RENEWABLES

Karina Kharchuk

Faculty of Electronics,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Let's first understand what renewable energy sources are. Renewable energy sources are sources that are renewed naturally. Renewable energy sources include periodic or steady flows of energy distributed in nature and limited only by the stability of the Earth as a cosmo planetary element: radiant energy of the Sun, wind, hydropower, natural thermal energy, etc. There are such basic technologies of renewable energy as wind energy, hydropower, solar energy, geothermal energy, biofuel, bioenergy. Now in more detail.

Let's start with wind energy. Wind energy has long been widespread in many countries of the world. Ukraine is no exception, because our country has a significant natural potential for the implementation of wind energy projects. It should be noted that there are seven powerful wind power plants in Ukraine. It should be noted that such wind farms are mainly used in remote areas, because they are ideal for holiday homes. tourist bases and holiday camps. Next, we will analyze hydropower. Hydropower is one of the oldest areas of energy in general, which is not surprising, because in this case we are talking about obtaining energy from a renewable, almost infinite source. For many centuries, people have used water energy in one way or another, starting with the simplest water mills and ending with modern hydroelectric plants. Compared to other renewable energy devices, hydro generators are the most complex. However, they have an undoubted plus: a hydro generator, equal in power to solar batteries and wind generators, however, produces more energy in the same period of time. Also, hydro generators are durable: their service life is up to 40 years, while the payback period is

The most widely used renewable source by ordinary people is solar energy, due to low operating costs - solar installations do not break down, and they are guaranteed for tens of years. It also ensures independence from rising current market prices and commercial suppliers, but reducing electricity costs requires one-time investments.

Geothermal energy is significantly different from other renewable energy sources such as sunlight and wind. More specifically, power plants use steam rising from underground hot water tanks. They are usually at a depth of several kilometers, but due to the high pressure, the water rises to the surface. The advantages of such an energy source are that Geothermal energy will exist until our planet cools down. It is ecological, reliable, but there is limited zoning here. There are quite a few places on the planet where hot water comes out of the ground in sufficient quantities to build power plants. Also, during the processing of hot water, a certain amount of greenhouse gasses is released.

Now about biofuel. Biofuel is an organic fuel obtained from raw materials of vegetable or animal origin, as well as from industrial waste. Varieties: Solid - traditionally, wood processing products (firewood, pressed pellets and briquettes) are a source of energy. Liquid - alcohol mixtures, ethers, biodiesel and biofuels. Gaseous - various gas combinations obtained during the thermal decomposition of raw materials in interaction with pyrolysis (oxygen-free), gasification (oxygen) and during the fermentation process (interaction of bacteria).

And briefly about bioenergy. The production of electricity from biomass at thermal power plants and thermal power plants is the most difficult business in "green" energy from the economic and operational points of view. First: raw materials. In contrast to SES, wind turbines and hydroelectric power stations, which work on the sun, wind and water, a bio-installation requires harvesting, delivery and processing of bio-raw materials. These are additional costs. A 5-6 MW bio-thermal power plant uses about 8,000 cubic meters of forest per month or 10-15 vehicles of raw material per day. Second: exploitation. Compared to other types of RES, bioenergy is the most difficult to operate. But there is also an advantage of such a source - a stable mode of operation. CHP plants based on biomass and biogas operate

in an even load schedule and, unlike solar and wind energy, do not require replacement capacities.

References:

Chukryna, V. (2016, September 14). *Biofuel*. Retrieved from <u>https://alternative-</u> energy.com.ua/uk/vocabulary/%D0%B1%D1%96%D0%BE%D0%BF%D0%B0%D

<u>0%BB%D0%B8%D0%B2%D0%B</u>E/

Energy front. (2023, October 29). *Renewable energy sources*. Retrieved from https://efront.in.ua/vidnovlyuvani-dzherela-energiyi-vde/

Voitova, V. (2021, January 08). *Wind energy: advantages and disadvantages*. Retrieved from <u>https://vinnytsia.name/uk/articles/2108-energiya-vitru-perevagi-i-nedoliki</u>