

PROJECT MANAGEMENT AND FINANCIAL AND ECONOMIC SECURITY IN THE CONDITIONS OF GLOBALIZATION

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MAIN CHALLENGES OF REFORMING THE WHOLESALE ELECTRICITY MARKET IN UKRAINE

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The reform of the wholesale electricity market (WEM) in Ukraine began in 2019 in order to create a competitive environment, attract investment and improve energy efficiency. In the context of the constant dynamics of the energy sector in Ukraine, the wholesale electricity market is a key element in ensuring the stability and efficiency of the country's energy supply. The results of reforming this market play a decisive role in improving the energy system and contribute to ensuring the country's energy security. At present, taking into account the difficulties arising in connection with energy reforms, the analysis of the results of the reform of the wholesale electricity market is of particular importance.

The article discusses the principles of effective and transparent management, which is key to the stability and development of the energy sector. The reforms aimed at modernizing and expanding infrastructure, as well as improving governance and ensuring transparency, play an important role in achieving these goals. They will help improve the efficiency and reliability of electricity supply, reduce energy losses and stimulate investment in modern energy technologies and infrastructure. It is proved that the study of the system of reforming the energy sector and the development of new proposals for its improvement is a key task for the further development of Ukraine.

ОСНОВНІ ВИКЛИКИ РЕФОРМУВАННЯ ОПТОВОГО РИНКУ ЕЛЕКТРОЕНЕРГІЇ В УКРАЇНІ

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електроенергії.

Реформування оптового ринку електроенергії (ОРЕ) в Україні розпочалося 2019 року з метою створення конкурентного середовища, залучення інвестицій та підвищення енергоефективності. В умовах постійної динаміки енергетичного сектору в Україні оптовий ринок електроенергії є ключовим елементом забезпечення стабільності та ефективності енергопостачання країни. Результати реформування цього ринку відіграють вирішальну роль у покращенні енергетичної системи та сприяють забезпеченню енергетичної безпеки країни. В даний час, з урахуванням складностей, що виникають у зв'язку з енергетичними реформами, аналіз результатів реформування оптового ринку електроенергії набуває особливого значення.

У статті розглянуто принципи ефективного та прозорого управління, що є ключовим для стабільності та розвитку енергетичного сектору. Охарактеризовано реформи, які спрямовані на модернізацію та розширення інфраструктури, а також на вдосконалення управління та забезпечення прозорості, відіграють важливу роль у досягненні цих цілей. Вони сприятимуть покращенню ефективності та надійності електропостачання, зниженню втрат енергії та стимулюванню інвестицій у сучасні технології та інфраструктуру енергетики. Доводиться, що дослідження системи реформування енергетичного сектору та розробка нових пропозицій щодо його покращення є ключовим завданням для подальшого розвитку України.

Statement of the problem

The relevance of studying the results of reforming the wholesale electricity market in Ukraine lies in the need to assess the achievements and determine the most effective ways of further development of the energy sector. Taking into account modern challenges such as climate change, energy efficiency and competitiveness, the development of the wholesale electricity market is becoming a strategic task for Ukraine.

Objectives of the article

The purpose of this study is to analyze and evaluate the results of reforming the wholesale electricity market in Ukraine in order to determine its impact on the country's energy system and develop recommendations for further improvement of the energy sector.

The main material of the research

It is difficult to overestimate the importance of the wholesale electricity market in the energy system, as it acts as a key component for the effective functioning and development of the electricity system.

To summarize, the wholesale electricity market plays a critical role in the energy system, ensuring the efficient use of resources, maintaining the stability and security of energy supply, promoting the development of renewable energy sources, and stimulating innovation and economic development. Its role in today's energy system is invaluable, and it is a key element in achieving a sustainable and efficient energy future.

The electricity supply system in Ukraine had numerous problems before the reform, including mismanagement and widespread corruption. A centralized approach to managing the energy sector has often led to suboptimal resource allocation and underdeveloped infrastructure. This caused distrust among the population and investors, which hampered the development of the industry [3, p. 43].

The previous power supply system in Ukraine had a number of problems. Reforms and transformation of the energy sector are aimed at diversifying energy sources, improving energy efficiency and integrating into the European energy system. The war created new challenges for the Ukrainian energy sector, but also opened up opportunities for modernization and transition to a more sustainable and secure energy system [3, p. 44].

Reforms in Ukraine's energy sector are aimed at creating a competitive market, separating functions between producers, suppliers and network operators, as well as creating an independent regulator that would monitor the activities of all market participants and ensure compliance with rules and standards.

