International Journal of Innovative Technology and Exploring Engineering (IJITEE)
ISSN: 2278-3075 (Online), Volume-9 Issue-2, December 2019

Power Management of Micro Grid under is Landed and Grid Connected Mode of Operation

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Abstract: Power management is a feature that permits users to manage the quantity of electric power consumed by the underlying devices, with smallest impact on performance of the system irrespective of its mode of operation. It permits the switch of devices in varied power modes with totally different power usage characteristics associated with device performance. Particularly in island or off grid mode, a microgrid plays vital role by integrating different sources of distributed generation (DG) and Renewable Energy Sources (RES). Typically plants run in synchronization with grid. Anyway normally plants have their islanding mode empowered, which can mechanically island or segregate the plant if there's some outside unsettling influence inside the grid. This paper is concerned with the dynamic and reactive power sharing of DGs with change in load. Here the power profile of three distributed energy resources are obtained with the impact of variable load and all the results are obtained by using MATLAB simulink.

Keywords: Microgrid, Distributed Generation, Distributed Energy Resources, Renewable Energy Sources.

I. INTRODUCTION

With the worldwide energy crisis and therefore the more and more serious environmental issues, renewable energy becomes a future energy trends. As a crucial type of renewable energy used, distributed generation (DG) has been fast development within the world [1]. However, massive scale integration of DGs can bring in operation and challenges to the facility system network. A microgrid is a crucial means that to the current drawback, and gained a lot of attention worldwide. Microgrid could be a clump of interconnected Distributed Energy Resources (DER)with storage devices [2]. A microgrid can operate in both grid-connected as well as island-mode of mode of operation. This paper concerns about the facility management problems in micogrid [4].In every microgrid the load sharing relies on the method of operation of microgrid. A procedure for load sharing is joined wherever the controllers are equipped for repaying the nonlinear and unbalanced loads. This paper proposes a procedure to safeguard the best possible load sharing at intervals. The I-V, P-V graph and the power profile of DERs are obtained by using MATLAB simulink modelling.

Revised Manuscript Received on December 30, 2019.
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II. MICROGRID STRUCTURE

In current propensities a microgrid is broadly utilized each in genuine applications moreover as in research facilities. This part gives the format of microgrid in conjunction with some current microgrid. A microgrid comprises of an tremendous advantage that it can operate in off grid mode automatically in case of any kind of grid failure as it relies assortment of sorts of DERs. Even with the abundant availability of renewable sources microgrid can't act as an accurate replacement of grid[4]. Microgrid has a more on automation. In case of AC microgrid, only AC main bus exists which is associated with an utility grid through sources, loads are associated with AC bus.There are particularly 2 assortments of Distributed Energy Resources (DER): one. This system comprises of electrically coupled DER and several old turning machine based DER. Basically it comprises of DC/AC or AC/DC converters that couples the DER to the utility network as showed up in figure 1. Reason for normal coupling (PCC) goes about as a change course between the microgrid and subsequently the utility grid. Contingent on the geological and ecological prerequisites the distinctive sorts of DERs are regularly incredible intigrated with the grid.

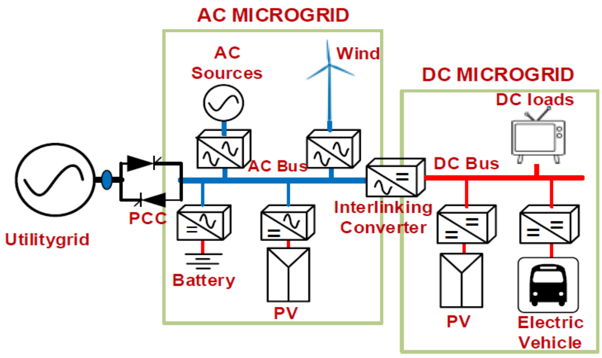

Fig 1 : Structure of Microgrid

At different irradiance i.e., 200w/m^2, 600w/m^2, 800w/m^2, 1000w/m^2 the I-V and P-V curve of a solar module is obtained which is shown in figure2.

