Power Generation in Distribution Site by Using Hybrid-Renewable Energy System

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Abstract---**Distributed generation site to a variety of technologies that generate electricity at or near where it will be used, such as solar panels and combined heat and power. It may serve a single structure, such as a home or company, or it may be part of a microgrid as a lesser grid that is also fixed into the larger electricity delivery system, such as at a major industrial facility, a military base, or a large college campus. When connected to the electric utility's lower voltage distribution lines, distributed generation can help support delivery of uncluttered, reliable power to extra customers and reduce electricity trouble along transmission and distribution lines.**

Index Terms: Renewable energy system, Multilevel Inverter, DC link.

I. INTRODUCTION

This study identifies and discusses a wide collection of renewable power opportunities available in a rural area of India. Other admissible topics bearing on the potential life of renewable power projects, such as transmission access for renewable electrical power, system regulation, transmission enlargement paths for renewable energy including modernization and a smart grid, future electricity demand, electric utility business models, and developing financing planning of renewable energy, are addressed. In addition, a large number of renewable electric power developments in a rural area of India.

The principal gathering for this study is expected to be local and state governments, rural leaders, rural based utilities (cooperatives, municipals, and investor-owned) and their leadership, and rural residents whose sympathy are focused on renewable power, distributed generation, and rural economic development. This document is an information resource for rural electric utilities and policymakers interested in expanding their association renewable energy generation capacity. Many renewable energy resources are located near rural association, making these association well positioned to generate and use renewable electric power. This presents an exclusive opportunity for rural electricity providers to adopt renewable energy technologies, as they face the challenges of rising energy costs and increasing demand as well as state and federal renewable energy mandates. While the much rural association has already adopted such technologies, adoption has varied widely at both state and regional levels. Power from renewable resources continues to represent only a small fraction of most rural electricity providers' energy portfolios. Renewables are now established around the world as current sources of energy. Rapid growth, particularly in the power sector, is driven by several factors, including the improving cost completeness of renewable technologies, dedicated policy initiatives, better access to financing, energy security and environmental involvement, growing demand for energy in developing and emerging economies, and the need for access to modern energy. Consequently, new markets for both centralized and distributed renewable energy are emerging in all regions.

II. RENEWABLE ENERGY SYSTEM

A. SOLAR SYSTEM

Solar power is generated by turning energy in the sun's light into electrical energy. Many technologies take advantage of solar energy, including Photovoltaic (PV) power systems and Concentrating Solar Power (CSP) systems, as well as passive solar heating, solar hot water, and solar process heating and cooling. The two main technologies used for solar electric power generation are PV and CSP. PV arrays use semiconductor devices called solar cells to convert sunlight to electricity as shown in fig. 1.

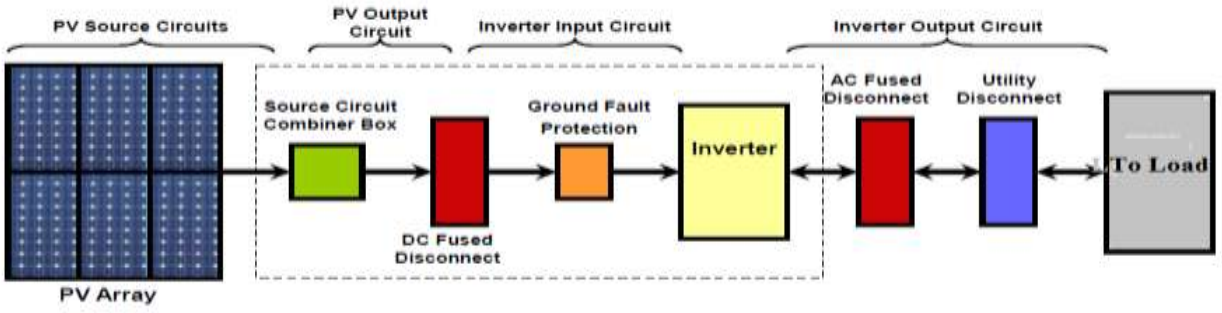

Figure1 Solar (PV Array) Power Generation

These solar cells are typically grouped into modules, while utility-scale PV power generation requires hundreds of connected arrays. Most areas in the India have enough sunlight for cost-effective, small-scale, non-grid connected PV, but not all areas have sufficient sunlight for utility-scale PV power generation. A modern PV array can be seen in there are several advantages to the use of solar power. Homes can use PV for heating and cooling as well as water heating, and may even produce enough electricity with PV to operate off the grid. Businesses and homes may be able to use PV to reduce electricity bills by selling excess electricity back to utilities. Such grid-connected solar systems have become a larger market than off-grid applications. Technologies are also being developed that will allow PV cells to be built directly into roofs, windows, and other structural elements of a building.

