Examining Non-Energy Impacts at the Measure Level and Income Level

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This poster reports on a subset of the results of an evaluation of the non-energy impacts (NEIs) associated with the residential and low-income energy efficiency programs of the Massachusetts Program Administrators (PAs). While the NEI literature is extensive, NEIs have rarely been studied at the measure level or examined comprehensively across multiple types of residential and low-income programs. This poster addresses some of these gaps by examining NEIs at the measure level and by income levels.

Energy efficiency improvements in a home have impacts beyond energy and energy bill savings. These NEIs are widely recognized but often difficult to quantify effects of energy efficiency programs. NEIs, generally positive, can accrue to the program sponsors, society at large, or the program participants. This poster examines a subset of NEIs that accrue to program participants. Program participants often realize a number of benefits because, for example, their homes are more comfortable or because of health or safety benefits associated with energy efficiency upgrades and technologies.

Seven NEIs for program participants were quantified through computer-assisted telephone interviewing (CATI) surveys, using a Relative Valuation (RV) method. With RV, respondents were asked to estimate the value of the NEIs, relative to the bill savings from the program. These individual NEI estimates were then scaled by asking respondents to estimate the total value of all NEIs, again relative to bill savings. Bill savings were estimated by using PA data of the estimated energy savings associated with each efficiency measure installed and converting to bill savings using a population weighted average of gas and electric rates in Massachusetts.

For the survey, low-income (LI) and non-low-income (NLI) participants were stratified by sets of commonly installed measures: building shell measures only (i.e., insulation, sealing), heating and cooling equipment measures only, and shell measures plus heating and cooling measures.

Six of the NEIs were estimated as annual impacts while the seventh, increased property value, was estimated as a one-time benefit. Overall, NLI participants believed that annual NEIs were worth $261 and LI participants believed that their annual NEIs were worth $242. In terms of energy bill savings, NLI participants believed that their NEIs were worth 77% of their energy savings, while LI participants believed that NEIs were worth 52% of their energy savings.

In general, NLI respondents placed a higher value than did the LI respondents on the NEIs that provide annual benefits with the exception of health impacts and lighting life and quality. NLI respondents valued thermal comfort and equipment maintenance the most ($125 and $124 per year, respectively), while LI respondents valued thermal comfort, lighting life and quality, and equipment maintenance the most ($101, $56 and $54, respectively). NLI respondents also estimated a substantially higher one-time property value increase attributable to the energy efficiency retrofits than did low-income respondents ($1,998 and $949, respectively).

NEI values varied among the three strata for each population. For the NLI population, the shell plus heating and cooling strata consistently valued their NEIs higher than did the other strata. Within the LI population, the shell strata gave a larger value to thermal comfort and noise reduction than did the other strata. Property value and equipment maintenance were valued more highly by the heating and cooling strata than by the other two strata.

Differences among the strata may be partially due to differences in estimated bill savings. Among the NLI population, the shell plus heating and cooling stratum had the highest average annual energy bill savings ($1,275) and generally the highest NEI values. Among the LI population, the shell stratum has the highest average annual energy bill savings ($583) and generally the highest NEI values. Further analysis, using bivariate Ordinary Least Squares (OLS) regressions, found a significant relationship between overall NEI values and total bill savings.