

Energy Saving Technologies as a Prerequisite of Economic Security of Ukraine

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Abstract. *The paper considers the use of energy saving technologies in the context of ensuring the economic security of Ukraine. The works of domestic and foreign scholars devoted to these issues have been analyzed. It was determined that the unsolved aspect is consideration of the energy efficient technologies as a prerequisite of economic security of Ukraine. The experience of the EU in energy efficient technologies implementation has been studied and examples of the most successful countries are presented. It was determined that achieving the desired results in efficient energy consumption in Ukraine is possible only in case of creating an effective energy management system at all levels of administration. The new directions of energy efficient technologies development in Ukraine have been defined. It was proposed to strengthen the actions in prudent use of fuel energy sources and activate the use of energy saving technologies to ensure the economic security of Ukraine.*

Keywords

Alternative energy sources, energy efficiency measures, economic security, energy saving technologies, energy security.

1. Introduction

The issue of limited energy sources and their wasteful use are becoming more important every year. The active steps worldwide are taken to reduce the negative human impact on the planet, to improve the efficiency of use the existing resources and to find new, more effective. Despite the efforts of the international community in promotion the alternative energy sources and energy efficiency, the most of world economy still runs on fossil fuels.

In today's difficult economic and political situation, there is the challenge of economic security of Ukraine. Thus the issues of high energy consumption, energy efficiency improvement and renewable energy development are very important for our country. In addition, the problem is misunderstanding the necessity to reduce energy consumption by citizens.

This problem caused by the lack of adequate consideration of these issues in schools and universities, the consumerist approach to environment and the lack of targeted government policies aimed on motivation in energy saving by citizens [1].

The problems in the field of energy management, energy efficiency, energy efficient measures' financing, their impact on the economic security of the state, and specifics of the state policy on energy efficiency are studied by domestic and foreign scientists, such as L. Abalkin, M. Bulgakova, I. Binko, E. Bobrov, V. Senchanov, A. Kaczynski, S. PyrozHKov, M. Prystupa, A. Mikhaylenko, Z. Varnaliy, A. Vlasyuk, V. Heyets, V. Horbulin, A. Sukhorukov, G. Pasternak-Taranuschenko, J. Zhailo, V. Muntiyan, V. Predborskyy, A. Shydlovskii, V. Shlemko et al. [1-13].

Along with the abovementioned, the detailed analysis of scientific papers on the subject revealed that issue of energy saving measures in the context of economic security have not got enough attention, although it is extremely important for Ukraine today. Thus, the consideration of the energy efficient technologies as a prerequisite of economic security of Ukraine currently remains among the unsolved aspects.

2. Analysis of State of the Art of Energy Efficiency

The economic security ensuring, along with the protection of the sovereignty and territorial integrity of Ukraine, applies to the most important functions of the state according to the Constitution of Ukraine [14]. As noted in [8], [9] "a hypertrophied structure of fuel and energy resources consumption with a high proportion of gas and huge prodigality in this area negatively affects the energy security"; "Ukraine is the world's largest importer of natural gas, is third in the world in terms of its use and the first in its consumption per capita".

The conditions that occur in the energy sector (Fig. 1), adversely affect the economic security of Ukraine as a whole, the livelihoods of all sectors of the economy, and socio-economic stability of society.

