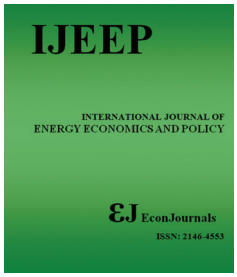

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2023, 13(1), 111-117.

Economic Aspects of Final Energy Consumption in Ukraine: Prospects of Implementation of the Positive Experience of the European Union

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Received: 08 October 2022 **Accepted:** 05 January 2023 **DOI:** https://doi.org/10.32479/ijeep.13815

ABSTRACT

The lack of a proper system for the use of energy resources is a nationwide problem in Ukraine. Payment for the consumed services for energy carriers mainly formed according to "consumption rates," which can significantly exceed the actually received amount of services and leads to an unjustified increase in the cost of energy resources. All this requires a search for new tools to stimulate energy intensity, effective accounting of the total volume of energy consumption and the introduction of the best foreign experience in the field of energy saving in Ukraine. The analysis of energy consumption in the country made it possible to identify the existing problems that subsist in the energy sphere today and provided an opportunity to propose ways to eliminate imbalances. The proposed methodology makes it possible to build models for establishing the relationship between energy intensity and final energy consumption in Ukraine. Evaluation of foreign European experience makes it possible to implement the most necessary reforms and measures in domestic practice to improve the sphere of energy consumption.

Keywords: European Integration, Final Energy Consumption, Economic Policy, European Union, Energy
JEL Classifications: P18, Q42, Q48

1. INTRODUCTION

European Union has launched a number of initiatives which aim to in-crease the efficiency of using energy, reduce energy demand and does attempt to decouple it from economic growth. Main instruments and im-plementing measures exist in this field, including the promotion of co-generation, the energy performance of buildings (whether private or pub-lic buildings), and energy labelling for domestic appliances. All these ac-tivities are extremely relevant for modern Ukraine, the energy losses of which are consistently high. Therefore, the introduction of the best inter-national experience in the energy sector of Ukraine will also have positive effects for the state economy.

It is worth noting that especially in recent years the European Union supports Ukraine in ensuring a democratic, prosperous, and stable future for all its citizens. The EU has been unwavering in its support for the Ukraine's territorial integrity and sovereignty and sees the full implemen-tation of Minsk agreements as the basis for a political solution of war con-flict in the Ukraine's East. Since spring 2014, the EU has stepped up its support for economic and political reforms in Ukraine; the advantage of such support is

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precisely the energy sector (Statistics Explained, 2021a; BRDO, 2017). In the energy sector, special attention paid to such indicators as total energy consumption and energy intensity, which better and more comprehensively characterize the changes that are taking place in the energy sector.

It is known that final energy consumption (FEC) is the total energy consumed by end users, such as households, industry and agriculture. It is the energy which reaches the final consumer's door and excludes that which is used by the energy sector itself. This indicator excludes energy uses by the energy sector, including for deliveries, and transformation. FEC also excludes fuel transformed in the electrical power stations of industrial auto-producers and coke transformed into blast-furnace gas where this is not part of overall industrial consumption but of the trans-formation sector. Final energy consumption in households, services and other spheres covers quantities consumed by private households, commerce, public administration, services, agriculture and fisheries.

According to official sources, gross available energy in the European Union in 2019 slightly decreased compared to 2018 (−1.7%). Mainly oil (crude oil and petroleum products) continued to be the most significant energy source for the economy of whole EU, despite a long-term down-ward trend, while natural gas remained the second largest energy source. Oil use was again on the decline, after a slight increase in the period between 2014 and 2017, whereas a certain fluctuation is observed in natural gas, with levels back on the rise in 2019. The contribution of renewable energy sources shows a stable growth, having already surpassed solid fos-sil fuels in 2018 and gaining further ground in 2019. Solid fossil fuels decreased by 19.7% in 2019 and reached the record lowest value since 1990, that is also a positive trend (Statistics Explained, 2021a; 2021b; 2021c).

2. LITERATURE REVIEW

Today, one of the most valuable resources for the economy of any state, ensuring its gradual sustainable development is energy. The current stage of socio-economic development is characterized by reduction of available nonrenewable resources, deterioration of environmental conditions and growth of population, production volumes and humanity's energy needs on the global scale (Yakubiv et al., 2019). That is why the conservation and economical use of energy, the introduction of alternative types, the introduction of eco-innovations is a strategic task of the developed coun-tries of the world (Yakymchuk et al., 2021, 2022; Ziolkowska and Ziolkowski, 2019).

