

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

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Vol. 7, Issue 12, December 2018

Wind and Solar Hybrid Generation at Variable Speed of Wind Based With SOFC

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ABSTRACT: This Paper deals with the hybrid system which is depends on the renewable energy sources . The all components used in the hybrid system is easily available in the environment so we used this components for the hybrid system based on SOFC to control the wind energy conversion at the variable speed so we got the reliable . The system consist of the components like Grid , fuel cell , Wind farm , solar panel respectively . In recent time large of industrilization and other development is occurs so , we needs the power in large scale. In developing countries the advanced new techniques are implemented so that lots of research is get done for making the environment with services . Fuel cell technology is a moderately new energy-storing technology that has the potential to participate with the conventional present generation facilities. Among the various Distributed Generation or onsite generation or localized generation technologies available, fuel cells are being deliberated or considered as a potential source of electricity because they have no geographic boundaries and can be placed any where on a distribution system. Modeling of SOFC is done by using Nernst equation. In that the output power of the fuel cell can be organized by adjusting the flow rate of the fuels used in the procedure and development. The wind energy conversion system (WECS) is equipped with a DFIG and two back-to-back Pulse Width Modulated (PWM) Insulated Gate Bipolar Transistors (IGBTs) based voltage source converters (VSCs) in the rotor circuit. The three phase PWM inverter to get the suitable form three phase output voltages for the grid associated applications. In this paper, design and modeling of Solid Oxide Fuel cell (SOFC), PV Modelling with wind farm is discussed for the distributed generation applications. Modeling and simulations are carried out in MATLAB Simulink platform.

KEYWORDS:Doubly-Fed Induction Generator (DFIG), Wind Energy Conversion System (WECS), RSC (Rotor side controller), GSC (Grid side converter), SOFC (Solid Oxide Fuel Cell system) , PV (Photo voltaic) .

I. INTRODUCTION

The growing industrialization and domestics, power demand is increasing vastly. To keep the green environment we have to create power from the various renewable energy sources in environment friendly manner. In present the bulk ac power transmission are not economic and also complex to control the power flow. To stunned this problems wind turbine and photovoltaic generators are used. The proposed hybrid model is most suitable for all weather conditions. And also, it is very safe working atmosphere with the hybrid model. Wind and solar energy is unsteady and unpredictable, and harnessed in relatively small quantities spread over a large area. If it is not properly controlled, the power output of a wind farm and PV array could too small percentage only. In this paper permanent magnet synchronous generator is used with variable speed control employed .

The flux in the generator is controlled by field controlled method, and speed Vs torque characteristics controlled by PI controller. Similarly, another one power produced by PV panel. Recently, there has been rigorous research on the voltage and frequency control of squirrel cage type, but relatively little research efforts have been devoted to the use of the slip-ring induction machine for generator applications.

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fuel cell is used for to stored the power and also for the production of electrical energy. Then power from each component is given by

Load Power requirement = 4 MW		
Parameters	Power delivered to load (MW)	Total Power from the Parameters
Grid	0.5	3.5 MW
Wind Farm	2	
Fuel Cell	0.5	
PV-array	0.5	

Table 1:- Power delivered from the Sources

III.MODELLING OF PV CELL

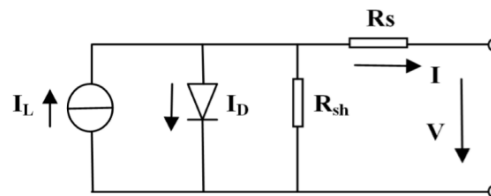


Fig.3:- Equivalent Circuit of PV Module

Normally, voltage output is based on solar irradiation and temperature of the cells. The converter is to get the voltage for which the peak value of power attained or gain from PV cell. The output variable is an increment value which increases or decreases the voltage reference of the PV array. Then the PWM duty cycle of the boost converter connected to the DC-link.

