

Design of Hybrid System Using Reflector for Isolated Areas

Saravanan A¹ Subhashini A² Deepak.M³ Shadhik.M⁴

¹Professor, Department of Electrical and Electronics Engineering, Dhaanish Ahmed College of Engineering College Chennai,
Assistant Professor, Department of Electrical and Electronics Engineering, Dhaanish Ahmed College of Engineering College,
Chennai, India

ABSTRACT: The project based on the concept of conservation of light energy from the lamps such as CFL, Incandescent etc and using the reflector to reflect the light energy to PV panel. The lamps are the essential things that we have been using day to day life. The Solar cells act as the light absorber which will convert the light energy into the electrical energy along with this the wind turbine which convert the kinetic energy in the wind into mechanical power is used to produce hybrid power So from that we can generate more energy and store this in a battery. The hardware implementation, Design and analysis of the Power generation from the light energy emitted from the lamps has been made in this project. The Solar panel with the reflector where the performance development has been scrutinized. This Hybrid power generation method is a pioneering approach which will provide the backup power generation system at the time of power failure. Emergency Lamp, Fan and Battery charging has been used as a load in this project. The load will vary when amount of power generated is varied.

Keywords: Voltage, Current, Power, Illumination level, Depreciation Factor, Utilization Factor

I. INTRODUCTION

The less availability of non-renewable energy resources increases the power demand. So by the application of hybrid energy system based rural remote area electrification will offer a power for household needs especially for light duty appliances. In this research we have been worked on the new hybrid system by combining energy from the Light and the wind energy.

This concept have been already worked using the Infrared led's and fluorescent lamps. The Led will also act as the light absorber so it is able to generate electricity but the power generated from this Led arrays on the tube light are very less it is 12V, 21 μ A. Here we worked on the incandescent lamp with the reflector to reflect the light to the PV panel for effective utilization.

The use of the lamps becomes the essential thing in our day to day life. In all the places they use the lamps; the number of lamp used will vary depending upon the environment. The environment such as Railway station, Class rooms, saw mills, Ware house, Food Industry, Companies etc. So we would be able to install this system in any of the above applications and power generated can be stored in the battery and that can be used to feed to the loads whenever a power shut down occurs. The overall system design and the work proceeded have been discussed in this paper.

II. Hybrid Power Generation Technique

Hybrid Renewable Energy System (HRES) is becoming popular in remote area due to advancement in renewable energy technologies. Usually a hybrid system consists of two or more renewable energy sources to increase the

system efficiency as well as greater balance in energy supply. The example of hybrid energy system is a photovoltaic array coupled with a wind turbine which can generate more output from wind turbine during winter and the solar panels produce more output during summer. The wind power developed by the turbine is given by the equation

$$P = \frac{1}{2} C_p \rho A V^3$$

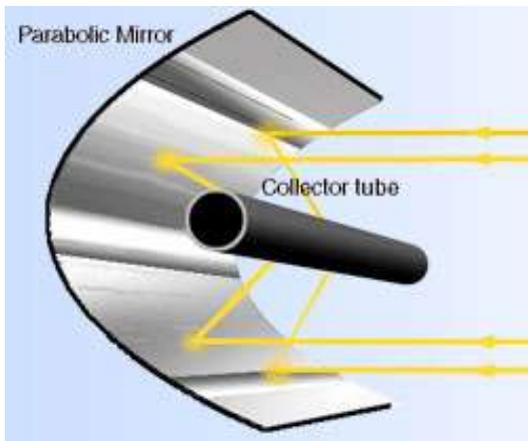
Where C_p is the Power Co-efficient, ρ is the air density in Kg/m^3 , A is the area of the turbine blades in m^2 , and V is the wind velocity in m/sec .

a. Parabolic reflector

The model which we have proposed will consist of the parabolic reflector type. Its shape is part of a circular paraboloid, that is, the surface generated by a parabola revolving around its axis. The reflector and the panel can be adjustable manually. This is because that the incident angle on the earth will get vary depend on its movement. The parabolic reflector converts the incoming plane wave travelling along the axis into a spherical wave converging toward the focus. Here the variation will be very small and the parabolic reflectors are used to collect light energy from distant source and bring it to a common focal point. So that we can improve efficiency of the system. The module is the parabolic reflector type the panel can be focused outward in a parallel beam.

The parabolic reflector functions due to the geometric properties of the paraboloidal shape, any incoming ray that is parallel to the axis of the dish will be reflected to a central point, or "focus". Because many types of energy can be

reflected in this way, parabolic reflectors can be used to collect and concentrate energy entering the reflector at a particular angle. Similarly, energy radiating from the focus to the dish can be transmitted outward in a beam that is parallel to the axis of the dish.



