**Performance Optimization of Constant Speed - Small Horizontal Axis Wind Turbine (CS-SHAWT) for Wind Energy Development in Malaysia**

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**ABSTRACT:**

Though Malaysia is blessed with a lot of natural resources, still it mainly depends on fossil-fuels for electricity generation. Due to this dependency, among the different polluting agencies, the electric power sector ranks second in the country’s statistics. So as to reduce the pollution from them and to reduce the dependency on the depleting fossil-fuels, Malaysia is very keen on promoting renewable energy based electricity generation. Following the Government’s renewable energy policy and subsidies, several renewable energy attempts were made and only the solar PV energy systems have had a good start; however, the continued development from the start is questionable because of the high capital cost involved and the unattractive energy conversion efficiency. Few attempts on the proven, cost-effective wind energy systems were carried out and the net outcome is not encouraging due to the low-speed scenario in Malaysia. As per a few successful studies on wind speed assessments, there are attractive sites for wind turbine based electricity generation not with high speed higher capacity turbines, but at low speed small capacity wind turbines. To promote wind energy in Malaysia and to attract global investors, this research aims at low capacity wind turbines suitable for low wind regimes as in the Malaysian context. The proposed constant speed-small horizontal axis wind turbines exhibited encouraging values of annual energy production, power coefficient and capacity factors promising a successful start of wind energy in Malaysia.

**Keywords:** Low end speed regimes, Small wind turbines, Energy sustainability, Blade Element Momentum Theory.

**JEL Classifications:** Q42, Q48, Q55, Q56