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An Assessment Study of the Monthly Complementarity of Renewable Energy Resources in Colombia

PEÑA GALLARDO, R. ^{a*}, OSPINO CASTRO, A. ^b

a. Universidad Autónoma de San Luis Potosí, San Luis Potosí

b. Universidad de la Costa, Barranquilla

**Corresponding author, rafael.pena@uaslp.mx*

Abstract

In order to assess the feasibility of a combined use of renewable energy sources over a determined region, it is necessary to carry out complementarity studies. These studies let us know the generation profile of renewable energy sources, with high variability, over a specific interval of time and establish a possible match between two or more different energy sources. Such is the case of wind and solar energy sources. In this paper is presented an assessment study of the monthly complementarity of wind and solar resources over Colombia for electricity generation. It is proposed to assess the complementarity based on a novel approach, using a dataset obtained from high-resolution images of wind and solar monthly resource maps of Colombia; images previously treated using image processing techniques. Then, the dataset is used to calculate average energy generation on each month of the year, and the complementarity of both renewable resources is obtained calculating the degree of correlation between them, with the Pearson correlation coefficient. The obtained results show a good degree of complementarity between both energy sources in some regions of Colombia, at the different seasons of the year. The results obtained in this study can be useful to identify regions with high potential of installation of power generation plants based on wind and solar energy.

Keywords: complementarity study, image processing techniques, photovoltaic energy, wind energy.