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SECURITY OF UKRAINE’S ELECTRICITY MARKET: IMPLEMENTATION AND CONTINUED HOLDING


Abstract
The emergence of state-owned enterprises, Market Operator andGuaranteed Buyer, which are responsible for the operation of the day-ahead and intraday market and form the price policy for payment of electricity services to producers and suppliers that use renewable energy sources, i.e., work according to "green tariff" and "regulated tariff" for the needs of the population. It was noted that energy is distributed within the UES by energy supply companies licensed to provide electric energy at regulated and non-regulated tariffs. It is outlined that the actual results of the processes of reforming the electricity market are: the organization of the electricity market segments, which allows to consider the day-ahead market as the leading indicator of price formation; two trade zones operating at the same time, the United Energy System of Ukraine and the energy center of the Burshytyn TPP, where different prices have been formed due to the generation structure; the possibility of using the export potential of electricity according to the principles of ENSTO-S has been launched, which promotes general agreement between supplier countries, increases competition, forms a system of balanced results with the minimization of losses, accelerates the processes of integration of the electricity market of Ukraine into the European energy system. At the same time, the electricity market of Ukraine faces many challenges and threats, among which the countdown to the implementation of the free electricity market model was not accompanied by objective reasons by changes in regulated electricity prices for specific categories of consumers (population) and cross-subsidization, which ultimately caused significant financial stress to the state-owned enterprises Energoatom and UkrHydroEnergo, which are subject to the imposition of special duties; the practice of operating auctions for renewable energy sources in order to optimize their value is not implemented correctly. In this area, only the construction of such objects took place under the conditions of fixing the "green tariff"; led to a drop in economic development, significant consumer debt, and a decrease in electricity consumption, as a result of a drop in prices, an increase in the deficit and debt coverage for select categories of consumers; the significant accumulation of the debt burden of SE Energorynok in front of a significant number of generating companies, requires immediate state regulation and the adoption of a particular law regarding the further resolution of this problem; replacement of old capacities with new ones with a quick start for balancing and functioning of gas piston units and energy storage systems. It became known that in terms of its actual content, the electric power industry has several specific features that characterize its energy orientation: the change of parameters depending on the field of application, the simultaneity of the processes of production and consumption as an energy resource; constancy and identity of volumes of produced and consumed electrical energy; lack of possibilities for reservations in the form of goods; the impossibility of a predictable assessment of resource generation and consumption; complete dependence of the production component on consumer demand. In addition to the circumstances of the economic direction, specific properties are also characteristic of electric energy, which is related to its essential purpose as an energy resource; power; time; terms and conditions of consumption; quality; distance; variability. Today, the already existing positive and negative consequences of the effectiveness of state economic regulation of the electricity market should be noted. As for the negative consequences, it should be noted the versatile and non-uniform nature of the application of various forms and methods of pricing to electricity producers; tax imbalance due to the lack of necessary tax and budget levers for regulating the electricity industry; the practice of the cross-subsidization system of some consumers at the expense of others through the wholesale market price (ORC) for electric energy. A review of safety criteria in the country’s electric power sector shows the imperfection of the electricity market and the need to strengthen the relevant safety tools.

Keywords: electric energy, electric power industry, energy, electric power safety, energy market of Ukraine.
БЕЗПЕКА ЕЛЕКТРОЕНЕРГЕТИЧНОГО РИНКУ УКРАЇНИ:
РЕАЛІЗАЦІЯ ТА ПОДАЛЬШЕ УТРИМАННЯ


Анотація
Зазначено позиву державних підприємств: «Оператор ринку» та «Гарантований покупець», які відповідають за функціонування ринку на добу наперед і внутрішньодобового ринку та формують цінову політику оплати послуг з електроенергії виробникам та постачальникам, які застосовують відновлювані джерела енергії, тобто працюють за «зеленим тарифом» та «регульованим тарифом» для потреб населення. Визначено, що Електрична енергія розподіляється в межах ОЕС енергоопорного регулювання, яка досягає економічного ринку в резонансі. Електрична енергія, електроенергетика, енергетика, електроенергетична безпека, JEL classification: Q43

Ключові слова: електрична енергія, електроенергетика, енергетика, електроенергетична безпека, енергетичний ринок України.

