

# Integrating Solar and Wind Power Generation

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**Abstract :** Renewable Energy Sources i.e. solar, wind, biomass, hydro power plant, ocean, tidal, geothermal etc. are considered as technological preference for generating a clean energy and green energy. But the energy generation from the non conventional energy sources is very much less as compared to the conventional energy sources. In present scenario the prices of all the conventional energy sources are on rises day by day and the cost of the electricity generation through the conventional energy sources i.e. fossils fuel, oil, nuclear power plant etc is very high. This paper deals with the solar wind hybrid power system which can be generate a clean and green energy. This type of hybrid power system can be suitable for industrial and also domestic purpose.

**IndexTerms-** Solar, Wind, Hybrid, Fossil Fuels

## I. INTRODUCTION

The requirements of electricity in our day to day life are mandatory and the electricity is an absolutely essential element of the growth of any country. The grade of society of any country is measured by ability to utilize electricity for human advancement and requirement human civilization have continued to increase the amount of change the form of electricity required in search of more and more comfort.

This result is an increase in electricity consumption too. So to complete the requirement we have to increase the generation of electrical energy. India currently the sixth greatest electricity generating country and has 6<sup>th</sup> position in annual electricity consumption. Overall annual electricity generating and consumption in India have increased in the past decade and its projected rate of increases is calculation yearly.

There are two modes of generation of electricity either by renewable energy sources or by non renewable energy sources. In presence scenario the generation of electrical energy is done by with the help of conventional energy sources i.e. fossil fuel, oil, diesel, nuclear power plant etc. The main disadvantage of these sources is that causes a wide range of health, environmental impact, hobbit loss and leads to environmental damages by polluting the atmosphere. Fossil fuel will get exhausted eventually in the next century, so in such a situation the non conventional energy or renewable energy source is an most effective preference for meeting ever increasing electricity demand. These are solar, wind, tidal, biomass, geothermal, etc and it is also called as alternative or renewable energy technology and these technologies are presently under the progressive stage.

The tidal energy has disadvantage is that it can available on sea shores. While for the generation of geothermal energy required very big effort to absorb the heat from the earth. Solar energy is easily available in nature but main drawback is that in rainy or cloudy season it could not produce electrical energy. Wind energy is available through the year but the circulation if the year is non uniform and it is not sufficient to fulfil the requirement of electricity. So we need to overcome this drawback we can use the renewable energy source like solar wind can be best alternative source. Solar wind hybrid power system is the combine power generation system by wind mill and solar energy. Using this system power generation can take place when wind source is available or when sunlight is available. Power can be generate when any one source or both source is available.

## II. LITERATURE REVIEW

Now a day the need of electrical energy of the human being is necessary and economic growth near about totally depend upon it. The maximum electricity demanded from conventional energy sources. With exhausts of the fossil fuel failure in supply electrical energy numerous electrical appliances used in day to day life for daily work may stop. With increasing the generation level population also increases the demand provided sufficient amount of electrical energy.

This paper deals the solar and wind hybrid power generation system that harness the non conventional energies in sun and wind to generate electrical energy. The system control mainly depend upon the microcontroller. It ensure the best utilization of source and improve the efficiency as compared their individual mode of generation.

In 2009 at international conference on solar and wind hybrid power generation system [3], presented the used of sun and wind energy. This paper publish and gives idea about the installations and used sun and wind energy. The similar idea about this hybrid project was also publish in technical university, 2004[5] by some researchers in Turkey.

With the help of matlab simulink™ 7.2 software the researchers have shown the used of optimum hybrid power system stand alone power generation [7]. This paper described a electrical power generation mechanism by integrating sun energy and wind energy and non conventional energy source. Thus we can have an unbroken power supply regardless of whether condition without any kind of environmental pollution. Moreover this project makes easily, freely possible to electrical power generation to the lowest degree of cost.

