Evaluation Performance of Thermoelectric Generator Network for Cooling and Waste Heat Utilization of PV Solar Cell

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Description of the Project:

The work in this project include experimental and numerical simulation. The experimental work done in renewable and alternative energy unit Lab. To teste the three model of PV solar cell. Which are the PV solar cell only, PV solar cell with thermoelectric integrated, and PV solar cell with thermoelectric with fins. While the numerical simulation of the three types of PV solar cell done by using Comsol Multiphasic software V6. The simulation includes make validation with the experimental results. Also steady the effect the weather conditions such as (direct solar radiation, ambient temperature, and wind speed) on the performance of three types models of PV solar cell. As well as study the using the thermoelectric Peltier device on the cooling the solar cell, and harvesting the energy by absorb the heat from solar cell.

Objectives of the Project:

1. Reducing the temperature of the solar cells using a platter.
2. Harvesting thermal energy and converting it into electrical energy.
3. Calculating the amount of energy produced practically and theoretically.
4. Calculating the energy obtained after sunset, practically and theoretically.

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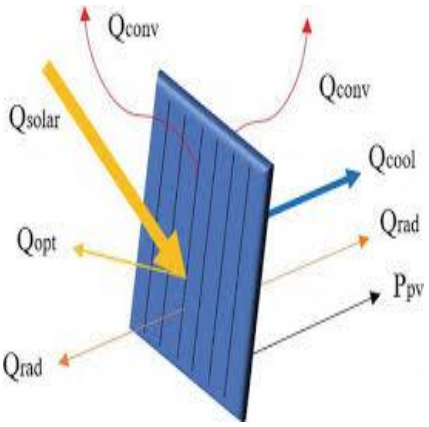

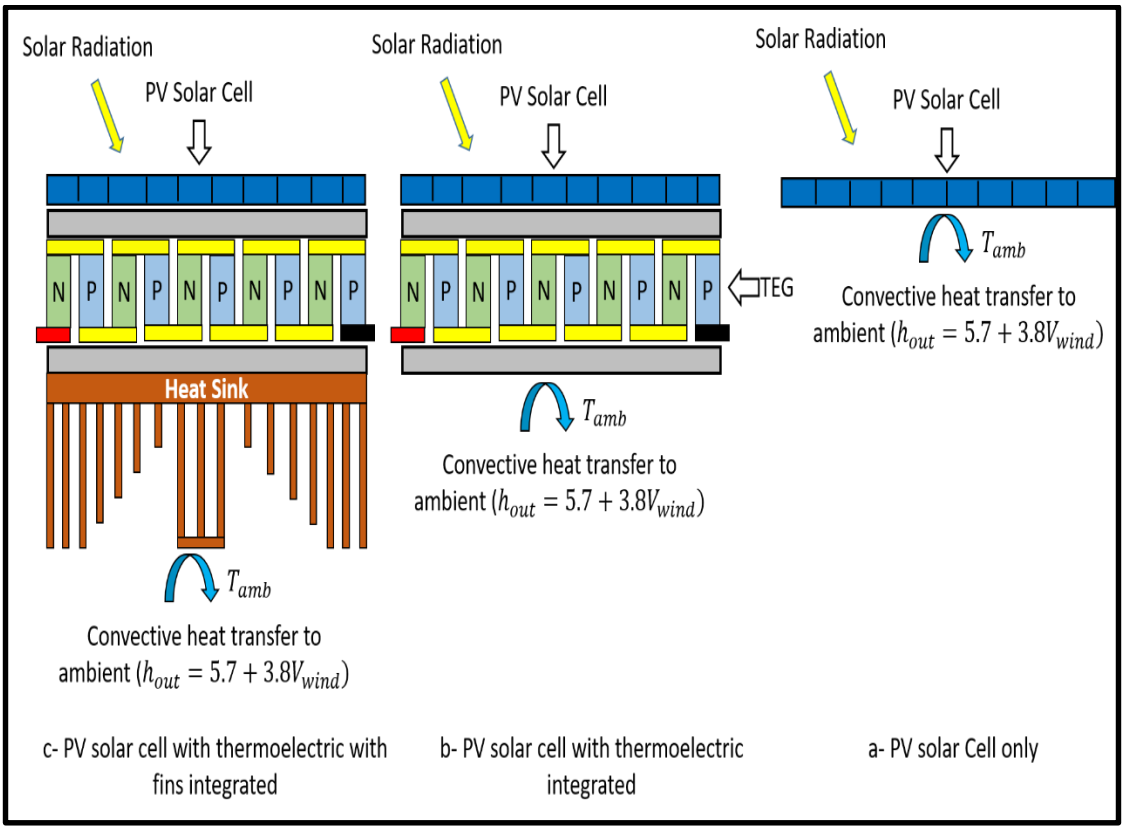
Solar Radiation
PV Solar Cell
N P N P N P N P N P
Heat Sink
T_{amb}
Convective heat transfer to ambient ($h_{out} = 5.7 + 3.8V_{wind}$)
c- PV solar cell with thermoelectric with fins integrated
Solar Radiation
PV Solar Cell
N P N P N P N P N P
TEG
T_{amb}
Convective heat transfer to ambient ($h_{out} = 5.7 + 3.8V_{wind}$)
b- PV solar cell with thermoelectric integrated
Solar Radiation
PV Solar Cell
T_{amb}
Convective heat transfer to ambient ($h_{out} = 5.7 + 3.8V_{wind}$)
a- PV solar Cell only