Performance Analysis of Renewable Energy Source using Solar and Wind Energy

Ankita Chourasia[1], Dr. Anuprita Mishra[2]
[1]M. Tech Scholar, Department of EX, TIT, Bhopal (India)
[2]Head & Professor, Department of EX, TIT, Bhopal (India)
[1]ankitachourasia92@gmail.com, [2]anupritamishratit@gmail.com

ABSTRACT
During the past few years renewable energy sources have received greater attention and considerable efforts have been made to develop efficient energy conversion and utilization system. The major goals of these approaches are to have reduced environmental damage, conservation of energy, exhaustible sources and increased safety. The vision of a Smart Grid includes technologies that enable the efficient integration of intermittent renewable energy sources (such as wind or solar energy) and electric vehicles, and will reduce demand by allowing consumers to better manage how electricity is used, stored, and delivered. Many countries are currently making massive investments on smart grid research and development, In this paper we presents the hybrid model for the renewable energy sources including wind energy for the whole day and solar energy sources for the day time only.

Keywords: Renewable energy, photovoltaic, Wind energy conversion system, hybrid energy system, Battery.

INTRODUCTION
Microgrids are key elements to integrate renewable and distributed energy resources as well as distributed energy storage systems. Nowadays electrical and energy engineers have to face a new scenario in which small distributed power generators and dispersed energy storage devices have to be integrated together into the grid [9]. The new electrical grid, also named smart-grid (SG), will deliver electricity from suppliers to consumers using digital technology to control appliances at consumer's homes to save energy, reducing cost and increase reliability and transparency. In this sense, the expected whole energy system will be more interactive, intelligent, and distributed. The use of distributed generation (DG) makes no sense without using distributed storage (DS) systems to cope with the energy balances [1].

In this sense, new power electronic equipment will dominate the electrical grid in the next decades. The trend of this new grid is to become more and more distributed, and hence the energy generation and consumption areas cannot be conceived separately [1] by using the droop method, the power sharing is affected by the output impedance of the units and the line impedances. Hence, those virtual output impedance loops can solve this problem. In this sense, the output impedance can be seen as another control variable. [3]

Another important disadvantage of the droop method is its load-dependent frequency and amplitude deviations. In order to solve this problem, a secondary controller implemented in the microgrid central control can restore the frequency and amplitude in the microgrid.[1] The conventional secondary control approach relays on using a MicroGrid Central Controller (MGCC), which includes slow controls loops and low bandwidth communication systems in order to measure some parameters in certain points of the MG, and to send back the control output information to each DG unit Microgrid control is designed to facilitate an intelligent network of autonomous units [3].

The rest of this paper is organized as follows in the first section we describe an introduction of about the Renewable energy sources such as wind, energy etc. In section II we discuss about the DER based distribution. In section III we discuss about the decentralized control methods. In section IV we discuss about the current proposed work and simulated results, finally in section V we conclude the about our paper and specify the future scope.

II DER-BASED DISTRIBUTION

Basic issue for DER is the technical difficulties related to control of a significant number of distributed energy sources. Using DER in the distribution system reduces the physical and electrical distance between generations and loads. For voltage drops, faults, blackouts etc. the DER with local loads needs to switch to island operation. The two major benefits of DER-based distribution are

- Increased efficiencies using waste heat
- Reduction of line losses and enhanced customer reliability through islanding during a power system outage.

The major road block is system complexities of managing such a wide and dynamic set of resource and control points [2]. Typical micro grid structure, including loads and DER units serviced by a distribution system it includes distributed energy resource (DER) units and loads of electricity and/or heat. DER units include both DG and DS units. The microgrid provides electricity and/or heat to customers such as residential buildings, commercial entities, and industrial compounds.

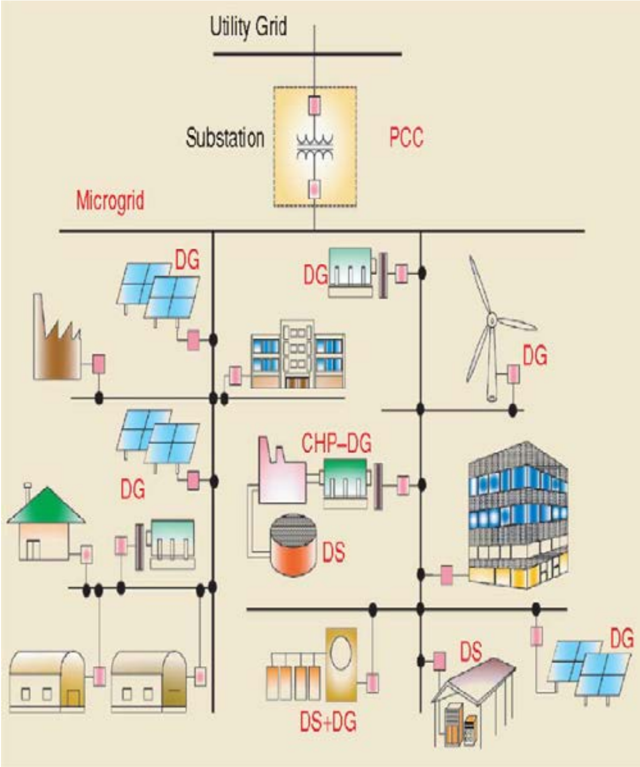

Figure 1: Shows a microgrid schematic diagram.