B. WIND SYSTEM

Electricity from the wind is generated by using turbines to convert the wind's kinetic energy into electrical energy. Wind turbines commonly have two or three airfoil, which spirals due to the aerodynamic lift that is created as the wind passes over them. These airfoils are attached to a shaft that runs a generator, which in turn creates electricity as shown in fig.2.

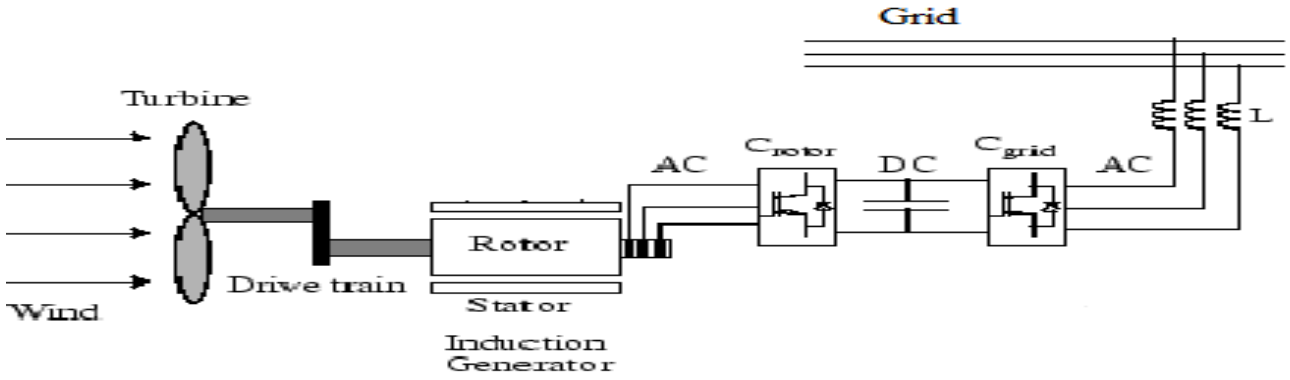

Figure 2 Wind Energy Converter into Electrical Energy Plant

Most turbines are mounted at least 30 meters (m) above the ground to take benefits of wind resources that are faster and less bitter than those closer to the ground. A typical modern wind turbine has three wings that are 70-80 meters in diameter mounted atop a tower 60-80 meters tall. Such a turbine can generate roughly 1.6 Megawatts (MW) of electrical power. Although turbines with larger airfoils, higher towers, and greater generation capacity may be developed in the future, it is uneasy the wing diameter of land-based wind turbines will exceed 100 m, which corresponds to a power output of 3-6 MW. This is because the transportation costs of such large components present a symbolic economic barrier to boundless ratification.

C. HYBRID SYSTEM

Hybrid systems generally to makes many renewable energy likes, solar, wind, hydro etc. but we are used to renewable energy that is solar and wind power generation. Those systems are very important to generate electrical power and also available easier than another system. Hybrid technology is easy to generated power in distribution side because these are less space, low cast, and low power generation then they are required as shown in fig. 3.

