NON-ENERGY IMPACTS (NEI) EVALUATION

Final Report

Prepared for

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NOTICE

ABSTRACT

This report presents research findings from the non-energy impacts (NEI) evaluation conducted by the Market Characterization, Market Assessment, and Causality (MCAC) evaluation team. The evaluation examined the NEIs associated with the **New York Energy $mart**^{SM} New Construction Program (NCP), Commercial/Industrial Performance Program (CIPP), Small Commercial Lighting Program (SCLP), ENERGY STAR® Labeled Homes Program, and two components of the ENERGY STAR® Products Program, compact fluorescent light bulbs (CFLs) and clothes washers. Results were derived from surveys with participants in each program as well as non-participant purchasers of standard efficiency new homes, CFLs, and clothes washers. Respondents were asked to complete two series of questions that sought to quantify the NEIs associated with the various programs. The first series of questions was a variant of the NEI estimation approach used in the 2003 and 2004 MCAC evaluations; the second series of questions used a conjoint-based estimation approach developed specifically for this evaluation.

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BACKGROUND AND EVALUATION OBJECTIVES

This report presents research findings from the non-energy impacts (NEI) evaluation conducted by the Market Characterization, Market Assessment, and Causality (MCAC) evaluation team. The evaluation examined the NEIs associated with the following **New York Energy $mart^SM^** programs:

- New Construction Program (NCP)
- Commercial/Industrial Performance Program (CIPP)
- Small Commercial Lighting Program (SCLP)
- ENERGY STAR® Labeled Homes Program
- Two components of the ENERGY STAR® Products and Marketing (ESPM) Program, compact fluorescent light bulbs (CFLs) and clothes washers.

Results were derived from surveys with participants in each program as well as non-participant purchasers of standard efficiency new homes, CFLs, and clothes washers. Respondents were asked to complete two series of questions that sought to quantify the NEIs associated with the various programs. The first series of questions was a variant of the NEI estimation approach used in the 2003 and 2004 MCAC evaluations; the second series of questions used a conjoint-based estimation approach developed specifically for this evaluation.

The objective of the evaluation was to better quantify the NEIs associated with the various program components in order to provide information that will assist NYSERDA staff in making sound decisions related to investments in the energy efficiency and load management programs that comprise the **New York Energy $mart^SM^** portfolio of programs. The research also benefits NYSERDA staff by providing valuable information that can assist in developing effective program marketing strategies. The **New York Energy $mart^SM^** Programs constitute an investment of System Benefits Charge (SBC) funds, and the MCAC work effort is designed to help ascertain the return from these investments.

RESEARCH APPROACH

The research approach used by the MCAC Team to conduct the NEI evaluation consisted of the following activities:

- Discussions with NYSERDA staff to identify potential NEI estimation approaches, review the pros and cons associated with each potential approach, and select the final approaches to be used in this evaluation
- A literature review largely compiled by NYSERDA[1] that looked at prior NEI studies in two areas:
    - Other NEI types of studies performed in the energy industry related to energy efficiency and load management programs.

[1] Ms. Laura Fiske, an intern at NYSERDA, compiled the majority of the studies reviewed. This literature review was augmented by several studies identified by the MCAC Team personnel.

- A broader survey of the literature in economics and evaluation across disciplines focused on "contingent valuation" (CV) methods. This literature examines approaches for estimating the value of non-priced attributes of goods (*e.g.,* visibility in National Parks) across a wide variety of applications.

- Discussions with four experts familiar with a broad application of CV methods. Some of these experts were asked to review methods similar to those employed by the MCAC Team in 2003 and 2004.[2]
- Review of the approaches and results of the NEI estimation efforts used by the MCAC Team in the 2003 and 2004 program evaluations. The approaches used in those years represented the current state of the practice as applied to assessments of NEIs for energy efficiency programs.
- Review of "measured" NEIs. Several studies as well as ongoing research are examining NEIs for select technologies including ENERGY STAR products (*e.g.,* clothes washers) as well as technologies that enhance the building environment.[3]
- Development and refinement of two NEI estimation approaches, the first a variant of the approach used in the 2003 and 2004 MCAC program evaluations; the second a conjoint-based approach developed specifically for this evaluation.[4]
- Review of program databases and other data sources for use as respondent sample frames.
- Development and refinement of the attribute lists and associated levels for use in the conjoint-based approach.
- Development of an analytic framework for evaluating the responses received from the various survey efforts.
- Pre-recruiting of most respondents to garner higher survey completion rates.
- Primary data collection via Internet and mail surveys with participants in each program as well as non-participant purchasers of standard efficiency new homes, CFLs, and clothes washers.
- Analysis and reporting of results.

This comprehensive approach enabled the MCAC Team to conduct a multi-faceted evaluation of the NEIs that might accrue to program participants and other purchasers of energy-efficient equipment in order to better understand the roles NEIs play in market actor decision-making.

FINDINGS

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[2] These experts/reviewers were: 1) Dr. Donald Waldman, Department of Economics, University of Colorado; 2) Dr. Bruce Tonn, Oak Ridge National Laboratories; 3) Dr. James Kahn, Department of Economics, Washington and Lee University; and 4) Dr. Lynn Hoefgen of Nexus Market Research, Inc. – Dr. Hoefgen is a member of NYSERDA's general evaluation assistance contractor team, but he has also led contingent valuation studies addressing both evaluation and market research issues.

[3] This would include enhanced productivity due to improved indoor air quality and/or improved lighting quality. Studies have been conducted in schools and office buildings by several research organizations. A tabulation of these research studies is on-going as part of the work effort.

[4] The conjoint-based approach was viewed as an appropriate experimental method based on the literature review and discussions with outside researchers on contingent valuation methods (*i.e.*, conjoint analysis is one type of contingent valuation method). In addition, the literature review showed that a conjoint approach was used most frequently across different types of non-market attribute valuation applications.

Select findings from the NEI evaluation include the following:

- NEIs continue to be important to respondents. Each estimation method employed in the current evaluation indicates that respondents do recognize the existence of NEIs and do assign supplementary positive value to the NEIs in addition to the corresponding energy savings that result from measure installation.

- Results from the Approach 1 series of questions generally correspond to the values reported in prior MCAC evaluation efforts. This was expected to be the case, as the Approach 1 survey component was designed as an extension of the direct query method used previously to assess NEI value with modifications to streamline the question set.

- Results derived from the conjoint analysis (*i.e.*, Approach 2) confirm that respondents value NEIs; however, the values assigned to the NEIs when the interactions among attributes are considered vary considerably by program. This is to be expected, considering that this was the first test of using conjoint analysis to evaluate NEIs and that the conjoint comparisons represent hypothetical bundles of attributes, not actual conditions experienced by respondents.

- Respondents continue to have difficulty answering direct willingness-to-pay (WTP) questions that ask them to directly assign a value they would be willing to invest to realize the reported benefits from NEIs. This finding reinforces the fact that while most respondents do recognize the existence of NEIs, many have a difficult time valuing the NEIs, especially when asked to do so in "net" terms.

- The conjoint method used in the current evaluation (*i.e.*, Approach 2) not only provides dollar values for the corresponding NEI groupings, it also provides insights into which NEIs or combinations of NEIs are most preferred by respondents, information that can be used by NYSERDA staff and implementation contractors to maximize the effectiveness of program marketing strategies.

SECTION 1:

INTRODUCTION

The New York State Energy Research and Development Authority (NYSERDA) is a public benefit corporation established in 1975. It administers System Benefits Charge (SBC) funds and the **New York Energy $mart^{SM}** Program under an agreement with the New York State Public Service Commission (PSC). NYSERDA also oversees and coordinates evaluation of the effort on behalf of the SBC Advisory Group that, pursuant to PSC order, is the independent evaluator of the programs. NYSERDA began operating the **New York Energy $mart^{SM}** Programs in July 1998. The programs are funded by an electric distribution SBC paid by customers of Central Hudson Gas and Electric Corporation, Consolidated Edison Company of New York, Inc., New York State Electric & Gas Corporation, National Grid, Orange and Rockland Utilities, and Rochester Gas & Electric Corporation.

In May 2003, NYSERDA contracted with a team under the direction of Summit Blue Consulting to conduct Market Characterization, Market Assessment, and Causality/Attribution (MCAC) studies for the **New York Energy $mart^{SM}** Program. This report documents the research findings from the NEI evaluation conducted by the MCAC Team in late 2005 and early 2006 of the following **New York Energy $mart^{SM}** programs:

- New Construction Program (NCP)
- Commercial/Industrial Performance Program (CIPP)
- Small Commercial Lighting Program (SCLP)
- ENERGY STAR® Labeled Homes Program
- Two components of the ESPM Program, compact fluorescent light bulbs (CFLs) and clothes washers.

The core MCAC Team, which consists of staff from Summit Blue Consulting and Quantec, worked closely with NYSERDA staff to conduct the data collection, analysis, and reporting activities summarized in this document.

1.1 BACKGROUND

All investments have direct and indirect impacts. Building a power plant provides electricity but it also has indirect impacts such as job creation and increased system reliability that can make a region more attractive to new businesses, and lead to other economic impacts. In addition to these positive indirect effects, there are also negative indirect impacts to building a power plant, with those related to the environment being cited most often. As a result, supply-side investments designed to generate electricity have both energy and non-energy benefits and costs.

Similarly, demand-side investments in energy efficiency have both direct and indirect benefits and costs. The indirect effects have been lumped together under the term "non-energy impacts."[5] Indirect impacts

[5] The term "Non-Energy Impacts" is used for the current evaluation work instead of the more commonly used term in prior evaluations "Non-Energy Benefits" (NEBs) since these "benefits" can be both positive and negative. Also, the term Non-Energy Impacts is more consistent with the literature on investment decision making, which includes both the direct and substantive indirect benefits and costs of an investment.

are typically part of the analysis of traditional capital investments, and they should also be an integral component of assessing investments in energy efficiency and demand response programs.

The issue is not whether NEIs exist. Ample empirical evidence indicates the existence of NEIs.[6] The challenge is to determine the additional value NEIs provide program participants that is not captured by traditional impact analyses that focus on energy savings. These values, if meaningful for a program, can be captured in that program's benefit-cost analysis. Given the large estimates for NEIs from recent studies and the increased attention they are receiving, assessing the context of these estimates has taken on greater importance.

Issues that need to be considered, especially if NEIs are to be incorporated in a benefit-cost analysis include:

Issue #1. NEI values should be "net" of what would have been obtained using the assumed baseline technology (*i.e.*, the assumed technology that would have been installed or in place if the program had not been offered). Most new technologies will have attributes that are different than the old technology they replace. For example, consider a "standard" new home versus an ENERGY STAR new home – both homes are likely to have benefits compared to the old existing home. To use NEIs in benefit-cost analyses, it is important to assess the net impacts between the new technology that would have been installed and the energy-efficient technology that was installed through the program.

Issue #2. Implicit in NEI surveys is the assumption that the program participant can provide a reasonably credible response to the questions being asked. This means that they have some knowledge about the level of the NEI and are not making a completely subjective judgment. For example, if they place a value on the equipment lasting longer, can respondents be expected to know the typical life of the equipment? In the case of ENERGY STAR clothes washers or refrigerators, NEI studies have shown that customers value the longer life of these appliances generally, without providing information on the actual expected lifetime. In crafting survey questions, evaluators need to critically consider whether the program participants can reasonably be expected to know the answers to the questions being asked.

Issue #3. Related to Issue #2, if the respondent can not reasonably provide an estimate of the value of an NEI, then the responses represent the perception of the survey respondent, and not the actual field conditions. Perceptions of program participants can be important in program design and marketing. However, evaluators should consider whether these perceptions are appropriate for a benefit-cost analysis, or solely for program marketing purposes.

Issue #4. Given that respondents are reasonably well informed on some NEIs, what is the best way to elicit answers that accurately reflect these values?

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[6] The Heschong-Mahone Group has produced several often-cited studies highlighting NEIs, including Heschong Mahone Group. October, 2003. *Windows and Offices: A study of office worker performance and the indoor environment*. California Energy Commission; and Heschong Mahone Group. 2003. *Windows and Classrooms: A study of student performance and the indoor environment*. Public Interest Energy Research. Other select studies demonstrating evidence of NEIs include: Worrel, Earnst, Jon A. Laitner, Michael Ruth, Hodayah Finman. "Productivity Benefits of Industrial Energy Efficiency Measures." *Energy* 28 (2003): 1081-1098; Boyce, Peter R., Jennifer A. Veitch, Guy R. Newsham, Michael Myer, and Claudia Hunter. December, 2003. *Lighting Quality and Office Work: A Field Simulation Study*. Prepared by Lighting Research Center, Rensselaer Polytechnic Institute and National Research Council of Canada, Institute for Research in Construction, for U.S. Department of Energy; and Boentgen, Rudolf, and Steve Bonanno. (2004) Statewide Non-Electric Benefits Development in Massachusetts. *ACEEE Summer Study Conference Proceedings*.

With respect to Issue #1, it is clear that the goal of evaluations should be to estimate the "net" NEIs that result from program actions and would not have occurred if the program had not been offered. Issues #2 through #4 are among the researchable questions that were addressed as part of this analysis effort.

1.2 EVALUATION OBJECTIVES

The objective of the current evaluation is to better quantify the NEIs associated with the various program components in order to provide information that will assist NYSERDA staff in making sound decisions related to investments in the energy efficiency and load management programs that comprise the **New York Energy $mart**SM portfolio of programs. The research also benefits NYSERDA staff by providing valuable information that can assist in developing effective program marketing strategies. The **New York Energy $mart**SM Programs constitute an investment of System Benefits Charge (SBC) funds, and the MCAC work effort is designed to help ascertain the return from these investments.

The current evaluation also sought to test the researchable questions discussed in the previous section and develop new and innovative NEI estimation approaches. As is discussed in subsequent sections of this report, the MCAC Team believes that the objectives of the evaluation have been successfully met and that the estimation approaches developed for this effort will continue to yield robust results for NYSERDA and the industry as a whole as they are further refined in future research efforts.

1.3 RESEARCH APPROACH

The research approach used by the MCAC Team to conduct the NEI evaluation consisted of the following activities:

- Discussions with NYSERDA staff to identify potential NEI estimation approaches, review the pros and cons associated with each potential approach, and select the final approaches to be used in this evaluation
- A literature review largely compiled by NYSERDA[7] that looked at prior NEI studies in two areas:
    - Other NEI types of studies performed in the energy industry related to energy efficiency and load management programs.
    - A broader survey of the literature in economics and evaluation across disciplines focused on "contingent valuation" (CV) methods. This literature examines approaches for estimating the value of non-priced attributes of goods (*e.g.,* visibility in National Parks) across a wide variety of applications.
- Discussions with four experts familiar with a broad application of CV methods. Some of these experts were asked to review methods similar to those employed by the MCAC Team in 2003 and 2004.[8]

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[7] Ms. Laura Fiske, an intern at NYSERDA, compiled the majority of the studies reviewed. This literature review was augmented by several studies identified by the MCAC Team personnel.

[8] These experts/reviewers were 1) Dr. Donald Waldman, Department of Economics, University of Colorado; 2) Dr. Bruce Tonn, Oak Ridge National Laboratories; 3) Dr. James Kahn, Department of Economics, Washington and Lee University; and 4) Dr. Lynn Hoefgen of Nexus Market Research, Inc. – Dr. Hoefgen is a member of NYSERDA's general evaluation assistance contractor team, but he has also led contingent valuation studies addressing both evaluation and market research issues.

- Review of the approaches and results of the NEI estimation efforts used by the MCAC Team in the 2003 and 2004 program evaluations. The approaches used in those years represented the current state of the practice as applied to assessments of NEIs for energy efficiency programs.
- Review of "measured" NEIs. Several studies as well as ongoing research are examining NEIs for select technologies including ENERGY STAR products (*e.g.,* clothes washers) as well as technologies that enhance the building environment.[9]
- Development and refinement of two NEI estimation approaches, the first a variant of the approach used in the 2003 and 2004 MCAC program evaluations; the second a conjoint-based approach developed specifically for this evaluation.[10]
- Review of program databases and other data sources for use as respondent sample frames.
- Development and refinement of the attribute lists and associated levels for use in the conjoint-based approach.
- Pre-recruiting of most respondents to garner higher survey completion rates
- Primary data collection via on-line and mail surveys with participants in each program as well as non-participant purchasers of new homes, CFLs, and clothes washers.
- Development of an analytic framework for evaluating the responses received from the various survey efforts.

This comprehensive approach enabled the MCAC Team to conduct a multi-faceted evaluation of the NEIs that might accrue to program participants and other purchasers of energy-efficient equipment in order to better understand the roles NEIs play in market actor decision-making.

1.4 REPORT FORMAT

The remainder of this report is organized in the following manner:

- Section 2 provides an overview of previous NYSERDA NEI evaluation methods and discusses the workplan used for the current evaluation.
- Section 3 presents information regarding the methodology used in the current evaluation including sample draws, attribute list and level development, survey mechanics, and analytic methods.
- Section 4 summarizes the results of the current evaluation by sector and by program.
- Section 5 presents conclusions and recommendations derived from the current evaluation.

[9] This would include enhanced productivity due to improved indoor air quality and/or improved lighting quality. Studies have been conducted of schools and office buildings by several research organizations. A tabulation of these research studies is on-going as part of the work effort.

[10] The conjoint-based approach was viewed as an appropriate experimental method based on the literature review and discussions with outside researchers on contingent valuation methods (*i.e.*, conjoint analysis is one type of contingent valuation method). In addition, the literature review showed that a conjoint approach was used most frequently across different types of non-market attribute valuation applications.

SECTION 2:

OVERVIEW OF NEI ESTIMATION APPROACHES AND WORKPLAN

In 2003 and 2004, the MCAC Team used then state-of-the-practice estimation techniques to assess the NEIs associated with various **New York Energy $mart**^{SM} programs. This section of the report provides an overview of previous NEI evaluation methods and results and discusses the workplan used for the current evaluation.

2.1 PREVIOUS NEI EVALUATION METHODS AND RESULTS

The research into the NEIs related to energy efficiency programs has seen numerous papers published, but a somewhat thin level of research into alternative methods. Many studies have used a direct query method where the energy efficiency program participant is asked about the value of benefits that may be derived from the installation of equipment or practices through the energy efficiency program.[11] Generally, the approach queried participants, trade allies, and some non-participants about impacts from investments in energy efficiency programs that are not captured in the energy savings counted in program records. These tend to include factors such as comfort, ease of selling/leasing the building, environmental benefits, and other benefits for participants. To the extent these benefits (or costs) can be quantified and verified, they can be included in the benefit-cost analysis scenarios for energy efficiency programs.

Like many other program administrators, NYSERDA has employed these standards to estimate NEIs in studies conducted by the MCAC Team during 2003 and 2004 for the **New York Energy $mart**^{SM} Program. NYSERDA and other program administrators have obtained results showing very substantial values for NEIs.[12] Figure 2-1 summarizes the range of NEI values derived from NYSERDA's surveys of various market actors over the past two years. Expressed as a percentage of project energy savings, it was common to find NEI values equal to, or greater than, the value of the energy savings. In addition to the business/institutional and residential sector program results shown in Figure 2-1, one low-income program was also evaluated. In that case, NEIs were valued slightly higher than the energy savings at 108%.

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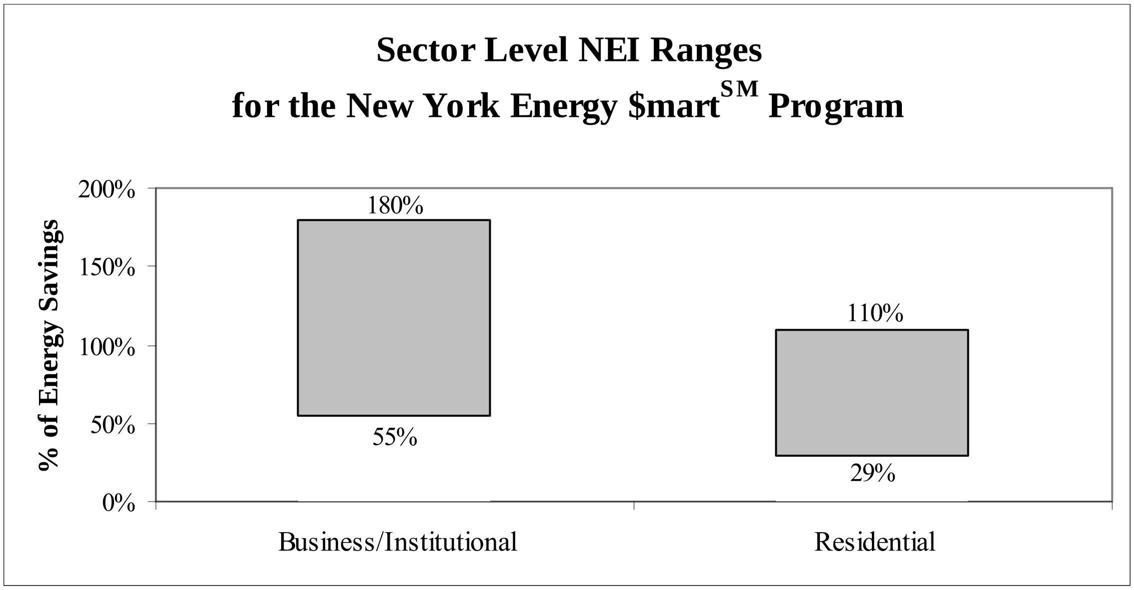
[11] Other studies have assessed NEIs using a review of records (*i.e.*, Heschong Mahone Group. October, 2003. *Windows and Offices: A study of office worker performance and the indoor environment*. California Energy Commission; and Heschong Mahone Group, as well as the Heschong-Mahone Group's studies on how daylighting influences student performance and retail sales), or directly testing the performance of treatment and control groups (*i.e.*, Boyce, Peter R., Jennifer A. Veitch, Guy R. Newsham, Michael Myer, and Claudia Hunter. December, 2003. *Lighting Quality and Office Work: A Field Simulation Study*. Prepared by Lighting Research Center, Rensselaer Polytechnic Institute and National Research Council of Canada, Institute for Research in Construction, for U.S. Department of Energy).

[12] Lisa Skumatz, of Skumatz Economic Research Associates, Inc., has been involved with past NYSERDA NEI studies and has authored many articles on the topic, including: Skumatz, Lisa. (2002) Comparing Participant Valuation Results Using Three Advanced Survey Measurement Techniques: Non-Energy Benefits Computations of Participant Value. *ACEEE Summer Study Conference Proceedings*; and Fuchs, Leah, Lisa Skumatz, and Jennifer Ellefsen. (2004) Non-Energy Benefits from ENERGY STAR: Comprehensive Analysis of Appliance, Outreach and Homes Programs. *ACEEE Summer Study Conference Proceedings*.

Figure 2-1. Range of NEI Values Derived from Prior NYSERDA Research Efforts



2.2 WORKPLAN FOR CURRENT NEI EVALUATION

NYSERDA's previous NEI research approach valued NEIs using a scale ranging from "much less valuable than the energy savings" to "much more valuable than energy savings."[13] The primary advantage of this approach is that the customer does not have to provide an answer directly in dollar terms, which can help respondents to feel more comfortable and result in a greater number of responses. A weakness of the approach, however, is that it requires the development of a transformation curve to translate responses to categorical questions into estimates expressed in dollar terms. Furthermore, the scaling approach may require some sensitivity analysis and cross checking. This illustrates the difficulty of assessing the value of non-market goods, and some of the trade-offs that need to be considered in developing the research approach. As a result, it is important to test alternative methods and to approach the research questions from different view points to verify the robustness of the results.

The goals of the current NEI evaluation effort were to: 1) extend the approach taken in previous NYSERDA evaluations, and compare these results with those from a new approach that takes a different view of NEIs; and 2) determine what can be learned from a review of environmental and economics literature related to contingent market valuation of non-market attributes.[14] In an effort to use the current research to build a platform for future research, the current evaluation employs an extension of the direct query method used in the 2003 and 2004 NEI assessments (Approach 1), as well as a conjoint method

[13] Lisa Skumatz, of Skumatz Economic Research Associates, Inc., devised the approach used in past NYSERDA NEI studies.

[14] Contingent valuation is an economic technique for assigning value to non-market attributes, or resources that are not bought and sold. Contingent valuation uses surveys to gather data on the utility people derive from non-market resources. The technique is often used to value environmental resources such as clean air and water. Contingent valuation studies that have used conjoint analysis include: Turner, Robert, Alia Giuda, and Laura Noddin. (2005) Estimating nonuse values using conjoint analysis. Economics Bulletin, Vol. 17, No. 7 pp. 1-15; and McCollum, Daniel, and Michelle Haefele. February 1999. A Survey of 1997 Colorado Anglers and Their Willingness to Pay Increased License Fees. USDA Forest Service and Department of Agriculture and Resource Economics, College of Natural Resources, Colorado State University; and Stevens, Thomas H., C. Barrett, and C. Willis. "Conjoint Analysis of Groundwater Protection Programs." Agricultural and Resource Economics Review 27(2), 1997, pp 229-236.

where respondents are asked to choose between different bundles of program-related attributes (Approach 2).

The conjoint method was chosen as a test approach for the current evaluation effort. This method allows respondents to choose between bundles of attributes (both positive and negative) that they can, theoretically, relate to as real-world consumer product options. In each bundle of attributes, or choice option, one attribute is expressed in dollar terms allowing for estimates of the dollar value of the non-market attributes included in the bundles. The conjoint approach used in this application is discussed in greater detail later in this report.

2.2.1 Approach 1 – Extension of the Direct Query Method to Assess NEIs

This approach used a set of questions similar to those used in NYSERDA's past NEI studies. The differences between this and previous studies included:

1. Use of fewer NEI attributes to avoid overlapping values at the outset. Prior years' studies were reviewed to correlate the results across attributes and develop a reduced set of attributes for use in the current questionnaires.

