ELECTRICITY PRODUCTION FROM PV PANEL AND IMPACT OF TEMPERATURE TO PRODUCTION ON THE PANELS

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ABSTRACT: *DC voltage occurs when light falls on the terminals of the solar panels. The resulting performance values of electricity, the amount of light falling on varies depending on the angle of incidence and climatic parameters. The yield of the electrical energy obtained from conversion according to the structure of the battery is between 10% and 20%.*

KEYWORDS: Solar Cells, Modul, Temperature, Effect of Temperature, Pannel

INTRODUCTION

Photovoltaic structure is composed of twolayered silicon structure. On the N-type base has a thin P-type (Figure-1) material. The light falss on the joint of two material(junction), N- type material to be possitive by the P-type voltage whhic occurs. Output voltage is connected to the light intensity that is falling on the element. When the load is connected to outout, a current will flow. The magnitude of this current is connected to the light intenstity which is falling on the element and surface area of element.. These cells (batteries) can connect in series or in parallel to obtain voltage and current intensity can be increased.[2]

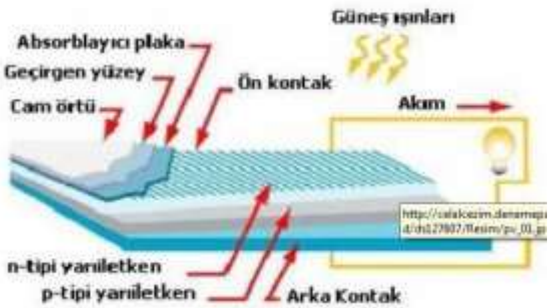

Figure - 1: The structure of the PV panels

PV ELECTRICITY PRODUCTION OF PANEL STRUCTURE OF PANEL

The top layer of the solar cell panels is occured coating and protection, which prevent against to breakage ,cracking. N-type and P-type semiconductor materials aralocated this layers. N and P type materials are occured . N-type and P-type materials are occured when the semiconductor material is in molten anda re doped which desired controlled substances. Mostly, polycrystallinesilicon is used cells as semiconductor materials. [4]

Semiconductor electronic circuit elements that make up the structure of Silicon and Germanium, isn't used in the production of circuit as pure elements.. Making contributions to

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this article valence band energy level up or pulled down Conduction band energy level. P-type semiconductors taken up the valence band called semiconductors. P-type semiconductor (Figure-2) installed in the space (hall) concentration is high.

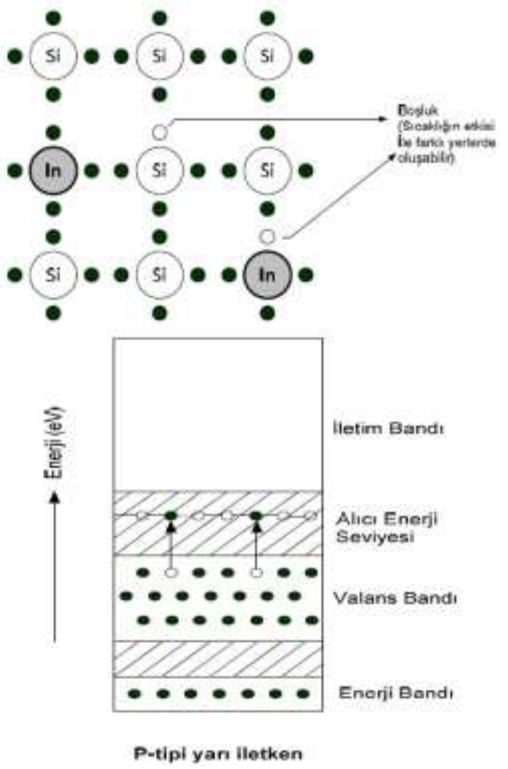

Figure - 2: P-type semiconductor

Who is pulled down the semiconductor conduction band is called N-type semiconductor (Figure-3). In the N-type semiconductor electron (e) concentration is high.

