

# Hybrid Generation with Inverter and Battery

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**“Abstract- The project aims at developing a system which makes use of wind and solar energy for rural electrification. Wind and solar energy is treated as renewable source of energy. The system also uses inverter to switch the AC devices. The project makes use of a wind turbine and solar panels. The wind energy obtained is stored to a battery. The battery supply is fed to pulse generator and send signal to controller. This is fed to a step-up transformer to generate a low voltage AC. This AC is fed to electrical appliance.”**

**Keywords**—Fuel cells; Hybrid renewable; energy systems; Photovoltaic.

## I. INTRODUCTION

Hybrid systems, as the name implies, combine two or more modes of electricity generation together, usually using renewable technologies such as solar photovoltaic (PV) and wind turbines. Hybrid systems provide a high level of energy security through the mix of generation methods, and often will incorporate a storage system (battery, fuel cell) or small fossil fueled generator to ensure maximum supply reliability and security. Hybrid renewable energy systems are becoming popular as stand-alone power systems for providing electricity in remote areas due to advances in renewable energy technologies and subsequent rise in prices of petroleum products. A hybrid energy system, or hybrid power, usually consists of two or more renewable energy sources used together to provide increased system efficiency as well as greater balance in energy supply.

Solar energy system is used to collect maximum power from sun. Solar cells can also be applied to other electronics devices to make it self-power sustainable in the sun. Wind and Solar would be able to provide sufficient source of voltage to charge the parent battery in case of rainy or cloudy days. A wind turbine is a device that converts kinetic energy from the wind, also called wind energy, into mechanical energy. It may be referred to as a wind charger when used for charging batteries.

In power engineering, the term 'hybrid' describes a combined power and energy storage system.

## II. LITERATURE SURVEY

The presented a Solar PV Wind Hybrid Energy System was implemented. A portion of the energy requirement for a private house, farm house, a small company, an educational institution or an apartment house depending on the need at the site where used has been supplied with the electricity generated from the wind and solar power. It reduces the dependence on one single source and has increased the reliability. Hence, we could improve the efficiency of

the system as compared with their individual mode of generation. [1]Increasing of energy demand in energy market, we have to adopt and implement some specific resources. The promotion of energy production from renewable sources represents an imperative objective in present times justified by environment protection, the increase of energetic independence by supplying sources diversity and economic and social cohesion reasons. Photovoltaic system also reacts sensitively to the weather of low changing efficiency, irradiation or temperature. And, its characteristics are different according to manufacturer of solar cell. In order to solve these existing problems, this paper was suggested the sub power generator that uses elasticity energy of spiral spring to photovoltaic system was also added. An alternative is renewable wind and solar electric power production. The possibility was thoroughly investigated.

The result is to install windmill farm in the mountainous area in the north, where wind speed proved to be viable, while the eastern desert is suitable to install solar power station. For reliable energy system, hybrid power production is essential. [3]A system and method for producing electricity for minor irrigation system using the biological energy of the muscles of animals like bullock by means of a mechanical device. The project goal was to combining the solar power and animal power to minor irrigation which will work when even sun is not available. This goal had to be met within the constraints of a low production cost and high safety. The project has to offer a durable product with relatively good efficiency and emission free system. This is also concluded that animals are the great energy source for generating power for formers for minor irrigation even having low speed. Hybrid energy systems that incorporate solar PV, wind and battery can be realized more accurately by using varying air density and PV panel efficiency. The sizes of wind turbine and PV panel may increase quiet. It can also be used demand response that is smart grid technology in order to reduce installed battery capacity in hybrid system. Results show that demand response application can reduce the battery size about 65%, thus causes the 28% reduction in capital cost of the system.

Subhadarshi Sarkar and Venkataramana Ajjarapu In this paper, a systematic stochastic planning approach—MWRAM— was demonstrated for assessing the MW resource availability of a hybrid ECS with wind and solar resources for a given location. The study period of one year was divided into four seasons; one day in each season was further divided into 24 1-hour time segments. This “stratified” approach captures the varying nature of the resources over different times of the day as well as the year by explicitly computing the probabilistic model parameters from actual field measurement data using the MLE method.

A place where wind speeds are not that good. It will charge the inverter battery even when there is no grid power. There is lots of space for improvement in this system like Maximum Power Point Tracking (MPPT) or other power enhancement methods. This improvement can be incorporated without any big increase in the

system costing because there is only a little addition to the electronic components to the charge controller circuitry. This can prove a vital system in the field of renewable energy resources and can be seen in every household in the northern India. [9]A new multi-input Cuk-SEPIC rectifier stage for hybrid wind/solar energy systems has been presented. The features of this circuit are: additional input filters are not necessary to filter out high frequency harmonics; both renewable sources can be stepped up/down (supports wide ranges of PV and wind input) MPPT can be realized for each source; individual and simultaneous operation is supported. [8]A generalized PV model which is representative of the all-PV cell, module, and array has been developed with Matlab/Simulink and been verified with a PV cell and a commercial. [10]

### III. WORKING OF HYBRID GENERATION WITH INVERTER AND BATTERY

Hybrid power generation often contain a renewable energy component (such as PV) that is balanced via a second form of generation or storage such as fuel cell or battery storage system. They can provide forms of power such as power source for applications.

