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Comparative Study of Energy Generation from a Hybrid Vertical-Axis wind Turbine

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Abstract: *The project "Design and Development of Energy Generation System" discusses a hybrid solution to renewable energy by combining wind, hydro, and solar power in one system. The structure consists of a vertical axis wind turbine (VAWT) on top, a Pelton hydro turbine at the bottom, and a solar panel placed above—the three sources of energy work together to produce electricity effectively using a shared power management unit.*

The system enables the selective use of the wind or hydro turbine based on environmental factors. An interchangeable mechanism facilitates switching between the two turbines, and a DC pump is employed for pressurized water flow simulation in the hydro system. The energy produced is stored in a battery and converted for viable use, with a USB charging output and an LED power generation status indicator.

This project showcases a novel and versatile energy harvesting system, maximizing multiple renewable sources for round-the-clock power generation. It is a functional prototype of sustainable energy technology and shows the potential of hybrid systems in actual use.

Keywords: Vertical Axis Wind Turbine, Solar Photovoltaic Panel, Battery Charging, Sustainable Energy, Low Wind Speed Operation

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