УДК 351:303.4; JEL classification: O13, Q40
DOI: https://doi.org/10.36887/2415-8453-2023-3-29

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STRATEGIC RISKS OF REFORMING THE ENERGY MARKET OF UKRAINE IN THE CONTEXT OF THE ENERGY SECURITY SYSTEM

СТРАТЕГІЧНІ РИЗИКИ РЕФОРМУВАННЯ ЕНЕРГЕТИЧНОГО РИНКУ УКРАЇНИ В КОНТЕКСТІ СИСТЕМИ ЕНЕРГЕТИЧНОЇ БЕЗПЕКИ

Новосад О. В., Чорна Н. П., Павлова О. М., Писанко С. В. Стратегічні ризики реформування енергетичного ринку України в контексті системи енергетичної безпеки. *Український журнал прикладної економіки та техніки*. 2023. Том 8. № 3. С. 197 – 204.

Novosad O., Chorna N., Pavlova O., Pysanko S. Strategic risks of reforming the energy market of Ukraine in the context of the energy security system. *Ukrainian Journal of Applied Economics and Technology*. 2023. Volume 8. № 3, pp. 197 – 204.

Monopoly structures and complete control over pricing deform the electric energy environment. An example of the European model of reforming the electricity market, which is based on transparency and consumer accessibility to electricity services, is shown. On this basis, the goals, and vectors of reforming the regional markets of electric energy services have been determined. It is foreseen that the reform process should be carried out on a combination of organizational, economic, technical, social, and other goals. The advantages and disadvantages of reforming the electric power market of the region and the country were identified using the author's SWOT analysis method. The proposed closed cycle of reforming the electricity market covers an interchangeable combination of the following components: regional electricity networks, market environment, information environment, financial and credit support, integration, labor resources, and communication links. Vectors of further reform are outlined. Competitiveness presupposes the free choice of a supplier by consumers in the absence of barriers to the supply and sales market. The new European format of the electricity market model creates new challenges and threats to the operation of electricity market enterprises, which relate to transparent and objective conditions of access to consumption and operation of electricity networks, impartial accelerated development of the electricity market to the requirements of the dynamism of the economic system. Reforming the electricity market combines the processes of achieving organizational, economic, technical, social, and environmental goals. However, this combination causes various consequences and risks associated with profit maximization. One of the most critical problems of the multi-system operator's functioning is ensuring its independence and mutual respect for all market participants. For this, the following measures are legally justified: procurement of related services on a competitive basis; transparent information about the available list of related services, their volumes, costs, terms, and requirements for suppliers; formation of accounting of the expense and income component when implementing the centralization of dispatching management from other types of activity; formation of access to the capacity of interstate electrical networks by conducting electronic auctions; submission of the UES development plan to the CMU of Ukraine for consideration, even in the case of inconsistency between the interested authorities; the investment component of the region will grow only under the conditions of reforming the electricity market. However, the processes of introducing a new model of the electric power services market are being formed under tight deadlines, the introduction and adoption of legislative acts, the implementation of organizational and structural transformations, and software approvals; despite everything, the processes of reforming the electric energy services market are an integral attribute of the region's integral investment policy.

Keywords: *energy market, energy security system of Ukraine, energy system, energy risks, strategic risks.*

