

# Review Paper on Hybrid Wind-Solar Power Generation System

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*Abstract- One of the essential requirements for socio-economic development in any country is the arrangement of reliable and adequate power supply frameworks. This work is an improvement of an indigenous innovation cross breed Solar - Wind Power framework that bridges the sustainable power sources in Sun and Wind to produce power. Here, electric DC energies delivered from photovoltaic and wind turbine frameworks are transported to a DC separate vitality Mix controller. The controller is bidirectional associated with a DC-AC drift charging-inverter framework that gives charging current to a substantial obligation stockpiling bank of Battery and in the meantime, delivers reversed AC energy to AC loads. In the outlined model, sunlight based PV module alongside a breeze turbine, the little model to make control. The half and half setup could be worked in manual and programmed modes. The previous mode comprises of a RF transmitter and recipient setup and the last is adequately controlled by methods for a microcontroller. The whole setup can be reached out for bigger loads so as to jolt remote and out of reach territories. Further, the venture can be actualized in modern and household areas on a bigger scale*

*Index Terms- Hybrid Power System, Renewable Energy, Solar Power, Wind Power*

## I. INTRODUCTION

Power is most required for our everyday life. There are two methods for power age either by customary vitality assets or by non-traditional vitality assets. Electrical vitality request increments in word so to satisfy request we need to produce electrical vitality. Presently a day's electrical vitality is produced by the ordinary vitality assets like coal, diesel, and atomic and so on. The principle disadvantage of these sources is that it produces squander like fiery remains in coal control plant, atomic waste in atomic power plant and dealing with this wastage is exorbitant. What's more, it additionally harms the nature. The atomic waste is exceptionally hurtful to individual too. The traditional vitality assets are draining step by step. Before long it will be totally vanishes from the earth so we need to discover another approach to produce power. The new

source ought to be dependable, contamination free and conservative. The non-regular vitality assets ought to be great elective vitality assets for the ordinary vitality assets. There are numerous non-regular vitality assets like geothermal, tidal, wind, sun oriented and so on the tidal vitality has downsides like it can just actualized on ocean shores. While geothermal vitality needs extremely ale venture to extricate warm from earth. Sun powered and wind are effortlessly accessible in all condition. The non-regular vitality assets like sun oriented, wind can be great elective source. Sunlight based vitality has disadvantage that it couldn't create electrical vitality in blustery and shady season so we have to defeat this downside we can utilize two vitality assets with the goal that any of source comes up short other source will continue producing the power. What's more, in great climate condition we can utilize the two sources join.

## II. IMPORTANCE OF RENEWABLE ENERGY

The worldwide hunt and the ascent in the cost of customary petroleum derivative is influencing supply-to request of power item relatively unthinkable particularly in some remote regions. Generators which are frequently utilized as a contrasting option to traditional power supply frameworks are known to be run just amid specific hours of the day, and the cost of filling them is progressively getting to be troublesome on the off chance that they are to be utilized for business purposes. There is a developing mindfulness that sustainable power source, for example, photovoltaic framework and Wind control have a vital part to play with a specific end goal to spare the circumstance.

### III. SOLAR ENERGY

Sun oriented vitality is vitality from the Sun. It is sustainable, boundless and ecological contamination free. Nigeria, as most different nations is honored with expansive measure of daylight all the year with a normal sun energy of 490W/m<sup>2</sup>/day. Sun based charged battery frameworks give control supply to finish 24 hours every day independent of awful climate. All the more along these lines, control disappointments or power variances because of administration part of repair as the case might be is nonexistent.

### IV. WIND ENERGY

Wind is a characteristic marvel identified with the development of air masses caused principally by the differential sun based warming of the world's surface. Occasional varieties in the vitality got from the sun influence the quality and bearing of the breeze. The breeze turbine catches the breezes active vitality in a rotor comprising of at least two cutting edges mechanically coupled to an electrical generator. The turbine is mounted on a tall pinnacle to upgrade the vitality catch.

### V. HYBRID WIND- SOLAR POWER SYSTEM

This framework is mix of wind vitality and sun based vitality, used to produce control from each other. Half and half framework is having advantage than framework those which are thoroughly rely upon single wellspring of vitality. Analysts have extremely intense assignment to expand the aggregate vitality yield from the framework with bring down cost and dependability. By and large breeze sun oriented half breed control framework comprises of wind turbines, photovoltaic exhibit, controller and capacity battery. Wind turbines is utilized to change over breeze vitality into mechanical vitality and afterward into electric vitality. Whatever electric vitality is producing from this framework is exchange and insecure. So some controlling units or inverters are utilized to make it ceaseless and store into battery. This vitality use for local reason or other. Photovoltaic cluster having sun oriented boards through arrangement or parallel, changes over sun based vitality into electrical vitality. This vitality is in DC frame, it is put away in battery

and controller supply control for AC or DC loads. This framework having high every day power age limit, low creation cost, support is low and has different preferences too.

