# SibFU scientists propose a way to improve the energy efficiency of buildings

The system for monitoring the energy efficiency of buildings, proposed by a team of scientists from Siberian Federal University within the framework of a grant from the Regional Science Foundation, will significantly save on energy costs. The main results of the study have been published in the Промышленная энергетика (Industrial Power Engineering) and ENVIRONMENTAL AND CLIMATE TECHNOLOGIES.

The developed and already registered program monitors in real time the correctness of the individual heating station and analyzes the reasons for deviations from the norm, helping to see how the efficiency of the system can be increased. The data are sent to the platform on the Internet, which means that the main consumers (homeowners' associations and utility management companies) will be able to continuously monitor the operation of the equipment remotely.

The task of the platform is to show how the automation works correctly at a particular facility, and how to reduce its energy consumption. The program was tested on three similar kindergarten buildings in Krasnoyarsk, the energy efficiency indicators of which turned out to be completely different.

> *"Reducing losses in a building and increasing its energy efficiency depends on many factors: weather, facade design, types of engineering systems, operation and maintenance, a wind rose,"* comments **Andrey Zhuykov**, the project manager, Ph.D. *"But no less important are heat transfer, mixing of substances, chemical reactions and equipment adjustment. We have developed a number of mathematical models that help determine specific energy consumption. And based on the analysis of specific consumption, the program concludes whether it is possible to further reduce the amount of energy consumed or not."*

The advantage of the proposed system is combining on one platform the opportunity to monitor consumption of both heat and electricity. For example, according to the calculations of the developers, the introduction of the technology will save up to 320.78 MW*h (2,265.19 thousand roubles) in the next five years at one facility due to organizational and technical measures, and will pay back quickly.

> *"State-funded organizations account for up to 30% of the total energy consumption in Russia, therefore, such studies will significantly reduce the load on the supply centres and significantly reduce the payment for energy supply services for the budgetary system,"* explains **Alexander Yuzhannikov**, assistant professor of the Department of Electrical Complexes and Systems of the Polytechnic School of Siberian Federal University, candidate of engineering. *"In this case, even 1% savings is a very large amount. At the same time, the proposed technology allows to optimize up to 5-10% of the total energy consumption. For example, to generate 1 kW*h of energy, we need to burn about 200-250 grams of coal at the CHPP, and energy savings in this case will have an additional effect on the environment."*

The developers are planning to improve the system by training it on the basis of artificial intelligence not only to analyze, but also to predict and classify the problems.

*“Support for practice-oriented projects that are ready for implementation in the real sector of the economy is a priority area in the work of the fund. The Regional Science Foundation holds a competition of projects of applied scientific-technical and social-humanitarian research and experimental developments annually. In 2021, we supported 17 projects aimed at creating products and technologies to ensure the competitive advantages of Krasnoyarsk Territory,”* comments **Irina Panteleeva**, executive director of the Regional Science Foundation.

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