2. Rather than asking respondents if the attribute is much less valuable, somewhat less valuable, the same value, somewhat more valuable, or much more valuable than the energy savings, and then having to translate these rankings into numeric amounts, the current study directly asks respondents to assign a value to each NEI attribute expressed in terms of a percentage of the project's estimated energy savings. This approach allows respondents to rank attributes appropriately using any percentage of the value of the energy savings that they deem appropriate. The literature on scaling shows that, even when using percents directly, an anchor is needed if individuals are to rank judgmental attributes on the same scale (*e.g.*, comfort). The use of energy savings as the reference point accomplishes this across the individuals.[15]

   For each attribute included in the survey (*e.g.*, lighting quality, occupant comfort, operation and maintenance costs, etc.) respondents were asked the following question. This example is taken from surveys developed for the Commercial/Industrial Performance Program (CIPP):

Energy Equipment Operation and Maintenance Costs *(not including fuel costs)* – Your experience with this non-energy impact has been (*please check one*):

Positive	□	And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact is _____% as valuable (insert best estimate).
Zero	□	
Negative	□	And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact detracts _____% (insert best estimate).
Don't know	□	

[15] This approach is called "labeled magnitude scaling with a modulus." See Kahneman, D. et al. "Shared Outrage and Erratic Awards: The Psychology of Punitive Damages" Journal of Risk and Uncertainty, 16:49 (1998).

3. A consistency check was applied that asks the respondent to rank all the NEI factors overall as a percentage of the energy savings attained. The question is as follows:

Now please consider the ***overall*** value of all the non-energy impacts mentioned above, compared to conditions in the building prior to the program. Your overall experience with all the non-energy impact has been (*please check one*):		
Positive	□	And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, the overall value of all the non-energy impacts is _____% as valuable (insert best estimate).
Zero	□	
Negative	□	And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, the overall value of all the non-energy impacts detracts _____% (insert best estimate).
Don't know	□	

4. Similar to the approach used in previous NYSERDA studies, an additional consistency check, a contingent valuation based willingness-to-pay question, was asked.. The question reads as follows:

If the overall value of the non-energy impacts is positive, and these positive impacts disappeared, approximately how much would you be willing to invest to gain back these benefits, in terms of an annual dollar amount?

❑ $___________/yr
❑ Don't know/refused

OR

If the overall value of the non-energy impacts is negative, what would you be willing to invest to eliminate these negative impacts from your new building, as an annual dollar amount.

❑ $___________/yr
❑ Don't know/refused

5. To ensure that respondents were gauging their answers based on realistic estimates of energy savings resulting from program participation, an estimate of energy savings for each individual participant was taken from program records and provided as a reminder at the outset of the survey.[16]

[16] In the case of residential respondents, average estimates of energy savings resulting from program participation were provided as this was the best information available.

2.2.2 Approach 2 – Conjoint Analysis to Assess NEIs

This approach was viewed as an appropriate experimental method based on a literature review and discussions with outside researchers on contingent market methods.[17] In addition, the literature review showed that a conjoint approach was used most frequently across different types of non-market attribute valuation applications.[18] While conjoint analysis is widely used for valuing non-price factors in other contexts,[19] it has not been applied to the types of energy efficiency programs that comprise the **New York Energy $martSM** portfolio. As a result, this is a new approach for addressing NEIs in this context.

The conjoint method is most frequently used in marketing and product management fields, but is also being applied in other fields. Its popularity is due, in part, to the fact that many individuals have difficulty determining the relative importance (or value) they place on a specific attribute (*e.g.*, an NEI) when asked directly. When asked which attributes are important, individuals often rank them all as important. To alleviate this, a conjoint analysis groups attributes into hypothetical product offerings, then asks the individual to choose between the different products. Ideally, six to eight of these preference questions are asked. Since one of the attributes is expressed in dollar terms and varies across the attribute groups, a statistical model can be used to develop values for those attributes that are not directly measured in dollars.

[17] Don Waldman, professor of economics at the University of Colorado at Boulder, has been instrumental in guiding the conjoint analysis component of this research. Lynn Hoefgen of Nexus Market Research has also been helpful in developing this research approach.

[18] The use of a conjoint analysis was determined to be the next step in research on non-energy impacts by an August, 2005 Report on "Value of Quality, Comfort, and Energy Efficiency in New Homes," by California Energy Commission (CEC), Public Interest Energy Research (PIER) Publication Number: CEC-500-2005-118. This document states that, "although consumer value of home energy efficiency, comfort and quality cannot be determined from existing data sources, this remains a viable area for future research. A conjoint analysis using a web-based consumer audience has been proposed by the National Association of Home Builders Research Center (NAHBRC) to assign value to the attributes of quality, comfort, and energy efficiency. The consumer survey that generates the Visions 2000 database is also available for enhancements to capture this information." This research has not yet been funded by the CEC based on phone communications.

[19] Conjoint analysis is often used for the purposes of market research and product development. Such studies tend to be privately-funded and unpublished. Sample conjoint survey tools used by an internet provider and a university (to assess library service preferences) were reviewed as part of this study.

Conjoint Analysis Example: Golf Ball Product Development

Conjoint analysis is typically used for the purposes of product development. Suppose a company wants to market a new golf ball. There are three important features of a golf ball: average driving distance, average ball life, and price. There is a range of feasible alternatives for each of these features:

Average Driving Distance	Average Ball Life	Price
275 yards	54 holes	$1.25
250 yards	36 holes	$1.50
225 yards	18 holes	$1.75

From the point of view of the market, the "ideal" ball would be:

Average Drive Distance	Average Ball Life	Price
275 yards	54 holes	$1.25

From the point of view of the manufacturer, the "ideal" ball would be:

Average Driving Distance	Average Ball Life	Price
225 yards	18 holes	$1.75

The basic marketing issue is that the company would lose money selling the first ball and the market probably wouldn't buy the second. The most viable product is somewhere in between. Conjoint analysis provides information on the trade-offs that consumers make when buying a golf ball. Some consumers would prefer a ball with a longer lifetime and some would prefer a ball with a longer driving distance, for the same price. Asking customers to rate all nine possible combinations demonstrates these trade-offs and the choices that consumers will likely make in the marketplace. This trade-off information is then analyzed to estimate buyer value systems, and then finally to predict consumer choices pertaining to a particular product scenario.

Source: Curry, Joseph. Sawtooth Software Research Paper Series: Understand Conjoint Analysis in 15 Minutes, 1996.

In this application, one challenge was to come up with reasonable groups of attributes for the NYSERDA programs selected for study. While it is recommended that conjoint analyses focus on only a limited number of attributes (ideally, six or fewer), previous year's NEI studies had included as many as fifteen attributes. In addition to honing the list of attributes, it was also important to describe the attributes in language that would make sense to respondents, while being careful not to lead the respondent in any way. Furthermore, the levels associated with each attribute had to be realistic so as not to bias respondent selections (*i.e.*, if respondents view an attribute level as unrealistically positive or negative, it is likely that the respondents' perception of that attribute would preclude them from making an honest assessment of the attribute's value).

As an example, the attributes used to assess the NEIs associated with NYSERDA's New Construction Program are shown in Table 2-1. These attributes were used to develop conjoint questions for the New Construction Program, such as the one shown in Table 2-2. Again, the New Construction Program example has one attribute that is expressed in dollars which varies across groups of attributes that the respondent is asked to choose between. Pair-wise choices are generally used in this type of analysis, *i.e.*, the respondent has to pick a favored "group" of attributes from the two choices posed in the question.

Table 2-1. Attributes and Levels for NYSERDA's New Construction Program

Project Attributes	Levels
Construction cost ($/ft^2)	• $140/ft^2 • $144/ft^2 • $148/ft^2
Energy equipment operation & maintenance (O&M) costs	• Annual planned and unplanned energy equipment O&M expenditures equal 5% of annual operating expenses. • Annual planned and unplanned energy equipment O&M expenditures equal 3% of annual operating expenses.
Lighting quality	• > 30% of building occupants express dissatisfaction with lighting quality (*i.e.* complain of dark spots, flickering, noise, etc.) • < 10% of building occupants express dissatisfaction with lighting quality (*i.e.* complain of dark spots, flickering, noise, etc.)
Thermal comfort and HVAC effectiveness	• Building occupants express dissatisfaction with conditioned space (*i.e.* temperature settings, ventilation, etc.) > 25 days per year • Building occupants express dissatisfaction with conditioned space (*i.e.* temperature settings, ventilation, etc.) < 5 days per year
Occupant productivity	• Occupant productivity increases by 2% relative to previous work environment • Occupant productivity increases by 10% relative to previous work environment
Ease of selling/leasing the building	• Average time on the market for vacant space is 60 days • Average time on the market for vacant space is 30 days

Table 2-2. Example Conjoint Question for NYSERDA's New Construction Program

Please consider the two building options that are presented, labeled A and B, and select the option that you prefer. For each comparison, please select the option you prefer even if you do not consider either option to be ideal.	**Building A** ☐	**Building B** ☐	**Difference**
Construction Cost	$140/ft^2	$148/ft^2	B has a 6% higher construction cost
Equipment Operation & Maintenance Costs: Annual energy equipment O&M costs as percent annual operating expenses	5%	3%	A has higher annual equipment O&M costs
Lighting Quality: Percent of building occupants expressing dissatisfaction with lighting quality (*i.e.* complain of headaches, dark spots, noise, insufficient light levels etc.)	< 5%	< 5%	No difference
Thermal Comfort and HVAC Effectiveness: Number of days per year building occupants express dissatisfaction with conditioned space (*i.e.* temperature, air quality, ventilation)	> 25 days	< 5 days	B occupants are more comfortable
Worker Productivity: Productivity in relation to previous work environment.	Increases by 2%	Increases by 10%	B workers are more productive
Ease of Selling / Leasing: Average days on market for vacant space	60 days	60 days	No difference

While a great strength of the conjoint framework is its ability to present respondents with realistic "product" choices so that they can make decisions in a context that is familiar to them as consumers, researchers must recognize that the product options (or bundles of attributes) for which respondents express their preferences are hypothetical; they may or may not mirror the respondent's actual experience. In the case of NEIs, this is a departure from earlier approaches to measuring attribute values, in which respondents have characterized their own experience with NEIs. This is one reason that an extension of the direct query approach was also maintained in this year's study.

Since a primary purpose of NEI studies is to measure dollar values of the actual NEIs experienced by program participants so that the values can be incorporated into benefit-cost analyses scenarios, it is important to explore strategies for using the conjoint framework to provide information regarding actual consumer experiences with NEIs. The results of this year's conjoint approach will increase evaluator understanding of consumer preferences for various NEI attributes and will have great value for product marketing and program outreach purposes. Future plans might include possibly exploring alternatives for applying the conjoint method to gauge respondents' actual experience with NEIs so that the results will be more directly applicable to program benefit-cost analyses.

2.2.3 Programs Selected for Evaluation

Several large-scale **New York Energy $mart**^{SM} programs that encompass a number of energy efficiency measures across different end-uses (multi-attribute programs) were selected for the current NEI evaluation. The multi-attribute programs selected were the Commercial/Industrial Performance Program, the New Construction Program, and ENERGY STAR Homes. In addition, two ENERGY STAR products --- compact fluorescent light bulbs (CFLs) and clothes washers -- were selected to perhaps more easily demonstrate the methods and techniques. Finally, the Small Commercial Lighting Program (SCLP) was selected due to the program's focus on NEIs and quality lighting design. This mix of programs was selected to provide a good baseline against which prior NEI estimates can be compared, as well as establish a platform for future research. Programs not addressed this year may be addressed in future years. The target audiences and goals for survey completes for primary research are shown in Table 2-3.

Table 2-3. New York Energy $mart[SM] Programs/Areas Undergoing NEI Study in 2005-2006

Program/Area of Focus	Survey Audience and Goal for Completes
New Construction Program	80 program participants (end-use customers)
Commercial/Industrial Performance Program	80 program participants (end-use customers)
Small Commercial Lighting Program	50 program participants (end-use customers)
ENERGY STAR Homes Program	50 program participants (end-use customers) 30 non-participants (end-use customers who purchased a new non-ENERGY STAR home)
ENERGY STAR Compact Fluorescent Light Bulbs	50 recent purchasers
ENERGY STAR Clothes Washers	50 recent purchasers

SECTION 3:

METHODOLOGY

This section presents information regarding the methodology used in the current evaluation including sampling protocol, development of attribute lists and levels, survey mechanics, and analytic methods. The final survey instruments used to conduct the evaluation are included as Appendix B of this report.

3.1 SAMPLING PROTOCOL

Table 3-1 summarizes the key elements of the sample draws conducted for the current evaluation. Where data were available, program participants who recently completed a separate MCAC survey as part of a prior evaluation effort were screened out of the samples to avoid potential respondent fatigue. Program tracking databases were used as the primary sample frames for the Business and Institutional program participants (*i.e.*, participants in the NCP, CIPP, and SCLP), supplemented by hardcopy project files as needed, to obtain missing contact information. The samples of participants in the Residential programs were obtained from other sources including recruitment efforts conducted during separate MCAC program evaluations, supplemental telephone recruiting efforts conducted by the MCAC Team, and in the case of clothes washers an e-mail list provided by NYSERDA of people who opted to receive energy efficiency tips from NYSERDA. The final samples used for the Approach 1 survey components contained only those respondents who had purchased and installed the referenced equipment in their facility or home. For the residential surveys, samples used for the conjoint portions of the surveys included individuals both with and without experience using energy-efficient lighting and equipment. The samples were not stratified in any way.

Table 3-1. Summary of NEI sampling approach

Program	Sample Frame	Eligible Projects/Participants
NCP	Program Database	Participating commercial buildings completed within the last three years[1]
CIPP	Program Database supplemented by SPC1 Forms	Participating commercial buildings completed within the last three years
SCLP	Program Database	Lighting projects completed within the last three years that used contractors participating in the SCLP
ENERGY STAR Homes	Recruited during MCAC surveys of participants and non-participants in the ENERGY STAR Homes Program with supplemental recruiting to meet quotas	People who purchased a new home (both ENERGY STAR and non-ENERGY STAR) within the past year
CFLs	Recruited during MCAC end-use customer survey as part of the ENERGY STAR Products & Marketing Program evaluation	People who purchased any light bulb (CFL or incandescent) within the past year
Clothes Washers	Recruited during MCAC end-use customer survey as part of the ENERGY STAR Products & Marketing Program evaluation supplemented by an e-mail list of people who opted to receive energy efficiency tips from NYSERDA	People who purchased a new clothes washer within the past five years

[1] The NCP NEI survey contained Upstate and Downstate variants to account for the difference in construction costs in the two regions.

3.2 DEVELOPMENT OF ATTRIBUTE LISTS AND LEVELS

In an effort to structure survey instruments that would capture respondents' preferences and experience with the variety of potential NEIs, attribute lists were developed for each program and realistic levels were identified for each attribute. As discussed in section 2.2.2, a number of challenges accompanied this task. The attributes used in the Approach 1 section needed to be similar to those used in previous years' NEI evaluation efforts in order to facilitate comparison of results across years. Similarly, the attributes used in Approach 1 and Approach 2 needed to relate to one another enough to allow for comparison of the two approaches.

The team also needed to be conscious of the number of attributes used for each program. In previous years, NEI surveys had inquired about as many as sixteen different attributes, some of which overlapped with one another. For example, Business and Institutional program attributes included operating costs, equipment maintenance, equipment performance and equipment lifetime. This attribute overlap may have resulted in double-counting of attribute value in previous studies. In addition to avoiding double-counting, it was important to keep this year's attribute lists short to provide for ease of survey completion and analysis of results.[20]

To address these challenges, the team first reviewed prior years' attribute lists and consolidated attributes that appeared to overlap with one another. Next, the team reviewed NEI literature, and worked with NYSERDA program staff to determine whether additional attributes should be addressed in the current study.

An additional challenge was to inquire about the range of attributes (both positive and negative) that could be associated with each of the programs and products in question, while making sure to present the attributes and levels in terms that would be understandable and meaningful to respondents. Both the use of attributes that were confusing to respondents and the use of inappropriate attribute levels had the potential to bias results. Striking this balance was particularly difficult for Business and Institutional programs (NCP, CIPP, and SCLP) since many NEIs pertain to the individual experience of building occupants. Respondents to the NCP and CIPP surveys were NYSERDA program participants, who tended to be facility managers. SCLP surveys were completed by contacts at facilities that received lighting upgrades conducted by electrical contractors participating in the program. Recognizing that the views of the Business and Institutional program survey respondents would represent one perspective on the preferences and experience of their facilities' occupants, the team made a concerted effort to characterize the attributes in terms that would be familiar to respondents. Furthermore, the team used only two levels for each attribute in the conjoint scenarios. Providing a sufficient distinction between the low and the high levels of each attribute, made it easier for participants to estimate their responses.[21]

Following is an overview of the information sources used to define the attribute levels for each program or product:

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[20] While each program was limited to six attributes for the purposes of the conjoint analysis, a few additional attributes were used for the Approach 1 section of the surveys. This allowed the team greater flexibility to follow up on attributes that had been examined in prior years (*i.e.*, sense of doing good for the environment), but which were not critical enough to be included among the attributes tested in the conjoint section of the survey.

[21] Based on discussions with Don Waldman (professor of economics at University of Colorado and an expert in the field of conjoint analysis), use of two attribute levels is consistent with standard practice for conjoint analyses..

NCP:

- Construction costs were based on 1999-2004 averages taken from the Dodge NAA (History) Database. Different cost ranges were used for upstate and downstate respondents to ensure that the levels would be realistic to respondents from each of those regions.
- Lighting attribute levels were refined using NYSERDA's "**New York Energy $mart**SM Small Commercial Lighting Program Technical Guide for Effective Energy Efficient Lighting."[22]
- Occupant productivity levels were based on results from other NEI studies.[23]
- Attribute levels for energy equipment operation and maintenance costs, thermal comfort and HVAC effectiveness, and ease of selling/leasing of building were estimated based on industry knowledge and discussions with NYSERDA program staff.

CIPP:

- Project cost levels were based on averages from a representative sample of CIPP projects taken from the CIPP TRC Program Database.
- Indoor air quality/safety levels were estimated based on industry knowledge and discussions with NYSERDA program staff.
- Attribute levels for lighting quality, occupant productivity, thermal comfort and HVAC effectiveness, and energy equipment operation and maintenance costs were identical to those used for the NCP. See sources referenced above.

SCLP:

- Project cost figures were based on averages taken from SCLP program data and included both labor and equipment costs.
- Lighting effectiveness, and occupant comfort and satisfaction attribute levels were estimated based on information in NYSERDA's "**New York Energy $mart**SM Small Commercial Lighting Program Technical Guide for Effective Energy Efficient Lighting."[24]
- Equipment operation and maintenance costs, occupant productivity and ease of selling/leasing the building attribute levels were identical to those used for the NCP. See sources referenced above.

ENERGY STAR Homes

- Cost and resale value are computed by using the annual energy cost comparisons on getenergysmart.org and the estimated value of an energy efficient home from a number of papers published on the www.energystar.gov web site.

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[22] Obtained from http://sclp.lightingresearch.org/pdf/SCLP_Technical_Guide_10-26-05.pdf, December, 2005.

[23] Studies included Boyce, Peter R., Jennifer A. Veitch, Guy R. Newsham, Michael Myer, and Claudia Hunter. December, 2003. *Lighting Quality and Office Work: A Field Simulation Study*. Prepared by Lighting Research Center, Rensselaer Polytechnic Institute and National Research Council of Canada, Institute for Research in Construction, for U.S. Department of Energy; and Heschong Mahone Group. October, 2003. *Windows and Offices: A study of office worker performance and the indoor environment*. California Energy Commission; and Heschong Mahone Group; and Jones, Carol and Kelly Gordon, Efficient Lighting and Office Worker Productivity. 2004 ACEEE Summit Study on Energy Efficiency.

[24] Obtained from http://sclp.lightingresearch.org/pdf/SCLP_Technical_Guide_10-26-05.pdf, December, 2005.

- The other attributes were developed based on the review of a number of government, utility, consortium, and builder Web sites that promote and educate consumers about the benefits of ENERGY STAR homes.

CFLs

- Price per bulb is based on typical prices for a 100 watt incandescent bulb or a 100 watt equivalent CFL bulb (23 watt-30 watt). Thirty five cents was used as the price per bulb for a typical 100 watt bulb, $2.00 was used as the mid-point price per bulb based on discounted CFL price for a multiple bulb pack, and $6.00 was used as the highest price point for a single 30 watt bulb based on the Niagara Mohawk CFL program offering (https://www.compactoffer.com/ product_listing.cfm?pc_id=nimo).
- The lifetime assumes a 750 hour lifetime for incandescent bulbs and a 10,000 hour lifetime for CFL bulbs, with both types of bulbs running an average of about 3.5 hours per day.

Clothes Washers

- Purchase price was based on typical prices at Sears.com in December 2005 for 3.5 cu. ft. washers.
- Energy use is based on assumptions from "How to Buy an Energy Efficient Clothes Washer" on the FEMP Web site. The estimates by domestic hot water fuel type used a weighted average of fuel types for water heating (electric, gas, oil) in New York based on the Department of Energy's (DOE's) Residential Energy Consumption Survey (RECS).
- Water savings are based on NYSERDA's deemed values.
- Drying time is based on a number of Web sites, including: http://eartheasy.com/live_energyeffic_ appl.htm, and http://www.geappliances.com/harmony/compare_dry_times.htm.

3.3 SURVEY MECHANICS

The Approach 1 and Approach 2 survey components were both developed around the attribute lists and levels generated by the MCAC Team and NYSERDA staff. The final survey instruments, which were reviewed by NYSERDA staff throughout the development process to ensure that the questions targeted the concepts most relevant to the current research, are presented in Appendix A of this report.

Table 3-2 summarizes the survey mechanics employed in the current evaluation. In most instances, respondents were pre-recruited into the survey effort via a telephone call that explained the nature of the survey effort and asked whether the potential respondents were willing to participate in the effort. If they agreed to participate, the recruited respondents were then asked to provide their e-mail address if they were to participate in an online survey or confirm their physical address if they were to participate in a mail survey.

The surveys of Business and Institutional program participants and most Residential program participants were conducted using an online format in which respondents were sent an E-mail invitation to complete the survey. The invitation had a link to the website where the survey was hosted and respondents' energy usage data was dynamically linked to their survey instrument through the use of a unique identifier assigned to each potential respondent. The surveys of the remaining Residential program participants were conducted using a traditional direct mail approach. Both online and direct mail survey respondents were sent multiple reminders. In addition, the MCAC Team made follow-up phone calls to pre-recruited respondents who had not yet completed their surveys in an effort to bolster response rates. In spite of these efforts, the clothes washer survey was the only survey that met its original goal for completes.

However, the responses are statistically valid for the Approach 2 conjoint questions and are sufficient to compare the Approach 1 results to results generated during prior NEI evaluations conducted by the MCAC Team.

Table 3-2. Summary of NEI Survey Mechanics

Program	Mode	Surveys Fielded	Surveys Completed	Response Rate	% of Original Survey Complete Goal Achieved
NCP	Online	205	31	15%	39%
CIPP	Online	88	15	17%	19%
SCLP	Online	133	41	31%	82%
ENERGY STAR Homes	Mail	168	64	38%	80%
CFLs	Online and Mail	149	24	16%	48%
Clothes Washers	Online and Mail	1,244	126	NA[1]	252%

[1] Because the eligible population of respondents that purchased a clothes washer in the last five years was unknown, the exact response rate cannot be determined.

3.4 ANALYTIC METHODS

Responses to the Approach 1 series of questions were entered into Microsoft Excel data files and frequencies and tabulations were computed using standard analytic techniques. Responses to the Approach 2 series of questions were computed using more detailed analytic techniques summarized in the remainder of this section and described in detail in Appendix A.

Every survey instrument included eight conjoint questions, or scenarios. Each scenario presented respondents with a hypothetical comparison between two alternative building or product options. Each option listed all the conjoint attributes for the specified program or product, with levels for each attribute varying across the different options and scenarios. For each scenario, respondents were asked to choose which of the two options they preferred, even if neither option was considered ideal. Three different sets of scenarios were developed for each program as a means of maximizing the variation in the response data, thus increasing its value.

The analytic goals were to: 1) calculate the respondents' relative preferences for the attributes presented for each program or product; and 2) determine the amount respondents would be willing to invest, on average, to increase from the less preferable to the more preferable level associated with the attributes (*e.g.*, using the Equipment O&M Costs attribute and levels presented in Table 2-2 as an example, respondents' willingness to invest to experience a decrease in equipment O&M costs from 5% of annual operating expenses to 3%).

Responses to the conjoint scenarios were analyzed using a Probit regression model.[25] The choices respondents made in each scenario, taken as a whole, revealed important trends in the survey groups' preferences. The model correlated the respondents' revealed preferences with the dollar values included

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[25] In probability theory and statistics the probit function is the inverse cumulative distribution function, or quantile function of the normal distribution. Like the logit (log odds) function, it may be used to transform a variable ranging over the interval (0;1) into a derived quantity ranging over the real numbers. This has applications in probit models, which are generalized linear models. Because the response is a series of binomial results, the likelihood is often assumed to follow the binomial.

in each scenario to calculate relative values associated with the various attributes. Details of the methodology used to create the conjoint questions and analyze the results are provided in Appendix A.

After calculating the relative values associated with the various attributes, the next step was to determine the total NEI values for each program and product. A variety of approaches were considered, including: 1) taking the highest valued attribute for each product or program; 2) totaling all attribute values for each product or program; and 3) totaling attribute values for each product or program, then subtracting certain attribute values to account for the fact that some attributes interact with one another, or provide inter-related benefits (*e.g.* in an efficient building, one can assume that worker productivity is related to lighting quality and HVAC system effectiveness).

