

# Mosque Energy Performance, Part I: Energy Audit and Use Trends Based on the Analysis of Utility Billing Data

ABDOU, A. A., AL-HOMOUD, M. S., AND BUDAIWI, I. M.

*Architectural Engineering Department  
KFUPM, Dhahran, Saudi Arabia  
adel@kfupm.edu.sa*

**ABSTRACT.** Mosques are distinguished from other types of buildings by having a unique function characterized by an intermittent operation schedule. Within a given area and time zone, mosques are operated simultaneously, which could have an impact on the demand for energy particularly in areas that are highly dependent on mechanical air-conditioning, and/or heating for achieving thermal comfort. The importance of achieving thermal comfort in mosques to enable worshippers perform prayers in a spiritual environment with minimum energy requirements; make the thermal design and operation of energy systems in mosques critical parameters in determining their performance. The analysis of electric energy bills data is a feasible and useful approach in showing the general trend and the history of energy use. The billing data can provide a reasonable estimate of the overall annual electric energy use in mosques. This study presents the analysis of five-year electric energy billing data for five typical mosques in the hot-humid climate of the eastern region of Saudi Arabia. The aim is to assess and compare energy use trends over time of different types of mosques as a step towards a comprehensive study of their energy systems, overall thermal performance and operation strategies.

**KEYWORDS:** Energy audit, mosques, energy use, utility bills.