppliers) in the electricity market have to operate on a separate, independent basis;
- all business entities have free access to the use of networks based on public contracts, and the market is transparent and open;
- the law defines and enables the creation of several electricity markets: the intraday market, the balancing market, and the ancillary services market. Each has a different mode of operation, a system for buying and selling electricity, price formation, and standards and quotas for sales volume [3].

The article aims to determine the priority areas for implementing the organizational and economic mechanism for the formation of the energy security system of Ukraine in the context of the electric power industry.

RESEARCH METHODS

In order to achieve the desired results and achieve the goal, this article uses not only general scientific approaches to research but also special ones, including analysis and synthesis, regional and economic analysis, and statistical and historical analysis.

ANALYSIS OF SCIENTIFIC RESEARCH

The modern electricity market has a history that reflects long-term civilizational changes. The historical and economic approach mainly defines the stages of electricity development from a resource supply to a vital and strategic industry. The electricity market's terminological and technological breakthrough was contributed by many researchers, such as the philosopher Thales of Miletus, the English physicist William Hilbert, the physicist Otto von Biren, the scientist Stefan Gray, German engineers Hausen, Bose and Winiler, Italian naturalist Alexandro Volta, researcher Andre Marie Ampère, scientist Nikola Tesla, Thomas Alva Edison, Lord Kelvin, Galileo Ferraris, and others. Moreover, the electricity market is still evolving, so new modern researchers are emerging: V. Kupchak, O. Pavlova, O. Stryshienets, K. Pavlov, V. Lagodienko, and others.

PRESENTATION OF THE PRIMARY MATERIAL AND JUSTIFICATION OF THE OBTAINED RESEARCH RESULTS

Following the European model, the national electricity market should adhere to the EU Directives when integrating. In particular, the EU countries collaborate to implement Directive 96/92/EC, the European Parliament and the Council of Europe on standard rules for the internal market in electricity regarding the following goals:

- to increase the level of competition for retail electricity supply within a certain period;
- to enable all participants to choose and access freely within the electricity market [4]. At the same time, the new configuration of the electricity market imposes new requirements for the operation of electricity grid companies. Among them are the conditions that allow reforms to be carried out on a competitive basis, such as ensuring transparent and non-discriminatory access to power grids, timely development of the electricity market to meet the needs and challenges of a dynamic economic system, and removing barriers to electricity transmission.

It is necessary to define the essence and meaning of the "organizational and economic mechanism" category to clarify the strategic directions for effectively implementing the organizational and economic mechanism and reform of the electricity market. The organizational and economic mechanism for reforming the electricity market of Ukraine is the existing forms and methods of state influence on the activities of electricity entities, including the performance of management functions, such as planning, organization of interaction, coordination, motivation, and control [6].

At the same time, the structure of this mechanism should consist of the following elements: - information, system, and regulatory support for the reform processes; methods of regulating the activities of the liberalized electricity market; investment and innovation policy; and tools for regulating the activities of electricity markets. The structured structure of the organizational and economic mechanism will help us to systematize the understanding of the stages of the electricity market functioning. Thus, the stages below form a coherent system of interrelations between the objectives of reform, the search for reform methods, sources of financial support, subject and object positions, principles, and methods of their regulation, which directly or indirectly affect the efficiency of the electricity market.

The suggested approach mainly emphasizes the proposed stages' interrelation and order, goal orientation, and systematic nature (a combination of relations, methods, forms, principles of organization, and practical reform). At the same time, the proposed stages will have different outcomes, depending on the chosen reform model, the impact of external factors and strategic directions that affect them, and the amount of possible financial involvement. Therefore, choosing the best solution requires a more accurate justification of the directions and methods of reform. Today, there are many models to evaluate and forecast market reform processes. However, most of these models are elements of the scholastic method, which, unfortunately, does not allow obtaining precise results.

Therefore, a simplified system of interrelationships will enable the formation of deterministic models that can describe the state of the object through a system of parameters and can also be used in a broader range since the electricity market is not able to significantly predict the transformation of external factors, since it does not depend on them directly. Thus, the effectiveness of the reform processes will depend on the accuracy of the reform methods and subsequent forecasting. At the same time, the relationships between the goals and directions of regulation should be classified according to their degree of closeness, direction, and analytical accounts [1].

