

RANCANG BANGUN PEMBANGKIT LISTRIK TENAGA ANGIN MENGGUNAKAN TURBIN VENTILATOR

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ABSTRAK

Kebutuhan energi listrik yang terus meningkat mendorong pemanfaatan energi terbarukan, salah satunya energi angin. Penelitian ini bertujuan merancang dan menganalisis kinerja Pembangkit Listrik Tenaga Angin (PLTB) menggunakan turbin ventilator. Sistem terdiri dari turbin ventilator, generator DC, *Solar Charge Controller* (SCC), baterai, dan *inverter*. Energi kinetik angin diubah menjadi energi mekanik berupa putaran turbin, kemudian dikonversikan oleh generator menjadi energi listrik arus searah.

Pengujian dilakukan dengan mengukur kecepatan angin, putaran generator, tegangan, arus, daya keluaran, dan perubahan tegangan baterai. Hasil pengujian menunjukkan bahwa peningkatan kecepatan angin meningkatkan putaran dan tegangan keluaran generator. Pada kecepatan angin 3,3 m/s diperoleh putaran 59 RPM dan tegangan 7,6 V, sedangkan pada 7,1 m/s diperoleh 362 RPM dan 22 V. Daya keluaran generator mencapai 0,10538 W. Hasil pengujian menunjukkan turbin ventilator dapat dimanfaatkan sebagai pembangkit listrik tenaga angin skala kecil.

Kata kunci: Energi Angin, Pembangkit Listrik Tenaga Angin, Turbin Ventilator, Generator DC, Baterai.

DESIGN AND CONSTRUCTION OF A WIND POWER PLANT USING A TURBINE VENTILATOR

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ABSTRACT

The ever-increasing demand for electrical energy is driving the use of renewable energy sources, including wind energy. This research aims to design and analyze the performance of a wind power plant (PLTB) using a turbine ventilator. The system consists of a turbine ventilator, a DC generator, a solar charge controller (SCC), a battery, and an inverter. The wind's kinetic energy is converted into mechanical energy in the form of turbine rotation, which is then converted by the generator into direct current electrical energy.

The test was conducted by measuring wind speed, generator rotation, voltage, current, output power, and changes in battery voltage. The test results showed that increasing wind speed increased the generator's rotation and output voltage. At a wind speed of 3.3 m/s, the rotation was 59 RPM and a voltage of 7.6 V, while at 7.1 m/s, the rotation was 362 RPM and 22 V. The generator's output power reached 0.10538 W. The test results showed that the ventilator turbine can be used as a small-scale wind power generator.

Keywords: *Wind Energy, Wind Power Plant, Ventilator Turbine, DC Generator, Battery.*