Creating a Typical Weather Data File for Analyzing and Estimating Energy Generation from Renewable Energy Systems in Five Cities in Iraq

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Abstract

In this research, we present creating a typical weather data file for different Iraqi cities and use it for planning to allocate suitable kinds of renewable systems to be installed in different parts of Iraq. To create typical weather data for five Iraqi cities, the daily, monthly, and yearly weather data for the last five years are averaged. We obtained the data from Power Data Access Viewer, which is operated by the National Aeronautics and Space Administration (NASA). We used this typical weather data to estimate the amount of daily electrical energy that a typical solar PV panel and a typical wind turbine can generate in each of the five cities over the span of a year. In the analysis, it was found that Basra has the highest daily solar irradiance availability during the winter and spring seasons. Haj Omran possessed the highest solar availability during the summer season. The seasonal and spatial difference in solar irradiance was reflected in the amount of daily electrical energy generated by solar PV panels in each of the selected cities. Regarding the correlation between wind speed and energy generated by the wind turbines, the highest amount of electrical energy can be generated from turbines installed in Basra, followed by Baghdad. Moreover, our analysis inferred that since Sulaymaniyah has the highest precipitation rate, as high as 3 mm/day, it can be a good place for generating clean energy through hydroelectric power plants.

Keywords: energy generation, renewable energies, weather data analysis

1. Introduction

Weather data plays a significant role in the design stage in many engineering applications. For example, engineers need to use weather data to estimate the annual energy demand of buildings or energy that renewable energy plants can generate (P.tootkaboni et al., 2021; Segarra et al., 2020). In fact, weather data are embedded in all simulation software that is used for selecting, designing, and sizing heating, ventilation, air-conditioning, and refrigeration (HVAC&R) systems (Adham et al., 2017; Shakir et al.,