Clarifying the outlined problems will create conditions for integrating statistical, dynamic, and expert methods application of rating analysis by modeling the assessment of the electricity market reform processes. At the same time, the objects should be services for providing electricity consumption resources to increase the production efficiency of electricity entities, and the subjects should be electricity networks

and the National Commission for State Regulation of Energy and Public Utilities. Of course, any organizational and economic activity in the process of reforming follows clear and understandable principles, which in our study are presented in the following algorithm (Fig. 1):

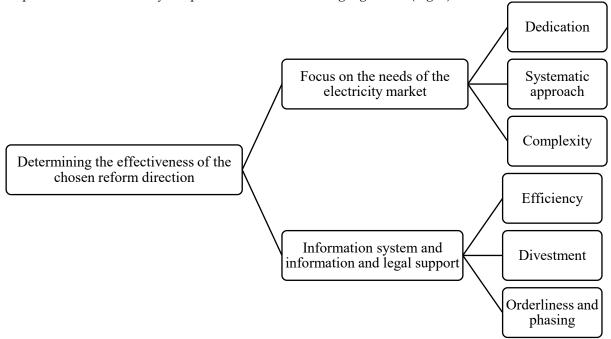


Fig. 1. Principles of the organizational and economic mechanism for reforming the electricity market Adapted by the author based on [14, 15, 16].

- orientation and needs of the electricity market involves the priority reform of the most inefficient areas in the activities of electricity market entities, which will reduce or even eliminate the risks of irrational spending of funds on the implementation of management decisions;
- goal-oriented means that the reform goals and their directions should be selected according to the potential and sources of funding, which will ensure the effective implementation of the reform process;
- -systematic implies the development and implementation of the mechanism for reforming the electricity market;
- -comprehensiveness includes all sources and instruments of organizational and economic changes in the reform process;
- information system and regulatory support means the use of the existing results of the implementation of the reform of the information system and the regulatory framework of the electricity market:
- efficiency focuses on the correct choice of methods and tools for reforming in order to achieve the most optimal results;
- diversification involves the comprehensive application of updated goals, models, directions, and sources of reforming their activities;
- orderliness and phasing determines the focus of the electricity market reform mechanism according to the planned orderliness at the approved stages, which will achieve the desired effect in the correct direction.

The principled approach of the organizational and economic mechanism for reforming the electricity market considered by us will allow all factors that may directly or indirectly affect the smooth functioning of electricity market participants to be considered. At the same time, the backbone of essential transformations is the structure of the relevant institutions and bodies, whose orderliness and organization will facilitate the likelihood of planning further development and effective operation of enterprises that expand their strategic potential. To clarify the goals, priorities, and tasks of the electricity market, it is first of all necessary to analyze the positive and negative aspects of its functioning. The most appropriate method is to apply the strategic SWOT analysis method, which can be used to state the actual situation and predict the further development of the industry. However, the scope of factors and determinants of strengths and weaknesses, potential opportunities, and threats of the electricity market are familiar but sufficient to focus on the necessary elements of the Strategy (Table 1).

Table 1. Opportunities and threats to the electricity market of Ukraine through the application of the SWOT analysis method [7, 18]

