

ENERGY EFFICIENCY ISSUES IN UKRAINE AND EU

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Introduction. Energy efficiency and energy resources currently are at a low level of use. Domestic energy consumption is from three to five times higher than in developed countries of the world. Extremely low attention is paid to this problem in the economic sectors. Obsolete stereotypes and production base industry of Ukraine is an obstacle to development and the formation of an efficient economy.

We are practically only at the beginning of the journey. In this regard, increased interest is gained by the experience of foreign countries in this field and the mechanisms of its adaptation to Ukrainian realities. Many of them have detailed legislation, an effective system that stimulates energy efficiency processes, established institutional tools, and successfully integrates the public and private sectors of the economy. The task is to adapt the positive elements of these mechanisms to the Ukrainian economy.

Review of the recent research and publications sources. Many European scientists have dedicated their work to energy conservation. Energy policy in the European Union (EU) is driven by the objective to transition to an affordable, reliable, and low carbon energy system. To achieve this objective, the EU has explicitly stated targets for greenhouse reduction, shares of renewable energy sources (RES), and energy efficiency improvements for 2020 and 2030. In this paper, we focus on the drivers, barriers and enablers to achieving the EU's RES targets (20% by 2020 and 27% by 2030). Effective energy policies play a key role in the deployment of RES technologies. In order to design effective policies, a clear understanding of past trends and projections for future deployment is required. In this paper, we first analyze the past deployment of RES technologies for electricity supply (RES-E) in selected EU Member States. This highlights the key drivers, barriers, and enablers for deployment of RES in the past. In a second step, we conduct a meta-analysis of projections for RES-E shares from multiple well-established studies. Such an analysis will help in supporting the design of more effective energy policies and successfully achieving the EU's energy targets [1].

The objective the work [2] is to develop an overview on the available building and system retrofit technologies for energy efficient school buildings including their impact on the energy performance and indoor environment quality. The idea is that Municipalities all over Europe can use the screening results and can find useful technologies for their specific school buildings. Also the work constitute background knowledge for further work in the School of the Future project, especially for the design guidelines to be developed, but also the extension of the information tool and the tailored training.

The paper [3] studies the relationship between energy saving behaviour, monetary drivers and non-monetary motivations in Italy, in a period, the end of the 1990s, when the energy industry was not yet liberalized, there were no energy saving incentive schemes, and the environmental sensitivity and information were lower. We consider as dependent variable the frequency with which individuals switch the light off when leaving a room; as monetary drivers, income and perceived energy costs; while non-monetary motives in our model are measured by proxies of pro-environmental attitudes, environmental information, social pressure, and pro-social behaviours. The analysis is based on probit and logit models estimated on a sample from the Multipurpose Household Survey dataset, conducted by the Italian Statistical Office. We find

that individuals who were less concerned about environmental issues were also more attentive in energy saving behaviour, suggesting, together with results about income and perceived energy costs, that monetary motivations were primary in driving this energy saving behaviour. Such findings are robust to the inclusion of variables accounting for pro-social behaviours. Altruism by individuals who claim to be more concerned about broad environmental externalities may have adversely affected their propensity to optimize energy consumption.

Energy Poverty (EP) [4] is the inability to attain a socially and materially necessitated level of domestic energy services. In the EU this occurs primarily due to low incomes, poor energy performance of buildings and high energy costs. The impacts of EP range from impaired social lives to unhealthy living conditions, with further consequences in the physical and mental health of energy poor individuals. Member states have been assigned by the EU with the responsibility of dealing with EP within their own territories. This is attainable mainly by creating effective policies, while also encouraging synergies among policies of different fields. However, scientific knowledge is gathered and action is taken on a national level only in a limited number of EU countries. For this reason, this paper aims to fill in the gap and capture snapshots from five EU countries (Cyprus, Spain, Portugal, Bulgaria and Lithuania) where EP has not been exhaustively examined. The study provides an overview of selected policies and measures directly or indirectly targeting EP alleviation and analyses their history and evolution at an EU level as well as at national level. It considers the different geographical dimensions, conditions and aspects (e.g. national or regional) where EP is encountered, in an attempt to identify any variances or similarities in the approaches adopted. Through this comparative study, strengths and weaknesses of national strategies are identified and analyzed. Conclusively, based on this analysis, recommendations are made on how to utilize policy tools and provide the most efficient support to energy poor households in the corresponding countries.

