Energy

**SOLAR ENERGY AS A RENEWABLE ENERGY SOURCE**

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Solar energy is one of the most renewable sources of energy we have on our planet. In order to be classified as "renewable," energy must come from a source that is inexhaustible. The energy from our Sun reaches our planet every day. A significant portion of this energy is absorbed by our land and oceans. It is this energy that keeps our planet warm and sustains the atmosphere. When we add solar panels to our planet, we are not reducing the amount of energy that reaches it. We are simply harnessing what is already there and will not be depleted [1].

Today, there are two main types of solar energy being utilized: solar panels (photovoltaic systems) and solar thermal systems (Fig. 1). Solar panels convert the sun's energy into electricity, allowing it to be used just like conventional electricity. Solar thermal systems, on the other hand, do not convert solar energy into electricity. They convert it into heat. These systems capture and store heat from the sun, which can then be used for various purposes, such as solar water heaters and passive home heating systems. Regardless of the type of solar energy being discussed, it is all renewable [2].



Fig. 1. Solar battery and solar thermal system

Renewable energy sources, including solar energy, are environmentally friendly and do not contribute to pollution. Solar panels have a minimal environmental impact during installation, and they do not consume energy during electricity generation. Solar energy is a renewable, sustainable, and clean energy source. However, some other renewable sources have environmental concerns. Nuclear energy, while efficient, poses risks due to the management of nuclear waste. Hydroelectric power can cause ecological damage through dam construction. Overall, solar energy is cleaner than non-renewable sources like coal and oil, as it does not release emissions or produce harmful byproducts. Solar energy is a renewable resource that provides clean, sustainable, and environmentally friendly power [1,2].

Nevertheless, solar energy is not without its imperfections. Generating solar energy involves the utilization of solar equipment, such as photovoltaic systems, which rely on non-renewable resources like minerals and plastics. The production of solar panels requires energy expenditure, and the transportation of materials and panels worldwide can contribute to greenhouse gas emissions. Thankfully, the solar industry has made significant strides in efficiency over the years. Currently, the energy invested in manufacturing a solar panel can be recovered within 1-3 years of utilizing the panel.

Some argue that solar energy is not truly renewable because the sun will eventually cease to exist. However, the deployment of solar panels does not hasten the sun's demise. The sun continuously radiates energy throughout the universe, and while Earth absorbs only a small portion of that energy, the remainder travels to other planets, galaxies, or empty space. Even if we were to cover every square inch of our planet with enormous solar panels or expand solar arrays for hundreds of kilometers into space, it would have no impact on the sun's lifespan. Ultimately, scientists predict that our sun will exhaust its fuel and evolve into a red giant in about 5 billion years, engulfing our planet. This outcome is independent of our utilization of solar energy. Therefore, it can be concluded that solar energy is genuinely renewable.Початок форми

1. T.M. Mazur,V.V. Prokopiv, M.P. Mazur, U.M. Pysklynets Solar cells based on CdTe thin films *Physics and chemistry of solid state.* 2021 Vol. 22, N 4. P. 817-827.DOI:10.15330/pcss.22.4.817-827.

2. T.M. Mazur, M.P. Mazur, I.V. Vakaliuk, Solar cells based on CdTe thin films (II Part) *Physics and chemistry of solid state.* V. 24, No. 1 (2023) pp. 134-145 DOI: 10.15330/pcss.24.1.134-145.