Inverter Control Analysis in a Community Microgrid based on Droop Control Strategy

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The control loops of inverters in grid-connected microgrids and community microgrids are more complicated from the stability point of view, since in addition to considering the amplitude of the voltage and frequency variations the exchange power among microgrids can affect the stability of the inverter [1], [2]. Droop control strategy is widely used to control power sharing in grid-connected inverters and community microgrids [3].

In this paper, firstly, the droop control method is introduced to identify the effect of power sharing among microgrids or the main grid. Then, the inverter control structure with inner loop and outer loop is presented to verify the inverter operation when extra power transfers to the other microgrid. According to the droop control method, the power references of the control loops can be adjusted. However, in order to obtain an optimal and efficient operation of the whole system an energy management system (EMS) can be applied to the system in order to determine the optimal power exchange of each microgrid [4]-[6]. Therefore, in this case, the droop control method is responsible to maintain the voltage and frequency rate of each microgrid. Finally, the simulation results of a voltage source inverter (VSI) is presented and the results verify that the control loops of the inverter can stabilize the system effectively.

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FIGURES

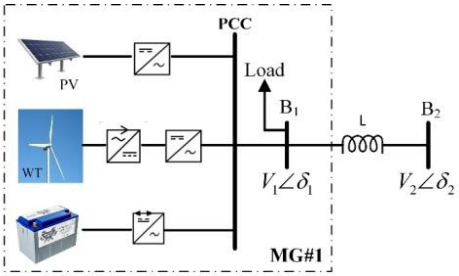

Figure 1: A sample microgrid consist of PV, WT and battery