

ЕКОНОМІКА ТА УПРАВЛІННЯ НАЦІОНАЛЬНИМ ГОСПОДАРСТВОМ

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**STRATEGIC ENERGY SECURITY OUTLOOK
FORMATION OF UKRAINE UNDER
EUROPEAN INTEGRATION PROCESS**

**СТРАТЕГІЧНІ ПЕРСПЕКТИВИ
ФОРМУВАННЯ ЕНЕРГЕТИЧНОЇ БЕЗПЕКИ
УКРАЇНИ ЗА УМОВ ЄВРОІНТЕГРАЦІЙНИХ
ПРОЦЕСІВ**

Urgency of the research. Energy security affects the competitiveness of national production in the world markets and the competitiveness of the national economy under globalization.

Target setting. Implementation of existing potential requires a deep reform of the regulatory and legal framework and the requirements of international agreements in full.

Actual scientific researches and issues analysis. Some aspects of energy security in terms of European integration exploring Barannik V., V. Geyets, Dzyadykevych Yu, J. Mazur, V. Mikitenko, A. and dry Khalatov A. et al.

Uninvestigated parts of general matters defining. The issue of energy security, consistency of government policy and coordination of strategic development prospects of relations at the level of the European Union, are not worked through.

The research objective. The article is devoted to strategic prospects of development and energy security of Ukraine, taking into account international trends in global energy markets.

The statement of basic materials. It is stated by the author that over the past decades, Ukraine is dependent on external sources of energy which is a critical threat to its national security.

It is proved that diversification is one of the main directions of reducing energy dependence of the country and in the current conditions can increase the level of energy security by reducing energy imports.

Established macroeconomic energy intensity indicator that reflects the level of fuel and energy consumption per unit of gross domestic product.

Based the expediency of adaptation of national legislation in the field of energy efficiency and renewable energy legislative framework to the European Union, will provide the international competitiveness of the Ukrainian economy.

Conclusions. Strengthening the energy security through the implementation of the energy strategy, an understanding on strategic energy partner of the European Union, expanding the cooperation to ensure full integration of energy markets Ukraine and the European Union will allow Ukraine guaranteed protection.

Актуальність теми дослідження. Енергетична безпека країни впливає на конкурентоспроможність продукції національного виробництва на світових ринках, а також на конкурентоспроможність національної економіки в умовах глобалізації.

Постановка проблеми. Реалізація наявного потенціалу вимагає глибокого реформування нормативної та правової бази та виконання вимог міжнародних договорів у повному обсязі.

Аналіз останніх досліджень і публікацій. Окремі аспекти енергетичної безпеки в умовах євроінтеграції досліджують В. Бараннік, В. Геєць, Ю. Дзядикевич, І. Мазур, В. Микитенко, О. Суходоля, А. Халатов та ін.

Виділення недосліджених частин загальної проблеми. Питання гарантування енергетичної безпеки, узгодженості державної політики та злагодженості стратегічних перспектив розвитку взаємостосунків на рівні країн Європейського Союзу, ще недостатньо опрацьовані.

Постановка завдання. Стаття присвячена стратегічним перспективам формування та розвитку енергетичної безпеки України, враховуючи міжнародні тенденції світових енергетичних ринків.

Виклад основного матеріалу. Автором констатовано, що протягом останніх десятиліть Україна була залежною від зовнішніх джерел енергії, що становить критичну загрозу її національній безпеці.

Доведено, що диверсифікація є одним із основних напрямів зменшення енергетичної залежності країни у сучасних умовах та дозволяє підвищити рівень її енергетичної безпеки за рахунок скорочення імпорту енергетичних ресурсів.

Встановлено макроекономічний показник енергоємності, що характеризує рівень витрат паливно-енергетичних ресурсів на одиницю виробленого валового внутрішнього продукту.

Обґрунтовано доцільність адаптації вітчизняного законодавства у сфері енергоефективності та використання відновлювальних джерел енергії до законодавчої бази Європейського Союзу, що забезпечить міжнародну конкурентоспроможність української економіки.

Висновки. Зміцнення енергетичної безпеки шляхом впровадження положень енергетичної стратегії, досягнення взаєморозуміння щодо стратегічного енергетичного партнера з країнами Європейського Союзу, розширення співробітництва, забезпечення повної інтеграції енергетичних ринків України та Європейського Союзу дасть можливість гарантованого захисту України.

