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A COMPARATIVE ANALYSIS OF SOLAR RESOURCE DATABASES AND GROUND OBSERVATIONS FOR DIFFERENT LOCATIONS IN SERBIA

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Abstract: Renewable energy offers a promising prospect for meeting the power needs of both developing and developed countries as it is available in all parts of the world. As the use of solar energy expands, with more and more commercial and residential users investing in solar energy systems around the globe, there is substantial demand for relatively simple, easy-to-use software packages for the planning and performance estimation of solar installations. This paper presents a review of a comparative analysis of different free internet solar databases and ground observations for two locations in Serbia. Results show that the use of solar RETScreen database can obtain precise data on the intensity of the global solar radiation for analyzed locations.

Key words: solar energy, comparative analysis, internet solar database

1. INTRODUCTION

Solar energy can have an important place in the energy sector of a country as a renewable and inexhaustible energy resource. It is interesting that energy technologies based on the use of solar energy are developed in the most technologically and economically powerful countries, because a number of reasons of which the most important strategic, economic and ecological factors. Solar energy is a clean form of energy whose application does not pollute the environment. Solar energy could simply transform directly into heat, and directly or indirectly into electricity, thereby enabling speedy implementation in all energy processes. Use of solar energy in all aspects of energy consumption increases in many countries and offers various possibilities for application. Modern solar systems enable utilization of solar energy throughout the year and at the same time, significantly reduce emissions of harmful gases into the atmosphere.

Solar energy technology is expected to play an important role in attaining the 10 % renewable energy target by 2020. Solar radiation is highly variable in time and space. The annual sum of incoming solar radiation can change significantly from year to year and the variability patterns are quite different each year. The successful and effective utilization of solar energy systems and devices largely depend on the availability of information on solar radiation characteristics of the location in which the system is to be situated. Accurate data of solar radiation is preferably measured at the ground level. Due to high equipment and installation costs it is often not financially feasible to install measuring stations. In that case, where ground-measured data is not readily available other solar radiation databases could be used, [1]. This paper shows the assessment of the accuracy of various methods for determining the solar radiation data on the horizontal surface at two different locations in the Republic of Serbia (Belgrade and Zlatibor) and comparing the results of these methods with the values that are at these locations measured over a longer period.

2. MATERIAL AND METHODS

Internet solar radiation databases

Concerning solar energy sources, there are varieties of databases worldwide today. Free internet solar radiation databases which are mainly used are: PVGIS, ESPA, SoDa, NASA, RETScreen and Meteonorm. In this paper, we analyze the data obtained from PVGIS, RETScreen and SoDa databases.

PVGIS (Photovoltaic Geographical Information System) is the part SOLAREC initiative that aims to contribute to the implementation of renewable energy in the European Union. PVGIS as one of the bases of solar radiation has an advantage compared to other similar databases because the software and the database is open source and available for free public use, [2]. In addition, PVGIS system is made in a very high geographical resolution of 1x1 km with a simple user interface based on maps. It is estimated that the overall accuracy of the calculations is very high. Detailed geographical, climatic

