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

power. They have the opportunity to choose for the location of wind power equipment best areas with the highest wind potential. The article defines the main factors influencing the effective work of wind power. Among these factors should be allocated as follows: available wind potential and the possibility of its use, technical characteristics of the installed equipment, the availability of high-quality network for the transmission of electricity to the consumer with minimal losses. The efficiency of Ukrainian wind power inferior to leading countries in this field, but it has good prospects for further development if certain conditions will be done. For the calculated performance of wind energy efficiency among the world's regions, South America is the leader (the efficiency of the installed capacity is 2847.8 KWH/Kw). The second position is taken in North America (2691.3 KWH/Kw and 30.7%), while the third position is in Africa (2338.7 KWH/Kw and 26.7%). The following positions were as follows: 4th place – Europe (2314.4 KWH/Kw and 26.4%); 5th place – Middle East (1787.5 KWH/Kw and 20.4 %); 6th place – Asia and the Pacific Basin (1530.6 KWH/Kw and 17.5%) With average indicators (2344.4 KWH/Kw) In South America, the Middle East and Africa are just beginning to develop their own wind energy sector, so it's too early to analyze the indicators of these regions. The top three regions of the world by the development of wind energy are Asia and Pacific Basin, Europe and North America. The pace of wind power development during the last five years was the leader of Asia and the Pacific basin. The pace of development of wind power in North America in 2015 amounted to 13.8%. The European wind energy market is the most saturated among all the regions of the world, and this, in recent years, has led to the slow pace of wind energy development in the region. Among the three world leaders in the installed capacity of wind power facilities the most efficient wind power in the United States (2737.8 KWH/Kw and 31.3%). Germany's second place (2089.4 KWH/Kw and 23.9%), and China only occupies the third Position (1425.4 KWH/Kw and 16.3%). On the performance of its own wind energy, among the countries on which statistics are available, China ranks last.

The gap in Chinese wind power can be explained by the following factors. The most important impact on the efficiency of the wind energy equipment produces an existing wind potential and, consequently, the choice of the best areas for the placement of wind farms. The second most important factor of influence is the technical characteristics of the equipment itself. In the case of comparison of indicators, namely, consumption, not production, it is important to have a qualitative network for the transmission of electricity to the consumer with minimal losses. So, on the example of wind energy in China, it should be noted insufficient attention to the placement of equipment, more than a number of quality of wind energy equipment compared to European or American counterparts and network connectivity problems [1].

The situation on the European wind market should be analyzed separately. Leading trio of European countries with the high efficiency of wind energy (UK, Norway, Denmark), in the future can still increase their performance due to the transition to new models of technology and the development of offshore wind power. Countries of Western Europe, which began to develop their own wind energy earlier

than eastern Europe, in the overwhelming majority, have higher performance indicators of wind power. In addition to these are: Finland (2925.9 KWH/Kw and 33.4%), Ireland (2699.5 KWH/Kw and 30.8%), Belgium (2673.0 KWH/Kw and 30.5%). Among Eastern European countries the share of the installed capacity is higher than 25% have only Ukraine (2451.6 KWH/Kw and 28.0%), Poland (2390.7 KWH/KWH/Kw and 27.3%), Romania (2369.2 KWH/Kw and 27.0%) and Bulgaria (2272.7 KWH/Kw and 25.9%) [2].

The efficiency of wind energy in Ukraine is the highest among the countries of Eastern Europe, available in the rating and even higher than the efficiency of wind energy in Germany. But the situation in Germany and Ukraine's wind power are significantly different. Germany is the undisputed European leader in the installed capacity of wind plants. This country has effectively exhausted the opportunity to develop ground wind power. The further development of German wind energy provides for the replacement of equipment for the existing wind power facilities for equipment with the best technical and economic indicators and the development of offshore wind power. Ukrainian wind energy has begun using modern wind farms and to choose sites with high wind potential, which determines the efficiency of the use of the installed power in the last few years. Upon further equipping of wind energy facilities with modern samples of equipment and gradual refusal from outdated equipment, the efficiency of wind energy in Ukraine can continue to grow, since it ranks second in Europe after Norway [3].

Wind energy is a renewable energy sector specializing in the use of kinetic wind energy. On the planet the occurrence of winds has a random character and uncontrolled. This applies both to the direction and strength of the wind. The appearance of wind depends on geographical region, season, period of day, terrain and altitude above sea level [4].

There are many advantages of wind energy development, including environmental, economic and practical. The total kinetic energy of the wind in the world can be roughly estimated as 80 times higher than the total power of man. And although for energy needs only a certain proportion of this general indicator can be used, the future development of technology itself has enormous potential. In the world, the total installed capacity of wind farms (WPP) at the end of 2008 has reached 120.8 Gw, more than 27 Gw which is installed only in 2008 year. This is about 1.5% of global electricity consumption. These figures show that there is a huge and growing global demand for environmentally friendly wind energy, which can develop quickly, almost everywhere in the world. Wind energy has become an important player in the global energy market [5].

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THE THERMAL RESONATOR IN OUR LIFE

Scientists from the Massachusetts Institute of Technology have developed a thermal resonator that generates electricity due to day-to-day fluctuations in air temperature. The prototype system is already working on the roof of one of the buildings of the Massachusetts Institute of Technology. It is designed to power sensors and small devices, and receives energy literally "out of nothing". The findings are being reported in the journal *Nature Communications*, in a paper by graduate student Anton Cottrill and professor Michael Strano. This is an advanced thermoelectric generator that operates on the principle of converting the difference in temperature into electricity. This principle is not new and is used in Peltier elements.

Compared to pyroelectrics — the most popular way to generate electricity by changing temperature — the thermal resonator showed a three-fold advantage in productivity. (Pyroelectrics - crystalline dielectrics with spontaneous (spontaneous) polarization, namely polarization in the absence of external influences.

Usually, spontaneous polarization of pyroelectrics is not noticeable, since the electric field created by it is compensated by the field of free electric charges, which “leak” onto the surface of pyroelectrics from its volume and from the surrounding air. With a change in temperature, the magnitude of the spontaneous polarization changes, which causes the appearance of an electric field, which can be observed until the free charges have time to compensate for it.)

“We basically invented this concept out of whole cloth,” Strano says. “We’ve built the first thermal resonator. It’s something that can sit on a desk and generate energy out of what seems like nothing. We are surrounded by temperature fluctuations of all different frequencies all of the time. These are an untapped source of energy.”

“They want orthogonal energy sources,” Cottrill says — that is, ones that are