The sun sunlight falling on the modül is absorbed by photovoltaic cells. The doped Silicon material which is polarized with radiation effects (on the electrical gaps formed boron-doped p-type silicon material and phosphorus-doped material to the accumulation of electrons N) Silicon material is converted into a source of energy because the electrons liberated from taking the energy of the photon. Electrons which are separeted from the Ptype substance and accumulated to the N-type material, through the external circuit, This electrons return again halls which is formed on the P-type material[6]. DC current is occured a result of this constand and umdirectional. When the output load is connected, a current will flow. This current violence depends on the intensity of the light falling on the surface area and on the elements. These cells (batteries) connected (Figure-4, 5 ,6)in series or in parallel to obtain voltage and current intensity can be increased.

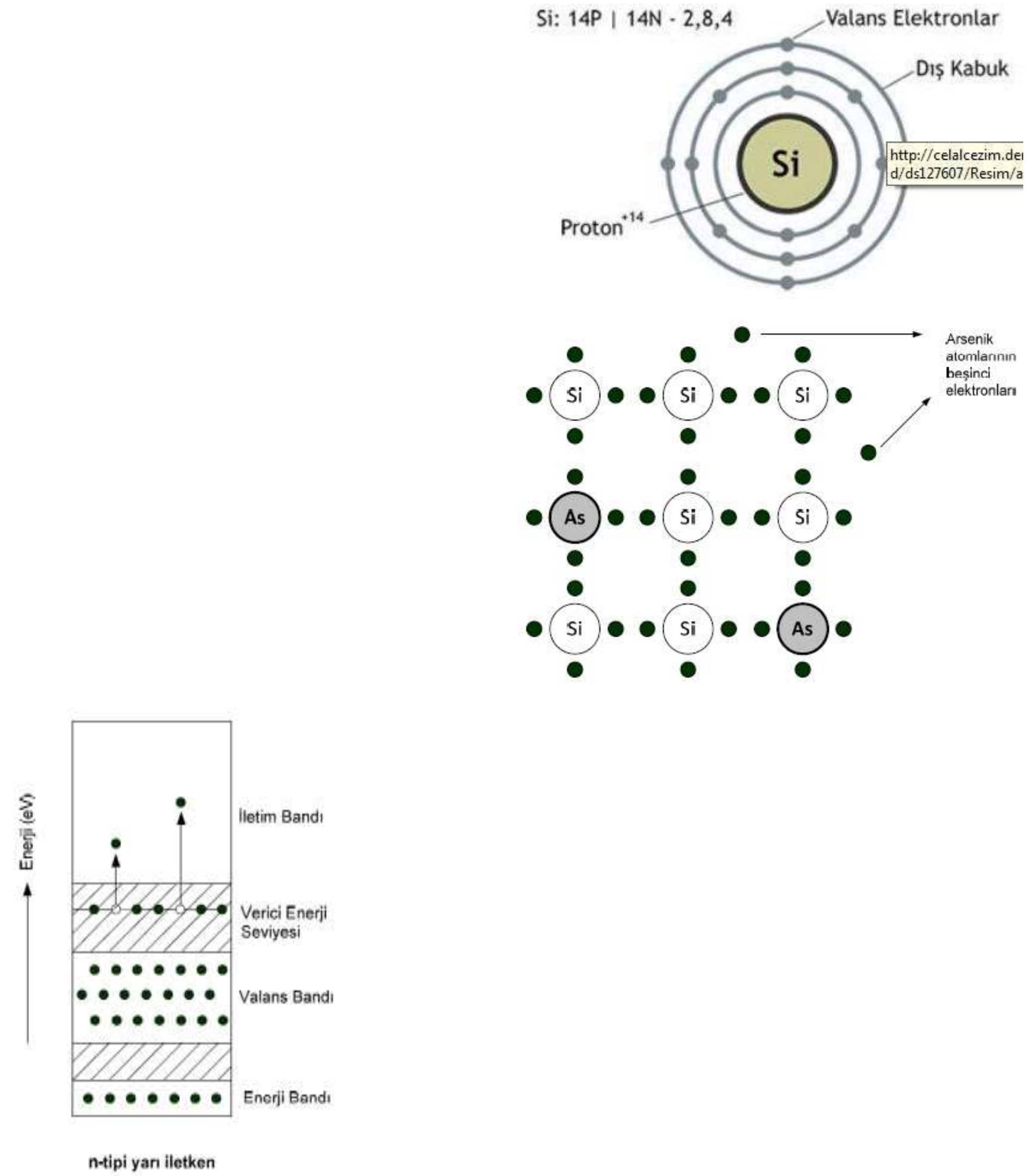

Figure - 3: n-type semiconductor

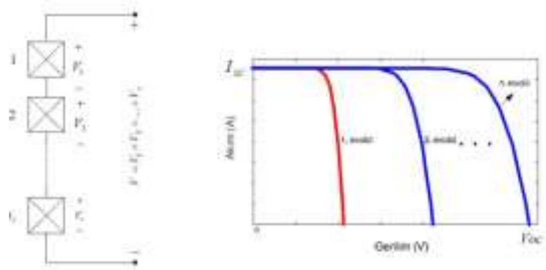

