SECTION 11.
ENERGY AND POWER ENGINEERING

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THERMAL MODERNIZATION OF THE ADMINISTRATIVE BUILDING IN VYSHGOROD AS PART OF AN INTERNATIONAL PROJECT

Abstract. *The article is dedicated to implementing energy-saving measures in Ukraine. The energy strategy of Ukraine and the law "About changing the same laws of Ukraine for creation of conditionals for using comprehensive thermal renovation of buildings". Thermal modernization measures are implemented on the example of an administrative building in the city of Vyshhorod, Kyiv region. The project was implemented thanks to the joint international cooperation of the Vyshgorod City Council, the City Council of the city of Eichenau (Germany), IBK Ingenieurbuero Koeberlein GmbH & Co. KG and the German federal foundation «SKEW - Engagement Global». The main goals are considered and fragments of the project implementation are given.*

Saving fuel and energy resources and reducing environmental pollution, thanks to the use of energy-saving technologies, does not lose its relevance. This direction was important in peacetime. Saving of electrical and thermal energy has gained in relevance on the one hand due to the invasion of the aggression country into the Ukraine and on the other hand due to the forthcoming heating season.

Energy conservation in Ukraine has long held a leading position and is under control at the state level.

Energy conservation can be characterized as implementing organizational, technical, economic measures, which are aimed at reducing the level of use of fuel and energy resources, while it is necessary to preserve the corresponding beneficial effect from the use of these measures. It is necessary to consider the volume of products that were produced, the list of works that were performed, and the services that were provided [3].

Energy saving and energy-saving technologies make it possible to solve the urgent and painful problem of preserving natural resources. Energy conservation is an urgent, acute problem that needs to be solved in a short period, and going forward, a lot of attention should be paid to it.

The energy saving program has the following implementation goals:

- Provision of the amount of fuel and energy resources of any building because of their savings
- Reducing the level of carbon dioxide emissions
- Use of energy-saving measures that contribute to the saving of electrical energy.

Energy-saving technologies are characterized as a set of measures aimed at increasing the efficiency and rationality of the use of fuel and energy resources. Using such technologies is carried out to save electricity, thermal energy, fuel of various types, renewable power sources. The result of implementing energy-saving measures is considered as a comprehensive characteristic. On the one hand, with the assistance of such measures, it is necessary to achieve an economic effect and profitability of production. On the other hand, reducing the level of carbon dioxide emissions reducing the negative impact on the environment [4].

As noted in the energy strategy of Ukraine for the period until 2030, the main principles of state policy in energy efficiency should be [1]:

- Introduction of mandatory energy management and energy audit at enterprises and institutions of all forms of ownership
- Development and implementation of mechanisms to stimulate energy distribution companies to ensure a reduction in electricity consumption by their customers;
- Establishing stricter energy efficiency standards during the construction and reconstruction of buildings and establishing rates for increasing the energy efficiency of existing buildings
- Promotion of measures to increase energy efficiency among the population.
- Stimulating the development of energy service companies (ESCOs) because of the creation of an appropriate regulatory framework and implementing EPC contract mechanisms.

The Law "On Amendments to Certain Laws of Ukraine Regarding the Creation of Conditions for the Implementation of Complex Thermal Modernization of Buildings" provides for several directions for implementing energy-saving measures and the development of a strategy for thermal modernization of buildings, among which it is necessary to focus on [2]:

- Reduction of the number of procedures and the time of their implementation for implementing energy-efficient thermal modernization of buildings;
- Creating the possibility of partial, rather than comprehensive, energy and thermal modernization;
- Implementation of a comprehensive approach to the formation of policy in energy efficiency of buildings through the strategy of thermal modernization of buildings in Ukraine and the creation of a national database of energy and operational buildings.

An important role in implementing such projects as thermal modernization of buildings is played by international cooperation and the accumulated experience of those countries where such directions are more developed.

One of the vivid examples of international cooperation in energy saving is the joint project of thermal modernization of the administrative building in the city of Vyshhorod, Kyiv region. Implementing the project was carried out with participation Vyshgorod City Council, sister city of Eichenau (Germany), IBK Ingenieurbuero Koeberlein GmbH & Co. KG and the German federal foundation «SKEW - Engagement Global».

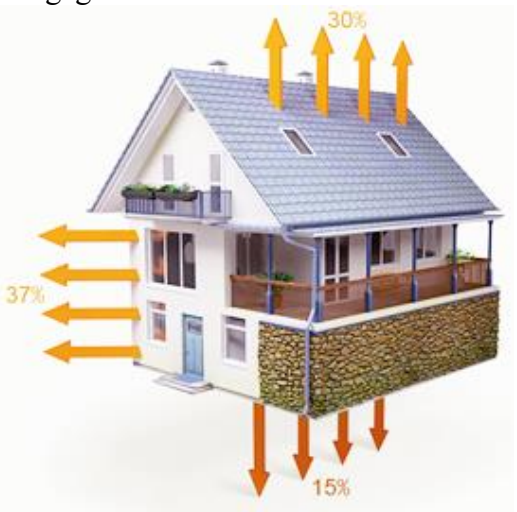

Fig. 1. **Estimated heat loss in the building**

Energy-saving technologies that were used in the process of thermal modernization of an administrative building in the city of Vyshhorod, Kyiv region, comprise the following stages:

- replacement of windows;
- insulation of the roof;
- insulation of external walls;
- installation of an individual heat point;
- installation of recuperators in each room;
- reconstruction of fire and ventilation systems.

