



Emergence of energy storage technologies as the solution for reliable operation of smart power systems: A review

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ABSTRACT

The ever increasing penetration of renewable energy systems (RESs) in today deregulated intelligent power grids, necessitates the use of electrical storage systems. Energy storage systems (ESSs) are helpful to make balance between generation and demand improving the performance of whole power grid. In collaboration with RESs, energy storage devices can be integrated into the power networks to bring ancillary service for the power system and hence enable an increased penetration of distributed generation (DG) units. This paper presents different applications of electrical energy storage technologies in power systems emphasizing on the collaboration of such entities with RESs. The role of ESSs in intelligent micropower grids is also discussed where the stochastic nature of renewable energy sources may affect the power quality. Particular attention is paid to flywheel storage, electrochemical storage, pumped hydroelectric storage, and compressed air storage and their operating principle are discussed as well. The application of each type in the area of power system is investigated and compared to others.

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