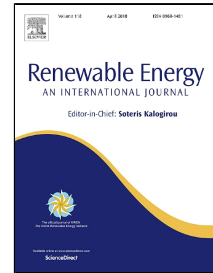


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# Analysis of wind speed data and wind energy potential in Faya-Largeau, Chad, using Weibull distribution

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## Abstract

In this work, we aimed at analyzing the wind speed of Faya-Largeau and making decisions of the cost effective wind turbine for the said zone. The characteristics of the wind speed and the energy potential of Faya-Largeau in the Saharan zone of Chad were studied using monthly wind speed data collected over eighteen years (1960-1978) and measured at 10 m height. In order to determine the wind power density and the available energy for the Faya-Largeau site in the Saharan zone of Chad, the Weibull probability density function was used. Thus, the annual values of the Weibull parameters  $k$  and  $c$  are respectively 3.75 and 3.60 (m/s), whereas the power density and available energy are respectively 343.31 W/m<sup>2</sup> and 249.87 kWh/m<sup>2</sup>. Three commercial wind turbine models were used. Based on the capacity factor, the 1.MW/54 Bonus model is cost-effective for the Faya-Largeau site and could be strongly recommended for installation.

*Keywords:* Mean wind speed; Weibull distribution; wind energy potential; Faya-Largeau; Chad

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## 1. Introduction

Today, many countries have been using renewable energy sources for several years because they are clean, inexhaustible. They contribute to reducing global warming, air pollution, and the depletion of unconventional fossils such as fuel [1,2]. Contamination of soils, water,

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