

Hybrid Power Generation by Using Solar and Wind Energy

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Abstract- Now a day's electricity is most needed facility for the human being. All the conventional energy resources are depleting day by day. So we have to shift from conventional to non-conventional energy resources. In this the combination of two energy resources takes place i.e. wind and solar energy. This process reviles the sustainable energy resources without damaging the nature. We can give uninterrupted power by using hybrid energy system. Basically this system involves the integration of two energy system that will give continuous power. Solar panels are used for converting solar energy and wind turbines are used for converting wind energy into electricity. This electrical power system can be utilize for various purpose. Generation of electricity will takeplace at affordable cost. This paper deals with the generation of electricity by using two sources combine which leads to generate electricity with affordable cost without damaging the nature balance.

Keywords-electricity, hybrid, solar, power, wind.

I. INTRODUCTION

Electricity is the basic necessity in our day to day life. There are two ways o electricity generation i.e., conventional and non conventional energy resources. With the increased demand of electrical energy the generation has to be increased. The Electrical energy is generated now a days using conventional energy resources like coal, diesel, nuclear, etc. The major drawback of conventional energy generation is that it produces waste like ash in coal power plant, nuclear waste in nuclear power plant and taking care of this wastage is very costly. And it also damages the nature.

The new source should be reliable, pollution free and economical. The non-conventional energy resources should be good alternative energy resources for the conventional energy resources. There are many non-conventional energy resources like geothermal, tidal, wind, solar etc. the tidal energy has drawbacks like it can only implemented on sea shores. While geothermal energy needs very lager step to extract heat from earth. Solar and wind are easily available in all condition. The combination of renewable energy sources, wind & solar are used for generating power called as wind solar hybrid system. This system is designed using the solar panels and small wind turbines generators for generating electricity.

II. HYBRID SYSTEM

Hybrid energy system is the combination of two energy sources for giving power to the load. In other word it can defined as "Energy system which is fabricated or

designed to extract power by using two energy sources is called as the hybrid energy system." Hybrid energy system has good reliability, efficiency, less emission, and lower cost. In this proposed system solar and wind power is used for generating power. Solar and wind has good advantages than other than any other non-conventional energy sources. Both the energy sources have greater availability in all areas. It needs lower cost. There is no need to find special location to install this system.

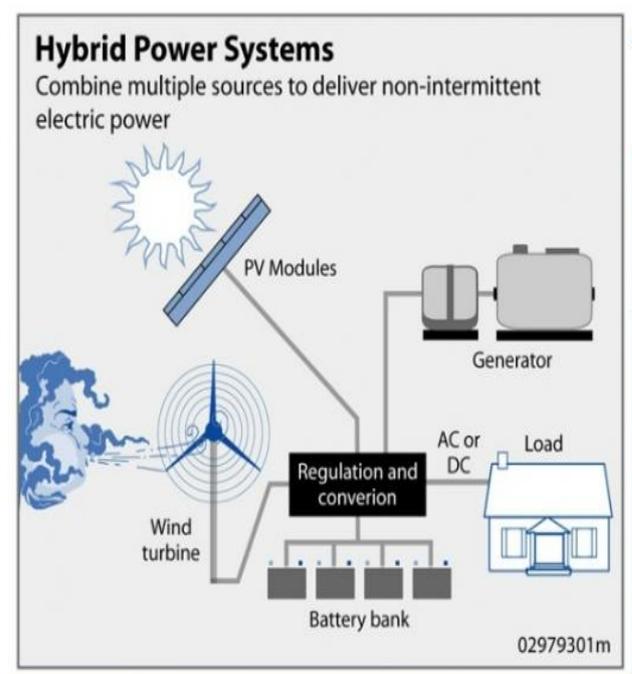


Fig.1 Hybrid solar & Wind energy system.

III. HARDWARE DESCRIPTION

The proposed hybrid system is designed based on the data of the solar energy and wind energy, the data required for the solar energy system is annual daily duration of sunshine hours and daily solar radiation horizontal (KWH/m²/day) and the data required for the wind energy system is Mean Annual Hourly Wind Speed (m/sec) and Wind Power that can be generated from the wind turbine. The block diagram below shows the hardware description of the solar wind hybrid system

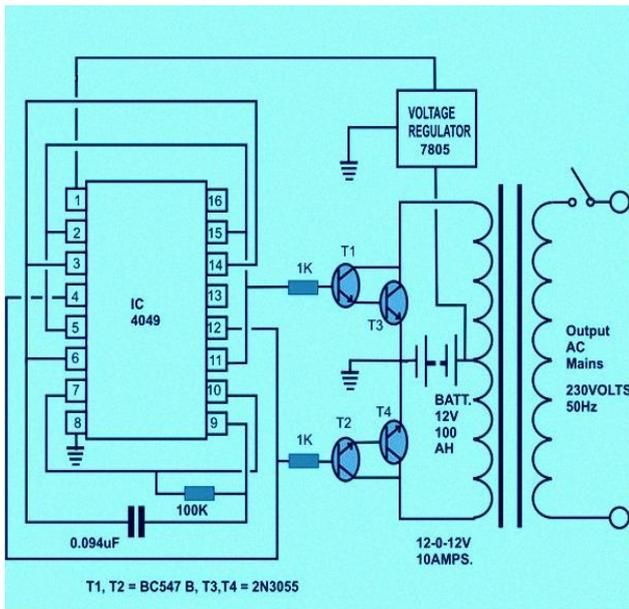


Fig 2 Block diagram of the proposed system.