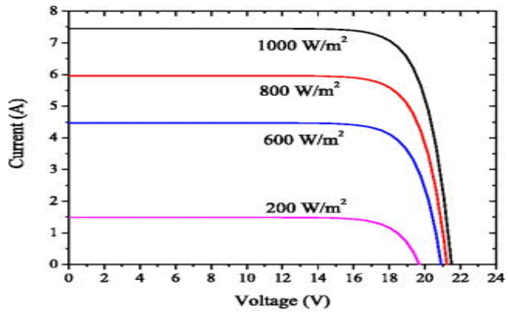

Fig 2(a) I-V graph of PV array at different irradiance

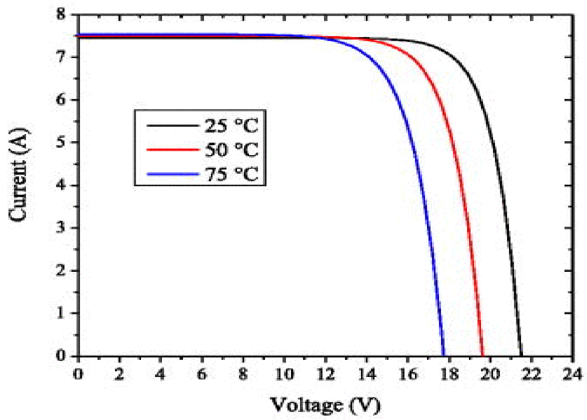

Fig 2(b) P-V graph of PV array at different irradiance

At different temperature i.e., 25°C, 50°C, 75°C the I-V and P-V curve of a solar module is obtained which is shown in figure3.

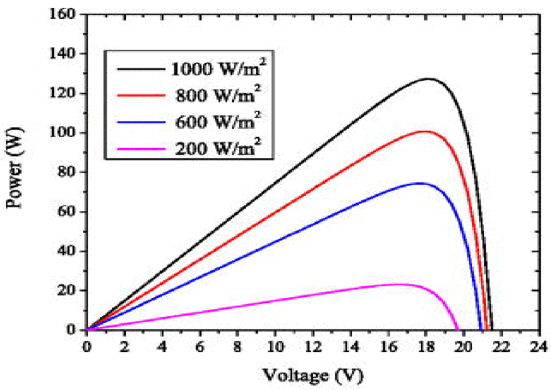

Fig 3(a) I-V graph of PV array at different temperatures

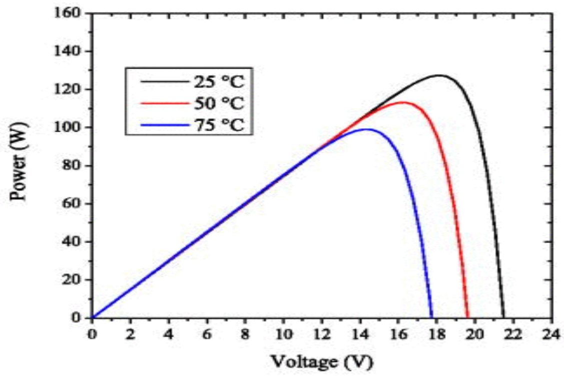

Fig 3(b) P-V graph of PV array at different temperatures

I. PROJECTED SYSTEM

This framework constitutes a four node ring kind conveyance framework that contains 3DGs alongside a grid, 3 critical loads and 2 non critical nodes. The active and reactive power traded is depicted by P and Q exclusively. Every one of the DGs are associated with each node by means of electrical switch called circuit breaker. Generally passed on generator gives its neighbourhood load to the utility in grid connected mode where as in islanding mode the adjacent load is given by the closest DG and essential loads are shared by each one of the DGs present inside the grid.

II. SIMULATION RESULTS

This paper is concerned about the administration of total power in a microgrid where the DERs are portrayed by proportionate sources. In this system, the operational organizations thought of to investigate the sharing of active and reactive power of different DGs other than the loads.

