

Design of Power Generating Leaf Shade Building

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Abstract: The core idea of this study is to propose a design of a building that is self-sustainable in terms of energy by harnessing renewable power from solar and wind energy sources. It utilizes the location with an innovative design and reducing energy consumption by implying advance green technologies, simultaneously. The building is shaded by a huge leaf like structure fulfilling multiple purposes: (1) Harnessing solar energy from installed photovoltaic (PV) modules, (2) Preventing it from direct sunlight and (3) Providing shade to reduce the cost of Heating Ventilation and Air Conditioning (HVAC). The building has three horizontal axis 100 kW turbines at three corners, directly exposed to coastal winds generating electricity, employed for three main purposes: (1) Harvesting the available wind energy at the site, (2) To support PV system in the times of low sun and (3) To earn revenue. Computer Aided Design (CAD) model has been presented to show design of the building. Annual electricity generation and consumption of the building has been estimated and the effect of leaf shading on HVAC and lighting applications has also been discussed. The building also takes advantage of net metering system. In order to ensure that our building saves sufficient energy and operates on ecofriendly processes the building is equipped with green features. This study proves that leaf shade, design of green buildings can be self-sustainable in terms of their energy requirements and electricity providing source.

Key words: Computational design, solar energy, wind energy, photovoltaic cells, green building

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