

## The Effect of Photovoltaic Integrated Shading Devices on the Energy Performance of Apartment Buildings in a Mediterranean Climate

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**Abstract :** With the depletion of traditional fossil resources and the growing human population, it is now more important than ever to reduce our energy usage and harmful emissions. In the Mediterranean region, the intense solar radiation contributes to summertime overheating, which raises energy costs and building carbon footprints, alternatively making it suitable for the installation of solar energy systems. In urban settings, where multi-story structures predominate and roof space is limited, photovoltaic integrated shading devices (PVSD) are a clean solution for building designers. However, incorporating photovoltaic (PV) systems into a building's envelope is a complex procedure that, if not executed correctly, might result in the PV system failing. As a result, potential PVSD design solutions must be assessed based on their overall energy performance from the project's early design stage. Therefore, this paper aims to investigate and compare the possible impact of various PVSDs on the energy performance of new apartments in the Mediterranean region, with a focus on Amman, Jordan. To achieve the research aim, computer simulations were performed to assess and compare the energy performance of different PVSD configurations. Furthermore, an energy index was developed by taking into account all energy aspects, including the building's primary energy demand and the PVSD systems' net energy production. According to the findings, the PVSD system can meet 12% to 43% of the apartment building's electricity needs. By highlighting the potential interest in PVSD systems, this study aids the building designer in producing more energy-efficient buildings and encourages building owners to install PV systems on the façade of their buildings.

**Keywords :** photovoltaic integrated shading device, solar energy, architecture, energy performance, simulation, overall energy index, Jordan

**Conference Title :** ICSBAM 2023 : International Conference on Sustainable Building and Architectural Models

**Conference Location :** Prague, Czechia

**Conference Dates :** July 03-04, 2023