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Abstract

The possibility of utilizing wind energy for electricity generation at 15 different sites across the 6 geographical zone of Nigeria is investigated in this paper with the aim of providing scientific information that can lead to optimal investment in wind technology for electricity generation. The data used for the study were obtained from the Nigeria Meteorological Station (NIMET), Oshodi Lagos and they consist of daily average wind speeds measured at the anemometer height of 10m over a period 4-16 years. The sites are identified for different wind power application based on their wind power potential. The appropriate wind turbine for the viable sites for grid integration is determined from their capacity factor estimation. The unit costs of energy of the turbines are calculated using the present value cost method. One of the key results reveal that sites S2 (Jos) and S3 (Kano) have excellent wind resources and are economically viable for grid integration application. This paper is useful at providing concrete scientific information on wind power potential and the economic viability across the various geographical zones that could aid renewable energy policy for the development of wind power in Nigeria.

Keywords: Capacity Factor, Wind Energy, Wind Turbines, Power Density, Unit Cost, Nigeria

1. Introduction

In recent times, utilization of wind energy for electricity generation is popular around the world, because of its environmental friendliness, competitive cost of energy compared to other

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