1. Solar panel

Solar panel is use to convert solar radiation to the electrical energy. The physical of PV cell is very similar to that of the classical diode with a PN junction formed by semiconductor material. When the junction absorbs light, the energy of absorbed photon is transferred to the electron proton system of the material, creating charge carriers that are separated at the junction. The charge carriers in the junction region create a potential gradient, get accelerated under the electric field, and circulate as current through an external circuit. Solar array or panel is a group of a several modules electrically connected in series parallel combination to generate the required current and voltage. Solar panels are the medium to convert solar power into the electrical power.

2. Wind turbine

Wind turbine is that system which extracts energy from wind by rotation of the blades of the wind turbine. Basically wind turbine has two types one is vertical and another is horizontal. As the wind speed increases power

generation is also increases. The power generated from wind is not continuous its fluctuating. For obtain the non-fluctuating power we have to store in battery and then provide it to the load.

3. Charge controller

Charge controller has basic function is that it control the source which is to be active or inactive. It simultaneously charge battery and also gives power to the load. The controller has over-charge protection, short-circuit protection, pole confusion protection and automatic dump load function. It also the function is that it should vary the power as per the load demand. It add the both the power so that the load demand can fulfill. And when power is not generating it should extract power from battery and give it to the load.

4. Inverter

We have to choose greater rating inverter than the desired rating .The pure sign wave inverter is recommended in other to prolong the lifespan of the inverter. Inverter is need to convert DC power into AC power. As our load working on the AC supply so we need to convert DC power. The input voltage Output voltage and frequency, and overall power handling depends on the design of the specific device or the circuitry. The inverter does not produce any power. The power is provided by the DC source.

IV. FIGURES AND TABLES

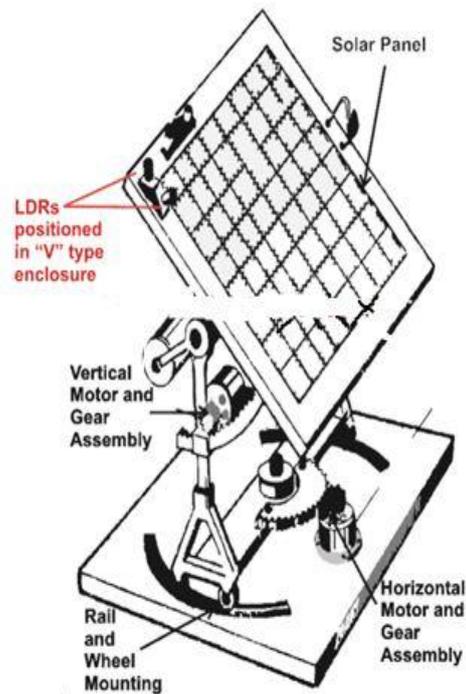


Fig 3 Solar inverter design.

IV. PROPOSED CALCULATION

The total power generated by this system may be given as the addition of the power generated by the solar PV panel and power generated by the wind turbine. Mathematically it can be represented as,

$$PT = NW * PW + NS * PS$$

Where,

PT- is the total power generated

PW- is the power generated by wind turbines

PS -is the power generated by solar panels

NW- is the no of wind turbine

NS - is the no of solar panels used

V. SOLAR TRACKING SYSTEM

The device is able to track the daytime motion of the sun precisely and shift in the vertical axis accordingly. The device also effectively tracks the seasonal displacement of the sun and moves the entire mechanism in the horizontal plane or in a lateral motion such that the orientation of the solar panel is always kept in a straight axis to the sun so that it complements the vertical actions of the tracker appropriately.

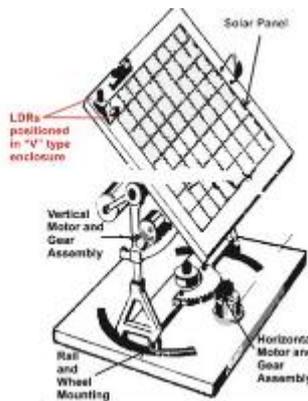


Fig- 4 solar tracking system.

The position of the LDRs are critical here and the set of LDR which corresponds to this vertical plane movement is so positioned that it senses the sun light accurately and tries to keep the panel perpendicular to the sun rays by moving the motor in the appropriate direction through a definite number of stepped rotations. The LDR sensing is actually accurately received and interpreted by an electronic circuit which commands the motor.

VI. EXPERIMENTAL SETUP

As per the above proposed system the solar panel and the vertical axis wind turbine is being installed. The solar panel is fixed with the solar tracking system with the LDR to track the sunshine. The proposed system is shown in the figure below



Fig 4: Experimental setup

VII. CONCLUSION

Hybrid power generation system is effective solution for power generation than conventional energy resources, has greater efficiency, with reduced transmission losses and cost. Cost reduction can be obtained by increasing the production of the equipment. The increase in the use of hybrid system is highly safe for the environment as it doesn't produce any harmful radiations and waste product like conventional energy resources.

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