Smart grid is a term referring to the next generation power grid in which the electricity distribution and management is upgraded by incorporating advanced two-way communications and pervasive computing capabilities for improved control, efficiency, reliability and safety. A smart grid delivers electricity between suppliers and consumers using two-way digital technologies. It controls intelligent appliances at consumers' home or building to save energy, reduce cost and increase reliability, efficiency and transparency. A key feature of microgrids with distributed energy sources is that the sources are dispersed over a wide area.

III DECENTRALIZED CONTROL METHOD

There are many control schemes for linear load sharing based on the various method droop method is also a one of them. In which a controller was proposed to also share nonlinear loads by adjusting the output voltage bandwidth with the delivered harmonic power. In an-other approach, every single term of the harmonic current is used to produce a proportional droop in the corresponding

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harmonic voltage term. However, the droop method exhibits a slow dynamic response since it requires low-pass filters with a reduced bandwidth to calculate the average value of the active and reactive powers. A wireless controller was proposed in order to enhance the dynamic performance of the paralleled inverters by adding integral derivative power terms to the droop control method. Using the conventional droop method, the output impedance and line impedance are considered to be mainly inductive, which is often justified by the large inductor value or by the long distances between the units. However, this is not always true since the output impedance of the inverter depends also on the control strategy, and the line impedance is predominantly resistive for low-voltage cabling. Another problem of the droop method is that the power sharing is degraded if either the output impedance or the line impedance is unbalanced. To ensure inductive output impedance, fast control loops are added to the droop-control method, thus avoiding the use of an extra output inductor.

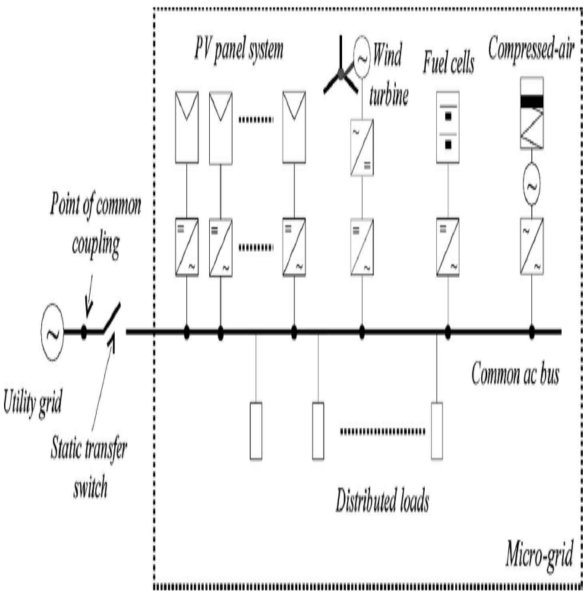

Figure 2: Distribution scheme of a possible microgrid.

IV EXPERIMENTAL RESULT ANALYSIS

Simulation refers to the imitation of the operation of a real-world process or system. Simulation involves the development of a model using efficient software that closely represents the physical world system/ process under study. MATLAB R2014a has been selected for implementing the numerous methods surveyed in the invented story for the computer vision scheme. In this model the proposed hybrid system measure the performance of wind energy and solar energy according to given time schedule such as from 06.00 AM to 06.00 AM (complete 24 hours for wind and 12 hours for solar) respectively for the each sources, and produce the electricity according to solar radiation and wind speed. A PV/wind hybrid system consists of wind energy, solar energy, controllers, battery and an inverter for either connecting to the load or to integrate the system with a utility grid. For analyzing the system performance these components need to be modeled individually. The accuracy of individual component's model decides the accuracy of the entire system. The performance of hybrid systems is also dependent on the performance of its individual components.