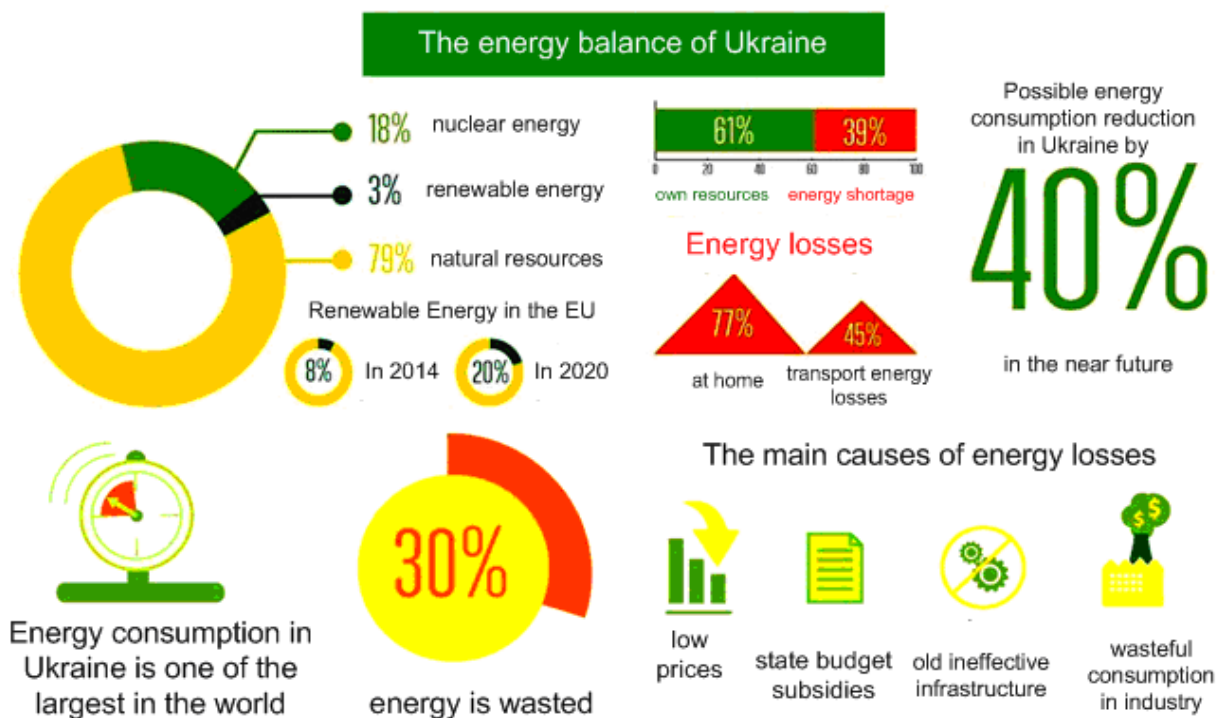


Fig. 1. The energy balance of Ukraine and the main causes of energy losses.

2.1 Basic Terms and Definitions

The issue of energy efficiency in recent years received much attention in Ukraine, which is reflected in the current legislation. In order to better understand the importance of energy saving technologies in ensuring the economic security of Ukraine, the clarification of such definitions as "energy security", "energy saving technologies", "alternative and renewable energy sources", "economic security" should be provided.

An energy security is the state of economy that assists the efficient use of energy resources of the country, the presence of sufficient number of energy producers and suppliers in the energy market, as well as accessibility, differentiation and environmental friendliness of energy resources [16].

As one of the most important components of economic security, an energy security appears, firstly, as the state of provision by fuel and energy resources which guarantee the full country livelihood and, secondly, as the security of energy industry and the ability to ensure the proper functioning of the economy and energy independence of the country. The political and energy independence are interdependent [11].

At the same time, an energy security is the state of economy that provides protection of national interests in the energy sector from existing and potential internal and external threats and allows meeting the real needs of energy resources to ensure the livelihood of population and

reliable operation of national economy within the normal state, the state of emergency and the martial law [17].

An energy saving technology is a method of manufacturing accompanied by the rational use of energy, which makes possible to simultaneously reduce the energy load on the environment and shorten the amount of energetic waste products obtained during the production and operation of the manufactured product.

Energy saving (energy efficient) measures (Fig. 2) usually aimed to implementation and manufacturing of energy efficient products, technologies and equipment [18].



Fig. 2. Energy saving and energy efficient technologies.

Alternative and renewable energy sources (Fig. 3) are permanently exist or periodically appear in the environment in the form of streams of solar, wind, Earth heat, rivers, seas and oceans energy, biomass [17].

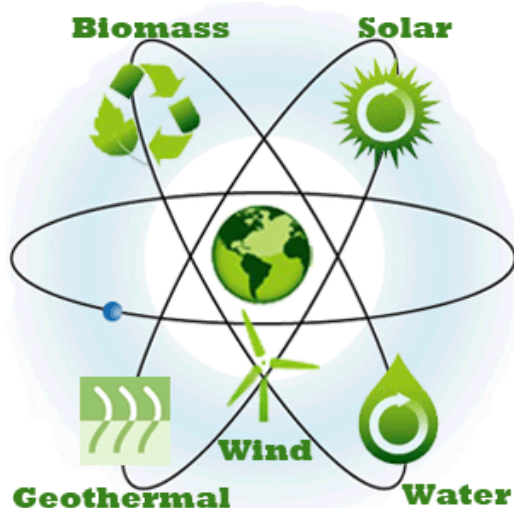


Fig. 3. Alternative and renewable energy sources.

Ensuring adequate economic security is a necessary condition for sustainable development of any country. In economic science and practice, there is no unanimous definition of "economic security". The Concept of Economic Security of Ukraine represents this term as "the ability of the national economy to get a free, independent development and maintain stability of civil society and its institutions as well as adequate defense capabilities of the state for all kinds of adverse conditions and scenarios, the ability of the state to protect Ukrainian national economic interests from external and internal threats" [15].

An economic security is a complex multifactorial category, which allows storing resistance to external and internal threats, represents the ability of the national economy to the expanded reproduction to meet the needs of citizens, society and the state at a certain level [6].

An economic security is a state of the national economy, which makes possible to maintain the stability to internal and external threats, to ensure a high competitiveness in the global economic environment and represents the ability of the national economy to sustainable and balanced growth [16].

