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As widely considered to be the next generation power grid, smart grid will be integrated with a variety of state-of-the-art information and communications technologies (ICT) to significantly improve the agility, stability, sustainability, and security of the power grid. The two-way communication networks between the power suppliers and consumers become very important, and the determining factor is timely access to information from smart meters, PMUs, and RTUs via reliable and secure smart grid communications.

The intrinsic characteristics of smart grid call for innovative ICT to fulfill a wide range of expected functionalities, including advanced metering infrastructure, demand response, fault-tolerance and self-healing, integration of renewable energy, and vehicle-to-grid. Smart grid communications span from individual homes and neighborhoods to wide area networks covering a large geographical environment. The generated energy-related data will be up to tens of terabytes in near future as estimated by the smart grid utility data market, which will pose a significant traffic demand for smart grid communication networks to process and store such large-scale information in the runtime/real time. On the other hand, the recent IEEE ComSoc technology news estimate that around 2–4% of the worldwide carbon footprint is related to ICT, approximately comparable to that of airplanes and one-quarter of that of cars. Within the framework of green communications and networking, energy efficient ICT enabled architectures and infrastructures are expected to reduce greenhouse gas emission and power consumption, paving the way towards a “greener” smart grid.

The purpose of this special issue is to provide the academic and industrial communities with an excellent platform to present the vision, research, and dedicated efforts on recent results in the area of green ICT for smart grid. We are seeking original and unpublished contribution of work which addresses the fundamental research challenges and recent developments in the area of energy efficient ICT in the context of smart grid, with applications to green communications and networking, energy harvesting and storage, renewable energy, electric vehicles, demand response, microgrids, wide area situational awareness, advanced metering infrastructure, and other related issues. The focus of this special issue is on the improvement of smart grid operations and applications with emphasis on green ICT.

Potential topics include, but are not limited to:

- ▶ Energy efficient communications in smart grid
- ▶ Energy efficient networking in smart grid
- ▶ Energy harvesting and storage for smart grid communications
- ▶ Green ICT enabled integration of renewable energy and electric vehicles
- ▶ Green ICT for demand response
- ▶ Green ICT for microgrid communications
- ▶ Green ICT for wide area situational awareness
- ▶ Green ICT for smart cities and buildings
- ▶ Energy efficiency of data centers and cloud computing in smart grid
- ▶ Energy efficiency of smart metering and advanced metering infrastructure
- ▶ Energy efficiency of home/neighborhood/wide area networks
- ▶ Other related issues for green ICT in smart grid

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