Strengths	Weaknesses
- orderly and phased implementation of the elements of the	- limitations on exports due to the unstable economic and political
organizational and economic mechanism for reducing electricity	situation in Ukraine;
consumption;	- regulatory framework not adjusted to liberalization processes;
- high level of information and operational security of power grids	- monopolization of the electricity generation and distribution
through constant monitoring of software updates and industry-	sectors;
specific computer security tools;	- low level of cultural consumption of electricity;
- availability of international resources from leading financial	- significant material and technical deterioration of fixed assets;
companies;	- dependence on the regulator (the National Commission for State
- favorable cross-border geographical location of Ukraine;	Regulation of Energy and Public Utilities) and lack of objectivity in
- significant raw material and reserve potential to meet internal and	the current tariff setting requirements;
external needs.	- lack of innovation policy in business processes and a high level of
	bureaucratic procedures.
Features	Threats
Features - Variety of sources of raw materials for hydroelectric and nuclear	Threats - low investment appeal;
- Variety of sources of raw materials for hydroelectric and nuclear	- low investment appeal;
- Variety of sources of raw materials for hydroelectric and nuclear power plants;	- low investment appeal; - military conflicts with Russia;
 Variety of sources of raw materials for hydroelectric and nuclear power plants; Unification of efforts and further cooperation with international companies and creation of own fuel cycle for fuel waste management; 	- low investment appeal; - military conflicts with Russia; - impossibility of mutual (bilateral) separation of energy systems between Russia and Belarus; - significant lobbying of monopolists' interests in the process of
Variety of sources of raw materials for hydroelectric and nuclear power plants; Unification of efforts and further cooperation with international companies and creation of own fuel cycle for fuel waste	- low investment appeal; - military conflicts with Russia; - impossibility of mutual (bilateral) separation of energy systems between Russia and Belarus;
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 Variety of sources of raw materials for hydroelectric and nuclear power plants; Unification of efforts and further cooperation with international companies and creation of own fuel cycle for fuel waste management; enhancing the level of safety in the development of emergency 	- low investment appeal; - military conflicts with Russia; - impossibility of mutual (bilateral) separation of energy systems between Russia and Belarus; - significant lobbying of monopolists' interests in the process of liberalization of the electricity market;
 Variety of sources of raw materials for hydroelectric and nuclear power plants; Unification of efforts and further cooperation with international companies and creation of own fuel cycle for fuel waste management; enhancing the level of safety in the development of emergency automation system complexes; 	- low investment appeal; - military conflicts with Russia; - impossibility of mutual (bilateral) separation of energy systems between Russia and Belarus; - significant lobbying of monopolists' interests in the process of liberalization of the electricity market; - total monopsony domination of regional electricity supply
- Variety of sources of raw materials for hydroelectric and nuclear power plants; - Unification of efforts and further cooperation with international companies and creation of own fuel cycle for fuel waste management; - enhancing the level of safety in the development of emergency automation system complexes; - adopting a strategy for the development of alternative energy sources; - implementing EU requirements and standards to integrate the	- low investment appeal; - military conflicts with Russia; - impossibility of mutual (bilateral) separation of energy systems between Russia and Belarus; - significant lobbying of monopolists' interests in the process of liberalization of the electricity market; - total monopsony domination of regional electricity supply markets;
- Variety of sources of raw materials for hydroelectric and nuclear power plants; - Unification of efforts and further cooperation with international companies and creation of own fuel cycle for fuel waste management; - enhancing the level of safety in the development of emergency automation system complexes; - adopting a strategy for the development of alternative energy sources;	- low investment appeal; - military conflicts with Russia; - impossibility of mutual (bilateral) separation of energy systems between Russia and Belarus; - significant lobbying of monopolists' interests in the process of liberalization of the electricity market; - total monopsony domination of regional electricity supply markets;

Taking into account the advantages and disadvantages of the strengths and weaknesses of the electricity market using the SWOT analysis, we should focus on the probability of reforming the critical elements of the Strategy for reforming the electricity market in Ukraine, which we visualized by grouping these elements: (Figure 2):

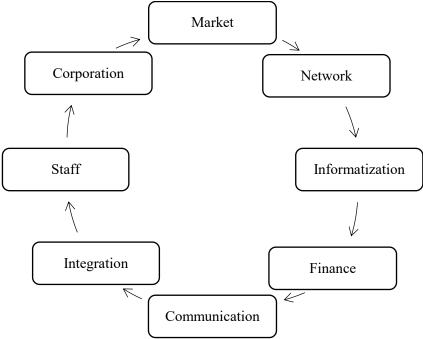


Fig. 2. Key elements of the electricity market underlying the reform [21].

- reforming the grid mainly involves solving the following tasks: increasing the system's reliability with the subsequent elimination of bottlenecks through the concept of reducing the cost of maintaining the entire system;

- reforming the market by increasing market conditions through the balancing market, ancillary services market, separation of commercial metering and settlement functions, and increased consumer participation;
- reforming information technologies will help balance the power system under current conditions and requirements by improving the quality of automation of settlements between market participants, electricity metering, control over payment transactions, and reliability of dispatching services;
- reforming financial support will allow choosing the most effective option for financing investment programs and methods of using rab "tariff by reducing the steep increase," reducing part of operating expenses, and increasing the depreciation fund;
- reforming integration processes will allow the preparation of the technical side of the ips of Ukraine for adaptation to the European network of transmission system operators, possible capacity exchange, and implementing efforts to control the structured construction of alternative energy through the introduction of feed-in tariff mechanisms;
- reforming the personnel and strengthening corporatization is necessary to increase labor productivity, improve the system of its repayment, develop personnel and comprehensively change activities based on corporate holistic management and strengthen corporate social responsibility;
- reforming communication processes will improve internal, external, and international communication through transparent information promotion to maximize popularization.