III.SIMULATION RESULT

The develop system is carried out in the MATLAB software, The result is gives the result from its respective sources such as wind farm,fuel cell, and PV-array we need the constant power from the sources so that we need the reliable and constant nature output is given by

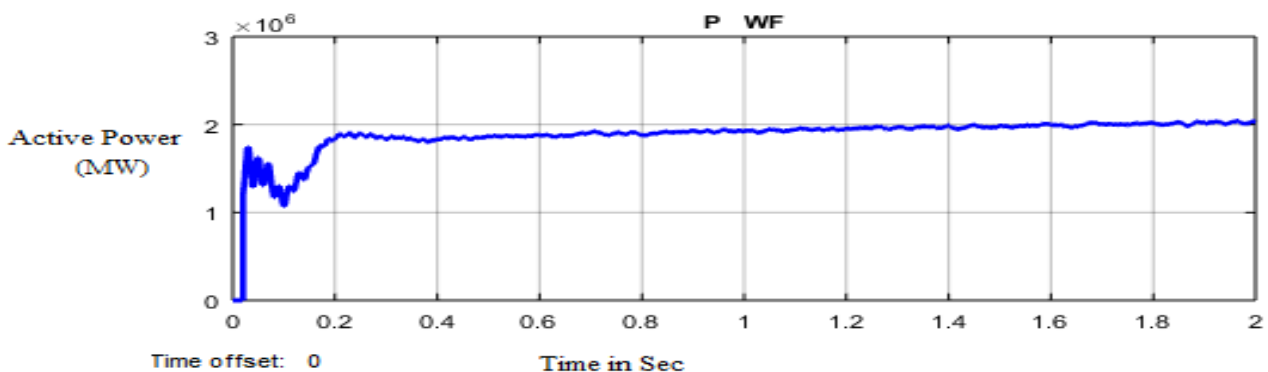


Fig 4:-Real Power output from wind farm

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The power delivered from the wind farm is 2 MW we use the PV-array to provide the continuous power to the load. Then again we use the fuel cell this fuel cell is utilized for creation of the electrical power and also used to store the amount of energy in it. The fuel cell having dual nature, the power delivered from the fuel cell is 0.5 MW. The power of graph is given by

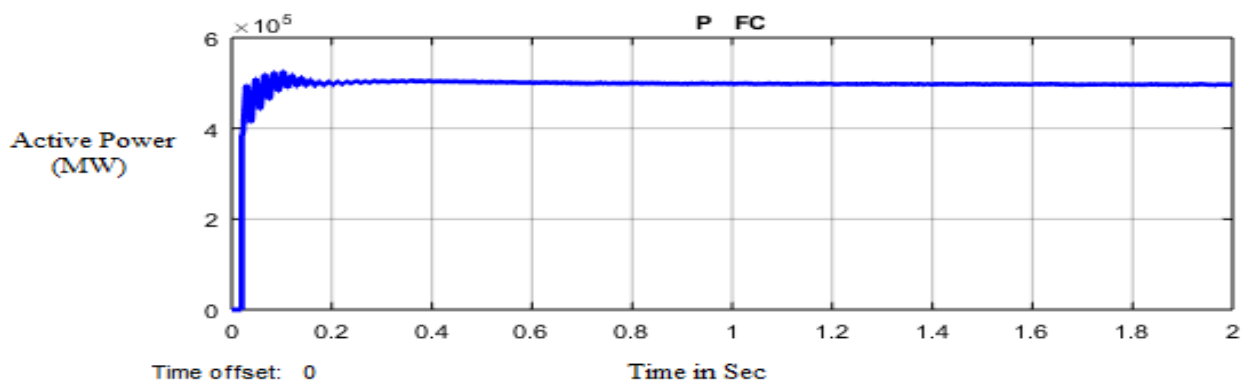


Fig 5:-Real Power delivered from the Fuel Cell

In that we provide the PV-array these PV module is used to deliver the result which is beneficial for our load demand our creation is improved and increase our output. The power delivered from the PV module is 0.5 MW and some power is from the grid is 0.5 MW, The PV-array contains the photo diode which convert the solar energy into the electrical energy the power from the PV-array is

