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Wind energy resource assessment in Ngaoundere locality

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Abstract

In order to secure future energy and protect the environment, it is important to consider the possibilities of wind as a resource for electrical energy supply. To carry out this study in Cameroon, we chose the locality of Ngaoundere, in which an assessment of the wind energy resource was made. Different kinds of data have been collected about climate, topography, and roughness. The Observed Wind Climate of the meteorological station has been made. The Wind Atlas and the resource grid have been calculated, especially in the high wind resource areas. Annual Energy Production of one hypothetical wind farm consisting of four 1.65 MW turbines was estimated using the Weibull-representative wind data for a total of 12 months. The computed Annual Energy Production is 5,985 MWh and according to the International Energy Agency statistics, this production could enable the reduction of CO_2 emission by 1200 tons per year. It was found that there is a good correlation between our calculation results and those of the Wind Atlas Analysis and Application Program (WAsP).

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Keywords: Weibull distribution; resource assessment; wind energy; wind potential; Ngaoundere.

1. Introduction

Recent years have witnessed a fundamental change in the way governments approach energy-related environmental issues. Promoting sustainable development and combating climate change have become integral

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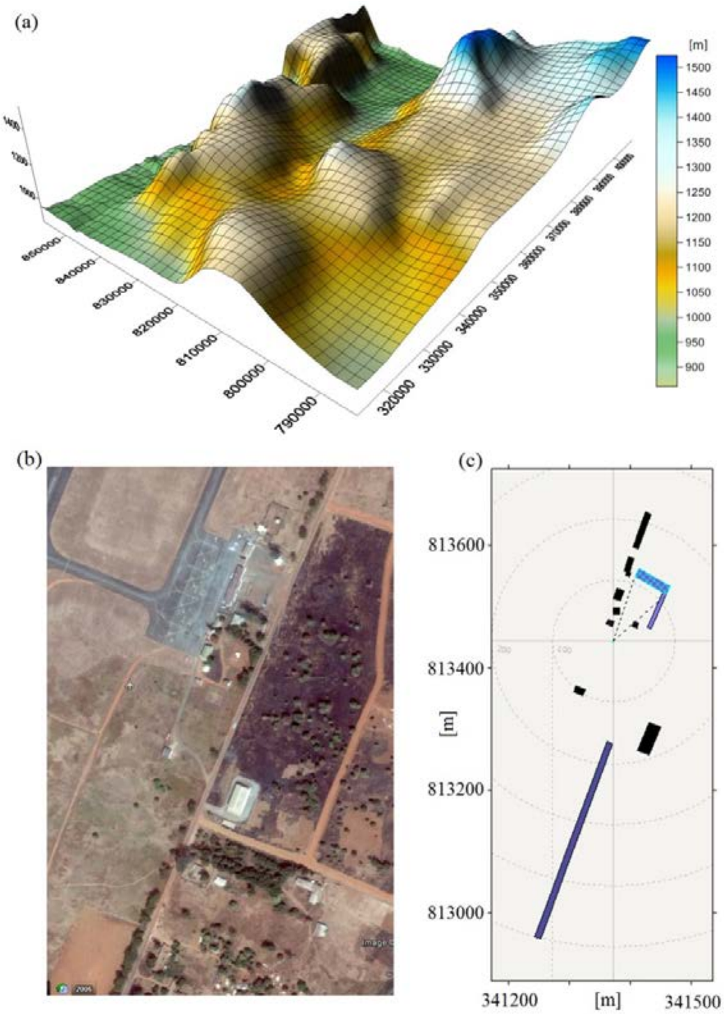

Fig. 1. (a) Topographic map of the Ngaoundere locality; (b) an aerial view of the site; (c) the map of modelled obstacles.

aspects of energy planning, analysis and policy making in many countries. In Cameroon, the question of development and environment are at the heart of the energy transition. The wind energy, which confirmed its status as the number two source of renewable electricity production in 2012, is now the most likely renewable energy source to back up the hydropower supply in halting the relentless increase in fossil fuel used to generate power [1]. However, this energy remains unexploited in Cameroon [2] in spite of its theoretical potential in the North of the country. The aim of this paper is to carry out the wind characteristic of the Ngaoundere locality and furthermore provide a wind resource map useful for the selection of suitable areas for wind park installation. It is a technical study that aims at bringing an efficient help to all decision makers, with respect to the planning and realization of wind energy projects. For this, we have collected and processed the data of our site. Then, using the models we have validated, we performed an assessment of the energy potential of this site.