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Figure - 4: Series connection of the panel

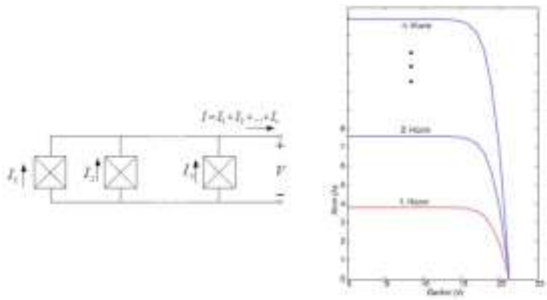

Figure - 5: Parallel connection of panels

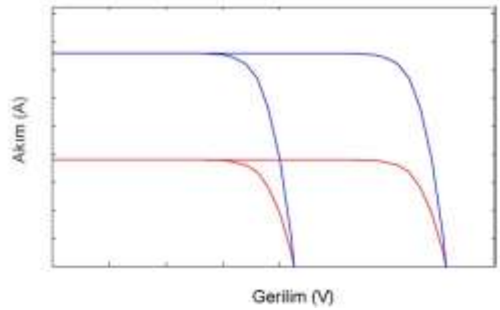

Figure - 6: Series-parallel connection of panels

EFFECTS OF TEMPERATURE ON PRODUCTION

To determine the performance parameters on a real PV cell is made by the following tests.

(i) Short circuit current (Isc)

(ii) Open circuit voltage (Voc)

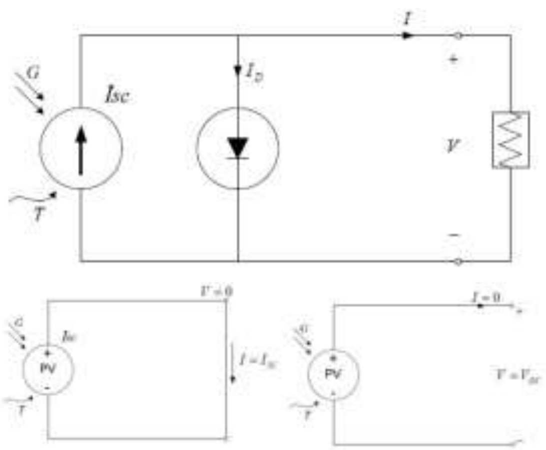

Figure - 7: Simple electrical equivalent model of a PV cell

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There is an inverse relationship between PV module power output and module temperature. I mean ,while module temperature increases PV module power decreases. Losses due to temperature is directly proportional to the cell temperature. If the ambient temperature rises, the cell temperature rises, which causes a reduction in the energy produced. (Short-circuit current of the PV cells increased with the increase in temperature, or circuit voltage is reduced.)

