

**SECTION: MECHANICS AND
ELECTRICAL ENGINEERING**

**RENEWABLE ENERGY AS A WAY TO REDUCE
CLIMATE CHANGE**

Tyrsin Oleksii

lecturer

Yakukhin Serhii

senior lecturer

Kabatska Anna

student

National University of Civil Defence of Ukraine

The modern development of the global economy is accompanied by a constant increase in energy consumption. Traditional energy sources such as coal, oil, and natural gas provide a significant share of electricity production; however, their use negatively affects the environment and contributes to global climate change [1]. Greenhouse gas emissions generated during the operation of thermal power plants are one of the main causes of global warming. In this regard, the development of renewable energy has become especially important as an effective way to reduce the negative impact of the energy sector on the climate and the environment.

Renewable energy is based on the use of natural energy sources that are continuously replenished in the environment. The main types of renewable energy include solar, wind, hydropower, bioenergy, and geothermal energy [2]. Unlike traditional energy sources, renewable energy technologies produce minimal harmful emissions into the atmosphere and significantly reduce environmental pollution.

One of the most promising sectors is solar energy. Solar power plants convert solar radiation into electrical energy using photovoltaic panels [3]. The main advantage of solar energy is its environmental safety and the inexhaustibility of the energy source. The use of solar power plants reduces the consumption of fossil fuels and decreases carbon dioxide emissions into the atmosphere.

Wind energy also plays an important role in combating climate change. Wind power plants generate electricity by converting the kinetic energy of wind using special turbines [4]. The use of wind energy reduces the load on thermal power plants and decreases the consumption of non-renewable natural resources. In addition, wind farms do not produce harmful emissions and have minimal impact on the environment.

Another important direction is the development of hydropower. Hydroelectric power plants use the energy of water flows to generate electricity [5]. Compared to thermal power plants, hydropower is characterized by significantly lower atmospheric pollution. However, the construction of large hydroelectric stations may affect river ecosystems and alter the natural balance of water resources.

Bioenergy is also important for modern energy systems. It is based on the use of organic waste and biomass for the production of thermal and electrical energy [6]. The use of biofuels makes it possible to partially replace traditional fuels and reduce the amount of waste accumulated in the environment. Furthermore, bioenergy contributes to strengthening the energy independence of a country.

For Ukraine, the development of renewable energy is of particular importance. Due to the continuous increase in the cost of traditional energy resources and the need to ensure national energy security, the implementation of alternative energy sources has become one of the priority areas for the development of the energy sector [7]. Ukraine has significant potential for the development of solar and wind energy, especially in the southern regions of the country. The expansion of renewable energy contributes to reducing dependence on imported fuels and improving the environmental situation.

An important aspect is the modernization of electrical installations and power grids for the efficient integration of renewable energy sources into the energy system. The use of modern automation systems, energy storage technologies, and smart grids improves the reliability of power supply and the efficiency of energy systems [8]. In addition, the implementation of energy-efficient technologies helps reduce electricity losses and decrease harmful emissions.

Therefore, renewable energy is one of the most effective ways to combat climate change and environmental degradation. The use of alternative energy sources reduces greenhouse gas emissions, decreases dependence on fossil fuels, and ensures the sustainable development of the energy sector. Further development of renewable energy, modernization of electrical installations, and implementation of modern technologies are important conditions for ensuring environmental safety and the energy independence of Ukraine.

References

1. IPCC Climate Change 2023: Synthesis Report. Geneva, 2023.
2. Kudria S. O. Non-Traditional and Renewable Energy Sources. Kyiv, 2020.
3. Boyle G. Renewable Energy: Power for a Sustainable Future. Oxford University Press, 2019.
4. Ackermann T. Wind Power in Power Systems. Wiley, 2018.
5. Paish O. Small Hydro Power: Technology and Current Status. Renewable and Sustainable Energy Reviews, 2017.
6. Demirbas A. Biofuels: Securing the Planet's Future Energy Needs. Springer, 2019.
7. Energy Strategy of Ukraine until 2050. Kyiv, 2023.
8. Denysiuk S. P. Energy Efficiency and Smart Energy Systems. Kyiv: Igor Sikorsky KPI, 2021.