A conservative approach was sought to account for the fact that cumulative attribute values, in many cases, exceed what a consumer could realistically be expected to pay for a building or product possessing all the preferred attributes. However, it was determined that merely taking the highest valued attribute did not sufficiently represent the overall NEI values revealed through the conjoint responses. Therefore, the MCAC team decided to total all attribute values for each program and product, but to account for interactions in attributes where applicable (*e.g.* subtracting values for one or more of the inter-related attributes). CFLs presented a unique situation, because the turn-on and warm-up delay attributes were negative in relation to an incandescent bulb. Therefore, for this product, an additive approach was used and the value of the negative attributes was subtracted from the value of the positive attributes.

SECTION 4:

RESULTS

This section summarizes the results of the current evaluation by sector and by program. Results are presented for both the extension of the direct query method used in the 2003 and 2004 NEI assessments (Approach 1), and the conjoint method where respondents choose between different bundles of program-related attributes (Approach 2). The current results are also compared to results generated by prior NEI evaluation efforts conducted for NYSERDA by the MCAC Team.

4.1 BUSINESS AND INSTITUTIONAL SECTOR PROGRAMS

Table 4-1 summarizes select findings from the NEI evaluations conducted for the **New York Energy $mart[SM]** New Construction Program (NCP), Commercial/Industrial Performance Program (CIPP), and Small Commercial Lighting Program (SCLP). Complete results for each program are then presented in the remainder of this section.

Table 4-1. Select NEI Findings for Business and Institutional Sector Programs (Percentages correspond to NEI value as a percent of annual energy savings)

Program	Annual NEI value calculated from prior MCAC Evaluations	Annual NEI value calculated from Approach 1 questions	Annual NEI value calculated from Approach 2 questions[1]
NCP	$16,040 - $22,055 (40% - 55%)	$11,500 (40%)	$97,923 (340%)
CIPP	$8,725 - $12,215 (25% - 35%)	$16,054 (46%)	$16,957 (49%)
SCLP	$1,705 - $2,860 (31% - 52%)	$2,805 (51%)	$217[a] (4%)

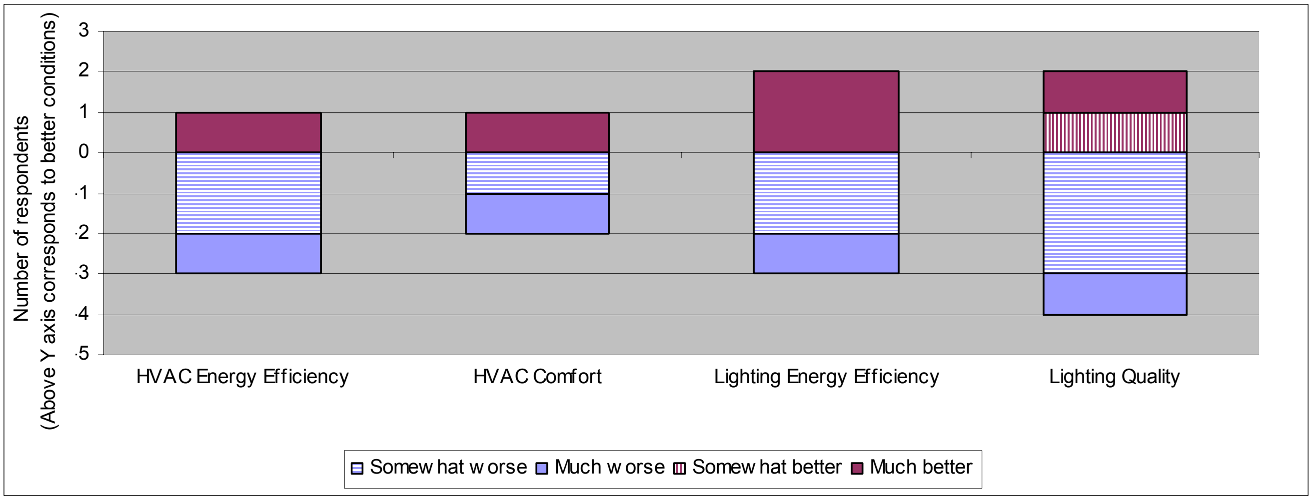
1 Annual NEI values calculated from the Approach 2 questions reflect the interactions between attributes.

[a] This value is lower than expected. The methodology for analyzing conjoint data uses values for the cost attribute as the basis for calculating other attribute values. Therefore, the low value for SCLP NEIs may be due to the small range in values provided for the cost attribute in the SCLP conjoint scenarios ($1.25/ft^2 for low cost scenario and $1.33/ft^2 for high cost scenario). In future research efforts, the MCAC Team will explore alternative strategies for addressing this issue.

4.1.1 New Construction Program (NCP)

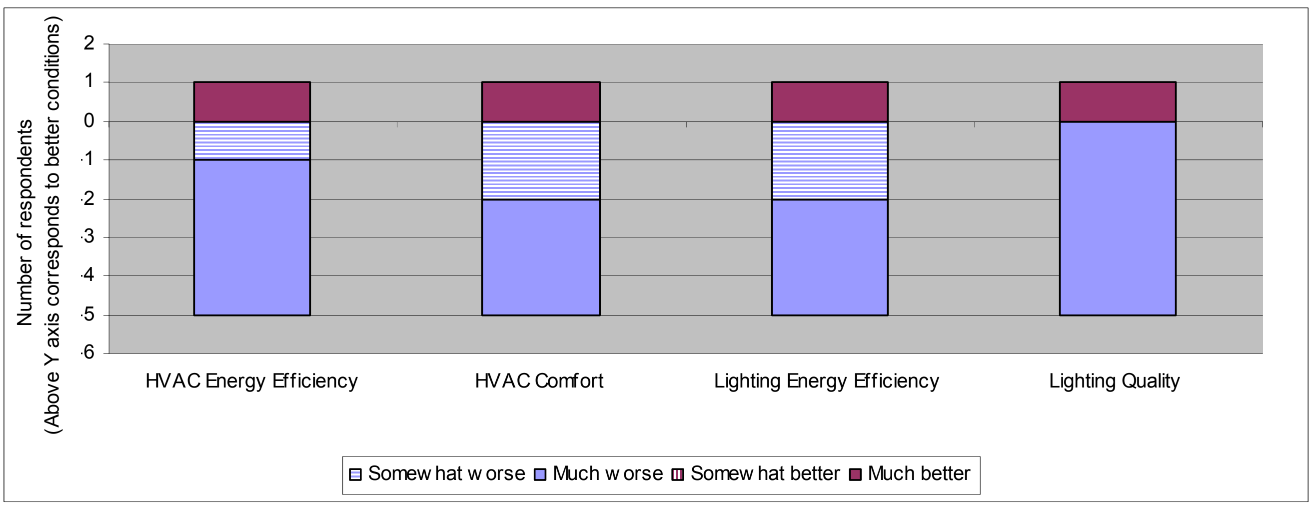
The NCP NEI survey effort garnered 31 responses. Respondents were first asked whether the new building they constructed through the NCP replaced another older building and, if so, 1) how their older building compared to other similar buildings (same type and age) in their area, and 2) how their older building that was replaced compared to their new building that received funding from NYSERDA's NCP. Six respondents (19%) indicated that the new building they constructed replaced another older building and, in general, that conditions in their older buildings were similar to or worse than conditions in other similar buildings in their area (Figure 4-1). Not surprisingly, most respondents stated that conditions in their older building were worse than conditions in their new building that received funding from NYSERDA's NCP, especially in terms of lighting quality and HVAC energy efficiency (Figure 4-2).

Figure 4-1. Comparison of conditions in respondents' older buildings that were replaced to conditions in <u>other similar buildings</u> (same type and age) in their area (n=6).



Note: respondents who reported conditions were the same are not shown in the graph.

Figure 4-2. Comparison of conditions in respondents' older buildings that were replaced to conditions in their <u>new buildings that received funding from NYSERDA's NCP</u> (n=6).



Note: respondents who reported conditions were the same are not shown in the graph.

Respondents were next asked an open-ended question regarding whether they had noticed other positive or negative impacts (besides energy savings) resulting from the energy-efficient features of their new buildings that received funding from the NCP. Three-quarters of respondents (76%) indicated that they had noticed additional positive impacts including:

- "Increased control/adjustment by tenant including offsite accessibility through the energy management system"
- "Quieter and more comfortable building"
- "Better lighting for production"

- “New energy efficient equipment - less down time and is more reliable”

Additionally, 25% of respondents (8) reported that they had noticed negative impacts including:

- “Equipment training and replacement parts are more expensive”
- “New lighting slow to relight after power interruption”
- “Roof top units need more maintenance than the old units”

Responses to this question imply that most participants in the NCP are realizing additional positive non-energy impacts from the energy-efficient features of their new buildings; however, negative impacts are also being experienced by a smaller subset of program participants. The remainder of the survey contained questions that sought to quantify the value respondents associated with various non-energy impacts.

Responses to NCP Approach 1 NEI Questions - Extension of the Direct Query Method

Respondents were asked to consider conditions in their new buildings that received funding from NYSERDA’s NCP and provide their best insights regarding:

a) Whether they experienced positive, zero, or negative impacts compared to other new buildings constructed only to meet (not exceed in any way) efficiency levels required by the State Energy Code.

b) How the value of the non-energy impacts (either positive or negative) compared, in percentage terms, to the value of the energy savings of their new building that received funding from NYSERDA’s NCP.

In this section of the survey, respondents were asked to provide feedback on their experience with the following attributes:

- Energy equipment operating and maintenance costs
- Lighting quality
- Thermal comfort and HVAC effectiveness
- Occupant productivity
- Ease of selling and leasing
- Indoor air quality
- Noise levels
- General sense of doing good for the environment
- Overall impacts

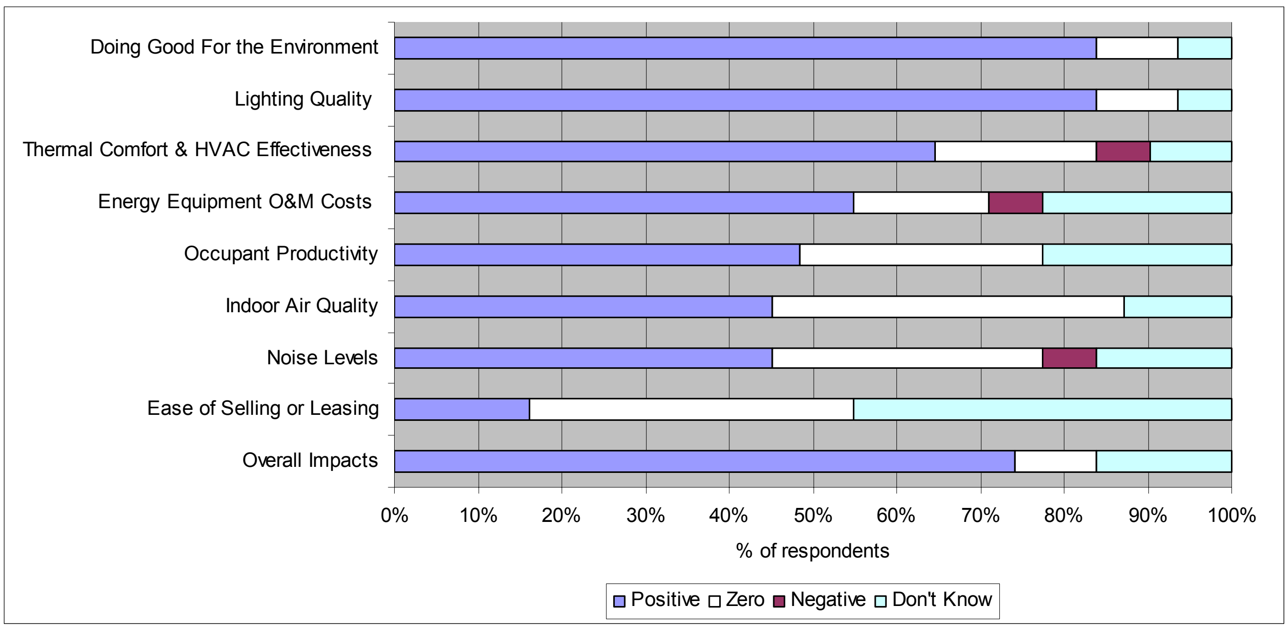
As summarized in Figure 4-3, a majority of respondents reported that they experienced positive non-energy impacts for the following attributes:

- Doing good for the environment
- Lighting quality

- Thermal comfort and HVAC system effectiveness
- Energy equipment operations and maintenance costs[26]

The remaining attributes had smaller percentages of respondents reporting positive impacts associated with them. Only three attributes - thermal comfort and HVAC system effectiveness; energy equipment operations and maintenance costs; and noise levels - had any respondents reporting negative impacts associated with them and in each instance, the negative perceptions were limited to approximately 6% of respondents. Nearly three-quarters of respondents (74%) stated that the overall value of the non-energy impacts was positive compared to other new buildings constructed only to meet efficiency levels required by the State Energy Code. None of the respondents replied that the overall value of the NEIs was negative.

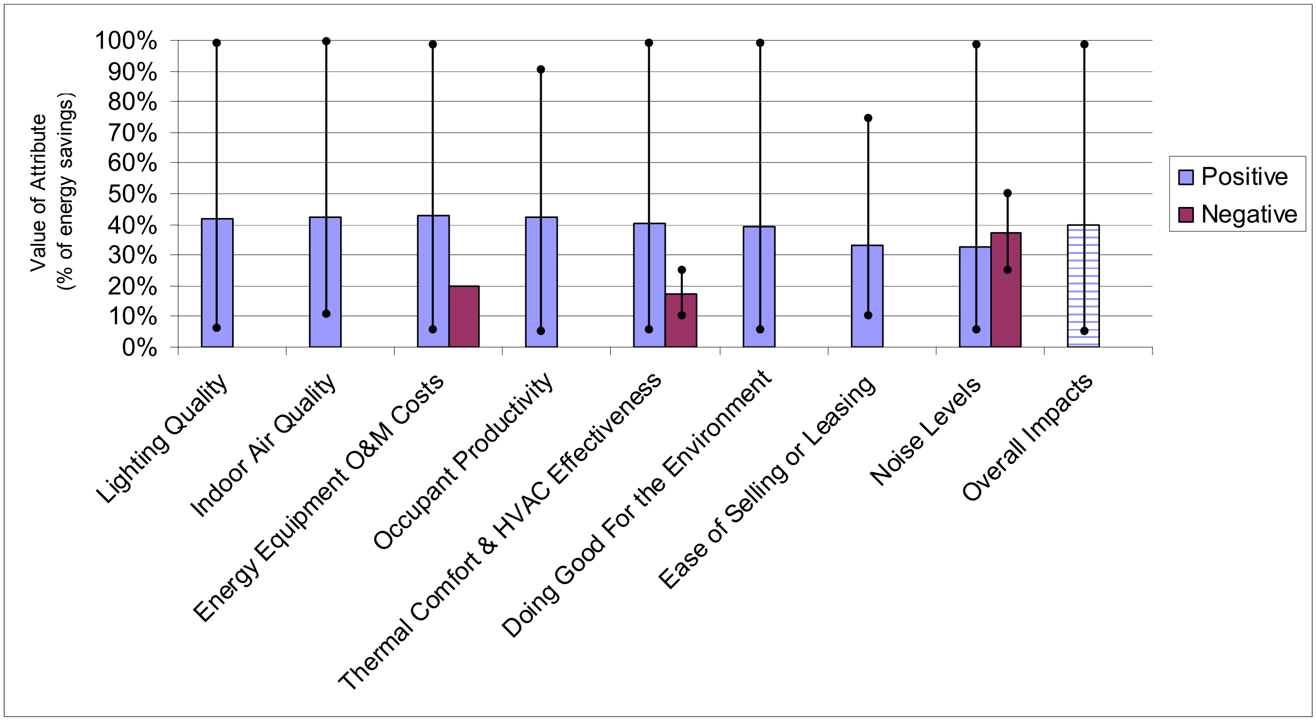
Figure 4-3. Percent of respondents indicating that they experienced positive, zero, or negative NEIs in their new buildings compared to other new buildings constructed only to meet (not exceed in any way) efficiency levels required by the State Energy Code (n=31).



On average, respondents stated that the non-energy impacts in their new buildings that received funding from NYSERDA's NCP were approximately 40% as valuable as the energy savings they realized in the new buildings (Figure 4-4). Respondents valued energy equipment operations and maintenance costs, indoor air quality and occupant productivity the most and ease of selling/leasing the building and noise levels the least. Respondents provided a wide range in percentages for each attribute (see the bars showing maximum and minimum responses provided in Figure 4-4); however, the resulting average percentage values were relatively consistent across the various attributes and for the overall value of the attributes in total.

[26] Variants of these attributes also ranked highest in the previous NEI evaluation conducted by the MCAC Team.

Figure 4-4. Respondent perceptions of the value of the NEIs (either positive or negative) compared, in percentage terms, to the value of the energy savings of their new NCP-funded building.



Note: Bars depict maximum and minimum responses received for each attribute. The number of responses used to quantify the value for each attribute is as follows: Lighting Quality (N= 25 positive & 0 negative); Indoor Air Quality (N= 14 positive & 0 negative); Energy Equipment O&M Costs (N= 16 positive & 2 negative); Occupant Productivity (N= 14 positive & 0 negative); Thermal Comfort and HVAC Effectiveness (N= 19 positive & 2 negative); Doing Good for the Environment (N= 25 positive & 0 negative); Ease of Selling or Leasing (N= 5 positive & 0 negative); Noise Levels (N= 13 positive & 2 negative); Overall Impacts (N= 22 positive & 0 negative).

Based on data obtained from the program tracking database, the average annual energy savings for the respondents to this survey was approximately $28,800. This series of questions shows that respondents value the non-energy impacts in their new buildings at a level equal to approximately 40% of the value of the energy savings they realized. Multiplying the average annual energy savings ($28,800) by the value of the NEIs (40%) reveals that value assigned to the NEIs by the respondents is approximately $11,500 per year on average. This value is slightly higher than the value calculated by the direct willingness to pay question asked of respondents (*i.e.,* if the overall value of the non-energy impacts was positive, and these positive impacts disappeared, approximately how much would you be willing to invest to gain back these benefits in terms of an annual dollar amount?). Five respondents (16%) answered this question and the average of the responses was $8,600 with a range of $500 to $20,000.

Next, respondents were asked a series of questions that sought to determine:

a) Whether anticipated non-energy impacts influenced their decision to increase the energy efficiency of their new building that received funding from the NCP.

b) How their experience with NYSERDA’s NCP affected their level of awareness of non-energy impacts.

The results to these questions imply that respondents do consider NEIs when making decisions regarding the energy-using systems and features of new buildings and that participation in the NCP influences respondents' awareness of NEIs. Eighty-one percent of respondents indicated that anticipated NEIs did influence their decision to increase the energy efficiency of their new building (Figure 4-5) and 84% of respondents stated that their experience with the NCP had affected their level of awareness of non-energy impacts (Figure 4-6).

Figure 4-5. Respondent perceptions of whether anticipated NEIs influenced their decision to increase the energy efficiency of their new NCP-funded building (n=31).

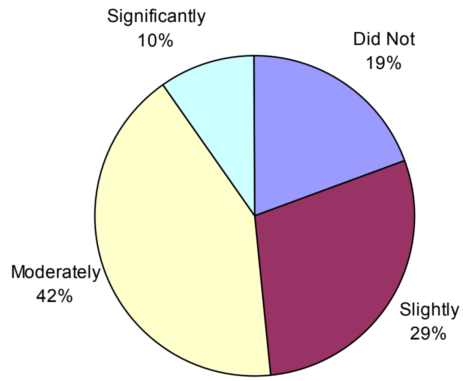
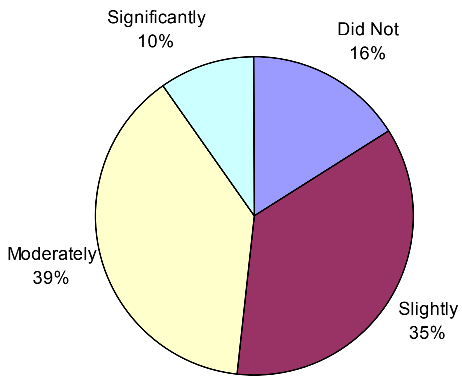


Figure 4-6. How experience with NYSERDA's NCP affected respondent awareness of NEIs (n=31).



Responses to NCP Approach 2 NEI Questions – Conjoint Analysis

In the final set of conjoint analysis questions, respondents were presented with a series of eight comparisons of building attributes and asked to assume that the two buildings in each comparison were identical in every way except for the variations presented among the listed attributes. The final attributes and levels used for the NCP conjoint scenarios are shown in Table 4-2.

Table 4-2. Final attributes and levels for the NCP[27]

Project Attributes	Levels
Construction cost ($/ft^2)	• $140/ft^2 • $144/ft^2 • $148/ft^2
Energy equipment operation & maintenance (O&M) costs	• Annual planned and unplanned energy equipment O&M expenditures equal 5% of annual operating expenses. • Annual planned and unplanned energy equipment O&M expenditures equal 3% of annual operating expenses.
Lighting quality	• > 30% of building occupants express dissatisfaction with lighting quality (*i.e.,* complain of dark spots, flickering, noise, etc.) • < 10% of building occupants express dissatisfaction with lighting quality (*i.e.,* complain of dark spots, flickering, noise, etc.)
Thermal comfort and HVAC effectiveness	• Building occupants express dissatisfaction with conditioned space (*i.e.,* temperature settings, ventilation, etc.) > 25 days per year • Building occupants express dissatisfaction with conditioned space (*i.e.,* temperature settings, ventilation, etc.) < 5 days per year
Occupant productivity	• Occupant productivity increases by 2% relative to previous work environment • Occupant productivity increases by 10% relative to previous work environment
Ease of selling/leasing the building	• Average time on the market for vacant space is 60 days • Average time on the market for vacant space is 30 days

Respondents were then asked to select the building option that was most preferable to them even if neither option was considered to be ideal. Responses from this series of questions were analyzed using the methods described in Section 3.4 of this report in order to determine the value respondents assigned to the various attributes.

NCP participants placed the highest value on the occupant productivity attribute indicating that they would be willing to pay an additional $12.64 per square foot of building space to generate a 10% increase in occupant productivity instead of only a 2% increase (Table 4-3). Respondents placed the lowest value on the lighting quality attribute indicating that they would be willing to pay an additional $6.02 per square foot to decrease occupant dissatisfaction with lighting quality from greater than 30% of occupants to less than 10%. It is important to note that this is still a positive value that respondents indicated they would be willing to pay to increase lighting quality; it is just the lowest ranked positive value of the attributes listed. Responses to the comparisons regarding the ease of selling/leasing the building did not produce statistically valid results.

[27] Separate attribute tables were developed for upstate and downstate respondents with the only difference being the construction cost levels. The upstate version of the attribute table is presented here – the construction cost levels in the downstate attribute table are $265/ft^2, $273/ft^2, and $281/ft^2.

Table 4-3. Relative value of NCP attributes (n=31).

Attribute	Lifetime value ($/ft^2)	Annual value ($)[1]
Occupant productivity	$12.64	$54,671
Thermal comfort and HVAC effectiveness	$11.54	$49,913
Energy equipment O&M costs	$9.99	$43,209
Lighting quality	$6.02	$26,038
Ease of selling/leasing the building	Results not statistically valid	N/A
Total value (all-inclusive)	$40.20	$173,874
Total value (interactive)[2]	$22.64	$97,923

[1] Annual values were calculated by multiplying the lifetime value ($/ft^2) by the average square footage of respondents' projects (81,314 ft^2), then dividing by the assumed measure lifetime (18.8 years based on data used in NYSERDA benefit-cost analyses).

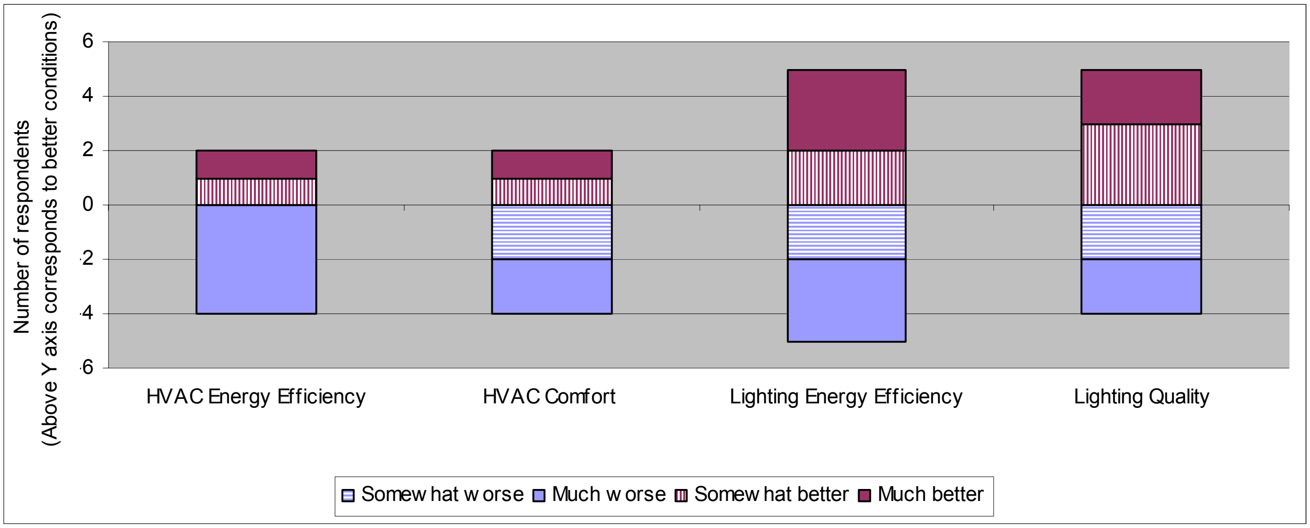
[2] This value is based on the assumption that thermal comfort and lighting quality interact with occupant productivity. Therefore, the first two attributes have been excluded from the total.