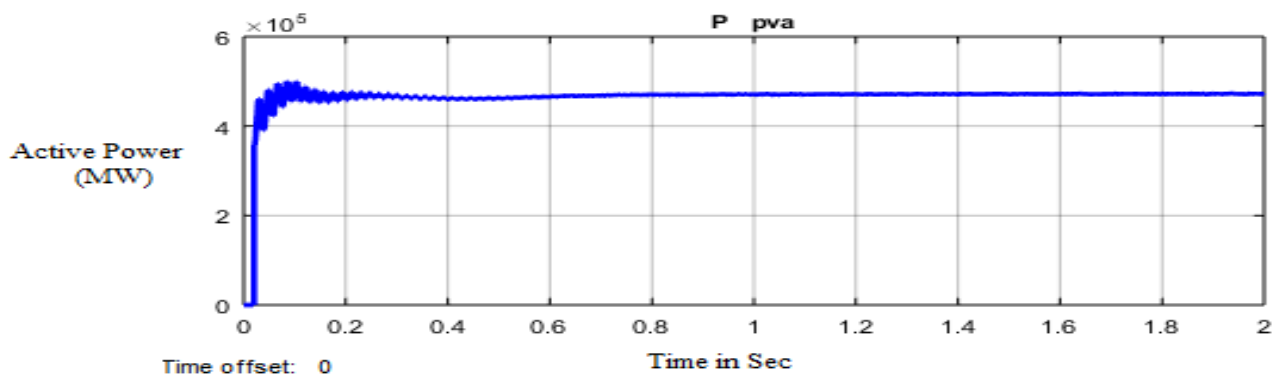


Fig 6:-Real power Provided from the PV-array

The sources like wind farm, fuel cell, PV-array is collected at the one point that point is known as the point of common coupling from that point coupling the power is provided to load is 3.5 MW then this point is the power collection point. The power collected at these point is given by

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Vol. 7, Issue 12, December 2018

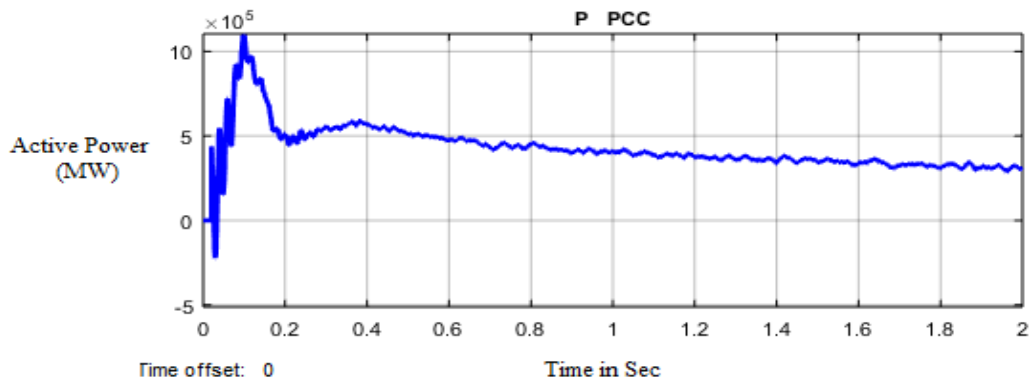


Fig 7 :-Power collection at PCC

The all parameters provide the combine power which are provided to the load then the these power is about the 4 MW it is the output power from the 4 sources which gives the power of 3.5 MW . The Power is given by

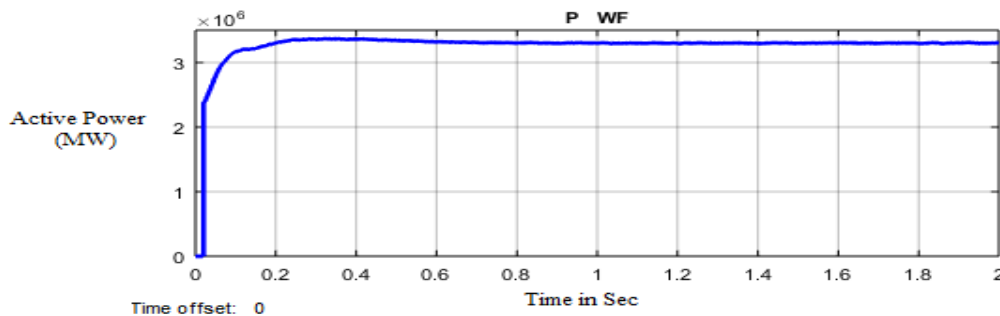


Fig 8. -Overall output power to the load

IV.CONCLUSION

The simple , easy and most well-organized integrated windmill & Solar with DFIG and PV solar cell system are proposed with SOFC . The advantages of SOFC having strength and the easy to implement when compared to the other fuel cell & it is economically useful & pollution free . It also simplifies to estimate the wind mill structures simply and correctly. Also, this hybrid generation system takes a dissimilar quality that the wind-PV power naturally accompaniment to one another to positive amount, there by assisting constant output power for full day to the load. In future the fuel cell also taken in to the account to achieve not only the constant supply but also better battery life. The system with wind conversion is achieved by vector control at the grid side. So this got the positive response to the power generation.

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