An Investigation of the effect of the dust on PV efficiency: A Case Study for Afyonkarahisar region

Tevfik KARGACIOĞLU[1], Fatih Onur HOCAOĞLU[*, 2]

[1,2]Department of Electrical Engineering, Afyon Kocatepe University, TURKEY

[1,2]Solar and Wind Research & Application Center, Afyon Kocatepe Univ., TURKEY

[1]kargaci.tevfik@gmail.com, [2]fohocaoglu@gmail.com

[*]Corresponding Author

Abstract

Due to the increase of global energy demands and decrease of fossil fuel sources, renewable energies are getting more attraction day by day. The technologies of renewables are increasing and the prices are decreasing in parallel. Solar energy is the most popular renewable energy source among the others. Moreover, in the last decade, solar photovoltaic energy research and construction has started to support by the governments in the world financially. Furthermore development and application of solar energy have been regarded by the governments of different countries and their people. However solar energy conversion systems have low efficiencies. Moreover environmental effects such as dust, snow, pollens of flavors etc. decrease the efficiencies of the modules. It is of vital importance to find intelligent solutions to handle such negative effects. Before doing this it is important to analyze the systems to determine the level of decrease on the efficiency.

In this study the effect of the dust on PV surface are examined in the sense of solar module efficiency. To examine the effect of the dust, mono crystalline type PV modules are tested under natural environmental conditions. The tests are performed at Afyon Kocatepe University main campus. Each module is situated on the same tilt angle to the sun. One of the modules is cleaned, systematically whereas the other is left naturally. Cleaning process is applied at the same hour of each day of December 2015. Hourly PV generations are measured and collected using a data logger. The data obtained from each module are compared and analyzed. Finally the total gain in the sense of energy generation is calculated and the results are discussed.