

## A HYBRID SOLAR WIND POWER GENERATION SYSTEM

Puja Pandurang Warhate<sup>1</sup>, Sonali Sunil Durutkar<sup>2</sup>, Prof Pranjali Kamble<sup>3</sup>

<sup>1,2</sup> Student (EE) SSCET, India.

<sup>3</sup> Asst. Professor (EE) SSCET Bhadrawati, India.

### ABSTRACT

Energy is critical to the economic growth and social development of any country. Indigenous energy resources need to be developed to the optimum level to minimize dependence on imported fuels, subject to resolving economic, environmental and social constraints. This led to an increase in research and development as well as investments in the renewable energy industry in search of ways to meet the energy demand and to reduce the dependency on fossil fuels. Wind and solar energy are becoming popular owing to the abundance, availability and ease of harnessing the energy for electrical power generation. It focuses on an integrated hybrid renewable energy system consisting of wind and solar energies. The focal point is to describe and evaluate a wind-solar hybrid power generation system for a selected location. Grid-tied power generation systems make use of solar PV or wind turbines to produce electricity and supply the load by connecting to the grid. In this study, the HOMER (Hybrid Optimization Model for Electric Renewable) computer modeling software was used to model the power system, its physical behavior and its life cycle cost. Computer modeling software was used to model the power system, its physical behavior and its life cycle cost. Through the use of simulations, the installation of ten 100-kW wind turbines and 150-KW solar PV was evaluated[1]. It is easy to get them into required size and shape by following design considerations. It is household usage purpose project which is available at low cost compared to individuals available.[2]

**Keywords:** Hybrid System, Solar and Wind Combination, Renewable Energy

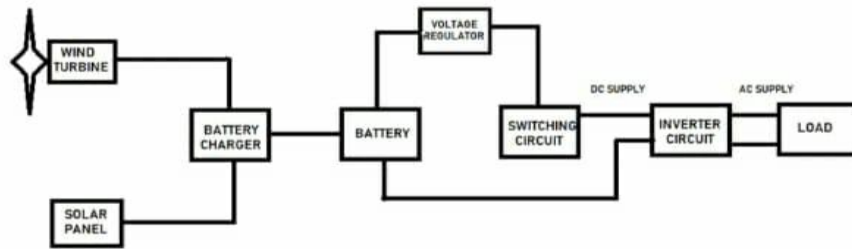
### 1. INTRODUCTION

There are two ways of electricity generation either by conventional energy resources or by non-conventional energy resources. Now a day's electrical energy is generated by the conventional energy resources like coal, diesel, and nuclear etc. The main drawback of these sources 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 nuclear waste is very harmful to human being also. The conventional energy resources are depleting day by day. Soon it will be completely vanishes from the earth so we have to find another way to generate electricity. 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 non-conventional energy resources like solar, wind can be good alternative source. Solar energy has drawback that it could not produce electrical energy in rainy and cloudy season so we need to overcome this drawback we can use two energy resources so that any one of source fails other source will keep generating the electricity and in good weather condition we can use both sources combine. In these project used a VAWT instead of HAWT. Hence these project is based on the combination of two energy source wind and solar [3]. 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 non-conventional energy resources like solar, wind can be good alternative source. Solar energy has drawback that it could not produce electrical energy in rainy and cloudy season so we need to overcome this drawback we can use two energy resources so that any one of source fails other source will keep generating the electricity. And in good weather condition we can use both sources combine.[4]

### 2. PURPOSE OF THIS PROJECT

- In Remote areas implementing power systems units at each apartment.
- Multistoried buildings
- Homes, schools.
- Street lightings covering a large area.
- Off grid applications.
- Solar water heaters. Electric kettles solar vehicles
- Traffic signaling and in many applications[5]

**Diagram**



**3. WORKING OF THE PROJECT**

To better understand the solar wind hybrid system, we must know the working of solar energy system and wind energy system. material, usually silicon. To work photovoltaic cell need to establish an electric field. Much like a magnetic field, which occur due to the opposite poles, an electric field occurs when opposite charges are separated. To get this field, manufacturers dope silicon with other materials, giving each slice of the sandwich a positive or negative electrical charge. Specifically, they seed phosphorous into the top layer of charges silicon, which add extra electron, a negative charge, to that layer. Meanwhile, the bottom layer gets a dose of boron, which result in fewer electron, or a positive charges. This all adds up to an electric field at the junction between the silicon layers. Then, when photons sunlight knocks an electron free, the electric field will push that electron out of the silicon junction. A couple of other component of the cell turn these electron into usable power. Metal conductive plates on the side of the cell collect the electron and transfer them to wires. Solar power system Solar energy is one of the major renewable energy source that can consist of three major block namely solar panel, solar photovoltaic cell, battery. The electrical energy generated using solar panel can be stored in battery or directly used for equipment. Solar panel works by allowing photons, or particles of light, to knock electron free from atoms, generating a flow of electricity. Solar panels actually comprises many, smaller units called photovoltaic cells. Many cells linked together make up a solar panel. Each photovoltaic cell is basically a sandwich made up of two slices of semi conducting.[7]

**4. ADVANTAGES**

- Continuous Power Supply
- Utilize the Renewable Sources in the Best Way
- Low Maintenance Cost
- High Efficiency
- Load Management [8]

