
ЕКОНОМІКА ТА УПРАВЛІННЯ НАЦІОНАЛЬНИМ ГОСПОДАРСТВОМ

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O. V. Abakumenko, Doctor of Economic Science, Professor,
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Abstract. The article, by analyzing of statistical information for the years 2007-2014 key trends in the national economy of Ukraine energy resources were identified. The trends of increase of energy-efficiency were identified, which is manifested in the reduction of energy consumption either in absolute terms or in approximate terms (annual costs per person and the amount of GDP per one ton of oil equivalent to the usage of energetic resources). Some changes towards diversifying of the sources of energy carriers imports were emphasized. It was determined that positive trends visibly gets offset by the overall increase in energy prices and the pretty high cost of European and American suppliers. The Russian Federation remains the dominant supplier of imported energy resources, and price parameters of Russian supplies in most cases are the most profitable.

Keywords: coal; energy dependence; energy resources; energy efficiency; energy carriers; oil; petroleum products and natural gas.

O. V. Абакуменко, д. е. н., професор,
П. О. Лук'яшко, к. е. н., доцент**ІДЕНТИФІКАЦІЯ ТА ОЦІНКА ОСНОВНИХ ТЕНДЕНЦІЙ РЕСУРСНОГО ЗАБЕЗПЕЧЕННЯ ЕНЕРГЕТИЧНОГО СЕКТОРУ УКРАЇНИ**

Анотація. У статті, на основі аналізу масиву статистичної інформації за 2007-2014 роки ідентифіковані основні тенденції забезпечення національної економіки України енергетичними ресурсами. Ідентифіковано тенденцію підвищення енергоефективності, що проявляється у зниженні споживання енергоносіїв як у абсолютному вираженні так і у відносних показниках (річний обсяг витрат на одну особу та сума ВВП, що припадає на одну тону нафтового еквіваленту використаних енергетичних ресурсів). Відмічені деякі зрушення в напрямку диверсифікації джерел імпорту енергоносіїв. Встановлено також, що позитивні тенденції в значній мірі нівелюються за рахунок загального зростання цін на енергоносії та порівняно високої їх вартості у європейських та американських постачальників. Російська Федерація залишається домінуючим постачальником імпортованих енергетичних ресурсів, а цінові параметри російських поставок у більшості випадків є найвигіднішими.

Ключові слова: вугілля; енергетична залежність; енергетичні ресурси; енергоефективність; енергоносії; нафта; нафтопродукти; природний газ.

O. V. Абакуменко, д. э. н., профессор,
П. А. Лукяшко, к. э. н., доцент**ИДЕНТИФИКАЦИЯ И ОЦЕНКА ОСНОВНЫХ ТЕНДЕНЦИЙ РЕСУРСНОГО ОБЕСПЕЧЕНИЯ ЭНЕРГЕТИЧЕСКОГО СЕКТОРА УКРАИНЫ**

Аннотация. В статье, на основе анализа массива статистической информации за 2007-2014 годы идентифицированы основные тенденции обеспечения национальной экономики Украины энергетическими ресурсами. Выявлено тенденцию к повышению энергоэффективности, которая проявляется в снижении потребления энергоносителей как в абсолютном выражении, так и в относительных показателях (годовые затраты на человека и сумма ВВП на одну тонну нефтяного эквивалента использованных энергетических ресурсов). Отмечены некоторые сдвиги в направлении диверсификации источников импорта энергоноси-

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телей. Установлено також, що позитивні тенденції в значительній мірі нивелюються за рахунок загального зростання цін на енергоносії і порівняно високої їх вартості у європейських і американських постачальників. Російська Федерація залишається домінуючим постачальником імпортованих енергетичних ресурсів, а цінові параметри російських поставок в більшості випадків найбільш вигідними.

Ключові слова: нафта; нафтопродукти; природний газ, вугілля; енергетична незалежність; енергетичні ресурси; енергоефективність, енергоносії.

Target setting. In terms of modern challenges towards economic and national security important problem of energy independence of Ukraine gets more and more important. The dependence of the domestic energy supply system on imported energy has become a factor of political and economic pressure at Ukraine, led to a series of unpopular decisions of government, caused reduction of welfare of the Ukrainian people and promoted for tension in society.

Analysis of recent achievements and publications. The issue of increase the energy efficiency in Ukraine became the object of scientific interest of many local scholars, among them Y. O. Berezhnyi, V. M. Gavrilenko, V. M. Horbachuk, I. M. Zaremba, L. V. Yevtushenko, A. I. Zaporozhets, S. V. Kulybaba, N. Y. Maystrenko, O. Y. Malyarenko, M. M. Mitrahovych, R. Z. Podolets, A. S. Rudnev and others. However it should be noted that the majority of works have fragmented character, meaning, it is dedicated to the issues of energy efficiency of individual branches, or focused on specific solutions to the problems, for example, increase of the production of energy from renewable sources.

