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THE IMPACT OF RENEWABLE ENERGY DEVELOPMENT ON TRADITIONAL ENERGY SYSTEMS

Today, Ukraine remains heavily dependent on fossil fuels, which accounted for around 70% of its primary energy supply in 2020. The Russian invasion led to

the occupation of the Zaporizhzhia NPP and about 44% of thermal capacity, along with the destruction of critical infrastructure, resulting in a sharp drop in energy supply. Electricity demand fell by 40% by October 2022.

Given Ukraine's high untapped renewable potential, bioenergy, hydropower, solar, and wind could form the foundation of its future energy system, contributing nearly 80% of total energy production by 2050. With strategic investments and complemented by nuclear power, renewable energy can drive Ukraine towards a carbon-neutral future. These conclusions stem from UNECE's pathway scenarios based on the Carbon Neutrality Toolkit, published ahead of the Ukraine Recovery Conference (London, 21–22 June).

Renewable energy development alone can reduce fossil fuel dependence and boost energy security. Achieving carbon neutrality, however, requires major shifts: a gradual fossil fuel phase-out, enhanced energy efficiency, and increased use of modern bioenergy.

Ukraine's energy intensity is 3–4 times higher than the EU average, driven by high heating demand, energy-intensive industry, and outdated infrastructure. By implementing energy efficiency measures and electrification, Ukraine could slow demand growth and cut energy intensity by up to 60% by 2050.

Economy-wide decarbonization is key. The report estimates a potential fossil fuel reduction of 93% in transport, 97% in industry, and nearly 100% in buildings by 2050. This large-scale transition could double electricity demand.

In addition, the transition to a carbon-neutral energy system will increase the resilience and independence of Ukraine's energy system. The report envisages a scenario of transition to domestic renewable energy sources and low-emission technologies, which will make Ukraine self-sufficient in terms of primary energy, reaching 98% by mid-century. This transformation will not only contribute to energy security, but also mitigate the impact of regional and global energy crises on Ukraine.

In the long-term (post-war) perspective, large-scale development of "green" generation and creation of a new model of Ukraine's energy sector will be possible provided that:

1. Adoption of clear National Strategies for the development of RES, renewable hydrogen production and offshore wind energy. Revision of the Energy Strategy until 2035, taking into account the replacement of decommissioned generation capacities with new ones with the associated increase in energy storage capacities. Adoption of the Energy Strategy of Ukraine until 2050;

2. Setting ambitious goals for the development of renewable energy sources that will be in line with the current EU energy policy, namely to achieve at least a 50% share of renewable energy sources in Ukraine's electricity balance by 2030 (taking into account large-scale hydroelectric power plants) and achieving a carbon-free economy by 2050;

3. Conducting international communication campaigns to encourage international strategic and financial investors to enter the Ukrainian renewable energy market;

4. Introducing new market mechanisms to stimulate the development of renewable energy, including “green” auctions, corporate PPAs, contracts for difference, etc.;

5. Ensuring the development of the renewable hydrogen market, namely:

Provide guarantees of hydrogen origin, review the carbon tax and increase it;

Check and technically justify the possibility of using the Ukrainian GTS, localize hydrogen production projects, connect them to the GTS;

Ensure the implementation of national hydrogen projects;

Build a reliable infrastructure for the production, consumption and export of renewable hydrogen;

Stimulate scientific organizations for research in the field of hydrogen technologies;

6. Research the potential and develop an appropriate legislative framework for the construction of hybrid power plants with renewable energy sources;

7. Ensuring the reliable functioning of the energy infrastructure, carrying out the necessary modernization measures, reducing breakdowns and accidents.