The values derived from the conjoint analysis were converted into annual dollar values that respondents would be willing to pay for the attributes by multiplying the lifetime value of each attribute (*i.e.*, $12.64 per ft^2 for occupant productivity) by the average building size for the pool of respondents (81,314 ft^2) then dividing by the lifetime of the energy efficiency measures and designs installed at the building (assumed to be 18.8 years based on data used in NYSERDA benefit-cost analyses). Doing so yields a cumulative annual value of $173,874 that respondents would be willing to pay for NEIs. In order to account for the interaction among certain attributes, a total "interactive" value was also calculated. This interactive value accounts for the fact that thermal comfort and lighting quality likely interact with occupant productivity. Therefore, the former two attributes have been excluded from the total interactive value, to arrive at a annual interactive value of $97,923. This equates to 340% of average annual energy savings ($28,800) for the pool of respondents.

4.1.2 Commercial/Industrial Performance Program (CIPP)

The CIPP NEI survey effort garnered 15 responses. Respondents were first asked how the condition of their building prior to their participation in NYSERDA's Commercial/Industrial Performance Program compared to other similar buildings (same type and age) in their area. Eleven respondents (73%) answered these questions and responses were mixed in terms of the comparisons (Figure 4-7). Other than lighting quality and lighting energy efficiency, which respondents tended to view somewhat favorably, respondents indicated that conditions in their buildings prior to participating in the CIPP were similar to or worse than conditions in other similar buildings in their area.

Figure 4-7. Comparison of conditions in respondents' buildings prior to participation in NYSERDA's CIPP to conditions in other similar buildings (same type and age) in their area (n=11).



Note: respondents who reported conditions were the same are not shown in the graph.

Respondents were next asked an open-ended question regarding whether they had noticed other positive or negative impacts (besides energy savings) resulting from the energy-efficient features of their buildings after participating in NYSERDA's CIPP. Nearly three-quarters of respondents (73%) indicated that they had noticed additional positive impacts including:

- "Better lighting made a better work environment"
- "Indoor air quality has improved dramatically. EMS control has freed up manpower"
- "More efficiency production and an accelerated production schedule"
- "Reduced Maintenance costs - greatly improved unit uptime"

Only one respondent reported that they had noticed any negative impacts citing increased staff training time to operate the new equipment.

Responses to this question imply that most participants in the CIPP are realizing additional positive non-energy impacts from the energy-efficient features of their new buildings. The remainder of the survey contained questions that sought to quantify the value respondents associated with various non-energy impacts.

Responses to CIPP Approach 1 NEI Questions - Extension of the Direct Query Method

Respondents were asked to consider conditions in their buildings after participating in the CIPP and provide their best insights regarding:

a) Whether they experienced positive, zero, or negative impacts compared to conditions in their buildings prior to participating in the CIPP.

b) How the value of the non-energy impacts (either positive or negative) compared, in percentage terms, to the value of the energy savings of the CIPP-funded project.

In this section of the survey, respondents were asked to provide feedback on their experience with the following attributes:

- Energy equipment operating and maintenance costs
- Lighting quality
- Thermal comfort and HVAC effectiveness
- Occupant productivity
- Ease of selling and leasing
- Indoor air quality
- Noise levels
- General sense of doing good for the environment
- Overall impacts

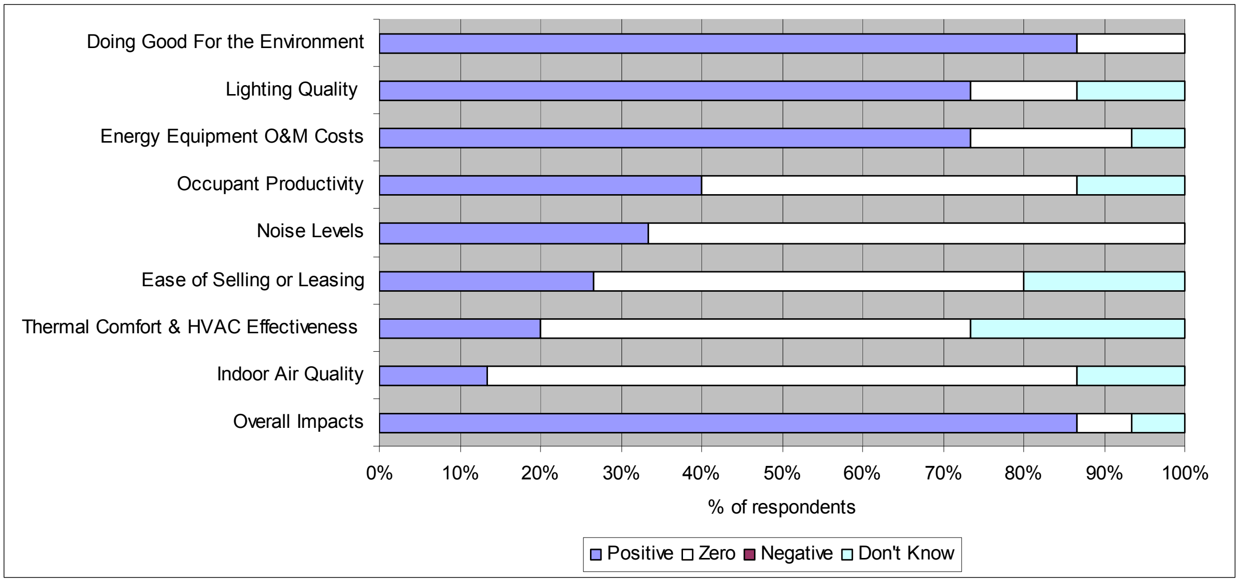
As summarized in Figure 4-8, a majority of respondents reported that they experienced positive non-energy impacts for the following attributes:

- Doing good for the environment
- Lighting quality
- Energy equipment operations and maintenance costs[28]

The remaining attributes had smaller percentages of respondents reporting positive impacts associated with them, but none of the attributes had any respondents reporting negative impacts. More than three-quarters of respondents (87%) stated that the overall value of the non-energy impacts was positive compared to conditions in their buildings prior to participating in the CIPP and none of the respondents replied that the overall value of the NEIs was negative.

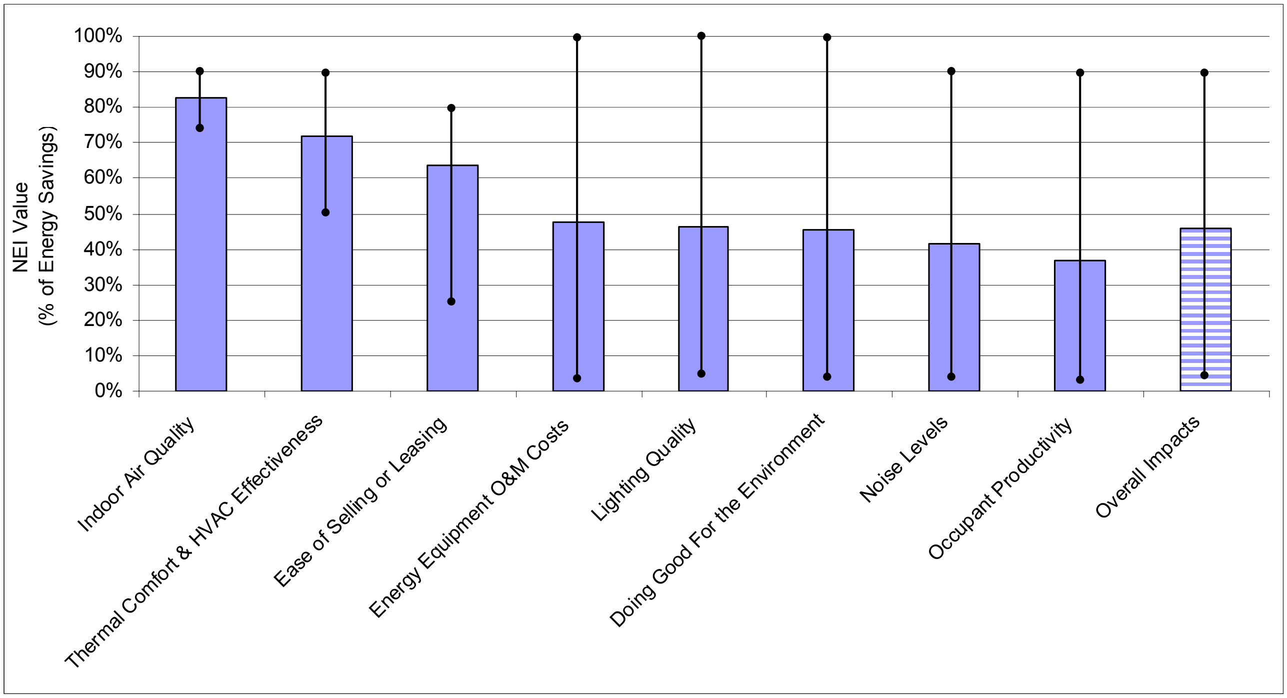
[28] In the previous NEI evaluation conducted by the MCAC Team, energy equipment operations and maintenance costs along with equipment performance and reliability were the NEIs ranked as most valuable by respondents. Interestingly, doing good for the environment and lighting quality were some of the lowest valued attributes in the prior NEI evaluation.

Figure 4-8. Percent of respondents indicating that they experienced positive, zero, or negative NEIs in their buildings after participating in the CIPP compared to conditions in their buildings prior to participating in the program (n=15).



On average, respondents stated that the non-energy impacts experienced after participating in the CIPP ranged from a low of approximately 37% (occupant productivity) as valuable as the energy savings to a high of 82% (indoor air quality) as valuable as the energy savings (Figure 4-9). Respondents provided a wide range in percentages for each attribute (see the bars showing maximum and minimum responses provided in Figure 4-9), and assigned a value of 46% to the overall impacts.

Figure 4-9. Respondent perceptions of the value of the NEIs (either positive or negative) compared, in percentage terms, to the value of the energy savings of their building after participating in the CIPP.



Note: Bars depict maximum and minimum responses received for each attribute. The number of responses used to quantify the value for each attribute is as follows: Indoor Air Quality (N= 2 positive & 0 negative); Thermal Comfort and HVAC Effectiveness (N= 3 positive & 0 negative); Ease of Selling or Leasing (N= 4 positive & 0 negative); Doing Good for the Environment (N= 13 positive & 0 negative); Lighting Quality (N= 11 positive & 0 negative); Energy Equipment O&M Costs (N= 11 positive & 0 negative); Noise Levels (N= 5 positive & 0 negative); Occupant Productivity (N= 6 positive & 0 negative); Overall Impacts (N= 13 positive & 0 negative).

Based on data obtained from the program tracking database, the average annual energy savings for the respondents to this survey was approximately $34,900. This series of questions shows that respondents value the non-energy impacts in their buildings at a level equal to approximately 46% of the value of the energy savings they realized. Multiplying the average annual energy savings ($34,900) by the value of the NEIs (46%) reveals that the average value assigned to the NEIs by the respondents is approximately $16,054 per year on average. Unfortunately, no respondents answered the direct willingness to pay question asked in Approach 1, so a comparison of these two values is not possible.

Next, respondents were asked a series of questions that sought to determine:

a) Whether anticipated non-energy impacts influenced their decision to increase the energy efficiency of their building that participated in the CIPP.

b) How their experience with the CIPP affected their level of awareness of non-energy impacts.

The results imply that respondents do consider NEIs when making decisions regarding the energy-using systems and features of their buildings and that participation in the CIPP does influence respondents' awareness of NEIs. Eighty-seven percent of respondents indicated that anticipated NEIs influenced their decision to increase the energy efficiency of their building (Figure 4-10) and 74% of respondents stated that their experience with the CIPP had affected their level of awareness of non-energy impacts (Figure 4-11).

Figure 4-10. Respondent perceptions of whether anticipated NEIs influenced their decision to increase the energy efficiency of their building that received funding from NYSERDA's CIPP (n=15).

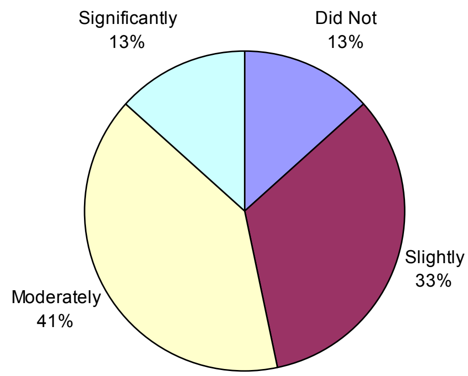
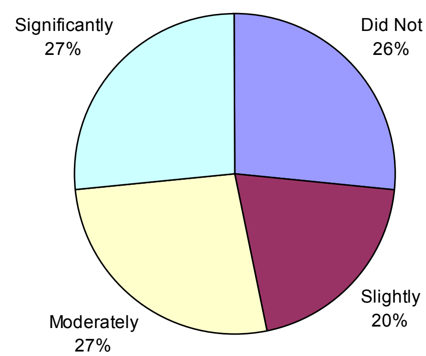


Figure 4-11. How experience with NYSERDA's CIPP affected respondent awareness of NEIs (n=15).



Responses to CIPP Approach 2 NEI Questions – Conjoint Analysis

In the final set of conjoint analysis questions, respondents were presented with a series of eight comparisons of building attributes and asked to assume that the two buildings in each comparison were identical in every way except for the variations presented among the listed attributes. The final attributes and levels used for the CIPP conjoint scenarios are shown in Table 4-4.

Table 4-4. Final attributes and levels for the CIPP

Project Attributes	Levels
Project cost ($/ft^2)	• $1.25/ft^2 • $1.75/ft^2 • $2.25/ft^2
Energy equipment operation & maintenance (O&M) costs	• Annual planned and unplanned energy equipment O&M expenditures equal 5% of annual operating expenses. • Annual planned and unplanned energy equipment O&M expenditures equal 3% of annual operating expenses.
Lighting quality	• > 30% of building occupants express dissatisfaction with lighting quality (*i.e.* complain of dark spots, flickering, noise, etc.) • < 10% of building occupants express dissatisfaction with lighting quality (*i.e.* complain of dark spots, flickering, noise, etc.)
Thermal comfort and HVAC effectiveness	• Building occupants express dissatisfaction with conditioned space (*i.e.* temperature settings, ventilation, etc.) > 25 days per year • Building occupants express dissatisfaction with conditioned space (*i.e.* temperature settings, ventilation, etc.) < 5 days per year
Indoor air quality/safety	• Building has normal air infiltration and ventilation that may allow dust, pollen, humidity, and car exhaust into the building • Building has reduced air infiltration and improved ventilation that help keep dust, pollen, humidity, and car exhaust out of the building, making the building safer in terms of carbon monoxide levels and gas leaks
Occupant productivity	• Occupant productivity increases by 2% relative to previous work environment • Occupant productivity increases by 10% relative to previous work environment

Respondents were then asked to select the building option that was most preferable to them even if neither option was considered to be ideal. Responses from this series of questions were analyzed using the methods described in Section 3.4 of this report in order to determine the value respondents assigned to the various attributes.

CIPP participants placed the highest value on the occupant productivity attribute indicating that they would be willing to pay an additional $0.95 per square foot of building space to generate a 10% increase in occupant productivity instead of only a 2% increase (Table 4-5). Respondents placed the lowest value on the thermal comfort and HVAC effectiveness attribute indicating that they would be willing to pay an additional $0.42 per square foot to decrease occupant dissatisfaction with conditioned space from greater than 25 days per year to less than five days per year. However, this is still a positive value that respondents indicated they would be willing to pay to increase thermal comfort and HVAC effectiveness; it is just the lowest ranked positive value of the attributes listed. Responses to the comparisons regarding energy equipment O&M costs did not produce statistically valid results.

Table 4-5. Relative value of CIPP attributes (n=15).

Attribute	Lifetime value ($/ft^2)	Annual value ($)[a]
Occupant Productivity	$0.95	$10,598
Lighting Quality	$0.73	$7,251
Indoor Air Quality/Safety	$0.52	$6,358
Thermal Comfort and HVAC Effectiveness	$0.42	$4,685
Energy Equipment O&M Costs	Results not statistically valid	N/A
Total value (all-inclusive)	$2.59	$28,894
Total value (interactive)[b]	$1.52	$16,957

[a] Annual values were calculated by multiplying the lifetime value ($/ft^2) by the average square footage of respondent projects (207,500 ft^2), then dividing by the assumed measure lifetime (18.6 years based on data used in NYSERDA benefit-cost analyses).

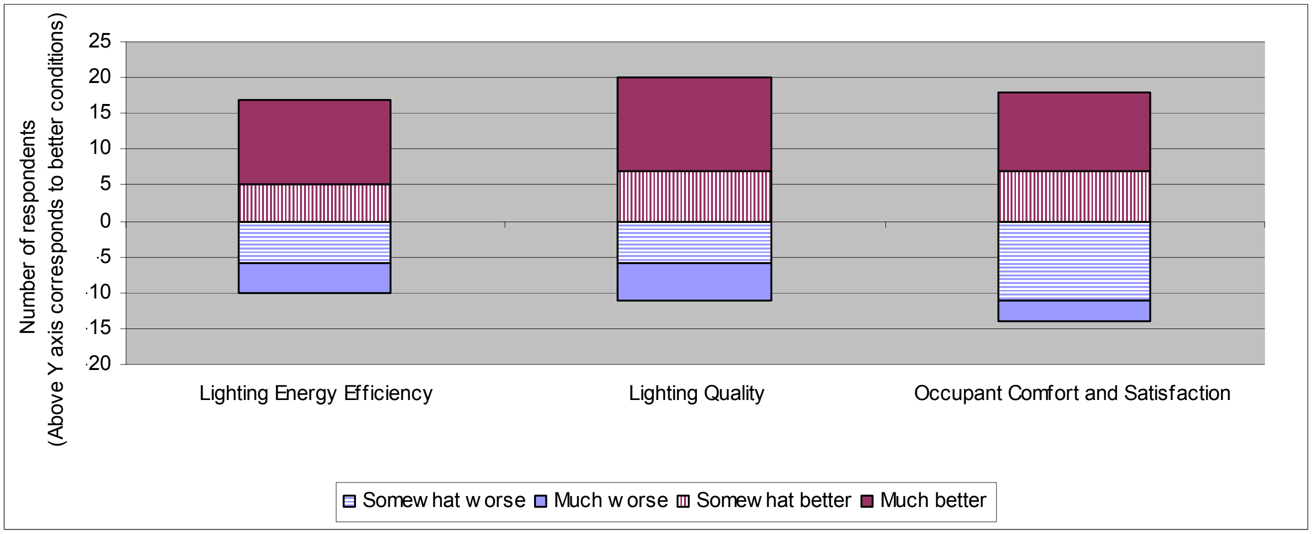
[b] This value is based on the assumption that thermal comfort and lighting quality interact with occupant productivity. Therefore, the first two attributes have been excluded from the total.

The values derived from the conjoint analysis were converted into annual dollar values that respondents would be willing to pay for the attributes by multiplying the lifetime value of each attribute (*i.e.*, $0.95 per ft^2 for occupant productivity) by the average building size for the pool of respondents (approximately 207,500 ft^2) then dividing by the lifetime of the energy efficiency measures and designs installed at the building (assumed to be 18.6 years based on data used in NYSERDA benefit-cost analyses). Doing so yields a cumulative annual value of $28,894 that respondents would be willing to pay for NEIs. In order to account for the interaction among certain attributes, a total interactive value was also calculated. This value accounts for the fact that thermal comfort and lighting quality likely interact with occupant productivity. Therefore, the former two attributes were excluded from the total interactive value to arrive at a value of $16,957. This equates to 49% of average annual energy savings ($34,900) for the pool of respondents.

4.1.3 Small Commercial Lighting Program (SCLP)

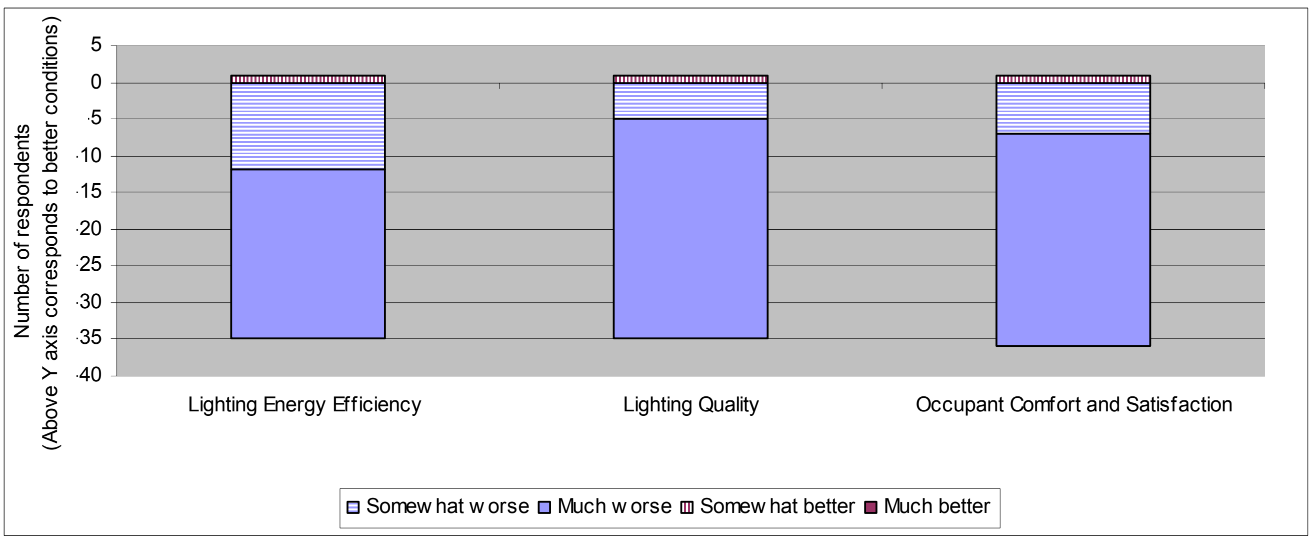
The SCLP NEI survey effort garnered 41 responses. Respondents were first asked 1) how the lighting in their facilities compared to other similar facilities (size and type) in their area prior to the new lighting project, and 2) how the lighting in their facilities prior to the new lighting project compared to the lighting in their facilities now (after working with a contractor who participated in NYSERDA's SCLP). Thirty-seven respondents (90%) answered these questions and indicated that lighting conditions in their facilities prior to the project were generally comparable to or better than conditions in other similar facilities in their area (Figure 4-12). Not surprisingly, most respondents stated that conditions in their facilities prior to the new lighting project were worse than conditions in their facilities now (Figure 4-13).

Figure 4-12. Comparison of lighting conditions in respondents' facilities prior to the new lighting project to conditions in other similar facilities (same type and age) in their area (n=37).



Note: respondents who reported conditions were the same are not shown in the graph.

Figure 4-13. Comparison of conditions in respondents' facilities prior to the new lighting project to conditions in their facilities now (after working with a contractor who participated in NYSERDA's SCLP) (n=37).



Note: respondents who reported conditions were the same are not shown in the graph.

Respondents were next asked an open-ended question regarding whether they had noticed other positive or negative impacts (besides energy savings) resulting from the new effective, energy-efficient lighting systems installed in their facilities. Three-quarters of respondents (75%) indicated that they had noticed additional positive impacts including:

- "Better distribution of light, ability to fire two different size bulbs with the same ballast giving us a choice of brightness in different areas, standardization thru-out the building, a sense of ownership in a good project and good looking fixtures"
- "Improved lighting shows merchandise much more favorably"

- “The new design is 50% more efficient, more esthetically pleasing, and more comfortable”
- “Better working environment”

Two respondents (5%) reported that they had noticed some negative impacts including:

- “Bulbs are more expensive to replace”
- “Increases ambient temperature in summer”

Responses to this question imply that most SCLP participants are realizing additional positive non-energy impacts from the effective, energy-efficient lighting installed in their facilities; however, negative impacts are also being experienced by a small subset of participants. The remainder of the survey contained questions that sought to quantify the value respondents associated with various non-energy impacts.

Responses to SCLP Approach 1 NEI Questions - Extension of the Direct Query Method

Respondents were asked to consider conditions in their facilities after installing the new lighting systems and provide their best insights regarding:

a) Whether they experienced positive, zero, or negative impacts compared to other new lighting systems designed only to meet (not exceed in any way) efficiency levels required by the State Energy Code.

b) How the value of the non-energy impacts (either positive or negative) compared, in percentage terms, to the value of the energy savings associated with the new lighting systems installed in their facilities.

