

Special Session on

“RESIDENTIAL MICROGRIDS: Architectures, Components and Control”

Organized by

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Call for Papers

Humanity advanced considerably in technology development for sustainable energy generation and transmission. However, these technologies have to be complemented with efficient end use of the energy. In recent years, after the turning point is evident in transport electrification, the newest challenge is energy and resource efficiency in the building sector. Residential and commercial buildings contribute close to 40 % of the total energy consumption in developed countries. As this sector is constantly expanding, the reduction of energy consumption and the use of energy from renewable sources in the building sector constitute important measures that are needed to reduce the energy dependency and carbon footprint. In this context, power electronics plays an important role, allowing for efficient conversion of electric power and easy integration and control of renewable energy sources and energy storages, thus achieving the highest possible performance of a power system. Thanks to rapid advances in semiconductor and packaging technologies as well as to the development of new power converter topologies, the power electronics is being applied in brand new applications, such as Electronic Power Distribution Systems, also known as Active Distribution Networks or Smart Grids. Depending on the power scale, such concepts could be applied either for a single building or for districts, thus facilitating larger shares of distributed energy generation and storage, demand-side efficiency and energy trading operations.

Addressing these new challenges is the main focus of this special session. We invite researchers from Academia and Industry to discuss technical challenges, exchange novel ideas, explore enabling technologies, and present R&D results related to power electronic

systems, control, protection, communication and operation aspects in designing and implementing of different architectures and functionalities in emerging residential microgrids.

Topics of interest include, but are not limited to:

- DC and hybrid AC/DC residential microgrid architectures
- Power electronics systems for efficient integration of distributed energy generators and storages into residential microgrids
- Solutions resolving interoperability issues and facilitating deployment of microgrids
- Optimal design methodologies for residential microgrids
- Operation, control and protection systems incl. solid-state protection devices
- Active power filtering, load-sharing, islanding operation
- Fault monitoring, location and isolation
- Predictive maintenance, adaptive communication-based protection
- Microgrids during emergency, islanding, and black start
- Supervision, management, security, and hierarchical control
- Communication-based resilient and robust control
- Power management strategies, distributed control and/or decentralized decision making
- Transient and stability analysis of residential microgrids
- Operation and control of interconnected residential microgrids (i.e., a microgrid community)
- Cyber security issues in residential microgrids.
- Control and management of multi-energy systems for residential microgrids