### III. BLOCK DIAGRAM

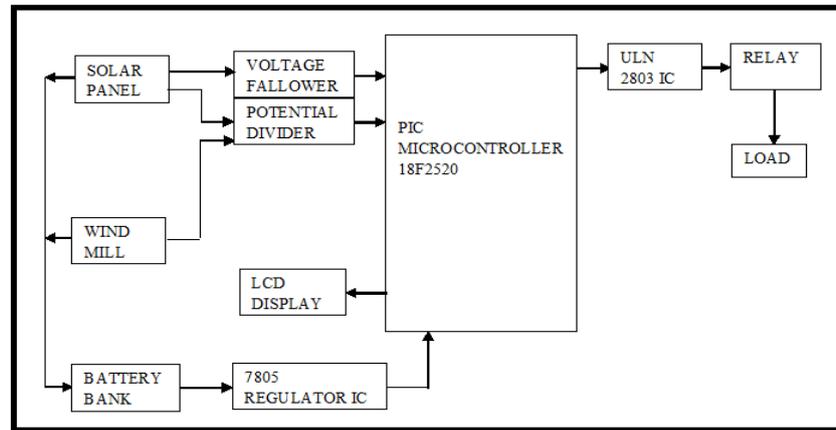


Figure1. Block Diagram

#### Hardwar Specifications

- 1) Solar panel 25W
- 2) Wind Mill
- 3) Charge Controller
- 4) Transformer
- 5) Inverter
- 6) Battery
- 7) PIC Microcontroller 18F2520
- 8) 7805 Regulator IC
- 9) Relays
- 10) ULN 2803 IC
- 11) 16\*2 LCD display
- 12) Load

#### A. Solar Cell

The conversion of solar energy into other form such as heat and electrical energy is done with the help of photovoltaic effect. The photovoltaic effect is defined as the production of electromotive force as a result of absorption of ionizing the sun radiation. Solar cell is the energy conservation device used to convert solar radiation into the electricity with the help of photovoltaic effect.



Figure 2. Solar Panel

A single converter cell is called solar cell and two or more converter cell is called the photovoltaic cell and combination of cell. To increase the generation of electorol power output we have need to connected number of solar cell in parallel. Solar panel is the best known application of photovoltaic cell to covert the solar power into electrical power.

#### B. Wind Turbine

A wind mill is a machine for conversion of wind energy. A wind mill use to convert the kinetic energy of the wind motion into mechanical energy which is transmitted by shaft. A generator further converts into electrical energy, there by generating electricity. Basically wind turbine classified as horizontal axis and vertical axis type.



Figure 3. Roof top assembly

The circulation of flow of air in the atmosphere is caused by the non-uniformity of the speed of air. If the speed of air increases, then the speed of the wind turbine increases and the power generation also increases. While the speed of the wind turbine decreases, the generation of electricity also decreases. The generation of electrical power with the help of wind is not continuous; it fluctuates. For acquiring a continuous flow of power, we have to store the electrical energy in a battery and then provide it to the load.

#### C. Charge Controller

The charge controller is a device that can be used to control the active or inactive source. The key function of the controller is that it provides overcharge protection, undercharge protection, pole confusion protection, short-circuit protection, and it should vary the power as per demand. When both sources, i.e., solar and wind, are not generating power, it can extract power from the battery and provide it to the load.

#### D. Transformer

A transformer is a static device which can transform power from one end to another end either by step-up or step-down without changing its frequency. So, in these step-up transformers, it is used to transform 12V DC into 230V AC without changing its frequency.

#### E. Inverter

The rating of an inverter is chosen such that it is greater than the desired rating. The inverter is a converting device which can convert 12V DC into 12V AC power supply.

#### F. Battery

The battery bank is used to store power from wind energy and solar energy. So, the size of the battery bank is chosen as per the load requirement. One fact is that if we increase the current rating of the battery, then the rating of wattage will decrease. So, we can get a larger battery bank size.

#### G. PIC Microcontroller 18F2520

Peripheral interface controller is fast and simple to use to implement a program as compared to other microcontrollers such as 8085. The quality of programming and simple interfacing with different peripheral PICs make it a successful microcontroller.

#### H. 7805 Regulator IC

7805 IC is used to regulate input power from the source and provide a fixed output voltage, an essential component which works on very low voltage.

#### I. Relays

A relay is an electrical device placed in the main circuit in such a manner that any abnormality in the circuit acts on the relay, which in turn causes the open contact. The relay ensures the safety of the circuit equipment from any damage which might be otherwise caused by the fault.

#### J. ULN 2803 IC

ULN 2803 IC is used to amplify the low input power from the source and provide a fixed voltage to the essential component.

#### K. LCD Display

The liquid crystal display is used to show the energy in the battery, solar cell, and wind generator. LCD 16\*2 can display 16 characters per 2 lines. This LCD display is commonly used in any circuit.

L. Load

By using these hybrid power generation systems we can generate 60 Watt power. So the load we can use LED Lights, Fan, etc up to 60 Watt as a load.