Material efficiency [5] is indispensable to reaching agreed targets for industry's energy and carbon emissions. Yet, in the EU, the energy – and emissions-saving potentials of this strategy continue to be framed as secondary outcomes of resource-related policies. Understanding why material efficiency has been overlooked as an energy/climate solution is a prerequisite for proposing ways of changing its framing, but existing studies have failed to do so. This paper fills this gap by triangulating interviews, policy documents and three policy theories: namely, historical and rational choice institutionalism, and multiple streams framework. Factors discouraging material efficiency as an energy and climate strategy include: difficulties in reframing the prevailing rationale to pursue it; the inadequacy of monitored indicators; the lack of high-level political buy-in from DG Energy and Climate; the ETS policy lock-in; uncoordinated policy management across Directorates; the lack of a designated industry lobby. Policy solutions are proposed. Before 2030, these are limited to minor amendments, e.g. guidance on embodied energy calculations or industry standards. Post-2030, more radical interventions are possible, such as introducing new fiscal drivers, re-designing the ETS emissions cap or benchmarks for allowances. This evidence suggests that the transition to a low-carbon industry will require Member State- and industry-level action.

Task statement. The aim of the work is to analyze the current state of international tourism in Georgia. On this basis, a set of activities and practical recommendations to improve the competitiveness of the tourism market of Georgia in the world market of international tourism services has been developed. Also, promoting the growth of the number of international tourists directly affects the development of the country's economy.

The need to achieve the goal of the study required the following tasks:

- study of the current state of the tourism market and service sector in Georgia, as the largest tourist region of Transcaucasia;
- analysis to identify "bottlenecks" in meeting the needs of international tourists and in the organization of international tourism;
- development of practical recommendations for improving the competitiveness of the international tourism market and improving the organization of international tourism.

The object of research is the existing tourist infrastructure of Georgia.

The subject of the study is a set of activities aimed at improving the competitiveness of the tourism market of international tourism in Georgia.

In the process of work General scientific methods were used: methods of induction and deduction, statistical methods, dialectical approach, the principle of logical and systematic analysis and synthesis, methods of comparative analysis, analytical and statistical international collections and publications of the world tourism organization.

Basic material and results. Energy efficiency should be considered as a multi-level economic category, which is divided into different components, their role should be defined at different levels of energy efficiency.

There is a lot of research in the scientific literature about this issue, and there are often discussions and disputes about the difference between the concepts of "energy saving" and "energy efficiency". Energy saving can be represented as a management subsystem for which an organizational and economic mechanism will be formed.

Energy saving is an organizational, scientific, practical and informational activity aimed at the rational use and economic consumption of primary and transformed energy, natural energy resources in the national economy, implemented using technological, economic and legal methods in accordance with [6].

The efficient development of energy efficiency and energy saving is hampered by a number of economic, legal, organizational and technological deficiencies that are present in most Ukrainian enterprises. For successful business activity the enterprise must take into account a complex of external and internal factors.

The external factors include:

- uncertainty about the prospects for the regional fuel and energy complex development, which causes the enterprises an aspire to build their own energy sources (it is assumed that the cost of own energy resources, taking into account their transportation, will be lower than for centralized energy supply);
- imperfection of the legislative framework of the country, characterized not only by complexity and mobility, but also by considerable uncertainty and controversy;
- unpredictability of changes in prices and tariffs for fuel and energy;
- environmental situation in the regions;
- underdeveloped market for energy saving equipment and services to implement energy conservation measures;
- insufficient elaboration of the scheme of financing energy-saving measures from sources other than the enterprise's own funds;
- lack of an effective mechanism for encouraging energy-saving businesses (preferential loans and taxes, reduced energy tariffs).

