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Why Misrepresenting Behavior Matters: The Case of Modeling Home Energy Retrofits

Typical occupant behaviors are often used in home energy analysis in new home design and home retrofit. These behaviors, including thermostat adjustments, window operation, etc., have a significant impact on the potential energy saving that a proposed energy efficiency measure could achieve. Underrepresenting the impact of actual occupant behavior during the design process, especially in home retrofit, may lead to energy performance that is substantially poorer than intended. This study reports on and analyzes behavioral statistics from a recently completed residential energy consumption survey. Statistical methods are used to derive actual behavior model based on the behavior related survey questions. Advanced modeling techniques are then used to explore the risk of misrepresenting occupant behavior in selecting energy efficiency measures during home retrofit. The recommended typical occupant behavior profiles, specified in Building America simulation protocol from Department of Energy, will be used as the reference in this study. Questions related to why misrepresenting behavior matters in home retrofit will be explored, such as the extent to which using actual behavior instead of typical behavior shifts preferences toward a specific energy efficient measure? A relationship map connecting occupant behavior aspects and common energy efficiency measures will be developed for future practice. The proposed map intends to provide guidelines when an actual behavior should be used in evaluating potential energy saving of certain energy efficient measure. And suggestions to behavior related questions in home auditing will be discussed.