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Solar photovoltaic energy for corporate buildings

There are two main synergies which can be incorporated into modern building design to reduce the dependency of electrical generation on fossil fuels. These synergies are to reduce the overall energy need of the building through the use of energy efficient methods, and to meet some of the energy needs by implementing a renewable energy system.

This is according to Rupesh Vaga, Project Engineer, EES Africa (Pty) Ltd, who points out that even though alternative means of generating electricity are being researched and implemented, current electricity generation is still predominantly based on the burning of fossil fuels, which have a huge negative environmental impact.

EES Africa is an ISO 9001:2008 certified company providing management, engineering and auditing services to a range of industries throughout Africa. It has been instrumental in the implementation of the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) projects in South Africa to date.

“There are many renewable energy sources that can be used in a building, such as solar, wind, geothermal and biomass. These options should be evaluated carefully and research should be conducted before considering an appropriate design,” Vaga advocates.

Explaining the unique benefits of the solar option for South Africa’s weather conditions, Vaga continues: “In South Africa we are particularly lucky to have ample hours of sunlight and the solar resource that can supply energy.”

Solar panels

Photovoltaic (PV) arrays convert the light energy absorbed by panels into electricity. These panels are placed on the roof of a building and can be mounted on the roof of parking areas exposed to sunlight. The electricity produced by the panels can be stored in batteries and used to power various devices or systems.

Solar panel power gains

“Conversion of solar energy to electricity can however be a challenge, especially when low irradiance and high temperatures occur. It is therefore essential to implement methods which aim to optimise the power gains of the solar arrays,” states Vaga. “This can be done through maximum power point tracking (MPPT) and solar panel tracking.”

Maximum power point tracking (MPPT):

MPPT is a method that aims to obtain the maximum power from the solar cells by finding the point where the maximum power is obtained. MPPT optimises the match between the solar array and the battery bank or grid. By implementing this type of controller, the user can obtain about 20-45% power gain in winter and 10-15% in summer. The use of a MPPT is recommended when implementing a PV system.

Solar panel tracking:

Panel tracking is another method that can be implemented to enhance the power gain of the panels. The solar panels are mounted on a mechanical lever that is designed to follow the movement of the sun throughout the day, thus optimising output power. This method can improve power gains by about 35% in winter and 15% in summer. It can be implemented in conjunction with MPPT.

Black River Office Park in Cape Town is currently working on a project to produce 1.9 gigawatt (1.9 million kilowatt) hours per year. The system is currently the biggest roof mounted PV system in South Africa. Capex costs of such a system are relatively expensive, but the costs can apparently be recovered within seven years of the operational life span of the system.

Solar windows

“Solar window technology is another method can be used on the façade of buildings to add both aesthetic appeal and functionality,” says Vaga. “Today’s skyscrapers use a great deal of glass to create appeal and modernisation. This can be used to power the building.”

A thin PV film that uses the solar energy and converts this energy to electricity is placed on the glass. New developments in this field have brought about innovation, which ensures that the windows are fully transparent. This innovation may soon change the way modern buildings are designed.

Tshedimosetso House in Pretoria is the first building on the continent to implement a PV façade. Two different types of power generating glass which had never been tested in Africa have been used. The system, which produces 16.8KW of power, is connected to an inverter, which has been integrated into the building’s grid system.

The current electricity crisis in South Africa has resulted in investigation into and implementation of alternative energy sources. PV renewable energy should be considered for the rooves of corporate buildings to reduce dependency on fossil fuels. Solar windows can be implemented after the building is built and can also reduce dependency on the grid. Be energy smart and invest in your future energy needs today.

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EES company profile:

Established in 2001, EES Africa (Pty) Ltd specialises in the integration of multiple system infrastructure including ICT, Data Centres, Audio Visual, Life Safety, Security and Building Automation Systems. As an ISO 9001:2008 certified company, our vision is to be Africa's management, engineering and auditing professional service provider of choice. The EES Value Proposition focuses on translating technology into tangible deliverables for clients through the experience of a talented team of Engineering and ICT Consultants and Project Managers. With offices in Cape Town, Stellenbosch, Johannesburg and Durban, EES operates predominantly in the Renewable Energy, Oil & Gas, Financial Services, Infrastructure, Utilities, Telecoms and Mining sectors.

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