

USING SOLAR POWER: POSSIBILITIES FOR UKRAINE

The main ways of using solar energy are considered. This study reveals the potential of solar power development in Ukraine. Advantages of solar power as an alternative source of energy are emphasized.

Solar power is energy coming from the sun. It is vitally important because without it life on Earth would end. Moreover, this kind of energy is free and available in the vast amounts. In fact, the number of its applications has increased significantly in recent years.

Ukraine's geographical location and a lot of sun especially in the south makes it necessary to study the ways of using sun energy in the world. Experience of foreign countries can be useful for Ukrainians. Rapid increase in cost of electricity in our country motivates us to use alternative sources of energy more. All these factors reveal the relevance of our research.

The objective of the research is to demonstrate some ways of using solar energy efficiently and reveal the potential of using it in Ukraine.

The Internet resources such as sites of international companies (Evergreen Solar, Activ Solar, NREL, Martifer Solar, Ashden, Rengy Development, Solar park, Solar energy plus and others) have been used.

The most widely spread in different countries are the rooftop or building integrated solar cells and solar panels. Solar cells, also called photovoltaic (PV), are devices that convert sunlight energy directly into electrical energy. Their work is based on the principle that photons (particles of light) knock electrons free from atoms and this generates the flow of electricity [1]. Nowadays there are cells of three generations with semiconductors made from different materials (silicon alloys, cadmium telluride, conductive plastic etc.). Many solar cells linked together make up a solar panel. There are large utility-scale power stations based on PV systems that produce hundreds of megawatts. Solar panels produce power that is consumed by the company or family and excess power is sold by connecting to the utility grid.

There is also a variety of solar thermal power plants: a parabolic trough, a solar power tower system, solar dish system etc. Solar thermal power generation systems collect and concentrate sunlight to produce the high temperature heat needed to generate electricity. All solar thermal power systems have solar energy collectors with two main components: reflector and receiver. Reflectors (mirrors) capture and focus sunlight onto a receiver. In most types of systems, a heat-transfer fluid is heated and circulated in the receiver and used to produce steam. The steam is converted into mechanical energy in a turbine, which powers a generator to produce electricity [4].

A parabolic trough is a type of solar thermal collector that is straight in one dimension and curved as a parabola in the other two, lined with a polished metal mirror. There is often a tube, which contains a fluid which is heated to a high temperature by the

energy of the sunlight. The hot fluid can be used for many purposes. Often, it is piped to a heat engine, which uses the heat energy to drive machinery or to generate electricity [2].

A solar power tower system uses a large field of flat, sun-tracking mirrors called heliostats to reflect and concentrate sunlight onto a receiver on the top of a tower. Sunlight can be concentrated as much as 1,500 times. Some power towers use water as the heat-transfer fluid [4].

Solar dish systems use a mirrored dish similar to a very large satellite dish. The mirrored dish is usually composed of many smaller flat mirrors formed into a dish shape. The dish-shaped surface directs and concentrates sunlight onto a thermal receiver, which absorbs and collects the heat and transfers it to an engine generator [4].

Today researchers from different countries are successfully working on projects for producing solar fuel, a synthetic chemical fuel produced directly or indirectly from solar energy through photochemical, thermochemical or electrochemical reaction. Sunlight is used as an energy source and can catalyze chemical reactions that use water and CO₂ to produce liquid or gaseous fuels (for example, hydrogen, methane, various alcohols and hydrocarbons).

Speaking about Ukraine, experts state that it has favourable geographical location for using solar energy technologies. According to research data the amount of solar energy reaching the earth's surface per 1 sq. square meter in Ukraine is higher than in Germany, which is a leader in efficient use of sun energy. There is a number of companies introducing sun technologies in Ukraine: Activ Solar (Odeska obl. and the Crimea), Martifer Solar, Rengy Development (Trostanets and Sharhorod), Energoinvest (Vinnytska obl.), Novosvit, Vinsolar, Eurosolar, Solar park, Solar energy plus and others.

The main advantages of using solar energy in Ukraine are: providing clean power for homes, communities and businesses, reducing the need for fossil fuel generation, cutting global carbon emissions and greenhouse gases, enabling businesses and families to save money, creating new jobs, economic development.

As a conclusion, all the ways of using solar energy described in the article are to be used in Ukraine. This will promote economic growth of the country and will help to care about the environment more efficiently.

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