### VI. REQUIREMENTS OF WIND-SOLAR HYBRID POWER SYSTEM

To build up this framework and to explore execution, demonstrating and numerical computations need to create. Diverse models of mixture framework have canvassed in writing.

Following are the components from review of literatures: -

Meteorological data: - Meteorological investigation of the area must be made for enhancement process. It is critical for add up to usage of PV/Wind sources. Estimating sun oriented and wind assets information is principle contribution of the half breed framework. That all information ought to be estimated hourly, day by day and according to climate or environmental change.

Load Demand: - It is essential piece of framework to outline and investigate. To discover the correct load request, it is exceptionally confounded and hard to choose. Load variety for various seasons isn't unsurprising, so framework need to plan for closer or more than stack request to full fill prerequisites.

Framework Configuration: - By concentrate all information like sun oriented radiation, wind speed and load request appropriate choice of types of gear must be made. Yet, measuring of framework will be as per the natural conditions. Since creating power from sun oriented breeze is rely on the area which is to be chosen.

### VII. SYSTEM CONFIGURATION

Sunlight based Wind half and half power plant comprises of primarily the sun based cells and an option for sun powered i.e. wind factories. The vitality is being created from the two with a blend. Assist the vitality is nourished to the cross breed controller. The vitality from the battery is encouraged to the heap by means of inverter according to the prerequisite.

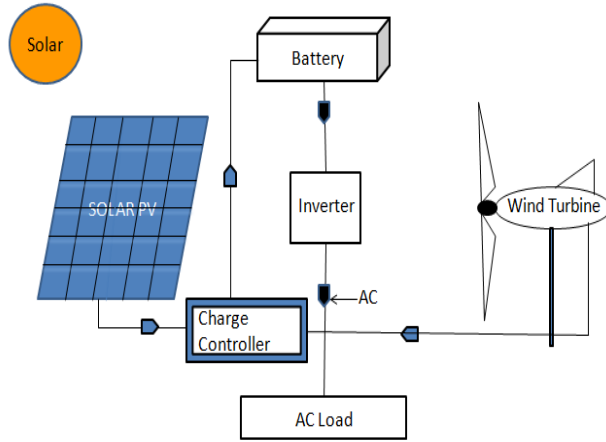


Fig: - Block diagram of Solar-Wind Hybrid Power System

VIII. SYSTEM SIZING

Keeping in mind the end goal to enhance framework proficiency, it is required to go for appropriate measuring of framework. A basic calculation is produced for framework estimating.

The flow chart of algorithm is as shown in fig.

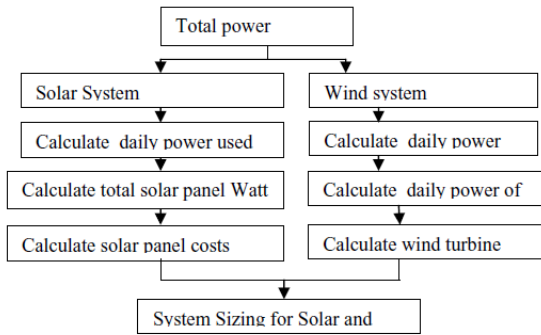


Fig: - Flow Chart of System Sizing

IX. LIFE CYCLE COST

Life Cycle Cost (LCC) of a half and half framework comprises of introductory capital speculation, the present estimation of task and support cost and the battery substitution cost. Life cycle cost examination is an instrument used to look at a definitive conveyed expense of advancements with various cost structures.

Example: - Consider, house consist of three rooms with 1 Tube, 3 CFL, 2 Fan & 1 T.V. as connected load.

S. No	Connect ed Load	Watt	Hours	Watt-hours
1	1 Tube	40	4	160
2	3 CFL	45	4	180
3	2 Fan	80	6	480
4	1 T.V.	150	6	900
Total load				315

Maximum Demand= It is greatest demand of load on the house during a given period.

