EXPERIMENTAL AND NUMERICAL STUDY OF THE EFFECT OF RATIO OF LENGTH AND DIAMETER ON TURBINE VENTILATOR PERFORMANCE

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ABSTRACT

Geographically Indonesia has the wind speed pattern that could proper for wind energy development. It was average wind speed relatively low compared to countries such as Finland with turbine ventilator users and other countries. Regions in Indonesia generally have Vmean between 3-6 m/s, in contrast to European Countries ranging between 9-12 m/s. hence, in this study utilizing a relativity smaller wind energy, a turbine ventilator was used as a small scale power plants, which utilize wind to driver of an electric generator.

Turbine ventilator using wind energy instead of electric-powered ventilation fan. Wind energy strike the turbine ventilator blade, a drag force is produced which causes turbine ventilator to rotate. This rotation produces a negative pressure inside the turbine ventilator duct so that the air sucked from the bottom of the channel. In this study using a turbine ventilator counter with 18 inch chimney sizes and varying the ratio L/D (High chimney with a chimney diameter) as well as variations in speed to the turbine ventilator between 4-9 m/s. The method performance in this study was experimental and numerical, which used CFD Fluent simulation to validation with experimental results.

Result are in the can, the shorter the distance L/D then the flow rates that produced the greater, and the power generated will be ever greater.

Key words : turbine ventilator, length ratio and diameter of the chimney, pressure drop, flow rate, power, torque, efficiency.