A number of scientists are currently engaged in energy issues in Ukraine, since this issue is more than temporary. After all, the loss of a part of the country's territory has led to a shortage of its own natural re-sources that meet the need for energy. Thus, Pavlov et al. (2020, 2021), Strishenets et al. (2018) investigated the issues of functioning of gas distribution enterprises and increasing their competitiveness. This research is important from the provision level of the population point of view with both its own gas and imported gas, namely, measuring the vol-ume of its demand.

Another area of research is the analysis of alternative renewable energy sources, namely: Wind, sun, the use of solid (wood) raw materials and agricultural waste, as the basis for providing energy systems (Was et al., 2020, Wisz et al., 2018; Shmatkovska et al., 2022; Danko et al., 2020; Heldak et al., 2018; Zhuk et al., 2014; Maksymiv et al., 2021; Zelinska et al., 2021; Popadynets and Maksymiv, 2016). These researchers consider both the world experience in attracting the best practices in alternative energy and the formation of the latest trends in the development of renewable energy sources.

The use of modern technologies in the energy supply system to attract management and investment and innovation mechanisms also takes place among the studies of domestic and foreign scientists (Jungmittag, 2004; Vasyltsiv et al., 2017; Ciborowski and Skrodzka, 2019; Danylyshyn and Bohdan, 2020, 2021; Kneysler et al., 2020; Stroyko et al., 2013; Zhak and Tridico, 2014; Ilyash et al., 2020; Antoniuk et al., 2017; Simkiv et al., 2021; Kucher et al., 2021; Havrysh et al., 2020; Nsair et al., 2020; Sodoma et al., 2018). In these works, attention focused on the regulatory factors of the sphere, the formation of the investment attractiveness of the energy sphere for potential investors, as well as the attraction of vari-ous financial resources to support and develop a number of energy enter-prises.

That is why the purpose of this article is to establish the relationship between the final energy consumption in Ukraine and energy intensity, to substantiate the need for a positive experience of the European Union.

3. MATERIALS AND METHODS

The following general scientific methods have been applied in the re-search: Cause and consequences-to study the causes and consequences of the financial and economic aspects of final energy consumption in Euro-pean Union and Ukraine, to study the energy intensity of the main sectors of the national economy. The special methods used in the research are a method of correlation-regression analysis-to establish a regression rela-tionship between the indicators of total energy consumption and energy intensity at the state level; expert poll-to collect estimates and judg-ments of competent persons on interests, roles and relationships in the interests of stakeholders in the energy saving field; to assess the socio-ecological and economic efficiency of the optimization of energy saving and implementation of the best foreign experience in Ukraine. Both a system method and an economic analysis method have been used to in-vestigate the economic aspects of final energy consumption in European Union and Ukraine. To create practical proposals for improving the level of energy saving, the modeling method also has been used.

4. RESULTS AND DISCUSSION

Today energy conservation is the practice of using less energy in order to lower costs and reduce environmental impact. This can mean using less gas, electricity or any other form of energy from utility and pay for. With finite energy resources available on our

planet, actively conserving energy when possible is beneficial individually and to our larger energy systems.

The main energy end user categories are private households, agriculture, industry, road transport, air transport (aviation), other transport (rail, inland navigation), services and other (Table 1). Gross inland energy consumption is the total energy demand of a country or region. It represents the quantity of energy necessary to satisfy inland consumption of the geographical entity under consideration. Such gross inland energy consumption covers distribution and transformation losses; consumption by the energy sector itself; final energy consumption by end users; statistical differences (not already captured in the figures on primary energy consumption and final energy consumption).

The structural-dynamic analysis of the main indicators of total energy consumption and energy intensity in Ukraine during 2007-2019 carried out, which represents Table 1.

