Saeed Alqaed et al., Expert Opin Environ Biol 2016, 5:3(Suppl)
http://dx.doi.org/10.4172/2325-9655.C1.012

Cost-optimal combined heat power for multifamily buildings using historical demand

Saeed Alqaed and **Kevin P Hallinan**
University of Dayton, USA

Combined heat and power (CHP) systems are increasingly used in conjunction with traditional grid power for industrial and residential applications in order to reduce energy cost and carbon emissions. This study considers a CHP application for a 220 unit multifamily residence in Columbus, Ohio built in 2008 to minimum code standards. This facility is fully electric with a peak power of 438 kW. A CHP with hot-water storage is designed to supply some of the facility's electrical and hot-water demand during hours of peak demand. A mathematical model is developed to optimize when the CHP should be activated to meet electrical demands in the facility and how thermal energy from the CHP should be dispatched, either for immediate hot water use or for storage in the hot water tank. The optimization seeks to find the CHP capacity and thermal storage volume which minimize annual levelized system costs. Considered in the optimization are the production and transmission prices for grid electrical power, which are sensitive to load variability. The modeling results indicate that a 31.5 kW CHP and a hot-water tank capable of storing 700 kWh of thermal energy will yield the lowest annual levelized cost, reduced 20% from current annual costs.

Biography

Saeed Alqaed has completed his Master's in Mechanical Engineering from the University of Dayton in 2014. He is currently pursuing a PhD from the University of Dayton, and his research interests include the use of Combined Heat and Power (CHP) for micro-grid applications.

alqaeds1@udayton.edu

Notes: