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# PUBLIC MECHANISMS OF FINANCIAL SECURITY IN ELECTRICITY: THE EXPERIENCE OF POLAND AND UKRAINE

**Abstract.** The research was conducted on the basis of the analysis of the current legislation, statistical data of the state authorities of Ukraine and program documents containing strategies of development of electric power industry of Ukraine and Poland. The purpose of the work is to determine the directions of developing the public mechanisms of financial support in electricity of Ukraine and Poland within cross-border cooperation. The study is logically built in terms of coverage of three areas, in particular, the analysis of the domestic electricity market of Ukraine (which conducts a critical analysis of the structure and volume of electricity in the UES of Ukraine); analysis of the compatibility of the principles of Ukrainian electricity legislation with the principles of the third EU energy package (which focuses on maintaining certain elements of non-market pricing that distort competition in the new model of the electricity market of Ukraine) and the imperative of cross-border cooperation between Ukraine and Poland which outlines them main tasks in the field of law and economics, the solution of which is necessary to create a transnational exchange market of Ukraine and Poland in the implementation of the Energy Strategy of Ukraine in the context of integration of the UES of Ukraine with the European energy system). The results obtained allow to determine the effective directions of public administering financial support of cross-border cooperation between Ukraine and Poland in electricity and possible forms and directions of its implementation.

***Keywords:*** financial support, electricity market, public mechanisms, cross-border cooperation, exchange trade.

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# ПУБЛІЧНІ МЕХАНІЗМИ ФІНАНСОВОГО ЗАБЕЗПЕЧЕННЯ У СФЕРІ ЕЛЕКТРОЕНЕРГЕТИКИ: ДОСВІД ПОЛЬЩІ ТА УКРАЇНИ

**Анотація.** Дослідження проводилось на основі аналізу чинного законодавства, статистичних даних органів державної влади України і програмних документів, що містять стратегії розвитку електроенергетики України та Польщі. Метою роботи є визначення напрямів розвитку публічних механізмів фінансового забезпечення електроенергетичної галузі України і Польщі за умов розвитку транскордонного співробітництва. Дослідження логічно побудовано щодо охоплення трьох областей, зокрема, аналізу внутрішнього ринку електроенергії України (який проводить критичний аналіз структури та обсягів електроенергії України); аналіз сумісності принципів українського електроенергетичного законодавства з принципами третього енергетичного пакета ЄС (який зосереджений на підтримці певних елементів неринкового ціноутворення, що спотворює конкуренцію в новій моделі ринку електроенергії України) та імперативу транскордонного співробітництва між Україною і Польщею, що окреслює їм основні завдання в галузі права та економіки, вирішення яких необхідне для створення транснаціонального біржового ринку України і Польщі при реалізації Енергетичної стратегії України в контексті інтеграції України з європейською енергетичною системою). Отримані результати дозволяють визначити ефективні напрями публічного управління щодо фінансового забезпечення транскордонного співробітництва між Україною і Польщею у сфері електроенергетики та можливі форми і напрями її реалізації.

***Ключові слова:*** фінансове забезпечення, ринок електроенергетики, публічні механізми, транскордонне співробітництво, біржова торгівля.

Формул: 0; рис.: 1; табл.: 1; бібл.: 14.

**Introduction.** Ukrainian electricity raw base consists of coal, natural gas, nuclear fuel, which produce 90% electricity. As a result of russian aggression Ukraine lost control over 81 of 119 coal mines including all anthracite mines and 17 oil and gas fields of the black sea shelf [1; 2], it

caused fuel crisis in 2015. At the same time, there was using reduction due to falling demand for electricity and due to a reduction in electricity loses in the chains, due to ukrainian power system features including geographical factors in which the largest consumers are located in the east, and the most powerful are located in the west, except zaporizhzhya npp.

Mentioned above factors and the change in Ukraine's vector of development have influenced on the reassessment of legal and financial regulation in the field of electricity. The adopted Law of Ukraine «On the Electricity Market», which become effective starting July, 1, 2019, the European functioning energetic space principles included into the Third EU Energy Package, on the non-discriminatory participation in the electricity market, fair competition through the pricing mechanisms, cross border cooperation, as well as the introduction of the additional requirements to the legislative status to their legal independent participants' participation in different market segments (generation, transmission, transition, etc.) Currently the legislation of Ukraine is largely unified with EU legislation and Poland as well as the EU member. This point removes regulatory barriers in cooperation between the two countries in this area.

