

Title: Wind Energy Evaluation For Electricity Generation Using WECS In Seven Selected Locations In Nigeria.

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Outlet: Elsevier: Applied Energy

Date:

Abstract: This paper statistically examine wind characteristics from seven meteorological stations within the North-West (NW) geo-political region of Nigeria using 36-year (1971–2007) wind speed data measured at 10 m height subjected to 2-parameter Weibull analysis. It is observed that the monthly mean wind speed in this region ranges from 2.64 m/s to 9.83 m/s. The minimum monthly mean wind speed was recorded in Yelwa in the month of November while the maximum value is observed in Katsina in the month of June. The annual wind speeds range from 3.61 m/s in Yelwa to 7.77 m/s in Kano. It is further shown that Sokoto, Katsina and Kano are suitable locations for wind turbine installations with annual mean wind speeds of 7.61, 7.45 and 7.77 m/s, respectively. The results also suggest that Gusau and Zaria should be applicable for wind energy development using taller wind turbine towers due to their respective annual mean speeds and mean power density while Kaduna is considered as marginal. In addition, higher wind speeds were recorded in the morning hours than afternoon periods for this region. A technical electricity generation assessment using four commercial wind turbines were carried out. The results indicate that, while the highest annual power is obtained with Nordex N80–2.5 MW as 14233.53 kW/year in Kano, the lowest is in Yelwa having 618.06 kW/year for Suzlon S52. It is further shown that the highest capacity factor is 64.95% for Suzlon S52–600 kW in Kano while the lowest is 3.82% for Vestas V80–2MW in Yelwa.