

## **RENEWABLES**

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Renewable energy sources (RES) are sources that are naturally renewable. Renewable energy sources include periodic or steady flows of energy that are distributed in nature and are limited only by the stability of the Earth as a cosmoplanetary element: solar radiation, wind, hydropower, natural thermal energy, etc.

What prompted the world to think about switching to renewable energy sources? The main reason, in my opinion, was the environmental crisis, which is partly caused by toxic emissions from traditional energy resources (coal, wood, oil, gas, nuclear fuel, etc.), which in turn do not have endless reserves in the subsoil and on the surface of the Earth. Also, the generation of electricity from traditional energy resources can make a country that is limited in these resources dependent on other countries that import these raw materials. Therefore, states consider the transition to alternative energy sources to be promising in terms of stabilizing the domestic energy market, in terms of the environment, economic costs, and national security.

Solar panels are special devices designed to convert solar radiation into electricity. The principle of its operation is based on the use of photocells. A photocell is usually a flat semiconductor that can directly convert visible and infrared radiation into electricity. This process is called the "photoelectric effect," which was described by Albert Einstein, referring to the idea of German physicist Max Planck. The essence of the process is as follows: a photon hitting the photographic plate gives the electron certain energy, it begins to move actively and create a potential difference, i.e., an electric current. Solar energy services are mainly used by private individuals by installing photovoltaic panels on the roofs of their homes. They allow users to partially or fully provide for themselves, and in case of excess electricity, to transfer it to the general grid and earn a certain profit. In addition, heat collectors can

be installed to meet their hot water needs. The advantages of solar energy are its inexhaustibility and lack of emissions. Significant disadvantages are the instability of weather conditions and the problem of utilizing photovoltaic plates.

The principle of operation of a wind turbine is based on converting the energy of the wind flow into mechanical rotation of a wheel. Its advantages are environmental friendliness and independence from traditional fuels. As in the previous case, a significant disadvantage is unstable weather conditions that make it impossible to fully utilize wind turbines, which makes it necessary to place a wind turbine park in areas with suitable altitudes and weather conditions.

Geothermal energy is believed to be one of the most profitable energy sources. Much of this energy is found in magma. The Earth's heat is a real gem that has a number of advantages over gas, oil and nuclear energy. Geothermal power plants themselves can meet the demand for hot water and electricity. To do this, wells are drilled, and the steam or hot water from them turns a generator turbine under pressure to produce electricity. The obvious advantage of this type of generation is the conservation of traditional energy resources. The disadvantage is, surprisingly, the inadequate environmental friendliness that results from the emission of sulfur, mercury, boron, and ammonia compounds dissolved in groundwater into the atmosphere, as well as the significant cost of well construction in proportion to the depth of drilling.

Despite the fact that the renewable energy sector has a number of disadvantages, namely the involvement of large land areas that may subsequently be polluted by the same geothermal plants that run on biomass, increased noise levels (wind turbines), which can cause harmful effects on hearing aids and the human body in general, other harmful impacts on natural resources, mostly low capacity of renewable energy generation, critical sensitivity of generating plants to topographic and weather conditions, yet the advantages of this sector outweigh the disadvantages, although it is not a panacea. Any type of renewable energy will be many times more environmentally friendly than traditional methods of electricity production, and renewable energy does not actually require serious expenditures on raw materials; to

a large extent, raw materials are natural phenomena with endless resources (ultraviolet radiation from the sun, high-speed air flows, heat from the earth's interior, water resources, etc.).

### References:

1. Renewable energy sources. (2023). Retrieved from: <https://efront.in.ua/vidnovlyuvani-dzherela-energiyi-vde/>
2. All about solar panels: types, characteristics, application features. (2023). Retrieved from: <https://130.com.ua/uk/vse-o-solnechnyh-panelyah/>
3. Pidlisna, A (2013). Alternative energy of Ukraine: prospects for the use of renewable energy resources [article], 7. Retrieved from: [https://ela.kpi.ua/bitstream/123456789/19049/1/SPEP-11\\_09\\_Pidlisna.pdf](https://ela.kpi.ua/bitstream/123456789/19049/1/SPEP-11_09_Pidlisna.pdf)
4. Wind turbines as an effective way to generate electricity. (2022). Retrieved from: <https://patriot-nrg.com/vitro-energetyka>
5. Geothermal power plants: advantages and disadvantages. (2019, December 14). Retrieved from: <https://avenston.com/articles/geothermal-pp-pros-cons/>
6. Zaporozhenko, A (2021). Improving the efficiency of energy supply of an industrial enterprise by using renewable energy sources [Master's thesis], 15-16, 21. Retrieved from: [https://ela.kpi.ua/bitstream/123456789/46785/1/Zaporozhchenko\\_magistr.pdf](https://ela.kpi.ua/bitstream/123456789/46785/1/Zaporozhchenko_magistr.pdf)
7. The environmental impact caused by the production of electricity. (2019, January 21). Retrieved from: <https://www.ez.rv.ua/vplyv-na-navkolishnye-seredovyshe-sprychynenyj-vyrobnytstvom-elektrychnoyi-energiyi/>