Електроенергетичне середовище деформоване монопольними структурами та повним контролем над ціноутворенням. Показано приклад європейської моделі реформування електроенергетичного ринку, що ґрунтується на прозорості та доступності споживачів до електроенергетичних послуг. На цій основі визначено цілі та вектори реформування регіональних ринків електроенергетичних послуг. Передбачено, що процес реформування мав би бути здійснений на поєднанні організаційних, економічних, технічних, соціальних та інших цілей. Виявлено переваги та недоліки при реформуванні електроенергетичного ринку регіону та країни за допомогою авторської методики SWOT-аналізу. Запропонований замкнений цикл реформування електроенергетичного ринку, який охоплює взаємозамінне поєднання таких компонент: регіональні електроенергетичні мережі, ринкове середовище, Інформаційне середовище, фінансово-кредитне забезпечення, інтегрування, трудові ресурси, комунікаційні зв'язки. Окреслено вектори подальшого реформування. Конкурентоспроможність передбачає вільний вибір споживачами постачальника, відсутність бар'єрів до ринку постачання та збуту. Новий європейський формат моделі електроенергетичного ринку формує нові виклики та загрози функціонування підприємств електроенергетичного ринку, що стосується прозорих та об'єктивних умов доступу до споживання та експлуатації електроенергетичних мереж, неупереджений прискорений розвиток електроенергетичного ринку до вимог динамічності економічної системи. Реформування електроенергетичного ринку поєднує і собі процеси досягнення організаційних, економічних, технічних, соціальних та екологічних цілей. Однак це по-єднання обумовлює різні наслідки та ризики пов'язані з максималізацією прибутку. Однією з найважливіших проблем функціонування системного оператора в забезпеченні його незалежності та взаємоповаги до усіх учасників ринку. Для цього законодавчо обґрунтовано наступні заходи: закупівля супутніх послуг на конкурентних засадах; прозоре інформування наявного переліку супутніх послуг, їх обсягів, вартості, термінів та вимог до постачальників; формування обліку витратної та доходної складової при здійснення централізованосте диспетчерського управління від інших видів діяльності; формування доступу до пропускної спроможності міждержавних електричних мереж шляхом проведення електронних аукціонів; внесення на розгляд КМУ України плану розвитку ОЕС навіть у випадку неузгодженості зацікавлених інстанцій; інвестиційна складова регіону зросте лишень за умови реформування ринку електричної енергії. Однак процеси запровадження нової моделі ринку електроенергетичних послуг формується за стислих термінів, запровадження та прийняття законодавчих актів, здійснення організаційних та структурних перетворень, апробації програмного забезпечення; попри все, процеси реформування ринку електроенергетичних послуг є невід'ємним атрибутом цілісної інвестиційної політики регіону.
***Ключові слова**: енергетичний ринок, система енергетичної безпеки України, енергетична система, енергетичні ризики, стратегічні ризики.*

Statement of the problem

Competitiveness implies free supplier choice by consumers without barriers to the supply and sales market. The new European format of the electricity market model creates new challenges and threats to the functioning of electricity market enterprises, including transparent and objective conditions for access to consumption and operation of electricity networks and impartial accelerated development of the electricity market to meet the requirements of the dynamism of the economic system.

Reforming the electricity market combines the processes of achieving organizational, economic, technical, social, and environmental goals. However, this combination causes various consequences and risks associated with cost minimization.

Clarifying long-term goals and objectives requires a comprehensive approach to analyzing the electricity market in the following areas: setting reform priorities, identifying benefits and risks, and assessing likely environmental risks.

The parsimony of the final calculations is explained by many researchers, including V. Lagodienko, O. M. Pavlova, K. V. Pavlov, L. Belyaev, and others. However, electricity resources are becoming increasingly important in today's globalized development. In addition, there is a need for an integrated approach to the investment and innovation processes of the electric power industry in the region and the definition of organizational and economic vectors of the national electric power Strategy.

The purpose of the research

This article aims to identify the most strategic risks of reforming Ukraine's energy market in the context of its energy security system.

Presentation of the main research material

The interaction of the factors of influence on the electricity market in the region methodically reflects the advantages and disadvantages, which should be reflected in the strategic SWOT analysis method (Table 1).

In addition, certain key reform areas require immediate changes and improvements. These include regional power grid facilities, the market information environment, financial and credit support, integration, human resources, and communication links.

1. Regional power grids are in a dilapidated state and are forced to be invested in. Therefore, the main goals of reforms in this area should be to increase the level of reliability of the system of security of electricity transmission and transportation of energy resources, review of costs in order to eliminate unnecessary costs of system maintenance;

2. Market environment. The desired situation in any market, including the electricity market. Achieving market competition is possible provided that a balance is achieved in the market of related

services and that the administration of commercial metering and settlements intended for active consumption are separated [6];

Table 1. SWOT analysis of the electricity market of Ukraine [1]

Strengths	Weaknesses
-gradual introduction of organizational and economic processes to increase electricity consumption on the basis of competitiveness; - maintaining a sufficient level of security and capacity of power grids through systematic updating of information support and compliance with security regulations; - financial and resource cooperation with international and financial organizations; - convenient geographical location of the country; -significant external and internal potential of raw material reserves of enterprises;	- limitation of export potential due to unfavorable economic and political criteria; -imperfect regulatory framework; - monopoly pressure in the electricity generation and distribution sectors; - low level of ethical norms and cultural awareness of consumption; -deterioration of the network and sectoral assets; - subordination to the NEURC regulator, non-transparent tariff setting; - the presence of bureaucratic obstacles and the lack of effective business processes;
-diversification of sources of raw materials; -cooperation with international organizations to form our own fuel and energy fund and regulate excess nuclear waste; -formation and provision of automated transmission systems for electric power resources; -formation of a strategy for the development of renewable energy sources; - step-by-step integration of EU requirements and standards into the domestic electricity market;	-lack of the necessary conditions for an investment-incentive environment; - non-transparent and hostile relations between russia and Ukraine; -the possibility of unilateral disconnection from the electricity system of belarus and russia; -political lobbying of monopolists' interests; -low solvency of electricity consumers.

