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Material and energy balance of fuel cell power unit for BIPV-FC-battery hybrid power system

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Building Integrated Photo-Voltaic (BIPV) replaces traditional building material with PV panels. These panels use as the building roof or wall, and the building becomes a power generator. A battery is necessary to manage the intermittent power generated from those PV panels. Recent modeling cases of BIPV-fuel cell power system are found in the literature. When PV cannot produce enough power, and the battery is totally drained, fuel cells can provide additional power for power isolated building. There is a delicate balance between fuel cell power, battery capacity, PV power, and load. In this work, we calculate required fuel cell power for different battery capacities. Calculation assumes a 10 kW PV capacity installed, and the daily load is 50 kWh. The calculation uses a daily PV power generation profile in 2014 acquired from a manufacturing plant in southern Taiwan. Figure 1 is the energy profile with a 30 kWh battery. A 200 kW fuel cell power unit is needed to avoid power outages. A 406 kW fuel cell power unit requires a 10 kWh battery. This work correlates a relation between fuel cell power and battery capacity.

Biography

Kan-Lin Hsueh dedicates his 35 years' career in Electrochemistry related areas, such as optimization of a 20 MW hydrogen/chloride battery for load leveling. He had developed a computer aid engineering tool for high speed reel-to-reel selective plating while working as a member of technical staff for AMP, a US based company. Since 2008, he is teaching at National United University, Taiwan on energy related courses, such as Fuel Cell, Energy Storage, and Energy-Saving. He is also serving as a Consultant for ITRI, Industrial Technology Research Institute/Green Energy Laboratories. His current research interests are rechargeable metal-air batteries, fuel cells, and redox flow batteries.

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