2.2 Energy Efficient Technologies in EU

A successful example of energy efficient technologies application is the EU. In particular, it combines the principles of sustainable economic development while preserving environmental security protection. There is a Program of reduction for 20% of greenhouse gas emissions and energy consumption per unit of GDP. Increasing the share of renewable energy sources (RES) by 20% in the energy balance of each country is also envisaged.

The most developed countries are achieving overfulfilment of the targets. For example, Denmark plans to acquire about 60% of its electricity from RES, Germany and Austria about 40-50%. The multistage system of legal regulation and encourage consumers to use energy saving contributes to this.

The biogas technology in Germany based on remains of plant and animal origin received strong growth. From 1999 to 2011 the number of biogas plants has increased from 700 to 7,000 with a total capacity of 2850 MW.

Another good example of electricity production based on biogas is Czech Republic. Its production reached 2243 GWh. Czech Republic has more than 500 biogas plants, ranking the 5th place in Europe where about 13800 similar installations are working. Most of them are in Germany, Italy, Switzerland and France. The total installed capacity of biogas plants in Czech Republic is about 392 MW as of January 1, 2014 [19].

3. Development of Energy Efficient Technologies in Ukraine

Energy efficiency is relevant today as ever. This tool, which also contributes to the three main objectives of energy policy:

- energy security improvement;
- reduction the harmful environmental action arising from the use of energy;
- increase the competitiveness of enterprises.

To achieve the desired results in efficient energy consumption in Ukraine is possible only in case of creating an effective energy management system at all levels of administration and providing the conditions of its public perception. Ukraine has a very high energy intensity of GDP, or, in other words, the economy is extremely energy intensive. Energy consumption in our country per unit of GDP is among the highest in Europe. Although in the last ten years there is a positive dynamics of reduction this factor in Ukraine, it remains relatively high and 2.1-3.7 times higher than one in energy developed countries. While energy efficient technologies are gradually being introduced in industrial sector, the situation in housing sector remains unchanged.

Therefore, Ukraine should make every effort to reduce dependence on expensive imported energy resources and mitigate the sharp increase in utility tariffs for the population, thus increase economic security. The State Agency for Energy Efficiency and Energy Saving of Ukraine has developed a mechanism to stimulate people for implementing energy efficiency measures. The government compensates the part of credit through this mechanism in the following amounts:

- 20% (but no more than 5 thousand UAH) for replacement of gas boilers;
- 30% (but no more than 10 thousand UAH) for implementation the energy saving measures by individuals (population) in the single-family houses and apartments;
- 40% for implementation the energy saving measures in apartments for housing offices.

