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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## 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

dams.

The energy of water is attractive because it is cheaper than the energy that is obtained when burning fuel or nuclear energy. In many countries, the use of water energy attracts the attention of environmental protection, which inevitably leads to new environmental costs, whereby electricity obtained in this way is not always cheaper. Consider some negative effects for nature, associated with the construction of dams in the rivers. When the flow of the river slows down, as it usually occurs when its waters fall into the pond, the hanging precipitate begins to descend to the bottom. Below the reservoir clean water, getting into the river, much quicker blurs river banks, as if capturing the volume of sediments, which was lost in the reservoir. Consequently, increased erosion and coast below the reservoir-common phenomenon.

The bottom of the reservoir is gradually covered with a layer of sediment, which periodically acts on the surface or again flooded when the water level falls and rises as a result of discharge water or its inflow. Over time, the sediments accumulate so much that they begin to occupy much of the useful volume of the reservoir. This means that the pond, built to preserve water or flood control, gradually loses its effectiveness. Accumulation of a large amount of sediments in the reservoir can be partially prevented, if regular control of the amount of loose material, water flows are exhausted.

There is another problem: after filling the reservoir under the water are valuable lands that are lost forever. Also disappear valuable animals and plants, and not only land; The fish that inhabit the fenced river dam may also disappear as dam recommits the way to places of their spawning.

In addition, in certain periods of water quality in the reservoir and, consequently, the quality of water emitted from it can be very low. During summer and autumn, the lower layers of water in the reservoir to oxygen, due to the simultaneous influence of two processes: incomplete stirring water and bacterial timetable of dead plants in bottom layers, which requires a large amount of oxygen. When this poor on oxygen, the water is produced from the reservoir, primarily suffering from fish and other aquatic organisms downstream.

Despite all this, the advantages of HYDROELECTRIC power are obvious — constantly restoring the nature's reserve itself, ease of operation, lack of environmental pollution. [1] The gross theoretical of hydropower rivers in the world is estimated at 39100 billion KWH.

Technical hydro-energy potential characterizes the part of water energy that can be used technically. In determining the technical hydro-energy potential, all losses related to the production of electricity are taken into account, including the inability to fully use the drain, caused by insufficient capacity of reservoirs and the power limit of HYDROPOWER, Due to limited use of saddle and grassroots rivers with small potential capacity, losses for evaporation from the surface of reservoirs and filtration from reservoirs, pressure and power losses in the flow-through tract and energy equipment of the HPP. Economically effective hydropower potential defines the part of technical capacity, which at this time is economically feasible to use. It should be noted the conditionality of the definition of cost-effective potential, because it is based on a

techno-economic comparison with the alternative electricity sources, which are the thermal power plants, and does not take into account quite fully the efficiency Comprehensive use of water resources. In addition, due to the growth of the cost of organic fuels, as well as the increase in the cost of TPP construction taking into account the rigidity of requirements for environmental protection and others can predict an increase in the prospect of cost-effective capacity, which will To approach technical hydro-energy potential. World Technical Hydropower potential (at the level of 2008) is estimated at 14650 billion KWH, and cost effective — 8770 billion KWH. In Ukraine, the economically efficient hydropower potential is used by 60%. [2]

In the last decade, large-scale studies of the practical use of the significant potential of currents in the seas and oceans, which are divided into non-periodic, monsoon (PASNI) and tidal air are carried out. Of these, first of all considered the possibility of using the energy of the main non-periodic currents, the total energy potential of which by different techniques is estimated from 5 to 300 billion Kw [3].

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## COMPARATIVE ANALYSIS OF THE EFFICIENCY OF WIND ENERGY IN THE LEADING COUNTRIES OF THE WORLD AND UKRAINE

The article provides a comparative analysis of the efficiency work of wind power in the major regions of the world and the leading countries of the world. Countries that develop offshore wind power or have a large area of territory are leaders in wind