Experimental and theoretical investigation of vertical axis wind turbine for low speed regions: case study at Al-Khobar – Saudi Arabia

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Abstract –
There are number of sources for generation of power but in recent years, wind energy has shown its potential as the clean source of energy that contributes to the high-energy demands of the world. Vertical axis wind turbine (VAWT) is the best option for low speed areas. Thus, in this paper, VAWT blades for low average wind speed regions like Al Khobar in Saudi Arabia is designed and implemented. The performance and power produced are investigated and utilized in the design and the economic analysis. An experimental and theoretical review on the performance of Savonius VAWT is presented. The turbine is made of aluminium alloy with a blade angle of 160 degrees and a maximum coefficient of power, Cp, of 0.286. The results of the current study show that the power output, with a minimum speed of 12-15 m/s generates 40-80 watts with an efficiency of 31~35%.

Keywords: Vertical Axis Wind Turbines, Wind speed, power generation, efficiency and performance.