Figure 4 : Experimental setup

IV. RESULT

Date 4th MARCH 2019			
Sr. No	Time	O/p of solar in WATT	O/p of wind in WATT
1	9AM-10AM	18	5
2	10AM-11AM	24	11
3	11AM-12PM	25	3
4	12PM-1PM	25	7
5	1PM-2PM	25	11
6	2PM-3PM	18	10.5
7	3PM-4PM	17	5
8	4PM-5PM	10	7
<b>AVERAGE</b>		<b>20.25</b>	<b>7.43</b>

TABLE 1: POWER OUTPUT FROM ASSEMBLY

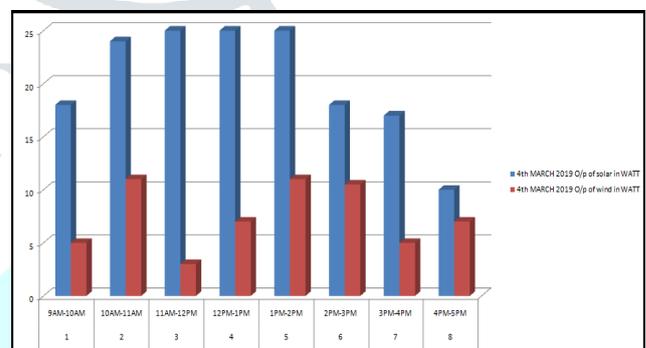
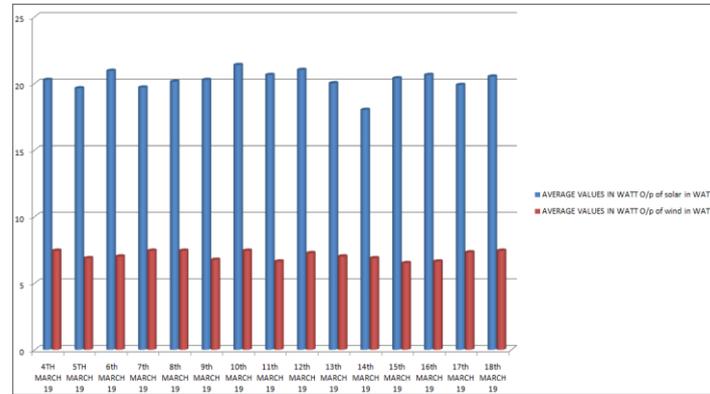


CHART 1: GRAPHICAL OUTPUT FOR ONE DAY

By using such type of Hybrid power system we have to generate 60W power. To achieve this 60W capacity we have to take different experiment and note down the different readings of both sources i.e. solar and wind. On the date 4<sup>th</sup> march 2019 we have to note down hourly readings of solar and wind are as from the morning onwards 9AM to 10AM solar generate 18W and wind generate 5W, 10AM to 11AM solar generate 24W and wind generate 11W, from 11AM to 12PM solar generate 25W and 3W similar continuously readings note down in also in afternoon onwards 12PM to 1PM solar generate 25W and wind 7W, 1PM to 2PM solar generate 25W and wind generate 11W, on 2PM to 3PM solar generate 20W and wind generate 10.5W similarly on 3PM to 4PM solar generate 19W and wind generate 5W and onwards 4PM to 5PM the power generation can take place through solar is 10W and through wind 7W and the total average of solar is 20.25W and wind is 7.43W this reading shown above in tabular form and also graphical representation.

Sr. No	DATE	AVERAGE VALUES IN WATT	
		O/p of solar in WATT	O/p of wind in WATT
1	4TH MARCH 19	20.25	7.43
2	5TH MARCH 19	19.62	6.87
3	6th MARCH 19	20.93	7
4	7th MARCH 19	19.68	7.43
5	8th MARCH 19	20.12	7.43
6	9th MARCH 19	20.25	6.75
7	10th MARCH 19	21.37	7.43
8	11th MARCH 19	20.62	6.62
9	12th MARCH 19	21	7.25
10	13th MARCH 19	20	7
11	14th MARCH 19	18	6.87
12	15th MARCH 19	20.37	6.5
13	16th MARCH 19	20.62	6.62
14	17th MARCH 19	19.87	7.31
15	18th MARCH 19	20.5	7.43



Similarly, we have take 15 days different reading from 4<sup>th</sup> March 2019 to 18<sup>th</sup> March 2019 of both sources and note down the average readings and this is also represent graphical and tabular form which is shown in below.

TABLE 2: POWER OUTPUT FROM ASSEMBLY (15DAYS)

CHART 2: GRAPHICAL OUTPUT FOR 15 DAYS

**CONCLUSION**

The generation of electricity using such type of hybrid power generation is the and attractive preference or solution as compared to the non renewable energy sources. This hybrid power generation system is suitable or it can be provided for remote and rural areas where the government is incapable to reach so that the power can be utilize directly where it is generated so that it will reduce the generation, transmission, distribution cost and losses. Cost minimization can be done by reducing the generation of the equipment. Peoples should actuate to use the renewable energy source. It is highly safe for the environment as it doesn't produce any emission and harmful waste product like conventional energy resources. It is cost effective solution for generation. It only need initial investment. It has also long life span. Overall it is the best, comfortable, reliable and inexpensive solution for generation of electricity.

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