

## NOVEL GENERATION OF WINDMILL-ELECTRIC PLANTS

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### Introduction

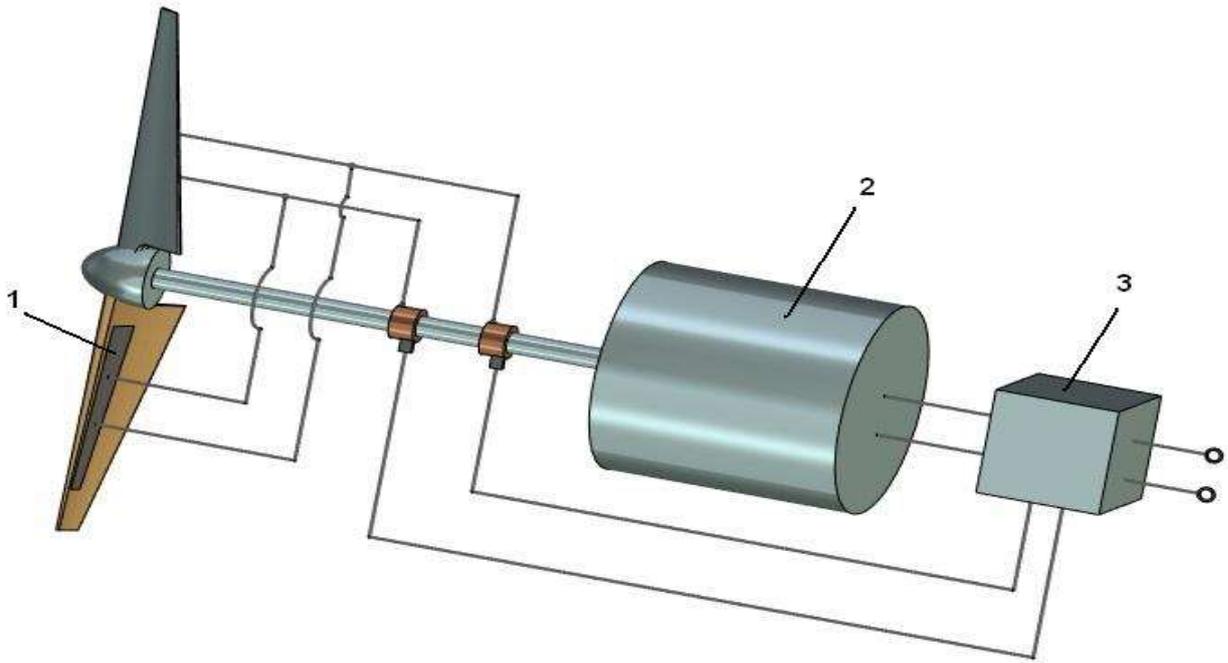
One of the main disadvantages of the existing windmill-electric generation plants is their low energy efficiency that equals not more than 30 % (if the wind turbine axis is horizontal) or 40 % (if this axis is vertical). It is conditioned by low level of the wind energy utilization by the wind turbine current types. In principle, it is possible to increase the wind generators energy efficiency by the increase of the aerodynamic lift acting on blades of wind turbine (both in a case when the wind turbine axis is horizontal, and in a case when this axis is vertical). But unfortunately at present all known methods of creation of lift are already completely used.

### Methods

The authors of this paper worked out the design principles for creating novel types of windmill-electric generation plants. The application of these principles will allow to increase considerably energy efficiency of wind generators. These novel principles of wind generators design are the following. First, the use of novel principle of creation of the aerodynamic lift that was discovered by the authors of this paper. They named this principle “energy-difference principle of creation of the aerodynamic lift”. According to this principle, aerodynamic lift appears when some quantity of energy passes from some energy source to the air flow which is in contact with one of the surfaces of a wind turbine blade. The realization of this principle can be obtained, for example, in the case when the blades of wind turbine are fitted with energy sources (heat sources, sound sources, etc.) [1-5]. Second, the use of the positive feedback for electric power supply of the energy sources of wind turbine blades. To fulfil this principle, the electric power supply of the energy sources of wind turbine blades must be provided from the output electric circuit of wind generator (Fig. 1).

### Conclusions

The combined application of the above mentioned principles allows to increase considerably the output electrical power of a wind turbine of the novel type in comparison with the existing wind generators (by a factor of 1.5-2.0).



*Fig. 1. General simplified diagram of windmill-electric generation plant of novel type:  
1 – blade energy source; 2 – DC generator; 3 – output circuit of the wind generator.*

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### **References**

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