In this section of the survey, respondents were asked to provide feedback on their experience with the following attributes:

- Lighting system operating and maintenance costs
- Lighting effectiveness
- Occupant comfort and satisfaction
- Worker productivity
- Ease of selling or leasing the building
- Noise levels
- General sense of doing good for the environment
- Overall impacts

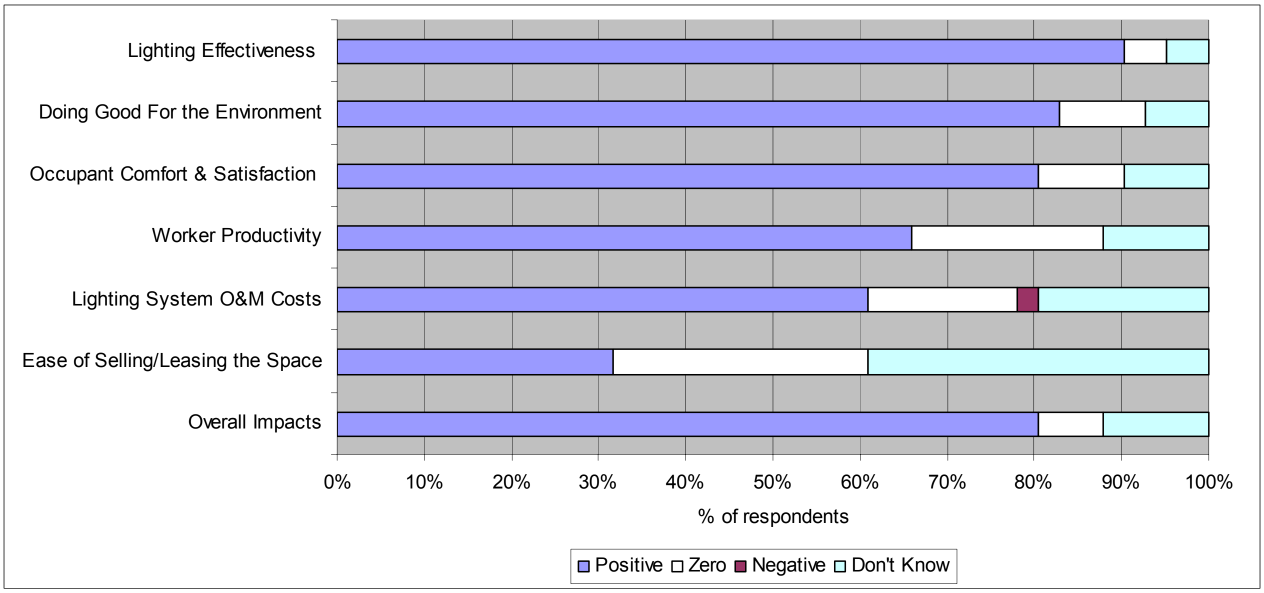
As summarized in Figure 4-14, a majority of respondents reported that they experienced positive non-energy impacts for all attributes except ease of selling/leasing the space, for which only 32% of respondents reported positive impacts. The following attributes showed the highest percentages of respondents reporting that they experienced positive non-energy impacts:

- Lighting effectiveness (90%)
- Doing good for the environment (83%)

- Occupant comfort and satisfaction (81%)[29]

Only one attribute – lighting system operations and maintenance costs - had any respondents reporting negative impacts associated with it, and only one respondent reported a negative impact. More than three-quarters of respondents (81%) stated that the overall value of the non-energy impacts was positive compared to other new lighting systems designed only to meet efficiency levels required by the State Energy Code, and none of the respondents replied that the overall value of the NEIs was negative.

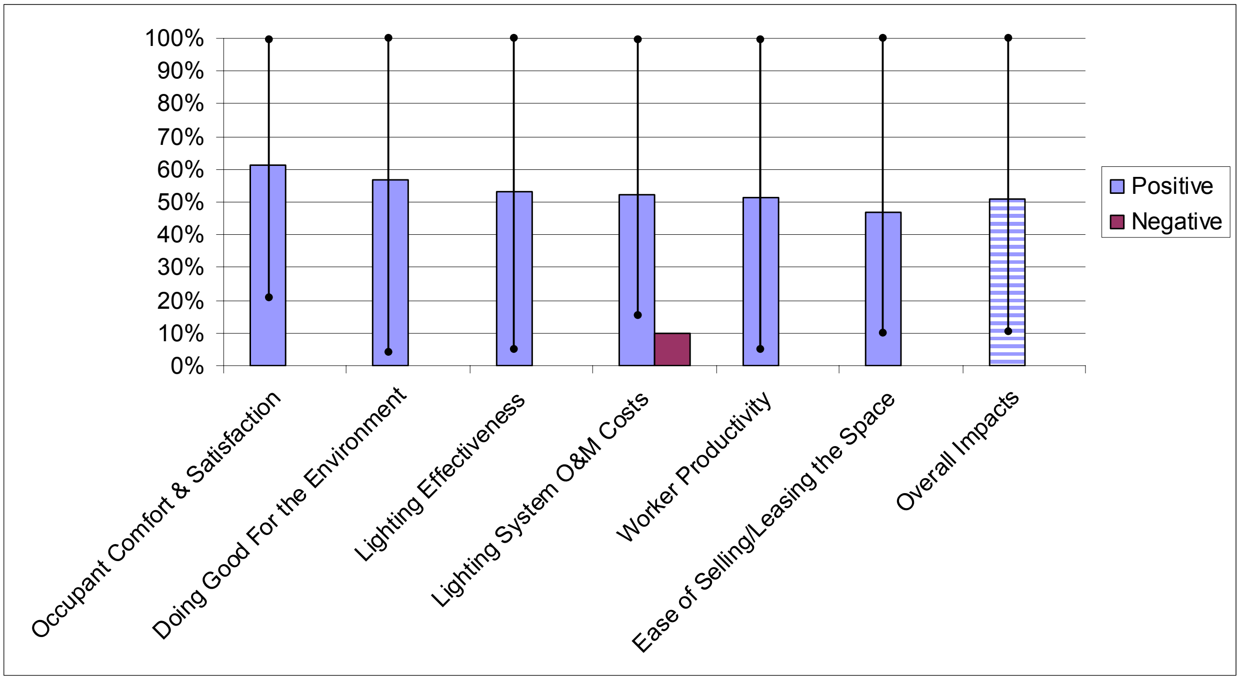
Figure 4-14. Percent of respondents indicating that they experienced positive, zero, or negative NEIs in their facilities after installing the new lighting systems compared to other new lighting systems designed only to meet (not exceed in any way) efficiency levels required by the State Energy Code (n=41).



On average, respondents stated that the various non-energy impacts associated with the new lighting systems ranged from a low of approximately 47% (ease of selling/leasing the building) as valuable as the energy savings to a high of 61% (occupant comfort and satisfaction) as valuable as the energy savings (Figure 4-15). Respondents provided a wide range in percentages for each attribute (see the bars showing maximum and minimum responses provided in Figure 4-15), and assigned the value of 51% to the overall impacts they realized from their new effective, energy-efficient lighting systems.

[29] The prior NEI evaluation conducted by the MCAC Team did not survey end-use customers so a comparison to prior results can not be made.

Figure 4-15. Respondent perceptions of the value of the NEIs (either positive or negative) compared, in percentage terms, to the value of the energy savings of their new lighting systems after working with a contractor who participated in the SCLP.



Note: Bars depict maximum and minimum responses received for each attribute.The number of responses used to quantify the value for each attribute is as follows: Occupant Comfort and Satisfaction (N= 33 positive & 0 negative); Doing Good for the Environment (N= 34 positive & 0 negative); Lighting Effectiveness (N= 37 positive & 0 negative); Lighting System O&M Costs (N= 25 positive & 1 negative); Worker Productivity (N= 27 positive & 0 negative); Ease of Selling or Leasing (N= 13 positive & 0 negative); Overall Impacts (N= 33 positive & 0 negative).

Based upon data obtained from the program tracking database, the average annual energy savings for the respondents to this survey was approximately $5,500. This series of questions shows that respondents value the non-energy impacts at a level equal to approximately 51% of the value of the energy savings they realized from the new lighting systems. Multiplying the average annual energy savings ($5,500) by the value of the NEIs (51%) reveals that value assigned to the NEIs by the respondents is approximately $2,805 per year on average. This value is slightly more than half the value calculated by the direct willingness to pay question asked of respondents. Seven respondents (17%) answered this question and the average response was $4,700 with a range of $500 to $10,000.

Next, respondents were asked a series of questions that sought to determine:

a) Whether anticipated non-energy impacts influenced their decision to install effective, energy-efficient lighting systems in their facilities instead of replacing their lighting with standard-efficiency equipment.

b) How their experience with the lighting installer affected their level of awareness of non-energy impacts.

The results to these questions imply that respondents do consider NEIs when making decisions regarding the energy-using systems and features of their buildings and that working with installers as contractors who participated in the SCLP does influence respondents' awareness of NEIs. Seventy-eight percent of respondents indicated that anticipated NEIs influenced their decision to increase the energy efficiency of their project (Figure 4-16) and 68% of respondents stated that their experience with contractors who participated in the SCLP affected their awareness of non-energy impacts (Figure 4-17).

Figure 4-16. Respondent perceptions of whether anticipated NEIs influenced their decisions to install effective, energy-efficient lighting systems in their facilities (n=41).

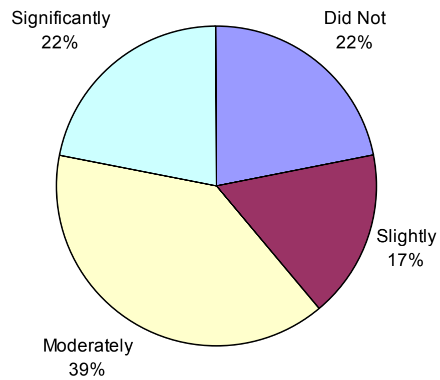
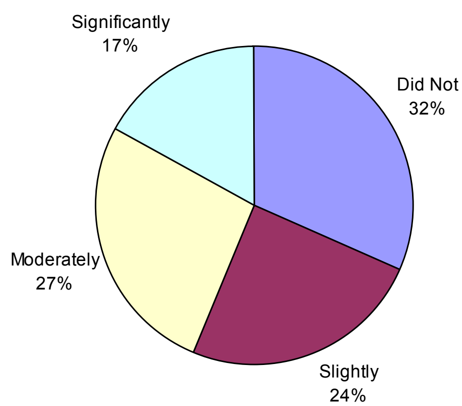


Figure 4-17. How experience with electrical contractor who installed new lighting affected respondent awareness of NEIs (n=41).



Responses to SCLP Approach 2 NEI Questions – Conjoint Analysis

In the final set of questions, the conjoint analysis of NEIs, respondents were presented with a series of eight comparisons of building attributes and asked to assume that the two buildings in each comparison were identical in every way except for the variations presented among the listed attributes. The final attributes and levels used for the SCLP conjoint scenarios are shown in Table 4-6.

Table 4-6. Final attributes and levels for the SCLP

Project Attributes	Levels
Project cost ($/ft^2)	• $1.25/ft^2 • $1.29/ft^2 (3% increase over lowest cost) • $1.33/ft^2 (6% increase over lowest cost)
Lighting equipment operation & maintenance (O&M) costs	• Annual energy equipment O&M expenditures equal 5% of annual operating expenses. • Annual energy equipment O&M expenditures equal 3% of annual operating expenses.
Occupant comfort and satisfaction	• > 20% of building occupants express dissatisfaction with lighting quality (*i.e.* complain of eye strain or headaches from flickering, noise, or glare) • < 5% of building occupants express dissatisfaction with lighting quality (i.e. complain of eye strain or headaches from flickering, noise, or glare)
Lighting effectiveness	• There is little uniformity in lighting levels throughout the building. Many task areas have problems with glare and shadows. • Lighting levels are uniform and appropriate throughout the building. Lighting includes direct, indirect and natural sources, as well as occupant and daylight dimming controls.
Occupant productivity	• Occupant productivity increases by 2% relative to previous work environment • Occupant productivity increases by 10% relative to previous work environment
Ease of selling/leasing the building	• Average time on the market for vacant space is 60 days • Average time on the market for vacant space is 30 days

Respondents were then asked to select the building option that was most preferable to them even if neither option was considered to be ideal. Responses from this series of questions were analyzed using the methods specified in Section 3.4 of this report in order to determine the value respondents assigned to the various attributes.

Respondents placed the highest value on the lighting effectiveness attribute indicating that they would be willing to pay an additional $0.24 per square foot of building space to increase the uniformity and appropriateness of lighting levels throughout their facilities (Table 4-7). Respondents placed the lowest value on the lighting system operations and maintenance attribute indicating that they would be willing to pay an additional $0.05 per square foot to decrease annual lighting system O&M costs from 5% to 3% of their annual operating expenses. However, this is still a positive value that respondents indicated they would be willing to pay to decrease lighting system O&M costs; it is just the lowest ranked positive value of the attributes listed. Responses to the comparisons regarding occupant comfort and satisfaction did not produce statistically valid results.

Table 4-7. Relative value of SCLP attributes (n=41)

Attribute	Lifetime value ($/ft^2)	Annual value ($)[1]
Lighting Effectiveness	$0.24	$86
Worker Productivity	$0.18	$62
Ease of Selling / Leasing Building	$0.12	$45
Equipment Operations & Maintenance Costs	$0.05	$23
Occupant Comfort and Satisfaction	Results not statistically valid	N/A
Total value[2]	$0.44	$217

[1] Annual values are calculated by multiplying the lifetime value ($/ft^2) by the average square footage of SCLP projects (6,941 ft^2), then dividing by the assumed measure lifetime (14 years based on data used in NYSERDA benefit-cost analyses).

[2] The MCAC Team did not anticipate substantial interaction among the SCLP attributes so an interactive total was not calculated (the interactive total would be the same as the overall total).

The values derived from the conjoint analysis were converted into annual dollar values that respondents would be willing to pay for the attributes by multiplying the lifetime value of each attribute (*i.e.*, $0.24 per ft^2 for lighting effectiveness) by the average building size for the pool of respondents (approximately 6,941 ft^2) then dividing by the lifetime of the energy efficiency measures and designs installed at the building (assumed to be 14 years based on data used in NYSERDA benefit-cost analyses). Doing so yields a total annual value of $217 that respondents would be willing to pay for NEIs. This equates to 4% of average annual energy savings ($5,500) for the pool of respondents.

4.2 RESIDENTIAL SECTOR PROGRAMS

Table 4-16 summarizes select findings from the NEI evaluations conducted for the New York ENERGY STAR Labeled Homes Program (NYESLH) and two products supported by the ENERGY STAR Products and Marketing (ESPM) Program (CFLs and clothes washers). Complete results for each program/measure are then presented in the remainder of this section.

Table 4-8. Select NEI findings for Residential Sector Programs (Percentages correspond to NEI value as a percent of annual energy savings)

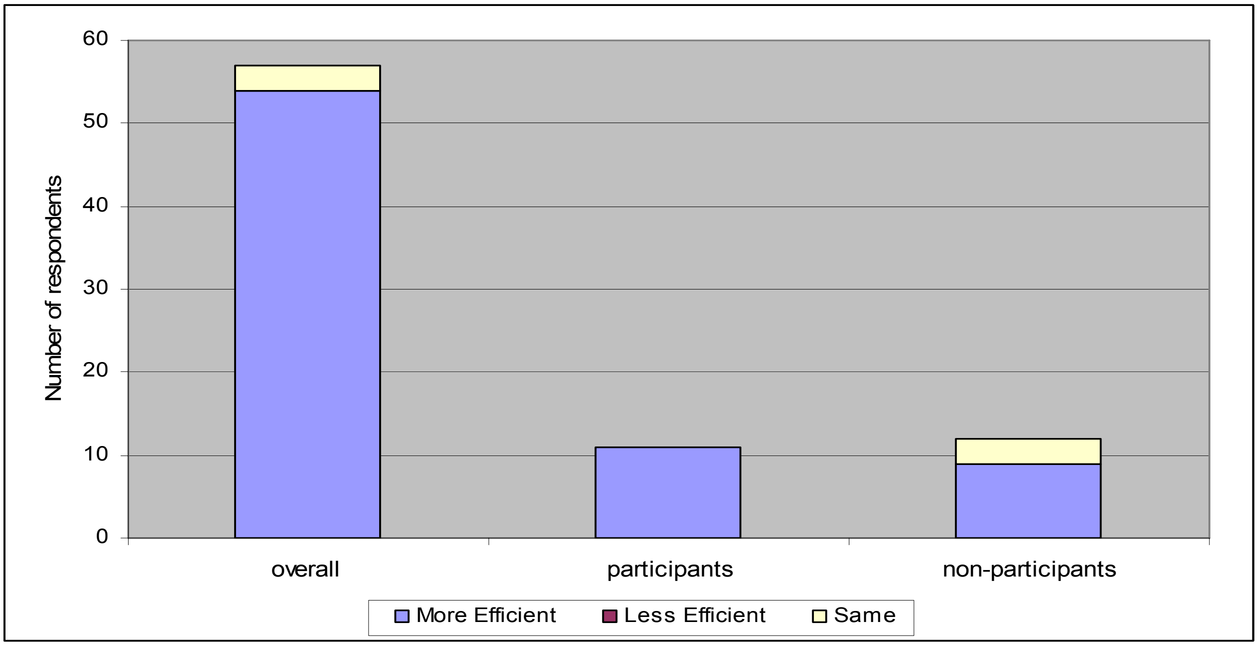
Program/Measure	Annual NEI value calculated from prior MCAC Evaluations	Annual NEI value calculated from Approach 1 questions	Annual NEI value calculated from Approach 2 questions
NYESLH	$300 (50%)	$303 (51%)	$801 (134%)
CFLs	$6.30 (45%)	$8.40 (60%)	$1.66 (13%)
Clothes Washers	$46.98 (27%)	NA	$83 (84%)

4.2.1 New York ENERGY STAR Labeled Homes Program (NYESLH)

The NYESLH survey effort garnered 64 responses. NYSERDA was interested in testing whether ENERGY STAR home owners have different experiences with NEIs compared to non-ENERGY STAR home owners. Therefore, the MCAC Team surveyed both participants in NYSERDA's NYESLH program as well as non-participants who had purchased new non-ENERGY STAR homes within the past year. While 64 respondents completed the survey, only 24 respondents could be identified as either participants or non-participants due to a data recording error. The 24 were spilt equally with 12 program participants and 12 non-participants. In this section, results are presented for the following groups: "participants," "non-participants," and "all respondents."

Respondents were first asked to compare their new home to their old home in terms of the level of energy efficiency, as well as other related features. Not surprisingly, more than 90% of both participants and all respondents reported that their new home was more efficient than their old home, whereas only 65% of non-participants believed their new home to be more efficient than their old home (Figure 4-18). None of the respondents indicated that their new home was less efficient than their old home.

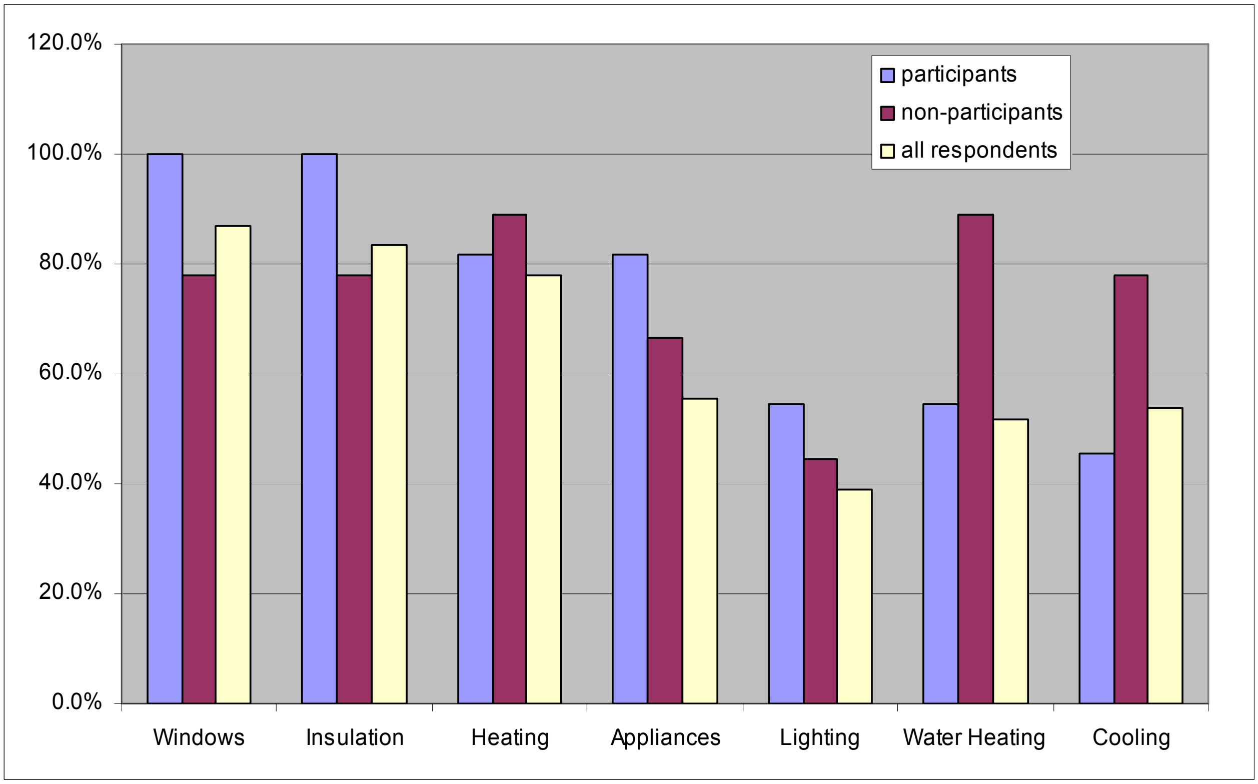
Figure 4-18. Respondents' comparison of the level of energy efficiency of their new home compared to their old home.



Note: No respondents reported that their new home is less efficient than their old home. Respondents who reported "don't know" are not shown in the graph.

Those who reported that their new home was more efficient than their old home were asked which of the following features accounted for the increased level of energy efficiency: heating system, cooling system, water heating, windows, insulation, appliances, lighting, or other features. As shown in Figure 4-19, there were significant differences in the responses of participants and non-participants. However, participant responses were proportionally similar to those of all respondents. Participants and all respondents believed that efficient windows and improved insulation accounted for the majority of their homes' energy efficiency, while non-participants believed that their space and water heating systems were responsible for the bulk of their homes' energy efficiency. This difference may reflect the fact that the heating equipment in new non-ENERGY STAR homes is more efficient because it is new technology, while the energy saving features of ENERGY STAR homes go above and beyond those of standard new homes by including higher up-front cost items such as high efficiency windows and increased levels of insulation. Alternatively, this could simply reflect an emphasis on efficient windows and insulation in marketing and educational materials for the NYESLH Program.

Figure 4-19. Respondent reports of the features accounting for increased energy efficiency of their new home compared to their old home.



Note: The number of responses used to quantify the value for each item is as follows: All respondents (N= 42 heating, 29 cooling, 28 water heating, 47 windows, 45 insulation, 30 appliances, 21 lighting); Participants (N= 9 heating, 5 cooling, 6 water heating, 11 windows, 11 insulation, 9 appliances, 6 lighting); Non-participants Participants (N= 8 heating, 7 cooling, 8 water heating, 7 windows, 7 insulation, 6 appliances, 4 lighting).

Comparing their new home to the last home in which they lived, respondents were asked to estimate the amount of money they save each year due to the energy-efficient features of their new home. The NYESLH Program estimate of $600 per year was provided as a point of reference.[30] Interestingly, participants estimated an average annual savings of $494 per year, which was lower than NYSERDA's estimate, as well as the estimates of non-participants and all respondents, who estimated average annual savings of $644 and $643 respectively (Table 4-9).

Table 4-9. Respondent estimates of annual savings per year in new home compared to old home.

	All Respondents (n=64)	Participants (n=12)	Non-Participants (n=12)
Average	$644	$494	$643
Minimum	$180	$200	$300
Maximum	$1,950	$900	$1,000

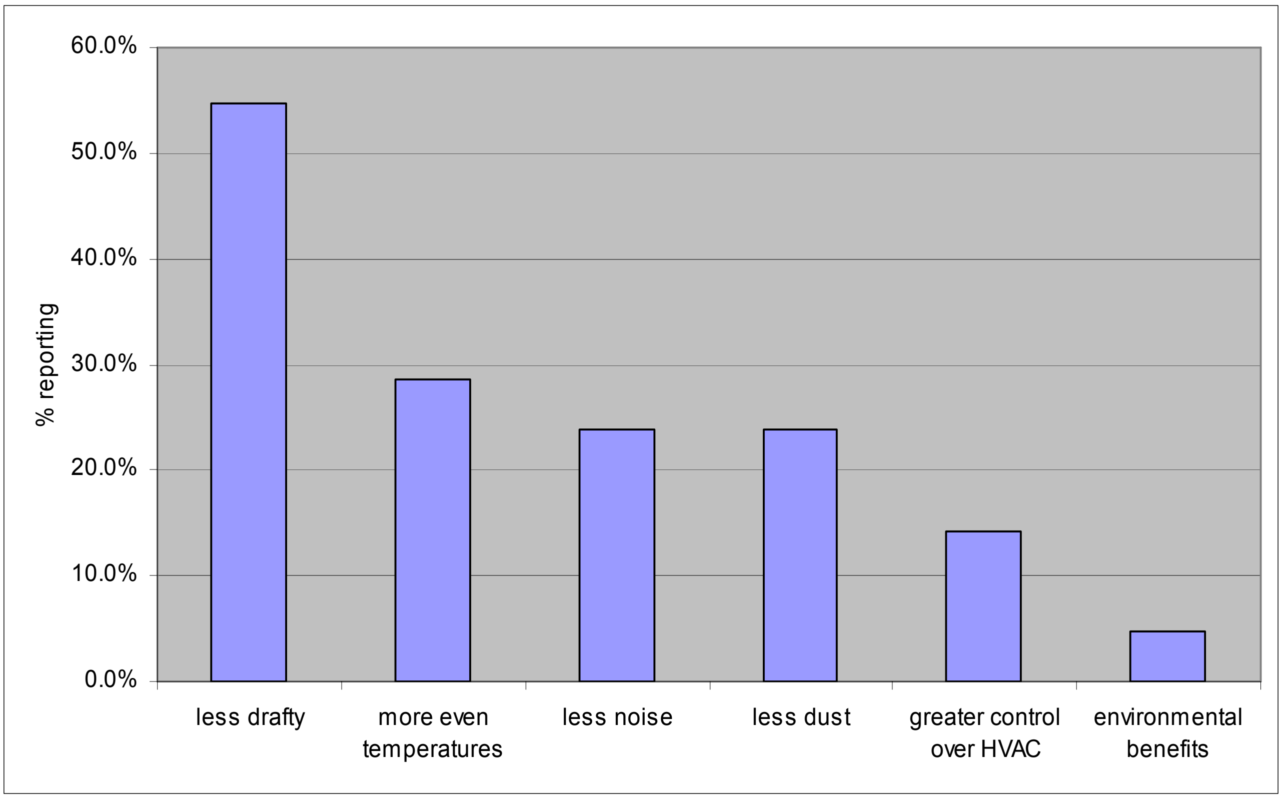
Respondents were then asked to record the year in which their previous home was constructed, and the number of months they had lived in their new home. The average year in which all respondents reported

[30] NYSERDA's estimated savings figure was based on the comparison of a new ENERGY STAR home to a new standard-efficiency home built to meet Energy Code requirements.

that their previous homes had been constructed fell within the range of 1976 (for all respondents) to 1980 (for non-participants). The average amount of time that all three sets of respondents had lived in their new home was 14 months.