The previous power supply system in Ukraine had numerous problems and shortcomings, among which the following can be distinguished.

Reforms in Ukraine's energy sector were aimed at addressing these challenges by modernizing infrastructure, creating a competitive environment in the electricity market, and improving the governance of the country's energy system.

The beginning of the reform of the energy sector in Ukraine was marked by a number of key events and initiatives aimed at improving the efficiency, transparency and stability of the country's energy system. In this section, we will consider the first steps taken in this direction [6].

1. Establishment of a legal framework: One of the first steps in reforming the energy sector was the adoption of important legislation. In particular, the Laws "On Electricity" and "On Natural Monopolies" were adopted, which established the legal framework for the liberalization of the electricity market and the creation of a competitive environment.

2. Liberalization of the electricity market: In order to attract the private sector and stimulate competition, the process of liberalization of the electricity market has

Table 1 – Criteria for the functioning of the wholesale electricity market

| Criterion | Characteristics |
|---|--|
| Efficient use of resources | The wholesale electricity market allows producers and consumers to interact efficiently to optimize the use of energy resources. It stimulates competition and allows producers to offer electricity at competitive prices, which helps to reduce energy costs for end consumers. |
| Flexibility of management | The wholesale market allows for flexible regulation of electricity production and consumption depending on changes in demand and production conditions. This allows for efficient management of the energy system and ensures the stability of electricity supply. |
| Support for the development of renewable energy sources | The wholesale market creates a favorable environment for the development and integration of renewable energy sources (RES) into the energy system. Thanks to market mechanisms, RES producers have the opportunity to compete in the electricity market and attract investments for further development. |
| Ensuring energy security | The wholesale market allows diversifying sources of electricity supply and ensuring the stability of energy supply in the face of changes in the energy market and geopolitical risks. |
| Innovation and technological progress | The competitive environment of the wholesale market stimulates innovation and development of new technologies in the energy sector. Producers are constantly looking for ways to optimize production and increase efficiency, which contributes to overall technological progress. |
| Support for economic development | The efficient functioning of the wholesale electricity market contributes to the stability of the energy sector and supports economic growth by ensuring the availability of electricity and stimulating investment in the sector. |
| International cooperation | Wholesale electricity markets can become the basis for international cooperation and exchange of electricity between countries, which contributes to energy security and stability in the region. |

Developed by authors by source [1]

Table 2 – Synchronization of the Ukrainian energy system with ENTSO-E

| Characteristic element | Main aspects |
|---|---|
| 1. Centralized system | |
| History | <ul style="list-style-type: none"> – Formed in the Soviet period. – Based on large thermal power plants (TPPs) and nuclear power plants (NPPs). – Electricity was transported over long distances. |
| Advantages. | <ul style="list-style-type: none"> – Criterion – Ability to export electricity. |
| Characteristic | <ul style="list-style-type: none"> – Efficient use of resources – High level of greenhouse gas emissions. – Vulnerability to damage and accidents. |
| 2. Problems of the previous system | |
| Flexibility of management | <ul style="list-style-type: none"> – Depreciation of TPP and NPP equipment. – Electricity losses during transportation |
| Supporting the development of RES | <ul style="list-style-type: none"> – Dominance of centralized electricity generation. – Underestimation of renewable energy sources (RES). |
| Ensuring energy security | <ul style="list-style-type: none"> – State regulation and market monopolization. – Lack of incentives for energy efficiency. |
| 3. Innovation and technological advancement | |
| Market liberalization | <ul style="list-style-type: none"> – Support for economic development – Allowing private investors to enter the energy sector. |
| Support for renewable energy sources | <ul style="list-style-type: none"> – International cooperation – Stimulating the development of solar and wind energy. |
| Improving energy efficiency | <ul style="list-style-type: none"> – Implementation of energy efficiency programs and standards. – Modernization of the housing stock and industrial enterprises. |
| 4. War and new challenges | |
| Damage to energy infrastructure | <ul style="list-style-type: none"> – Destruction of thermal power plants, nuclear power plants and power grids. – Blackout of large areas. |
| Growing demand for electricity | <ul style="list-style-type: none"> – Restoration of destroyed facilities. – Transition to alternative energy sources. |
| Main aspects | <ul style="list-style-type: none"> – Restoration of destroyed facilities. – Transition to alternative energy sources |

Developed by the authors at the source: [1, 2]

