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# Generation of Electricity by Using Hybrid System (Non-Conventional Energy Resources)

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**ABSTRACT:** Now a day's most needed facility for the human is electricity. Hybrid power generation system is effective and good solution for power generation than conventional energy resource. Conventional energy resources destroying day by day. We use non-conventional energy resources for generating electric power which is uninterrupted power. Basically this system involves the combination (integration) of two energy system that will give continuous power. It is safer for the environment and it doesn't produce any emission, smoke and harmful waste products like conventional energy resources. Solar panels and wind turbines are used convert solar energy and wind energy into electricity. This power utilize for various purpose. This paper deals with the detailed of hybrid system of a solar-wind energy for generation of electricity with affordable cost.

**KEYWORDS:** Solar power, Wind power, Hybrid generation energy, Inverter.

## I. INTRODUCTION

Electricity demand increases in the world day by day, so it fulfils demand we have to generate electricity. Now in the world electricity is most needed for various type of work. Electricity generated by two ways i.e conventional and non-conventional energy resources. In conventional energy, for generation of electricity uses resources energy like coal, diesel and nuclear etc. By using this resources not only generate electrical energy but also generated wastage product. And this wasteproduct is very harmful to human being and also environment. Waste product like Ash and Nuclear produced by coal and nuclear power plant Disposed of wastage product are goes to very costly. In conventional energy resources destroying day by day. In future one day non-renewable energy will end then we will use to another way of source for generating electricity. That new source should be pollution free, economical and reliable etc. The non-conventional resources are best alternative resources(i.e. solar and wind). Solar and wind are easily available in all environment condition. Geothermal, Tidal are all non-conventional energy resources. But this non-conventional energy resource has drawback like tidal only implemented on seahorse and geothermal needs large step to extract heat from earth. Solar also has drawback that it does not produce electrical energy in cloudy and rainy season, so we need overcome this drawback is combination of two energy resources. If anyone of them one of them fail then other source will continue generating of electrical energy, and in good weather condition use both sources for generating of electrical power. A number of storage technologies based on electrical, mechanical, chemical and thermal energy storage principles are available with quite different technical parameters and operating characteristics [1], [2], [3]. Current system analysis studies indicate energy storage demand on a short-, mid- and long-term time scale [4], [5].

## II. HYBRID POWER GENERATING SYSTEM

In hybrid power generating system, usually consist of two or more renewable energy sources used together. The combination of different but complementary energy generation system based on natural resources mixed is known as



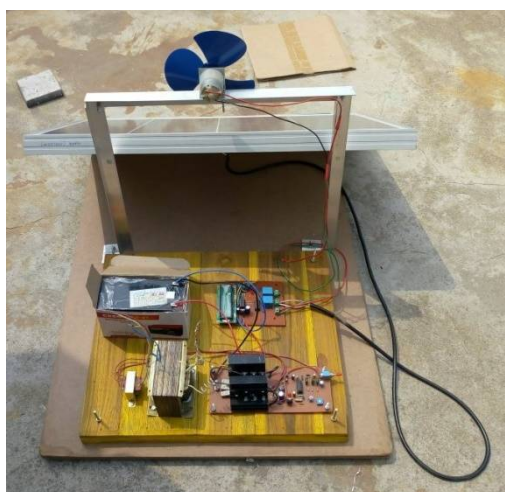
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hybrid system. Hybrid power generating system is considered to take full advantage of natural resources so significantly as to improve the stability and reliability of power system and also it has lower cost of electricity some extent by reducing the capacity of the battery and extending the life of battery.



Overall it good reliable and affordable solution for generating electricity. There is no need to find the special location to install this system. This paper deal with the combination of solar and wind energy generation system, the global warming will be reduced. Hybrid system of solar and wind energy has a excellent advantage than any other non-conventional energy resources. PV and wind power fluctuations on an hourly, daily and annual time scale (and with a regional distribution) can be handled, employing a variety of flexibility technologies, such as demand side management, grid extension or energy storage [1]. By using the solar and wind energy generation system the global warming will be reduced. [6]

## **SOLAR ENERGY**

The huge amount of solar energy available on earth and it makes highly attractive source of electricity. Solar energy is green and clean energy. Now the solar energy provides to be extremely beneficial for environment and also economical.

## **WIND ENERGY**

Wind energy describes by which wind is used to generate electricity. Wind energy gives variable power, depend upon the weather condition which is very consists year to year.

## **III. DIAGRAM OF HYBRID SYSTEM**

Following figure shows Hardware of Hybrid System for generating electric power by using Solar Panel and Wind Turbine.

This diagram include following points,

- 1] Solar Panel
- 2] Wind Turbine
- 3] Inverter
- 4] Battery Bank



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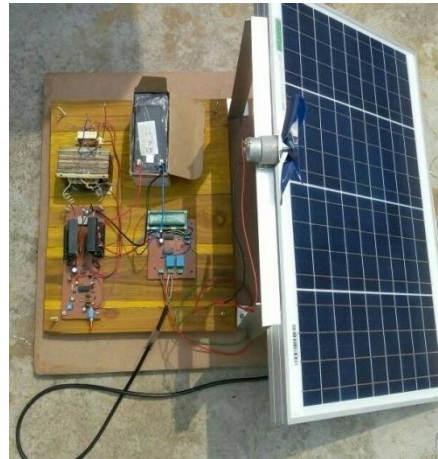


Fig. Hardware of hybrid system.