The loss of fuel and energy resources and energy efficiency is also influenced by a group of internal factors:

- irrationality of energy consumption;
- low technical level of energy economy and technical imperfection of technological processes of the enterprise, their underloading;
- imperfection of energy management of both individual structural units and the enterprise as a whole.

This group of factors, unlike external ones, can be actively influenced and practically reduced by their enterprises to a certain minimum. It should also be borne in mind that high energy costs during production, energy security issues, ever-changing energy prices, the need to switch to a resource-saving and low-carbon business model pose risks and problems for energy efficiency for businesses:

- worsening financial performance as fuel and energy prices rise;
- stopping production in case of unreliable supply of energy;
- the deterioration of the reputation of a company that did not justified expectations in the field of energy efficiency;
- additional costs for reimbursement penalties.

Most public administration scholars are inclined to say that the concept of "energy saving policy" means the direction of action.

Energy saving is one of the essential directions of state economic policy and one of the factors of solving environmental problems. It is the introduction of energy-saving technologies in energy, industry, construction, agrarian and industrial sectors, housing and communal services and others.

The following characteristic will allow a more detailed examination of the effectiveness of energy saving policy implementations. Foreign practice in the field of energy conservation, considers the following types of energy-saving policy: depending on the energy-saving policy measures nature – normative-declarative and financial-educational; depending on the nature of the energy conservation policy objects, standard and alternative. The characteristics of these types of policies are summarized in Table 1.

Table 1

Classification of energy saving policy types

Model name	The nature of the feature	Country
By the nature of energy conservation measures		
Regulatory-declarative	<ol style="list-style-type: none"> 1. The main emphasis is on the creation of relevant legislative and regulatory documents and their mandatory implementation by all energy conservation actors; 2. Allocation of responsibilities between individual companies, national executive authorities, and gradual convergence of individual countries positions 	Norway, Denmark, Sweden, Great Britain
Financial-educational	<ol style="list-style-type: none"> 1. Various ways, tools, by which enterprises, budgetary institutions, citizens are interested in carrying out energy-saving measures; 2. Use of mixed financing of energy saving measures; 3. Widespread use of educational methods aimed at energy consumers and the formation of a new energy consumption culture based on economical conservation and conscious choice of energy-saving technologies 	USA, Poland, Austria
By nature of the objects of energy saving policy		
Standard	<ol style="list-style-type: none"> 1. Development of state standards and requirements for the level of heat protection of premises; 2. Equipping of buildings and structures with devices for the account of consumption of energy resources and water; 3. Saving energy resources 	Russia, China, Sweden, Netherlands
Alternative	<ol style="list-style-type: none"> 1. Increasing the share of renewable energy sources; 2. Development of alternative energy sources use activation processes. 	Japan, Germany

The accumulation of foreign experience in the field of energy saving will allow Ukraine to increase its energy efficiency potential, reduce the energy intensity of the country's economy, which will strengthen its economic security.

According to the world experience, today, in the conditions of fierce competition in the world market of energy resources and difficult ecological situation, high energy and resource-efficient technological level of the state becomes a guarantee of further development and gaining of strong positions in the world community. Finding ways to build an effective system of financial support for the implementation of state resource-saving policies leads to learn the experience of solving these problems in other countries of the world. In the current conditions for successful implementation of resource-saving programs, their financial support must combine budget financing and extra-budgetary sources (energy service contracts, public-private partnerships, banks specialized projects, special funds for promoting energy efficiency, grant programs, etc.) [7].

