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DESIGN OF HYBRID SYSTEM (WIND AND LIGHT) USING REFLECTOR FOR ISOLATED AREAS

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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 combination of wind-solar generation systems can considerably reduce the storage capacity of batteries and the total cost of the system. But the efficient and reliable operation of these hybrid systems depends on 1) their availability at all times, and 2) the control strategies of their controller The overall system design, Hardware implementation and the performance have been discussed in this paper.

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

I. INTRODUCTION

Energy is playing an important role in human and economic development. One of the driving forces for social and economic development and a basic demand of nation is energy. Most of the energy production methods are one-way, which requires change of form for the energy. In parallel to developing technology, demand for more energy makes us seek new energy sources. Researches for renewable energies have been initiated first for wind power and then for solar power.

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 µA. 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 applicationsand power generated can be stored in the battery and that can beused 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. SOURCES OF POWER GENERATION

The conventional energy sources are limited and have pollution to the environment. For this reason more attention has been paid to the utilization of renewable energy sources such as wind energy, fuel cell and solar energy etc. Wind energy is the fastest growing and most promising renewable energy source. During last two decades, the high penetration of wind turbines in the power system has been closely related to the advancement of the wind turbine technology and the way of how to control. Doubly-fed induction machines are receiving increasing attention for wind energy conversion system during such situation [6]. Wind turbine is classified into two general types: 1. Horizontal axis and 2.Vertical axis. The limitations on the extraction of energy from the wind include the practical size of wind machines, their density, friction losses in the rotating machinery and efficiencies of conversion from rotational energy to electrical energy. A windmill works on the principle of converting kinetic energy of the wind to rotary mechanical energy. In more advanced model the rotational energy is converted into electricity [7]. Wind turbines convert the kinetic energy present in the wind into mechanical energy by means of producing torque. Since the energy contained by the wind is in the form of kinetic energy, its magnitude depends on the air density and the wind velocity.The amount of power transferred to a wind turbine is directly proportional to the area swept out by

the rotor, to the density of the air, and the cube of the wind speed.

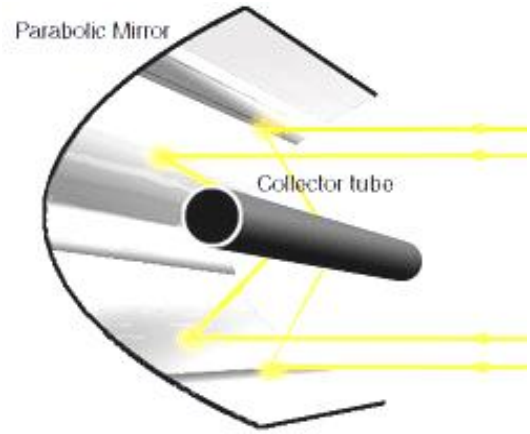
The wind power developed by the turbine is given by the equation

$$P=1/2\ Cp\ \rho\ AV3$$

Where Cp is the Power Co-efficient, ρ is the air density in Kg/m3 , A is the area of the turbine blades in m2 , and V is the wind velocity in m/sec.

a. Parabolic reflector

A parabolic (or paraboloid or paraboloidal) reflector (or dish or mirror) is a reflective surface used to collect or project energy such as light, radio waves. Its shape is part of a circular paraboloid, that is, the surface generated by a parabola revolving around its axis. The parabolic reflector transforms an incoming plane wave traveling along the axis into a spherical wave converging toward the focus. Conversely,



a spherical wave generated by a point source placed in the focus is reflected into a plane wave propagating as a collimated beam along the axis. Parabolic reflectors are used to collect light energy from a distant source and bring it to a common focal point, thus correcting spherical aberration found in simpler spherical reflectors. Since the principles of reflection are reversible, parabolic reflectors can also be used to project energy of a source at its focus outward in a parallel beam used in devices such as spotlights and car headlights.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.

II. PROPOSED SYSTEM

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

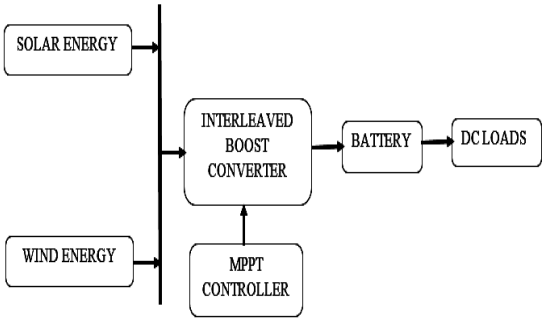


Fig: 1 Block Diagram of the Single Incandescent Lamp and reflector with Solar panel

The system contains Incandescent lamp, Solar panel, reflector, Voltage Regulator and the Battery unit. The block diagram depicts the power generation on theindividual lamp. The light energy from the lamps and also reflector reflects the light to the PV panelwhich converts itintothe useful electrical energyThe 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

A boost converter (step-up converter) is a DC-to-DC power converter with an output voltage greater than its input voltage. It is a class of switched-mode-power-supply (SMPS) containing at least two semiconductors (a diode and a transistor) and at least one energy storage element, a capacitor, inductor, or the two in combination. Filters made of capacitors (sometimes in combination with inductors) are normally added to the output of the converter to reduce output voltage ripple.

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 in erter 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 lOOW 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. PROPOSED CIRCUIT DIAGRAM

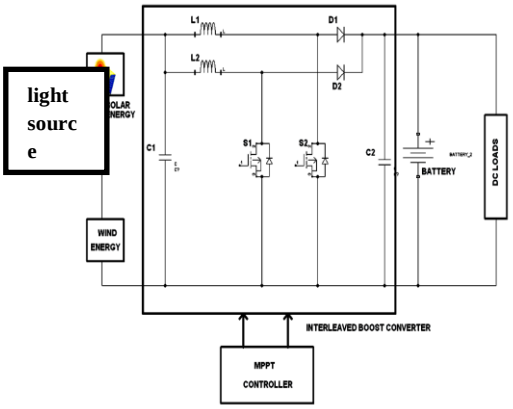


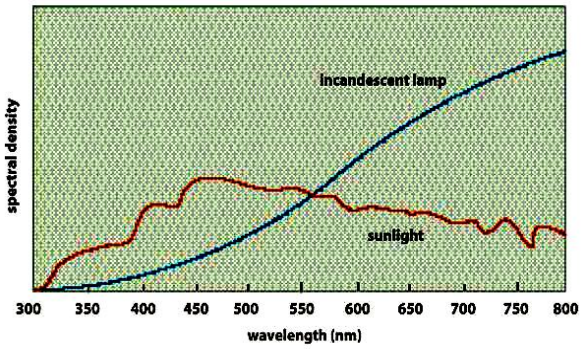
Fig proposed system circuit diagram

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 interleaved boost converter is used to improve efficiency, reduce ripple, and shrink capacitor and inductor size in buck converters, the multiphase approach can provide the same benefits for boost converters.Theoutput of the interleaved boost converter is given to battery to store the energyThe 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.



CONCLUSION

Our study focused on designing a model that would allow us to find the optimal system design parameters

of a hybrid wind-light source system, taking into consideration the number of pv panel arrays and wind turbines, as well as the wind turbine rotor diameter and height. The objective was to meet the load of different applications using our designed hybrid system, while minimizing cost

In this work the collection of the pv panel was enhanced by 76.5% from that of the single panel with the help of reflectors. Further energy obtained using the windmill and altered design together adds to an increase in the efficiency by an overall margin of above 50%. The provision of hybrid wind-light source energy system to power the storage battery street lights and power grid.

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