

## ENERGY SAVING TECHNOLOGIES

*Ivan Polegashko*

*Faculty of Electric Power Engineering and Automatics,*

*National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”*

Energy-saving technologies are know-how in technological development, as well as an absolute necessity at modern energy prices and environmental requirements, which are constantly increasing.

In the structure of operating costs of a typical commercial building, energy costs make up about 30%, and in some enterprises of the metallurgical, chemical, oil refining industry, the share of energy in the cost of the product can reach 60%. Therefore, a properly designed set of energy-saving measures can significantly reduce costs and optimize the budget.

The main direction of world energy development is the use of alternative renewable sources, such as the energy of the sun, wind, water, and biofuel. The use of waste from the agro-industrial complex, pellets, as well as the re-equipment of gas boilers are also relevant for Ukraine.

Today, the share of renewable sources in the structure of energy production is about 14%. At the same time, the largest share continues to be for biofuel. At the same time, the largest increase is shown by solar energy with an average growth of 37% annually, wind energy by 23.5%, biogas by 12%. Undisputed leaders in the use of such energy are the Scandinavian countries, where the share of alternative energy is about 70%.

Scientists are constantly looking for new opportunities to increase efficiency and use new, cheaper materials for renewable energy sources. As an example, not so long ago, scientists from China were able to increase the efficiency of organic solar cells, equating them with conventional ones. Modules made of carbon and plastic are much cheaper than ordinary silicon modules, and thanks to their structure, they can

be applied to thin and flexible surfaces, windows, facades, columns, trees, etc.

But we should not forget that cheaper and ecological energy is good, but energy efficiency inside the real estate object is no less important, maybe even more.

Let's start with heating. Experts claim that most of the heat escapes through windows and walls, so insulating facades and replacing windows with energy-saving ones is a "must have" for any commercial building. The next point is the modernization of the heating system itself. Modern technologies make it possible to modernize existing boilers and convert them from gas to organic fuel. Industry professionals also recommend using the residual potential of technological coolants. That is, installation of recuperation systems, "condensate traps", secondary use of heated water will help to significantly improve the energy efficiency of the building.

Lighting. Lighting accounts for almost 20% of global energy consumption. What has become the norm, replacing incandescent lamps with LEDs can show savings of 5-7 times. Despite the relative high cost compared to incandescent lamps, the service life of such lighting elements is 7-10 times longer. Among the disadvantages of LED lighting, the largest is the mercury content, which means that you need to take care of the correct disposal of the bulbs in advance.

The next stage of reducing lighting costs can be the installation of lighting sensors, movement and maximum use of daylight. Thanks to the use of various sensors, you can automatically adjust the brightness of the lighting, turn off the light when people leave the room. In some cases, this can save you another 20%.

Air conditioning and ventilation. The most common method of reducing costs when using this equipment is the installation of recovery systems. Proper setup and timely maintenance can reduce costs by up to 10%. Of course, it is best to design such systems during construction, but there are often cases when modernization has to be carried out in buildings that have already existed for a long time, and here it is important to contact experienced designers who will help to correctly calculate all indicators and install the system in the most optimal way.

Water supply. One of the popular technologies for saving water supply is the collection and further processing of rainwater for further use in the building. Of

course, it is relevant only in latitudes where it rains quite often, and in winter there is no sub-zero temperature.

For most developed countries, automated water supply sensors and the use of the residual potential of coolants for water heating are relevant.

As a conclusion: all the methods and technologies listed above can be used both individually and in combination. An individual approach, a preliminary study of all features of the object, infrastructure and systems, conducting an energy audit to identify the most vulnerable places is important here. In the conditions of difficult economic realities, the complete conversion of the premises to energy-efficient solutions is hardly possible, but with a developed plan, the gradual reduction of costs will have a positive effect on the cost of products and on work productivity.

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