In Ukraine, the standard type of energy saving policy prevails [9]. On the basis of foreign countries the possibilities of its adaptation to the national specificity of investment processes in the field of energy saving are determined: development of a financing energy saving measures model for the population; widespread use of educational measures aimed at reducing the volume and forming a new culture of energy consumption, creating and operating energy service companies in Ukraine; gradual transition to the use of electricity alternative sources (Fig. 1).

The introduction of energy-saving policy principles should promote the efficiency of economic systems, and their implementation will allow:

- to save money, which will increase the competitiveness of the enterprise, especially with rising energy prices;
- increase productivity by improving production processes related to how energy is used;
- set emission quotas that will reduce energy price dependency, reduce risks;
- reduce emissions into the environment [9].

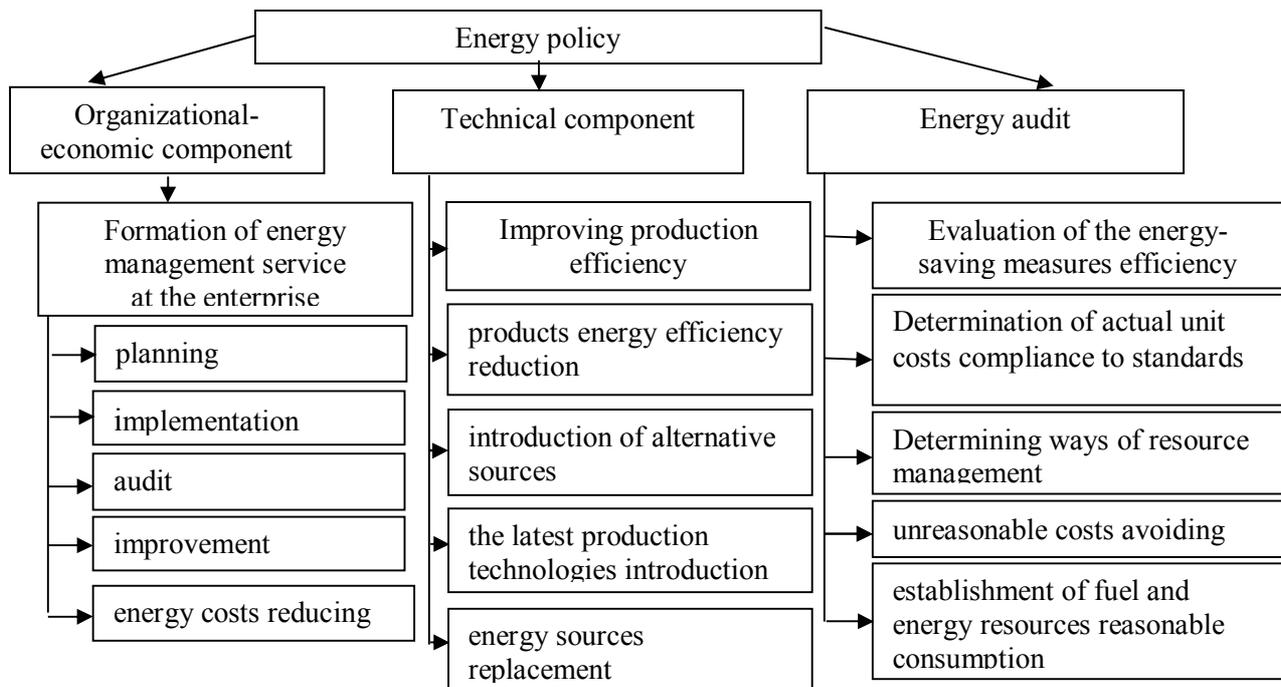


Fig. 1. Key elements of an energy saving policy system

The implementation of an effective energy-saving policy should be based on the following principles (Table 2).

