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Demand response and smart grids

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The smart grid is conceived as an electric grid able to deliver electricity in a controlled, smart way from points of generation to active consumers. Demand response (DR), by promoting the interaction and responsiveness of the customers, may offer a broad range of potential benefits on system operation and expansion and on market efficiency. Moreover, by improving the reliability of the power system and, in the long term, lowering peak demand, DR reduces overall plant and capital cost investments and postpones the need for network upgrades. Lessons learnt from industrial case studies and research projects evidenced that DR can be employed for overall load reductions in response to peak power concerns and for ancillary services for frequency regulation with faster scale response times (up to 4-sec response times). Advanced DR programs and innovative enabling technologies are required for such applications and to support the coordination of DR in a SG. Enabling technologies, such as smart meters, AMI, home energy controllers, EMS, wired and wireless communication systems are presented and discussed referring to real industrial case studies and research projects. Important areas for research that require to be further investigated in this field include measurement and settlement processes, developments in integrated electronic circuits, optimization and control systems, information and communications technologies. The integration of storage devices, distributed generation and on-site renewable generation in automated DR brings additional flexibility and complexity that should be coped with innovative technologies and methods.

Biography

Pierluigi Siano (M'09) received the MSc degree in electronic engineering and the PhD degree in information and electrical engineering from the University of Salerno, Salerno, Italy, in 2001 and 2006, respectively. He is currently an Aggregate Professor with the Department of Industrial Engineering, University of Salerno. His research activities are centered on the integration of renewable distributed generation into electricity networks and smart grids. In these fields, he has coauthored more than 140 papers including more than 60 international journals. He is an Associate Editor of the IEEE Transactions on Industrial Informatics, member of the editorial board of more than twenty International Journals in the field of power systems and smart grids. He is Vice-Chair of the Technical Committee on Smart Grids and a member of the Technical Committee on Renewable Energy Systems of the IEEE IES. He served as a reviewer and session chairman for many international conferences.

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