3. Information environment. The need to consider the modernized technological basis is also a vector of market reform on a competitive basis. The introduction of modern information and technical technologies will allow balancing the energy system in real space, automating accounting and financial calculations of market participants, metering electricity, controlling payments, and ensuring the proper quality of IPS dispatching;

4. Financial and credit support is indispensable for reforming the electricity market. It involves finding the most efficient way to finance investment programs, developing a new RAB-tariff methodology to avoid its shock increase, reducing operating costs, and increasing depreciation charges;

5. Integration. This is a segment of achieving the technological orientation of the integrated power system of Ukraine and the regions to unite with the European Network of Transmission System Operators for Electricity in Europe (ENTSO-E) with possible exchange of capacities and isolation from other member countries. It also stimulates organized control and structured construction of renewable energy sources based on the practice of "green" auctions;

6. Labor resources. Increased labor productivity, modernization of the remuneration system, motivation for staff development, and a comprehensive training approach;

7. Corporatization. An essential process of corporatization of the company through the transformation of a state-owned enterprise into a private one, taking into account the elements of corporate governance and social responsibility;

8. Communication links. It is essential for uninterrupted supply and analysis of information. They require constant internal, external, and international communication improvement in developing a new information policy and significant popularization.

Therefore, the Strategy for reforming the electricity market of Ukraine resembles a closed cycle of essential components of its activities (Fig. 1).

Thus, in terms of consolidating ties with European countries, the following main goals should be pursued about reform principles:

- to obtain transparent, competitive conditions not only in the field of production but also in the field of electricity supply between regional electricity markets;
- increasing the level of internal and, at the same time, external security of energy supply through a systematic process of modernization of technological re-equipment of "infrastructure connection" facilities, etc;
- improving the quality of services provided by regional electricity market participants;
- limiting the destructive impact of the electricity industry on the environment;
- formation of a pricing system adaptive to consumers;
- continuation of organizational, regulatory, and legislative integration of regional electricity markets into the European energy space [7].

Based on the most effective reform option, which focuses mainly on the implementation of legal and policy frameworks, as well as on following certain stages of the experience of the European Union, the main elements of the transformation of regional electricity markets should be outlined:

- a market for direct supply of electricity resources, ensured through bilateral purchase and sale agreements between the main actors and regional electricity markets. The main entities include direct producers of electricity (TPPs, CHPs, NPPs), suppliers, and direct consumers (contracts are concluded on exchange and over-the-counter terms);

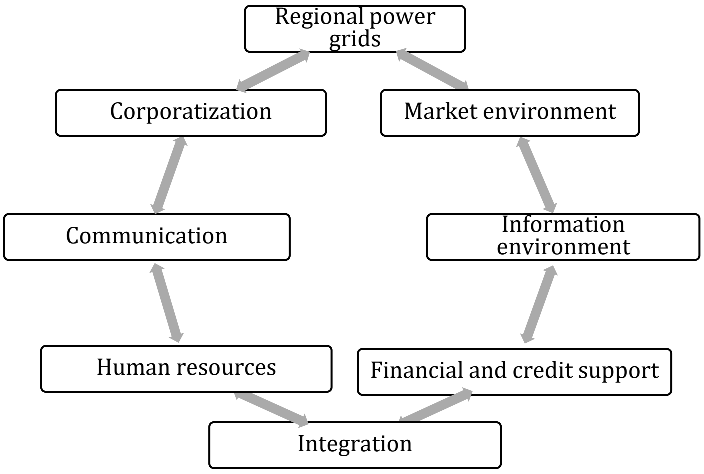

Figure 1. Strategy for reforming the electricity market of Ukraine

- dynamic electricity market (deviation of actual activity from the planned one) - an arrangement that makes it possible to meet the actual needs of electricity consumers through the dynamics of the main elements provided for in bilateral agreements with a subsequent sale at an auction (slot market);

- ancillary services market - services of ancillary nature provided by the entity of regional wholesale markets under conditions of competition based on reliability, safety, and sufficient quality of electricity supply to consumers (subject to systematic monitoring and accounting of electricity resources) [15].