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Keywords: energy security; energy intensity; energy; European integration processes; fuel and energy resources.

Ключові слова: енергетична безпека; енергомісткість; енергоносії; євроінтеграційні процеси; паливно-енергетичні ресурси.

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The relevance of research. Ukraine is among the countries that provided partly own traditional fuel and energy resources. The result is a need for significant volumes of imports. The quotient of imports in total primary energy supply in Ukraine in recent years was about 38%, which determines its energy dependence as the average European. Such dependence contributes not only to the lack of sufficient domestic energy resources, but also their inefficient use.

Formulation of the problem. The energy intensity of gross domestic product of Ukraine is much higher not only compared with the leading economies of the world, but also with the neighboring countries of Central and Eastern Europe. So, adjusted for the structure of the economy indicator of energy efficiency of the Ukrainian economy, calculated on the basis recommended by the International Energy Agency figures, 60% of the average EU level in 2014. [1, p. 18; 2, p. 56].

Ukraine is facing a number of problems associated with excessive use of expensive imported fuel, inefficient markets and infrastructure. Despite this, Ukraine has a significant potential to accelerate economic growth and improve energy security. In turn, energy security is an important component of national security and one of the global problem of every country in the world. The implementation of the existing potential requires a deep reform of the regulatory framework and the requirements of the international agreements in full. Effective competition, together with a gradual transition to market prices, will also help Ukraine to attract investment for the development of the energy sector and increase energy security [3; 4].

Analysis of recent researches and publications. The research potential of the prospects for the development of the energy sector of the economy, international partnership and energy security in general is devoted to significant number of scientific publications of foreign and Ukrainian scientists: V. Barannik, M. Voinarenko, V. Geitz, J. Dzyadkevich, M. Zemlyanoy, I. Mazur, S. Mykytenko, A. Sukhodolia, A. Shevtsov, A. Khalatov and others.

Highlighting unexplored aspects of the problem. A significant number of issues relating to energy security, harmonization of state policy and coordination of strategic prospects of relations development at the level of European Union countries is still underdeveloped.

In this regard, there is a need for analysis of European integration processes on the adequacy and effectiveness of the existing mechanisms of legislative and institutional securing of implementation, and determination of priority directions of state policy in the context of increasing state energy security.

Statement of the problem. The purpose of this article is to define the strategic prospects of formation and development of Ukraine's energy security, given the international trends of world energy markets, implementation of state policy to ensure country energy security.

Presentation of the basic material. The current stage of development of the domestic economy is characterized by significant changes in the organization of production processes at national and international levels, is the basis for the active formation of a new type of interaction of socio-economic systems, as well as the development of new mechanisms for the implementation of the results of their interaction [6, p. 46].

We believe that globalization leads to the formation of a single economic space and increased competition on world markets. Under these conditions, the crucial competitive advantages of the national economy of any country is the availability of raw materials, the level of development of science and technology, innovative production capacity, favorable geographical position. Therefore, the question of participation of our country as a country with insufficiently developed economies in the complex process of economic globalization is quite important.

In recent decades, Ukraine has been dependent on external sources of energy, primarily from the Russian Federation. In world practice it is believed that the dependence on the supplier that exceeds 1/3 is a critical threat to the national security. In 2011-2013 more than 90 per cent of the value of natural gas volumes almost 85% of crude oil, 95-98% of the nuclear fuel imported from the Russian Federation [3; 5; 7].

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Such dependency has become a clear signal to Ukraine in order to strengthen energy security and energy independence of the state. Since then, the speed and quality of implementation of laws of the European Union in Ukraine has increased, and cooperation between Ukraine and European Union have entered a new, more effective level.

It should be noted that in 2015 there was a decrease in imports of natural gas to 16.4 billion cubic meters (15% less than in 2014). Also in 2015, the quotient of OAO "Gazprom" has decreased to 37.6% in total import volume of natural gas (Fig. 1).

Compared to 2015, 2016 Ukraine reduced the import of natural gas by 32.7% (5.376 billion cubic meters) – 11.078 billion cubic meters. Cost of natural gas imports last year amounted to \$1.6 billion. Note in 2015 Ukraine imported almost 16.5 billion cubic meters of natural gas worth \$4.5 billion. In 2016 such as 2015, there was a reduction of natural gas consumption.

