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IET Renewable Power Generation

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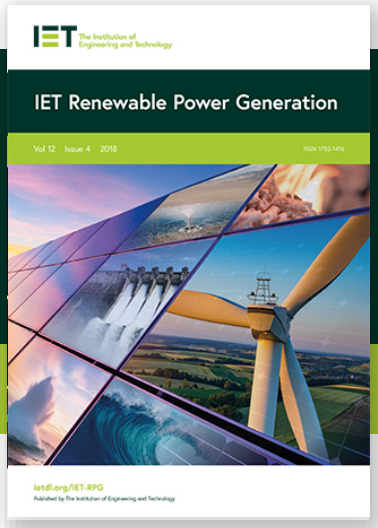

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Editor-in-Chief: David Infield, University of Strathclyde, UK

Special Issue on:

Behind-the-Meter Flexibility Services by Prosumers with Own & Community-Shared Renewables & Batteries in Active Distribution Networks

The world needs an urgent transition from the current fossil fuel-based energy systems to decarbonised one to, thus, achieve the ambitious target of limiting global temperature rise below 1.5°C, and, also, provide more affordable energy to customers. In this regard, the expansion of renewable energy within electricity distribution systems, especially in customers' locations (residential, industrial and commercial buildings), has been identified as a part of the solution. Such deployment of resources is usually referred to as "behind-the-meter", since their control is not subject to any grid operator and, in most cases, the revenue is some function of load pricing. These applications, as also the demand side management programs have given rise to the role of "prosumers", i.e. of end-customers who can produce, consume, and store energy rather than only demand it. In this framework, the energy flow between prosumers and the network is controlled based on prosumers' preferences and enabled thanks to advanced power electronics and automatic/digital decision making. Prosumers' preferences and behaviour may be further complicated, by considering the use and charging patterns of electric vehicles. Therefore, network operators are expected to handle increased uncertainty introduced by renewables and prosumers' actions, while those same resources are left untapped for the purpose of stability, security and acceptable power quality of the grid. Hence, innovative technologies, software and market incentives are required to ensure reliable network operation, while considering prosumers' preference and uncertainties, and reimbursing them for the use of their assets. This special issue aims to design approaches for local energy communities, end-customers willing to aggregate their capacities and larger entities, such as commercial and industrial customers, to act as prosumers in sharing their energy and power for grid flexibility and resolving uncertainties.

Topics of interest include, but are not limited to:

- Proposing market-based, predictive-based, and game theory-based approaches to exploit behind-the-meter renewables, batteries and load flexibility while incentivizing prosumers to this aim
- Designing control for low-inertia system frequency and voltage stability with appropriately sizeable behind-the-meter aggregation of resources
- Presenting ideas for defining and connecting local (distribution level) electricity markets to each other and concentrate on handling their uncertainty from renewable resources and customers' behaviours
- Economic assessment and value cases of expanding penetrations of renewables and energy storage in the location of customers and the grid (from the level of the distribution side)
- Providing solutions and meaningful incentivization for managing uncertainties associated with renewables by customers and operators
- Decentralization of control process in local energy communities for prosumers energy sharing
- Assessing the impacts of local markets on distribution system operation
- Proposing central and decentral learning-based approaches for fast response management
- Impact of prosumers on TSO and DSO interactions

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Guest Editors:

Prof. Innocent Kamwa (Senior)
Laval University, Canada
E: innocent.kamwa@gel.ulaval.ca

Dr. Seyed Masoud Mohseni-Bonab (Lead)
Hydro-Québec Research Institute (IREQ)/ Laval University, Canada
E: masoud.mohseni@gel.ulaval.ca; mohseni.masoud@hydro.qc.ca

Dr. Abbas Rabiee (Lead)
University College Dublin, Ireland
E: abbas.rabiee@ucd.ie

Prof. Miguel Anjos
University of Edinburgh, UK
E: miguel.f.anjos@ed.ac.uk

Prof. CY Chung
The Hong Kong Polytechnic University, Hong Kong, China
E: c.y.chung@polyu.edu.hk

Dr. Fei Ding
National Renewable Energy Laboratory, USA
E: fei.Ding@nrel.gov

Prof. Andrew Keane
University College Dublin, Ireland
E: andrew.keane@ucd.ie

Prof. Behnam Mohammadi-Ivatloo
University of Tabriz, Iran
E: mohammadi@ieee.org

Prof. S. M. Muyeen
Qatar University, Qatar
E: sm.muyeen@qu.edu.qa

Prof. Qinmin Yang
Zhejiang University, China
E: qmyang@zju.edu.cn

Prof. Junbo Zhao
University of Connecticut, USA
E: junbo@uconn.edu