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PASSIVE AND ACTIVE SYSTEMS IN THE USE OF SOLAR ENERGY

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ANNOTATION:

The main difference between active and passive solar heating is that active heating uses sunlight in the form of heat or electricity to enhance heating systems. Whereas passive heating takes heat from the sun as it enters your home through windows, roofs and walls to heat items in your home.

Keywords: Active, passive, solar energy, solar collectors, energy systems, hot water supply, clean energy, conversion, heat.

INTRODUCTION:

Advances in science provide advanced methods for using solar energy. The construction technologies developed in this connection provide for the design of buildings, taking into account the climatic conditions of the construction site, the building materials used. After construction is completed, as much solar energy as possible should be used to light, heat or cool the building. In the building structure, the building structure acts as a collector of solar energy. In particular, in the design and construction of housing in the northern regions of the globe, it is assumed that it will have many windows facing south. Only in winter, more sunlight enters through the windows and warms the house. In summer, there should be few windows on the east and west sides of the building to reduce the amount of sunlight. In such houses it is bright and warm in winter and cool in summer.

MATERIALS AND METHODS:

In the design of such buildings, the arrangement of windows, incoming heat and thermal insulation form a single structural system. Eco-friendly self-powered cozy houses have a lot of natural light and, as a result, save a lot of heat energy. Covering walls, ceilings and floors with heat-insulating materials ensures long-term heat retention in such buildings. The number of such "green" projects with renewable energy systems has been growing in recent years due to the growing desire for environmental cleanliness in the world.

Such buildings are often called "eco-houses". Their main feature is low power consumption using passive energy saving methods. Most passive houses are built using frame technology, which saves 80 percent of energy. In Finland, for example, 95 percent of all low-rise buildings were built according to such projects. The extreme popularity of building passive houses using this technology

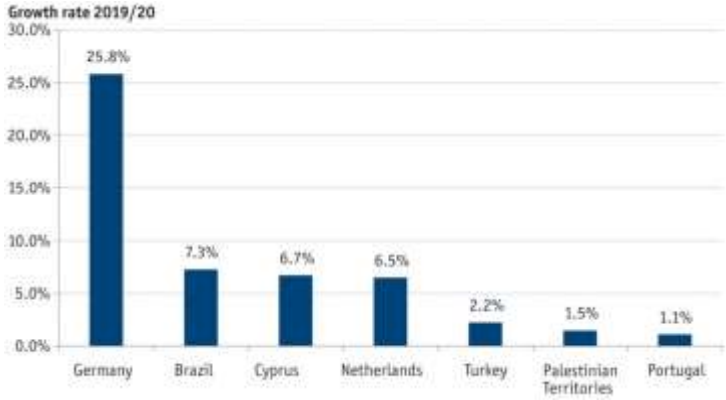
is due to the speed, economy and energy efficiency of the project. Ideally, a passive house should consist of an independent energy system that does not require the cost of maintaining a comfortable temperature. Passive heating of the house should be produced by the heat generated by people and household appliances. If additional "active" heating is required, alternative energy sources will be installed. Hot water can also be provided by renewable energy devices such as a heat pump or solar water heater.

Active systems for the use of solar energy. Scientists say that the basis of active systems for the use of solar energy are solar panels - a set of modules that receive and convert solar energy. In most cases, when we talk about solar panels, we mean a device that converts solar energy into electrical energy. Solar panels can generate electricity regularly or store it for later use. Such batteries were first used in space satellites.

Comparison table Table 1

Passive heating	Active heating
This system works without pumps, blowers or other mechanical devices.	In this system, pumps, blowers, or other mechanical devices require the circulation of a working fluid to transport heat.
A special building design is required.	No special building project is required.
In this system, solar radiation is captured by the structural element itself. Various elements of buildings, such as walls, roofs, windows, partitions, etc., are selected and architecturally combined in such a way that they participate in the collection, storage, transportation and distribution of thermal energy.	In this heating system, solar radiation is collected using separate collectors. Solar energy can be stored in sensible heat storage materials or latent heat storage materials, and the energy is redistributed throughout the building space using pumps, blowers, fans, etc.
These systems are suitable where there is a lot of sunlight in winter and unhindered access to the south side is possible.	The active system can be used almost anywhere and in any type of building.
It is cheaper than an active system to build and operate.	Construction and operation are more expensive than a passive system.

While the pandemic has taken a heavy toll on most economies in 2020, some large solar thermal markets have surged on increased political support, such as in Germany and the Netherlands. In Turkey and Brazil, demand for solar water heaters has increased as homeowners spend more time at home and make home improvements.