III. TEXT RECOGNITION

A Power Generated from the Single incandescent Lamp along with reflector using the Solar Cells: the Block Diagram of the arrangement of single incandescent lamp along reflector with solar panel has been shown in fig

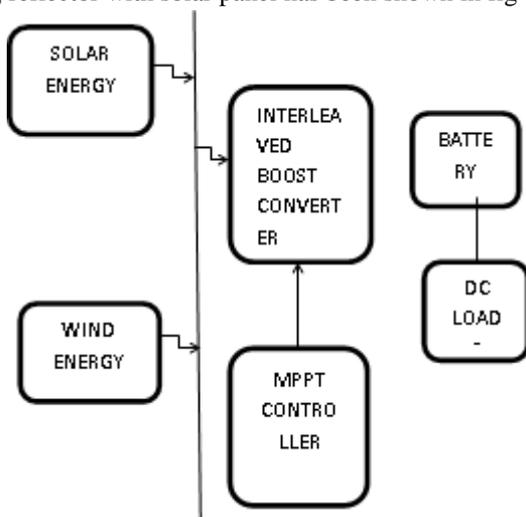


Fig: 1 Block Diagram of the Single Incandescent Lamp and reflector with Solar panel

The system contains Incandescent lamp, Solar panel, reflector, Voltage Regulator and the Battery unit. The block diagram depicts the power generation on the individual lamp. The light energy from the lamps and also reflector reflects the light to the PV panel which converts it into the useful electrical energy. The more sunlight that is absorbed, the more energy that can be produced. And that will be regulated by the voltage regulator IC 7805 and then stored in the battery

a. SOLAR PANEL

Photovoltaic panel converts solar energy directly into electrical energy. This electrical energy is given to the charge controller. In a Photovoltaic panel, cells are soldered together to produce a 36 cell string (or longer). This string is laminated between toughened glass on the top and an electrical back contact. The string consists of four layers: antireflective coating, contact grid, p-n junction.

b. CONVERTER

An infinite number of converters can be possible. The converter contains switches which is embedded in a network of inductors and capacitors. Two class of converters are :

- Single-input single-output converters containing a single inductor.
- Single-input single-output converters containing two inductors.

For both the types the switching period is divided into two subintervals.

c. BATTERY

The smallest element of the battery is a cell. Many cells are connected in series to give required voltage rating of the battery which usually varies with the inverter rating lies between 12V DC. They must supply constant output power because the inverter delivers a constant output voltage to the load. As the battery voltage decrease (due to battery discharge), then the battery current increases to maintain constant output voltage and hence constant output power. The output voltage and current fed to the inverter.

d. INVERTER.

This medium power inverter is capable of generating approximately 300 power. You can power the inverter from your battery to generate 50Hz ac supply. The inverter provides enough backup power to light up to three 100W bulbs for up to 2 hrs provided the battery is full charged. The battery can be charge through battery charger circuit whenever it discharges. Inverter gives output of 230v, 50Hz AC supply. This output given to the load.

e. PROBABLE CIRCUIT

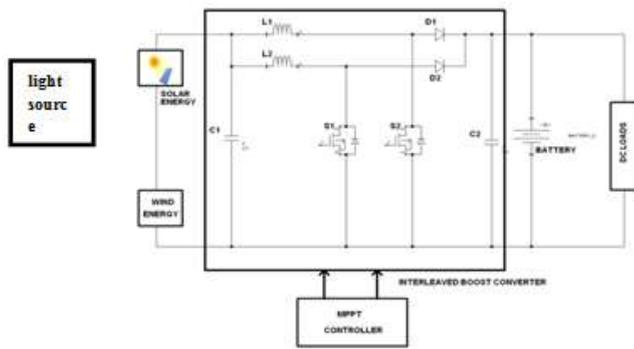
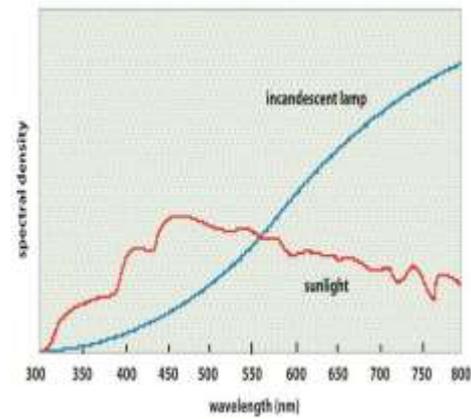


Fig proposed system circuit diagram



The PROPOSED CIRCUIT DIAGRAM

The proposed system consists of solar energy, wind energy, interleaved boost converter, mppt, battery and load. Solar panel produces DC electrical energy from sunlight using photovoltaic effect. Wind energy system produce electrical energy using the motion of wind. Wind-solar energy systems are combined to produce hybrid energy system. The output of the interleaved boost converter is given to battery to store the energy and the stored energy in the battery is given to DC load.

OBJECTIVES

The aim of the work is design and implementation of a light-wind hybrid energy system. the work is expected to help to understand the basics of wind-light hybrid power generation. A small part of the daily electricity consumption with an efficient utilization of light energy and wind power. Here we made a hybrid system where the light power is stored in a battery and the combination of battery output and wind power output fed to the load. Because of the availability of wind and light source is throughout the day and night. In brief the objectives are:

- Wind power generation
- Generate power using light source
- Storage of generated light energy
- To design a suitable charger for battery
- Make a wind light source hybrid power system.
- Display electrical power output using LED lighting system methods.

IV. CONCLUSION

The project is put forwarding an innovative approach on power generation from the light The calculation is done on the a single lamp and also further calculation has been made based on referring the Illumination engineering Standards and basic principles concept. The calculation shows that we can generate more power depend on the application where it has been installed .And this power is stored in battery can be used to operate the load at the power shutdown periods. The Performance analysis of the light with reflector is also done n this project .It is an Hybrid technique where we need an alternative source to act as a backup for the other .In this project the wind energy from the reflector will act as the backup scheme when the lamps are not working then we can use the energy generated from the wind .On the place of light with reflector we can also use other advanced tracking system such as MPPT etc .In order to make it has cost effective the Reflector concept has been used .And also other renewable energy sources can also be used an hybrid with this project .And that depends on the place where it has been implemented

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