

SOLAR ENERGY POTENTIAL IN ARCHITECTURE

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Abstract. This article addresses the urgent issue of using the sun as a source of light and heat transfer in the architectural works. The role of the sun and solar energy is reflected in ancient times. When a person faced a serious problem of survival, the sun was for him not only a source of light and life-giving warmth, but also the divine principle of everything that exists. In turn, architects who were able to use this extraordinary energy for the benefit of people, proclaimed the sun as their indispensable assistant.

Keywords: the sun, solar energy, architecture, solar architecture.

Every day the humanity lives one more moment of its existence and development on our huge, loving planet. But due to the constant rush and hustle and bustle, we unfortunately cannot always enjoy the most beautiful moments of our lives, it is sunrise and sunset, the sun's rays filling every living particle with warmth and energy. However the Sun is not only a source of heat and light, this celestial body on which the life of all creatures on planet Earth depends.

Today, the necessary condition for the existence and development of human civilization is the use of energy. The need to meet the growing socio-economic needs of society will lead to an increase in energy consumption in the world. As a result, it is the energy resources that are the most necessary and most valuable for humanity. Hence the decision of the European branch of the International Society of Solar Energy, marks the International Day of the Sun annually in early May, the purpose of which is to draw public attention to the possibilities of using renewable energy sources [3].

Energy resources such as oil, natural gas, coal and lignite, oil shale, peat, wood, energy of atomic decay and nuclear fusion, etc. are a familiar and traditional source of energy for us. However, do not forget about what nature itself gives us.

German scientists note that in a week solar energy enters the territory of Russia, exceeding the energy of all Russian resources of oil, gas, coal and uranium [1].

In this article, we turn our attention to the “alternative” or so-called non-traditional energy resource, namely, solar energy, which is an invaluable energy resource for many branches of human activity, as well as for the successful and safe existence of man on planet Earth. The sun, as a source of light and heat, is widely used in the work of architects. This provision explains **the relevance of the article**.

Main part. At all times, when a person faced a serious problem of survival, the sun was for him not only a source of light and life-giving warmth, but also the divine principle of everything that exists. In turn, architects who were able to use this extraordinary energy for the benefit of people, proclaimed the sun as their indispensable assistant. In architecture, there is even a special term “solar architecture”, which denotes a special approach to the construction of buildings, taking into account the possibilities of solar light reflection.

Even in ancient times, our ancestors learned to turn the power of the sun in the right direction. Thus, passive solar architecture was used by the ancient Greeks, who built houses facing south, using stones that retain heat for a long time. The ancient Romans, who used transparent materials in the windows, did not lag behind. And the Scandinavians used black basalt, "attracting" the sun's rays [2].

But if earlier interaction with the sun was reduced mainly to correctly orienting the building, choosing materials that accumulate heat or reflecting the sun's rays, today we are primarily talking about active technologies that make the sun work for a person. Today, we are much more able to “demand” from the Sun. Along with the principles that have been considered for centuries in construction, a real breakthrough in solar architecture is associated with the appearance of the first solar panels in the mid-1950s. In the early 1970s, the world's first houses with a solar battery appeared [4].

Despite the fact that solar architecture has a high cost, however, these costs pay off over time and most importantly – such buildings do not pose any threat to the world, as the global pollution of our planet is one of the most important, pressing problems of human civilization. The traditional production and use of energy pollutes the environment. For example, when burning fossil fuels, toxic gases and substances are formed that adversely affect nature, polluting the air, soil and water. All living things on the planet suffer and die out.

The sun, on the contrary, is a clean, and from an environmental point of view, energy source that does not produce either greenhouse gases or toxic waste. New trends in architecture, BAPV and BIPV show us how ordinary and organically integrated into our lives, from an aesthetic point of view,

solar “power plants” can become without occupying additional space and minimizing the loss of electricity during its transportation.

In addition, it is worth noting that the sun is a practically inexhaustible source of energy. It is hard to imagine, but during half an hour the Earth receives from the Sun the energy that all of humanity consume during the year. In recent years, there is a strong view that all of humanity's energy needs to be covered by the use of solar energy alone.

For many years, humanity has been struggling with the problem of creating a safe thermonuclear reactor, which is practically an attempt to recreate a small model of the Sun on Earth. Relatively few means and efforts are made for more efficient use of energy from an already existing thermonuclear source – the Sun, while solar energy, being absolutely free, is “supplied” in abundance to a large part of the Earth’s surface [6].

A significant role in reducing the level of environmental pollution from the use of traditional fuels belongs to the expansion of the use of renewable energy sources. The rational use of energy, the reduction of energy consumption, as well as the use of technologies that do not harm the environment, act as important tools in the field of environmental protection. Unfortunately, both in our country and around the world, the potential of renewable energy sources are used in modest amounts, including in the construction industry. Although it should be noted that the topic of using renewable energy sources in house building began to be considered relatively long: so the first house with a solar collector was built back in 1947 (house MIT-I). The energy crisis of the 1970s gave impetus to the development of research in this area. Active development of houses using renewable energy sources was underway in our country, but after 1991, for a number of reasons, these studies were suspended [5].

Currently in Ukraine the development of the architecture of energy-saving buildings is very relevant, because the country's climatic resources are promising for producing reproducible energy. However, unfortunately, this potential is used little because of the situation in the country: the used architectural solutions only take into account energy saving aspects to a small extent; low popularity of energy saving ideas among the population.

Conclusions. Taking into consideration all of the above, we can conclude that architecture using the sun must necessarily become an important component of the strategy of not only insolation, heating, lighting, but also energy conservation. When designing energy-efficient buildings, it is worth paying attention not only to the efficient use of solar energy, but also to reducing energy consumption in the whole cycle of their operation. Thus, we will prevent global environmental pollution. Only a deep knowledge of the human environment, the resources of our planet, the

consequences of their consumption and transformation, the protection of the world around us – only this will help us survive, find ways to correct mistakes made in economic and in any other human activity, will save planet Earth for our future generations.

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PILE IMMERSION METHOD AND BEARING CAPACITY

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Abstract. This article discusses the problem of building foundations in cramped urban conditions, and also describes the results of laboratory tests in a tray of pile models loaded by driving and indenting.

Relevance. Bearing capacity of pile foundations is influenced by many factors. Such factors include: design and geometric parameters of piles; distance between piles; the location of piles in the bush; way to dive piles.

As you know, recently, more and more often there is a need to build residential and civil buildings adjacent to existing buildings and structures. With such construction, the use of piles immersed by driving or vibration dipping is dangerous, since dynamic effects arise from which damage to the structures of existing buildings occurs. In the late 70s and early 80s in the city of St. Petersburg, Moscow, Kiev, etc., thanks to the joint work of scientists and builders, a number of technologies and mechanisms have