

# The Hybrid Solar and Wind Power Extraction for Domestic Purposes: A Review

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**Abstract:** The demand for electricity power is increasing day by day, which cannot be met with the satisfied level without non-renewable energy resource. Renewable energy sources such as wind, solar are universal and ecological. These renewable energy sources are best options to fulfil the world energy demand, but unpredictable due to natural conditions. The use of the hybrid solar and wind renewable energy system like will be the best option for the utilization these available resources. The objective of this research paper is to study the various aspects of hybrid solar and wind system. This paper discusses and analysis different aspects such as modelling, capacity and reliability issues. The application and different theories related to the development of hybrid also discussed in this paper.

**Keywords:** Hybrid System, Wind Energy, Solar Energy

## 1. INTRODUCTION

Energy is essential to life. Without it, many billions of people would be left cold and hungry. The major source of energy comes from fossil fuels, and the dominant fossil fuels used today by most industrialized and developing countries are oil, coal, and natural gas. Among these fossil fuels, oil is the most consumed for energy conversion, followed by coal, then natural gas. Production of these fossil fuels is expected to rise, approximately doubling the amount of use of each fossil fuel. As world population continues to grow and the limited amount of fossil fuels begins to diminish, it may not be possible to provide the amount of energy demanded by the world by only using fossil fuels to convert energy. There are plenty of ways to convert energy without fossil fuels, and many of are being used, but not nearly to their full potential. Countries must take action to promote a greater use of renewable energy resources, such as geothermal energy or nuclear power, so that we can be well prepared when the supplies of fossil fuels are not as plentiful as they seem today. The fairly low cost of converting natural resources to energy causes most countries to use fossil fuels as their main source of energy, but there is a major problem that arises out of this: natural resources are limited and non-renewable. There is only so much oil, coal, and natural gas that the earth can hold, and we cannot use these resources as if there is an unlimited amount for much longer. Some estimates say that there may only be as few as 20 years of oil left if the world keeps with the increasing consumption trend before oil prices sharply increase resulting in

a possible international economic crisis (EIA). Prices would go up because of the simple economic model of supply and demand. There has been an increasing demand for fossil fuels in the past thirty years, and this can be seen by the growing trend of energy produced by all three of the fossil fuels. The decentralized power generation using renewable energy sources is one of the best options for urban, rural and remote locations. Solar and wind energy systems have shown remarkable growth for power generation in recent years as these are freely available environmental friendly sources for electrical power generation [1,2]. Wind turbines and solar photovoltaic systems are clean energy systems does not greenhouse gas emissions like fossil fuel based power plants. However, energy produced by large wind farms have impact on environment like bird mortality, noise pollution, communication, etc. The large wind turbine farms can affect a larger area with noise than roof mounted micro wind turbines [1, 2]. However, if wind turbine farms are designed and planned carefully, many of these negative impacts can be minimized.

## 2. DESCRIPTION OF STUDY REGION

The problem of using the fossil fuels can be lead by the use of renewable energies resources. In most region of Maharashtra state the solar energy are easily available through the year. The most of the area of Sahandri ranges and Satpuda ranges are available for installing the wind farm, for the domestic used of hybrid system Nagpur is also best options for meet the growing demand of the energies for country. The Nagpur is located in the

Vidarbha region with the latitudes 21.1458° N, longitudes 79.0882° E.

### 3. UTILIZATION OF RENEWABLE ENERGY SOURCES IN MAHARASHTRA

The Maharashtra is best suited place for developing the hybrid solar and wind power system. The average daily temperature in most regions is ranges between the 30-35°C. The some regions Maharashtra like Vidarbha having good condition for using the solar wind hybrid system. The details of annual global radiation and wind speed meteorological data obtained from satellite resources given below:



Table: Study locations in Eastern Vidarbha Region, Maharashtra, India.

