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ЭКОЛОГИИ, ИНЖЕНЕРИИ
И ПРИРОДЫ**

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межвузовской студенческой
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2. Who says electricity and water don't mix. World Development Report. Monsanto Enviro-Chem Systems, Inc. 1997.

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THE MAIN DIRECTIONS OF MODERN RESOURCE AND ENERGY SAVING IN CONSTRUCTION

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Abstract: The article examines the main directions of modern resource and energy saving in architectural design and construction. The technologies of mass construction, reconstruction of buildings, and principles of passive house construction are analyzed. Determined that energy and resource-saving technologies in the Russian Federation are still imperfect and have some shortcomings, explained by the incomplete adaptation of European practices to Russian conditions. It is concluded that the construction of a passive house is a promising direction in terms of ecology, requiring new developments, qualified engineers, environmentally friendly building materials, and reducing the cost of construction.

Keywords: energy conservation, energy efficiency, resource-efficient construction, sustainable development concept, passive house

1. INTRODUCTION

Energy-saving and energy efficiency are current priorities in developing science, technology, and engineering in the Russian Federation [1, p. 5]. The construction industry is of great importance to all humanity and has recently been significantly changing its requirements for improving the energy efficiency of buildings [2, p. 4-6].

For the economic benefit of resource-saving, it is necessary to develop and build a holistic model of resource-saving

construction management [3, p. 11]. This model takes into account all factors that can reduce energy and resource consumption at all stages of construction and further in the operation of buildings and structures [4, p. 26].

One of the most critical tasks of modern economic development is developing and implementing technologies that will allow industrial waste as a raw material for building materials due to the depletion of natural resources, their irrational use, and the ever-increasing cost of energy. Most modern technologies were created when no one had yet thought about the conservation of natural resources, as they were not in short supply [1, p. 34]. The main task at the time was to increase production.

From the industry point of view, there is a concept of "sustainable development" [5, p. 45]. It aims to improve well-being and protect our planet. This is achieved, among other things, by maximizing the use of renewable resources and the reuse of waste. This concept has spread to the construction industry [5, p. 45], which led to the emergence of the idea of "sustainable construction," which is possible only when buildings do not damage the environment [1, p. 13]. Such facilities should have virtually zero energy consumption for heating or air conditioning. Their constructions must be fully recyclable so that in the future, it would be possible to obtain new building materials and products from them [6, p. 27].

2. METHODOLOGY

The climate in most parts of the Russian Federation is harsh. Winters are long, so in our country is essential ability to keep heat as long as possible, that is important to consider the materials of the enclosing structures (walls, windows, doors, roof, etc.), methods of heating, energy production, and conservation in terms of its efficiency, how to deliver this energy to the consumer and the resulting heat loss, technology use and energy conservation in the consumption point [1, p. 29].

Developers recognize the need to study and improve both the problem as a whole and certain architectural aspects. Issues related to the environment, price, comfort, and reliability of building operation are critical. It is important to note that the design does not consider the construction sites' climatic and geological conditions. Outdated design standards are still used, there is no proper control over the quality of construction [1, p. 30].

3. RESULTS

The qualitative parameters of the currently used architectural systems rarely meet the new energy and resource efficiency requirements. For the most part, mass housing construction is carried out according to new and improved standard designs while insulating only the enclosing structures of the walls. In individual building (its volume is about 40% of the total volume of construction in our country) new requirements to strengthen the thermal insulation is almost always ignored [4, p. 51].

One of the topical areas of energy and resource-saving in developing mass-produced new generation building structures, which have increased thermal protection. The use of such systems will make it possible to reduce the cost, improve the quality and speed of construction of buildings, so their production should be the basis of the construction industry [1, p. 62].

A passive house (energy-efficient house) is a technological building, the main feature of which is the absence of heating or low energy consumption [7, p. 19]. It becomes possible with some home design, proper insulation, and thoughtful ventilation. The ideal energy-efficient home does not require the expense of maintaining the right temperature. Heating in such a house is due to the heat generated by people and household appliances, and if necessary additional heating, is desirable to use alternative energy sources [8, p. 22]. Hot water is provided by heat pumps or solar water heaters (a more traditional backup source is possible).

4. CONCLUSIONS

All projects related to energy efficiency in construction require additional financial costs. It is worth talking about the feasibility of these investments. The cost of building an energy-efficient house exceeds the price of a traditional building by 10-15% [1, p. 24]. High fees can pay off only in 8-10 years [1, p. 25].

Energy- and resource-saving technologies today are still imperfect and have some shortcomings. A more detailed and concrete feasibility study for the application of such technologies is needed.

It is established that the construction of a passive house - a promising direction in terms of ecology, but requires new developments engineers, new building materials, and designs of houses, taking into account resource-energy efficiency, reducing the cost of construction.

Given the increasing cost of energy resources and their reduction, humanity will sooner or later come to a strict economy of resources. Such buildings will be more economical, save energy, reduce the adverse effects on the climate, conserve natural resources, improve quality of life, and most importantly, protect the health of us and future generations.

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