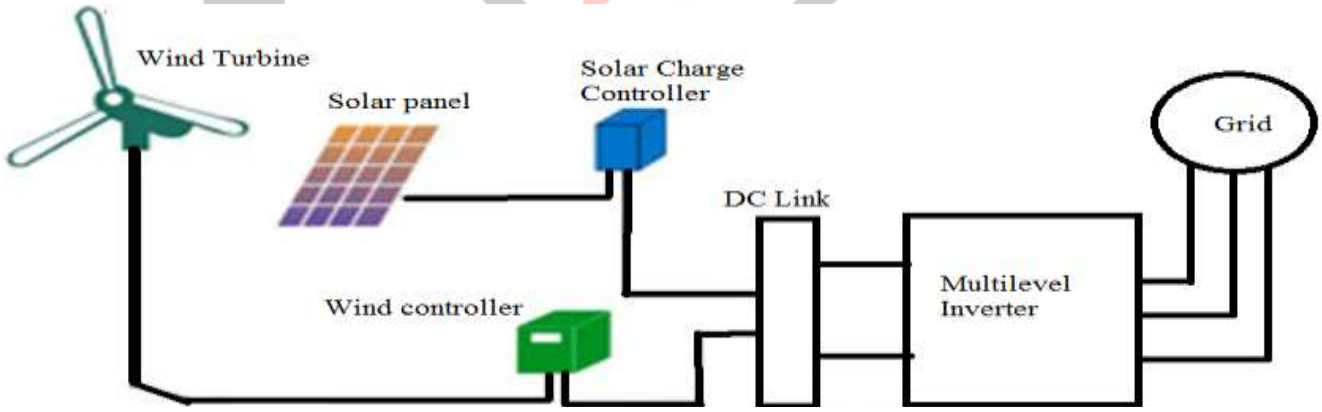

Figure 3 Solar-Wind Hybrid System with Multilevel inverter

Solar-wind system is more effective than another non-conventional system. It improves power quality and economical barrier.

III. SIMULATION MODELS

A. Simulation model of PV system

PV module design of simulation model and it is used to convert solar radiation to the electrical energy. The physical of PV cell is very similar to that of the classical diode with a PN junction formed by the semiconductor material. When the junction absorbs light, the energy of the absorbed photon is transferred to the electron-proton system of the material, creating charge carriers that are separated at the junction. The charge carriers in the junction region create a potential gradient, get accelerated under the electric field, and circulate as the current through an external circuit. Solar array or panel is a group of several modules electrically connected in series-parallel combination to generate the required current and voltage. Solar panels are the medium to convert solar power into the electrical power. Those model used temperature block to the constant temperature and also used radiance block. These PV model to used boost converter and he is low DC power to large DC power as shown fig. 4.

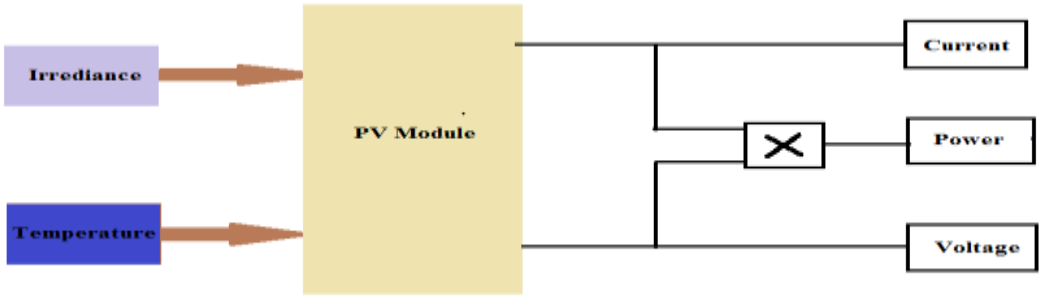

Figure 4 PV module in simulation model

B. Simulation model of wind system

Wind turbine model consists of turbine, Induction generator,and filter and converter model as shown in fig. 5.

