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RATIONAL DESIGN OF BIOPOSITIVE BUILDING CONSTRUCTIONS: IMPACT ON STABILITY AND ECOLOGICAL EFFICIENCY

In the modern world, where attention to environmental issues and sustainable development is growing, architectural projects are increasingly oriented towards ensuring comfort and health of residents, as well as preserving the environment. The concept of biopositive buildings, aimed at improving the quality of life and promoting human health, is becoming increasingly relevant. In this context, rational design of biopositive building constructions plays a key role in ensuring the stability and ecological efficiency of such structures.

Biopositive buildings are structures that take into account the impact of building materials, constructions, and technologies on human health and the environment. Such buildings aim not only to minimize negative environmental impact but also to actively contribute to improving air, water, and indoor environment quality.

Utilization of eco-friendly materials: This includes the use of renewable sources of materials, waste, and biomaterials that have minimal or zero negative impact on the environment and human health.

Optimization of thermal and sound insulation: Rational use of insulated materials and effective insulation helps reduce energy consumption for heating and air conditioning, while ensuring comfort and health of residents.

Maximization of natural lighting and ventilation: Rational placement of windows, light wells, and ventilation systems allows for maximizing the use of natural resources to ensure comfort and health.

Utilization of energy-efficient technologies: Implementation of solar panels, wind generators, geothermal systems, and other alternative energy sources reduces consumption of traditional energy resources and lowers emissions into the atmosphere.

Reduction of energy costs: Application of energy-efficient technologies and constructions significantly reduces energy consumption for heating, conditioning, and lighting, thus reducing emissions into the atmosphere and ensuring building stability.

Improvement of air and water quality: Rational use of natural resources for ventilation and purification of air and water ensures the health of residents and contributes to the stability of building operation.

Rational design of biopositive building constructions plays an important role in ensuring sustainable development and the health of residents. By implementing advanced technologies, innovative approaches, and eco-friendly solutions in construction, significant reduction of the impact of building processes on the environment can be achieved, providing comfortable living conditions for people.

Integration of biopositive principles into the construction process can be challenging due to factors such as the cost of materials and technologies, the need for specialized knowledge and experience in design and construction. However, the development of this direction in construction promotes the implementation of cutting-edge technologies and stimulates the development of eco-friendly solutions.

Biopositive buildings not only reduce negative environmental impact but also have a direct positive impact on the health and well-being of people. Providing a healthy microclimate, using natural materials, and access to natural light and green spaces contribute to reducing the risk of illness and improving quality of life.

Thus, rational design of biopositive building constructions opens up new opportunities for creating a sustainable, environmentally friendly, and healthy living and working environment. The development of this direction in construction is an important step towards ensuring sustainable development and improving the quality of life of modern society**.**

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ENERGY EFFICIENCY IMPROVEMENT IN RECONSTRUCTION OF RESIDENTIAL BUILDINGS (UKRAINE)

While the global community addresses the issue of global warming and attempts to mitigate the consequences of climate change, more pressing scientific and applied tasks have emerged in Ukraine since February 24, 2022.

With the beginning of the Russian invasion in Ukraine, the Russian Federation launched multiple massive and methodical missile strikes against critical infrastructure in Ukraine during the winter period. These strikes caused power and heating cut-off for thousands of consumers.

In addition, the housing stock of Ukrainian cities is largely represented by houses of typical series that do not meet current normative requirements for energy saving. The pipelines for the centralized heat supply systems are worn out due to long-term operation.

Today, we are facing the problem of significant 'aging' of the infrastructure of heat supply systems, further complicated by hostilities. This critically affects the microclimate inside residential buildings. With the external temperature of -5°C, the indoor temperature drops from +20 to +12°C in 24 hours [1].

Modern research in Ukraine pays considerable attention to the reduction of energy costs during the operation of multi-apartment multi-story residential buildings. However, most of these works concern new construction, where the principles of energy efficiency can be taken into account at the design stage and implemented during construction [2].

Regarding reconstruction, research is aimed at individual structural elements, for example, double-glazed windows, which allow for an almost thermally homogeneous outer shell of the house [3]. Scientists are also investigating the modernization of the ventilation system [4] and the heat distribution system [5], studying the use of new materials.

There are a lot of great individual works, but we need one working system, the implementation of which will make it possible to save energy and make existing buildings more autonomous.

This issue concerns millions of Ukrainian families who are currently living in houses of typical series. Reconstruction of these buildings will cost tens of billions of hryvnias, but replacing a similar amount of housing with new ones will cost hundreds of billions of hryvnias.

Improving energy efficiency of buildings requires a comprehensive approach to the implementation of energy-saving measures, in particular:

Insulation of external enclosing structures;

Modernization of the heating system;