

## HYBRID ENERGY GENERATION WITH PUMPED HYDRO STORAGE

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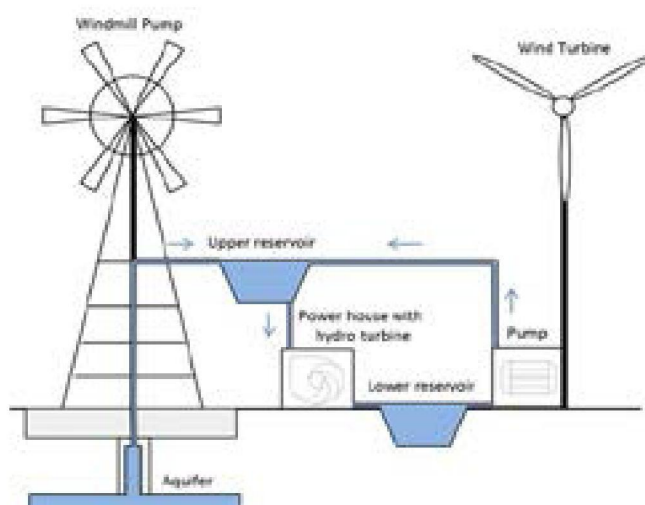
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### INTRODUCTION.

This project proposes an installation of a demonstrative site of hydro energy storage system as a way to effectively accumulate excess energy generated from renewable sources in a form of the gravitational potential energy of pumped and stored water. Hydropower is then extracted from flowing water by means of a turbine as a useful mechanical power, which, in its turn, is converted into electricity using an electric generator.

### METHODOLOGY.

The proposed system (Fig. 1) comprises a windmill pump, two reservoirs placed at different elevations, a hydro-turbine with an electric generator, a pumping station and a wind turbine. It is a hybrid system in terms of the energy used to pump up the water into the upper reservoir, since both mechanical power of the windmill and electricity generated by the wind turbine are involved. The implementation of the project will increase research capacity for developing technical solutions for water and electrical power supply to remote communities having suitable terrain with no access to such essential utilities. Also, a problem of instability in supplying electricity into the power grid due to intermittent nature of renewable sources of energy such as wind and sun can be solved.



*Figure 1. Schematic diagram of the proposed system.*

### RESULTS.

The researchers have purchased and installed all primary equipment, developed a LabView model to obtain parameters such as plant operating time and power generation. Also, the researchers have developed a control algorithm for optimization of plant operation.

### CONCLUSIONS.

Future work includes development of plant monitoring and control system. Upon the launch of the plant the researchers will collect all necessary data, test and optimise the control system.

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