

A STUDY ON THE POWER GENERATION POTENTIAL OF MINI WIND TURBINE IN EAST COAST OF PENINSULAR MALAYSIA

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ABSTRACT

A small-scale wind turbine is an attractive renewable energy source, but its economic viability depends on wind speed. The aim of this study is to determine economic viability of small-scale wind turbine in East Coast of Peninsular Malaysia. The potential energy generated has been determined by wind speed data and power curved of. Hourly wind speed data of Kuantan throughout 2015 was collected as the input. Then, a model of wind turbine was developed based on a commercial a 300W mini wind turbine. It was found that power generation is 3 times higher during northeast monsoon season at 15 m elevation. This proved that the northeast monsoon season has higher potential in generating power by wind turbine in East Coast of Peninsular Malaysia. However, only a total of 153.4 kWh/year of power can be generated at this condition. The power generator utilization factor PGUI was merely 0.06 and it is not technically viable. By increasing the height of wind turbine to 60 m elevation, power generation amount drastically increased to 344 kWh/year, with PGUI of 0.13. This is about two-thirds of PGUI for photovoltaic technology which is 0.21 at this site. If offshore condition was considered, power generation amount further increased to 1,328 kWh/year with PGUI of 0.51. Thus, for a common use of mini wind turbine that is usually installed on-site at low elevation, it has low power generation potential. But, if high elevation as what large wind turbine needed is implemented, it is technically viable option in East Coast of Peninsular Malaysia.

Keywords: Malaysia; Potential; Power Generation; Wind Turbine

1. INTRODUCTION

Wind energy is very promising alternative energy and many wind turbine is commercially available in market. There are differencnt sizes depending on the applications. While the large scale wind turbine is used for wind farm, small scale can be used as distributed generation for on-site application. Because of the small or distributed wind energy sources, smaller wind turbines can be used to install at homes, buildings and public facilities, which off-set all or a portion of on-site energy consumption. It can also be integrated with photovoltaic and gen-set to stabilize the power output from various sources. A small wind system can be used on-grid or off-grid. For on-grid, small wind can

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