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Integration of Renewable and Distributed Energy Resources in Power Systems

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The electric power sector is poised for transformative changes. Improvements in the cost and performance of a range of distributed energy generation (DG) technologies and the potential for breakthroughs in distributed energy storage (DS) are creating new options for onsite power generation and storage, driving increasing adoption and impacting utility distribution system operations. In addition, changing uses and use patterns for electricity—from plug-in electric vehicles (EVs) to demand response (DR)—are altering demands placed on the electric power system. Finally, the infusion of new information and communications technology (ICT) into the electric system and its markets is enabling the collection of immense volumes of data on power sector operations and use; unprecedented control of generation, networks, and loads; and new opportunities for the delivery of energy services. In this Special Issue of Energies, research papers on topics related to the integration of distributed energy resources (DG, DS, EV, and DR) are included. From technologies to software tools to system-wide evaluations, the impacts of all aforementioned distributed resources on both operation and planning are examined.

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