**Literature review and problem statement.** The investigation in order to introduce the new electricity market cross-border interconnection ukraine and poland needs scientific support. The theoretical basis of the study were conceptual provisions contained in the work of ukrainian and foreign experts as I. Artyomov, P. Belenky, M. Biel, O. Bogorodetskaya, V. Borschevskiy, V. Budkina, M. Buffona, S. Hakman, V. Goblyk, G. Gorzelak, M. Dolishny, V. Zasadko, G. Koval, K. Kutsab-bonk, E. Kish, T. Komornitsky, L. Leusha, M. Lendiel, V. Markovich, N. Mikula, A. Mishchuk, O. Obukhov, V. Reutov, E. Ryabinin, R. Sadovsky, I. Studennikov, S. Ustych, Y. Tsybulska, M. Yavorsky and others. At the same time, researchers scientific development who have made significant contribution to the electricity development do not cover the multifaceted public and financial support issues of cross-border electricity cooperation Ukraine — Poland.

The purpose of the work is to determine the directions of developing the public mechanisms of financial support in electricity of Ukraine and Poland within cross-border cooperation.

**Materials and methods.** The methodological basis of the research is the use and definition of analytical information and indicators provided by the World Bank, the International Energy Agency, the Global Energy Statistical Yearbook, the global community of renewable energy REN21, indicators of the domestic electricity market of Ukraine based on data from the Ministry of Community and Territorial Development of Ukraine, the State Committee of Statistics of Ukraine.

**Results and discussion.** The priority of world energy policy is to increase energy efficiency, which will allow the states to develop a competitive and energy-independent economy, as well as to reduce the negative impact on the environment.

The indicators and trends in specific energy consumption in various regions of the world vary widely, reflecting differences in economic structure and advances in energy efficiency. In 2019, due to the slowing economic growth, energy consumption across the world slowed down by 0.6% compared to 2018 (2.2%) (*Fig*.).

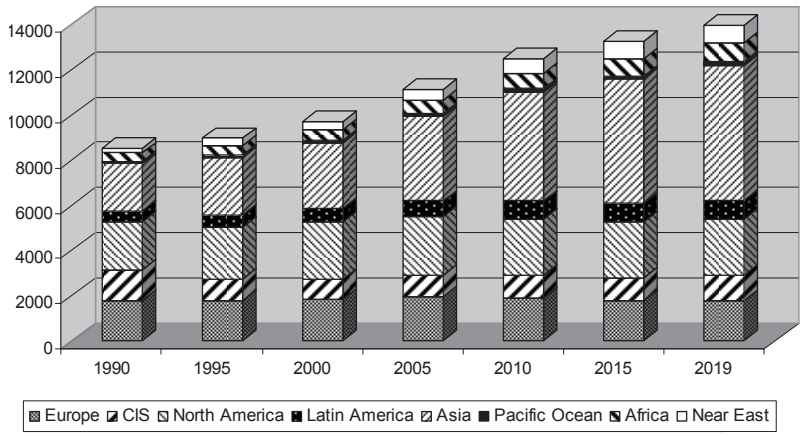


Fig. **The world energy consumption in 1990—2019**, Mtoe

*Source*: [3].


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In the developed countries, a long-term public policy aimed at financing various sectors of the economy for efficient use of energy resources in terms of sustainable economic development is implemented [4]. The most common financial mechanisms in energy efficiency are as follows: partial guarantee schemes and credit financing (conducted by revolving financing funds, specialized agencies, commercial banking institutions); use of energy service companies; use of Demand-Side-Management schemes by heat supply companies (implementation of energy efficient projects by consumers, providing contractual relations with consumers, technical solutions, financing); other types of funding (in the form of grants, funding in the format of the Kyoto Protocol, public-private partnerships, global development alliances).

The International Energy Agency identifies the following mechanisms of energy efficiency policy at the state level: controlling, regulatory; price; fiscal and financial incentives; information mechanisms; financial, commercial, technological development [5].

The measures aimed at improving energy efficiency, taken by foreign states, differ in composition and content according to the state of socio-economic development and attention paid at the state level to the problems of rational use of energy resources. The powerful means of regulation is taxes, which can influence electricity consumption and investment in energy efficiency. Taxes are also used to raise funds for energy efficiency projects. In Sweden, Italy, Germany and other countries, subsidies and tax benefits are provided for the purchase of energy-efficient industrial equipment. The German government subsidizes the use of environmentally friendly alternative energy sources [6]. In countries such as Belgium, Denmark, and France, the Renewable Fund has been established, which is a state fund for providing loans to invest in energy saving measures.

Poland is currently the second largest exporter Ukrainian electricity after Hungary. The Thermal Modernization Fund, established in 1998, is a comprehensive solution that allows for the energy modernization of the entire residential sector in Poland. The sources of the Fund's funding are state budget funds stipulated by the budget legislation, income from the Fund's deposits, income from the Fund's investments in securities of the state treasury or the National Bank, as well as bonds and promissory notes and stock market currencies, charitable donations. The fund is annually replenished from the state budget in the amount corresponding to the market demand for this instrument. In 2020, the fund received 0.612 billion euros, and the volume of investments was 6.5 times higher. Also, in Poland there are seven programs to stimulate energy efficiency of buildings, which allows to create the most favourable conditions for co-financing for end users — the population [7].

