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## **HYBRID MODEL OF WIND-PV SYSTEM WITH MAXIMUM POWER POINT TRACKING FOR DOMESTIC ELECTRIFICATION**

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**Abstract :** In this paper, the renewable energy sources are regarded as related to present atmospheric movements. The Solar Electric systems, which are also called photovoltaic or PV and wind systems are reliable and pollution-free. This system is eco friendly energy sources have been showing excellent potential as a form of contribution to conventional power systems. The integration of photovoltaic (PV) system and wind energy conversion (WECS) system is an excellent option for distributed energy production. This paper is focused to the development of such a hybrid energy system which is being connected to grid and is being provided with a Maximum power point tracking (MPPT) technique to track maximum power from individual system. The proposed system is connected to grid through an inverter, which can achieve dc bus voltage regulation or stabilization if one or more of the energy sources are degraded.

**Keywords:** Photovoltaic (PV), Wind energy, Wind Energy Conversion system (WECS), Maximum Power Point Tracking (MPPT)

### **INTRODUCTION**

The energy consumption of the world is increasing dramatically with the rapid increase of population. Renewable energy resources are holding the predominant place for satisfying the future energy demand and eco friendly energy sources. The renewable energy sources such as photovoltaic (PV) system and wind energy conversion (WEC) system have become two promising alternate sources of energy. A power generating system which combines two or more different sources of energy is called hybrid system. The hybrid power systems exhibit higher reliability and lower cost of generation than those that use only one source of energy. This paper aims at a hybrid wind and photovoltaic power generating system. The wind and photovoltaic are used as energy sources. A simple control method tracks the maximum power from the wind energy source without measuring the wind or generator speed, which is very useful for actual small size wind turbines. The same control principle is applied to

track maximum power point of the photovoltaic system without sensing the irradiance level and temperature [4]. Integration of the two energy sources, as a storage device placing the huge conventional batteries or super storage capacitors, leads to a non-polluting reliable energy source and reduces the total maintenance costs.

The hybrid system is being provided with a maximum power point tracking controller which tracks the maximum power from each source and which is being provided to grid. Various techniques of MPPT have been considered in renewable energy applications. Although the MPPT efficiency demonstration or comparisons to other methods is beyond the scope of the present work, a voltage based MPPT for PV and WEC systems has been proposed for its simplicity and faster tracking response. This paper is aimed at combining WEC and PV power generating systems to maximize the output energy and reduce the output power fluctuations. The proposed hybrid system can be connected to the grid through an inverter.

### **HYBRID SYSTEM MODEL**

The hybrid energy system integrating two main subsystems of PV and WEC with two individual control

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units and a bridge inverter is shown in fig.1. The PV and WEC systems are used as energy sources. The two subsystems such as PV and WEC systems are connected to individual dc-dc boost converter. The control is being provided using MPPT technique. The output of the hybrid systems are connected to a common dc bus. The DC power available at the dc bus is supplied to the grid inverted using an inverter which also provides voltage regulation. Thus the entire system when connected to the grid will provide a required continuous energy supply even if any one of the energy sources is being diminished.

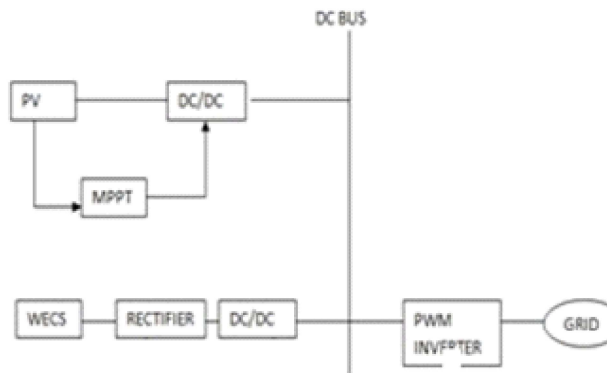


Fig 1: hybrid energy system

**SYSTEM DESCRIPTION**

**Photovoltaic System**

Solar cell is defined as a p-n junction, fabricated on a thin wafer of semiconductor. A number of such solar cells from the building block of a PV array

. The electromagnetic radiation of solar energy is directly converted to electrical energy through photovoltaic effect. Photovoltaic generation system are day by day becoming important as renewable energy source since it has no fuel cost, does not pollute, requires less maintenance, no operating noise and so on.

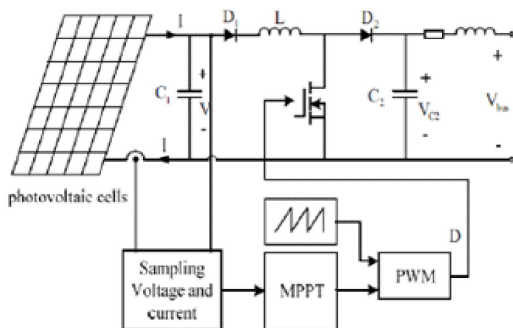


Fig.2 PV system

**Wind Energy Conversion System**

Wind energy system consists of a wind turbine, permanent magnet generator, a diode bridge rectifier and a dc-dc boost converter as shown in Fig.3 The WEC system consisting of a wind turbine coupled to a generator and the turbine is rotated by means of wind energy and electricity is being produced by converting the rotation of turbine into electrical power by the generator. The generator is connected to three phase diode bridge rectifier which provides a rectified dc to the input of a dc-dc boost converter.

