

Methodology of Choosing Technology and Sizing of the Hybrid Energy Storage Based on Cost-benefit Analysis

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Abstract : We present a method to choose energy storage technologies and their parameters for the economic operation of a microgrid. A grid-connected system with local loads and PV generation is assumed, where an energy storage system (ESS) is attached to minimize energy cost by providing energy balancing and arbitrage functionalities. The ESS operates in a hybrid configuration and consists of two unique technologies operated in a coordinated way. Based on given energy profiles and economical data a model calculates financial flow for ESS investment, including energy cost and ESS depreciation resulting from degradation. The optimization strategy proposes a hybrid set of two technologies with their respective power and energy ratings to minimize overall system cost in a given timeframe. Results are validated through microgrid simulations using real-life input profiles.

Keywords : energy storage, hybrid energy storage, cost-benefit analysis, microgrid, battery sizing

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