Ion and Von voltage and current in order to get the reference temperature. α and β get the current temperature and voltage coefficients. If the operating temperature would increase up to ΔT, new current and voltage are as follows [4].

$$I = I_0 \times (1 + \alpha \times \Delta T)$$

$$V = V_0 \times (1 - \beta \times \Delta T)$$

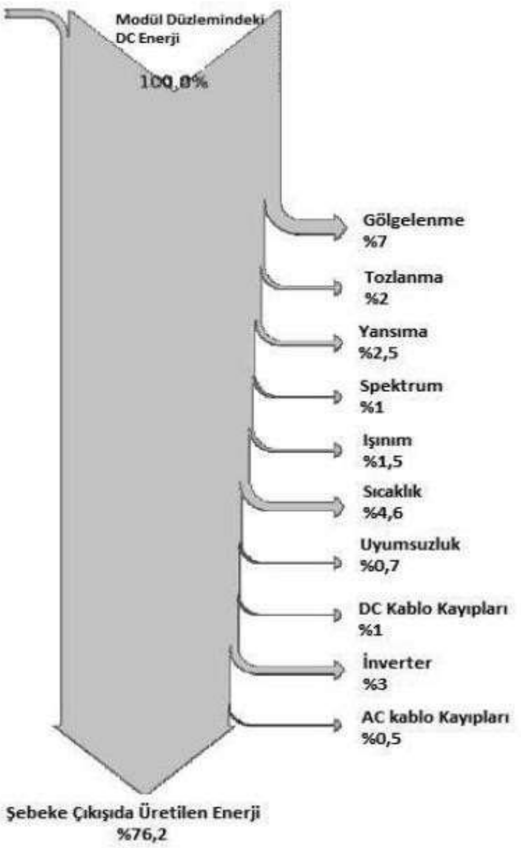

Figure - 8: Losses incurred in PV panels

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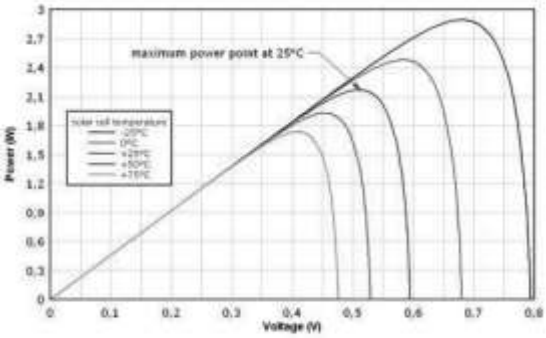
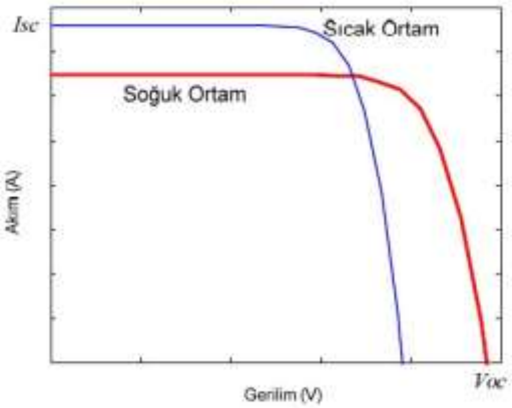


Figure - 9: Constant radiation and power outputs at different temperatures for a solar cell



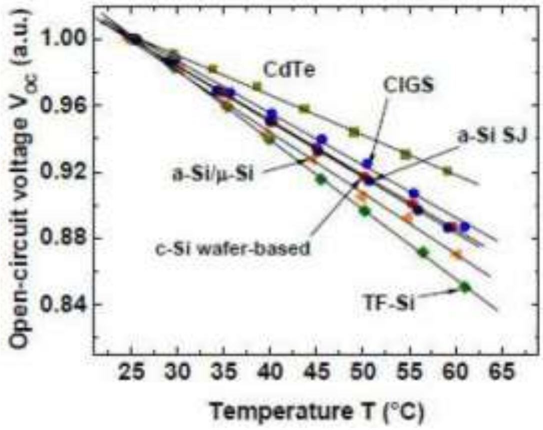


Figure - 12: The effect of temperature on PV

Figure - 10: Isc and Voc's Exchange that panel voltage according to the ambient temperature

