

Design Strategies for Battery Energy Storage Systems in Renewable Power Grids

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Abstract: *The intermittent and variable nature of solar and wind power necessitates efficient storage solutions to maintain grid stability, reliability, and power quality. This review looks at different design strategies for battery energy storage systems in renewable power grids, with an emphasis on system sizing, configuration, control methods, and optimization techniques. The study also explores the role of BESS in frequency regulation, load leveling, peak shaving, and voltage support. A comparison of various design strategies highlights the trade-offs between cost, performance, and operational efficiency. The results show that hybrid approaches, sizing techniques, and advanced control algorithms can greatly increase the effectiveness of BESS in the integration of renewable energy.*

Keywords: Battery energy storage systems, renewable energy, grid stability

