

Green Tower – Solar and Wind Mill Powered High Mass for Circulating Area Illumination: An Overview

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Abstract: The concept of green tower means effectively planned office space. Fundamental division of the building into zones ensures obtaining very low ratio of common area only about 4%. Modular structure of the floors allows division of the area into small offices or studies (from 150 m²) or large open spaces located on entire floors. We are using green tower with the help of solar energy and wind energy for great area illumination, solar energy is generated by solar panels of PV cell, wind energy is generated by wind mills by their individual function after creating hybrid both the energy sources and charge the battery with help of controller and inverter we will generate electricity for great area illumination. The components like wind-mill, solar-panel, LED flood light and control box are mounted on 15 m tower. The battery in the control box is charged by wind mill and solar panel every day. During night the LED flood light (24 V/ 60W type total 8 nos.) are automatically switched on, illuminating the circulating area and switched off in the morning. When all LED flood light are on, total weightage consumption is 480 W. each LED flood light can be selectively programmed for 100% or 50% light output for busy or slack hours during night.

Index Terms- Green Tower, Wind Mill, Green Technology, Solar Panel etc.

1. INTRODUCTION

Energy is totally based on human life. There is hardly any movement that is independent of energy. Every moment of the day we are using energy. Earlier man used muscle power, then fire and animal power. Next, he learned to harness energy, convert it to useful form and put it to various uses. Over the past few decades, energy is the backbone of technology and economic development. In addition to men, machines and money, 'energy' is now the fourth factor of production [1] without energy, no machine will run, electricity is needed for everything. Hence, our energy requirements have increased in the years following the industrial revolution [5]. This rapid increase in use of energy has created problems of demand and supply. If this growing world energy demand is to be seen with fossil fuels, they will be no more available for producing the energy after few years. It is a need of today's world to concentrate on renewable energy source to satisfy the demand and conserve our finite natural resources for the generation to come.

2. FEATURES & SPECIFICATIONS OF GREEN TOWER [7]

- a) 15 mtrs. Self-support, triangular, tubular structure tower with inbuilt ladder for maintenance. Tower can withstand wind-speed of 150 kms/ hr.
- b) Wind-Mill: 24 V / 750 W type (Solar make)
- c) Solar-Panel: 24 V / 720 W type

- d) Battery: 24 V / 480 AH type, maintenance free.
- e) LED Flood-Light: 24 V / 60 W each (Total 8 nos.- Solar make)
- f) Battery Charged by wind mill & solar panel (State Electricity charging standby)
- g) Electricity Charger: 220 V / 50 Hz input, output 24 V at 30 Amps.
- h) Timer in-built for 100% or 50% light output for busy / normal mode of working.

3. GREEN TECHNOLOGY DEFINITION

The word green technology is comparatively new have been adopted just over the last couple of decades; green is the way to go today green is the way to go today. In order to understand what green technology is; let us first start with a simple green technology definition. Unlike the technological waves in recent decades, green technology is almost entirely materials science based. Relying on the availability of alternative sources of energy

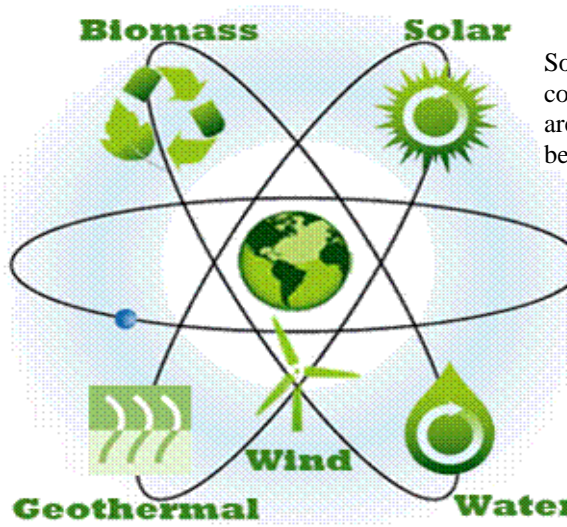


Figure 1: Green Technology Block diagram [3]

