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ENERGY MANAGEMENT IN SMART MICROGRIDS

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Abstract

With the proliferation of distributed energy resources in the form of distributed generation, distributed storage and combination of these two, the concept of microgrid is known more than ever. Microgrids are small-scale networks in the low voltage level which are designed to supply electrical and thermal loads of an integrated building such as: a residential, commercial, or industrial building. Energy management of distributed energy resources is necessary to provide optimal operation of microgrids.

In this presentation, the studied microgrid is a residential building. This study is more focused on a Micro-CHP unit as a distributed energy source. Thermal load is analyzed more precisely in the form of the required hot water and desired building temperature. This provides a better coordination of Micro-CHP thermal and electrical output power which leads to optimal control and operation of the unit. Furthermore, this microgrid is assumed to be equipped with advanced metering infrastructure (AMI) and controllable electrical loads. The information provided by AMI can be processed and utilized in implementing smart control of distributed energy sources, storages and demand response programs. The study is aimed at presenting an optimal scenario for energy management of the microgrid energy sources considering technical and economical constraints. Finally, the robustness of the proposed scenario is investigated by means of uncertainty analysis and the impact of each uncertain parameter is studied individually.

Biography

Mohammad Tasdighi received his B.Sc. and M.Sc. degrees in electrical engineering from University of Tehran, Tehran, Iran, in 2009 and 2012, respectively. Currently, he is a research assistant pursuing his PhD studies in electrical engineering at power system control and protection lab of Texas A&M University, College Station, TX, USA. His fields of interest are: Intelligent Protection of Power Systems Interacting with High Penetration of DG, Energy Management in Smart Grids, and Renewable Energy Sources Operation.