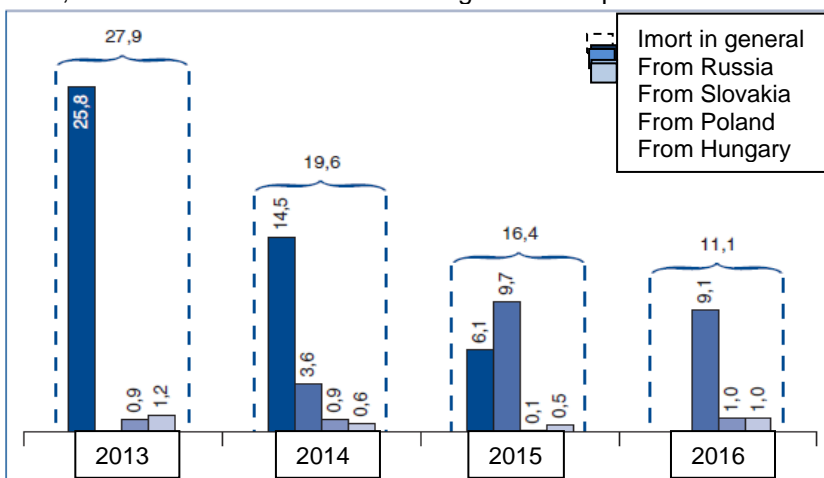


Fig. 1. Imports of natural gas in Ukraine 2013-2016, bn. cu. m.

*Built according to the authors [7; 8]

In particular, Ukraine has reduced natural gas consumption by 4.1% (1.366 billion cube. m.) compared to 2015 – to 32.361 billion cubic meters.

According to the ministry in 2016, industry used 9.599 billion cubic meters (-15,9% or 1.817 billion cubic meters less than in 2015). But other categories of consumers showed an increase in the consumption level, namely: population and budget organizations – 12.457 billion cubic meters (+2.3%, or 0.279 billion cubic meters more), heating utilities – 7.034 billion cubic meters (+1.4%, or 0.096 billion cubic meters more), production costs amounted to 3.271 billion cubic meters (+2,4% or 0.076 billion cubic meters more).

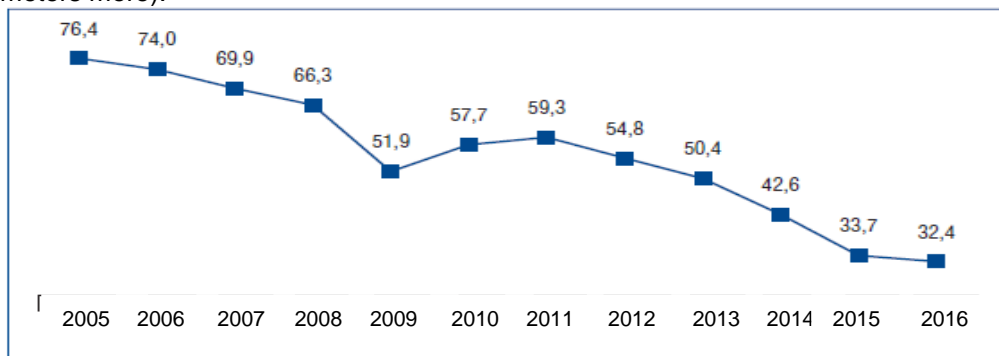


Fig. 2. Natural gas consumption by Ukraine in 2005-2016, billion cubic meters

*Built according to the authors [7; 8]

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Such a rapid reduction in natural gas consumption is definitely associated with the total decline in industrial production poses a threat to the national economy of Ukraine (Fig. 3), decrease of the norms for consumption and, to a certain extent with energy efficiency measures and replacing gas.