4. MAJOR COMPONENTS OF GREEN TOWER

Green Tower is generated green energy from two natural sources like as solar and wind:

- Solar panel
- Wind -Mill
- LED Flood-Light
- Control Box

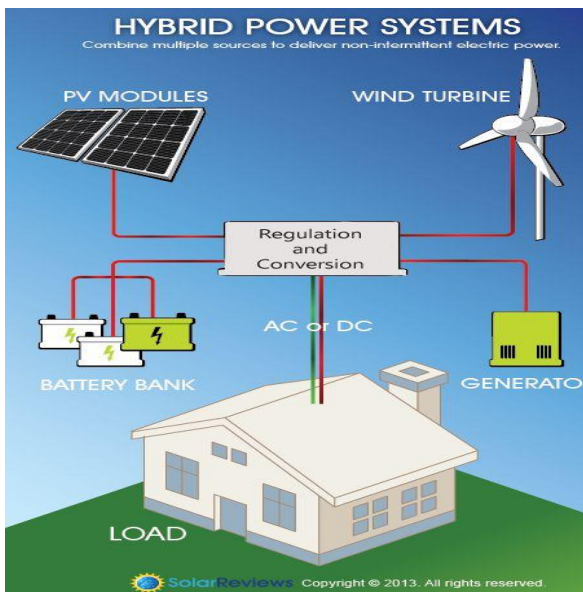


Figure 2: Green Tower [2]

5. SOLAR PANEL

Solar panels harness the energy of the sun light and convert it into usable electricity. In this article, we are going to have a detailed look at the theory behind the basic principle used in solar panels.[7]

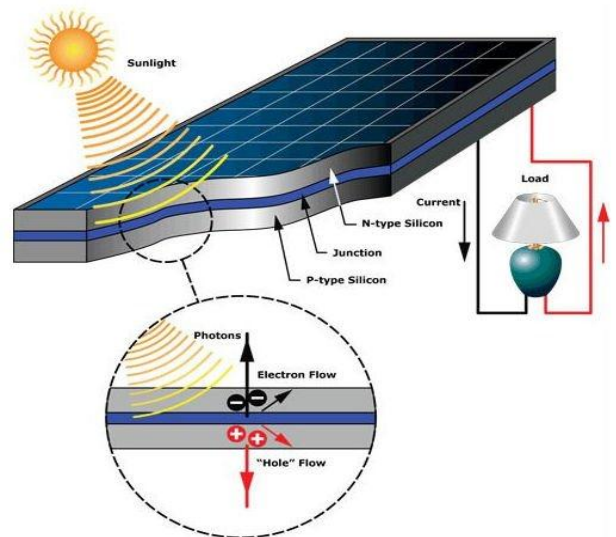


Figure 3: Solar Panel [2]

There is still another principle that guides the nature of solar panels. This refers to p-n junction solar cells used in solar panels. Here the material which is illuminated by the sun's energy is the source of current due to the parting of excited electrons and holes that are swept away in the dissimilar directions. This is caused due to the built in electric field of the p-n junction present at the depletion region[8].

Solar panels contain a system of solar cells that are interconnected so that they can transfer the induced voltage/current between one another so that the required parameters can pile up and a suitable throughout can be obtained. Series connections of solar cells in solar panels help add up the voltage and the same is true for solar cells connected using parallel connection.

Solar cells are secure from the mechanical damage as well as external factors like dust and moisture that can be severe to degrade their performance. Solar cells have materials that are mostly rigid. But when it comes to the thin films, they need extra care as they are available in semi-flexible nature.

