RAWLEMON – THE SPHERICAL SOLAR GENERATOR

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Summary. *The prototype of the Rawlamon spherical solar generator is called beta.ray. This innovative technology has the shape of a glass globe wich is filled with water. Indeed, Rawlemon can convert both sunlight and light from the moon. This generator combines spherical geometry with a two-axis solar tracking system. Spherical lenses are able to focus up the sun light to a small focal point, that is connected to a photovoltaic panel. The photoelectric installation plays an important role in reducing environmental pollution. The conversion of solar energy into electricity is based on the internal photoelectric phenomenon. A spherical solar generator sounds like an imaginary idea that can help the transition from fossil fuels to fully renewable energy.*

Keywords*: renewable energy, generator, glass globe, technology, sun power*

Introduction

Human being has always sought to improve the environment in which he lives. Solar energy continues to convince a large number of users. Climate change and the potential depletion of fossil fuel resources are major concerns for humanity. The solution that can solve these problems in the long run is the use of renewable energy in electricity production. One of the basic solutions is focused on the direct use of solar energy to produce electricity as a result of its conversion process. German architect André Broessel revolutionized solar technology in 2012 by introducing Rawlemon's spherical solar generators. Rawlemon design uses a spherical lens to concentrate sunlight and moonlight at a small point in the photovoltaic panel, combining a dual-axis system that allows to track the sun. Rawlemon has two basic concepts: Solar electricity, and solar thermal energy, which provide high efficiency and low-cost energy, to provide humanity with transparent energy conversion generators. Rawlemon has the goal of producing the cleanest technology on earth, and to make the world a better place than we found it [1-4].

1. Solar radiation

The electromagnetic radiation transmitted by the sun to the Earth is divided according to the wavelength, depending on this, the energy level also changes, which we can see in Tab. 1 [4].

Tabel 1

The spectrum of electromagnetic radiation [4]

Type of electromagnetic radiation	Approximate wavelength range [m]	Energy level
Cosmic radiation	$<10^{-14}$	Very large
Gamma radiation	$10^{-14}…10^{-12}$	High
X-rays	$10^{-12}…10^{-8}$	High
Ultraviolet	$10^{-8}…10^{-7}$	High
Ultraviolet	$10^{-7}…10^{-6}$	Relatively high
Visible light	$0.38·10^{-6}…0.78·10^{-6}$	Moderate
Infrared	10^{-5}	Relatively low
Infrared	$10^{-5}…10^{-3}$	Low
Microwave	$10^{-3}…10^{-2}$	Low
Where TV	$10^{-2}…10^{-1}$	Very low
Radio waves	1	Very low

2. Operating principales

The innovative technology Beta.ray is able to reflect the sunlight and the moonlight in a beam that is aimed to a solar cell, due to its many optical fundamentals such as glass, mirrors and lenses.

Beta. rey has a surface with small photovoltaic panels, which are instaled on a double-axis system that has the ability to travel with the sun so that the sun's rays to fall perpendicular each time in order to achieve an optimal use of solar energy [3].

The optimal angle below which photoelectric panels should be tilted each month of the year to achieve greater efficiency are shown in Tab. 2. Thanks to this constant solar tracking system that is not present in classical photovoltaic installations, this invention can double the efficiency of a conventional panel with a much smaller area.

Tabel 2

Optimal angle of inclination of the panels [4]

Month	Optimum angle [degrees]	Month	Optimum angle [degrees]
January	64	July	13
February	57	August	26
March	45	September	41
April	30	October	55
May	16	November	62
June	9	December	64
The mean value of the angle of inclination 35 degrees			

In fact, due to the presence of water-filled acrylic polymer, which functions as a converging lens, we can concentrate a larger number of light rays, which helps increase the yield.

There are several types of beta.ray, depending on the size of the diameter of the ball. The 1.8 m diameter prototype contains 3055 liters of water and can generate 560 Watt electrical data (220 W / square meter) and 890 Watt thermal data (350 W / square meter), at an average of 3.4 kW·h per day.

A key point in increasing efficiency, which remains to be discussed by scientists, is the cooling system of the photovoltaic panel.

3. The photovoltaic cell

The photoelectric cell is the smallest component of the solar energy conversion plant. It is usually square in shape with a side of 12.5; 15 or 20 cm. Most of the time, there are plates made on the basis of monocrystalline silicon, polycrystalline or film. Photovoltaic cells are large surface semiconductor diodes.The photovoltaic cell ensures the transformation of solar radiation energy into electricity based on the internal photoelectric effect. The energy determined by the light radiation allows the electrons to pass from the valence band into the conduction band and the appearance of electric current in the external circuit (if closed), Fig.1.

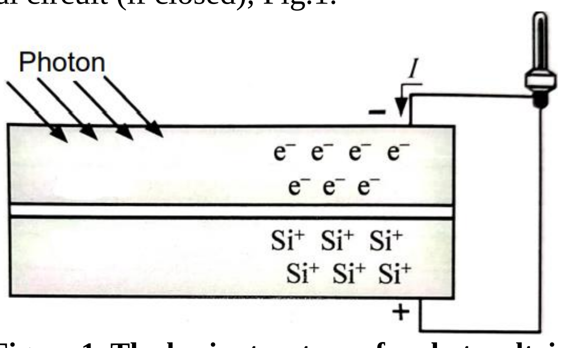

Figure 1. The basic structure of a photovoltaic cell [4]

To increase the number of electrons that can pass from the valence band to the conduction band, a material with less prohibited band width should be chosen. Calculations show that a 1.4 eV extension of the prohibited zone provides maximum power. In Fig. 2, the components of a photovoltaic cell are represented [4].

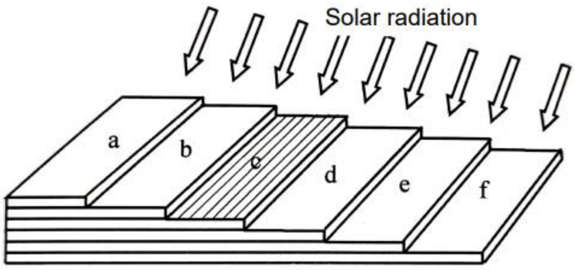

Figure 2. Components of a photovoltaic cell:
a - protective layer; b - anti-reflective layer; c - contact layer (positive pole); d – silicon N; e – silicon P; f – supporting layer (negative pole) [4]

4. **Apllications**

Instant impact and service can create and develop our interest in this modern technology. Compared to classical photovoltaic panels that are located in open spaces, for a higher incidence angle without shade, it can be combined by architects in different types of street or ecological design projects. This technology can be implemented in stations that can charge electric cars, windows that can produce green energy, autonomous power generators, etc. Rawlemon promotes off-grid performance in buildings, on land, in the air and at sea [3-6].

Conclusion

Rawlemon focused on the idea of producing greater efficiency using modern technology, thus developing the application of simple photovoltaic panels. Compared to classical photelectric panels, Rawlemon shows an improvement in efficiency of 15% efficiency thanks to the spherical lens that concentrates several solar rays [6].

Moreover, looking at the way of construction Rawlemon occupies at least 75% less surface area for photovoltaic panels used to convert solar energy, with mostly small carbon footprints [6]. In the case of a typical panel, the protective layer of the cell, namely the glass heats up much faster than the water in the globe, which generates less heat on the rawlemon panels making a higher efficiency.So we noticed that beta.ray presents a new hope for the future of renewable energies, offering much greater efficiency than simple panels due to its innovative construction.

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