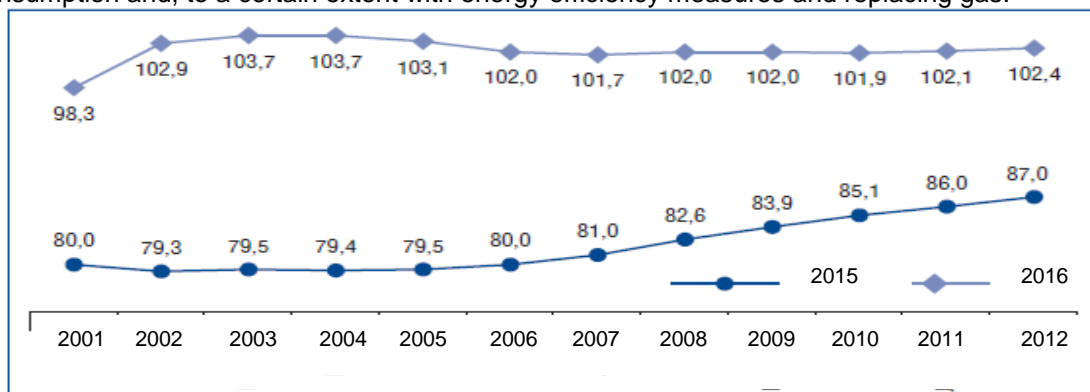


Fig. 3. Industrial production indexes 2015-2016 (Cumulative % in the corresponding period previous year)

*Built according to the authors [9]

However, at the same time, in addition to these previously identified threats, new threats associated with the destruction of power facilities of Ukraine, reduction of its domestic resource-base, the blocking of energy supplies from the Eastern direction.

The main way to neutralize these threats is diversification. In [10, p. 7; 11, p. 69; 12, p. 48] defined diversification as one of the main directions of reducing energy dependence of the country in the modern world. This diversification should address not only the sources and routes of transportation of energy resources, but also energy technologies.

Diversification not only reduces the political risks associated with a monopoly supplier, but also because competition is a powerful factor in reducing costs for the purchase of fuel and energy resources. European Union countries are widely used several areas of diversification of energy products. The first was the massive use of liquefied natural gas, which quotient in 2011 was about 20% of the total imports of natural gas [11, p. 70; 13, p. 43]. The second direction of diversification involves changes in the structure of consumed energy resources, allows the country to improve energy security by reducing energy imports [14, p. 55].

In this concern, Ukraine has a high bioenergy potential, the prospects of which are defined by the National action plan of renewable energy for the period 2020.

In accordance with this plan bioenergy should reach of substitution of natural gas 7.2 billion cubic meters per year (Fig. 4).

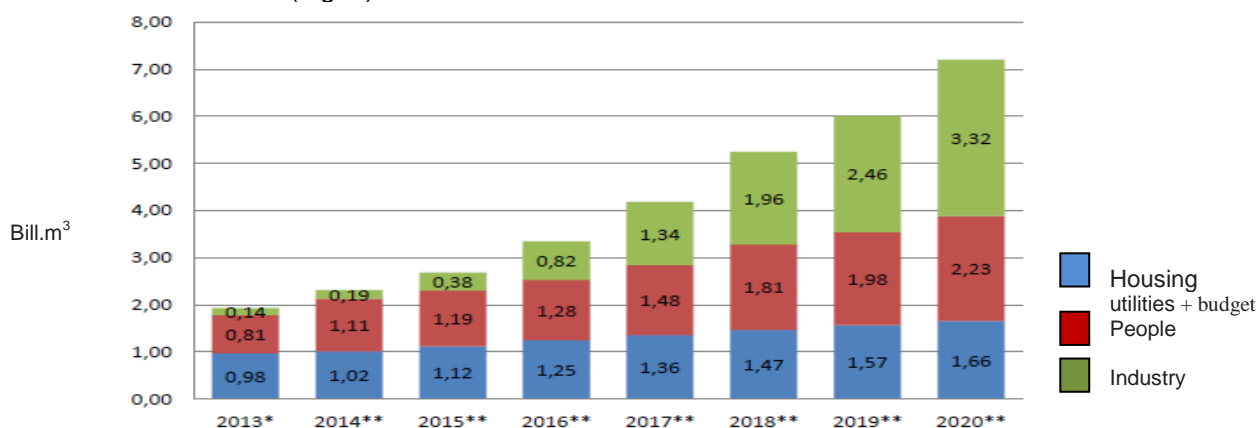
Generalized macroeconomic indicator characterizing the level of fuel consumption and energy resources per unit produced gross domestic product called the energy intensity of gross domestic product (EIGDP). The energy intensity of gross domestic product - one of the fundamental characteristics of economic efficiency of each country. Dynamics of energy intensity of the gross domestic product of Ukraine and countries of the world in 2016 is presented in Fig. 5.

