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"Hybrid Power Generation Using Solar Panels And Vertical Axis Wind Turbine"

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ABSTRACT
Electrical energy is responsible for the overall growth & development of society. In today's world, the population is increasing day by day so we are facing the problem of increasing demand for electricity. Conventional energy sources are limited & we need to use them properly. This Conventional source Increases global warming & greenhouse effect, to overcome this problem the use of a hybrid energy generation system can beneficial for future purposes. In this research, the review is carried out on different types of solar &wind associated hybrid systems.
Keywords-Solar panel,Wind turbine,Controller,Battery.

Introduction

We need electrical energy for using most of the appliances in our daily life. Therefore, electricity has become an essential part of our life.

There are two ways of supplying electricity by using a conventional source of energy & second by nonconventional sources of energy. In day-to-day life , the population is increasing & the advancement of new technology, usage of electricity is increasing exponentially.

Simultaneously, we require to extend the assembly of electricity also so as to satisfy the stress of growing population. The biggest disadvantage with the usage of conventional resources is that their usage causes pollution thanks to the assembly of varied pollutants like ash just in case of a coal power plant, smoke just in case of diesel power station, material just in case of atomic power plant. Maintaining these pollutants is not an easy task and it also requires a lot of money. So, we have to find some other methods to produce electricity.

The best possible way is by using non-conventional sources of energy. Out of all the possible options available in non-conventional sources of energy, solar and wind are the simplest methods. As tidal energy is often used only on the ocean shores, ocean thermal energy can utilise in the centre of the ocean and its setup is additionally very difficult. While solar and wind are available altogether the areas of the planet and fixing their power, station is additionally not a cumbersome task.

The availability of solar power could be a major concern, because it is accessible for around eight hours during a day, on the opposite hand wind is accessible nearly for twenty-four hours. But we can do one thing to make up for that problem by integrating these two together. During foul weather one among them are often used while during normal weather both are often operated together. So, in this paper we will be describing a hybrid power system.

I. Literature Survey

i. **"Sumit Wagh, 2.Dr P.V Walke "REVIEW ON WIND-SOLAR HYBRID POWER SYSTEM" International Journal of Research in Science & Engineering Volume:3 Issue: 2 March -April 2017":**
This paper proposes the development of system and performance, modelling and mathematical calculations have been developed. Different models of hybrid systems have covered in literature.

ii. **"Vaibhav J. Babrekar, Shraddha D. Bandawar, Ashwini R. Behade, "Review Paper on Hybrid Solar-Wind Power Generator", International Journal of Computer Applications (0975 – 8887) Volume 165 – No.5, May 2017" :**

In this paper authors discuss about the various advantages and disadvantages of the hybrid power system. And also they proposed calculations for solar energy and wind energy.

iii. **"Kanwarjit Singh Sandhu and A. Mahesh, "Optimal sizing of PV/wind/battery Hybrid Renewable Energy System Considering Demand Side Management", International Journal on Electrical Engineering and Informatics, vol. 10, no. 1, March 2018".:**

In this paper an attempt has been made to see the effect of DMS on the sizing of a PV/wind/battery hybrid energy system using an energy filter. The mathematical modelling of all the sources and the proposed strategy has been explained in detail. The simulation study has been performed for the two load pattern i.e. actual load and the modified load by using DSM. From the result it can be concluded that the DSM has the positive effect on sizing of the system, which includes huge reduction in the number of energy stored elements required thus resulting in the less cost per unit of electricity.

iv. **"Prof.Vishal V.Mehtre, 2.Mr.Shreyas Paliwal, 3.Mr.Nishchal Sharan, 4.Mr.Mayank Gupta, 5.Mr.Aditya Mishra "Review on Solar-Wind hybrid energy generation system" International Journal of Advanced Research in Computer and Communication Engineering Vol. 9, Issue 6, June 2020":**

The paper tells that this energy is convenient and effective than non-renewable energy resources. It is not only less costly but also dose not cause any harm to the environment. The paper also provide the information about advantages and disadvantages of the system.

v. **"Nishant Jha , 2.Deepak Prashar ,3.Mamoon Rashid ,4. Zeba Khanam,5. Amandeep Nagpal,6.Ahmed Saeed AlGhamdi ,and Sultan S. Alshamrani " Research article energy _efficient hybrid power system model based on solar & wind energy for integrated grids" Received 10 October 2021; Revised 15 January 2022; Accepted 26 January 2022; Published 21 February 2022.":**

This paper concluded the limitation of the system, and it also provides the data that how use of hybrid PV-wind power generation units could save up to10% to 20% of the cost of the current systems.

Proposed Methodology:

For increasing the output, for fulfilling the demand of consumer there is need to hybridize the system. So for this purpose it is easier to combine solar system and wind system as they are compliment to each other Following methodology is used for hybrid system.