However, reforming the regional electricity market should pursue specific strategic objectives:

- comprehensive promotion of a competitive environment in the areas of production and supply of electricity resources;
- strengthening the technological and reproduction structures of investment support through modernization and re-equipment of market infrastructure facilities in order to comply with the required safety and reliability standards for energy supply
 - improving the quality of services provided;
 - limiting the eco-destructive impact on leisure activities;
 - improving the pricing system;
 - integrating the system into the European Energy Area.

In general, the market transformation of the electricity market should achieve the following main segments of market transformations: the market for direct commodity supply of electricity through bilateral contracts for the sale and purchase of electricity between producers of electricity resources, suppliers, and direct consumers; the balancing electricity market (which coordinates deviations of planned electricity supply from actual volumes), which satisfies consumer electricity needs by adjusting in real-time.

Any reforms should initially focus on the actual performance of a particular industry so that it is possible to specialize further in the effectiveness or, conversely, the ineffectiveness of the implemented strategies and measures. As for reforming the electricity market and its model, it should facilitate non-discriminatory access to the electricity grid for new entities and promote the overall competitive situation to increase electricity generation and distribution. All this, in turn, requires the creation of an automated system of differentiated approach to electricity metering and efficient data exchange, which will allow us to know the algorithm for tracking each kilowatt hour in the regions of Ukraine. The essence is the need to improve the system of all components of the balancing mechanism [12].

At the same time, the reform of the electricity market of Ukraine not only strengthens the liberalization processes of competing principles but also gives a significant place to subjective interaction, forming a scenario of unification and coordination of their interests in strategic decision-making. However, competing principles imply increased actors due to the emergence of risk situations and force majeure. As noted earlier, the Ministry, the National Commission for State Regulation of Energy and Utilities (Ukrenergo), and Oblenergos are the actors in the Ukrainian electricity market. Using a vertically integrated spiral, we can focus on their functional obligations and the risks involved.

However, based on the experience of foreign countries, it should be realized that the liberalization of regional energy markets may lead to the following unfavorable events that should be addressed in the future:

1. Alteration of the market type with the transition from the perfect competition market to the "monopolistic competition" market with the continued influence of monopoly structures. This circumstance is supported by legislation, in particular, by the Law of Ukraine "On the Electricity Market," which requires the Oblenergos to separate their obligations and own documents into the distribution segment (ensuring the operation, maintenance, development of the distribution system and the direct

functioning of distribution, as well as the segment of electricity supply by flowing electricity to consumers through the networks of distribution system operators). Since this model does not limit the influence of monopolistic structures, it is worth strengthening the integration and implementing contractual relations with the European Union and involving a potential participant in domestic competition through foreign electricity supplies.

- 2. The increase in electricity tariffs is also the result of the interaction of the Energy Strategy 2030. The electricity tariff in Ukraine is one of the lowest in Europe, given the low average wage. The National Commission for State Regulation of Energy and Public Utilities regulates tariffs for all suppliers, which use their approaches to supply electricity to non-household consumers according to contractual prices. At the same time, the retail market is characterized by significant cross-subsidization by industrial consumers for the sale of electricity to specific categories of consumers at fixed tariffs.
- 3. Lobbying of political and business interests in regulating the electricity market. Given that the legislation does not allow changing the form of ownership, the pricing aspects of which are controlled externally. That is, payment for dispatchers' services is made at a fixed rate by the National Commission for State Regulation of Energy and Utilities, indicating a partial impact on the system.
- 4. The possible risks of disruption of gas supply and consumption mainly explain the imbalance of the unified energy system. Acts of nature, technical failures, or breakdowns often make it impossible to meet the terms of bilateral contacts and imbalance the supply and demand match. Ukrenergo is responsible for its balance sheet, which must have appropriate reserves, and the ancillary services market is a tool for maintaining it. These services are provided on a fee basis, the amount of which can be regulated within the framework of the current legislation.
- 5. Decline in the investment climate in market development. It should be noted that in Ukraine, the average service life of electric power grids today exceeds 40 years; the material and technical base of infrastructure facilities needs to be revised by 60-85%, which raises the problem of electricity supply quite acutely. Only 20% of the total has been allocated in just five years for infrastructure modernization.