Therefore, as evidenced by the data Table 1, the total energy consumption in all industries during 2007-2019 in Ukraine decreased by almost half (by 42.65) and amounted to 49.3 mln toe in 2019, which is 36 less in absolute terms compared to the base year 2007, 5 mln toe. The largest share in the structure of energy consumption consistently occupied by industry – 29-38%. The second position in the structure of energy consumption in Ukraine during the study period 2007-2019 belongs to households 26-35%. The third position occupied by energy consumption in the transport sector – 15-20% in the overall structure of total energy consumption indicators. In terms of energy consumption, approximately the same share occupied by the sector of commercial and public services and the sector of non-energy use of energy – 5-9%. Agriculture, forestry and fisheries accounted for only 2.3-4.1% of the total energy consumption during the study period. It is worth noting that a decline in energy use observed in all areas of energy consumption. In particular, the industry reduced its energy use by more than 50% – in 2019, 16.1 mln toe was consumed compared to the base year 2007-32.8 mln toe, in absolute terms this decrease amounted to more than 16.7 mln toe, which is a significant indicator. Households cut energy consumption by 40% and the transport industry by 35%. The share of the sphere of non-electric energy use also decreased in 2019 compared to 2007-by 63% and amounted to 2.7 mln toe, respectively, against 7.7 mln toe. There was a slight decrease in energy consumption in agriculture, forestry and fisheries by 6.3%, as well as in the service sector by 9.7%. All this indicates a decrease in the total volume of energy consumption in Ukraine, which is caused by both the rise in prices for energy carriers and a decrease

Table 1: Total final energy consumption for 2007-2019 years in Ukraine, thsd. Toe

Indicators	Years							
	2007	2008	2009	2010	2011	2012	2013	2014
Total final energy consumption-total among them	85955	83283	67555	74004	75852	73107	69557	61460
Industry	32852 (38.2)	30942 (37.2)	22629 (33.5)	25327 (34.2)	26253 (34.6)	24845 (34.0)	21864 (31.4)	20570 (33.5)
Transport	15417 (17.9)	15141 (18.2)	12396 (18.3)	12627 (17.1)	12611 (16.6)	11448 (15.7)	11280 (16.2)	10327 (16.8)
Residential	23001 (26.8)	22845 (27.4)	22084 (32.7)	23813 (32.2)	23604 (31.1)	23466 (32.1)	23495 (33.8)	20384 (33.2)
Commercial and public services	4956 (5.8)	4952 (5.9)	4176 (6.2)	4643 (6.3)	4802 (6.3)	5037 (6.9)	5745 (8.3)	4663 (7.6)
Agriculture, forestry and fishing	2018 (2.3)	2107 (2.5)	1994 (3.0)	2036 (2.8)	2246 (3.0)	2195 (3.0)	2242 (3.2)	2016 (3.3)
Other activities	0 (0.0)	0 (0.0)	7 (0.0)	10 (0.0)	327 (0.4)	0 (0.0)	0 (0.0)	0 (0.0)
Non-energy use	7712 (9.0)	7295 (8.8)	4269 (6.3)	5547 (7.5)	6008 (7.9)	6116 (8.4)	4932 (7.1)	3500 (5.7)
Energy intensity, toe/ thousand international dollars	0.144	0.136	0.13	0.137	0.133	0.128	0.122	0.115
Indicators	**2015**	**2016**	**2017**	**2018**	**2019**	**Absolute deviation 2019 to 2007 (+;-)**	**Relative deviation 2019 to 2007, %**	
Total final energy consumption-total among them	50831	51649	49911	51458	49359	−36596	57.4	
Industry	16409 (32.3)	1495 (29.0)	15098 (30.2)	16491 (32.0)	16126 (32.7)	−16726	49.1	
Transport	8750 (17.2)	9165 (17.7)	9624 (19.3)	9488 (18.4)	10064 (20.4)	−5353	65.3	
Residential	16554 (32.6)	17588 (34.1)	16487 (33.0)	16668 (32.4)	14004 (28.4)	−8997	60.1	
Commercial and public services	3838 (7.6)	4856 (9.4)	4337 (8.7)	4275 (8.3)	4475 (9.1)	−481	90.3	
Agriculture, forestry and fishing	1961 (3.9)	2143 (4.1)	1847 (3.7)	1887 (3.7)	1890 (3.8)	−128	93.7	
Other activities	0 (0.0)	31 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	-	-	
Non-energy use	3318 (6.5)	2910 (5.6)	2515 (5.0)	2645 (5.1)	2796 (5.7)	−4916	36.3	
Energy intensity, toe/ thousand international dollars	0.106	0.105	0.099	0.099	0.092	−0.052	63.9	

2014-2019 Excluding temporarily occupied territories of Autonomous Republic of Crimea, Sevastopol and part of the temporarily occupied territories in Donetsk and Luhansk regions.
Source: Compiled according to official data (State Statistics Service of Ukraine, 2021)

in the volume of production capacities, the negative impact of the pandemic, etc. Therefore, an urgent task for the modern sphere of energy consumption is the search for new (alternative) energy sources with a lower cost.