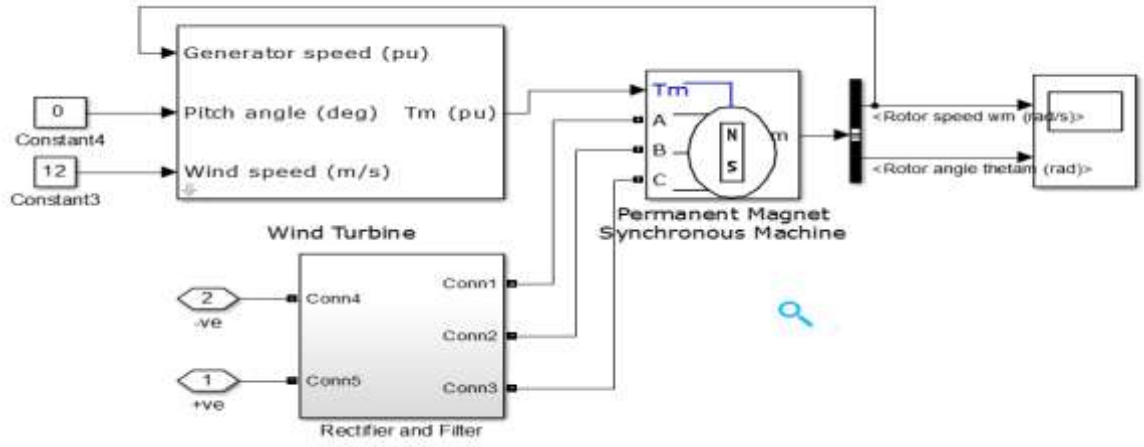

Figure 5 Wind Turbine Simulink Model

Wind energy depends mostly on kinetic energy and wind speed of the air mass even though wind speed is also affected by air density, air temperature, air barometric pressure, elevation, and local landscape. Wind turbine generators are useful where the average wind speed is greater than 4.5 m/s and with fixed flow rate at less disturbance and minimum powerful wind barrage. Fig. 4 shows best wind turbine locations on mountainous cement-rain.

C. Solar-Wind System Hybrid model

The hybrid system is tied into the solar-wind system. The output voltage of the solar arrays and the wind generators are linked and synchronised together with the DC link as shown infig.6.

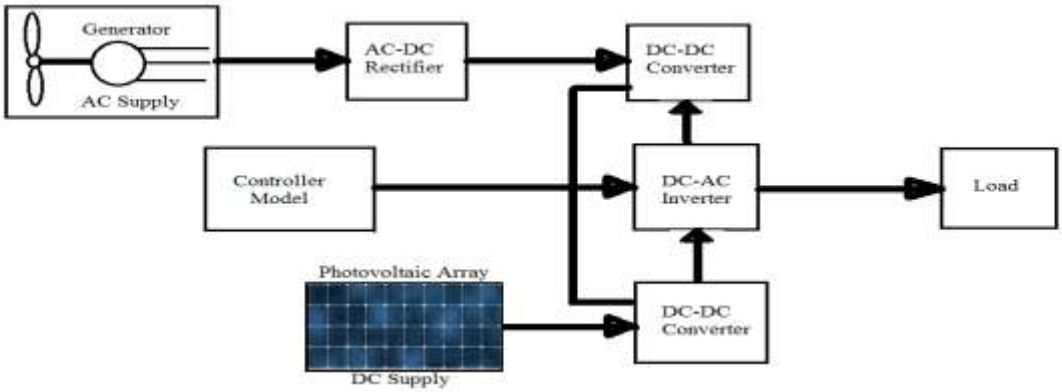

Figure 6 Solar-Wind System Hybrid model

IV. MULTILEVEL INVERTER

He proposed configuration represents the grid connection of three, single phase inverters which are connected in star. The DC sources can be obtained from renewable energy sources such PV and the wind. Multilevel inverters have gained much attention in recent years due to their various advantages. The general concept of multilevel inverters involves the utilising a higher number of power electronics switches to perform the power conversion in small voltage steps. The small voltage steps lead to obtaining the low harmonic distortion and switching losses, devices possessing low voltage ratings and higher efficiency. It is complicated to connect a single power semiconductor switch directly to medium voltage grids. For these reasons, a new family of multilevel inverters has emerged as the solution for working with higher voltage levels.