Location	Latitude	Longitude	Altitude above mean sea level (m)
Nagpur	21.1458° N	79.0882° E	310 m
Chandrapur	20.2095° N	79.5603° E	190 m
Bhandara	21.0736° N	79.8297° E	274 m
Gadchiroli	19.4969° N	80.2767° E	217 m
Gondia	21.4624° N	80.2210° E	300 m
Wardha	20.7453° N	78.6022° E	293 m

### 4. LITERATURE STUDY ON THE HRES SYSTEM

The utilization of hybrid solar wind is necessity for the development of the country. The different researches were carried out on the development and performance assessment of the solar and wind hybrid system. Getachew Bekele [3] et.al. Design the hybrid wind and photovoltaic power generation system for the Ethiopian remote area. The research studies design the system for basic electrification requirement. The data for the study collected from national agency. The simulation of analysed using the HOMER software. The results of the study concluded with satisfied working of the system and the shortage of electricity is covered upto 20%.Sunanda Sinha [4] et.al. presented the prospects for installation of micro wind and PV hybrid system in the Western Himalayas region.The analysis of the hybrid system is carried out on the basis data available from NASA and ANN predicted data, measured data for Hamirpur and estimated data for eleven locations of Himachal Pradesh. Makkbul A.M. Ramli [5] et.al. Presented case study model on the hybrid solar and wind system on the techno-economic energy analysis for in Saudi Arabia. The study is carried out for economic production for the electric using the hybrid system; the different parameters are taken into consideration for economic production. Palash Jain[6] et.al.discussed on the performance prediction and fundamental of small scale VAWT for blade pitching during variable amplitude. The different design issues were studied and concluded that the maximum from turbine is due wide ranges of wind speed and tip speed ratio and amplitude of blade pitching varied with wind speed and tip speed ratio. Yahia Bouzelata [7] et.al.explored about the optimal design and performance in the hybrid solar and wind energy system. The Doubly fed induction generator used for generation of electricity with WECS.The results of the study concluded that the used power electronics for electricity generation improved the power quality. Vikas Khare [8] et.al.presented the review on the HRES.The presented research concentrated on the different issues related with HRES such as optimum sizing, feasibility analysis, modelling, control aspects and reliability.Prabhakant [9] et.al. developed the optimized techniques for hybrid solar and wind power generation in remote areas. This presented study associated with saving of coal and carbon production during the power generation. Y.M.Irwan [10] et.al. asserted the new techniques in Perlis Malaysia for hybrid power generation. The power generation form the wind is used for cooling of the PV module. The combination of Savinius and Darrieus is used with PV module. The new

approach for hybrid system design can improve the performance.

## 5. PROPOSED WORK

Motivated from the research study we have proposed to develop the 100 Watts power output hybrid wind and PV system. The proposed study developed on the basis of daily electricity requirement for domestic used. The peak load is considered for the study to develop the design of the hybrid system. For design of wind turbine rotor the different factors are taken into consideration such as feasibility, solidity, and tip speed ratios etc.

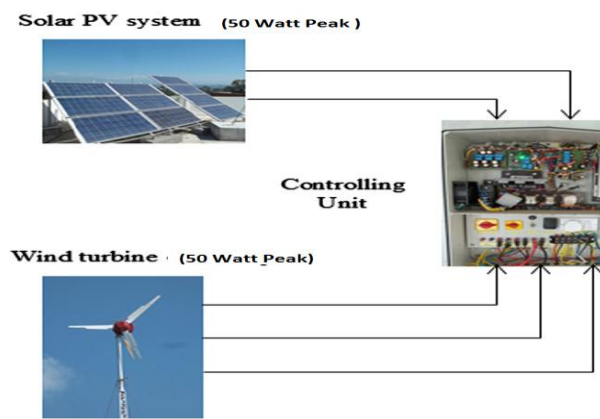


Fig.1.1.Proposed Setup

## 6. CONCLUSION

The use of solar-wind hybrid renewable energy system is ever-increasing day by day and has shown incredible development in last few decades for electricity production all over the world. With the development of new technologies and researches in the field of solar wind hybrid renewable energy system, a new difficulty arises, which become much more easily solved with new techniques. The presented review paper reported the different techniques and ideas about the HRES and its energy utilization.

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