Table 3 – The main shortcomings of Ukraine's electricity supply system before the reforms

| Disadvantage | Characteristics |
|---|--|
| Centralized management | The system was highly centralized, with insufficient balance between the central and regional levels of government. This led to underestimation of local needs and insufficient attention to the development of regional networks. |
| Insufficient efficiency and reliability | Old and outdated power transmission and distribution networks caused technical problems and accidents. This resulted in frequent power outages, especially during peak loads. |
| Low energy efficiency | Many power plants and grids had low energy efficiency, which led to excessive energy consumption and increased emissions. |
| Corruption and vagueness | The system was plagued by corruption and unclear governance, leading to inefficiency and wastage of resources. |
| Insufficient investment in development | The lack of sufficient investment in the modernization and development of power grids slowed down innovation and the introduction of new technologies. |
| Dependence on energy imports | Ukraine was heavily dependent on imports of energy resources, such as gas and coal, which made the energy system vulnerable to external influences and price fluctuations on world markets. |
| Uneven development of regions | The uneven development of regional power grids resulted in some regions having insufficiently developed infrastructure, which limited their opportunities for industrial and social development. |
| Large technical losses | The old electricity transmission networks had high technical losses due to inefficiency and old equipment. This led to significant electricity losses during transportation. |
| Insufficient competition | The lack of competition in the electricity market limited opportunities for innovation and service quality improvement. Monopolization of the market reduced incentives for efficiency and development. |
| Energy instability | Outdated power plants and infrastructure often operated at the limit of their capabilities, leading to instability in energy supply and possible accidents. |

Improved by authors based on [3, 4, 5]

begun. Mechanisms were introduced to separate the production, transmission and supply of electricity, which created conditions for the emergence of new participants in the market and a decrease in state influence.

3. Establishment of the Regulatory Authority: To ensure the effective regulation of the energy sector, the National Commissariat was established, which was given the authority to monitor and regulate the activities of all participants in the electricity market. This was an important step in ensuring transparency and equality in the market.

4. Stimulating renewable energy: Reforming the energy sector also involved actively promoting the development of renewable energy sources. Measures were taken to attract investment in the renewable energy sector and create favorable conditions for the development of wind energy, solar energy and other environmentally friendly sources.

5. Implementation of international standards: As part of the reforms, measures have been taken to harmonize energy legislation with international standards and practices of the European Union. This contributed to the convergence of Ukraine's energy market with European standards and opened up new opportunities for cooperation and integration.

It is reasonable to assert that the wholesale electricity market is a key element of the energy infrastructure that ensures the optimal functioning of electricity supply in the country. It is based on the principles of the free market and competition, ensuring the efficient generation, transmission and distribution of electricity. Below we will consider the basic principles and features of the wholesale electricity market [7]:

1. Free access to the market: One of the main principles of the wholesale market is that all participants have equal access to it. This means that any electricity producer can enter the market and sell their energy, and any consumer can purchase electricity at competitive prices.

2. Competitive bidding: The production and distribution of electricity in the wholesale market is carried out through competitive bidding. This means that producers offer their energy for sale at a certain price, and buyers choose the best deals. This process stimulates competition and ensures optimal electricity prices.

3. Energy balancing: To ensure the stability of the power supply, the balance between electricity production and consumption is taken into account in the wholesale market. In the event of an imbalance between these two processes, mechanisms such as reserve capacities or consumption regulation mechanisms can be used to ensure the stability of the system [8].

4. Tariffs and pricing: Electricity prices in the wholesale market are determined on the basis of competitive bidding. They can change depending on supply and demand, the state of the energy system, and other factors. Electricity tariffs can also be regulated by government agencies in order to ensure affordability and price stability for consumers.

5. Role of the Regulator: The National Energy Regulator acts as a key figure in ensuring the efficiency and transparency of the wholesale electricity market. It establishes the rules for the functioning of the market, controls the activities of market participants and ensures compliance with the law [8, 9].

Thus, the wholesale electricity market is an important mechanism for ensuring the efficiency and stability of electricity supply. It promotes competition, innovation and development of the energy sector, which in turn contributes to improving energy efficiency and reducing costs for both electricity producers and consumers [10, p. 40]. In addition, the wholesale electricity market creates conditions for the development of renewable energy sources and increasing the environmental sustainability of the energy system.

Thus, the reform of the wholesale electricity market in Ukraine has led to positive changes in the energy sector, contributing to increased production efficiency, the development of renewable energy sources, lower electricity prices and improved quality of electricity supply.

In turn, we believe that further reform of the wholesale electricity market should be carried out with an emphasis on renewable energy sources, because this is one of the world's Sustainable Development Goals and therefore can receive support from the international community. Thus, we propose to review the future achievements and challenges in reforming the wholesale electricity market at the expense of renewable sources.