The purpose of this article is to accomplish a comprehensive evaluation of empirical data and to identify trends of commodity ensure of national energy.

General results of the research. In our opinion, the solution of a problem of Ukraine's energy could be found in several areas, such as: increase of extraction of domestic energy resources, diversification of the suppliers of imported energy, the development of alternative energy, optimizing of the energy efficiency and domestic consumption. It is better to build this analytical study considering exactly these directions.

Main indicators of the providing national economy of energy resources are performed in Table 1.

Below mentioned information demonstrates the high level of dependence of national economy on energy supplies from abroad - for years 2007-2014 imported energy were for more than 38% of all proceeds of this type of resource. There is a tendency of increase the independence of Ukraine on imported energy sector. In 2014, imported energy was less than 31% of total revenue, while in 2007 - higher than 43%. The mentioned tendency should be considered as positive, especially taken into consideration the reduction of the amounts of in energy carriers imports was faster than the reduction of their use in the economy in general. The general decrease of energy use in Ukraine in 2014 compared to 2007 was 26.5%, and a decrease in imports reached the level of 47%. And the mentioned below feature was observed during all the analyzed period.

Table 1

Indices	Unit	2007	2008	2009	2010	2011	2012	2013	2014
1	2	3	4	5	6	7	8	9	10
Pro-duction	thous. tonnes of oil eq	84998	84260	79339	78712	85485	85247	85914	76928
	% from revenue	56,7	56,4	62,1	60,6	59,6	64,7	68,4	69,1
Import	thous. tonnes of oil eq.	64975	65263	48506	51260	58055	46520	39722	34437
	% from revenue	43,3	43,6	37,9	39,4	40,4	35,3	31,6	30,9
Revenues (producing + import)	thous. tonnes of oil eq.	149973	149523	127845	129972	143540	131767	125636	111365

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1	2	3	4	5	6	7	8	9	10
Export	thous. tonnes of oil eq.	7901	7984	7081	9278	10303	8007	8213	6967
	% from revenue	5,3	5,3	5,5	7,1	7,2	6,1	6,5	6,3
Total resources (production + imports - exports)	thous. tonnes of oil eq.	142072	141539	120764	120694	133237	123760	117423	104398
The average population	Thous. person	46509	46258	46053	45871	45706	45593	45490	44178
Energy resources per person	tonnes of oil eq.	3,05	3,06	2,62	2,63	2,92	2,71	2,58	2,36
GDP	mIn UAH	751106	990819	947042	1120585	1349179	1459096	1522657	1586915
	UAH./tonne oil eq.	5286,80	7000,32	7842,09	9284,51	10126,16	11789,72	12967,28	15200,63
	\$/tonne oil eq.	1046,89	1329,04	1018,45	1169,98	1270,92	1475,37	1622,33	1278,80

The sources and general efficiency of energy resources in Ukraine in 2007-2014 years *

* Compiled by authors based on [1; 2]

Volume declined for almost 10% in domestic production of energy resources, which occurred in 2014. This fact is obviously related to the loss of the eastern coal-mining areas of the country because of separatist movements and related military action. This assumption is confirmed by almost 22% declination in coal production in 2014 compared to 2013.

In terms of quite high level of national economy in the energy sector dependence on importation, as well a high indices of energy exports during the period - 5.7% out of total revenues. The tendency to export energy resources intensified over the years, so gains as for reduce import volumes partially leveled by the export activity. The level of energy independence of Ukraine would be higher, in case of providing reduction of energy export channels.

To evaluate the general energy efficiency, we've calculated indexes of energy consumption per 1 person and GDP per 1 ton of energy. Both figures are quite successful in modern Ukrainian realities, as the method of calculating largely eliminates the effects of the loss of territory and population as a result of political and military events of 2013-2014 years.

So considering the indices of energy use for 1 person in Ukraine, there is a general tendency to reduce consumption. For seven years managed to reduce energy consumption by nearly 0.7 t. of oil equivalent per person per year. Totally including general increase in energy efficiency (eight years the amount of created added value per 1 t. of oil equivalent increased by more than \$ 230) the tendency to reduce their use is positive.

By identifying common trends in energy supply economy of Ukraine, should be also evaluated its structure by the type of energy carriers. The volume and the structure of energy production sorted by main types of energy are presented in Fig. 1.

The main energy source produced in Ukraine during the period under was coal. Its volume decreased significantly due to political and military instability in the eastern regions of the country, as well as in 2014. The second most important element of domestic production is electricity generated by nuclear power plants.

