

RENEWABLE ENERGY SOURCES. WIND ENERGY

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Wind energy is a form of solar energy. The sun heats the Earth's atmosphere unevenly due to differences in terrain the presence of water bodies, and the angle of incidence of the sun's rays. Warm air rises, and cold air moves to take its place. This constant movement of air masses is wind. As long as the sun shines, this process will continue, making wind energy a virtually inexhaustible source. As a result of uneven heating by solar rays of the Earth's surface and lower layers of the Earth's atmosphere, in the surface layer, as well as at an altitude of 7 to 12 km, movements of large air masses occur, that is, wind is formed, which carries a huge amount of energy. Wind intensity is governed by the velocity of air flow and can vary over a broad range. Wind energy is characterized by its extensive spatial availability, inherent accessibility, and long-term sustainability. A key advantage lies in the absence of requirements for fuel extraction, processing, or transportation, as the kinetic energy of the moving air mass is directly converted by wind turbines installed along the flow path. This feature is of particular importance for remote or sparsely populated areas lacking centralized energy infrastructure, as well as for decentralized energy supply systems with relatively low demand levels.

The main disadvantage of using wind as an energy source is the instability of its speed, and therefore of energy over time. Wind is characterized not only by long-term and seasonal variability, but also changes its activity during the day and in very short periods of time. However, modern achievements in the field of wind energy ensure the effective use of wind energy and large-scale implementation of equipment in various sectors of the national economy. Wind energy is a branch of science and technology, within which theoretical foundations, methods and means of using wind energy to obtain mechanical, electrical and thermal energy are developed, and directions and scales of expedient use of wind energy in the national economy are determined. Wind energy consists of 2 main parts: wind engineering, which develops theoretical foundations and practical methods for designing technical means, and wind utilization, which includes solving theoretical and practical issues of optimal use of wind energy, rational operation of installations and their technical and economic indicators, as well as generalizing experience in the practical application of wind energy installations. "Wind energy" in the broad sense of the word means a set of knowledge and technologies for converting uncontrolled wind energy into controlled energy for the benefit of people. Small wind energy has attractive prospects in recreational areas, since it does not require sewage, electricity and does not disrupt the environment and landscape. Small wind energy complements large in terms of meeting the seasonal needs of remote energy consumers. In small energy systems, the task of accumulating energy of various types within the limits of consumer needs has been practically solved. Small energy installations have high mobility, ease of installation and liquidity.