Today, as demonstrated by international experience, energy intensity is one of the indicators to measure the energy needs of an economy of a state. It is often used as an approximation of energy efficiency. Many factors influence energy intensity. It reflects on the structure of the economy and its cycle, general standards of living and weather conditions in the reference area (Pavlov et al., 2021). Energy intensity has been calculated as units of energy per unit of GDP. This indicator expressed in chain linked volumes is more suitable to be used to compare different time periods in one country, and is more suitable to be used to compare across countries in one specific year.

The gross of energy intensity of each EU Member State depends, to a large degree, on the structure of its energy system, the availability of natural resources for primary energy production, and the structure and development of each economy; this is true not only for conventional fuels and nuclear power, but also for renewable energy sources. In keeping with the data for the whole of the EU, gross energy intensity fell in all of the EU Member States to 2009. Consumption rebounded in 2010 in most of the Member States, with only Lithuania, Greece, Portugal, Cyprus, Croatia and Spain recording consecutive contractions in consumption in 2009 and 2010, possibly reflecting the low level of economic output and consumer confidence in several of these Member States. In 2011, a fall in consumption was recorded by 22 of the 28 Member States, the main exceptions being Bulgaria (a 7.4% increase) and Lithuania (3.2%). Only nine Member States recorded an increase in consumption in 2012 and again only nine in 2013, including two of the largest Member States (Germany and France) in both years. In 2013, Croatia and Spain extended their runs of falling consumption to 6 years, while for Greece and Cyprus 2013 was their fifth consecutive decrease; Portugal recorded an increase in consumption of 0.7% in 2013 after 7 years of decreases. Germany had the highest level of gross inland consumption of energy in 2013, accounting for a 19.5%. France (15.6%) and the United Kingdom (12.1%) were the only other EU Member States to record double-digit shares, with Italy's 9.6% share just below this level. Together these four Member States accounted for 56.7% of the EU gross inland consumption (Statistics Explained, 2021a; 2021b; 2021c; Consumption of energy in EU, 2021).

Renewable energy sources accounted for more than one third of gross inland consumption of energy in Latvia (36.1%) and Sweden (34.8%), and their share was over one quarter of the total in Austria (29.6%) and Finland (29.2%). The fastest expansion in the share of renewable energy sources in energy consumption was recorded in Latvia, Denmark, Lithuania, Romania, Italy, Estonia, Sweden and Finland. Energy intensity is a measure of an economy's energy efficiency. The least intensive economies in the EU were Ireland, Denmark, the United Kingdom and Italy, which used the least amount of energy relative to their overall economic size (based on gross domestic product (GDP)). The most energy-intensive EU Member States were Bulgaria and Estonia. It should be noted that the economic structure of an economy plays an important role in determining energy intensity, as service based economies will, a priori, display relatively low energy intensities, while economies with heavy industries (such as iron and steel production) may have a considerable proportion of their economic activity within industrial sectors, thus leading to higher energy intensity. Substantial energy savings were made in the Lithuanian and Romanian economies, as well as in Slovakia, Bulgaria, Poland, Cyprus and the Czech Republic, as the amount of energy required to produce a unit of economic output (as measured by GDP) was reduced by at least one quarter (25%) (Consumption of energy in EU, 2021).

As shown in the Table 1, energy intensity in Ukraine has a steady downward trend: In 2019, it decreased by 36.1% compared to 2007, that is, more than 3 times. The absolute value of energy density is 0.092 toe/thsd. International dollars in 2019 versus 0.144 toe/thsd international dollars in 2007. However, despite the fact that the global regulation goal of "reducing the energy intensity of GDP" is being achieved (in general, the energy intensity of GDP fell by 16%); it is still the highest in Europe and exceeds the global indicator. Therefore, Ukraine is still an energy dependent state. Thus, in 2016, Ukraine imported 34% of gas, 80% of oil products and 100% of nuclear fuel to ensure domestic consumption (Statistics Explained, 2021a; 2021b; 2021c; Consumption of energy in EU, 2021). In addition, in 2014-2017, access to anthracite deposits was difficult, which made it necessary to import coal of this grade. The constant shortage of primary fuel could not but affect the market of the secondary energy resource-electricity. Therefore, during 2014-2017, the Government of Ukraine introduced temporary emergency measures on the electricity market, which for consumers consisted, first, in "rolling" blackouts. That is why the rational use of fuel and energy is the main goal of the state policy in the field of energy efficiency and energy saving. It is possible to establish whether the goal has been achieved by analyzing the energy intensity of GDP as a whole (goods, works and services) and individual industries.

For these purposes, the research based on the data in Table 1 revealed regression relationships between energy intensity and final energy consumption in Ukraine, which is presented in Tables 2 and 3.

