

## SOLAR CELLS: ADVANTAGES AND DISADVANTAGES

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### **Анотація.**

У цій статті розглядаються системи сонячної енергії (SES), їхні компоненти, економічна ефективність і вплив на навколишнє середовище. SES використовує сонячне світло та перетворює його в електричну енергію за допомогою фотоелектричних елементів у сонячних батареях та інверторах, які перетворюють постійний струм на змінний для споживачів. Оскільки витрати на виробництво фотоелектричних елементів знижуються, очікується, що до 2023 року сонячна енергія стане такою ж доступною, як і традиційні джерела енергії, сприяючи швидкій окупності інвестицій. Висока сонячна активність в Україні, особливо в її південних областях, і «зелений тариф» підтримують цю тенденцію, незважаючи на коливання виробництва сонячної енергії в різні сезони. У статті зазначається, що в той час як сонячна енергія зменшує шкідливі викиди в атмосферу, виробництво, транспортування та утилізація сонячних панелей викликає деякі екологічні проблеми. Тим не менш, завдяки триваючим дослідженням підвищення ефективності сонячних панелей і безпечної утилізації, вплив сонячної енергії на навколишнє середовище зменшиться, що ще більше розкриє її потенціал у майбутньому енергетичної галузі.

**Ключові слова:** сонячні батареї, вигідно та перспективно, безкоштовний видобуток, витрати, екологія, окупність, клімат.

### **Abstract.**

This article explores Solar Energy Systems (SES), their components, cost-effectiveness, and environmental impact. SES harness sunlight and convert it into electrical energy via photovoltaic cells in solar panels and inverters that transform direct current into alternating current for consumer use. As production costs of photovoltaic cells decline, solar energy is expected to be as affordable as traditional energy sources by 2023, promoting quick return on investment. The high solar activity in Ukraine, especially in its southern regions, and the "green tariff" support this trend, despite variations in solar energy production during different seasons. The article notes that while solar energy reduces harmful atmospheric emissions, the production, transportation, and disposal of solar panels have some environmental concerns. Nonetheless, with ongoing research into improving solar panel efficiency and safe disposal, solar energy's environmental footprint is set to decrease, further establishing its potential in the future of the energy industry.

**Keywords:** solar batteries, profitable and promising, free extraction, cost-effectiveness, ecology, payback, climate.

### **Introduction**

SES is a system consisting of several components and a storage system, including photo panels and an inverter. It uses sunlight, turning it into electrical energy. Then, direct current is converted into alternating current – it is designed to power various appliances and devices.

Solar panels are key components of the station. They consist of many cells containing semiconductor material. They are responsible for converting light into electricity.

Another important element of SES is the inverter. Given the principle of operation of a solar power plant, the generated current is constant. It is not suitable for consumer power, so it must first be converted to AC. This task is undertaken by the inverter, which is one of the main components of the system.

Depending on the type of equipment, the SES can both meet the facility's needs and supply the surplus to the power grid. Knowing how solar panels work, it becomes clear that the main differences in the configuration relate to other components of the system, as well as their parameters and the principle of operation.

## Payback of solar energy

The cost of manufacturing photovoltaic cells for solar cells has been decreasing every year, and this trend continues. This means that the cost of batteries continues to fall – specialists predict that by 2023, a kilowatt of solar energy will catch up with traditional analogues in price.

In addition, the production of electricity in this way will make it possible to quickly pay off the station: the state is interested in purchasing clean energy.

## Climate

Logically, the maximum energy is accumulated during the sunny months from mid-spring to mid-autumn. The Ukrainian climate is characterized by high solar activity over almost the entire area of the country. Even in cloudy weather, typical of colder periods, solar energy does not stop being produced, although it does so with less efficiency.

The highest solar activity is traditionally observed in the more southern regions of Ukraine: Zaporizhia, Odesa, Mykolaiv, Kherson and Dnipropetrovsk. The high level of insolation makes the territory of Ukraine attractive for the development of technologies for the production of clean energy, and the "green tariff" allows it to be done profitably.

## How environmentally friendly is it?

Solar panels make it possible to produce clean energy from an inexhaustible source, reducing the amount of harmful emissions into the atmosphere in the process of electricity production by traditional methods.

Despite the obvious environmental friendliness of the technology itself, solar cells still harm the environment. Certain toxic materials are used in their production, their transportation leaves a significant carbon footprint, and there is still no clear certainty about how to properly dispose of solar panels

But everything is not so bad - options for the safe disposal of solar panels are currently being developed and improved. And with the way scientists are working to increase the efficiency of photovoltaic cells using the achievements of modern physics, there is no reason to doubt that this type of electricity production will become many times more environmentally friendly.

Solar energy has room to grow and is already credited with being the future of the energy industry.

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