Multiyear Load Growth Based TechnoFinancial Li-ion Discharge and Corrosion Behaviors in a Microgrid Located in Algeria

Fouzia BRIHMAT

Abstract : The primary current-collector materials used in lithium-ion cells, aluminum and copper, are both susceptible to environmental degradation. Localized corrosion occurred on bare aluminum electrodes during simulated ambient-temperature cycling in an excess of electrolyte. The highly oxidizing potential associated with the positive electrode charge condition was the most important factor. In contrast to typical aqueous electrolyte pitting, each site was filled with a mixed metal/metal-oxide product, forming surface mounds or nodules. The status quo for relaying such confidence is economic and technical planning models, which are used to design microgrids and distributed energy resources DER. Long-term DER investments and short-term DER dispatch are typically determined by these models. This paper investigates the optimal cost analysis of a hybrid (photovoltaic-diesel) renewable energy system (HRES) in the Adrar region based on the Total Net Present Cost (TNPC). The Hybrid Optimization Model for Electric Renewable is used to perform the optimal cost analysis of HRES. Furthermore, the system is simulated for each time step for each year of the project's 20-year lifespan. The trade-off for this model, which captures battery storage levels from year to year, photovoltaic performance degradation, and diesel cost escalation above the inflation rate, is that the model is more precise, but the calculation takes longer. To begin, we ran the model without Multi-Year and used the Optimizer to find the best system design. The optimal system for the single-year model includes a Danvest generator with 760 kW, 200 kWh of recommended Li-ion storage, and a slightly lower COE of $0.309/kWh. Various scenarios have been simulated, taking into account variations in the power production of the gasified biomass generator, and various solutions to ensure the balance generation/consumption have been analyzed.

Keywords : corrosion, Diesel, Financial planning optimization, Hybrid energy system (HES), Li-ion battery, Multi-year planning, Microgrid, Photovoltaic, Technical planning optimization, total net present cost