International Energy Journal, Volume 13, Issue 4, December 2012

Study of Diurnal and Seasonal Wind Characteristics for Wind Resource Assessment

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Abstract

The wind characteristics of Hambantota (6.15° N and 81.07° E) have been assessed by collecting continuous wind data using an automated weather station for a period of 12 months to explore the possibility of implementing small scale wind turbine. The monthly average wind speeds vary in the range of 2.07 m/s to 4.46 m/s at 3 m height. Comparatively higher wind speeds exceeding 2 ms^{-1} was observed during the middle of the day compared to the night and early morning hours. In order to characterize the wind speeds and to estimate the power density, Weibull distribution was used. The estimated annual power density exceeds 1,000 W/m^2 at a height of 30 m. When the estimated wind power at different heights were compared, it was observed that at 30 m height the wind power increase by approximately a factor of 2 compared to the wind power at 3 m height. The study revealed that it is possible to harness wind energy in small scale during the day time, during the south west monsoon season.