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Ukraine has significant potential to increasing energy production, thanks to nuclear power plants, which currently have limited capacity. In recent years, heat consumption in Ukraine has decreased by at least 30% (*Table*).

Over the last 5 years, electricity production in Ukraine decreased by 6.25% (from 64 Mtoe to 60 Mtoe), in Poland — by 14.5% (from 69 Mtoe to 59 Mtoe). In Poland, energy consumption in 2019 compared to 2015 increased by 7.3%. For Ukraine the given indicator during the reporting period decreased by 4.3%, which indicates the effectiveness of government policy in the field of energy efficiency.

Table

**Indicators of energy production and energy consumption of Ukraine and Poland in 1990—2019,** Mtoe

| Year | Energy production | | Energy consumption | |
|---|---|---|---|---|
| | Ukraine | Poland | Ukraine | Poland |
| 1990 | 136 | 104 | 252 | 103 |
| 1995 | 82 | 99 | 164 | 99 |
| 2000 | 76 | 79 | 134 | 89 |
| 2005 | 79 | 79 | 141 | 92 |
| 2010 | 79 | 67 | 132 | 101 |
| 2015 | 64 | 69 | 93 | 96 |
| 2019 | 60 | 59 | 89 | 103 |

*Source*: compiled by the authors on the basis of [3].

According to the projected indicators, which were set in Ukrainian Energetic Strategy until 2035, in the medium term at least until 2025, the existing energy balance surplus will be maintained [9]. Meaning Ukrainian energy producers, mainly nuclear power plants, which have significant untapped reserves and geographically located near the border with EU member states, they are interested in expanding the market for their products. In the future it will be possible to reduce generation volumes, which will update the search for reliable electricity sources of national representatives.

In this context, Ukraine's cooperation with Poland is one of the most promising. On the one side, Poland has already experience in successfully reforming the energy market, which can be useful for Ukraine in the process of further improving national legislation.

On the other side, in recent years the systemic electricity deficit in Poland's electricity sector has been exacerbated and its manifestations are becoming more acute. Under these circumstances, Ukraine has a surplus of cheap electricity and its located nearby, it can become a reliable partner in overcoming these negative phenomena.

Reforming Ukraine's electricity legislation is a complex process and there are certain delays and its rigidity has objective reasons. The task of adapting national legislation to the EU Third Energy Package is not limited to creating an identical external «shell» (unification of terminology, institutional structure, distributions the roles between major market participants, legal status, etc.). Despite the unconditional importance of this work, the degree of perception the basic principles, laid down in the Third Energy Package of the EU, and the quality of their implementation in Ukrainian legislation will be more important.

Competitiveness has a multidimensional impact on the market development relations. It is one of the key tools to achieve energy and global goals. Moreover, this is the tool to overcome energy poverty, to increase settlements' viability, to provide rational production and consumption, etc. In the Ukrainian electricity market, the main legal competitive influential areas are: 1) providing non-discriminatory access; 2) the market pricing mechanism. The first component has a dual nature, which provides the requirements' extension of non-discrimination to both physical and economic access [10].

According to the draft National Plan for Energy and Climate (2021—2030), Poland is considering the use of nuclear energy as a way to deepen the diversification of energy sources and supplies from third countries. The launch of the first unit of the Polish NPP is planned for 2033 [11]. In this context, the entry of Ukrainian nuclear energy, which experiences the greatest restrictions on economic access to the network in the domestic market, to the Polish market has significant prospects. In addition to expanding the electricity market, Ukraine's experience in creating a competitive market environment in the electricity market in a large segment of coal generation may also be useful for Ukraine. In Ukraine, despite significant liberalization of legal approaches to pricing in general, it has not yet been possible to ensure market prices for electricity.

More effective way to influence the price situation in the electricity market is to use market, in particular, Exchange instruments. The efficiency of the United European Electricity Market


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depends on the coordinated energy policy of EU member states on legislation and the development of the necessary infrastructure, including energy exchanges involved in electricity trade at interstate borders. In this context, the experience of the Polish Electric Power Exchange (TGE). Established in late 1999, TGE has proposed a number of innovative solutions: established publicly available and clear trade rules that ensured the purchase and sale of electricity at objective market prices; equal access to information on the state of the market; equal opportunities for market participation of all participants, regardless of the volume of trade; security in concluding contracts through the supervision of the financial commission; the lowest payments for transactions on the Polish market.

The results of TGE Exchange trading are proof of the EU modern model electricity market effectiveness, which is based on the principle of integration of energy exchanges within the Community, which objectively leads to specific economic results: equalization of spot prices in regional electricity markets, reducing operational risks and prices.