The choice of the analytical form of the model describing the dependence of energy consumption on energy intensity carried out based on the constructed scatter diagram, which is a graphical representation of the selected statistical sample. The relationship between energy intensity and final energy consumption in Ukraine is close to linear; therefore, in this case, it is advisable to choose a linear function in the role of dependence between variables. The sample linear regression function in this case will look like this:

$$\hat{y} = b_0 + b_1 x \quad (1)$$

Where: $\hat{y}$ – estimation for the mathematical expectation of the dependent variable of the model (final energy consumption); x – independent variable of the model (energy intensity); b0, b1-parameters of sample regression.

To find estimates of the model parameters b0, b1 we used the values of energy intensity indicators by branches of Ukraine for 2007-2019 (Table 1). As a result of calculations the values of the model parameters b0 = −23513.06; b1 = 743629.2 are received.

Accordingly, the built dependence model of energy consumption on energy intensity has the form:

$$Y = -23513.1 + 743629.2x. \quad (2)$$

To check the choice correctness of the structure of the constructed dependence model of energy consumption on energy intensity, in the form of linear regression, its verification was carried out, that is, a statistical check of the model for adequacy, quality and significance. To assess the quality of the constructed model we used the correlation and determination coefficients. The statistical significance of the model was checked based on Fisher's and Student's criteria.

To assess the adequacy of the model with statistical data, the value of the coefficient of determination R2 was calculated. Since the value of the coefficient of determination R2= 0.930608, the effect of energy consumption is quite significant (93% change y depends on the change x). The degree of closeness of the linear relationship between the model variables estimated using the correlation coefficient. Based on the value of r = 0.96468, it is concluded that there is a close linear relationship between the indicators of the model.

The following F-statistics (Fisher's F-criteria) used for verification:

$$F = \frac{R^2}{1-R^2} \cdot \frac{n-k}{m}, \quad (3)$$

Which has a Fisher distribution with degrees of freedom v1=m i v2=n – k.

Table 2: Initial data to the correlation-regression model for establishing the relationship between energy intensity and energy consumption in Ukraine

Years	Final energy consumption, thousand toe	Energy intensity, toe/thousand international dollars
2007	85955	0.144
2008	83283	0.136
2009	67555	0.130
2010	74004	0.137
2011	75852	0.133
2012	73107	0.128
2013	69557	0.122
2014	61460	0.115
2015	50831	0.106
2016	51649	0.105
2017	49911	0.099
2018	51458	0.099
2019	49359	0.092
Absolute deviation 2019 to 2007 (+;-)	−36596	−0.052
Relative deviation 2019 to 2007, %	57.4	63.9

Source: compiled according to data (BRDO, 2017; Official website of the European Union, 2020, State Statistics Service of Ukraine, 2021)

According to the statistical tables of Fisher's F-distribution at a given level of significance α = 0.05, the critical value of Fisher's criterion Fcr = 4.844 was found (Yakymchuk et al., 2020). Because the actual value of the Fisher criteria (Ff = 147.519) is more than critical, it indicates the statistical significance of the constructed model as a whole and its adequacy. To determine the significance of which parameters of the model provides its overall statistical significance, we checked the statistical significance of the model parameters, and used t-statistics (Student's criteria):

$$t_{b_j} = \frac{b_j}{\hat{\sigma}_{b_j}}, \; j = \overline{0,m} \quad (4)$$

Where: bj –estimation of the parameter βj of the theoretical regression, $\hat{\sigma}_{b_j}$ – standard error of the j-th parameter of the model.

According to the selected level of significance α = 0.05 and degrees of freedom according to the statistical tables of the Student's t-distribution, the critical value of the Student's criterion tcr = 2.201 was found.

Since tb0=|−3.199| and tb1 = 12.146 are greater than tcr, a conclusion is made about the statistical significance of the parameters b0 and b1.

The results of the dependence model verification of energy consumption on energy consumption given in the Table 3.

The results of the dependence model verification of energy consumption on energy intensity indicate the adequacy of the model to statistical data and the existence of a close linear relationship between its variables, as well as the significance of the constructed model as a whole and the significance of its parameters.