It all depends upon how the solar panels are designed and manufactured. These factors help them produce electricity from a range of frequencies of light. Solar panels cannot be designed practically in order to internment photons of the entire spectrum of light emitted by the sun. Capabilities of solar panels that capture rage of frequencies mostly exclude the infrared, ultraviolet etc. and a poor performance is witnessed in the low or diffused light.

Another fact is that solar panels produce much lesser efficiency as compared to when their basic components viz. solar cells are used independently without any interconnections. Naturally, solar panels that are available commercially are only able to depict their best efficiency as low as 21%. Due to the significant impact of efficiency, a number of techniques are used in order to tweak the performance of solar cells.

Solar cells are planned in combination with concentrators which contain lenses to focus the light on to tightly packed and coupled array of solar cells. Although there is an increase in the design and implementation of the solar panels in terms of high cost per unit area, the basic motto of rise in efficiency is reached with least efforts. Thus the science and technology behind solar panels is increasing by the day and advancement in the same is occurring at a rapid pace.

6. WORKING PRINCIPLE OF SOLAR PANEL

PV cells change sunlight directly into electricity without creating any air or water pollution. PV cells are made of at least two layers of semiconductor material. One layer has a positive charge and the other negative. When light enters the cell, some of the photons from the light are absorbed by the semiconductor atoms, freeing electrons from the cell's negative layer to flow through an external circuit and back into the positive layer. This flow of electrons produces electric current [9].

Form the figure given below it can be found that the physics of the PV cell is similar to that of the classical diode with a pn junction. The energy form the light is absorbed by the junction. The absorbed photons are transferred to the electron-proton by the silicon system. And then it comes to electron flow in the circuit which could be used in electric load.

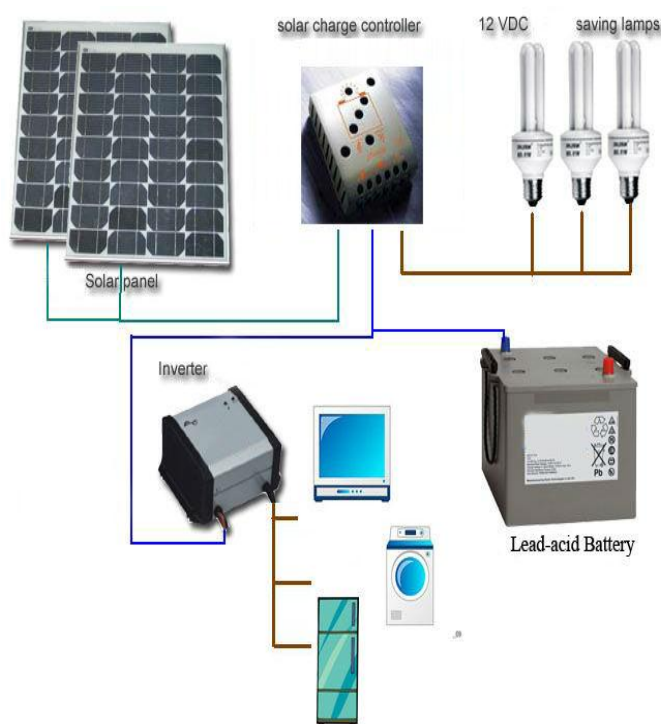


Figure 4: working of Solar Panel [7]

7. CONCLUSION

Wind and solar energy are reliable sources of electricity that can diversify our nation's energy portfolio. However, continued growth of renewable energy faces a serious challenge: the lack of transmission. Clean Line's direct current (DC) projects will deliver thousands of megawatts of renewable energy from the windiest and solar-rich areas of the United States to communities and cities that lack access to new, low-cost, clean power.

Wind is air in motion caused by natural factors like the uneven heating of the earth's surface by the sun, the rotation of the earth and the irregularities of the earth's surface. Wind energy has been used for centuries to move ships, pump water and grind grain. In the twentieth century, windmills were commonly used across the Great Plains to pump water and to generate electricity

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