It is understood that due to the need to strengthen mutual energy security and environmental protection in the energy sector is necessary to ensure the functioning of interregional exchanges market participants which can be energy Ukraine and Poland exchange.

The results of Cross-Border energy exchanges cooperation between Ukraine and Poland should be the total energy surplus maximization of all participants, which due to cheaper electricity in one country will help to fulfill the demand and reduce prices in another country. According to experts, under such conditions, prices will gradually equalize prices in neighbouring countries, where there is sufficient capacity. The integration of exchange markets will also be able to lead to a more efficient use of the daily capacity of the integrated power systems between the networks of the involved national grid system operators.

However, it should be emphasized that organizing and conducting electronic auctions of electricity on the Commodity Exchange «Ukrainian Energy Exchange» under Regulation made under bilateral agreements [12]. The exchange acts as an organizer of the auction is an entity that is a winner for the selection of the organizers of the auction, organizes and auctions for the sale of electricity via e-trading system. Thus, trade in electricity is essentially carried out in the form of OTC trading, the exchange is not regulated by law and, in particular, the Law of Ukraine «On the Commodity Exchange».

In some extent this provision was the result of gaps in the law of Ukraine «On electricity market», which spelled out the requirements for organizing and conducting the auction, but there are no regulations on stock trading, which is very critical was estimated expert community in the evaluation process of reforming the electricity market [13]. Whereas this approach, we can say that the new model is reformed electricity market Ukraine does not include the stock market as an important segment of the wholesale electricity market now.

Areas Energy Exchange first be paid to the use of adapted European standards and regulations. In the context of resolving the organization issue and cross-border cooperation development in the field of exchange trade of electricity with Poland, it is important to form an exchange segment of the energy market of Ukraine based on the implementation of the Third Energy Package. A certain step towards solving this task was the signing on 24.11.2016 of the Memorandum of Understanding on the Strategic Energy Partnership between Ukraine and the European Union together with the European Atomic Energy Community, which aims to ensure the synchronous functioning of the United Energy System of Ukraine and Central European countries in the long run and improving the asynchronous operation of power systems in the short term.

An important step in this direction is the launch of a full-fledged energy exchange in Ukraine by 2021 on the basis of a modern clearing and trading system, in accordance with the Memorandum with the USAID Energy Security Project. This act was expanded mandate that will include cooperation on launching a modern clearing and trading platform for energy trading and financial products for the preparation of the legal framework of Ukraine in the organized trading in commodity markets.

The National Commission on Securities and the Ukrainian Stock Market has signed a Memorandum with the European Federation of Energy Traders (EFET) to cooperate in

developing commodity markets for energy products in 2019. This international act can be the basis for creating organizational and technological conditions for exchange trading in derivatives. electricity of Ukraine primarily in such issues as the introduction of trading in forward and futures contacts, the operation of the clearing system, in accordance with European standards.

Analyzing some experience of the EU energy policy in the field of energy efficiency, we can identify the main provisions in order to learn from the experience, namely:

adoption of national energy efficiency targets;
mandatory requirements for energy efficiency in public procurement;
introduction of energy audit for large companies and industries;
reconstruction of buildings in order to increase energy efficiency;
application of appropriate classes of energy consuming equipment labeling;
the obligation of energy companies to finance energy saving measures.
ban on the sale of any goods that do not meet energy efficiency standards.

**Conclusion.** Public mechanisms of organizational, legislative and financial support of electricity in Ukraine and Poland within the cross-border cooperation are as follows:

1. Background potentially promote cross-border cooperation in the electricity sector between Ukraine and Poland are: 1) the availability of surplus electricity in Ukraine, which provided income to the domestic market in Poland, will exert a positive influence on the sphere of interests of consumers; 2) the presence in Poland developed institutional framework, especially the energy exchange, which creates a market competitive environment in the sphere of electricity; 3) no significant regulatory barriers to such cooperation.

2. Factors that potentially complicate such cooperation include: 1) preservation in the new model of functioning of the electricity market of Ukraine of certain elements of non-market pricing that distort competition; 2) legislative uncertainty regarding the place of the exchange in ensuring the purchase / sale of electricity in Ukraine, when their participation is not explicitly prohibited, but also not regulated; 3) the risk of strengthening the role of non-market means of state regulation in case of unsatisfactory results of the electricity market according to the new model.

3. During the next few years the main focus of reforming the electricity market in Ukraine will be made on a competitive and attractive investment environment, including by launching exchange market through the implementation of the Third energy package that will create a full cross-border electricity exchange market in accordance with EU energy legislation.

4. In the framework of the implementation of the Ukrainian Energy Strategy should be recognized as a priority to create a transnational exchange market between Ukraine and Poland, which will be focused on working in a new market environment and the actual integration of UES of Ukraine with the European energy system.

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