Figure beneath demonstrates the power profile of different DERs. As should be obvious from various results comes about it has been resolved that in islanded method (from t = 0.2 s to 0.5 s), on account of the deficiency of power from the grid.Furthermore we can investigate that the reactive power demand of the load that was before being equipped by the grid, is as of now shared between 2DGs, especially DER1 and DER3. With a particular true objective to find the power sharing between the diverse DGs, once noncritical loads are moved, at t = 0.35 sec, the dynamic power profile of DER2, goes down from 380 kilo watt to a hundred and eighty kilo watt. The reactive power of the DG1 circumvents a measure of forty kVAr and for DG2 it circumvents a measure of fifty kVAr and for DG3 it circumvents a measure of twenty kVAr.Thusly the aggregate decrease in reactive power is on the very edge of a hundred and ten kVAr. The reactive power request of the non critical load is a hundred kVAr, subsequently basically reactive power in like manner remains balanced. Thus, it gives a suggestion that situation of the load and DG doesn't choose that whether DG can have a considerable measure of effect on its active and reactive power profile once some load associated closest to that is turned off.

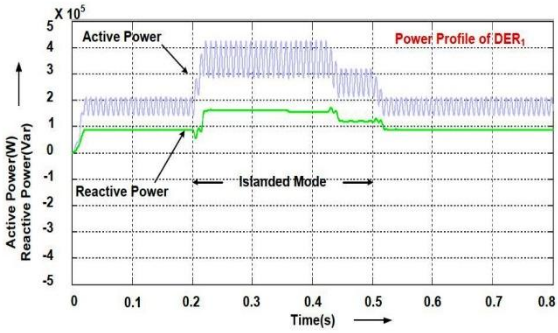

Fig 4: Power Profile of DER1

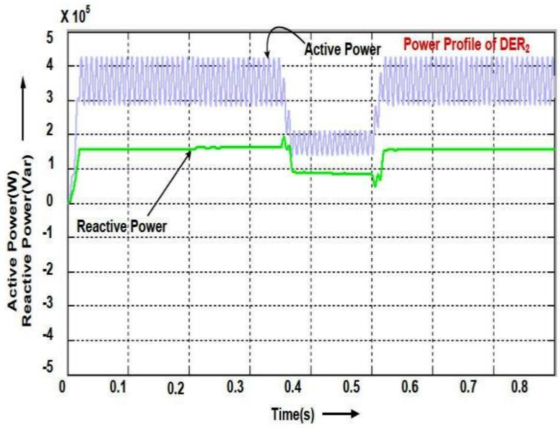

Fig 5: Power Profile of DER2

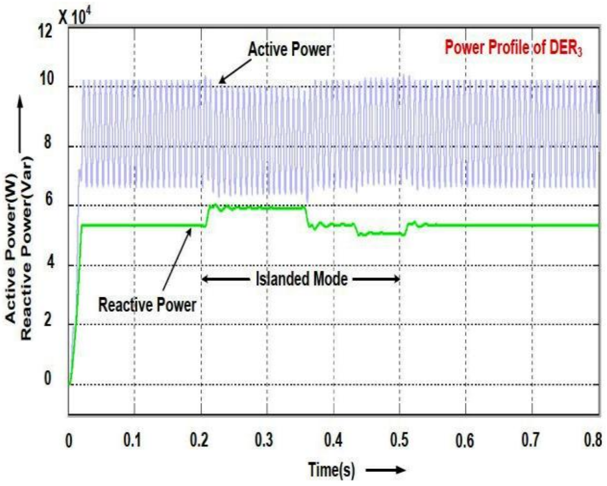

Figure 6: Power Profile of DER3

III. CONCLUSION:

From the different simulation results , it can be infer that regardless of whether all DGs will have equal generation capacity, in any case once the load is changed this doesn't guarantee in equal load sharing of the power which is the main demerit of conventional control strategy. From the obtained power profile results it's quite clear that once the grid is turned off at t = 0.2s the dynamic power profile of DER2 and DER3 remains unaltered. Once the second noncritical load is detached at t = 0.42sec, the dynamic power profile of DER2 and DER3, stays unaltered in their normal worth though DER1 goes a progress from 350 kilowatt to 250 kilowatt, i.e. a genuine power reduction of a hundred kilowatt. Here the controllers can remunerate the consequence of critical and noncritical loads. So the proposed control technique provides better results than other traditional techniques.

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