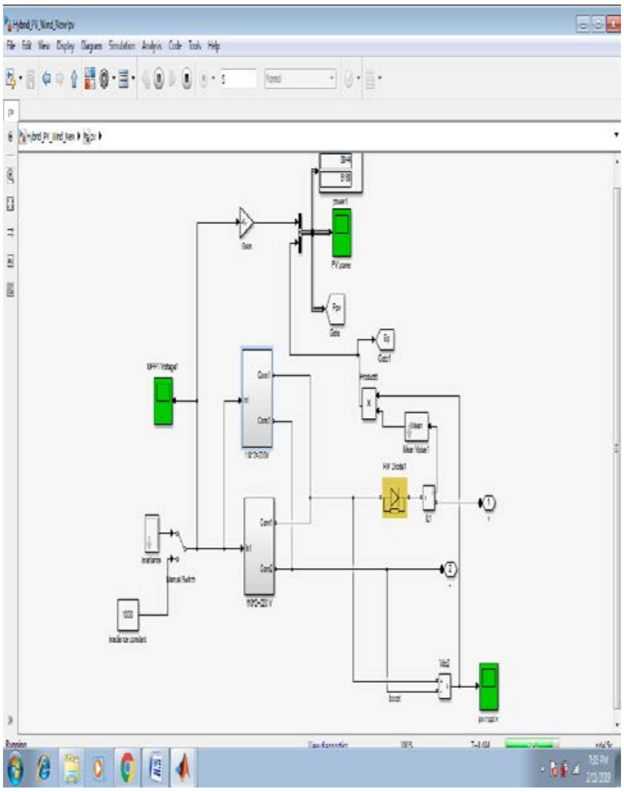

Figure 3: This figure shows the proposed architecture for the solar PV system.

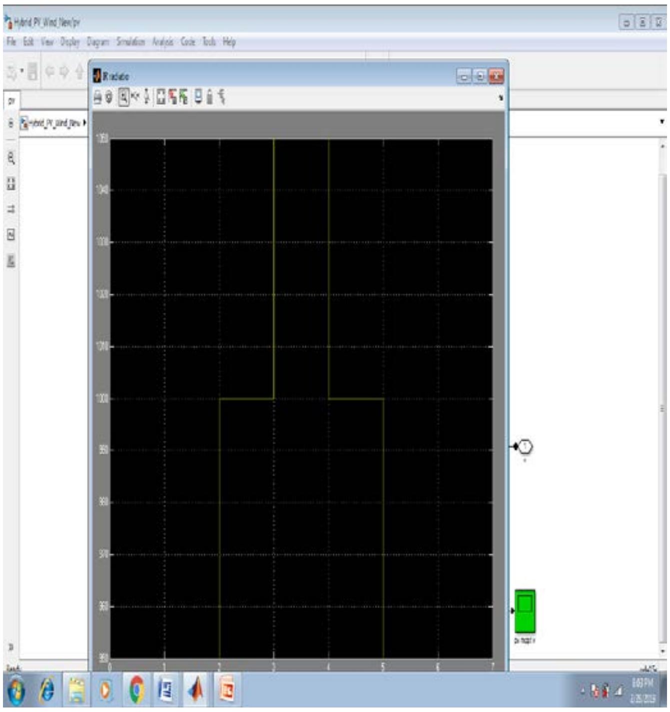

Figure 4: This figures show that the power of photovoltaic module.

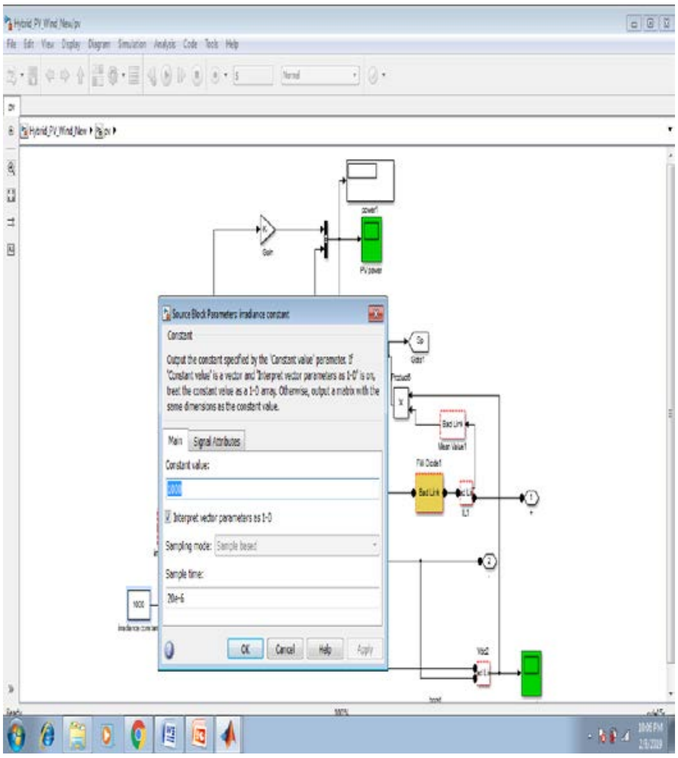

Figure 5: Shows the internal window for constant value used in solar system.

V CONCLUSIONS AND FUTURE WORK

The permanent increase in the energy demand is considered as one of the most critical issue nowadays. Besides, as conventional power sources are limited and have adverse effects on the planet, has necessitated an imperative search for renewable energy which causes no pollution of the earth. Current research contribution and day to day experience news show used of alternative energy sources either in standalone or grid integrated form. A PV/wind hybrid system consists of wind energy, solar energy, controllers, battery and an inverter for either connecting to the load or to integrate the system with a utility grid. For analyzing the system performance these components need to be modelled individually. The accuracy of individual component's model decides the accuracy of the entire system. In this paper we presents the hybrid model for including solar and wind energy and improve the performance of network, in future we also some other renewable energy sources and generate more power.

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