

Energy Sustainability Through Generation Decentralization

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Abstract

Distributed energy systems (DES) have significant potential to enhance sustainability of electricity systems. Decentralized generation systems are small-scale power technologies generally ranging between 3 kW– 10 MW located very close to consumers to provide an alternative or enhancement to the centralized or conventional power system. The DGs are connected directly to the distribution system or on the customer side of the meter which significantly reduces the transmission and distribution losses of the power system. The high consumption of fossil fuels and global commitments to reduction in energy related emissions has generated huge interest in renewable energy resources for use in power generation. This has increased the opportunities of utilizing decentralist generation systems in power generation. The renewable DG systems may be connected to the grid for peak shaving or as a stand-alone system to serve a particular load or an area. Integrating renewable DGs to the power system has many benefits as well as threats if not well coordinated and integrated into the power system. High penetration of renewables can cause several adverse effects on the distribution systems. like voltage rise, reverse power flow, high line losses, creation of harmonics and reduction in voltage quality. Decentralized power systems units should be designed and operated within limits to maintain optimal quality of the power system There is therefore need for optimal sizing and location of renewable decentralized generation (DG) units in the distribution power system for technical and economic benefits. The penetration of renewable decentralized generation systems is considered as a significant contribution to the world energy and environmental crisis

Keywords

Decentralized generation, sustainable energy; distributed generation