Special Issue

Sustainable Integration of Data Centers in Smart Grids: Strategies and Opportunities

Message from the Guest Editor

This Special Issue focuses on strategies for the sustainable integration of data centers within smart grids, emphasizing solutions that enhance energy efficiency, operational flexibility and renewable energy utilization. Contributions that explore how data centers can interact with power systems as not only large electricity consumers but also active participants capable of providing energy flexibility and supporting grid stability are invited. Topics of interest include, but are not limited to, demand response and workload management, integration with renewable energy sources, energy storage solutions, waste heat recovery, microgrid-based data centers and AI-driven energy management systems. Studies addressing market mechanisms and planning approaches that facilitate the grid-interactive operation of data centers are also welcome. By bringing together insights from the energy and digital infrastructure domains, this Special Issue aims to advance sustainable and resilient smart energy systems.

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Message from the Editor-in-Chief

Energies is an international, open access journal in energy engineering and research. The journal publishes original papers, review articles, technical notes, and letters. Authors are encouraged to submit manuscripts which bridge the gaps between research, development and implementation. The journal provides a forum for information on research, innovation, and demonstration in the areas of energy conversion and conservation, the optimal use of energy resources, optimization of energy processes, mitigation of environmental pollutants, and sustainable energy systems.

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