Growth in the use of solar heat in European countries despite COVID
Diagram 1

Solar thermal heating and cooling systems serve millions of residential, commercial and industrial customers around the world using a wide variety of technologies. Below are three leading countries in various market segments.

Solar panels are simple in design, easy to install, low maintenance and long service life. Does not require additional installation space. The only condition for its use is not to leave it in the shade for a long time and to wipe the dust from the surface in a timely manner. Such batteries can only produce power on sunny days, even on cloudy days. Modern solar panels remain operational for decades. Such a system, which is characterized by safety, efficiency and long-term operation, is rare. Today, many houses are built with battery sources that store solar energy. Solar panels are installed on the roofs of buildings or on special supports.

Solar energy is used for lighting, heating, cooling, ventilation and power generation. There is a growing number of solar power plants in the world - modern stations that convert solar energy into a large amount of electricity. The principle of their action is simple. Heliostat windows, installed over an area of several thousand square meters, rotate with the sun, directing sunlight into a container filled with a liquid, often water. Subsequent processes continue as in conventional thermal power plants. That is, the water is heated and turns into steam. The steam turns the turbine, and the turbine turns the rotor of the generator, and thus electricity is generated.

Solar energy is undoubtedly the energy of the future. Today, the world is abandoning traditional fuels due to rising gas and oil prices. Most countries have developed government programs to develop the use of solar energy.

Uzbekistan is one of the first countries in Central Asia that has entered a new stage of development based on its scientific developments in the field of solar energy. A lot of work in this direction was done by the Physico-Technical Institute of the Research and Production Association "Physics-Sun" of the Academy of Sciences of the Republic of Uzbekistan. Scientists of the Institute conduct effective research on the rational use of the huge potential of solar energy in our country. For more than ten years, on the basis of scientific developments of domestic scientists, a system of hot water supply and heat supply of residential and social facilities based on solar water heaters has been developed and used as an experiment. Solar water heaters have been installed in Tashkent, Samarkand, Kashkadarya regions and other regions.

The latest developments of Uzbek scientists are also used in agriculture. It is known that for some reason there are difficulties with the supply of water upwards in areas where power lines and water supply systems do not work. For this, photovoltaic devices are widely used that convert solar energy into electrical energy. These devices include solar panels, an energy storage system, and a device that converts direct current to alternating current. Farms can use resource-saving technologies such as drip irrigation and reclamation of previously non-irrigated lands. The photovoltaic device has a long service life, does not require special maintenance and pays for itself in several years.

Institute scientists have developed devices for solar desalination, photovoltaic power plants and street lighting systems and other technological innovations.

JSC "Uzelectroappart-Electroshield" is engaged in the production and sale of alternative energy sources. The company has launched the production of hybrid hot water and heat supply systems; in addition to solar panels, a diesel generator has been installed. This system is fully automated. On sunny days, the panels provide electricity to buildings, and then store energy in them for autonomous operation. In winter or on cloudy days when the panels cannot provide enough power, the diesel generator will automatically start up and run until power from the solar panels is restored. Such systems can be successfully

combined with stationary systems, and any building can be supplied with electricity from both municipal power supply and hybrid systems. Batteries, on the other hand, store energy from the grid for subsequent autonomous operation.

In our country, compact photovoltaic power plants have been developed, which are used to supply electricity to electrical equipment. They provide independent protection against overvoltage and short circuit, battery overheating, overcharging or overcharging.

RESULTS:

Passive solar systems practically reduce the cost of using electricity by up to 50%. Because the cost of electricity when using solar energy is zero. If the builder of a house (building) is familiar with the operation of a passive heating system, then the cost of building a solar house will be equal to the cost of building a typical house.

Active solar heating has a sophisticated technology that aims to produce heat in excess of passive heating. Such a heating system, as a rule, consists of three parts: a solar collector that absorbs sunlight, a collector of the received solar energy and a heat exchange system for heating a dwelling, active systems can be air and water.

How active heating systems differ from each other by the accumulation of solar energy in the collector. In water systems, the energy is absorbed by the liquid, and in air systems, the energy is absorbed by the air. Usually solar collectors are installed on the roof of the building, so it is advisable to place the hot air outlet on the ceiling. The built-in system mixes the air in the house while acting as a ceiling fan.

The aforementioned heating system, despite its uniqueness and difference, reduces the cost of electricity consumption and saves the consumption of the environment.

Adopting a solar heating system to heat your home has several benefits:

-Environmental cleanliness of solar thermal equipment,

- Solar heat does not pollute the environment and does not emit greenhouse gases,

-Equipment used to obtain heat from the sun, saves energy resources on Earth,

-Solar heating equipment is an effective choice for people with allergies and sensitivities to various chemicals,

-Solar heat production equipment is very stable in terms of cost.

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