CONCLUSIONS

Analysts and practitioners of the electricity market assess the situation as one that, in terms of reliability and uninterrupted electricity supply, requires about USD 25 billion over the next ten years [18].

At the same time, effective reform of the electricity market should be based on the practical and transparent functioning of the National Commission for State Regulation of Energy and Public Utilities, separation of the production sector from the distribution sector of power grids, necessary certification of the transmission system operator; updating system, technical and software and information software; optimization of measures and reform of the retail market to meet the needs of consumers; economic justification of tariff setting to achieve the set goals and priority areas will reduce risks in reforming the electricity market, stimulate competition between market participants, create conditions for improving the quality of services, and limit the impact of adverse environmental factors with an incentive pricing policy.

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НАПРЯМИ РЕАЛІЗАЦІЇ ОРГАНІЗАЦІЙНО-ЕКОНОМІЧНОГО МЕХАНІЗМУ ФОРМУВАННЯ СИСТЕМИ ЕНЕРГЕТИЧНОЇ БЕЗПЕКИ УКРАЇНИ: ЕЛЕКТРОЕНЕРГЕТИЧНИЙ АСПЕКТ

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Вже давно триває процес реформування електроенергетичного ринку. Європейські орієнтири лібералізації ринку спонукають до змін в Україні. Проте, внутрішні суперечності вітчизняного ринку уповільнюють ці зміни. Основою цих змін є Закон України "Про ринок електричної енергії", прийнятий ще у 2017 році, який закладає підвалини для глибокого реформування. Це виявляється в такому: всі підприємства (виробники та постачальники) на ринку електроенергетики мають працювати на відокремлених, самоорганізованих принципах; відкритість та гласність, та вільний доступ до користування мережами всіх суб'єктів господарювання на засадах публічних договорів; законом передбачається та створюється кілька ринків електроенергії: внутрішньодобовий ринок, балансуючий ринок, ринок допоміжних послуг. На кожному з них діє окремий порядок функціонування, система купівлі-продаже електроенергії, ціноутворення, встановлення норм та квот обсягів продажу.

Метою статті є визначення пріоритетних напрямів реалізації організаційно-економічного механізму формування системи енергетичної безпеки України, в контексті електроенергетики.

Ситуація на електроенергетичному ринку потребує великих інвестицій (близько 25 млрд. дол. за 10 років) для забезпечення надійності та безперебійності поставок електроенергії. Реформування електроенергетичного ринку має базуватися на таких принципах: ефективність та прозорість діяльності НКРЕКП; відокремлення виробництва електроенергії від її розподілу; необхідна сертифікація оператора системи передачі; оновлення системного, технічного та програмно-інформаційного забезпечення; оптимізація заходів та реформування роздрібного ринку до потреб споживачів; економічне обгрунтування ціноутворення до потреб та можливостей споживачів, зокрема зміна механізму перехресного субсидування. Реалізація запланованих цілей та пріоритетних напрямків допоможе знизити ризики при реформуванні електроенергетичного ринку, активізувати конкурентну основу між учасниками (суб'єктами) даного ринку, створити умови для покращення якості послуг, обмежити вплив негативних факторів на навколишнє середовище з стимулюючою політикою ціноутворення. На наш погляд структурована будова організаційно-економічного механізму дозволить певним чином систематизувати розуміння етапності функціонування електроенергетичного ринку. Відтак, формуватиметься в своїй сукупності єдина система взаємозв'язків між цілями реформування, пошуком методів реформування, джерелами фінансового супроводу, суб'єктними та об'єктними позиціями, принципами та способами їх регулювання, які прямо або опосередковано, здійснюють вплив на ефективність електроенергетичного ринку.

Ключові слова: система енергетичної безпеки, електроенергетична безпека, енергетика України, організаційно-економічний механізм, формування системи енергетичної безпеки України.