Diversity Factor= sum of individual max. Demand / Max. Demand of house

Total Consumption= 1620wh Approximate consumption= 1.8kwh or 1.8units/day

Consumption per month= 1.8 x 30= 56units/month

Monthly bill=56 x 4=Rs.224/-

Annual bill=224 x 12=Rs.2688/-

Approximate annual bill=Rs.2800/- per annum

For solar panel: -

Solar panel watt capacity= 1.8kwh/7hours x 1.25=0.32142kw or 321.42watts per day Solar panel cost= 321.42 x 150=Rs.48, 213/- (as per table given below)

For wind generation: -

For 800 w generation of electricity considering value from table,

Wind System Cost = 0.8 x 45,000 = Rs. 36,000/-

Total cost of solar and wind hybrid system = Rs 48213 + 36,000 + 8000 + 8000 = Rs. 1,00,213/-

S. No	Parameters	Cost
1	Silicon type PV module cost	Rs.150-200 /Wp
2	Lead acid battery cost	Rs.4000 /kWh
3	Cost of battery charge controller	Rs.2000 /kWh
4	Wind system cost	Rs. 45,000 /kW
5	Economic evaluation period	20-30 years
6	Lead acid battery average life	4-5 years
7	Life period of wind machine	10 years
8	Life period of SPV system	25 years
9	Silicon type module efficiency	8-14%

Table No. 2 Cost values of the economic parameters and components for the base case

## X. COSTING

The cost of the framework changes from Rs 2.50 lacs to Rs 3.50 lacs for every kW relying upon the proportion of wind and sunlight based parts.

The inexact cost of establishment, including common works, is about Rs 10,000 for each kW.

Repair and upkeep cost is about Rs 3000 for each kW for each annum.

Payback Period estimation: - Total Cost of Solar and wind half and half framework = Rs. 1, 00,213/- = Rs. 1,03,000/- Along these lines, payback period for mixture framework will be, Payback Period = Total cost of sunlight based and wind cross breed framework.

Add up to cost of utility supply Payback Period=  $1,00,213/1,03,000 = 0.97$  years = 1 year (roughly)

Along these lines, Solar and Wind Hybrid System is more productive for provincial zones which are not yet charged.

## XI. CONCLUSION

Under current intense power lack situation with expanding expense of flammable gas, coal and turbine fuel and because of their effect on condition, there is an exceptionally dire and awesome need of discovering substitute wellspring of vitality to create power. There are a few courses by which power can be created utilizing inexhaustible sources, for example, sun oriented, wind, bio gas, and so on. Singular age of sun oriented and wind vitality is costlier.

## REFERENCES

- [1] Ashish S. Ingole\*, Prof. Bhushan S.Rakhonde\*\*, Hybrid Power Generation System Using Wind Energy and Solar Energy International Journal of Scientific and Research Publications, Volume 5, Issue 3, March 2015 1 ISSN 2250-3153
- [2] Ajay S. Tiwari Department of Mechanical

Engineering (4th Sem ME Thermal) Gandhinagar Institute of Technology Gandhinagar, India, Solar and Wind Hybrid System for Rural Electrification, International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321- 8169 Volume: 2 Issue: 5

- [3] Swapneel kaurav<sup>1</sup>, Prof.P.Yadav<sup>2</sup> M-Tech student, Dept. of Electrical Engineering, Oriental college of Technology, Bhopal, India Professor, Dept. of Electrical Engineering, Oriental college of Technology, Bhopal, India <sup>2</sup>, International Journal of Innovative Research in Science, Engineering and Technology, Vol. 5, Issue 1, January 2016
- [4] Bharat Raj Singh<sup>1</sup>, Bal Krishna Dubey<sup>2</sup>, SOLAR-WIND HYBRID POWER GENERATION SYSTEM, International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 05 Issue: 01 | Jan-2018 www.irjet.net p-ISSN: 2395-0072
- [5] Mr. Sthita Prajna Mishra<sup>1</sup>, Dr.S.M.Ali, Ms. Prajnasmitha Mohapatra, Ms. Arjyadhara Pradhan, A Hybrid System (Solar and Wind) Energy System for Remote Areas, International Journal of Engineerin Research and Development eISSN : 2278-067X, pISSN : 2278-800X, www.ijerd.com Volume 4, Issue 8 (November 2012), PP. 64-68
- [6] Ardashir Arash, Maghsud Nasiry, Samad Baghi and Sajjad Sadig Department of Electrical Engineering, Ardabil Branch, Islamic Azad University, Ardabil, Iran, Hybrid Wind and Solar Electric Generation System, Technical Journal of Engineering and Applied Sciences Available online at www.tjeas.com ©2014 TJEAS Journal-2014-4-1/14-17 ISSN 2051-0853 ©2014 TJEAS