Guest Editorial
Special Section on Intelligent Buildings and Home Energy Management in a Smart Grid Environment

BUILDINGS consume a large portion of the world's energy and are a source of greenhouse gas emissions. The nature of buildings is changing from static and passive structures to dynamic and active environments for working and living. The concept of sustainable and intelligent buildings is emerging as an important area for the smart grid initiative. In addition, effective home energy management is becoming more feasible using the innovative smart grid technologies. This special section is focused on intelligent buildings and home energy management in a smart grid environment. After careful peer reviews, 17 original research and practical contributions from both academia and industry have been chosen and included in this special section.

In "A Smart Domestic Hot Water Buffer" by Vanthournout *et al.*, four key indicators of domestic hot water buffers for meeting different requirements are proposed. And their validity has been verified by simulations and experiments on a laboratory prototype.

In "Intelligent Energy Optimization for User Intelligible Goals in Smart Home Environments" by Corno and Razzak, a new energy optimization scheme by solving a constrained Boolean satisfiability problem is proposed, which is developed based on explicit high-level modeling of user intentions and automatic control of device states.

In "Performance Analysis and Comparison on Energy Storage Devices for Smart Building Energy Management" by Xu *et al.*, a stochastic optimization problem is formulated and solved using the scenario tree method in order to plan, schedule, and coordinate all the storage devices and schedulable loads in a building facilitated by the microgrid technology.

In "Intelligent DC Microgrid With Smart Grid Communications: Control Strategy Consideration and Design" by Wang *et al.*, a multi-layer local power management structure is proposed for a DC microgrid with photovoltaic-storage building integrated system by utilizing the information on grid availability.

In "A System Architecture for Autonomous Demand Side Load Management in Smart Buildings" by Costanzo *et al.*, a system architecture is presented for demand-side load management in the smart grid, which is made up of three major modules for admission control, load balancing, and demand/response management.

In "An Algorithm for Intelligent Home Energy Management and Demand Response Analysis" by Pipattanasomporn *et al.*, an intelligent home energy management algorithm is proposed for managing high power consumption household appliances with simulation for demand response analysis.

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In "Retrofitted Hybrid Power System Design With Renewable Energy Sources for Buildings" by Reddy *et al.*, the authors describe the topology of retrofitting hybrid power systems with the DC motor-synchronous generator set instead of using the inverter to an existing building power system.

In "The Fair Allocation of Power to Air Conditioners on a Smart Grid" by Chen *et al.*, a novel scheme is proposed to allocate power to air conditioners in a fair fashion when the power demand exceeds the power supply or when the load in regions of the power network exceeds the capacity of the transmission links.

In "On the Application of Clustering Techniques for Office Buildings' Energy and Thermal Comfort Classification" by Nikolaou *et al.*, an integrated classification method is developed for the determination of office buildings' energy and thermal comfort rating classes.

In "Simulation-Based Policy Improvement for Energy Management in Commercial Office Buildings" by Jia *et al.*, a joint schedule problem is treated in order to satisfy the electricity load, sensible heat load, and latent heat load in buildings with the minimal expected cost.

In "Modeling for Residential Electricity Optimization in Dynamic Pricing Environments" by Hubert and Grijalva, the authors propose an energy scheduling model and optimization algorithms for residential electricity consumers who attempt to optimally schedule their electricity consumption, generation and storage in a dynamic pricing environment.

In "Smart Gateway Grid: A DG-based Residential Electric Power Supply System" by Wang and Peng, a smart residential electric power supply system termed smart gateway grid (SGG) is proposed. It facilitates residential distributed generations and energy storage system to participate in system operations.

In "Intelligent Residential Air-Conditioning System With Smart-Grid Functionality" by Thomas *et al.*, a novel intelligent residential air-conditioning system controller is developed that features smart grid functionality. It uses various environmental and occupancy parameters to provide optimal intertemporal comfort/cost trade-offs for the resident.

In "Performance Evaluation of Wireless Home Automation Networks in Indoor Scenarios" by Langhammer and Kays, a methodology is presented for evaluating wireless smart homes and home automation networks in indoor scenarios. It is used to investigate the performance of actual wireless technologies in a smart home environment.

In "Observe, Learn and Adapt (OLA)—An Algorithm for Energy Management in Smart Homes Using Wireless Sensors and Artificial Intelligence" by Qela and Mouftah, an algorithm based on the adaptable learning system principles is proposed. The Observe, Learn and Adapt (OLA) algorithm is developed

by combining wireless sensors and artificial intelligence concepts.

In "Optimizing Energy Costs for Offices Connected to the Smart Grid" by Georgievski *et al.*, a system is proposed and implemented to monitor and control an office environment and to integrate it with the smart grid. The operation of devices is scheduled based on the user-defined policies.

In "Front-End Electronic Circuit Topology Analysis for Model-Driven Classification and Monitoring of Appliance Loads in Smart Buildings" by He *et al.*, a non intrusive appliance load monitoring strategy is proposed for energy management in a smart building environment.

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