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Importance of Location Selection of an Energy Storage System in a Smart Grid

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Abstract : In the recent times, the need for the integration of Renewable Energy Sources (RES) in a Smart Grid is on the rise. As a result of this, associated energy storage systems are known to play important roles in sustaining the efficient operation of such RES like wind power and solar power. This paper investigates the importance of location selection of Energy Storage Systems (ESSs) in a Smart Grid. Three scenarios of ESS location is studied and analyzed in a Smart Grid, which are – 1. Near the generation/source, 2. In the middle of the Grid and, 3. Near the demand/consumption. This is explained with the aim of assisting any Distribution Network Operator (DNO) in deploying the ESSs in a power network, which will significantly help reduce the costs and time of planning and avoid any damages incurred as a result of installing them at an incorrect location of a Smart Grid. To do this, the outlined scenarios mentioned above are modelled and analyzed with the National Grid's datasets of energy generation and consumption in the UK power network. As a result, the outcome of this analysis aims to provide a better overview for the location selection of the ESSs in a Smart Grid. This ensures power system stability and security along with the optimum usage of the ESSs.

Keywords : distribution networks, energy storage system, energy security, location planning, power stability, smart grid
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