Vertical Axis Wind Turbine:

The Vertical Axis Wind Turbine (VAWT) has blades which are symmetrical and they are oriented vertically. This means they are always catching the best wind, and don't have to be artificially oriented to maximize electricity generation.

When the wind blows, it creates a positive force in the scoop and a negative force on the back side of the scoop. This difference in force pushes the turbine around. The backside of the scope.

Solar Energy:

The energy produced in the sun is due to nuclear fusion. During this fusion large quantum of energy is releases and reaches the earth's surface in the form of electromagnetic radiation. Solar energy available on the earth is in abundant manner and throughout the year. Solar energy is freely available. This energy is available at low cost and without pollution. Solar system has freely available. This energy is available at low cost and without pollution. Solar system has high efficiency and very low maintenance cost makes it suitable for the hybrid system for power generation.

Working:

The solar panels are used to hybridize the system. There are 4 solar panels each of 12V, 25W are used. These solar panels are installed in inclined manner at 30" to gain maximum intensity from sun to the North direction. These solar panels are connected parallel.

As "Hybrid System" means system made by combining two or more different system, In this project, both systems i.e. wind energy and solar energy is combined to make hybrid system. The

VAWT is combined with PV panels. By using such technique, we can generate maximum The VAWT is combined with PV panels. By using such technique, we can generate maximum amount of power without using non-renewable sources of energy such as coal, fossil fuel etc. Using individual system we get following results.

From solar panels: 19.45V approximately

From VAWT : 6.24 v approximately.

The output of the generator given to charge controller, The charge controller is voltage or current controller to charge battery and keep electric cells from overcharging. It directs the voltage and current hailing from the solar panels setting off the electric cell. The combine voltage in charge controller is 22V from which 12V from panel, 14.2V output for battery charge and 12V supplied to the battery.

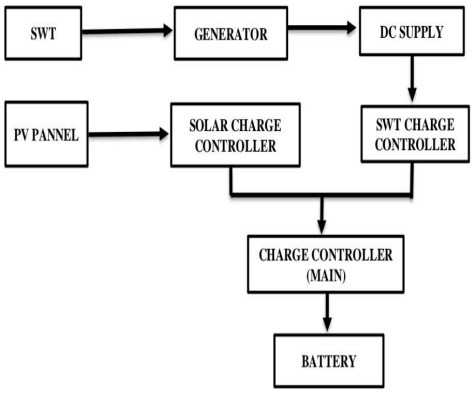


Fig.1.1.1: Block Diagram of Hybrid System

Advantages:

1. Both solar as well as wind power generating systems can be established at the same place
2. As the solar panels are mounted on tower of windmills, space occupies less.
3. Both AC as well as DC loads can be run.
4. Flexible to use.
5. Low maintenance.
6. More efficient than a traditional solar or wind power project
7. As sources of energy are renewable. It is environment friendly. Thus
8. Our motto of protecting and retaining the environment is served.

Application:

1. **Grid formation in village by using this hybrid system:**
   In villages if power demand is more to fill this demanding to form grid using more number of hybrid system.

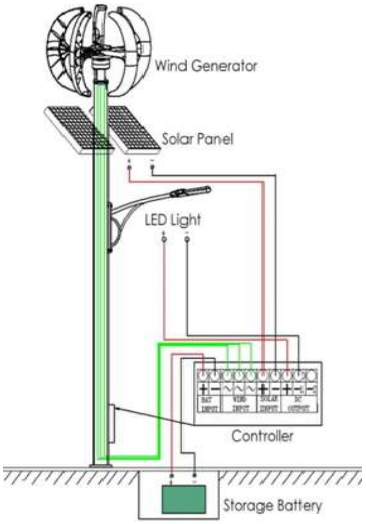
2. **On the top of Ship:**
   This hybrid system is also used for lightning purpose of ship.

3. **Village (On top of Water Tank):**
   As in villages there is problem of power cut off. So, to overcome this problem this hybrid system is used.

4. **Large Scale Billboards:**
   This hybrid system can be used near to advertising boards, stadium etc. for lighting purpose.

5. **On highways for street lightning:**
   This model is also installed on divider for street lightning purpose and for traffic signals.

Schematic Diagram:



Conclusion:

1. Our work and the results obtained so far are very encouraging and reinforce the conviction that vertical axis wind energy conversion systems are practical and potentially very contributive to the production of clean renewable electricity from the wind even under less than ideal sitting conditions this project will be helpful in rural areas where the electricity supply is scarce.
2. Also in most cities, bridges are a faster route for everyday commute and in need of constant lighting makes this an efficient way to produce energy
3. Savonius VAWT can also be fabricated by cutting hollow metallic or plastic cylinder. Such a system can be implemented in remote areas as well as in the road divider using VAWT.
4. So this system is cost effective, efficient and non-polluting. It also has long life span with less maintenance. Overall it is a reliable solution for energy crisis across globe.

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