In this circuit diagram we used as set power supply priority according to present if solar energy present then microcontroller sense voltage from resistor R1, R2 Same as other R3, R4 are sensing wind and solar respectively.

So according to sensing of voltage relay RL1 and RL2 on off and connected wind, solar supply to directly battery charging resistor are sense voltage according to voltage divider rule.

Rectifier voltage AC is converting to DC supply capacitor help to maintain voltage.

16x2 lcd is used to display which supply voltage generation present in percentage. +5v power supply is required to run lcd, relay sensing voltage from wind solar.

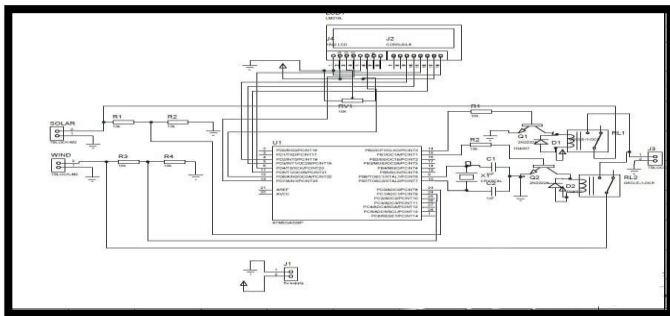


Figure - Circuit Diagram

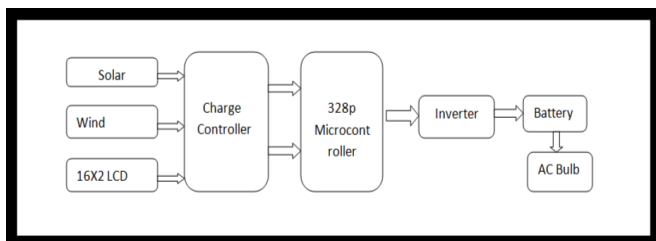


Figure - Block Diagram

### IV. RESULT AND DISCUSSION

Wind or solar power cannot be the sole source of electricity in a stable base-load grid, but they can reduce the use of conventional energy sources. The environmental benefits of the wind-solar hybrid system in this study were assessed in terms of avoided emissions. Given that a conventional thermal power plant emits a certain amount of pollutant per kWh of generated electricity, the wind-solar hybrid system can be considered to cause an avoidance of emissions, since it generates the electricity with nearly zero pollutant emissions. Although there are many types of emissions related to electricity production, CO<sub>2</sub> emission was considered, sulfur dioxide and nitrogen oxides. CO<sub>2</sub> is the largest component of the emissions from conventional electricity production and may be considered as the greatest environmental impact caused by the established power industry. The amount of CO<sub>2</sub> produced by conventional diesel fuel is 0.6kg for 1kWh. Hence, the reduction of CO<sub>2</sub> from energy saving of 0.427GWh would be 331 tons/y, sulfur dioxide and nitrogen oxides would be 1.5 ,0.74 tons/y annually.

Pure AC pattern. They have harmonics. To reduce this harmonic, we have to use proper filter.

#### Project photos



Microcontroller and 16 x 2 LCD Display



Figure - Inverter and Holder

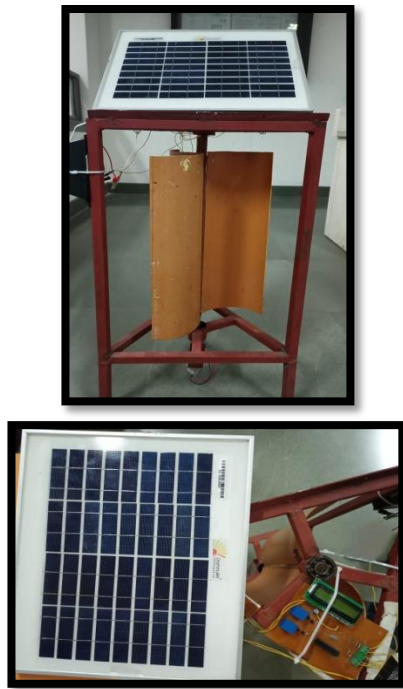


Figure - Front and Top View

## VII. CONCLUSION

The present worldwide trends concern energy security and sustainable development across the globe. The role of renewable energy has therefore become ever more significant. The developed world is already on the track for walking out from the fossil fuel era and involving mainly the areas of renewable energy technologies and energy efficiency. Through this study an insight into the energy situation and renewable energy potential of India was given. It was identified that India has economically feasible power generation potential of wind and solar energy. Using HOMER simulation software a grid tied wind-solar hybrid power generation system was modeled for a selected location in the almarj area of India (MARJU), located on the coastal belt near Benghazi. Through the simulation process, installation of 10 numbers of 100kW wind turbines and 150kW solar PV array was identified as economically most feasible design to supply average load connected to grid where payback period of the design is 2.6 years.

## VIII. FUTURE SCOPE

- The wind, solar for generating the hybrid at small level that help to the decision makers to study the various factors in construct a Hybrid generation plant with a various minimum cost with highest generating capacity.
- The result shows by the experimental and theoretical data that has been able to predict the energy generation through hybrid system. For future scope different time period has been use for calculating the power and efficiency.
- This method motivates the engineers to install small scale solar wind hybrid system in Jodhpur region.
- The government of India takes a major decision towards the hybrid energy sources.

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