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Accordingly, the temperature-dependent parameters of the PV cell (Figure-11, 12 13, 14) can be written as.

$$I_{SC}(T) = I_{SC} \times [1 + \alpha_{Isc} \times (T_{hücre} - 25)]$$

$$I_{mp}(T) = I_{mp} \times [1 + \alpha_{Imp} \times (T_{hücre} - 25)]$$

$$V_{OC}(T) = V_{OC} \times [1 - \beta_{Voc} \times (T_{hücre} - 25)]$$

$$V_{mp}(T) = V_{mp} \times [1 - \beta_{Vmp} \times (T_{hücre} - 25)]$$

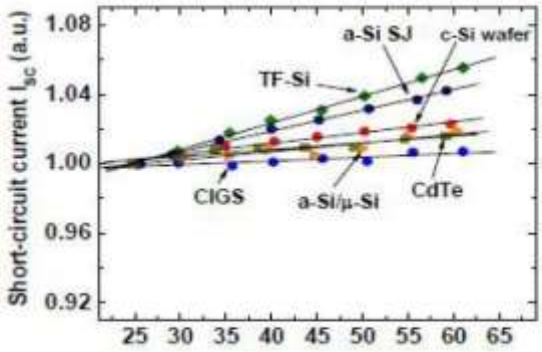

Figure - 13: The effect of temperature on current in the PV panels

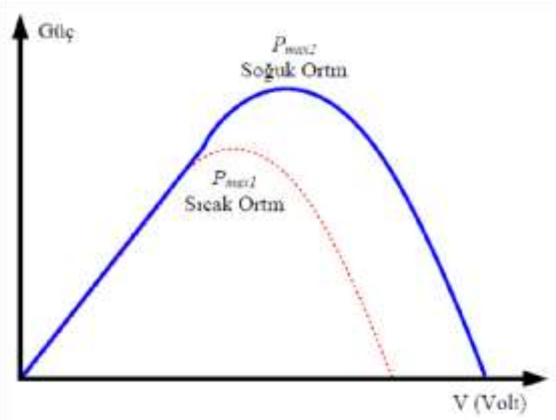

Figure - 11: According to the temperature W and V peak values

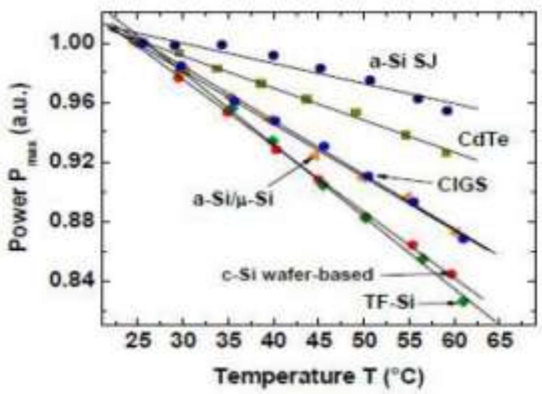

Figure - 14: The effect of temperature on PV panels to power

RESULT

Any T is the temperature on the PMP (T) is calculated to be asked;

$$P_{mp}(T) = V_{mp}(T) \times I_{mp}(T)$$

Cell temperature not only because of the ambient temperature also varies with the change in solar radiation The part of radiation that falls on PV cells, don't convert to electricity as heat released in the cell as "nominal operating cell temperature" is defined by Tnom. Tnom ambient temperature of 20 ° C, the solar intensity of 0.8 kW / m ^ 2 and wind speed of 1 m / s for defined. Cell temperature for different ambient temperatures is calculated as follows.

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$$T_{hücre} = T_{ortam} + \left(\frac{T_{nom} - 20}{0{,}8}\right) \times G$$

Here:

$T_{hücre}$= Cell Temperature (° C)

T_{ortam}= Ambient Temperature (° C)

G= Solar radiation (kW / m2)

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