Respondents were next asked an open-ended question regarding whether they had noticed other positive or negative impacts (besides energy savings) resulting from the energy-efficient features of their new home compared to their old home. Sixty-six percent of respondents provided positive comments about their new home. There were no significant variations across the different categories of respondents. The most common positive responses are summarized in Figure 4-20.

Figure 4-20. Respondent reports of positive impacts of their new home compared to their old home. Percent of open-ended responses by category (all respondents; n=42).



Only 19 respondents had something negative to report about their new home. Fewer common themes emerged among these responses, and again, there were no distinct differences across the categories of respondents. The most common complaint was that the new home was too airtight and did not allow enough fresh air to enter the home (five respondents).[31]

Responses to NYESLH Approach 1 NEI Questions - Extension of the Direct Query Method

Respondents were next asked to consider conditions in their new homes compared to their old homes and provide their best insights regarding:

[31] QA5 Response data: n=19. It is interesting to note that, while this was the most common negative response, none of the respondents from the known "participant" group recorded this response.

a) Whether they experienced positive, zero, or negative impacts compared to the last home they lived in; and

b) How the value of the impacts (either positive or negative) compared, in percentage terms, to the value of the energy savings of their new home.

In this section of the survey, respondents were asked to provide feedback on their experience with the following attributes:

- Durability
- Equipment or appliance maintenance requirements
- Thermal comfort
- Air quality
- Noise levels
- Anticipated ease of selling home
- Safety
- Overall impacts

As summarized in Table 4-10, the most common positive attribute cited by all categories of respondents to these direct query-questions was thermal comfort with noise and durability ranked second and third by both participants and non-participants. The "all respondents" category ranked durability ahead of noise. The overall experience with NEIs was reported to be positive by 83.3% of participants, 58.3% of non-participants, and 65.6% of "all respondents." The distribution of positive and negative responses for the "all respondents" category is shown in Figure 4-21.

Table 4-10. Respondents reporting positive NEIs by attribute.

	Participants	Non-participants	All respondents
Thermal comfort	91.7%	66.7%	75%
Noise levels	75.0%	66.7%	64.1%
Indoor air quality	66.7%	53.8%	51.6%
Ease of selling / leasing	50.0%	33.3%	51.6%
Safety	41.7%	41.7%	40.6%
Maintenance	41.7%	41.7%	39.1%
Durability	41.7%	58.3%	51.6%
Overall Impacts	**83.3%**	**58.3%**	**65.6%**

Participants n=12, non-participants n=12, all respondents n=64.

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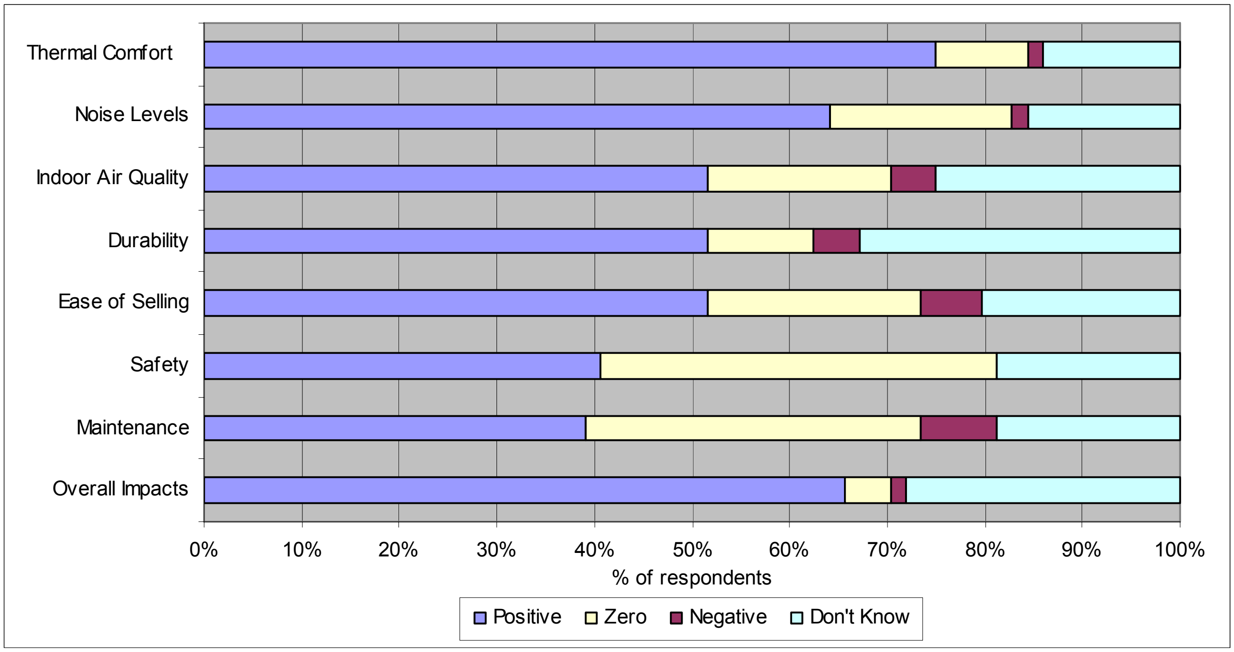
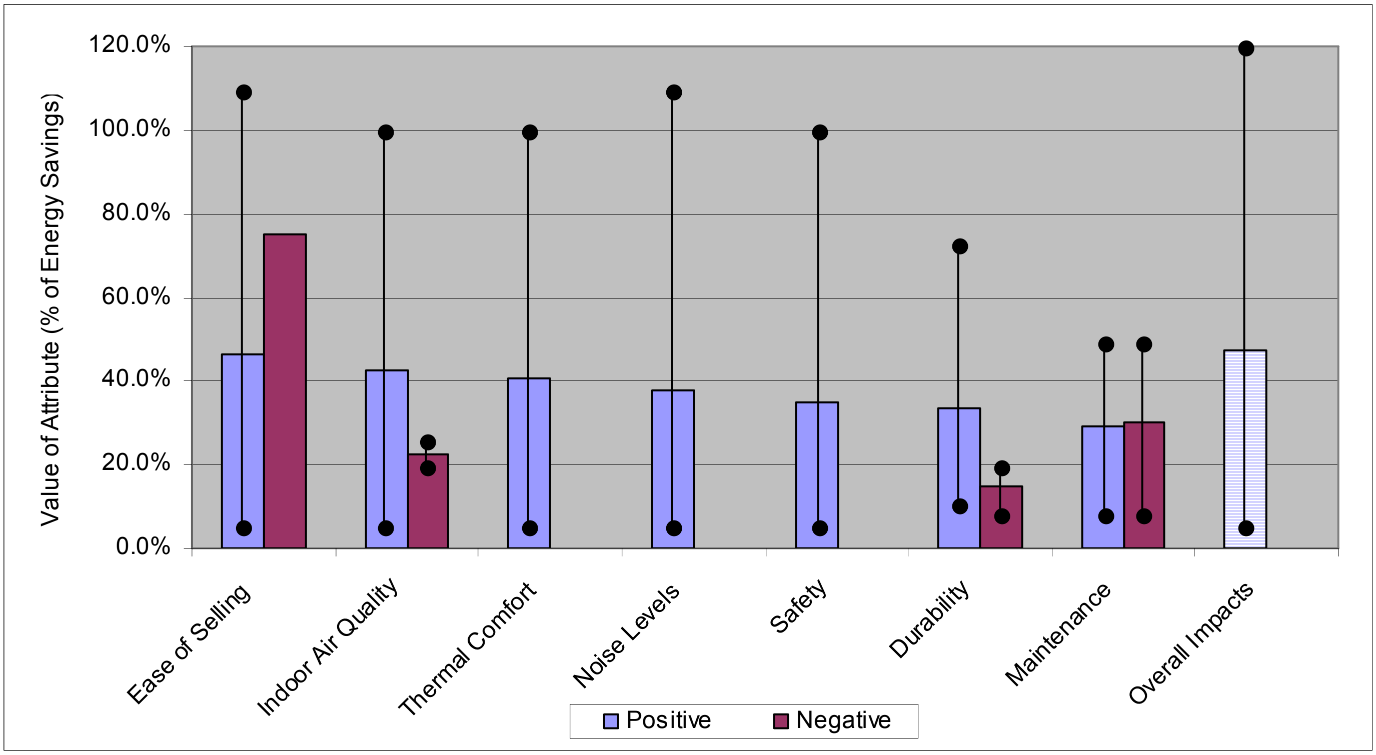
Figure 4-21. Percent of respondents indicating that they experienced positive, zero, or negative NEIs in their new homes compared to their old homes (n=64).



For the group of all respondents, on average, the overall non-energy impacts in their new homes were approximately 47% as valuable as the energy savings they realized (Figure 4-22). All three groups of respondents valued ease of selling, indoor air quality and thermal comfort the most, and maintenance, durability, and safety the least (Figure 4-22, Figure 4-23, and Figure 4-24).[32] Respondents provided a wide range in percentages for each attribute (see the bars showing maximum and minimum responses provided in Figure 4-22, Figure 4-23, and Figure 4-24).

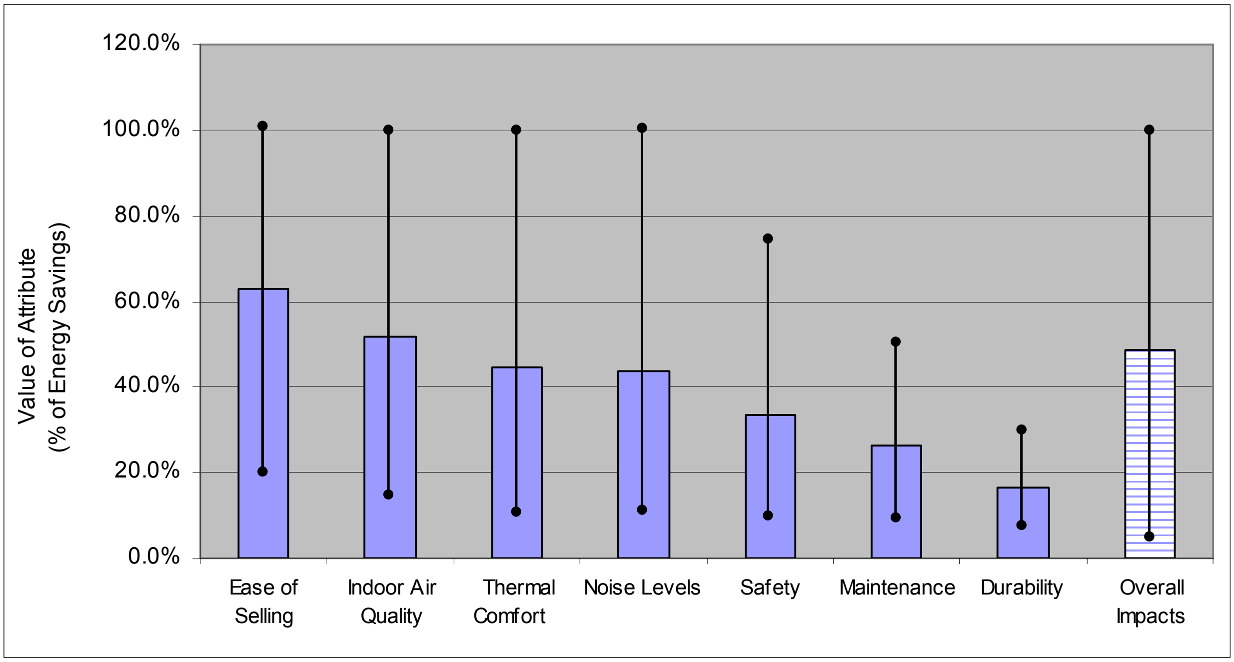
[32] The rank order of these attributes varied slightly across groups within the sets of top three and bottom three attributes.

Figure 4-22. Value of Attributes in Relation to Energy Savings - All Respondents



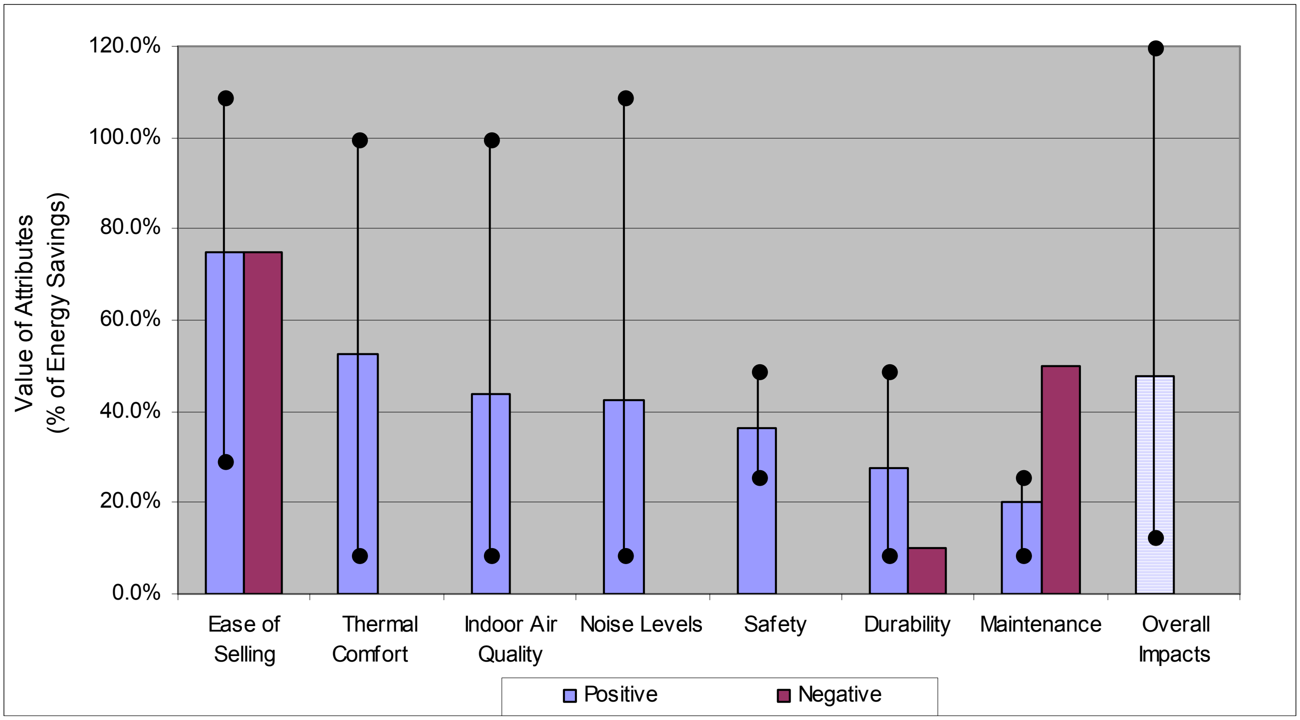
Note: The number of responses used to quantify the value for each attribute is as follows: Ease of selling (N= 25 positive & 1 negative); Indoor air quality (N= 22 positive & 2 negative); Thermal comfort (N= 35 positive & 0 negative); Noise levels (N= 31 positive & 0 negative); Safety (N= 17 positive & 0 negative); Durability (N= 20 positive & 2 negative); Maintenance (N= 17 positive & 2 negative); Overall impacts (N= 31 positive & 1 negative). Due to the fact that only one respondent reported negative overall impacts (reporting a value of 75%), this value is not shown on the graph.

Figure 4-23. Value of Attributes in Relation to Energy Savings - Participants



Note: The number of responses used to quantify the value for each attribute is as follows: Ease of selling (N= 5 positive & 0 negative); Indoor air quality (N= 6 positive & 0 negative); Thermal comfort (N= 9 positive & 0 negative); Noise levels (N= 8 positive & 0 negative); Safety (N= 3 positive & 0 negative); Maintenance (N= 4 positive & 0 negative); Durability (N= 3 positive & 0 negative); Overall impacts (N= 8 positive & 0 negative).

Figure 4-24. Value of Attributes in Relation to Energy Savings - Non-Participants

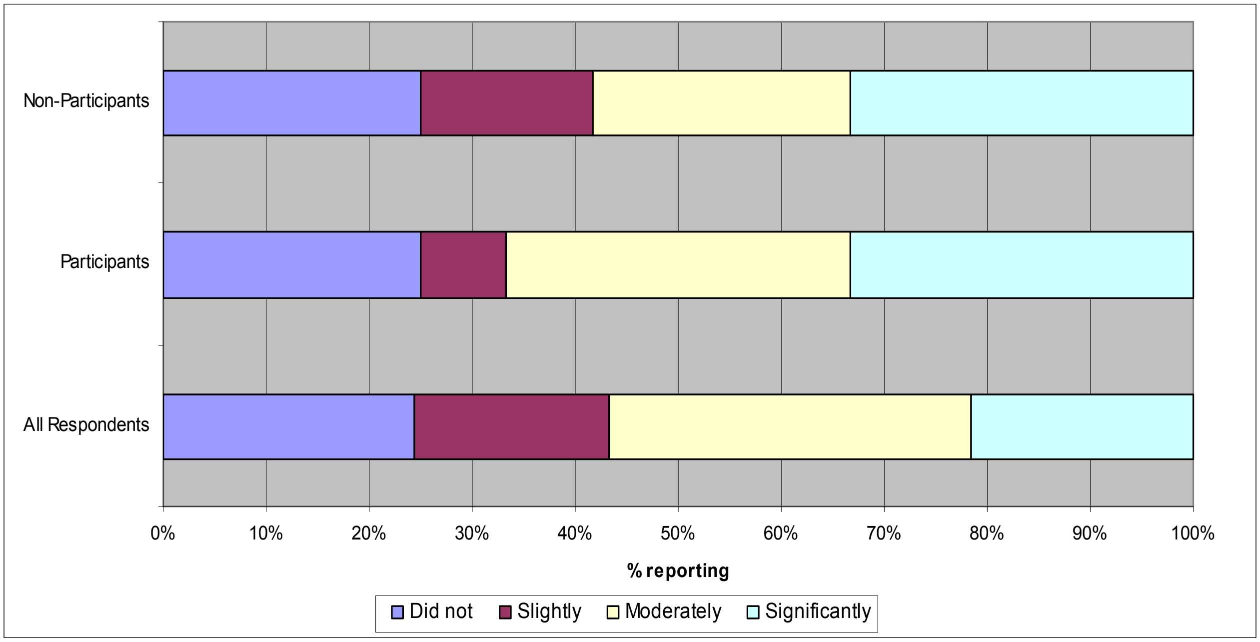


Note: The number of responses used to quantify the value for each attribute is as follows: Ease of selling (N= 4 positive & 1 negative); Thermal comfort (N= 6 positive & 0 negative); Indoor air quality (N= 5 positive & 0 negative); Noise levels (N= 6 positive & 0 negative); Safety (N= 4 positive & 0 negative); Durability (N= 4 positive & 1 negative); Maintenance (N= 4 positive & 1 negative); Overall impacts (N= 7 positive & 1 negative). Due to the fact that only one respondent reported negative overall impacts (reporting a value of 75%), this value is not shown on the graph.

NYSERDA estimates that the average annual energy savings for an ENERGY STAR Home compared to a standard new home is approximately $600. As discussed earlier in this section, respondents' annual savings estimates differed somewhat from the NYSERDA estimate; the average estimate of savings across the three categories of respondents ranged from $494 (participant category) to $644 (all respondents category). For the "all respondents" category multiplying the average annual energy savings ($644) by the value of overall NEIs (47%) reveals that value assigned to the NEIs by the respondents is approximately $303 per year on average. This value is significantly less than the value calculated by the direct willingness to pay question asked of respondents (*i.e.,* if the overall value of the non-energy impacts was positive, and these positive impacts disappeared, approximately how much would you be willing to invest to gain back these benefits in terms of an annual dollar amount?). Twenty-five respondents (39%) answered this question and the average of the responses was $1,016 with a range of $200 to $3,000. The average willingness to pay for overall NEIs among the participant category of respondents was $750, and $817 for the non-participant category. There were no significant differences in the range of responses across the three categories of respondents.

Next, respondents were asked a series of questions that sought to determine whether anticipated non-energy impacts influenced their decision to buy a more energy-efficient home. The results to these questions imply that most new homebuyers consider NEIs when making decisions regarding the energy-using systems and features of their new homes. In the "all respondents" category, 75% of respondents indicated that anticipated NEIs did influence their decision to buy a more energy-efficient home (Figure 4-25).

Figure 4-25. Respondent perceptions of whether anticipated NEIs influenced their decision to buy a more energy efficient home.



Note: The number of responses used to quantify the value for each category is as follows: All respondents n=37, participants n=12, non-participants n=12.

Responses to NYESLH Approach 2 NEI Questions – Conjoint Analysis

In the final set of conjoint analysis questions, respondents were presented with a series of eight comparisons of new home attributes and asked to assume that the two homes in each comparison were identical in every way except for the variations presented among the listed attributes. The final attributes and levels used for the NYESLH Program conjoint scenarios are shown in Table 4-11.

Table 4-11. Final attributes and levels for the NYESLH Program

Project Attributes	Levels
Cost/Resale[1]	• Valued the same as similar sized homes in the same location and condition • Valued at $2000 more than similar sized homes in the same location and condition • Valued at $4000 more than similar sized homes in the same location and condition
Comfort	• The home uses standard insulation and windows [may allow some excess heat and cold to enter the house, so some areas may be less comfortable]. • The home uses improved insulation and windows [helps keep out excess heat and cold, maintaining a more consistent temperature throughout the house].
Noise Level	• Some street and outdoor noise can be heard inside the house. • Very little street and outdoor noise can be heard inside the house.
Indoor Air Quality	• The home has normal air infiltration and ventilation [may allow some dust, pollen, humidity, and car exhaust into the house]. • The home has reduced air infiltration and improved ventilation [helps keep dust, pollen, humidity, and car exhaust out of the house].
Durability	• The home is built to standard installation practices so that heating and cooling and structural materials will likely last their expected lifetimes, but may fail earlier. • The home is built following best practices in installation so that the heating and cooling and structural materials are less prone to failure and may exceed their expected lifetimes.
Safety	• The heating system has backdraft protection [makes the home safer in terms of carbon monoxide levels]. • The heating system has no backdraft protection [may present a risk of elevated carbon monoxide levels].

[1] The second and third scenarios are computed using the annual energy cost comparisons on getenergysmart.org and the estimated value of an energy efficient home from http://www.energystar.gov/index.cfm?c=new_homes_benefits.hm_b_higher_resale_value (1982 and 1983-35). Using the 1982 scenario, the computation was: (896-645) * $11.63 = $2,919.13. Using the 1983-85 scenario, the computation was [(405-323) + (856-635)] * $12.52 = $3,793.56. Selected $2000 and $4000 for variance. Also, other ES Home Websites (e.g., http://www.midamericanenergy.com/html/energy3b.asp) suggest the incremental cost can be over $2000 without incentives.

Respondents were then asked to select the home that was preferable to them even if neither option was considered to be ideal. Responses from this series of questions were analyzed using the methods specified in Section 3.4 of this report in order to determine the value of the various attributes.

Results for the conjoint questions have only been calculated for the "all respondents" category. Respondents placed the highest value on the durability attribute indicating that they would be willing to pay an additional $5,648 in the upfront cost of the home to have a home that is, "built following best practices in installation so that the heating and cooling and structural materials are less prone to failure and may exceed their expected lifetimes" (Table 4-12). The comparison case was a home "built following standard installation practices so that heating and cooling and structural materials will likely last their expected lifetimes, but may fail earlier." Respondents placed the lowest value on the noise level attribute indicating that they would be willing to pay an additional $2,015 in the upfront cost of their home to avoid hearing street noise inside the home. These results represent significantly different NEI values than those derived from Approach 1. However, it is important to note that the conjoint results are based on respondent preferences under hypothetical conditions. In contrast, Approach 1 questions asked for feedback on respondents' actual experiences with the NEIs in question.

Table 4-12. Relative value of NYESLH Program attributes (n=64)

Attribute	Lifetime value ($)	Annual value ($)[1]
Durability	$5,648	$202
Comfort	$5,337	$191
Safety	$5,072	$181
Indoor Air Quality	$4,363	$156
Noise Level	$2,015	$72
Total value[2]	$22,437	$801

[1] Annual values are calculated by dividing the total lifetime values for each attribute by the assumed measure lifetime (28 years based on data used in NYSERDA benefit-cost analyses).

[2] The MCAC Team did not anticipate substantial interaction among the NYESLH attributes so an interactive total was not calculated (the interactive total would be the same as the overall total).