The current rate of consumption of the gross domestic product of Ukraine points to a deep systemic crisis of the economy of Ukraine and is much higher not only compared with the leading economies of the world, but also with neighboring countries in Central and Eastern Europe.

It should be noted that the high level of energy intensity of gross domestic product is the result of a high quotient of resource - and energy-intensive industries in the structure of economy of Ukraine - metallurgy, chemical industry, mining. However, the situation is complicated by the low energy efficiency in the sectors of transformation and delivery of energy, high specific energy consumption for heating and hot water supply of households. Thus, the average efficiency of coal use in thermal power sector of Ukraine is almost 1.5 times lower than in commercially available technologies, the energy

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losses in the networks is twice higher than in Germany and the United States, and the average specific annual energy consumption of the housing stock is about 270 kWh/m², which is almost twice the rates of European countries with similar climatic conditions [15, p. 48; 16]. Negative is not only the high energy intensity of the gross domestic product of Ukraine, and the absence of pronounced dynamics of its decrease in recent years [17]. According to the results of research, the achievement of objectives of National energy strategy (NES) to reduce energy intensity of gross domestic product to 20% is possible provided a gradual reduction of total primary energy supply (TPES), calculated as the sum of production (extraction), import, export, international bunkering and stock change of energy in the country, more than 10% by 2020 and gradual growth of the gross domestic product beginning in 2017 due to the reduction of the consumption of all types of energy, except electricity technology which is more efficient (Fig. 6).



*Data of the energy balance of Ukraine
 **Forecast of the national renewable energy plan

Fig. 4. Dynamics reduce natural gas consumption by bioenergy in Ukraine

* Built according to the authors of [8]

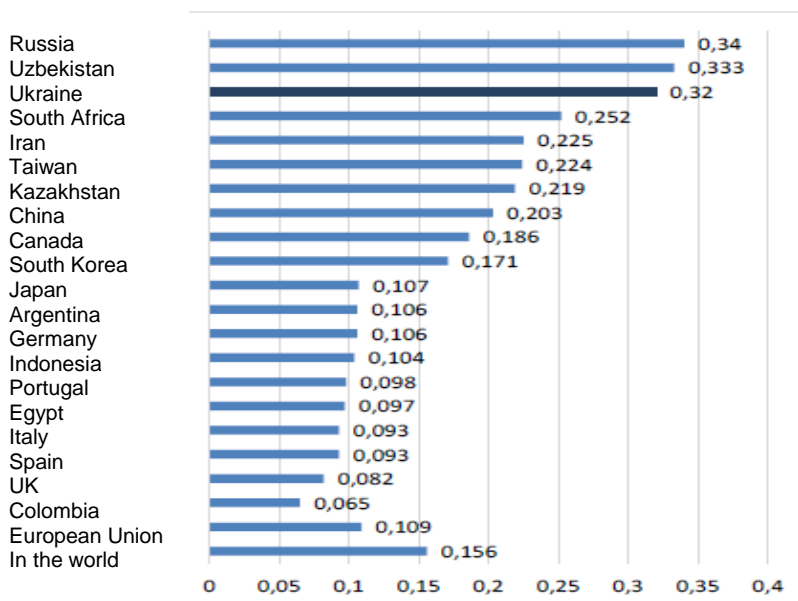


Fig. 5. Energy intensity of gross domestic product of Ukraine and countries in 2016, kh.n.e. / USD

* Built according to the authors [9]

