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PROBLEMS AND SOLUTIONS OF BUILDING ENERGY EFFICIENCY IN THE CONSTRUCTION FIELD

***Abstract** - The article analyzes the current state of problems arising in the design of roofs of low-rise buildings. For this purpose, various design concepts are considered, based on which roof structures are created. As one of the elements of the implementation mechanism of these plans, specific examples of energy-efficient roof design are presented.*

***Keywords:** construction, energy-saving, climate, energy consumption, construction of houses, thermal energy, design.*

ПРОБЛЕМЫ И РЕШЕНИЯ ПОВЫШЕНИЯ ЭНЕРГОЭФФЕКТИВНОСТИ В СФЕРЕ СТРОИТЕЛЬСТВА

***Аннотация:** В статье проанализировано современное состояние проблем, возникающих при проектировании крыши малоэтажных зданий. Для этого рассматриваются различные конструктивные решения, на основе которых создаются конструкции крыши. В качестве одного из*

элементов механизма реализации этих планов представлены конкретные примеры проектирования энергоэффективной кровли.

***Ключевые слова:** строительство, энергосбережение, климат, энергопотребление, строительство домов, тепловая энергия, проектирование.*

Energy saving is becoming one of the urgent issues from year to year. The limited energy resources, the high cost of energy, the negative impact of its production process on the environment, all this requires saving energy in the conditions of limited resources and finding a solution to the problem. In this direction, scientific and practical work is being carried out in the world to reduce energy consumption, to effectively use new, alternative energy sources. From November 4, 2016, the Paris Agreement on global climate change will enter into force, which aims to ensure that the average temperature of the planet does not exceed 2°C, move to the stage of carbon-free cities, and reduce SO₂ emissions. According to UN data, in 1950, 30 percent of the population lived in cities, and in 2015, this figure increased to 54 percent. Forecasts show that by 2050, 66-70 percent of the population will live in cities. Currently, about 15,964 million (51%) of the population of Uzbekistan live in cities, and the remaining 5,612 million (49%) live in rural areas. According to the data, Tashkent is the leading city in terms of population among large cities in Uzbekistan, with 2 million inhabitants. 353 thousand people live there. 49% of all energy consumed in Uzbekistan in one year or 17 million tons of oil equivalent is accounted for by buildings. Energy saving issues are neglected in the design and construction of buildings, which leads to excessive energy consumption. It is known that the majority of our population, i.e. 76.8 percent, lives in low-rise houses. This is almost 24.6 million. means a person. Unlike high-rise buildings, the heat energy system supplied to low-rise private residential buildings is decentralized, and the variety of design solutions leads to an increase in the factors affecting their

energy consumption. Rapidly growing urbanization processes and a sharp increase in the number of people in cities cause a shortage of construction land. For this reason, today, many state and non-state design organizations offer to design a cozy and comfortable mansard floor at the design stage of low-rise residential buildings. This is definitely an acceptable architectural-artistic solution. But in the territory of our republic with dry heat and severe continental winter conditions, turning the attic part into a living room has the effect of increasing the energy consumption several times. Increasing the energy efficiency of the roof structures of low-rise buildings, reducing the energy consumption of the attic part, and the thermal-physical solutions used in the conditions of Uzbekistan in this direction, the use of solar panels, and their economic efficiency have not been thoroughly studied. In the design of modern low-rise residential buildings in dry hot climates due to the limited and increasing cost of traditional energy sources, especially during the period of operation, the energy efficiency issues of the attic roof structure, in which the economic efficiency indicator of solar energy solutions are carefully considered, requires learning. By increasing the energy efficiency of the roof structure of a low-rise building, it is possible to increase the overall energy efficiency of the building and thereby save energy consumption.

From a number of studies carried out in this direction[1], it became known that the main aspect in the energy efficiency of the roof is the location of the thermal insulation material. Incorrect selection of the mutual location of the layers of the roof structure has a direct impact on the non-reduction of heat loss, and requires alternative solutions for the temperature-humidity regime. In 1983, Tashkent was the first in the former Soviet Union to achieve a reduction in energy consumption by 40-50% per year as a result of experimental experiments with a heating system using solar water heaters placed on the roof [2]. "Designing energy-efficient buildings under the conditions of Uzbekistan" [3] covers the issues of energy saving in the design of social sector buildings and

residential houses. Traditional and non-traditional energy sources, their use in the conditions of Uzbekistan, ways to increase the energy efficiency of buildings, the technical and economic basis of choosing their options, and the issues of energy saving and energy efficiency of buildings were examined separately in "Physical-technical aspects of building design" In the book "basics of design" [4], the issues of energy saving in the design of buildings are covered in depth, climatological effects in the conditions of the Republic of Uzbekistan, ways of reducing them, the effect of seasonal changes on buildings and the design of new buildings should be paid attention to. some aspects are shown.

During the winter of 2023, thousands of people in Uzbekistan were forced to live without reliable energy supply for almost two weeks during anomalous cold weather. Power outages have exposed the vulnerability of aging infrastructure and the inadequacy of existing energy-saving technologies. In some areas of the country, due to the lack of energy sources such as natural gas or electricity, residents have switched to burning coal to heat their homes. This has had negative consequences, especially in terms of air quality and the accumulation of greenhouse gas emissions.

In conclusion, it can be said that creating comfort conditions on attic roofs in dry and hot climates, improving the technology of assembling building materials that make up the roof structure, implementing measures to reduce the energy consumption of structural elements of the building, and improving the energy efficiency of the roof structure and this way with increasing the general energy efficiency indicators of the building. This provides an opportunity to use new energy-efficient design and technological solutions in construction practice.

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