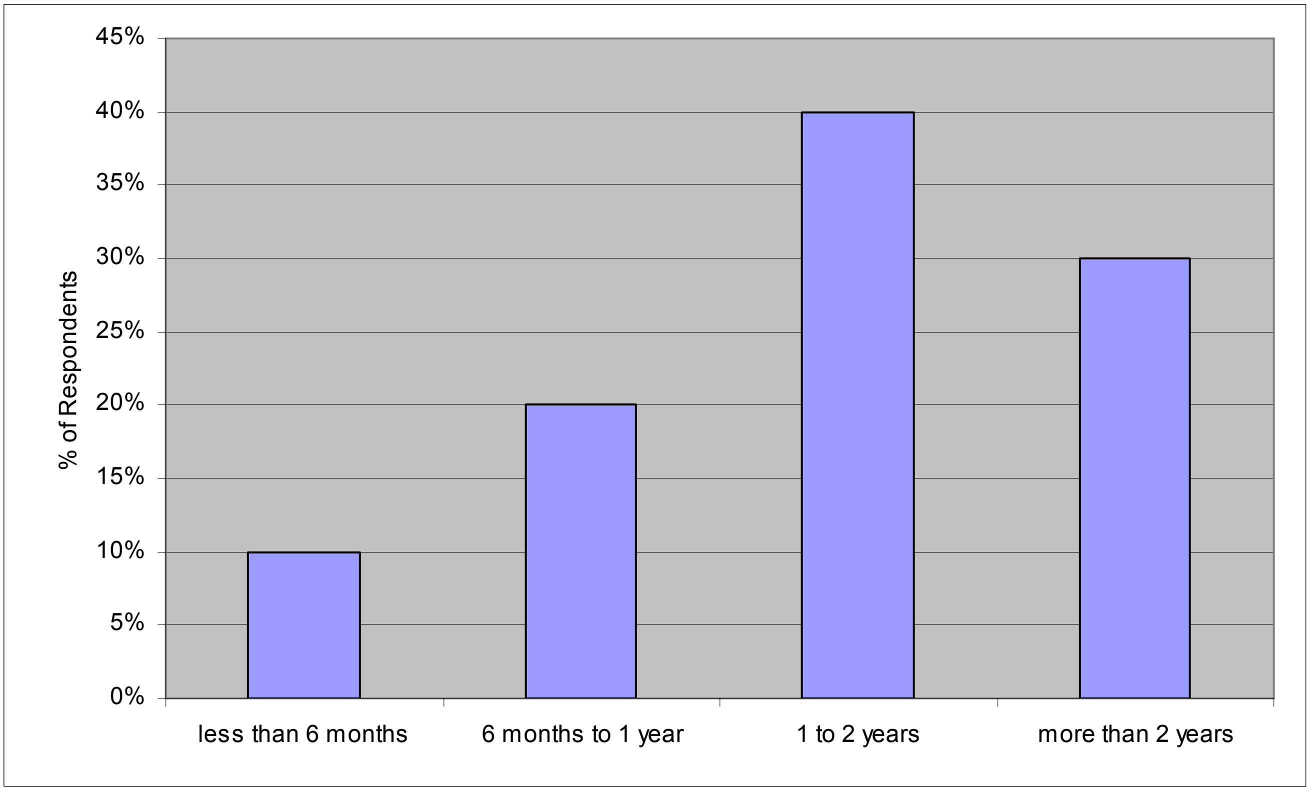
The values derived from the conjoint analysis were converted into annual dollar values that respondents would be willing to pay for the attributes by dividing the total assigned lifetime values for each attribute by the lifetime of the energy efficiency measures and designs installed at the home (assumed to be 28 years based on data used in NYSERDA benefit-cost analyses). Doing so yields a total annual value of $801 that respondents would be willing to pay for NEIs. This equates to 134% of average annual energy savings ($600) for the pool of respondents.

4.2.2 ENERGY STAR Products and Marketing: Compact Fluorescent Light Bulbs (CFLs)

The compact fluorescent light bulb (CFL) survey was completed by ten respondents who own CFLs and 14 respondents who do not own CFLs. Those who own CFLs completed both the Approach 1 and Approach 2 sections of the survey; those who do not own CFLs completed only the Approach 2 (conjoint) portion of the survey.

For those who own CFLs, the survey began by asking how long they have been using the bulbs. Nine respondents to this question reported that they have used CFLs for more than six months (Figure 4-26). Furthermore, the average number of CFLs used by respondents who own them was 11.3. Therefore, the group of respondents to Approach 1 questions can be expected to have enough experience with CFLs to provide informed feedback on the non-energy impacts associated with this measure.

Figure 4-26. Length of Time Respondents who own CFLs have been using CFLs (n=10).



As a point of reference, the survey provided an estimated annual savings figure of $14 per CFL. Respondents were asked to report whether this estimate was consistent with their experience. If the survey estimate was not consistent with their experience, they were asked to provide their own estimate of annual savings. Only three respondents confirmed that the survey estimate was consistent with their experience. One respondent estimated their savings at $11 per year. Others either answered "don't know" or did not complete the question.

Respondents were next asked an open-ended question regarding whether they had noticed other positive or negative impacts (besides energy savings) resulting from their CFLs. Six respondents indicated that they had noticed additional positive impacts including:

- "Bulbs lasted longer" or "do not need to change bulbs as frequently" (four respondents)
- "Light from CFLs is brighter or better quality than that of incandescent bulbs "(four respondents)
- "CFLs save money" (one respondent)
- "Bulbs are cool to the touch" (one respondent).

Additionally, nine respondents reported that they had noticed negative impacts including:

- "Light is dimmer or harsher (white) than incandescent bulbs" (five respondents)
- "The shape of the bulbs is awkward" or "they don't fit into many fixtures" (three respondents)
- "Take too long to warm up" (two respondents)

- “Can’t use with dimmer” (two respondents)
- “Not lasting as long as expected” (one respondent)
- “There’s a delay when I turn on the light” (one respondent)

Responses to CFL Approach 1 NEI Questions - Extension of the Direct Query Method

Respondents were next asked to compare the features of their CFLs to those of incandescent bulbs and provide their best insights regarding:

a) Whether they experienced positive, zero, or negative impacts compared to incandescent bulbs; and

b) How the value of the impacts (either positive or negative) compared, in percentage terms, to the value of the energy savings from their CFLs.

In this section of the survey, respondents were asked to provide feedback on their experience with the following attributes:

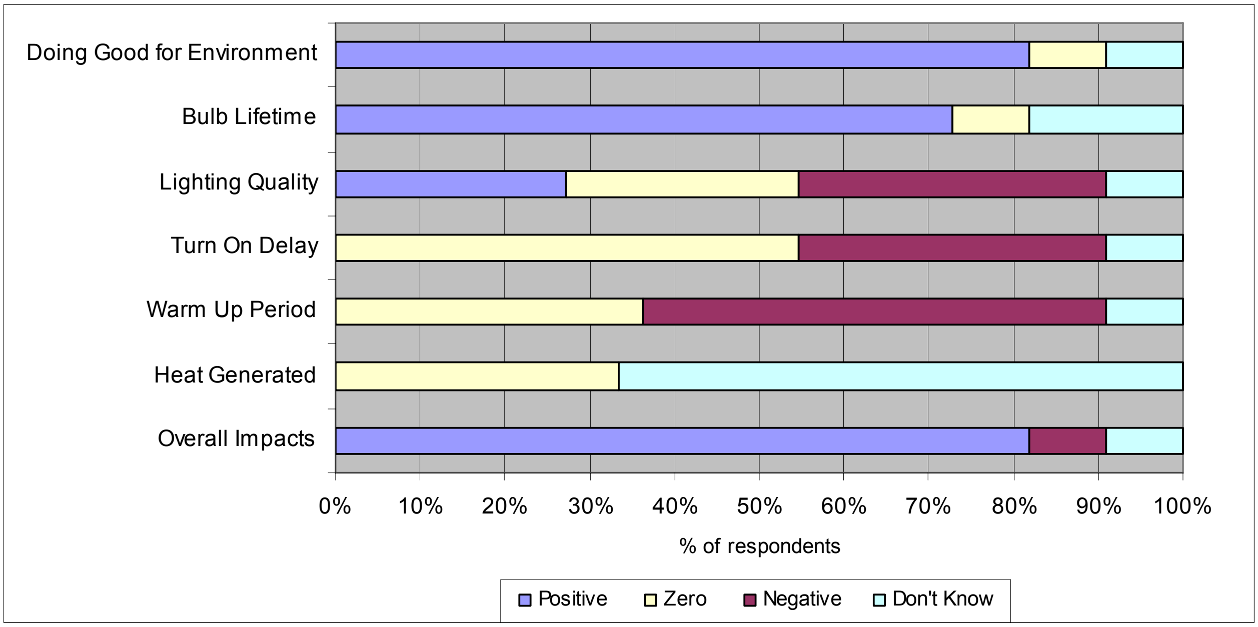
- Bulb lifetime
- Lighting quality
- Delay in turning on
- Warm up period
- Heat generated
- General sense of doing good for the environment
- Overall impacts

As summarized in Figure 4-27, a majority of respondents reported that they experienced positive impacts for the following attributes:

- Bulb lifetime
- Doing good for the environment

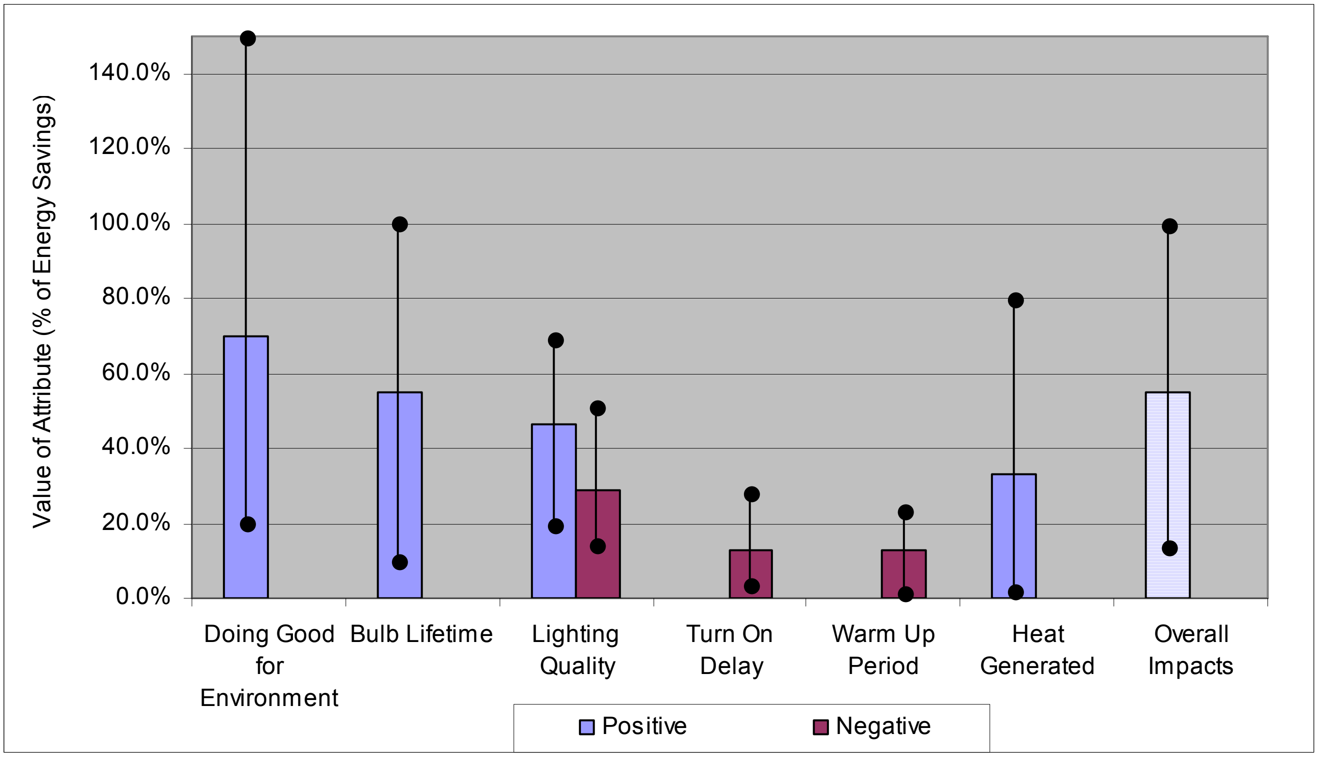
Three respondents also reported having a positive experience with the lighting quality of their CFLs. Respondents reported experiencing significant negative impacts with three attributes – warm up period; turn on delay; and lighting quality. Warm up period was by far the most commonly-cited negative impact; six respondents indicated that they had experienced negative impacts associated with this attribute. While there were substantial reports of negative impacts for individual attributes, nine respondents still reported that overall, they had a positive experience with the NEIs associated with their CFLs. One respondent replied that the overall value of the NEIs was negative.

Figure 4-27. Percent of respondents indicating that they experienced positive, zero, or negative NEIs associated with their CFLs compared to incandescent bulbs. (n=10)



On average, respondents stated that the non-energy impacts of their CFLs were approximately 60% as valuable as the energy savings they realized (Figure 4-28). Attributes receiving the highest ratings by respondents included doing good for the environment, bulb lifetime, and lighting quality. Interestingly, lighting quality was also included among the least favored attributes. Warm up period and turn on delay were the other two attributes that respondents reported as having detracted from the value of the energy savings from their CFLs. Respondents provided a wide range in percentages for each attribute (see the bars showing maximum and minimum responses provided in Figure 4-28).

Figure 4-28. Respondent perceptions of the value of the impacts (either positive or negative) compared, in percentage terms, to the value of the energy savings of their CFLs (n=10)

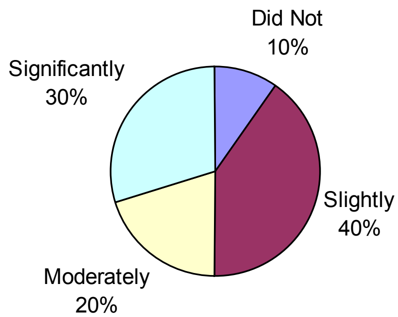


Note: Bars depict maximum and minimum responses received for each attribute. The number of responses used to quantify the value for each attribute is as follows: Doing good for the environment (N= 9 positive & 0 negative); Bulb lifetime (N= 8 positive & 0 negative); Lighting quality (N= 3 positive & 4 negative); Turn on delay (N= 0 positive & 4 negative); Warm up period (N= 0 positive & 6 negative); Heat generated (N= 8 positive & 0 negative); Overall impacts (N= 9 positive & 1 negative). Due to the fact that only one respondent reported negative overall impacts (reporting a value of 20%), this value is not shown on the graph.

The estimated average annual energy savings for a CFL is $14. Responses to this series of questions show that respondents value the non-energy impacts of their CFLs at a level equal to approximately 60% of the value of the energy savings they realize from their CFLs. Multiplying the average annual energy savings ($14) by the value of the NEIs (60%) reveals that value assigned to the NEIs by the respondents is approximately $8.40 per year on average. This value is far less than the value calculated by the direct willingness to pay question asked of respondents. The average response to this question was $35, but only three respondents answered this question (responses ranged from $1 to $50).

Next, respondents were asked whether anticipated non-energy impacts influenced their decision to purchase CFLs. The results to this question imply that respondents do consider NEIs when making decisions regarding their light bulb purchases. All but one of the ten respondents indicated that anticipated NEIs did influence their decision to purchase CFLs (Figure 4-29).

Figure 4-29. Respondent perceptions of whether anticipated NEIs influenced their decision to purchase CFLs (n=10)



Responses to CFL Approach 2 NEI Questions – Conjoint Analysis

In the final set of conjoint analysis questions, respondents were presented with a series of eight comparisons of light bulb attributes and asked to assume that the two light bulbs in each comparison were identical in every way except for the variations presented among the listed attributes. The final attributes and levels used for the CFL conjoint scenarios are shown in Table 4-13.

Table 4-13. Final attributes and levels for CFLs

Project Attributes	Levels
Purchase Price Per Bulb	• $0.35 • $2.00 • $6.00
Turn On	• When the switch is turned on, the light comes on instantly • When the switch is turned on, there is a 1 second delay before the light comes on
Warm-Up Period	• When the switch is turned on, the light is at full intensity immediately • When the switch is turned on, the light comes on to 85% intensity and takes about 90 seconds to warm up to full intensity
Lifetime	• Replace every 6 months • Replace every 8 years
Heat generated	• When left on the bulb gets very hot to the touch, lowering heating costs in the winter but increasing cooling costs in the summer • When left on the bulb stays cool, having little impact on heating or cooling costs

Respondents were then asked to select the light bulb option that was most preferable to them even if neither option was considered to be ideal. Responses from this series of questions were analyzed using the methods described in Section 3.4 of this report in order to determine the value of the various attributes.

The conjoint questions were asked of both CFL owners and those who do not own any CFLs to examine differences in the preferences among these groups. As shown in Table 4-13. four attributes were explored: bulb lifetime, heat generated, turn on delay and warm up delay. Turn on delay and warm up delay are generally considered to be negative attributes of CFLs. The results of the conjoint analysis indicate how much respondents are willing to pay for an increase in attribute level. In the cases of turn on delay and warm up delay, the values indicate how much respondents are willing to pay to go from a long turn on or warm up delay (that would typically be associated with CFLs) to a short delay.

Both CFL owners and non-owners rated bulb lifetime as the highest valued attribute. Among all respondents, the willingness to pay for an increase from a bulb lasting just six months to one lasting eight years was $7.19 (Table 4-16). Respondents placed the lowest value on the warm up delay attribute indicating that they would be willing to pay an additional $1.14 per bulb to reduce the warm up delay. Respondents attribute much greater value to bulb lifetime, one of the positive CFL attributes, than to the negative warm up or turn on delay attributes.

Table 4-14. Relative value of CFL attributes (n=21)

Attribute	All Respondents		CFL Non-Users		CFL Users	
	Lifetime value	Annual value[a]	Lifetime value	Annual Value[1]	Lifetime value	Annual Value[a]
Bulb lifetime	$7.19	$1.80	$8.48	$2.12	$5.78	$1.45
Heat generated	$3.67	$0.92	$4.91	$1.23	$2.22	$0.56
Turn on delay	$3.09	$0.77	$2.99	$0.75	$3.07	$0.77
Warm up delay	$1.14	$0.29	Statistically invalid		$1.34	$0.34
Total (all-inclusive)	$15.09	$3.77	$16.38	$4.10	$12.41	$3.10
Total (net)[2]	$6.63	$1.66	$10.40	$2.60	$3.59	$0.90

[1] Annual values are calculated by dividing the total values for each attribute by the assumed measure lifetime (4 years based on data used in NYSERDA benefit-cost analyses).

[2] For the total net value , negative attribute values (turn on and warm up delay) have been subtracted from positive attribute values.

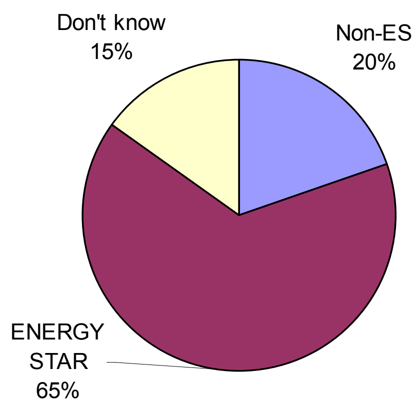
The values derived from the conjoint analysis were converted into annual dollar values that respondents would be willing to pay for the attributes by dividing the total lifetime dollar value of each attribute (*i.e.*, $7.19 for bulb lifetime) by the lifetime of the bulb (assumed to be four years based on data used in NYSERDA benefit-cost analyses). Because turn on delay and warm up delay are both negative attributes associated with CFLs (*i.e.,* values for these attributes represent what respondents are willing to pay to go from a long delay, that is associated with using CFLs, to a short delay), values for these attributes were subtracted from the positive values for lifetime and heat generated attributes to arrive at a total net value. In the category of all respondents, the total net annual value is $1.66. This value equates to 13% of average annual energy savings ($14) resulting from the use of CFLs.

4.2.3 ENERGY STAR Products and Marketing: Clothes Washers

A total of 126 respondents participated in the NEI study for clothes washers. In order to ensure a large enough sample, those who purchased a new clothes washer in the last five years were invited to participate in the study. Because of this extended time period, however, the Approach 1 questions were omitted for concern that changes in clothes washers in the last five years could alter respondent perceptions regarding these attributes (*i.e.*, current perceptions of certain attributes, such as noise levels, could differ between recent purchasers and those that purchased a new clothes washer five years ago). Instead, respondents were only asked to estimate NEIs through the use of the conjoint analysis (Approach 2).

Respondents were first asked a few questions regarding the type of clothes washer they purchased. Almost two-thirds of the respondents (65%) indicated that they had purchased an ENERGY STAR washer (Figure 4-30).[33] In addition, slightly greater than half (59%) indicated that they had purchased a top-loading washer, with the remaining respondents (41%) reporting that they had purchased a front-loading washer.

Figure 4-30. Type of Clothes Washer Purchased (n=126)



Respondents were then asked an open-ended question to identify what positive or negative non-energy impacts they perceived with the clothes washer. Seventy percent of the purchasers of ENERGY STAR clothes washers offered more than 113 positive non-energy impacts, compared to only 32% of the respondents that offered 26 negative non-energy impacts. As shown in Figure 4-31, the most commonly mentioned positive non-energy impacts included using less water (35%), quieter/less noise (31%), and using less detergent (28%). Positive responses included:

- “Less noise. Clothes end up less moist because of the intense spin cycle so they dry faster. We don't keep track of water bills, but I can see thru the window that it uses very little water. I haven't kept track of wear and tear, but I can see thru the window that its washing action is gentler than our previous top loader”
- “Clothing gets cleaner, water bills are less expensive, clothing wears better & lasts longer, less detergent used in loads, clothing comes out of washer less wrinkled up & almost dry.”
- “Uses less water and cleans the clothes so much better than my former top loader.”
- “Use less detergent, fewer loads, greater capacity with out impact on cleaning quality, much quieter, less water and clothes do not come out all tangled/knotted together.”
- “Quiet, uses less soap, water and clothes are clean I can also control which program I want and what values I want for each individual load.”

The most commonly mentioned negative attributes included complaints about increased noise from vibration during the spinning cycle (7%), disappointment about the quality of the washing (6%), and mentions of the high price (5%) and not noticing savings (5%) (Figure 4-32). Negative attributes included:

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[33] As presented in the ESPM MCAC report respondents often erroneously answer whether or not they purchased an ENERGY STAR model. The stratified NEI results, therefore, may contain respondents that are incorrectly classified as ENERGY STAR vs. non-ENERGY STAR, but their perception regarding the efficiency of their current washer is being accurately captured.

- "The clothes washer seems to be a little loud, but otherwise is a good investment."
- "Very noisy when it spins and makes the house shake - the machine is located on the second floor of our house - we have had it leveled several times but still makes noise when it spins."
- "Longer wash cycle, not as much savings in electricity as expected."

