

Energy Management System Based on Economic-Technical Optimization for Microgrids

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This paper presents a new Energy Management System (EMS) for a microgrid based on four energy sources: a wind turbine (WT), photovoltaic (PV) solar panels, a battery, and a hydrogen system, which is composed of a fuel cell (FC) and an electrolyzer. This new strategy optimizes the total cost of the hybrid system through lifetime estimations calculated hourly for each energy storage device (the battery and hydrogen system). This control strategy links the expected lifespans of the energy sources to their generation costs. when the lifespan is low, the generation cost increases and, consequently, this energy source will start to be used less. The performance of the novel EMS, including these estimations, was tested for an isolated load and compared with two simpler EMSs: EMS-1, which considered fixed generation costs and lifetimes, and EMS-2, which prioritized the use of the battery. Simulation results show the appropriate behavior for the novel EMS to optimize the generation costs and the number of required elements throughout the expected lifetime of the hybrid system (25 years).

Keywords : Energy management, system Lifetime, estimation Isolated, system Generation cost. Hybrid system,

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