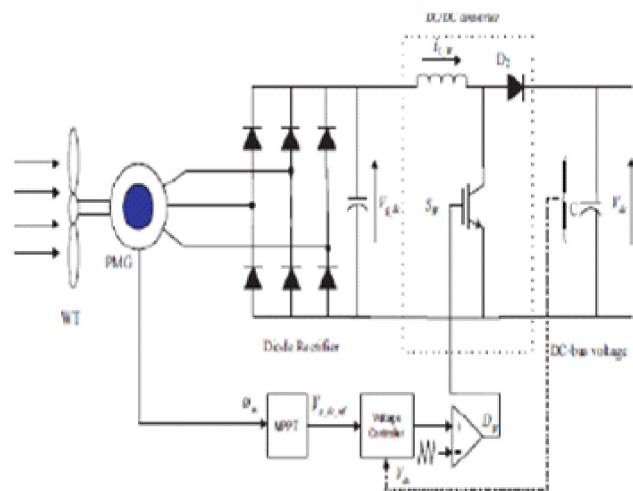


Fig. 3 Wind energy conversion system

**SIMULATION MODEL**

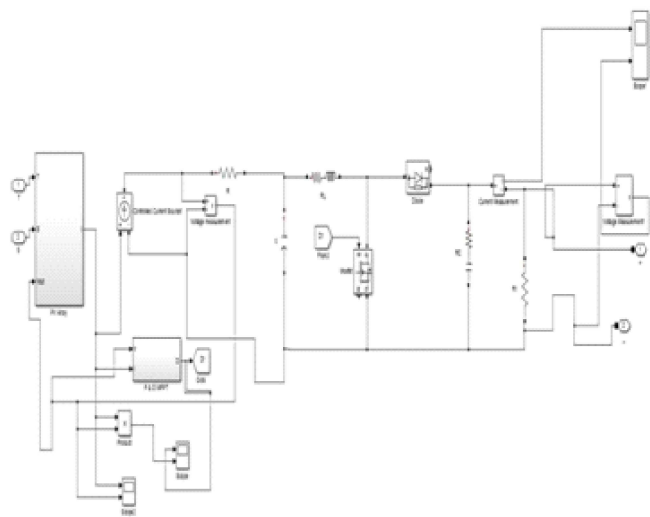
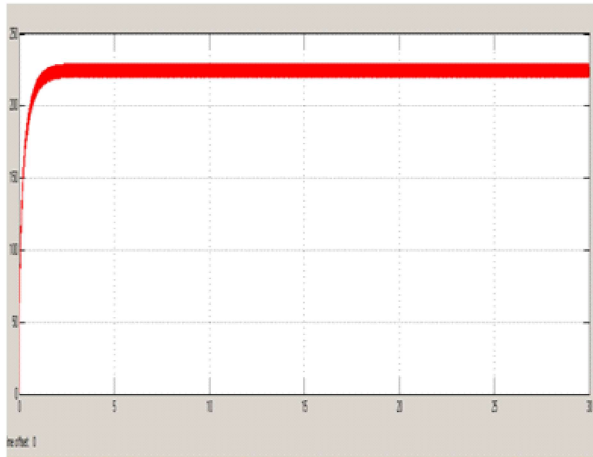
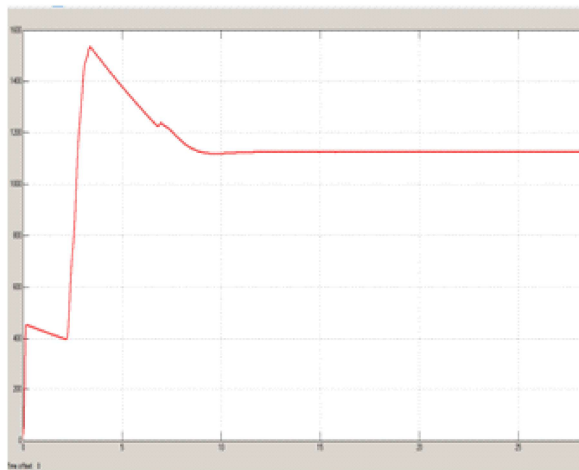


Fig.4 PV system with MPPT

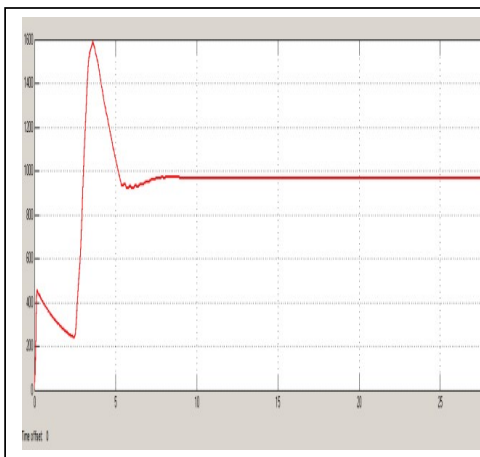
### RESULTS



**Fig.5 DC Output Voltage of PV System**



**Fig.6 DC Output Voltage of WECS**



**Fig.7 DC output voltage of Wind-PV Hybrid system**

### CONCLUSION

The paper presents a hybrid energy system with MPPT and dc bus voltage regulation. The entire system can provide a continuous output across the grid. The output power obtained from primary energy sources such as PV and WECS will vary depending on solar irradiance and wind speed variation. The overall system provides a continuous power output across the grid with load variation and environmental changes for Rural Electrification.

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