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HOW SOLAR ENERGY CONVERTS INTO ELECTRICITY

Solar energy can be converted into electricity in two main ways: thermodynamic and photovoltaic. With the thermodynamic method, electricity can be generated from solar energy using traditional schemes in thermal

plants, in which the heat from fuel combustion is replaced by a stream of concentrated solar radiation.

Solar photovoltaics is the direct conversion of solar radiation into electrical energy. The principle of operation of a photovoltaic converter is based on the use of the internal photoelectric effect in semiconductors and the effect of separation of photogenerated charge carriers (electrons and holes) by an electron-hole junction or a potential barrier such as a metal-dielectric-semiconductor.

The photoelectric effect occurs when a photon (light beam) falls on an element made of two materials with different types of electrical conductivity (hole or electronic). Once in such a material, the photon knocks an electron out of its environment, forming a free negative charge and a "hole". As a result, the equilibrium of the so-called p-n junction is disturbed and an electric current is generated in the circuit.

To improve the efficiency of photovoltaic conversion of solar energy, gallium arsenide is used as a starting material, whose photovoltaic losses at high temperatures are much lower than those of silicon.

Two three-stage cells with high efficiency at a concentration level of 1000 or more were created on the basis of gallium arsenide. Laboratory samples of solar cells with an area of 0.5 cm^2 with $k = 500$ and efficiency 40%.

Experts in the field of photovoltaic conversion of solar radiation show that the most promising will be concentrators with $k = 1000$, which work with multi-stage arsenidgallium solar cells of a new generation. Solar cells are usually used as converters of solar energy into electricity, which are connected together to form solar panels.

The average annual amount of total solar energy received annually in Ukraine is in the range of $1,070 \text{ kWh/m}^2$ in the northern time zone.

Photovoltaic equipment can be operated quite efficiently throughout the year however, it is most effective during 7 months of the year (from April to October).

The conversion of solar energy into electricity in Ukraine should be focused primarily on the use of photovoltaic devices. The availability of significant reserves of raw materials, industrial and scientific and technical base for the manufacture of photovoltaic devices can fully meet not only the needs of domestic consumers, but also export more than two-thirds of the products.