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UTILISATION OF HIGH-EFFICIENCY SYSTEMS FOR GENERATION AND STORAGE OF HYDROGEN FOR STAND-ALONE POWER SUPPLY

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Modern scientific and technical achievements have allowed to reduce the cost of electricity generated by wind power plants (WPP), and it has become almost equal to the cost of electricity generated by thermal power plants. In addition, the environmental benefits of using renewable energy sources (RES) must be taken into account. Further reduction of cost, increase of capacity, increase of efficiency of these installations, as well as improvement of technical and economic indicators as a whole, is achieved through the introduction of advanced scientific and technical

solutions. Power plants based on fuel elements, which are environmentally friendly generators of electric and thermal energy and have relatively high efficiency at the level of 40-45 % in a wide range of capacities, can be attributed to the promising developments. In this case, the fuel cell (FC) produces electric current with constant voltage, which can be used in autonomous power supply systems. The operation of autonomous power systems powered by renewable energy sources depends on the constancy of the energy source. Taking into account the use of RES, when designing autonomous power plants of this type, it is necessary to provide additional power equalization systems.

Scientific and technical solutions are proposed to improve the reliability of power supply to autonomous systems and reduce the environmental impact when using hydrogen technologies. In case of emergency power plant shutdown, the use of a buffer hydrogen storage system - metal-hydride hydrogen storage system is envisaged, which provides safe storage of hydrogen with its subsequent use in FC [1]. The problem of increasing the operational efficiency of an autonomous power supply system consisting of the following elements: wind generator - membrane-free electrolyser - metal-hydride battery - fuel cell has been solved. Theoretical studies of thermodynamic and thermophysical processes in the complex system "metal-hydride hydrogen accumulator - fuel cell" are presented. The conducted studies served as a basis for the development of an autonomous power supply system and justification of the approach to the development of metal-hydride system of hydrogen accumulation and its supply to the fuel cell. The use of innovative electrolysis technology in the wind power complex will increase its competitiveness in the market of equipment for the production and use of hydrogen [2].

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