Advantage or Not? Evaluation of the Sacramento Municipal Utility District Residential New Construction Program

Ed H. Hamzawi, SMUD, Sacramento, CA
Willem Bos, SMUD, Sacramento, CA
Richard T. Oberg, SMUD, Sacramento, CA

Study Objective

Quantification of summer A/C electricity energy and summer peak demand savings associated with the SMUD Advantage Tier III Home program for homes built between January 1998 and June 2000.

Advantage Home Program Requirements

The program provides incentives to builders in the form of hookup fee discounts to construct homes that exceed performance requirements of the California Title-24 energy standards by 50%. 3460 homes, representing 35% of all new single-family units built during this period, were Tier III Advantage homes.

Research Approach

The research approach used the following steps: 1) Establish a statistically valid study sample of participant and non-participant homes occupied for at least one year; 2) Collect data from the sample through customer surveys, on-site audits, 15-minute load recorders for whole-house and A/C-compressors, and logger data for indoor temperatures; 3) Compare the physical, demographic, and behavioral characteristics between Advantage and non-Advantage homes and occupants; 4) Develop a two-stage multiple regression model to estimate cooling energy use; and 5) Estimate program-level savings.

Results Highlights

Differences In Characteristics. Advantage homes have slightly larger square footage, lower cooling set points, more glazing but predominantly Low E2 glass, and smaller cooling tons per square foot than non-Advantage homes. Duct tightness and cooling system SEER were comparable between Advantage and non-Advantage homes, while non-Advantage homes had predominantly standard clear double pane glazing.

Air-Conditioning Use. Summer cooling energy use was 30.1% (307 kWh) less, and average peak demand (1-9PM) was 15.3% (.08 kW) less in Advantage Tier III homes than non-Advantage homes. Savings were smaller than predicted by the Title-24 compliance model, although the study period encompassed the California energy crisis of 2000/2001, which likely reduced consumption due to behavioral factors.

Conclusions

Overall, summer A/C savings from Advantage Tier III homes for the study period were 1.1 GWh and .42 MW (1-9PM average). Savings per home were significant but smaller than predicted, due to compliance model overestimation of cooling hours, as well as better performance of non-Advantage homes than predicted.