Introduction

The electric energy market functions in a regulatory and legal sense guided by the Law of Ukraine "On the Electric Energy Market" dated 04/13/2017 No. 2019-VIII. The main postulates are the implementation of the relevant norms and standards of the legislative framework of Europe for further integration into the electricity market familiar with it.

A large number of studies at both the theoretical and practical levels were devoted to studying issues related to Ukraine's electric power sector.

The vast majority of them, in a certain way, reveal the main provisions that have already been highlighted in the Ukrainian Energy Strategy of the state. It is worth noting among the research scientists in this field: I. Bohonko, S. Galyanta, M. Korotya, R. Romanyuk, and others [13-15, 19-20].

Among the researchers who support the opinion regarding the consolidation and socialization of the regulatory and legal basis of the state's electric power sector, it is worth mentioning V. Kupchak, O. Novosad, K. Pavlov, O. Pavlova, O. Strishenets, etc. [4-5; 7-10; 12-14; 17].

The purpose of the article

The purpose of this article is a comprehensive study of the peculiarities of the implementation of the security of the electricity market of Ukraine.

Presenting main material

The practical countdown to reforming the electricity market began on July 1, 2019. The result was the termination of the previous cooperation between the State Enterprise Energorynok, which played a decisive role in price formation in the electricity market. At the same time, models of the free market of bilateral contracts, the day-ahead market, the intraday market, the balancing market, and the market of auxiliary services have been formed.

State enterprises appeared, Market Operator and Guaranteed Buyer, which are responsible for the operation of the day-ahead and intraday market and form the price policy for payment of electricity services to producers and suppliers that use renewable energy sources, that is, they work for "green tariff" and "regulated tariff" for the needs of the population. Concerning commercial accounting, the administration is entrusted to the operator of the transmission system PrJSC NEC Ukrenergo. In addition, the state energy companies Energoatom and UkrHydroEnergo are authorized with special duties to supply electricity at special regulated prices for the needs of the population and to provide financial resources to pay producers from renewable energy sources the surplus in the "green tariff" relative to the market price for electricity.

Electric energy is distributed within the UES by energy supply companies licensed to provide electric energy at regulated and non-regulated tariffs. Regarding the regulated tariff, the suppliers own the electricity distribution networks and have licenses for the supply and transmission of electricity through their networks. The situation in the wholesale market of electricity establishes by law the presence of equal access of all business entities to the market of electricity services with subsequent purchase and sale. Under such conditions, pricing relies on generating companies [3, 8]. Significant results of the electricity market reform process are:

- the organization of electricity market segments, which allows considering the day-ahead market as the leading indicator of price formation;
- two trade zones are operating at the same time – the United Energy System of Ukraine and the energy center of the Burshtyn TPP, where different prices have been formed due to the generation structure;
- the possibility of using the export potential of electricity according to the principles of ENSTO-S has been launched, which promotes general agreement between the supplier countries, increases competition, forms a system of balanced results with the minimization of losses, accelerates the processes of integration of the electricity market of Ukraine into the European energy system.
At the same time, the electricity market of Ukraine faces many challenges and threats:

- the countdown to the implementation of the free electricity market model was not accompanied, for objective reasons, by changes in regulated electricity prices for specific categories of consumers (population) and cross-subsidization, which ultimately caused significant financial stress on the state-owned enterprises Energoatom and UkrHydroEnergo, which are subjects of special duties. Therefore, considering changes to the parameters of regulated prices and cross-subsidization will have an essential organizational significance for the objective and transparent reform of the electricity market [9];

- the practice of operating auctions for renewable energy sources to optimize their value is not implemented correctly. In this area, only the construction of such objects occurred under the conditions of fixing the "green tariff." In June 2020, more than 7 GW of capacity was put into operation, which also exerts a significant financial burden on the electricity market and hinders the stability of operations for the transmission system operator in balancing the work of the entire energy system. Launching auctions for renewable energy sources will make it possible to stabilize the price chaos of tariff formation and strengthen the competitive component of the market;

