**ABSTRACT**

This paper presents a method to operate a grid connected hybrid system. The hybrid system composed of a Photovoltaic (PV) array and a Proton exchange membrane fuel cell (PEMFC) is considered. Two operation modes, the unit-power control (UPC) mode and the feeder-flow control (FFC) mode, can be applied to the hybrid system. In the UPC mode, variations of load demand are compensated by the main grid because the hybrid source output is regulated to reference power. Renewable Solar energy is currently widely used. The photovoltaic (PV) array normally uses a maximum power point tracking (MPPT) technique to continuously deliver the highest power to the load when there are variations in irradiation and temperature which makes it an uncontrolled source. In order to overcome these inherent drawbacks, alternative sources, such as PEMFC, should be installed in the hybrid system that makes it controllable. Therefore, the reference value of the hybrid source output must be determined. The system can maximize the generated power when load is heavy and minimizes the load shedding area. When load is light, the UPC mode is selected and, thus, the hybrid source works more stably. The changes in operating mode only occur when the load demand is at the boundary of mode change; otherwise, the operating mode is either UPC mode or FFC mode. Besides, the variation of hybrid source reference power is eliminated by means of hysteresis. The proposed operating strategy with a flexible operation mode change always operates the PV array at maximum output power and the PEMFC in its high efficiency performance band, thus improving the performance of system operation, enhancing system stability, and decreasing the number of operating mode changes.