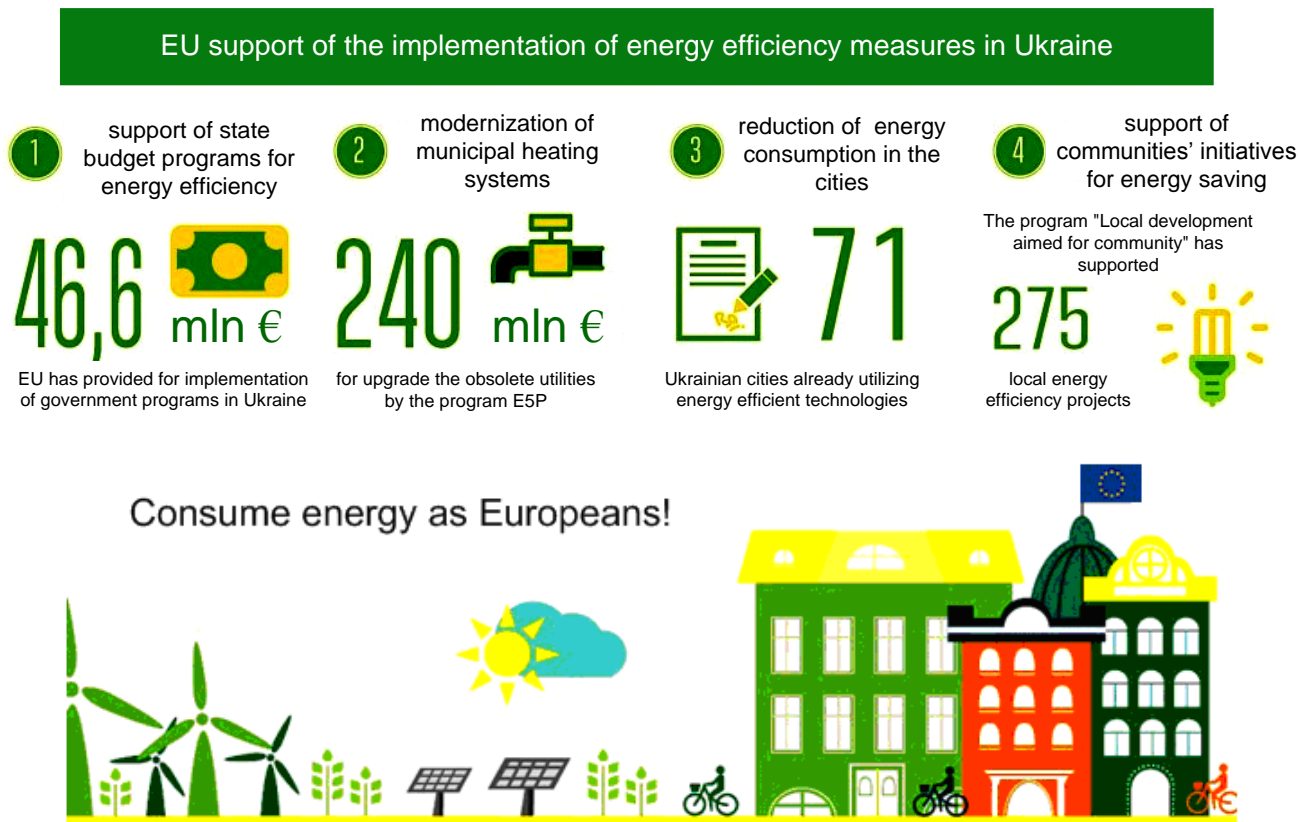


Fig. 4. EU support of the implementation of energy efficiency measures in Ukraine

It should be noted that foreign investors will strengthen cooperation with Ukraine on renewable energy. In particular the company «2ZK» (Belgium) and "Trafikon" (Czech Republic) have presented the project "Bioteplo 100". This project is a collective initiative of a group of industry companies to create infrastructure in Ukraine for growing and ensuring long term biomass supply.

At the current time the negotiations on support are providing with the international donors and investment organizations such as USAID (United States Agency for International Development), NEFCO (Nordic Environment Finance Corporation), EBRD (European Bank for Reconstruction and Development) and other (Fig. 4). The establishment of regional centers of biomass, which will link between producers and consumers, are planned. Pilot projects will be implemented in Vinnytsia, Rivne and Chernihiv regions.

Ukraine has considerable potential for biomass utilizing. The incentive tariff for heat energy production from any type of fuel, other than gas, was introduced last year in the country for the creation and development the heat production from biomass. According to statistics, installed thermal power facilities put into operation only in the fourth quarter of 2014 was 450 MW. In general, more than 3650 MW thermal energy production based on biomass are utilizing today.

In addition, the new direction of development of energy efficient technologies in Ukraine is geothermal energy. A unique experience in this matter has Iceland. It should be noted that the annual technically achievable heat potential of geothermal energy in Ukraine is equivalent to about 90 million MWh per year, and its use saves about 10 billion m³ of gas. The structure of electricity production based on renewable energy sources in Ukraine in 2014 is presented in Fig. 5.

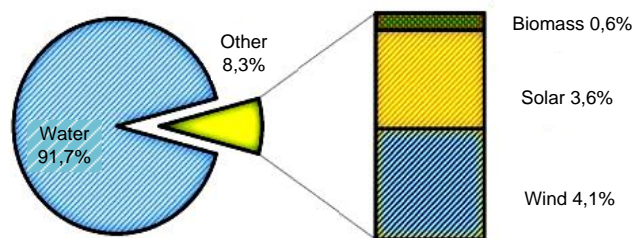


Fig. 5. The structure of electricity production based on renewable energy sources in Ukraine in 2014.

According to experts' estimation of the International Renewable Energy Agency IRENA, if Ukraine will make efforts in terms of energy efficient technologies, the share of renewable energy in overall energy consumption could be at least 21% in 2030. It is predicted that 72% of renewable energy will be used for heat, 20% for electricity generation, and 8% for the transport sector.

4. Conclusions and Suggestions

Taking into account the current economic and political situation in Ukraine, the issues of energy efficiency and energy saving in the context of economic security are particularly relevant. Ukraine occupies one of the leading places in the world in terms of energy consumption. Most of energy resources are imported. The challenge of energy independence of our country was sharply raised in 2014. The only logical way of energy development of the country, which spends huge costs on resources' import, is increased focus on energy saving. Thus the issues of prudent use of energy resources, replacing natural gas by alternative fuels, energy saving technologies have become a priority tasks in ensuring the economic security and need to be addressed immediately.

Acknowledgements

The research described in this paper was supervised by Prof., Dr.Sc. in Economics, Valeriy Ilchuk, Head of the Department of Finance, Chernihiv National University of Technology, Ukraine. It was performed according to the priority topic of development of science and technology in Ukraine "Power Engineering and Energy Efficiency".

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