Under such conditions, the updated model of reforming the region's electricity markets is designed to provide unrestricted access to electricity grids for new entities and create a transparent, competitive environment for the electricity generation and distribution sectors.

The reform process should first consider the smart-technology scenario, which requires the development of an automated system of differentiated metering of electricity resources access to data exchange, which will allow periodic tracking of the movement of each kilowatt-hour in Ukraine. In addition, international standards require forming a model of a dynamic electricity market [4].

However, these changes are prolonged due to several factors that hinder liberalizing the competitive environment, concluding direct supply agreements, secure energy supply, prudent pricing policy, and transparent tariff setting. Forming a competitive environment is inherently a source of conflicting interests of different business entities and the emergence of risky situations. Generally, the interaction between participants in the regional electricity market is as follows (Fig. 2).

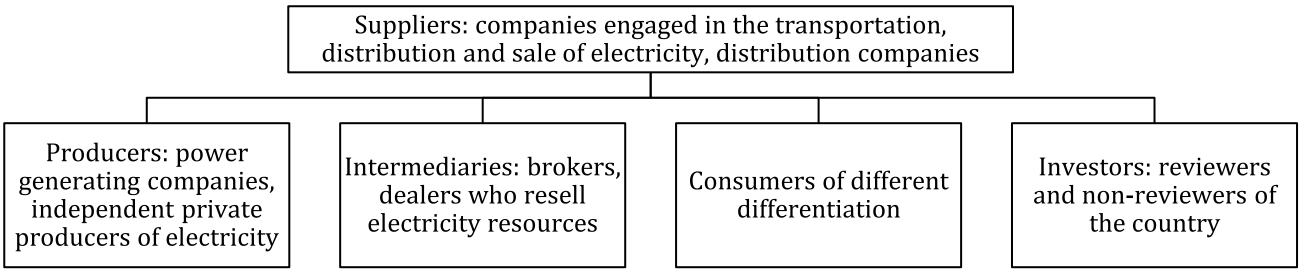

Figure 2. Participants in regional electricity markets. Improved by the author based on [3].

However, any reform will inherently have specific consequences for regional electricity markets, summarized in the following.

- deformation of the competing model of all sectors of the economy and redistribution of influence from some monopolists to others

- increase in electricity tariffs;

- political and oligarchic lobbying of the interests of third parties and the regulatory function of this market;

- an imbalance of functions between the structural units of the UES (integrated energy system [8].

As for the first consequence, which concerns the deformation of the competing model of all sectors of the economy and the flow of influence from one monopolist to another, it appears that the Cabinet of Ministers' resolution and the relevant Law of Ukraine "On the Electricity Market" have not yet been implemented. These draft laws allow us to consider the requirements of the Third Energy Package, as a result of which oblenergos are obliged to separate distribution activities from the supply of electricity resources. This leads to the delimitation of spheres of influence between the two companies regarding the above functionality. The first company will become the distribution system operator and ensure the electricity distribution system's operation, maintenance, and further development and improvement.

The second company will become the transmission system operator, selling to direct consumers the right to use electricity supplied through the network. However, in this case, the Law of Ukraine creates preconditions not for solving the problem of monopolization but for its strengthening, only increasing the number of monopolists in this market. Therefore, adhering to the European vector orientation is essential, which will limit the control of the dominant entities and consider the consumer's interest by creating import competition for electricity resources and stabilizing prices in this market [13].

Regarding the second consequence, the increase in electricity tariffs, the retail electricity market of Ukraine is governed by the new version of the Law of Ukraine "On the Electricity Market" - 13.04.2018, No. 2019 VIII) Moreover, it aims to implement the leading EU Directives 2009/72/EC. Suppliers provide 25 universal service suppliers at a regulated tariff and 33 at an unregulated tariff, private electricity resale companies. The National Commission for State Regulation of Energy and Public Utilities, the main regulator of the electricity and public utilities sector, regulates tariffs for all enterprises except for unregulated tariff enterprises, which supply electricity mainly to non-household consumers on a competitive basis at contractual prices. A negative manifestation of pricing in the retail market is the too high level of cross-subsidization by industrial consumers of the cost of electricity sold to specific categories of consumers at fixed prices. The total amount of losses from compensation to energy supply companies in 2020 amounted to UAH 1 billion, up from 2019 [14].