Table 4 – Achievements and challenges of the wholesale electricity market with regard to RES

| Achievement / challenge | Characteristics |
|---|---|
| Achievement | |
| Creating a competitive environment | One of the key achievements of the reform is the creation of a competitive environment in the wholesale electricity market. This incentivizes producers to increase efficiency and reduce prices, which leads to improved quality and affordability of electricity for consumers. |
| Development of renewable energy sources | Reforms have promoted the development of the renewable energy sector (RES). This helps reduce dependence on coal fuels and reduces greenhouse gas emissions, contributing to environmental sustainability. |
| Improving energy efficiency | Market reforms encourage producers and consumers to use resources more efficiently. This helps to reduce overall energy consumption and pollutant emissions. |
| Challenges | |
| Market heterogeneity | Despite the achievements, the electricity market may remain heterogeneous due to differences in the level of competition between different regions and business entities. |
| The need for infrastructure investment | Investments in energy infrastructure are needed to support the development of renewable energy sources and ensure the stability of the electricity grid. |
| Reforming the regulatory environment | Regulatory rules need to be constantly evaluated and updated to ensure transparency and efficiency of the wholesale market. |
| Energy security | Changes in the structure of energy production can affect the country's energy security, so it is necessary to ensure a balance between the development of RES and traditional energy sources. |

Table 5 – Advantages of using RES for Ukraine

| The advantage of using renewable energy sources | | Characteristics |
|---|--|-----------------|
| 1. Diversification of energy sources | | |
| Increasing the share of RES | <ul style="list-style-type: none">– Reducing dependence on fossil fuels.– Reducing greenhouse gas emissions.– Creation of new jobs. | |
| Development of decentralized generation | <ul style="list-style-type: none">– Increasing the stability of the power system.– Reducing losses during transportation.– Involvement of consumers in electricity production. | |
| 2. Improving energy efficiency | | |
| Reduced energy consumption | <ul style="list-style-type: none">– Reduced energy costs.– Reduction of greenhouse gas emissions.– Increased energy security. | |
| Modernization of infrastructure | <ul style="list-style-type: none">– Reduction of electricity losses.– Improving the reliability of electricity supply.– Creation of new technologies. | |
| 3. Integration into the European energy system | | |
| Access to new energy sources | <ul style="list-style-type: none">– Increase in electricity supplies from the EU.– Reducing dependence on domestic sources.– Increased competition in the market. | |
| Creating a common energy market | <ul style="list-style-type: none">– Increase electricity exports from Ukraine.– Attracting investments in the energy sector.– Unification of technical standards. | |
| 4. Impact on consumers | | |
| Rising electricity prices | <ul style="list-style-type: none">– As a result of reforms and investments.– The need for state support for vulnerable groups. | |
| Expanding the choice | <ul style="list-style-type: none">– The ability to freely choose an electricity supplier.– Stimulating competition in the market. | |
| Raising awareness | <ul style="list-style-type: none">– Increased knowledge about energy efficiency and renewable energy sources.– Motivation to save energy and use environmentally friendly sources. | |

We believe that during the reform of the wholesale electricity market at the expense of renewable energy sources in Ukraine, a number of significant prospects will be achieved. Let's consider the impact of RES wholesale electricity market reforms on the energy system and consumers.

Thus, we have proved that reforms in the energy sector of Ukraine with the help of renewable energy sources (RES) have a positive impact on the energy system and consumers. Diversification of energy sources, increased energy efficiency and integration into the European energy system make the Ukrainian energy sector more sustainable, safe and environmentally friendly. Rising electricity prices are a challenge, but government support and expanding choices for consumers can help mitigate its impact.

Conclusions

The electric power system is of great importance for the economy, society and various industries. The reform process in the electricity sector is of great importance for ensuring sustainable development, increasing the

efficiency and competitiveness of this sector. In conclusion, it can be noted that the period before and after the reform of the electric power industry is characterized by significant transformations that have affected all levels of this industry.

Since the reform, there has been significant progress in many aspects of the electricity system. In particular, the liberalization of markets has helped to increase competition, lower prices, and stimulate innovation. The introduction of regulation and control mechanisms made it possible to ensure the stability and reliability of energy supply. Also, the reform contributed to the development of alternative energy sources and reduced environmental impact.

However, it must be recognized that the process of reforming the electricity system has its own challenges and problems. Solving these problems requires joint efforts of the government, industry players and society as a whole. Only in this way it is possible to ensure the sustainable and efficient functioning of the electric power system that meets the modern requirements of the development of society.

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