

Control and Automation System of Power Generation through Photovoltaic-Hydrogen Technology to Lighting

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ABSTRACT

At present, it is very important study new power generation systems, like a photovoltaic-hydrogen. This is a hybrid system where the photovoltaic modules are used to provide power to the electrolyzer for producing hydrogen and oxygen through the water electrolysis. Gases produced are stored to be supplied when they are required into a fuel cell to generate electrical power.

The prototype was integrated by solar photovoltaic modules to generate 2.49 KWh day⁻¹. PEM electrolyzer is used to produce hydrogen from 100 to 300 cm³ min⁻¹ at 0-120 psi. The prototype has a variable volume storage system at atmospherically conditions (25°C and 585 mm Hg) and fuel cell stack can be operated in a range of 50 W to 150 W.

The system is able to operate with different fuel cells in a range of 10 to 1000 cm³ min⁻¹ hydrogen flow. In order to be a safe system and make easier the regulation flow, it is really important to develop a control and automation system. In this project, it is proposed a closed loop system where the hydrogen and oxygen needed is selected in a panel control. Gasses flow is controlled by pumps and proportional electrovalves that use a recirculation system which is monitored by flow sensors. Algorithm main aspect is the flow regulation, because the gases are storage in a variable volume system where the flow is not constant. Also, the project includes a monitoring system where power energy behavior can be reviewed.

Keywords: Fuel Cells; Automation; Renewable Energy