Despite this, the tariff for electricity services in the regions of Ukraine is considered the lowest in Europe. However, revenues are also the lowest in the country itself.

Currently, the tariff setting for electricity provided by Energoatom is based on the "Cost +" method, which does not create incentives for enterprises to release part of transaction costs since the amount of profit under this methodology is practically independent of the effective operation of the enterprise.

Therefore, one of the integrating points of rapprochement with the European energy market should be implementing a tariff-based approach to regulating natural monopolies based on the "rate of return-on-investment capital" methodology, considering service quality indicators. In other words, Ukraine is facing the issue of applying methods of comparative analysis in rating companies and considering the quality of services.

The Cabinet of Ministers of Ukraine itself supports the incentive pricing method. However, it needs to be convinced by the draft adopted by the National Energy and Utilities Regulatory Commission on 27.07.2017 to justify the feasibility of its application in the industry, which may affect price hikes.

The reform of the electricity market is expected to lead to an increase in tariffs for households. This is possible due to the revaluation of Ukrenergo's assets, which is expected to result in a sharp increase in depreciation charges, leading to an increase in tariffs. In addition, the practice of some countries that have liberalized their electricity markets proves that price regulation for ordinary consumers and pricing by energy generating companies leads to disruptions in electricity supply and has signs of the old regulated model [5].

The following is the third aspect of political and oligarchic lobbying of third-party interests in the electricity market regulatory system. An important argument is the imperfection of the current legislation, which needs to consider the dynamics of ownership changes for the described operator (state-owned) pricing, which is formed by external factors. That is, pricing is formed from the centralized dispatch control and within the tariff regulated by the National Commission for State Regulation of Energy and Public Utilities. However, given the "vulnerability" of the regulatory body to political and personal business demands, the economic feasibility of the established tariffs remains questionable.

Imbalance of functions between the structural units of the integrated energy aspects. Generally, the market is an element of free partnership exchange of performance results. However, the situation has a certain peculiarity in the electricity market, provided that each producer or supplier is responsible for its imbalance (deviation of production and consumption). When forming bilateral contracts or selling electricity on the day-ahead market, suppliers and producers must ensure their consumption and production at certain hours are appropriate.

However, ensuring compliance with the contract terms is almost impossible, as there are several unforeseen circumstances: deteriorating weather conditions, changes in the actual volume of generation by wind and solar power plants, and modernization of generating equipment [12].

Therefore, the transmission system operator Ukrenergo is generally responsible for the balance of the IPS of Ukraine. This body must create reserve stocks and a market for related services. Such services are formed based on payment, the tariff regulated by secondary legislation [10].

The fifth aspect is the reduction of investment in the modernization and development of electricity facilities.

In Ukraine, the average service life of distribution power grids exceeds 45 years, and the infrastructure is 60-85% worn out, which causes problems with ensuring uninterrupted electricity supply to consumers. About UAH 15 billion has been invested in domestic oblenergos in recent years, while the plan provides UAH 70 billion.

The Association of Distribution Network Operators of Ukraine forecasts that about UAH 25 billion will be needed to ensure the reliability of uninterrupted electricity supply and modernize the power grids.

An effective way to ensure investment in this area is to upgrade the grid infra-structure through a system of incentive tariff setting and RAB regulation of the system of long-term strategic pricing. RAB regulation is possible by introducing a regulatory rate of return based on the following calculation: "costs + return on invested capital + return on invested capital."

Regulation of tariff setting is possible by increasing the following investment decisions: 1) increasing the profitability of enterprises by minimizing costs; 2) attracting private investment; 3) increasing the volume of institutional services. However, it is typical for risks to arise that will hurt investment objects. Typical risks are an ineffective mechanism for protecting private investors, inconsistent and ineffective policies, imperfect legal legislation, political and business influence, and undervaluation of Ukrenergo's assets to attract investment. In this direction, the report of the international company Ernst and Young, "Mapping pioneer utilities regulation in Europe," assesses the investment resources by an independent expert, which will make the RAB, the regulator, more effective in activating financial capital and protecting the interests of all market participants.

Therefore, the practical reform of the electricity solution lies in the plane of such organizational and managerial decisions:

- effective and transparent regulation by the National Energy and Utilities Regulatory Commission;
- division of functional responsibilities between regional energy companies;
- obtaining a certified permit to operate as a transmission system operator;
- purchase of software;
- improvement and staffing of technical measures in the context of retail electricity market reforms;
- adapt all market participants to function in fundamentally new conditions;
- eliminate cross-subsidization mechanisms and bring prices for consumption to economically justified levels;
- to completely resolve the chronic debts throughout the integrated energy system.

