

Oksimets Yura

Bachelor

*Scientific Advisor:**PhD of Psychology, Associate Professor**Tsymbal S.V.*National University of Life and Environmental Sciences of Ukraine
Kyiv

HYDRO-POWER POTENTIAL OF UKRAINE

After studying and analyzing of threats to Ukraine's energy security, scientists agreed to concentrate significant resources on researching and creating of program for introducing new (less-developed) energy sources as quickly as possible. One of this types is small hydro-energetics. The biggest advantage of this one, is that if we will keep to rules of building this, small hydro-power plant will save natural and touristic balance of our country. Since, Ukraine's renewable energy market becomes ever more important, especially with the steep increase in gas price and the adoption of green-tariff price incentives for electricity from renewable energy sources, in the beginning of 2012 in Ukraine there are about 30 private companies, which invest in renewable energy production, particularly in small hydropower plants [1].

According to the "Energy balance of Ukraine in 2013" prepared by the State Statistics Service, the share of renewable energy sources (RES) accounted for 2.7% of total primary energy supply, while hydropower provided 91.7% of all renewable energy sources. At the end of 2014, State Statistics Committee of Ukraine published the following figures: the share of renewable energy increased to 5.88%, HPPs accounts for 86.9%. The total hydropower energy system is only 5.1% [2].

According to the Ukrainian legislation small hydro power plants comprise small electric power stations, which have installed hydropower generation capacity not exceeding 10 MW. Information provided by the State Agency on Energy Efficiency shows that installed capacities of small hydropower plants at the end of 2011 amounted to 71 MW, and that their electric energy production for the year amounted to 203.5 kWh. Major hydropower facilities are located in the following regions of Ukraine: Vinnytsia, Kirovohrad, Mykolayiv and Ternopil regions, currently 64% of all hydro power plants are located in these regions, while the technical hydropotential of the rivers in these regions amounts to only 14% of the country potential. The share of electricity produced by hydroelectric power plants, including large, in the general structure of electricity production in Ukraine was 5.6% (against 44% in the European Union), while the share of electricity production by small hydroelectric power stations is about 2% of the total production of electricity by hydropower plants [3].

According to environmental NGOs there is no small HPP in Ukraine that meets environmental criteria, and they bring much more environmental damage than potential benefits can be obtained (for example, a reduction of greenhouse gas emissions). At the

same time, there are examples of HPPs in Austria and Norway that are completely safe for the environment. Therefore, a compromise option was chosen in this study: the use of 50% of the available potential of small HPP provided that the most stringent environmental criteria are met. As of 2016, installed capacity of small HPPs is 90 MW⁵². According to the Institute of Renewable Energy of the National Academy of Sciences of Ukraine, the maximum capacity of small HPPs, which could be achieved by 2030, amount of balancing capacity. Hydropower will not be able to meet the demand for balancing capacity, so development of solar and wind energy should be accompanied by the development of energy storage technologies (batteries) to ensure the stability and predictability of these types of generation [4]

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Makogin Olexandr

Bachelor

Scientific Advisor:

PhD of Psychology, Associate Professor

Tsybal S.V.

National University of Life and Environmental Sciences of Ukraine

Kyiv

PROBLEMS WITH THE USE OF HYDROPOWER

Hydropower is the energy concentrated in the streams of water masses in the river waters and tidal movements. For human needs most often used energy of falling water. The magnitude of this energy is directly dependent on the height of the fall. To increase the difference in water levels, especially in the lower currents rivers, are constructed