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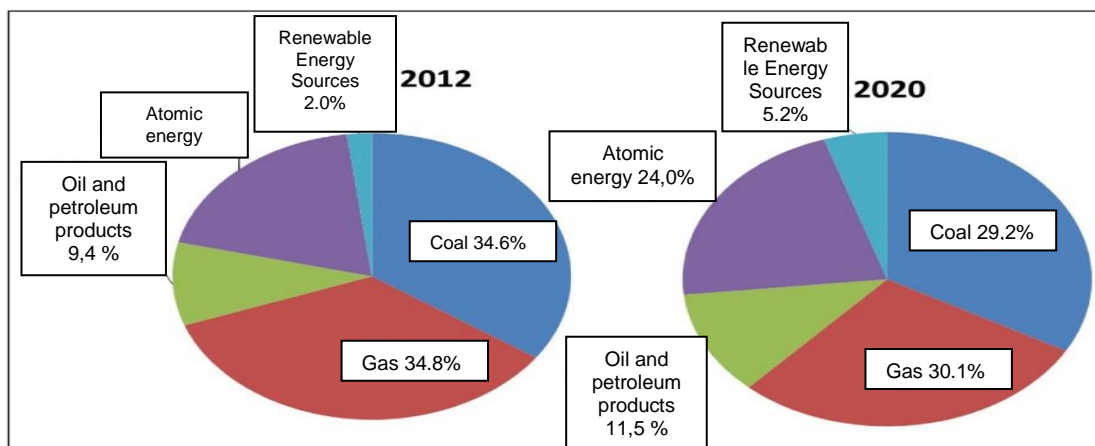


Fig. 6. Structure of total primary energy supply in Ukraine in 2012 and 2020.

* Built according to the authors of [7]

Under these conditions, the reduction in gas consumption may be more than 22% and its quotient in the structure of total primary energy supply will decline from 34.8% to 30.1%. The quotient of coal in the structure of total primary energy supply in 2020. down - to the level of 29.2%, whereas the quotient of nuclear energy, oil and oil products will grow by 4.8% and 2.1%, respectively. The growth of energy production from renewable energy sources will happen through the development of alternative energy in Ukraine (more than 60% due to biofuels). It is assumed that their quotient in the structure of total primary energy supply will grow rapidly from 2% to 5.2% or 2.6 times (that's over 7.5% of final energy consumption), but in the conditions of transformation of the economy and the financial problems of the country is still lacking. In the long term in 2035p., assumes dynamic growth of the quotient of renewable energy from total primary energy supply to 20% by replacement of coal and natural gas, and the index of GDP energy intensity will decrease to the level of technologically developed countries of the European Union to 0.12 thousand tons of oil equivalent/\$1000. Implemented the energy efficiency potential in 2035 will reach about 140 million tons of oil equivalent.

Considering prospects of development of Ukraine's energy security in the context of the European integration process, Ukraine signed a Memorandum of understanding on strategic energy partnership with the European Union together with the European atomic energy community (Euroatom). The memorandum includes: expansion of cooperation in strengthening energy security on the basis of the principle of solidarity and trust; ensure the full integration of energy markets Ukraine and EU and implementation of the Third Energy Package of the European Union; energy efficiency in all sectors of energy consumption; reducing greenhouse gases; and promoting the use of renewable energy [9].

European orientation of Ukraine, which is embodied in the recent years, calls for increased adaptation of national legislation in the field of energy efficiency and use of renewable energy sources in the legal framework of the European Union. This approach will ensure international competitiveness of the Ukrainian economy, prerequisites for membership in international organizations and is a stimulus for the revival of the domestic energy industry.

In may 2014, the European Union released a strategy for energy security, the main purpose of which is to ensure stable and sufficient reserve of energy for citizens and for the economy in general. The distribution of the main activities of the strategy of energy security of the European Union in the part of short-term objectives provides for the implementation of the market approach in the provision of energy, enhancing coordination in the implementation of safe materials, no restrictions on cross-border energy trade, energy efficiency. In part long-term activities as follows: climate protection, increased energy production in the European Union, the diversification of countries-suppliers of energy, creation of infrastructure for rapid response to interruptions of fuel and energy resources supplies, strengthen coordination between the countries of the European Union.

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For example, in the European Union is leading the program "20-20-20", named so because of specifically defined targets: a 20 percent energy efficiency of the economy; a 20 percent increase in the production of "green" energy; a 20 percent reduction in carbon dioxide emissions. In the European Union conducted a large-scale work on attraction of each of countries to environmental changes. One of the first country that it plans not to use oil as energy source before the end of 2020, will be Sweden. These plans require significant resources to implement. In the United States according to the law "On restoration of economy", and reinvestment, 2009 p. direct environmental investments reached to \$80 billion., indirect - \$400 billion. The EU has already allocated in the 1990s - 2010s 260 billion euros, and increasing capital investments. China, which does not belong to the countries with a post-industrial economy, declared that starting from 2009 and during 5 years investing 454 billion on environmental issues, and this figure will surpass the USA and Japan [7].