We believe that in accordance with the requirements of the Association Agreement, the Energy Efficiency Fund should be introduced in Ukraine, which would provide support for initiatives to introduce economic incentives for energy efficiency measures. The key idea behind the operation of such a fund should be to channel energy subsidies towards financing energy efficiency measures. In June 2017, the Verkhovna Rada adopted the Law "On the Energy Efficiency Fund," which defines the basic principles of its activities (but provides for the adoption of a by-laws number). It should be noted that the field of energy efficiency and energy saving is attractive for international investors in the

Table 3: Results of regression analysis of the dependence model of energy consumption on energy intensity of Ukraine

Indicator name	Symbol	Value
Correlation coefficient	r_{yx}	0.96468
Determination coefficient	R^2	0.930608
Fisher's criteria (actual)	F_f	147.519
Student's criteria b_0	t_{b_0}	−3.199
Student's criteria b_1	t_{b_1}	12.146
Fisher's criteria (critical)	F_{cr}	4.844
Student's criteria (critical)	$t_{b_{cr}}$	2.201

Source: calculated by the authors

European Union and not only. Such programs "Municipal Energy Reform," already funded by the US government (16 million USD), "Establishment of Energy Agencies in Ukraine" funded by Germany (3 million euros), and regional programs to support energy efficiency are being developed. At the same time, there are a number of programs of targeted donor assistance from the GEF, UNIDO, EBRD, USAID and other organizations to improve energy efficiency in Ukraine.

5. CONCLUSION

Thus, the economy can operate as a competitive industry only if there are innovative development in industrial technologies, development of intel-lectual capital. At the same time, budget financing is an important aspect of increasing the level of competitiveness of the economy. According to the experience of developed countries of the world, a competitive econo-my can develop both with proper state regulation and in combination with free market mechanisms For the Ukrainian economy, the leading place occupied by the energy sector. The work carried out a structural-dynamic analysis of the main indicators of total energy consumption and energy intensity in Ukraine during 2007-2019, which testified to a significant decrease in these indicators. However, a comparison of energy intensity indicators in Ukraine with European ones showed that it remains twice as high in Ukraine. All this requires a search for new ways to regulate energy intensity and alternative energy in Ukraine.

Energy efficiency and energy saving are techniques to reduce energy use. At the same time, energy saving is aimed at saving fuel and energy resources and reducing consumption, and energy efficiency-at useful (efficient) energy consumption, i.e. reducing the amount of energy used while the volume of services consumed or goods produced.

Today, by international standards, Ukraine is one of the most inefficient energy consumers due to a large share of energy-intensive sectors, outdated and inefficient technologies and highly depleted fixed assets. Ukraine's energy intensity, measured as the ratio of total primary energy supply to GDP, is ten times the OECD average. When adjusted for pur-chasing power parity, Ukraine consumes about 3.2 times more energy per unit of GDP than the OECD average.

Revealed regression relationships between energy intensity and final energy consumption in Ukraine, which showed a high closeness of the relationship between these indicators (0.96-1.0), and checking the signif-icance of the model indicators confirmed its adequacy.

A set of measures is proposed to improve the national energy efficien-cy system. We propose to revise the regulatory acts, to abolish such out-dated regulatory instruments as rates of consumption of fuel and energy resources in social production, energy certification of the company. Nec-essary to create the prerequisites for the introduction of mandatory 100% individual metering of energy consumption, providing in the regulatory legal acts adopted in pursuance of the Law of Ukraine "On Commercial Accounting of Utilities," the norms aimed at preventing the erosion of responsibility for the irrational consumption of energy resources of con-sumers. Today it is necessary to use fiscal instruments more widely: To provide tax incentives to enterprises implementing energy-saving and energy-efficient technologies, in particular, by establishing increased de-preciation rates for energy-saving fixed assets; to provide for publicly available customs privileges when importing energy efficient and energy saving equipment to Ukraine. An important aspect is the need to intro-duce the minimum necessary quality control of services in the field of energy service, energy audit and energy management. The authorities should conduct massive information campaigns aimed at raising aware-ness of citizens in the field of energy efficiency and energy saving. In addition, they should eliminate the prerequisites for the occurrence of corruption offenses by formalizing the procedures for maintaining regis-ters (list, database, etc.) of persons performing energy audit services, energy service, implement energy management systems and certified special-ists in these areas. All these measures will create an effective and publicly available system for collecting and analyzing indicators and indicators of efficiency and rationality of energy use optimize the state regulation sys-tem in the field of energy efficiency and energy saving, by concentrating the policy-making process, unifying regulatory instruments and powers in the field of energy efficiency.

6. ACKNOWLEDGEMENTS

This research was funded by Ministry of Education and Science of Ukraine, grant number 0121U107684. The authors thank all brave defenders of Ukraine that made finalizing this publication possible.

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