

Residential load management system for future smart energy environment

[10.5339/qfarc.2014.ITOP0645](https://doi.org/10.5339/qfarc.2014.ITOP0645)

Shady Samir Khalil; Haitham Abu-rub

CORRESPONDING AUTHOR :

shady.khalil@qatar.tamu.edu

Texas A&m University At Qatar, Doha, Qatar

Abstract

Electricity consumption has increased substantially over the last decade. According to the Gulf Research Center, the residential sector represents the largest portion (about 50%) of electricity consumption in the GCC region, due to substantial growth of electrical residential appliances. Therefore, we present a novel online smart residential load management system that is used to monitor and control power consumption of the loads for minimizing energy consumption, balancing electric power supply, reducing peak demand, and minimizing energy bills while considering residential customer preferences and comfort level. The presented online algorithm manages power consumption by assigning the residential load according to utilities power supply events. The input data to the management algorithm is set based on the categorized loads according to: importance (vital, essential, and non-essential electrical loads), electrical power consumption, electricity bill limitation, utilities power limitation, and load priority. The data are processed and fed to the presented algorithm, which accurately manages the power of dwelling loads using external controlled disconnectors. The proposed online algorithm yields to improve the overall grid efficiency and reliability, especially during the demand response periods. Simulation results demonstrate the validity of the proposed algorithm.