V. RESULT

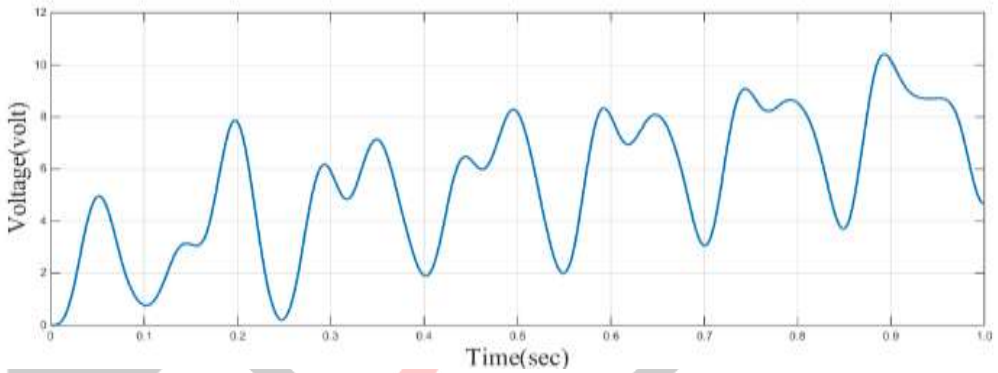

Figure 7 Solar system output voltage

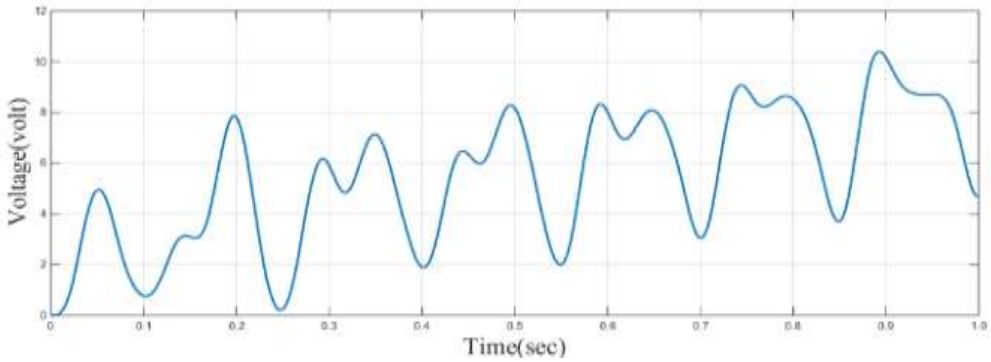

Figure 8 Wind system output voltage

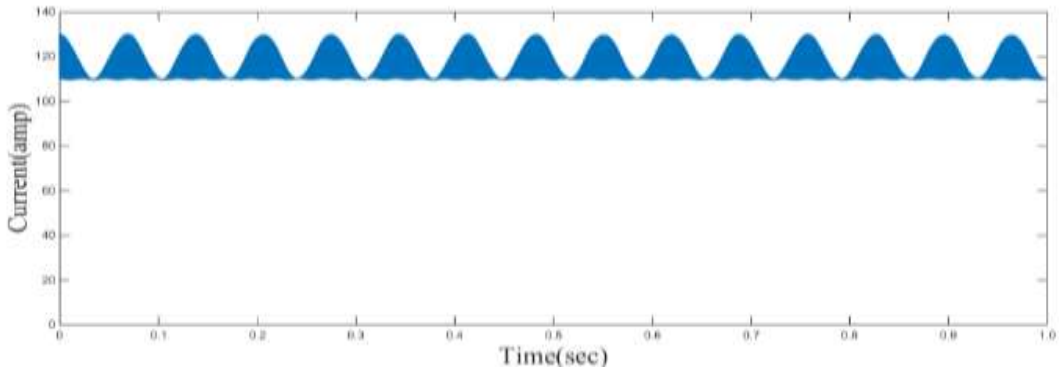

Figure 9Common DC Link Current in hybrid system

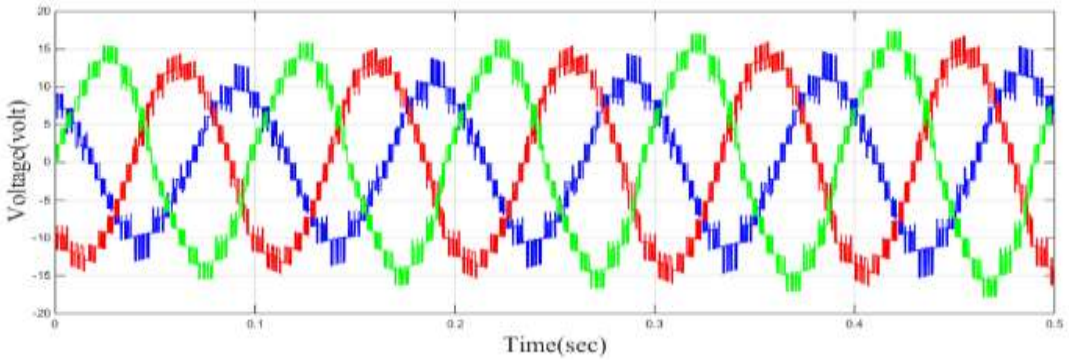

Figure 10Output Voltage in multilevel Inverter to connected in hybrid system

VI. CONCLUSION

Power generation in distribution site is very important because Today we are power demand increases so that power generation in distribution area to peak up the growth of the country. It is decreasing power to the production of industry and rural area is very slow in that condition our need to more power to the development of country growth. It is the energy to increasing growth of power sector in manufacturing and so on. This energy generated in rural area, commercial and industrial site to our need of energy is fulfilled. And also to the improved the efficiency of supply. This paper can be generated power in distribution site. The overall increasing efficiency of the grid and reduced losses in transmission and distribution.

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