

Renewable energy can reduce overall energy need of buildings

Rupesh Vaga, project engineer at EES Africa, says 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.

“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 says.

“In South Africa we are particularly lucky to have ample hours of sunlight and the solar resource that can supply energy. 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. This can be done through maximum power point tracking (MPPT) and solar panel tracking.”

Advantages of 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.

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.

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