



[Início](#) > [Diários](#) > [International Journal of Energy for a Clean Environment](#) > [Volume 11, 2010 Edição 1-4](#) > **WIND ENERGY POTENTIAL FOR POWER GENERATION OF A LOCAL SITE IN GUSAU, NIGERIA**



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WIND ENERGY POTENTIAL FOR POWER GENERATION OF A LOCAL SITE IN GUSAU, NIGERIA

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RESUMO

This study was used to evaluate the wind energy potential of a meteorological site in Gusau, the capital city of Zamfara state, in Nigeria. Twenty-one years (1987–2007) of three-hourly monthly mean wind data from the Nigeria Meteorological Department were assessed and subjected to two-parameter Weibull and other statistical analyses to determine the resource potential of the site for periods of months, seasons, and years. Attempts were made to compare the mean measured data with estimated data, and the Kolmogorov-Smirnov statistics were employed to show the site's wind profile's consistence with Weibull two-parameter distribution. The results showed that the monthly values of k and c ranged between $3.9 \leq 7.9$ and $4.0 \leq 8.3$, respectively, with over 80% of all the data having values ranging between 5 and 10 m/s or more. Most probable and maximum energy-carrying wind speeds also were found to be between 3.7 and 7.7 m/s and 4.5 and 9.3 m/s, respectively, across the period. Estimated wind power densities also ranged from 69.0 (in October) to 626.2 W/m² (in January) at 10 m height. Seasonally, the dry season experiences higher wind speeds and the period of highest wind energy harvest could be from January to June every year.

Palavras-chave: [clean energy](#), [wind power](#), [Weibull analysis](#), [Gusau-Nigeria](#), [wind speed data](#)