- the problems in Ukraine led to a drop in economic development, significant consumer debt, and a decrease in electricity consumption as a result of a drop-in prices, an increase in the deficit, and debt coverage for preferential categories of consumers and subjects in the segment of renewable energy sources;

- the significant accumulation of the debt burden of SE Energorynok in front of a significant number of generating companies requires immediate state regulation and the adoption of a particular law regarding the further resolution of this problem;

- replacement of old capacities with new ones with a quick start for balancing and functioning gas piston units and energy storage systems. At the same time, this involves private investors and the implementation of a system of special auctions with the further guarantee of their investment payback;

- for a long time, distribution and transmission systems operators used a regulated tariff, which did not allow large-scale repair and construction works to be carried out. Therefore, it is essential to use incentive tariff formation (RAB-tariffs) for the reconstruction and modernization of networks and the application of electrification and informatization of services based on the transferability principle.

Restoration of the electric power industry is one of the strategies for the country's economic growth. The central thesis of this transformation will be the modernization of the domestic energy industry. Implementing this process will, of course, take into account the best practices of countries with experience in technically reliable and environmentally sound ways to ensure the supply of energy resources and achieve the required level of energy security [2, 4].

In terms of its actual content, the electric energy industry has several specific features that characterize its energy orientation. First of all, it concerns the place and importance in the economic development of the economic system:

- changing parameters depending on the scope of application,
- the simultaneity of production and consumption processes as an energy resource, 
- constancy and identity of volumes of produced and consumed electrical energy;
- lack of possibilities for reservation in the form of goods;
- the impossibility of a forecasted assessment of resource generation and consumption;
- complete dependence of the production component on consumer demand.

In addition to the circumstances of the economic direction, electric energy is also characterized by specific properties that are associated with its essential purpose as an energy resource (fig. 1) [11, 19, 22]: power, time, conditions and regimes of consumption, quality, distance, variability. Ukraine’s electricity system is characterized by its operation based on the constant search for an optimal combination of balance between demand and generation. Therefore, the safety criterion in this sense is exclusively maneuverability as a necessary
condition for the stability of its further functioning and implementation of the supply function. Violation or non-observance of the appropriate proportion can cause significant economic imbalances related to the loss of electricity and will affect the unprofitability of the entire technological chain of electricity supply and consumption.

![Diagram: Specific properties of electronic energy as a resource](image)

**Fig. 1. Specific features of the electric power industry**

*Built and systematized by the author, [11, 20, 23]*

The maneuverability of the power supply system is simultaneously a technological and complex process, which is ensured by the main subjects (producers) of electricity (thermal power plants, cells of renewable energy sources, and storage systems). As a rule, these structures are indicators of the reaction to changes in the generation volume relative to consumer requests.

The following criterion for increasing the level of security is ways to increase the level of maneuverability of energy security at the expense of consumers through the use of a demand management system. The expected result of the specified mechanism should be an independent change in the load schedule relative to the regularity of the work of the dispatcher and operator of the transmission systems before the change in the market situation.

In practice, consumer demand management focuses on the need to license enterprises that play the role of a demand management regulator and defend the position of the consumer group in the auxiliary services market [6, 10, 12].

Therefore, the specified actions are intended to unify their efforts to increase the potential of consumers in the direction of changing demand and its further implementation in the relevant segment of the electricity market. The implementation of the Notifications de change de blocs defacement mechanism provided a regulation for the exchange of messages between market participants to sell demand.

