

## Features of using solar panels on the roofs of low-rise buildings in Ukraine

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### I. INTRODUCTION

Lately, society has been striving to improve the environment status of the environment.

That is evident in the use of environmentally friendly materials, newest devices such as electronically switched motors, EU fans, various current converters like inverters or solar panels. Modern people have begun to make extensive use of alternative energy sources, namely solar panels, which can significantly reduce electricity consumption.

### II. MAIN PART

#### 1. How solar panels work

Solar panels consist of square panels, which in turn have several layers of silicon sandwiched between the conductive paths. These include photovoltaic modules that generate electricity through the use of photovoltaic cells and collectors that generate heat. The principle of formation of electric current is that there are many electrons in the upper layer of silicon, and there are not any of them in the lower layer. As the photons of sunlight fall on silicon, electrons begin to move from their principal places to the empty one. It creates an electric current. The solar panels are connected to the inverter, which in turn is connected to the electrical network that the owner uses as a result.

Consider a commercial for a 10kW power plant (*Table 1*).

#### Commercial Offer for a 10kW Power Plant

The size of the roof	Cost of the project	Payback period	Annual profit
72 m <sup>2</sup> (square meter)	\$11245	6-7 years	€1700

*Table 1*

#### 2. The benefits of solar panels over other energy sources

Solar panels have a number of advantages over other alternative sources of energy: availability, inexhaustibility of solar energy, safety for the environment, endurance, ability to work autonomously, and they do not require operating costs. With modules, you can not only save but also increase your energy output and your income.

#### 3. Use of solar panels in Ukraine

Many manufacturers in recent years, have turned their attention to alternative energy sources, which is why the solar panel market in Ukraine has grown significantly. In 2014, the 21<sup>st</sup> solar power plant was installed in Ukraine, and in 2017 their number increased up to 2323. And that adds up to 35 MW. In fact, this is by no means a large

number compared to the countries like Germany where home stations account for about 30% of all renewable energy sources. To date, we have 52%. The climate of Ukraine allows to use solar panels all year round. The highest activity of photo modules is observed from March to September, and the peak power is observed in June as a result of increasing solar energy generation. In the cold season, solar efficiency decreases, but it can increase with active solar radiation. The so-called "green tariff" has become very popular. A person who decides to install solar panels has to wait for 6 or 7 years until the losses are recouped and a net profit can be made. The desire to save has pushed society to attempt to install solar panels on its own. This usually applies to people who are technologically literate. The owners of the right solar system are independent of expensive centralized energy and do not pollute the environment.

You can install solar panels at agricultural enterprises, residential and business buildings, apartments, cottages. However, it is more profitable to install solar systems on private low-rise buildings because people who live in apartments need the permission not only from the government agencies but also residents of the house. Moreover, they also need to have a large space for mounting the panels.

We offer project proposals for a low-rise individual dwelling house of a geographer located in the village of Horenka, Kyiv region. Its main feature is the solar system located on a flat roof. The project offers installation of silicon panels. They are more widespread due to the large amount of silicon in the earth's crust, high efficiency, and easier manufacturing technology. The only disadvantage is that silicon solar photo modules work less efficiently with scattered light, have a smaller angle of incidence of sunlight and can only be faced the same way. However, if you install panels to the south, they will generate more than enough electricity. For the geographer, the priority will be to preserve the environment, provide comfort and save time by purchasing a home where solar panels have already been installed.

### **III. CONCLUSION**

After studying and analyzing the information, it can be concluded that for low-rise buildings, it is advisable and environmentally sound to use solar panels as alternative sources of energy if you set up a solar grid station of sufficient capacity and get a green tariff.

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