

Using photovoltaic Solar Cells to Improve Residential-Commercial Complex Energy Efficiency

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Abstract

Iran is experiencing a rapid growth in the demand of energy, especially in residential and commercial buildings. The residential sector use forever 41% of total national electricity consumption. In order to promote sustainable development it is vital for Iran to reduce the usage of fossil fuels. The presented research evaluate the performance of solar photovoltaic flat panels in residential-commercial complex with environmental sustainability approach. For this purpose, it has been designed a residential building integrated photovoltaic. BIPV is an application where solar photovoltaic panel are integrated into the building structures such as the roof or the facade to produce electricity. Also by considering the building regulations such as optimal insolation and orientation, using the high thermal capacity of materials, double glazed windows, vertical awnings and passive design strategies an environmental sustainable building has been designed. Important parameters were measured, and analyzed to determine which roof form, orientations and PV types influence the power generations. It was estimated that by choosing the building in correct way of sunlight and using the natural daylight, energy consumption will be reduced by 20%. In this paper, the simulation of solar photovoltaic system is presented with PVSYST software and their performance was evaluated. The performance of power electronics are calculated. From the results by installing about 2600 m² solar photovoltaics in roofs and facades can produce about 500 KWh electricity daily.

Key words: Residential-Commercial Complex, Sustainability, Solar Energy, Photovoltaic, Passive design.

1. Introduction

In recent years, building design improvements for reduced energy use is typically measures that improve the thermal characteristics and/or that increase solar radiation gains through the transparent parts of the buildings. But, due to the high prices for energy and also