## Solar Panel

Solar panel absorbs sunlight as a source of energy to generate electricity. Solar panel is a packaged interconnected assembly of solar cell is called as photovoltaic cell. The photovoltaic cell is a device where electrical quantities, such as current, voltage or resistance vary when exposed to light. The separate solar cell known as module and the combination of this solar cell know as solar panel. An array of solar cell convert solar array into a usable amount of electricity.

## Wind Turbine

Wind turbine is used to convert the wind power into electric power. Inside the turbine the electric generator is used which converts the mechanical power into electric power. Wind turbine that produce energy from wind through circulating of blades. Basically the wind is constructed in a wide range of vertical and horizontal axis type. In addition The generation of electricity using wind turbines is well-suited for isolated places with no connections to the outside Grid [7].

## Inverter

Inverter is often needed at places where it is not possible to get ac supply from the mains. An inverter is used to convert the dc power to ac power. The basic idea behind every inverter is to produce oscillation using the given dc and apply these oscillation across amplifying the current. The inverter implemented is a square wave inverter and works with device that do not require pure sine wave so that it can be used in PWM technique. Thus the purpose of PWM technique have been designed is used to minimum switching power loss and total harmonic distortion. as our load working on the dc supply so we need to convert ac power.

## Battery Bank

In this paper we have to select battery bank, size as per the load requirement. Battery backup are particular designed to store the generating energy and gives required timing. If the battery low, then the solar panel can provide power and recharge the battery. Battery act as back up source.

## IV. WORKING OPERATION

The power is generating from the two natural resources such as solar and wind. The power generation depends on the weather condition. During day time the power will generate from the solar panel and during the night time and rainy season, the power will generate from the wind turbine. And power is also generate from the wind turbine at day time. In our project, the micro-controller will control the whole process. During the day time if the solar panel power is greater than wind turbine then power of solar panel will feed to the load and if the wind turbine power is greater than solar



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panel then the power of wind turbine will feed to the load and those lesser power will charge the battery. If output of both the sources is same then the combined power will feed the load. In this system the battery is connected for backup purpose in the system, so that the battery will supply the load when the system is in off condition. When the output power of the fan is too large, if you still need to charge the battery, then part of the power must be removed through uninstalling the circuit in order to avoid damage of generation system.[8] . This battery feeds the power to the micro-controller to provide the proper timing for the system. Application of hybrid system can reduced the storage capacity of batteries and the total cost of system, compared with stand-alone solar or wind generation system [9] [10].

## V. PROPOSED CALCULATION OF HYBRID SYSTEM

The total power generated by hybrid system may be given as the addition or power generated by the solar (PV) panel and power generated by wind.

Mathematically it can be represented as,

$$P_T = N_W * P_W + N_S * P_S$$

Where,

$P_T$  = Total power generated

$P_S$  = Power generated by solar panel

$P_W$  = Power generated by wind turbine

$N_W$  = Number of wind turbines

$N_S$  = Number of solar panels

### A. CALCULATION FOR SOLAR ENERGY

To determine the size of PV module (solar panel), The required energy must be estimated, So the power CS calculated as

$$P_S = I_{ns}(t) * A_{SP} * E_{FF}(pv)$$

Where,

$P_S$  = Power generated by solar panel

$I_{ns}(t)$  = Isolation at time (t).....(Kw/m<sup>2</sup>)

$E_{FF}(pv)$  = Overall efficiency of PV panel Overall efficiency is given by,

$$E_{FF}(pv) = H * P_R$$

Where,

H = Annual average solar radiation on tilted panel

$P_R$  = Performance ratio, coefficient for losses

### B. CALCULATING FOR WIND ENERGY

The power generated by wind energy is given by,

Wind Power = Density of air \* swept area / 2

$$P_W = 1/2 * \rho(A_S)(V)^3$$

Where,

P = Power in watt (W)

$\rho$  = Air density in Kg/m<sup>3</sup>

$A_S$  = Swept area by air in square meter (m<sup>2</sup>)

### C. COST FOR HYBRID SYSTEM

The total cost of the hybrid system (solar and wind) is depend upon the total number of solar panels used and the total number of wind turbines used. So the total cost is given as follows:

Total cost = (Number of batteries use in battery bank \* Cost of single battery) + (Number of wind turbines \* Cost of single wind turbine) + (Number of solar panels \* Cost of single solar panel)

$$C_T = (N_W * C_{WT}) + (N_S * C_{SP}) + (N_B * C_B)$$

V = Wind speed in meter per second (m/s)



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Where,

- $C_T$ =Total cost (RS.)
- $C_{SP}$ =Cost of one solar panel (RS.)
- $C_{WT}$ =Cost of one solar wind turbine
- $C_B$ =Cost of one battery (RS.)
- $N_S$ =Number of solar panels
- $N_W$ =Number of wind turbines
- $N_B$ =Number of batteries used in battery bank

## VI. CONCLUSION

Non-conventional power generation system is good solution for power generation than conventional energy resources. It can be provided in rural area where the government cannot transmit the electricity by conventional sources. By using hybrid system it will reduce the transmission losses and cost. Hence in order to achieve high electrical power by hybrid system-combination of two or more renewable energy sources. It is more reliable sources so the people use this system easily. It does not produce any harmful waste material like non-renewable energy sources. It only needs installation cost. It has long life, greater efficiency. Overall it good, reliable and affordable solution for generation of electric power.

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