COMPARATIVE ANALYSIS OF A PHOTOVOLTAIC SYSTEM FOR AN EDUCATIONAL BUILDING USING PVSYST AND SIMULINK

Assit. Lect. Dr. Ana-Maria Moldovan
Lect. Dr. Tania Rus
Lect. Dr. Raluca-Paula Moldovan
Department of Building Services Engineering, Technical University of Cluj-Napoca, **Romania**

ABSTRACT

The present research explores the integration of a photovoltaic system for an educational building through a comparative analysis using the PVsyst and Simulink platforms. The building, intended for university education, is located in Cluj-Napoca, Romania. Considering the building's location and specific climate, the feasibility of installing a photovoltaic system was analyzed with the aim of reducing electricity consumption from the electrical grid. The study began with a PVsyst simulation, which indicated that a substantial amount of energy could be generated by the photovoltaic system, a result further validated by simulations using the Simulink model. The nearly identical results obtained from both methods confirm that this proposal is a reliable solution for the building in question. A detailed analysis was conducted for each month of the year, assessing the performance indicators of the proposed system in comparison to energy consumption and emphasizing the benefits of implementing such measures. Additionally, the use of two different programs allowed for the identification of both their advantages and the potential challenges encountered in their application.

Keywords: photovoltaic system, PVsyst, Simulink

INTRODUCTION

ENERGY, one of the most used words nowadays could be seen as a trend, and in some situations, it may appear to be used superficially. However, the smart and thoughtful consumption of energy should be a major concern for everyone.

Energy can take many forms, but this paper focuses on electricity and the possibility of producing it locally for an educational building. The proper functioning of any educational institution is entirely dependent on the continuity of the electricity supply. Lighting, internet, computers, laboratory equipment, air conditioning, and heating all require electricity and are vital for carrying out daily activities in educational buildings.

This paper investigates the feasibility of integrating a photovoltaic system into the Faculty of Building Services Engineering building in Cluj-Napoca, Romania. With an annual electricity consumption of approximately 100 MWh (e.g., 103.87 MWh in 2023, a significant increase from 82.38 MWh in 2012 [1]), the building currently relies entirely on the electrical grid for its energy needs.

The study aims to assess the potential benefits and challenges of generating on-site renewable electricity using two distinct software tools: one dedicated to photovoltaic systems and another applicable to a wide range of engineering applications [2]. The

https://doi.org/10.5593/sgem2024v/4.2/s16.03