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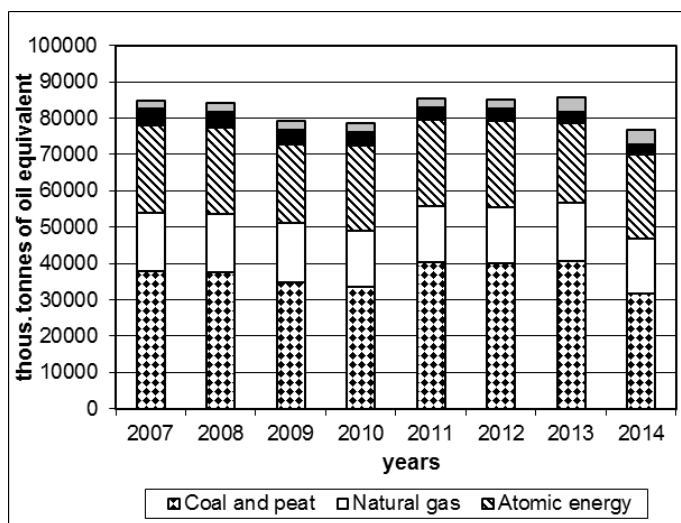


Fig. 1. The volume and structure of energy resources in Ukraine in 2007-2014 years *

* Completed by the authors based on [1]

The volume of production was more or less stable in 2007-2014. Domestic production of natural gas is way smaller volume comparing to the previous two in total. The volume and structure of imports of energy resources are presented in Fig. 2.

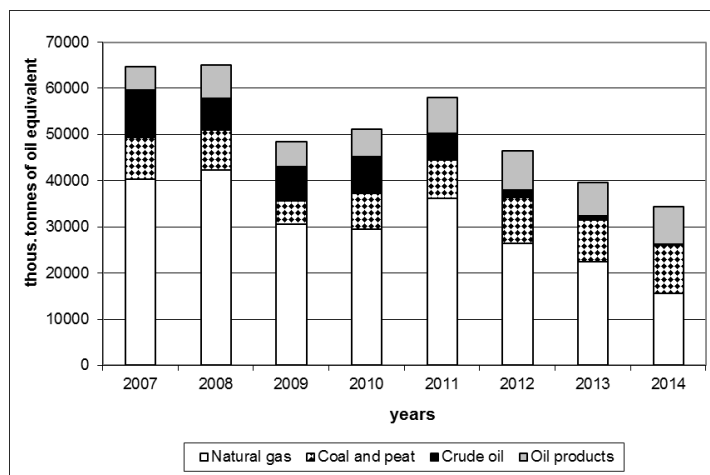


Fig. 2. The volume and the structure of imports energy in Ukraine in 2007-2014 years *

* Completed by the authors based on [1]

The import leading position belonged to natural gas. However, its volume and part reduced significantly, since 2009 with partial rise in 2011. We believe that the decline in imports of natural gas should be linked primarily to the global financial crisis of 2007-2008, which significantly affected the development and output of major export industries in Ukraine - metallurgy. Meanwhile coal imports increased since 2009, and in 2014 exceeded 10 million tons of oil equivalent or 200% in 2009. Fluctuations in oil imports were not that significant. And an import of crude oil has almost stopped.

Volume and structure of total revenues and energy resources are presented in Table 2.

During 2007-2014 there was a significant change in the structure of sources of resource supply and energy complex of Ukraine. In 2007-2008 its base (almost 40%) was natural gas, 70% of which was imported, and in 2014 the part of this resource has decreased to 28%, while imports in its composition are significant - more than half.

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Table 2

Volume, structure, dynamics flow of energy resources in Ukraine in 2007-2014 *

Resources	Unit	2007	2008	2009	2010	2011	2012	2013	2014
Coal and peat	thous. tonnes of oil eq.	46917	46209	40094	41509	48685	50182	49809	42265
	% before 2007	11,0	109,3	94,9	98,2	115,2	118,7	117,8	100,0
	% before total	31,3	30,9	31,4	31,9	33,9	38,1	39,6	38,0
Crude oil	thous. tonnes of oil eq.	4839	11141	11322	11475	9190	5039	4016	3010
	% before 2007	493,0	370,1	376,1	381,2	305,3	167,4	133,4	100,0
	% before total	9,9	7,5	8,9	8,8	6,4	3,8	3,2	2,7
Oil products	thous. tonnes of oil eq.	4976	7256	5379	6029	7750	8370	7258	8117
	% before 2007	61,3	89,4	66,3	74,3	95,5	103,1	89,4	100,0
	% before total	3,3	4,9	4,2	4,6	5,4	6,4	5,8	7,3
Natural gas	thous. tonnes of oil eq.	56314	58584	46804	44977	51707	41993	38611	30742
	% before 2007	83,2	190,6	152,2	146,3	168,2	136,6	125,6	100,0
	% before total	37,5	39,2	36,6	34,6	36,0	31,9	30,7	27,6
Atomic energy	thous. tonnes of oil eq.	24273	23566	21764	23387	23672	23653	21848	23191
	% before 2007	04,7	101,6	93,8	100,8	102,1	102,0	94,2	100,0
	% before total	6,2	15,8	17,0	18,0	16,5	18,0	17,4	20,8
Other	thous. tonnes of oil eq.	2654	2767	2482	2595	2536	2530	4094	4040
	% before 2007	65,7	68,5	61,4	64,2	62,8	62,6	101,3	100,0
	% before total	1,8	1,9	1,9	2,0	1,8	1,9	3,3	3,6
Total	thous. tonnes of oil eq.	49973	149523	127845	129972	143540	131767	125636	11365