Demand in the electricity market is an aggregate indicator and is determined by several indicators:
- trends in the economic growth of the country and regions;
- the formed structure of electricity consumption, which currently exists in the region (industrial, residential, and household consumption and the share of energy-intensive industries of production);
- the level of energy efficiency and energy saving in the use of energy resources by consumers;
- the intensity and directions of electrification of the economy and everyday life;
- territorial and climatic features of the region;
differentiation of electricity tariffs [21]. Since the production and consumption of electricity are synchronized in time, the corresponding resource cannot be produced and purchased in advance for backup in case of unfavorable conditions [14]. Therefore, for the electric power industry, there is still an unsolved problem of forecasting demand, not only in terms of volume but also in time, since an increase in demand can cause investment instability. A decrease is a reason for enormous losses for electricity supply companies and a drop-in service quality [25, 26].

The need for a mechanism for demand management is also considered by Directive 2012/27/EU of the European Union, in particular in clause 15.8, where it is determined that the regulators of the EU member states are obliged to stimulate the activity of other subjects of this market to increase their generation capabilities to ensure the continued functioning of electricity markets [6, 13]. During the implementation of the directive, 11 member states of the European Union have already implemented their regulatory framework, which is intended to be adapted for subjects of electricity demand management. As a result of these actions, Europe currently accounts for more than 22 GW of managed demand capacity. Also, according to the estimates of the European Commission, there are optimistic forecasts regarding the likely and expected increase of this indicator to 160 GW by 2030 [24].

One more safety criterion should be understood as the formation of competitive market relations between subjects and the organization of a full-fledged system of marketing an electric energy resource [16]. First of all, the system and territorial integrity of electricity transportation and the connection between the supplier and the consumer of electric energy, as a rule, is carried out by trunk and interstate or local electric networks, is essentially the legalization of a natural monopoly [18].

Under the conditions of the functioning of the competitive mechanism, markets are designed to form the consistency and unbreakability of the technological connection in the transmission, distribution, and use of electricity. This, in turn, implies the unity of the power transmission network under commercial and technical dispatching conditions. Therefore, compliance with the specified criterion requires compliance by the owner of power grids with the rules of equal service of any business entity to create a favorable competitive market environment [1].

In addition, it should be outlined that the quality of electricity is a constant indicator and cannot differentiate between competing enterprises. This is evidence that when balancing supply and demand, the main competitive factor can be only the price [15].

The following criterion for the safety of the electric power industry is a balanced and adaptive state regulation, the main goal of which is to restore the UES. Taking into account the reformation shifts that have already been introduced in this market, it should be noted that the systematic observance of the principles of energy security is in the plane [17]. At the same time, it is the state economic regulation of the electricity market of Ukraine that must ensure compliance with the balance of the interests of the state and the subjects of this market, as well as strengthen competition between producers and suppliers of electricity. The main instruments of state regulation should be the licensing policy, the formation of a tariff profile, the implementation of the regulation of payment and settlement relations on the Wholesale Electric Energy Market (WEE), the protection of consumer rights, and the European course of cooperation [5].

Conclusions and prospects for further investigations

Today, the existing positive and negative consequences of the effectiveness of state economic regulation of the electricity market should be noted. As for the negative consequences, the following should be noted [7]:

- differentiation of electricity tariffs [21]. Since the production and consumption of electricity are synchronized in time, the corresponding resource cannot be produced and purchased in advance for backup in case of unfavorable conditions [14]. Therefore, for the electric power industry, there is still an unsolved problem of forecasting demand, not only in terms of volume but also in time, since an increase in demand can cause investment instability. A decrease is a reason for enormous losses for electricity supply companies and a drop-in service quality [25, 26].

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Today, the existing positive and negative consequences of the effectiveness of state economic regulation of the electricity market should be noted. As for the negative consequences, the following should be noted [7]:
multifaceted and non-unified nature of the application of various forms and methods of pricing to electricity producers;  
tax imbalance due to the lack of necessary tax and budget levers for regulation of the electricity industry;  
the practice of a system of cross-subsidization of some consumers at the expense of others through the wholesale market price (ORC) for electric energy, as well as regions of active hostilities with damaged electric infrastructure, unprofitability, and receivables of electric power companies, application of the NCRECP, a unique mechanism of distribution of funds between the members of the UES.

A review of safety criteria in the country’s electric power sector shows the imperfection of the electricity market and the need to strengthen the relevant safety tools.

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