Clearly defining the goals and directions of reform and mitigating potential risks in reforming the electricity market will further create conditions for improving the quality of services, limiting negative environmental impacts, improving pricing, and strengthening international cooperation.

However, despite the existing aspects, reforming the electricity market is very important for organizing more complex activities that are formed in a politically un-stable situation and external aggression. Since it is necessary to change the model of development of the electricity market, it requires updated organizational and economic forms, given the inability of the current "single buyer" model to solve new problems that arise in the electricity environment. The inability of the existing model is related to the specifics of regional economic development: hopelessly outstanding debts between wholesale market participants, shortage of current accounts, artificial manipulation of cash flows in the market, unfair competitive situation, lack of a market for related services; administrative pressure in market regulation, lack of an effective mechanism of credit guarantors and the likelihood of risk mitigation [9].

The updated model is an implemented scenario of the European energy market and covers the following market segments:

1. Bilateral contracts market. The functioning of this market is conditioned by the fact that producers can sell electricity to distribution companies and direct end consumers.

Entities entering into contracts: electricity producers, independent suppliers, guaranteed suppliers, electricity distribution companies, and qualified consumers.

The following processes take place in the market of bilateral contracts: Electricity suppliers generally cover most electricity needs. The regulator does not interfere in the pricing processes and relationships between market participants. Consumers have the right to purchase and sell energy products. Suppliers can enter into direct bilateral contracts with producers based on the parties' agreement to fore-cast future revenue and cost policies.

The day-ahead market. Market participants sell electricity resources "the next day" by submitting purchase (sale) orders to the market operator. The primary purpose of this market is to reduce imbalances between participants. The day-ahead market participants are the electricity producer, the indispensable supplier, the guaranteed electricity supplier under the feed-in tariff, the electricity distribution company, and the day-ahead market operator. In this sense, the market is an exchange where a unified approach to pricing is formed based on competitive principles of supply and demand interaction.

Balanced market. Generally organized by the system operator to achieve the following goals:

1. Balancing supply (electricity exports and imports) and demand (internal and external).
2. Streamlining the existing systemic limitations of the integrated energy system of Ukraine.
3. Financial regulation of the consequences of imbalances in the electricity component.

The market participants should include electricity producers, an independent supplier, a guaranteed supplier, a guaranteed buyer under the feed-in tariff, a system operator, a settlement administrator, and a qualified consumer, if they acquire the status of a market participant that will ensure compliance with the balance.

Market of related services. The system operator provides services to wholesale market participants on a competitive basis to achieve reliability, quality of service provision to consumers, etc. It procures these services to ensure the sustainable and reliable operation of the integrated power system following approved standards.

System operator. In the domestic legal framework, a system operator is a unitary or corporate enterprise that cannot change its form of ownership. In general, the system operator performs the following functions: centralized dispatch control of the IPS of Ukraine operating modes, ensuring the functioning of the balancing market, ensuring the operation of the ancillary services market, administration of settlements, and commercial accounting [2].

One of the most critical problems of the system operator's functioning is to ensure its independence and mutual respect for all market participants. To this end, the following measures are legally justified:

1. Procurement of related services on a competitive basis;
2. Transparent communication of the available list of ancillary services, their volumes, cost, terms, and requirements for suppliers;
3. Accounting for the cost and revenue components when centralizing dispatch management from other activities;
4. Formation of access to the capacity of interstate power grids through electronic auctions;
5. Submit the IPS development plan to the Cabinet of Ministers of Ukraine, even in case of stakeholder disagreement.

However, strengthening the role of the system operator only ensures its complete independence from external risks. The liberalization of the electricity market considers the accessibility of other participants to the wholesale market that can directly conclude agreements with generation companies and sell electricity on the retail market. Such participants are usually large industrial consumers. At the same time, the retail market is creating a so-called competitive environment on the supply side, which is an alternative to the existing oblenergos. The formation of consumer choice will further affect competitive relations' price quality and transparency.

Conclusions and prospects for further research

The investment component of the region will increase only if the electricity market is reformed. However, the processes of introducing a new model of the electricity market are being formed quickly, introducing, and adopting legislative acts, implementing organizational and structural changes, and testing software.

Nevertheless, reforming the electricity market is an integral part of the region's comprehensive investment policy.

Література

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Стаття надійшла до редакції 15.07.2023 р.