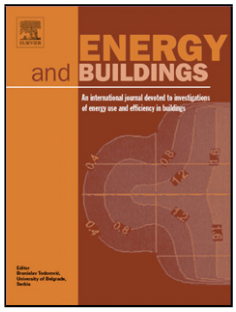

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Experimental investigation of the performance of 6 kW BIPV system applied in laboratory building

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Abstract

This paper describes the operational performance results of 6 kW grid-connected building integrated photovoltaic system (BIPV) applied in laboratory building, installed in Colombia (in Bogotá, at 4°35' latitude and 2.580m altitude) after one year of monitoring (September 2015-August 2016). The BIPV system is operating in the building "Researching Center of the Engineering Programs – CIPI" at Universidad de Bogotá Jorge Tadeo Lozano. The photovoltaic array is installed on the building's roof and it has been operating properly since the month of January 2015. The BIPV system is composed of 24 photovoltaic modules connected to the electrical grid through a 5000W inverter. A monitoring system was implemented using virtual instrumentation to measure irradiance, environment temperature and DC-AC variables of the photovoltaic system. A one-year monitoring process of the system and the meteorological variables allowed us to assess the energy performance and correlate power production with solar radiation. The results indicated that the average of AC energy generated by the pv system was 471,083 kWh/month; the average of irradiance was 4,048 kWh/m^2-day; the average of the photovoltaic array´s efficiency was 13,68% and the maximun final yield of the system's performance (YF) was 88,6 kWh/kWp-year. The grid-connected BIPV plant fulfills the specifications demanded for such systems by National and International standards.

Keywords: BIPV system, distributed energy, pv performance, monitoring, efficiency.

1. Introduction

Photovoltaic (PV) power generation employs solar PV module composed of a number of cells containing photovoltaic material. Materials presently used for solar PV cell include crystalline silicon, amorphous silicon, cadmium telluride, and copper indium selenide [1].

Building integrated photovoltaics are solar PV materials that replace conventional building materials in parts of the building envelopes, such as the rooftops or walls.

Furthermore, BIPV are considered as a functional part of the building structure, or they are integrated into the building's design [2].

One of the most prominent renewable distributed generation (DG) is the solar based on