



APPLYING ENERGY-SAVING TECHNOLOGIES IN ENERGY-EFFICIENT HOUSES

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ABSTRACT

The article under discussion depicts the issues on energy-saving technologies, namely energy-efficient houses, in order to save energy, reduce operating costs for housing and improving of living standards inhabitants. The authors of the article consider that all over the world, the idea of an eco-house is being developed. Modern eco-technologies can make the environment cleaner and save energy resources. These are not technologies of the future, but developments that are already in use today. With their help, humans are able to save the Earth from ecological disaster and save it for future generations.

KEY WORDS: *energy conservation, construction, passive house, technology, introduction, economy, sector, power, requirements, finished products, rational use.*

DISCUSSION

In accordance with the adopted acts of the President of the Republic of Uzbekistan Sh.M.Mirziyoev, the authority of the Ministry of Energy includes introduction of modern energy-efficient and energy-saving technologies in state bodies and organizations, as well as monitoring of energy resources consumption efficiency.

To implement these tasks, the Ministry of Energy has an Inspectorate for control over use of oil products and gas under the Ministry of Energy (Uzneftgazinspekt) and the Inspectorate for Control in the Electric Power Industry under the Ministry of Energy (Uzenergas Inspectorate).

At the same time, the main tasks and functions of the Uzneftgazinspektion in the area of energy efficiency and resource saving are:

- State control over compliance with the requirements of regulatory and legal acts in the sectors of the economy, starting from the processes of extraction of hydrocarbon raw materials to the production of finished products, as well as implementation of measures to reduce and ensure its rational use in the sectors of the economy and social sphere;
- Participation in the development and implementation of state energy-saving programs in the sectors of the economy, control over their implementation, assessment of energy efficiency, as well as coordination of energy audits and expertise of consumers of oil, gas, gas condensate and products of their processing;



- Introduction of energy-saving technologies in the energy sector, participation in acceleration of energy efficiency processes at enterprises and practical assistance within the authority of the inspection.

The issue of ensuring rational, economical use of energy resources by consumers has become one of the main daily tasks of Uzneftegazinspection.

Uzbekistan, being one of the developing countries, has great prospects for energy saving. Losses and expenses occur first of all in industry, in the housing and utilities sector, in the fuel and energy complex. Energy saving depends on rational and efficient use of available energy resources. It is worth paying special attention to energy saving in housing and communal services through introduction and distribution of energy efficient private houses [1].

In the 80s, Europe started thinking about houses that would cost a small amount of heat. The objective was to use heat energy efficiently in order to reduce production costs and save existing resources. Such houses became known as energy efficient, zero or passive houses.

An ideal passive house should not be heated with energy from outside. Heat loss should be reduced to zero, and the necessary energy the house should receive from the heat of household appliances, people, pets inside the house and from renewable energy sources. The most widespread such sources are heat pumps with which to receive heat from low-potential energy of the Earth, solar batteries which are established on roofs of houses, and solar water collectors. The first experimental house was built in 1991 in Europe. The project proved to be a success, and the state, having supported the idea, began to develop it [2].

An energy-saving house is a building that maintains an optimal microclimate, while the consumption of various types of energy from external sources is low compared to conventional buildings. An energy saving house is well insulated and not only receives heat from external sources, but also serves as a heat source itself. Energy from external sources is used for heating, hot water and electricity for household appliances. Thus, an energy-saving house is a building that, thanks to its construction, can significantly reduce the need for thermal energy. The house, which is comfortable to live in, thanks to the microclimate created in it.

In order to create an energy saving house, it is necessary to develop a project, which will include the following directions:

- Ensuring the reduction of heat losses through walls, windows, floor, roof and ventilation systems, because in an ordinary

house, these losses are very significant (see diagram).

- Use of quality materials to reduce heat losses. The development of individual architecture of the building and its location on the ground should maximize the performance of tasks.

The construction of the building should provide for the absence of cold bridges, which may occur during the construction of the foundation, installation of window blocks and balcony slabs, etc. Technical building systems should be oriented to energy saving, so for the system: ventilation - it is necessary to provide heat recovery, when warm air in the exhaust ventilation system heats the outside air of the supply ventilation; heating - use different types of heat pumps; hot water supply - installation of solar collectors; electric supply - use of solar power stations or wind generators.

When building an energy-efficient house, special attention is paid to four elements: special glass units, thermal insulation, regenerative ventilation and air tightness.

In such houses, double-glazed or triple-glazed windows are made, which in turn are filled with argon or krypton. The glass is covered with a coating that transmits short light waves from outside but reflects the thermal long waves from inside. The concentration of the windows is on the south side of the building to capture the sun's radiation as much as possible.

Extended layers of insulation are used to insulate the enclosing structures. Special attention is paid to identifying "cold bridges". This is the name of places where heat escapes more intensely: metal elements, corners of the building. For example, instead of metal, plastic can be used, because the thermal conductivity of plastic is much lower than metal.

Such a house can be compared to a thermos, which keeps the heat for a long time. Immediately there is a question about ventilation. In Russia, the source of fresh air is often "ventilator". But with this approach, along with fresh air, the cold air enters, and eventually the house loses heat. Naturally, this is unacceptable for an energy efficient home. With this ventilation method, heat losses can be up to 40%. To solve this problem, a ventilation system with heat exchangers-recuperators is used [4].

Taking into account the fact that it is important to pay attention to heat losses from the total area of the house, in the process of passive house design it is important to pay attention to the bottom of the structure, as in a dome. An energy saving private house should be made in this way so that the compact coefficient is within the norm. This



factor determines the ratio of the total area of the house to its scope.

The introduction of wind power plants also plays a crucial role in the basis of energy efficient houses. In countries such as Germany, the USA, the Netherlands, etc., interest in wind power is associated with autonomous installations of small capacity, about 10-20 kW. It should be noted that sometimes the variability of wind speed forces either to install a battery together with a wind turbine or to accumulate it by installing it on organic fuel. Wind turbines with horizontal axis of rotation are mainly installed because of their high efficiency of 45%-50%. Payback period of one wind turbine is about 3-4 years on average [3].

In Europe, the construction of passive houses is very active, for example, in Germany the state stimulates citizens with compensation of 5000 Euros and preferential loans for energy-efficient new buildings. Many people use this program, as the cost of ecohouses is only 5-10% higher than usual. With their climatic conditions and electricity tariffs, the passive house is expected to pay off in 7-10 years.

CONCLUSION

The concept of a passive energy-efficient house implies a comprehensive approach. It includes not only and not so much energy saving as a whole philosophy based on the idea of cooperation with the environment. All supporting structures in the volumetric-modular house are made of environmentally friendly wood. Wooden walls "breathe", creating a cozy and favorable atmosphere in the house.

Advantages of ecohouses

- a favorable microclimate without radiators and air conditioners, which role is played by warm floors and ground recuperator;
- independence from heat networks through the use of solar energy and alternative heat sources in an autonomous hot water supply system (HTW);
- thanks to autonomous biological treatment, it is possible to eliminate waste water that poisons the nature and emits methane, which gives rise to the greenhouse effect of irrigation fields;
- a biogenerating system for recycling biological waste, converting it into biogas and fertilizer will make it possible to reduce landfills for solid domestic waste, which are the source of "greenhouse" methane;
- biogas make it possible to achieve energy independence and remain in harmony with nature;
- collection and use of rainwater reduces dependence on water, and saves a precious natural resource - drinking water.

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