**5. APPLICATIONS**

- Solar Wind Hybrid Energy Systems are using in almost all field small electric power usage. Some of the applications of SWHES are given below.
- Grid connected and Stand alone
- Grid connected: The large power rating of SWHES, where the access of wind and sun irradiation is more, they can be connected to Grid. In these types of generation, if the system failed to generate power the Grid will supply the load.
- Stand alone: Almost all SWHES applications are stand - alone not connected to the grid.
- Street lighting: The foremost application of SWHES is solar street lighting. Solar Street light become as SWHES lighting. Use of this reduces the load from conventional power plants.
- Household: Residential appliances can use power generated through hybrid solar wind energy system. SWHES are used to supply electricity to different offices or other parts of the building in reliable manner.
- Remote Applications: like military services where it is impossible to provide conventional power supply these SWHES systems are useful.[10]

**6. CONCLUSION**

Hybrid power generation system is good and effective solution for power generation than conventional energy resources. It has greater efficiency. It can provide to remote places where government is unable to reach. So that the power can be utilize where it generated so that it will reduce the transmission losses and cost. Cost reduction can be done by increasing the production of the equipment. People should motivate to use the non-conventional energy resources. 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 good, reliable and affordable solution for electricity generation.[14]

## 7. FUTURE SCOPE

This hybrid power generation at small level that help to construct hybrid generation plant with a minimum cost with highest generating capacity. In past days vertical axis wind turbine had to be start by giving the excitation, our project aspect is to make self-starting wind turbine and another is that to reduce the power fluctuation due to the uneven wind. So that we get constant power supply [13]

## 8. REFERENCES

- [1] Peter Jenkins, Monaem Elmnifi, Abdalfadel Younis, Alzarooq Emhamed," Hybrid Power Generation by Using Solar and Wind Energy: Case Study" World Journal of Mechanics > Vol.9 No.4, April 2019
- [2] K.Balaji, K. B. Mohan Krishna, S. Prathap, K. N. Lokesh Chandra," Hybrid Power Generation System using Solar and Wind Energy," International Journal of Engineering Research & Technology (IJERT), ISSN: 2278-0181, Vol. 5 Issue 03, March-2016
- [3] SamikshaPatil,"HYBRIDPOWER GENERATION(SOLAR AND WIND ENERGY)",IJARIE, Vol-4 Issue-2 2018 IJARIE-ISSN(O)-2395-4396
- [4] Ashish S. Ingole, Prof. Bhushan S. Rakhond,"Hybrid Power Generation System Using Wind Energy and Solar Energy", International Journal of Scientific and Research Publications, Volume 5, Issue 3, March 2015ISSN 2250-3153
- [5] Jyoti Gulia, Vibhuti Garg,\_"Wind-Solar Hybrid: India's Next Wave of Renewable Energy Growth"\_IEEFA Energy Economist October 2020
- [6] Sinchana G, Sanjana P, Sowmya AG, Tejaswini BS, Bhagya," Renewable Power System Using Hybrid architecture" e-ISSN: 2582-5208 International Research Journal of Modernization in Engineering Technology and Science ( Peer-Reviewed, Open Access, Fully Refereed International Journal ) Volume:04/Issue:06/June-2022
- [7] Nema Parveen, VarshaSharma," A Review on Hybrid Solar PV and Wind Energy System" International Research Journal of Engineering and Technology (IRJET)e-ISSN:2395-0056 Volume: 05
- [8] Haoxiang Wang," Inventive Research Organization Fault Diagnosis in Hybrid Renewable Energy Sources with Machine Learning Approach" Journal of Trends in Computer Science and Smart technology (TCSST) (2021) Vol.03/ No. 03
- [9] [9] Avinash Nath Tiwari, Navnit Dubey,"A Methodology Of Optimal Sizing For Wind SolarHybridsystem"Citation:10.2348/Ijset0515051
- [10] [10] Mergu Chandramouly, Dr. A. Raghuram,"Introduction to Solar Wind Hybrid Energy Systems" International Journal of Engineering Research in Electrical and Electronic Engineering Vol 3, Issue 12, December 2017
- [11] Jyoti Kant ,Hari Kr Singh." Scope and Potential of a Hybrid Solar & Wind Energy System for Jodhpur Region, Case study "International Journal of Science and Research, ISSN (Online):2319-7064ImpactFactor(2012):3.358Volume3Issue6,June2014
- [12] Nand Shaherawala, Kalpesh Chudasma, Mehta Deep, Rathod Hardik, Sardhara Niraj," Hybrid Power Generation Using Solar And Wind With GSM Technology "International Journal for Research in Engineering Application & Management (IJREAM)ISSN : 2454-9150 Vol-03,
- [13] S.Gopalakrishnan,R.Sasikumar,"Hybrid Power Generation Using-Vertical Axis Wind Turbine and Solar Panel" International Journal of Research in Engineering and Science (IJRES) ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
- [14] Jyoti Gulia, Vibhuti Garg,\_"Wind-Solar Hybrid: India's Next Wave of Renewable Energy Growth"\_IEEFA Energy Economist October 2020
- [15] Sanap Jalindar Devidas , Dhomse ChetanSanjay, Dhomse Swapnil Sanjay ,Awhad Vaibhav Dnyaneshwar , Mr. G. D. Katala." Hybrid Power Generation System" 2581-9429 International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)Volume 2, Issue 7, May 2022.