Table 2

Principles of energy saving policy

Principles	Content of principle
The priority principle of the power system goal	The purpose of the power system operation is to produce products (services) with a minimum specific energy consumption
The systematic principle	The consistency of the activities of all entities (energy savings must be made at all levels) and that the energy savings system is a subsystem of the production management system
The complexity principle	Existence of a measures system (technical, technological, organizational-economic, social-psychological, etc.) aimed at energy saving
The principle of needs for energy completeness	Production should be provided with energy resources in such volumes, at which the energy factor at least limits the production volumes. The lack of direct energy can be offset by partly past costs in other industries consumed in the production process.
The principle of energy resources distribution efficiency	Insufficient energy resources should be allocated in alternative directions so that the cost of production growth when using the last unit of energy in each direction is the same
The principle of energy efficiency production maximization	Planning the structure of production must take into account the specific energy consumption. It is possible to reduce energy consumption of production due to structural shifts aimed at optimization of production volumes by the energy efficiency criterion.
Principle of producers interest in energy saving	Evaluation of business entities, employees incentive system should take into account the effects of energy consumption, the energy intensity level of production
The principle of regulatory energy consumption	The rational production management is based on the application of economically justified energy costs standards, which should be progressive (oriented towards the achievement of scientific and technological progress) and differentiated based on regional and sectoral features.
The principle of energy efficiency targeting	Is to focus spending scarce energy resources in areas where their use would have the highest impact
Principle of production factors and energy saving adequacy	It is in accordance with technical, technology and production management requirements of increasing the energy efficiency of technological processes
The principle of energy efficiency indicators systematic performance	Means the application of a efficiency indicators system in the use of energy resources and the possibility of determining them on the basis of the current accounting system and reporting of the enterprise

One of the ways of implementing energy-efficient measures is attracting grant funds to raise the energy efficiency of our society [10].

This article is dedicated to the presentation of the Jean Monnet training module, European Union Erasmus+ program on the topic: "THE CHALLENGES OF ENERGY EFFICIENCY: COOPERATION OF UKRAINE WITH THE EU". The main goal of the project is popularization and form a complex system of target audience knowledge connected with the introduction of European energy efficiency management in Ukraine; formation of practical skills in the development and introduction of energy saving events, rational usage of energy sources both at home and in the workplace.

The training module is multidisciplinary, as accumulates knowledge in the field of materials science, technology and organization of production, project analysis, investment, enterprise Economics.

A powerful team of National University "Yuri Kondratyuk Poltava Polytechnic" is working on this module, which will ensure the implementation of the project for three years.

I dwell on the key points of the module. I want to note that the main priority is formation of the new target audience thinking type, which is based on the understanding of consumed resources value, the problem of their insufficiency. Our team faces important tasks (Fig. 2).

These tasks are improvement of basic principles of the European model of energy efficient economy as well as strategic documents like "green and white book", corresponding road maps, directives, which allow to develop recommendations for Ukrainian legislation adaptation to EU standards, perform civil hearings. Also this is the study of the European system of technical and technological and financial support for energy saving measures.

