Using random inquiry optimization method for provision of heat and cooling demand in hub systems for smart buildings

Author: Noor H.Jabarullah, Muhammad Salman Shabbir, Mazhar Abbas, Ahmed Faisal Siddiqi, Stephen Bertie

Keywords : Demand response, Energy hub; Energy storage; Plug-in hybrid electric vehicle; Short-term scheduling

Abstract

A technique for planning the energy hub is proposed in this work that provides electrical, thermal and cooling demands with respective energies and managing the continuous and on/off controllable loads. Features of energy hub elements including the energy losses, cost of degradation in cooling, thermal and electrical energy storage and feasible operation region of the combined heat and power plants are comprehensively simulated. The presented equation is utilized on two different days in winter and summer considering different scenarios to investigate the effect of energy storage, selling power to the main grid, intelligent charge and discharge of vehicles with electric engine and managing the controllable loads. The results suggest that utilizing energy hub and managing loads has significant advantages in both user and main grid sides, and results in a flatter load curve in time of use demand response.