* Completed by the authors based on [1]

According to a decrease in the importance of natural gas resources in Ukrainian energy sector, a part of coal increased. In 2007-2008 it was about 31%, in 2014 rose up to 38%. However the tendency to increase the part of foreign sources in a complex of the volume of of coal flow from 19% in 2007 to 24.5% in 2014 is negative.

The third most important source of energy for Ukraine was atomic energy. Its part increased from 16% in 2007 to 21% in 2014. This phenomenon should be assessed as generally positive, because its domestic production is provided by nuclear power plants. However, it should be noted that the fuel for this production is fully imported, so nuclear energy can not be considered as a basis for energy independence of Ukraine in its full meaning.

An equally important aspect that determines energy independence and the efficient use of energy in Ukraine is their cost. Unfortunately, complete data on energy costs is not presented officially, therefore for the analysis we can use only exports and imports data, which was published both in natural and in cost terms. Certainly data on foreign trade operations will not evaluate the level of domestic energy cost, however, in our opinion, on their basis the trend of price changes can be judged.

We shall consider the trend of exports and imports of energy resources, reduce of their importance for Ukraine for the end of 2014, as presented in Table 2.

The main supplier of coal in Ukraine during considered period remained the Russian Federation. During 2007-2014 years this country has imported to Ukraine 38.6% of the total import of coke and 75% of anthracite and the other types of coal. The share of Russian Federation in 2014 was 36% and 71%. Also the important suppliers in 2014 were Poland 46% coke and the United States 13.5% anthracite and other coal. Moreover, the price parameters cooperation with Russia has been the most profitable. Producer price of coke in that country was 10% -20% lower than Polish. In 2010 and 2013 there was the opposite situation, with excess of Russian prices in 2014 were 40%. However, coke

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amounted to 10% of Ukrainian coal imports with anthracite and other species as basis. By this item Russian prices were better than major competitors by 20% -50% (as of 2014 - 30%).

As for the import of natural gas Russia remained the dominant contractor since 2010, when finally ousted prior suppliers from the domestic market - Turkmenistan, Kazakhstan and Uzbekistan. In 2014, the part of imports from Russia amounted to 74%. The rest was covered by European countries (mainly Germany, Hungary and Norway). Moreover, the price indexes of Russian gas in 2010 was more acceptable, even by Central Asian, not to mention European deliveries, which in 2014 were more expensive for 22%

Unfortunately the role and conditions of supply of imported fuel for nuclear power plants is difficult due to lack of relevant detail in the official statistical material.

The basis of domestic oil imports is formed by two countries - Russia and Belarus. The combined part of these countries in the structure of domestic imports in 2010 was not reduced below 65%. Moreover, the share of these countries remains, in spite of a reasonable price parameters of products from Kazakhstan. In 2013-2014 the proportion of European countries (Bulgaria, Greece, Lithuania, Poland, Romania - collectively more than 14%) significantly increased, but the price indices in most cases is much higher than the former Soviet Union.

As for the imports of electricity the Russian Federation was the only supplier, although this is mainly due to technological peculiarities of transportation of this product.

An additional assessment of cost parameters of energy carriers import in Ukraine allows to note that some progress in the plane of diversification of energy sources of their supply mainly contradicts the financial interests of the country and consumers, as rejection of Russian-made products in many cases necessitates purchase products at much higher prices.

Before proceeding to the formulation of the general opinion on studies, should be noted that for the most options of energy import, the prices significantly exceed the price parameters of domestic exports, which further exacerbates the issue of its feasibility in terms of domestic shortages of energy resources and a sufficiently high level of import dependence.

Conclusions. The evaluation of the official statistics on the functioning of domestic energy industry allows to specify a number of achievements to improve energy efficiency and to increase energy independence. Ukraine during 2007-2014 managed to significantly reduce energy consumption per 1 person and GDP energy. Also a higher level of diversification of natural gas and petroleum products has been achieved. But the general permanent deterioration of a price situation on the energy market and an additional increase of their value due to attraction of new suppliers eliminate the achievements. A need for radical reform of the domestic energy sector in terms of finding financial mechanisms reduce the cost of energy and technological reserves to increase energy use seems obvious.

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