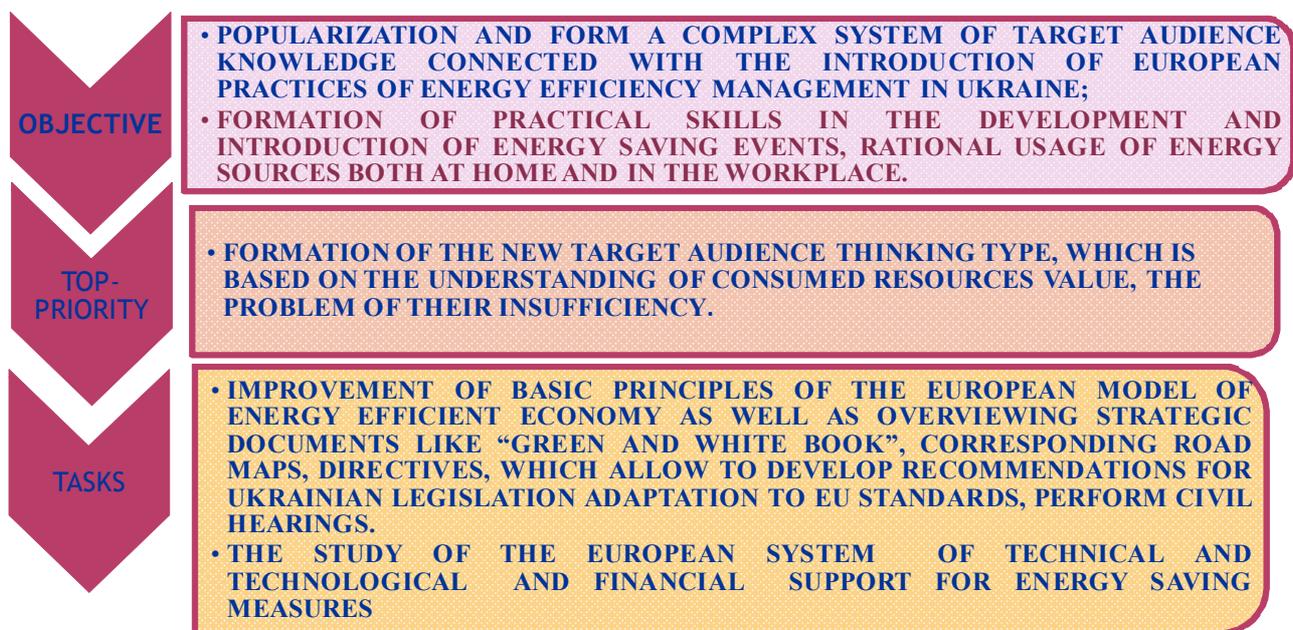


Fig. 2. Project objective and specific tasks

I would like to emphasize the relevance of the presented module (Fig. 3).

I note that the solution of energy saving and energy efficiency is one of the main vectors of development of our country and the relevance of this direction is beyond doubt.

The course is unique because the recommendations on implementing energy saving measures are aimed at different sectors of the economy, reforming the housing-communal services.

Consider the structure of the module. The module covers eight thematic areas. Namely, it are the European model of energy-efficient economy; implementation of European energy saving standards in Ukrainian legislation; future challenges for energy efficiency in Ukraine and the EU; formation and implementation of energy efficiency potential in Ukraine and EU countries; organizational, technical and technological components of energy saving; contemporary European practice; system of financial and economic provision of energy saving measures in Ukraine and the EU; European experience in assessing investment attractiveness and risk-responding to energy saving; European practice of forming energy efficiency consciousness.

Expected impact of the project should be on the local, regional, national, European level.



Fig. 3. The relevance of the project

Conclusions. According to the results of the research, the main directions of energy saving can be formed by implementing the following measures:

- revision and improvement of current legislation, standardization of energy efficiency of renewable energy sources and fuels;
- optimization of the state energy balance structure;
- energy audit of energy consumers and energy resources in order to implement energy-saving measures;
- optimization of the state energy balance structure;
- refining the mechanism of pricing for fuel and energy resources;
- improving the methodology for calculating energy efficiency indicators;
- introduction of support mechanisms to the introduction of fuel and energy metering devices;
- Ukraine's participation in international agreements, projects on energy efficiency, attracting significant and long-term investments to ensure modernization, sustainable development, security and competitiveness of energy saving;
- development of measures to stimulate the spread of energy management systems in energy-intensive industries;
- improve the method of administration of energy audit services;
- timely cash payments on the «green tariff»;
- adapting public administration mechanisms to the principles and requirements of EU law.