Currently, the replacement of windows, insulation of the roof and insulation of the external walls of the building has been completely completed.

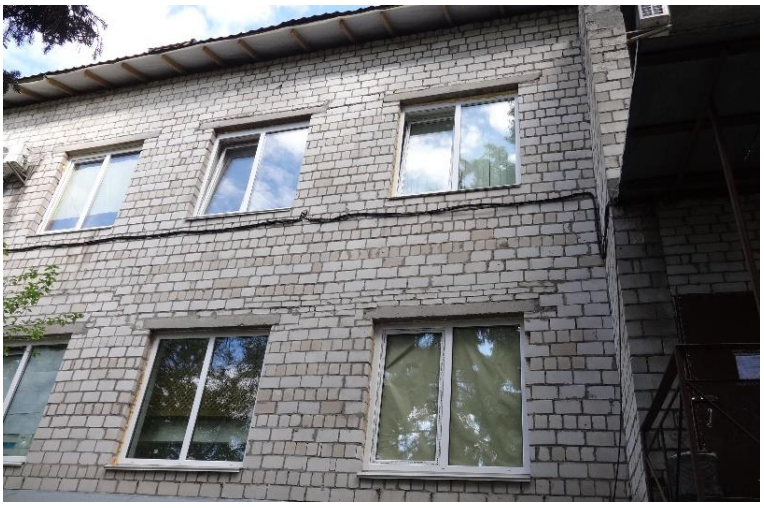

Fig. 2. **Replacement of metal-plastic windows of the administrative building**

Replacement of windows from single-chamber double-glazed windows to three-chamber ones on the first floor with a total area of 236 sq.m. made it possible to save 26.8 kWh per sq.m and year of thermal energy.

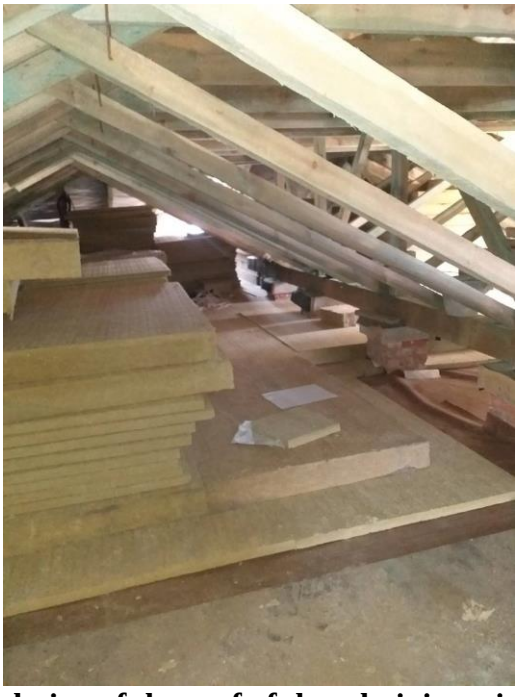

Fig. 3. **Insulation of the roof of the administrative building**

Currently, work on the thermal modernization of the building is underway, and external insulation of the walls is being carried out.

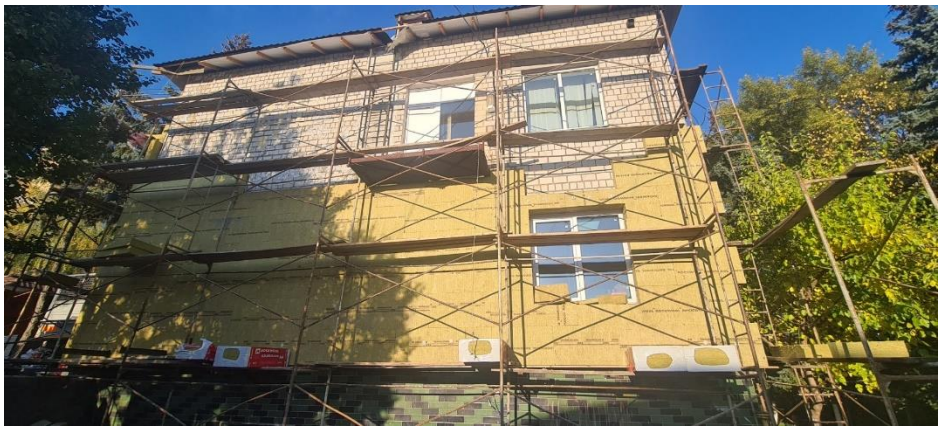

Fig. 4. **Insulation of the external walls of the administrative building**

Conclusions. Analyzing all the above, it should be noted that energy saving is an important task, implementing which is supported at the state level. Reducing the consumption of fuel and energy resources, reducing pollution in the surrounding environment, saving utility and thermal bills are the main goals of conducting heat modernization measures.

The article discussed the project of thermal modernization of an administrative building in the city of Vyshhorod, Kyiv region. The project was implemented as part of international cooperation with the participation of the Vyshgorod City Council, the City Council of the city of Eichenau (Germany), IBK Ingenieurbuero Koeberlein GmbH & Co. KG and the German federal foundation «SKEW - Engagement Global». Currently, the replacement of metal-plastic windows with more energy-efficient ones has been completed, the roof and external walls have been insulated.

Also, the following stages are implemented - the installation of an individual heat point and recuperators in each room, as well as the reconstruction of the fire and ventilation systems.

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