Project Description – R67: Lighting Interactive Effects Study

April 18, 2014

Objective and Priority Outcomes:

The purpose of this study is to quantify the effect on HVAC systems of replacing incandescents with more efficient bulbs such as CFLs and LEDs; this is referred to as interactive effects (IE). . Because energy efficient lighting generates less heat than traditional incandescents, failure to take these effects into account can lead to incomplete estimation of savings, as lighting retrofits can result not only in electric savings at the lighting end use, but also increased heating fuel consumption as well as additional electric cooling savings. The objective of this study is to determine the factors by which program savings estimates can be altered to reflect these interactive effects. The study will calculate a statewide IE factor, as well as separate IE factors by primary heating fuel type and cooling system configuration.

Work Summary:

The IE factor can be calculated using a variety of methods, including simulation modeling and billing analysis. This study will leverage the REM/Rate models developed for the Connecticut Weatherization Baseline Assessment and Technical Potential Study to determine lighting IE factors for single-family homes in Connecticut.

A REM/Rate model was developed for each of the 180 homes that were audited for the Connecticut Weatherization Baseline Assessment. For the Potential Study, these baseline models were used to develop various upgrade scenarios, in which all of the inputs were consistent with the baseline model except for an efficiency improvement in one area (e.g., lighting). The lighting components of the baseline and upgrade scenarios are organized into two entries, one for efficient bulbs and one for inefficient bulbs. Inputs for these entries—number of bulbs, hours of use per day, and wattage—were obtained from the Saturation Study data. The wattages for the efficient lighting entries were derived by averaging the wattages of three efficient bulb types (CFLs, LEDs, and fluorescent tubes) as they were found during the Saturation Study.

This study will calculate statewide heating and electric IE factors as well as separate IE factors within various strata, including (but not limited to) primary heating fuel type and cooling system type.

In order to assess peak demand savings, the study will use REM/Rate demand estimates as a starting point (REM/Rate assumes coincidence factors when assessing peak demand), but apply Connecticut-specific coincidence factors to provide a more accurate estimate of the peak demand impacts (i.e., using coincidence factors derived from a recent Northeast Residential Lighting Hours-of-Use Study conducted by NMR and DNV GL).[1]

Lighting interactive effects studies have been conducted in recent years in a number of states, including New York, California, Minnesota, Maryland, and Vermont.[2] The study will compare the results of the various IE factor calculations conducted for this study to the results of similar studies performed in the northeastern U.S.

Schedule:

The majority of the work, including analysis of REM/Rate data, calculation of IE factors, and report writing, will be performed in May through June, 2014. The final draft of this report will be completed in early July of 2014.

Budget (Time and materials pricing)**:**

The budget for this task is estimated to be $25,000.

[1] NMR Group, Inc. & DNV GL. "Northeast Residential Lighting Hours of Use Study." Submitted to Connecticut Energy Efficiency Board on March 14, 2014. Page XVII.

[2] James J. Hirsch & Associates. "Project Report: A Study of the Sensitivity of DEER HVAC Interactive Effects Factors to Modeling Parameters." Submitted to CPUC Energy Division on March 28, 2012. Pages 19-21.