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УДК 338.012

JEL classification: F 02

Чичуліна Ксенія Вікторівна, кандидат технічних наук, доцент. **Биба Володимир Васильович**, кандидат технічних наук, доцент, доцент. **Міняйленко Інна Валентинівна**, кандидат економічних наук, доцент. Національний університет «Полтавська політехніка імені Юрія Кондратюка». **Питання енергоефективності в Україні та ЄС.** Економіка України залежить від здатності адекватно реагувати на виклики сучасності, що проявляються в енергоефективних змінах економічної, екологічної, соціальної сфер діяльності громадянського суспільства. Досліджено практики розвинених країн щодо типів енергозберігаючої політики, визначено їх особливості та можливості адаптації до українських реалій, розроблено принципи енергозберігаючої політики й визначено фактори державного регулювання сфери енергозбереження. Наведено приклад залучення грантових коштів, реалізація яких дозволить підвищити енергоефективну свідомість нашого суспільства, популяризувати ідеї енергозбереження на рівні підприємств, органів самоврядування. Практична імплементація запропонованих напрацювань щодо співпраці України та ЄС у сфері енергозбереження забезпечить формування екологічної зацікавленості суб'єктів господарювання, органів влади різних рівнів в активізації енергоефективних змін у контексті реалізації основних орієнтирів сталого розвитку України.

Ключові слова: енергозбереження, енергоефективність, чинники, типи політики енергоефективності, елементи, принципи, грантова програма.

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Chychulina Kseniia, Ph.D., Assoc. Professor of Economics. **Byba Volodymyr**, Ph.D., Assoc. Professor of Economics. **Miniailenko Inna**, Ph.D., Assoc. Professor of Economics. National University «Yuri Kondratyuk Poltava Polytechnic». **Energy Efficiency Issues in Ukraine and EU**. The economy of Ukraine depends on the ability to adequately respond to the challenges of today that are manifested in energy-efficient changes in the economic, environmental, and social spheres of civil society. Practices of developed countries on types of energy saving policy are investigated, their peculiarities and possibilities of adaptation to Ukrainian realities are determined, principles of energy saving policy are developed and factors of state regulation of energy saving sphere are determined. The example of attracting grant funds, the implementation of which will raise the energy-efficient consciousness of our society, promote the idea of energy saving at the level of enterprises, self-government bodies is given. The practical implementation of the proposed developments on cooperation between Ukraine and the EU in the field of energy saving will ensure the formation of environmental interest of economic entities and authorities of different levels in the activation of energy efficient changes in the context of the implementation of the main guidelines for sustainable development of Ukraine.

Keywords: energy saving, energy efficiency, factors, types of energy efficiency policy, elements, principles, grant program.

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Чичулина Ксения Викторовна, кандидат технических наук, доцент. **Биба Владимир Васильевич**, кандидат технических наук, доцент. **Миняйленко Инна Валентиновна**, кандидат экономических наук, доцент. Национальный университет «Полтавская политехника имени Юрия Кондратюка». **Вопросы энергоэффективности в Украине и ЕС**. Экономика Украины зависит от способности адекватно реагировать на вызовы современности, которые проявляются в энергоэффективных изменениях экономической, экологической, социальной сфер деятельности гражданского общества. Исследована практики развитых стран относительно типов энергосберегающей политики, определены их особенности и возможности адаптации к украинским реалиям, разработаны принципы энергосберегающей политики и определены факторы государственного регулирования сферы энергосбережения. Приведен пример привлечения грантовых средств, реализация которых позволит повысить энергоэффективное сознание нашего общества, популяризировать идеи энергосбережения на уровне предприятий, органов самоуправления. Практическая имплементация предложенных наработок относительно сотрудничества Украины и ЕС в сфере энергосбережения обеспечит формирование экологической заинтересованности субъектов хозяйствования, органов власти различных уровней в активизации энергоэффективных изменений в контексте реализации основных ориентиров устойчивого развития Украины.

Ключевые слова: энергосбережение, энергоэффективность, факторы, типы политики энергоэффективности, элементы, принципы, грантовая программа.