RENEWABLE ENERGY SECTOR IN UKRAINE

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Renewable energy sources are a strategic direction for the development of the energy sector of Ukraine. This question is indeed complicated, but its importance is vital. Thanks to the reduction of the need for imported fuel (gas, coal), RES contributes to the strengthening of energy independence, stimulates the stability of the economy and infrastructure, creating new jobs, developing technologies and local production. The transition to clean energy sources helps to fulfill international obligations, ensures environmental safety and reduces harmful impacts on the environment. Finally, mechanisms such as the «green tariff» open up significant

investment opportunities.

Before the full-scale invasion had begun, renewable energy capacity in Ukraine was 9.9 GW, including 2 GW of wind, 6 GW of solar, and 0.2 GW of bioenergy. At the beginning of 2024, the figure had changed by 8.7 GW, due to the fact that part of the energy infrastructure remained damaged or partially occupied. However, according to (UkraineInvest, 2025), in the first half of 2025 alone, more than 590 MW of new «green» capacities were introduced in Ukraine, which indicates the sustainable development of the industry despite the war.

The Ukrainian government, together with scientists and international partners, is developing a plan to reduce greenhouse gas emissions to 35% of the 1990 level and achieve carbon neutrality. They aim to implement this plan by 2060. The main way to achieve the goals is to replace coal and gas generation of RES and implement a storage system. In 2025, the Department of Energy introduced an auction system for «green» projects with quotas for 2025-2029 to attract private investment. Since 2009, Ukraine has had a «green tariff», which encourages private owners to install their own energy sources: solar panels, wind turbines and small hydroelectric power plants. In 2024, the «rate of the green tariff» was €0.117 per kWh (VoxUkraine, 2025).

Solar energy is a promising direction. According to (ARXIV, 2024), the potential of rooftop solar installations in Ukraine exceeds 230 GW, which corresponds to an annual production of about 290 TW/h – more than the country's current consumption. At the same time, the wind potential of the Black Sea coast can make Ukraine the future leader of offshore (marine) wind energy in Eastern Europe. Solar energy in Ukraine has significant potential. The annual volume of solar energy in Ukraine is higher than in Germany, one of the leaders of the industry. From 2018 to 2020, solar power capacity in Ukraine increased almost fivefold. As of 2024, solar power plants make up about 75% of Ukraine's renewable energy (excluding large hydroelectric power plants). About 1 400 solar power plants of various capacities, owned by 931 licensees, are operating in Ukraine.

An equally important direction is bioenergy, which uses agricultural waste,

wood and biogas from farms. According to (UA Renewable Energy, 2024), biomass is able to provide up to 20% of the country's thermal needs, reducing dependence on gas imports.

Green hydrogen, which is produced from electricity from RES, is becoming an innovative area. In 2024, the (Hydrogen Ukraine Initiative,2024) announced several pilot projects for the production of hydrogen for industry and transport. This direction is supported by the European hydrogen strategy and is included in the plan for the post-war recovery of Ukraine.

Among the main problems remains the financial barrier. The destruction of infrastructure and the instability of the investment climate complicate large projects. However, decentralization and the creation of energy communities open up new opportunities. As (VoxUkraine, 2025) notes, hundreds of communities are already installing solar panels, small wind turbines and energy storage systems to ensure a stable energy supply at the local level. Ukraine has significant potential for the development of RES thanks to its natural resources.

It is estimated that the technical potential of wind energy is about 180 GW, and solar – is about 39 GW. These indicators significantly exceed the total installed capacity of the energy system of Ukraine before the war, which amounted to 59 GW.

Due to the hostilities, a large part of RES facilities was threatened. In particular, 89% of wind farms are located in active war zones or in their immediate vicinity. 37% of ground-based and 35% of rooftop solar plants, as well as 48% of bioelectric power plants, are also at risk. Total investment in the RES sector over the past 10 years has amounted to more than US$ 12 billion, of which more than 5.6 billion are in active war zones.

Environmental and social aspects also play an important role. The transition to renewable energy supports the European Green Deal and helps Ukraine fulfill its international obligations under the Paris Agreement. In addition, the development of green energy contributes to the creation of new jobs and the improvement of the qualifications of specialists in the field of energy.

The European Bank for Reconstruction and Development (EBRD) invested a

record €2.4 billion in Ukraine in 2024, including in decentralized energy supply projects. This includes the financing of 100 MW of gas generation for the company «Ukrnafta» in the amount of 80 million euros. Overall, the EBRD has invested nearly €6.2 billion in Ukraine since the war began.

All wars end, no matter how long they last. After the victory, Ukraine will restore not only its cities, but also a clean, smart and sustainable energy system. As noted by the public organization Global 100 RE Ukraine, the main goal of – is that by 2070 100% of Ukraine's energy will be renewable. Electricity, heat and fuel must be produced from sources that do not emit greenhouse gases.

Despite all the difficulties, Ukraine demonstrates that the transition to renewable energy – is not only possible, but also necessary for national security, economic growth and environmental recovery.

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