Strengthening energy security of Ukraine in cooperation with the European Union once again held during the second meeting in Brussels on 11 February 2016 and recorded by the Association Agreement. The agreement provides for the exchange of experience between Ukraine and EU, the establishment of mechanism for early warning of accidents at energy facilities, addressing the problems of Chernobyl disaster, the exchange of statistical information between the parties, cooperation in using of infrastructure and the like.

In addition to the Association Agreement, cooperation between Ukraine and the European Union in the energy sector are reflected in the Treaty establishing the Energy Community 3, to which Ukraine joined in 2011 and according to which the government implemented about 15 of European Union directives in the field of gas, electricity, oil, competition, energy efficiency, environment.

It should be noted that the European side acts as a donor for reforms in Ukraine, in particular, by providing grants, loans and macro-financial assistance, regulated by the Memorandum between Ukraine and the European Union in May 2015, and consultant in developing a new legislative framework, which all EU regulations. Support and consultations from European side promotes awareness of the standards of energy sector of the European Union among officials, experts and journalists in Ukraine, carries the discussion on the reform to new qualitative level, helps to better monitor effectiveness of changes inside the country.

With regard to the energy strategy of Ukraine, this document was developed to 2035 and formalizes the policy of our country to ensure energy security, sustainable energy sector development, a stable energy supply of national economy and public needs, both in peacetime and special periods. In contrast to the energy strategy of Ukraine up to 2030, this document generates the target trajectory of the development of the energy sector, ensuring consistency of priorities with the broader objectives of society, as a component of sustainable socio-economic development of Ukraine and stipulates the following: 1) determining the target state of the energy sector of Ukraine based on the priorities of energy security and implementation of European integration aspirations of Ukraine; 2) the introduction of modern methodological approaches adopted in the EU, the development of strategic planning documents and practical activities on realization of state policy in the energy sector; 3) formation of integral system of state control of the energy sector; the formation of a coherent system of governance, aimed at achieving the objectives and establishing a system of monitoring the implementation of the strategy of the provisions of the strategy by all involved in its scope subjects.

To achieve this goal, it is necessary to conduct a systematic transformation of the energy infrastructure of Ukraine. Ukraine has long relied on the export of energy resources from Russia. As a result of such systemic reforms Ukraine's energy infrastructure should become a flexible instrument system of energy security of Ukraine, the basis of reliable energy supply of consumers, the level of security of supply in the EU.

According to the authors, to achieve the main objectives of securing energy security of Ukraine, taking into account the provisions of the Energy Strategy of the country until 2020, should identify a number of common tasks:

1) ensure energy independence, including the creation of strategic reserves, diversification of sources and routes of supply. From the same source, Ukraine should receive no more than 30% of energy resources (nuclear fuel target is defined separately);

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- 2) reduction of energy intensity of gross domestic product by 2020 for 20% compared to 2012;
- 3) the functioning of a competitive and transparent markets for electricity, heat, gas, oil and oil products, coal, etc. taking into account the factor of external aggression; alternative energy sources;
- 4) formation and monitoring on a regular basis of the energy balance of Ukraine and its assessment according to the criteria of efficiency;
- 5) ensuring the reliable functioning of energy sector of the economy and the protection of critical energy infrastructure;
- 6) the creation of conditions for investment attractiveness of the energy market; improvement of legislation governing of the energy sector;
- 7) implementation of innovative approaches and their scientific and technical support at the stages of production, use and conservation of energy, with a focus on European standards.

Consequently, the implementation of effective energy policy to ensure energy security in the context of integration processes requires political liberty, professional planning and implementation a thorough analysis, quality statistics, public dialogue, constant monitoring of progress indicators.

In order to perform these tasks, it is necessary to improve the legal, institutional infrastructure, to strengthen relations with the countries of the EU energy security to boost economic growth.

Conclusions. Given the above, the implementation of strategic reforms in terms of energy supply, enhance energy security through the implementation of the provisions of the energy strategy, to achieve mutual understanding on strategic energy partner with the countries of the European Union, enhanced cooperation, and ensuring full integration of the energy markets of our country and the EU will give the opportunity for guaranteed protection of Ukraine, the formation of a competitive energy market and sustainable socio-economic development.

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