As an important branch of power demand side management, residential energy management (REM) plays an important role in reducing the emission and enhancing the energy efficiency in the energy delivery side. Recent technical advances bring significant transformations to energy end users. Firstly, increasing penetrations of residential renewable energy source, electric vehicle, and residential energy storage system have been transforming residential energy consumers to be “Energy Prosumers (Producer and-Consumer)”, which are capable to generate and consume energy simultaneously. Secondly, the two-way communication infrastructure enables residential energy entities interact and exchange information flows with the external environment. Thirdly, recent advances in ubiquitous sensing and metering technologies, such as Internet of Things (IoT), non-intrusive load monitoring, and advanced metering infrastructure, enable the deep understanding on behaviours of energy end users and related environments. These technical advances consequently drive residential energy entities to become complex cyber-physical-social systems, which require new solutions for coordinating, managing, and optimizing residential energy resources with the active participations of end users.

11 papers are collected in this special issue, covering several important topics in residential energy management. J. Zhang et al. develop a new non-intrusive appliance load monitoring technique that can identify newly added appliances from the total power consumption profile recorded by smart meter. K. Miyazaki et al. design a model predictive controller for demand response; they evaluate the controller using the Japan’s grid data. M. Yousefi et al. investigate the accuracy of different stochastic methods on modelling home energy resources. Their work provides new understanding on applying stochastic approaches in home energy management, which is a controversial issue in academia since residential computing power is often limited and hard to handle the complexity of stochastic based models. J. Yang et al. propose a new price clearance mechanism for peer-to-peer (P2P) energy markets. L. An et al. propose a resilient bargaining game mechanism for enhancing energy sharing of microgrids consisting of residential buildings. The works of J. Yang et al. and L. An et al. provide new references to ongoing discussions on residential side P2P energy trading. Q. Sun et al. develop a distributed double-consensus algorithm for addressing the energy management problem of a residential electricity-heat-coupling system. S. Sharma et al. propose a multi-energy building management system; their work provides a reference for co-ordinately considering multiple kinds of energy sources in demand side management. S. Kumar and B. Singh propose a self-normalized-estimator-based controller for accommodating renewable energy and energy storage systems in a residential microgrid. K. Ma et al. develop an energy management scheme for air conditioning systems in residential buildings; their work sufficiently considers the user’s indoor thermal comfort using the predicted percentage of dissatisfied model. Y. Zhang et al. develop a knowledge-driven electricity retail plan recommender system, which can help residential users better filter information from a group of candidate electricity retail plans.

We hope the papers collected in this special issue can provide useful references to researchers and engineers, and can advance the knowledge in residential-side energy management techniques.