Figure 4-31. Positive Attributes of ENERGY STAR Clothes Washers (n=82)

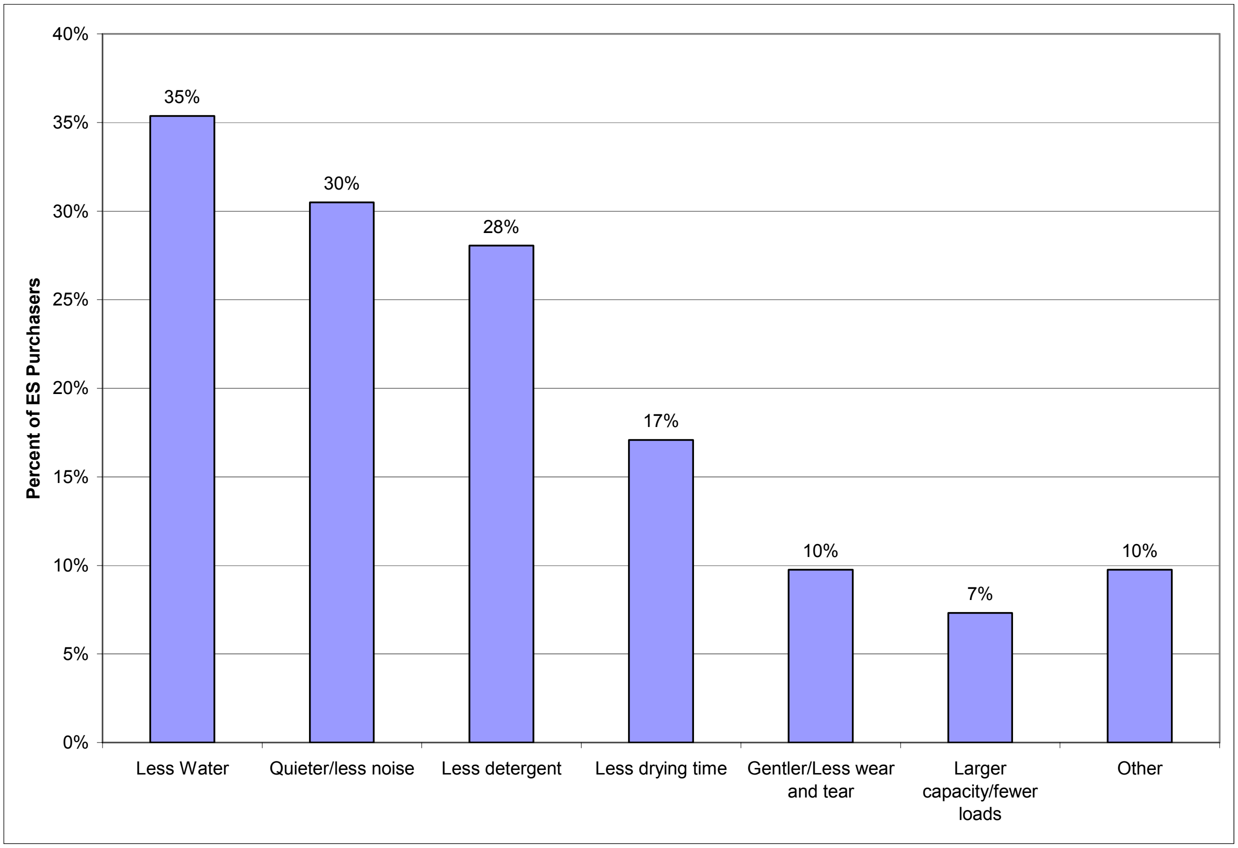
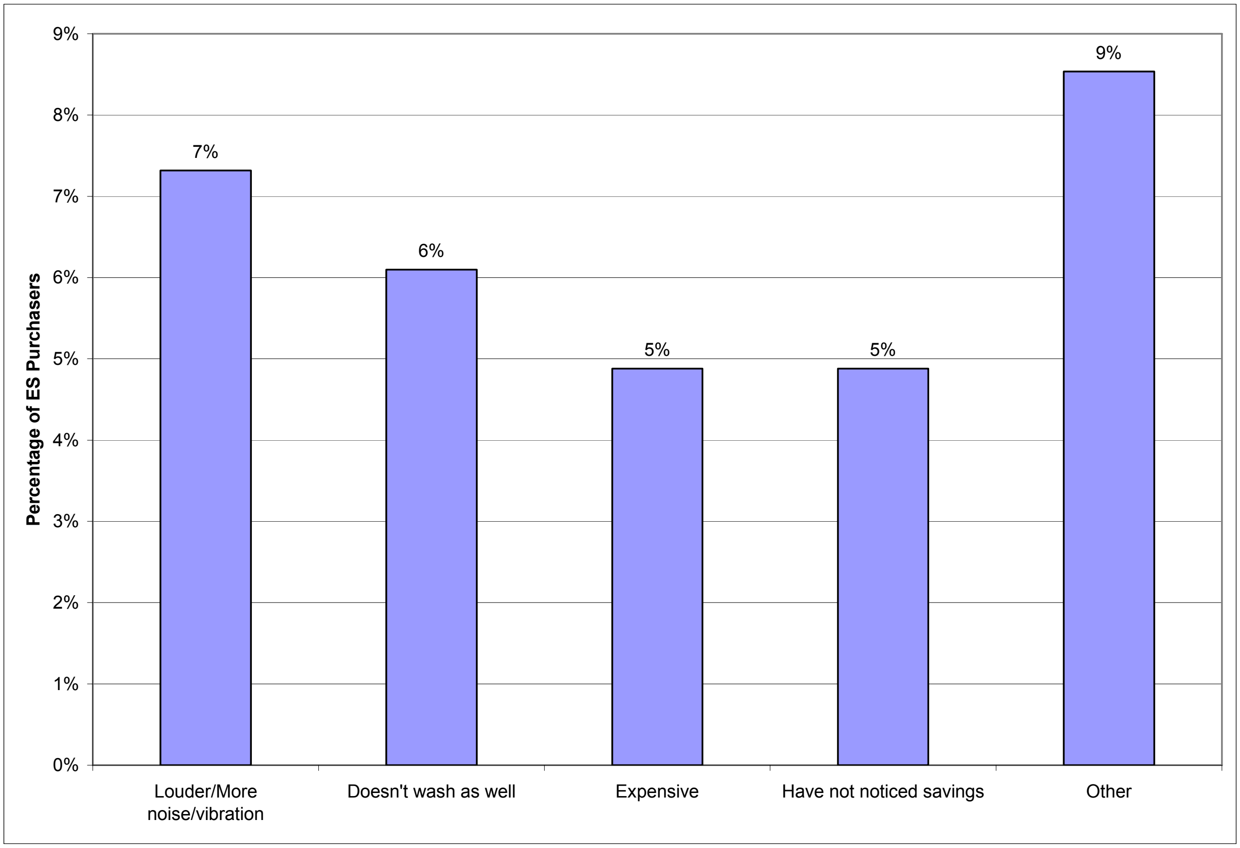


Figure 4-32. Negative Attributes of ENERGY STAR Clothes Washers (n=82)



Responses to Clothes Washer Approach 2 NEI Questions – Conjoint Analysis

In the conjoint analysis section of the survey, respondents were presented with a series of eight comparisons of clothes washer attributes and asked to assume that the two clothes washers in each comparison were identical in every way except for the variations presented among the listed attributes. The final attributes and levels used for the clothes washer conjoint scenarios are shown in Table 4-15.

Table 4-15 Final attributes and levels for clothes washers.

Project Attributes	Levels
Purchase Price	• $500 • $800 • $1,300
Energy Use	• $55 • $190
Water Use	• 8,600 gallons per year • 13,700 gallons per year
Wear and Tear	• The washer has an agitator, which contributes to wear and tear on clothes • The washer has no agitator, which reduces wear and tear on clothes
Drying Time	• Based on the amount of water left in the clothes after washing, drying time per average load is about 40 minutes • Based on the amount of water left in the clothes after washing, drying time per average load is about 60 minutes
Noise	• You can hear the washer running from the next room • You cannot hear the washer running from the next room
Detergent Use[5]	• Uses 1 ounce of detergent and other washing agents for the same cleaning power • Uses 8 ounces of detergent and other washing agents for the same cleaning power

The results of the analysis, presented in Table 4-16, demonstrate that clothes washer purchasers placed the highest value on reducing energy costs, indicating that they were willing to pay an additional $640 on top of the initial purchase price to reduce average energy cost by $135/year. Of the non-energy attributes, reducing water use was considered the most valuable: respondents were willing to pay an extra $344 to reduce water use from an average of 13,700 gallons/year to 8,600 gallons/year. Reducing wear and tear on the clothing was considered the least valuable non-energy attribute, with respondents indicating they were willing to pay an additional $54 to eliminate the agitator from the machine and reduce wear and tear on clothes. Respondents that reported purchasing an ENERGY STAR model were willing to pay more for all attributes except reducing wear and tear.

Table 4-16. Relative value of CW attributes (n=82)

Attribute	Total (All Respondents)		Non-ES Purchasers		ES Purchasers	
	Lifetime value	Annual Value[1]	Lifetime value	Annual Value[1]	Lifetime value	Annual Value[1]
Reduced energy cost	$640	$42.67	$510	$34	$724	$48.27
Reduced Water Use	$344	$22.93	$330	$22	$357	$23.80
Reduced Wear and Tear	$54	$3.60	$90	$6	$37	$2.47
Reduced drying time	$293	$19.53	$267	$18	$317	$21.13
Reduced noise	$201	$13.40	$162	$11	$223	$14.87
Total (all-inclusive)	$1,532	$102	$1,359	$91	$1,658	$111
Total (interactive)[2]	$1,239	$83	$1,092	$73	$1,341	$89

[1] Annual values are calculated by dividing the lifetime values for each attribute by the assumed measure lifetime (15 years based on data used in NYSERDA benefit-cost analyses).

[2] For the total interactive value, drying time has been subtracted from the total value for each category to account for the fact that this attribute overlaps with reduced energy cost.

These lifetime values were converted into annual values by dividing by the expected useful life (EUL) of the measure. Assuming an EUL of 15 years[34], the annual impacts were highest for reduced energy cost (Table 4-16). In terms of the non-energy impacts, reduced water use was valued at approximately $23/year, followed by reduced drying time (~ $20/year). Not surprisingly, the current NEI values, if taken independently, are substantially lower than the previous MCAC estimate of $96/year for the all-inclusive non-energy impacts of ENERGY STAR clothes washers.[35] This difference, however, may be attributed to a few items, including:

- The previous MCAC evaluation used a methodology more similar to the Approach 1.
- The previous MCAC evaluation applied energy savings of $174/year, which assumes the difference of a base model to the most efficient – and not necessarily the average– high efficiency model. Using the previously developed "NEI multiplier" of 27% multiplied by the $135 annual energy savings assumed in this study reduces the non-energy impacts to $36.
- The actual value of the current NEIs will lie between the value of the point estimate of the most valuable NEI (reduced water use at $23/year) and the sum of all the individual estimates ($83/year including interactive effects), which represents a difference, but closer convergence of the two estimates.[36]

As shown in Figure 4-33, if the willingness to pay values for the NEIs are summed together (without a reduction for potential interactive effects), they are valued at a greater amount ($102) than the willingness to pay for reducing energy costs ($43). These values are then compared to two estimates of average annual savings. The first estimate, from a FEMP study conducted in 2000, estimates annual savings in New York at $98, on average, for ENERGY STAR clothes washer. The second estimate, which differs

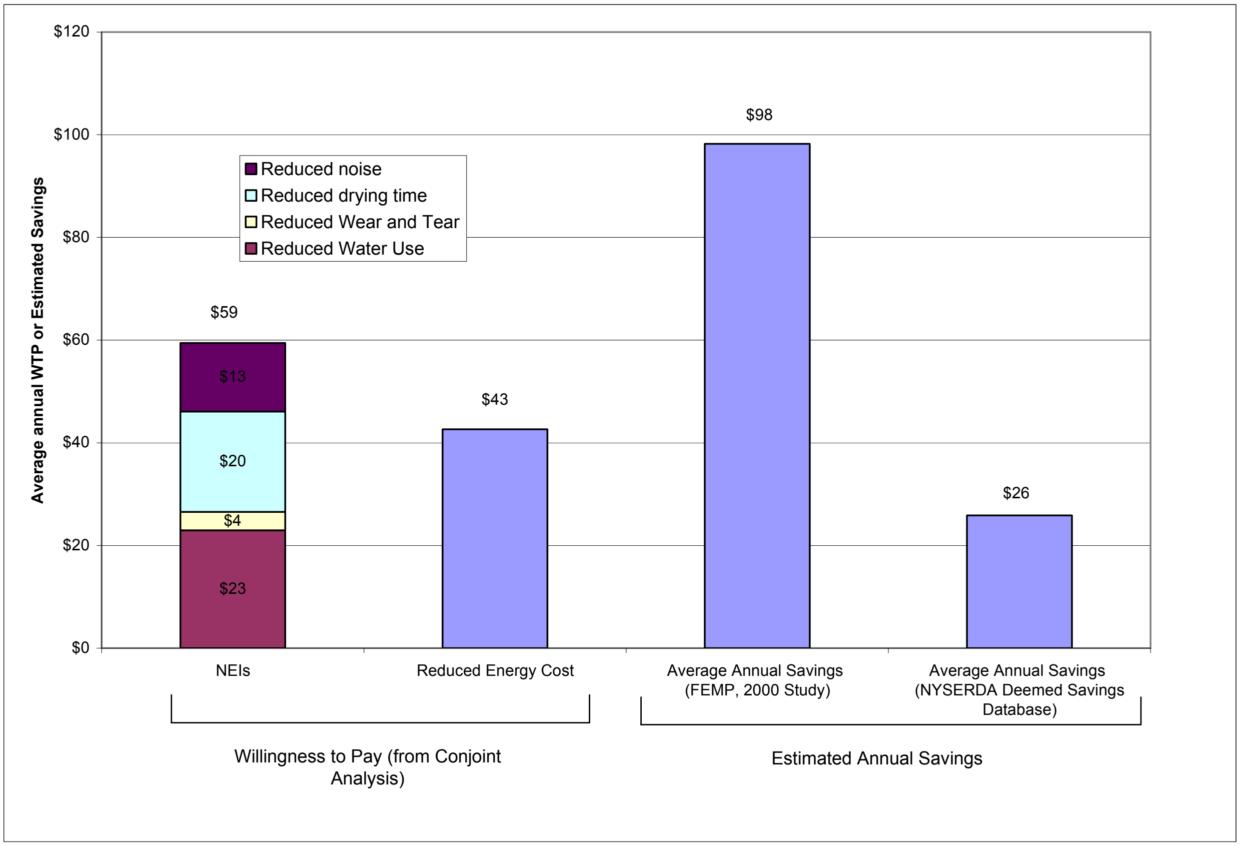
[34] Based on the California Database for Energy Efficiency Resources (DEER): http://eega.cpuc.ca.gov/deer/

[35] Note that both studies, however, show water savings as being the most valuable NEI.

[36] Summing up the individual NEIs, of course, does not account for interactive effects.

substantially from the first, uses the current NYSERDA deemed savings database, and shows estimated savings at $26/year.[37]

Figure 4-33. Comparison of NEI Values with Energy Savings Values



[37] Differences in baseline values between 2000 and 2005 explain some, but not all, of these differences, as the Deemed Savings Database shows average annual savings as $42 during the 1999 to 2003 period.

SECTION 5:

CONCLUSIONS AND LESSONS LEARNED

This section presents conclusions and lessons learned from the current evaluation.

5.1 CONCLUSIONS

Table 5-1 summarizes respondent perceptions of NEI value as a percentage of their facilities' annual energy savings. Results are presented from prior MCAC evaluations as well as from the two estimation methods used in the current evaluation. As Table 5-1 illustrates, each of the three estimation methods indicates that respondents do recognize the existence of NEIs and do assign supplementary positive value to the NEIs in addition to the corresponding energy savings that result from measure installation.

Table 5-1. NEIs as a Percentage of Energy Savings

Program/Measure	Annual (de-rated) NEI value calculated from prior MCAC Evaluations	Annual NEI value calculated from 2006 Approach 1 questions	Annual NEI value calculated from 2006 Approach 2 questions
NCP	40% - 55%	40%	340%
CIPP	25% - 35%	46%	49%
SCLP	31% - 52%	51%	4%
NYESLH	50%	51%	134%
CFLs	45%	60%	13%
Clothes Washers	27%	Not Applicable	84%

Given the range in NEI values presented in Table 5-1, the challenge becomes determining the level at which NEIs should be incorporated in the respective programs' benefit-cost analyses. Results from the Approach 1 series of questions generally correspond to the (de-rated) values reported in prior MCAC evaluation efforts. This was expected as the Approach 1 survey component was designed as an extension of the direct query method used previously to assess NEI value with modifications to streamline the question set (see discussion in Section 2.2.1). The results derived from the conjoint analysis (*i.e.*, Approach 2) confirm that respondents value NEIs; however, the values assigned to the NEIs when the interactions among attributes are considered vary considerably by program. This is also not surprising, considering that this was the first test of conjoint analysis to evaluate NEIs and the conjoint comparisons represent hypothetical bundles of attributes, not actual conditions experienced by the specific respondents.

Such results imply that the conjoint approach holds promise for assessing respondent perceptions of NEIs; however, further development and refinement of the approach is necessary to increase robustness of the results. That being the case, the MCAC Team recommends that NYSERDA use the annual NEI values calculated from this year's Approach 1 questions as inputs into the programs' benefit-cost analyses.[38] In addition, the MCAC Team recommends that NYSERDA consider incorporating the conjoint method into future research efforts to further develop this technique.

[38] CFLs and clothes washers are two of six measures evaluated in the previous assessment of NEIs associated with the ENERGY STAR Products and Marketing Program. For the program as a whole, the MCAC Team recommends an NEI multiplier of 40% of annual energy savings be incorporated into the 2005 benefit-cost analysis.

Additional conclusions can be drawn from the current research effort. First, as was the case in the prior NEI evaluations conducted by the MCAC Team, respondents continue to have difficulty answering direct willingness-to-pay (WTP) questions that ask them to directly assign a value they would be willing to invest to realize the reported benefits from NEIs. This is true even though respondents were provided with an estimate of their facilities' respective energy savings as tracked in NYSERDA program records at the outset of the surveys in order to benchmark their responses on realistic energy savings values resulting from program participation. In spite of these efforts, few respondents provided answers to the direct WTP question, and the answers that were received varied widely (*i.e.*, had large standard deviations). This finding reinforces the fact that while most respondents do recognize the existence of NEIs, many have a difficult time valuing the NEIs, especially when asked to do so in "net" terms (*i.e.*, NEIs that result from actions and would not have occurred if the program had not been offered). Thus, researchers must use methods similar to those used in the current evaluation to overcome this issue and derive meaningful NEI valuations that can be used to assess program cost-effectiveness.

A second conclusion drawn from the current research effort is that the conjoint method used in the current evaluation (*i.e.*, Approach 2) not only provides dollar values for the corresponding NEI groupings, it also provides insights into which NEIs or combinations of NEIs are most preferred by respondents. This is important information that can be used by program managers to maximize the effectiveness of program marketing strategies. In the marketing and product management fields, conjoint analysis is frequently used to assess the appeal of various advertising tactics and test customer acceptance of new product designs. As the results from the current evaluation illustrate, conjoint analysis can successfully be applied in the energy efficiency field to achieve similar results and help guide program marketing efforts. However, as is further discussed in the next section, it is important to develop focused, reasonable, and realistic attributes and levels for use in the conjoint analysis to ensure respondent understanding and interpretation of the selected comparisons and generate meaningful results using this technique.

5.2 LESSONS LEARNED

Much has been learned during the course of this year's methodological development and analysis process. Key insights into NEI levels and values are highlighted below.

Background Research is Key to Developing Focused, Reasonable, and Realistic Attributes and Levels for Conjoint Analyses

In developing a conjoint analysis, one must take considerable care in creating a limited and focused list of attributes that address reasonable categories of NEIs, and that are specified at levels likely to be experienced by program participants. This requires a great deal of background research and critical thinking but results in a better understanding by the research team of the NEIs they are attempting to estimate.

As discussed earlier, conjoint analyses are based upon pair-wise comparisons of different attribute groupings that are presented as separate product offers. The groupings are based upon a selection of attributes that are defined in terms of various levels (*i.e.*, a high-price level, a mid-price level, and a low-price level or a 10% increase in occupant productivity, a 5% increase in occupant productivity, and no increase in occupant productivity). The levels associated with each attribute must be realistic and reasonable given available knowledge of the attributes and real-world conditions. If this is not the case, the robustness of the conjoint analysis is reduced. For example, if the levels associated with a specific attribute are unrealistic and/or unreasonable for a given region or market actor group, respondents will rightfully be disinclined to value that attribute in a given pair-wise comparison. This will skew the results of the evaluation.

Conjoint analysis also requires that the researcher use a limited number of attributes since a long list of attributes is not practical in a choice experiment. In prior research efforts, which have used long lists of NEIs, when the values associated with the individual NEIs are summed, the result is often greater (sometimes by a factor of five) than the overall value respondents assign to all NEIs considered in aggregate. A review of attributes used in prior studies shows that there are a number of closely related attributes. For example, an attribute defined as tenant satisfaction in a commercial building that is rented will also be related to attributes such as comfort, reduced noise, and better lighting. Including all of these attributes in the analysis is bound to lead to estimates of NEI values that are difficult to interpret and overly large in terms of their collective value. In contrast, an NEI conjoint analysis which focuses on just a key set of attributes will highlight those attributes that are the greatest drivers of value for participants. While some NEI factors may be left out, the list that is included should capture the vast majority of NEIs and, depending on the outcome of the research, may result in values that are viewed as having greater credibility. This reality argues for a carefully considered evaluation design and background research.

Evaluation Design Must Consider the Difficulty Respondents Have in Conceiving of Net NEIs

As discussed previously in this paper, the goal of NEI evaluations should be to estimate the net NEIs that result from program actions that would not have occurred if the program had not been offered. In order to do so, NEI evaluations must be designed to elicit information regarding these net impacts. Results from previous NEI (and other) evaluations imply that it is likely that some respondents may have difficulty conceiving of net NEIs. As an example, consider residential purchasers of new homes. In most instances, the new homes people purchase, whether ENERGY STAR labeled or not, will have more efficient equipment and systems than the existing homes they are leaving behind (assuming the existing homes are more than several years old and have not undergone major renovation activity). Is it reasonable to expect that purchasers of new ENERGY STAR certified homes will be able to determine the net NEIs associated with their homes as compared to other new homes that are not ENERGY STAR? This is a difficult question regardless of the program type considered (*i.e.*, commercial new construction programs, equipment replacement programs, etc.), and one that argues for a carefully considered evaluation design that acknowledges and explicitly addresses the difficulty of the questions respondents are being asked to answer.

Pre-screening Respondents to Obtain Committed Survey Respondents Is Important

The current research effort reveals the importance of pre-screening efforts to recruit committed survey respondents. This is especially true for the conjoint analysis portion of the evaluation due to the fact that conjoint analysis is most effective when respondents are able to see the pair-wise comparisons they are being asked to consider (*i.e.*, a telephone survey is the least preferred mode for conducting a conjoint analysis). Pre-screening efforts not only enable the purpose of the research effort to be explained to potential respondents, they also increase overall survey response rates and can decrease turn-around time. In addition, pre-screening efforts can help alleviate respondent reservations regarding on-line survey efforts, given the large volume of junk email and websites that many respondents have to contend with. The pre-screening efforts can be conducted during separate non-NEI survey efforts or through telephone calls or direct mailings to potential survey respondents. Overall response rates for the current research effort would undoubtedly have been lower had it not been for the pre-screening (and follow-up) efforts conducted by the MCAC Team. Future research efforts should include adequate resources, both time and budget, to incorporate these measures (*i.e.*, comprehensive pre-screening and follow-up efforts) and other innovative approaches (*e.g.*, incentives and other value propositions for respondents) into the project designs in an effort to bolster overall response rates.

APPENDIX A:

DETAILS REGARDING CONJOINT ANALYSIS METHODOLOGY

DETAILS REGARDING CONJOINT ANALYSIS METHODOLOGY

Each survey instrument had eight conjoint questions that represented hypothetical comparisons between different combinations of attributes. There were three versions of this question set, and each question was unique over all the versions. Each individual question is a comparison of all listed attributes for the program, with the levels of the individual attributes differing.

Details of the methodology used to create these questions and analyze the results are given in the appendix.

The choice of attribute levels for each question was done in the following way:

1. A list of all possible combinations of attribute levels was created. For programs that have six different attributes, a total of 96 combinations are possible, as the first attribute has three levels, and the remaining attributes have two ($3 * 2^5 = 96$). For programs that have five different attributes, a total of 48 combinations are possible ($3 * 2^4 = 48$).
2. Combinations of attributes that are too heavily weighted in one direction (*e.g.,* all attributes are positive or negative) were removed from the list as these combinations would have theoretically been chosen (if all positive) or not chosen (if all negative) by all respondents and would not have provided meaningful information for the conjoint analysis.
3. The combinations of attributes included in the final survey instruments were randomly selected from the list of remaining attribute combinations. Three sets of questions were created, ensuring that a wide variety of combinations would be evaluated. The version of the question set that was sent out to respondents was tracked so that the correct analysis could be done on the responses.

FORMAT DATA FOR ANALYSIS FROM SURVEY RESULTS

Once the data was received, either from the on-line version or the paper version, the choices that respondents had made in the conjoint section were analyzed.

First, a set of difference values was created from the conjoint questions that had been answered by respondents. These values represented the difference between the attribute level in choice A and the attribute level in choice B (in the order of A - B). Doing so produces a list of five or six values for each question (depending on the number of attributes associated with the program), which were either -1, 0, or 1. The -1 value represents choice A having a lower attribute level than choice B, the 0 value means the choice A and choice B attribute levels were the same, and the 1 value represents choice A having a higher attribute level than choice B. The exception to this calculation is the first attribute, which represents a monetary value (either construction cost, project cost, or purchase price depending on the program) used to quantify the results for the other attributes. For this monetary attribute, the actual dollar value of each level was used, instead of a -1, 0, or 1.

Next, the corresponding difference values were combined with respondent choices for each question. A 1 was used for choice A, and a 0 for choice B. A table was then compiled from the data which had the following format with each line of the table corresponding to one question response:

Choice	Attribute 1	Attribute 2… 5 or 6
Choice of the respondent: 1 = A, 0 = B	Difference in $ value between levels in choice A and choice B	Difference in attribute levels in choice A and B (-1, 0, or 1)

ANALYZE DATA WITH PROBIT REGRESSION MODEL

The final table containing responses to all conjoint questions was input into the software package STATA, where a probit analysis was run. The probit analysis produced a table of coefficients which were used to calculate respondent willingness-to-pay (WTP) for all non-monetary attributes.

The coefficients were statistically valid only if both of the following conditions were met:

1. The z value is > 1.0. The z value represents the number of standard deviations from the mean and indicates how unusual the measurement is in the population. For the conjoint analysis, a z value greater than one represents a statistically valid result.
2. The coefficient is of the expected sign. If the lower attribute level is preferable, the coefficient should be positive; if the lower attribute level is less preferable, the coefficient should be negative. For example, a 10% increase in productivity is preferable to a 2% increase in productivity. As the attribute level definitions for the productivity attribute are: level 1 = 2%, level 2 = 10%, then the corresponding coefficient for the productivity attribute should be positive.

If either of these conditions is not true, it indicates that there is too much variance in the responses and the resulting coefficient is not statistically valid.

The WTP for each attribute was then calculated by dividing the coefficient of each attribute by the coefficient of the first attribute (*i.e.*, the attribute with a monetary value). If the resulting value is negative, it is multiplied by -1 (the sign is not important, as long as the coefficient is valid).

THEORY OF CONJOINT WTP CALCULATIONS WITH PROBIT REGRESSION

In reference to the conjoint analysis, the willingness-to-pay (WTP) is defined as the dollar amount that a consumer would be willing to pay in order to gain an improvement in the level of the attribute. Or put another way, the amount they would be willing to pay to go from the less preferable attribute level to the more preferable level - e.g. from a 2% increase in productivity to a 10% increase in productivity. The following calculations show how this value is calculated from the answers to the conjoint questions.

For simplicity, suppose that there is a single attribute, x, with marginal utility. Then the WTP for one additional unit of x is the amount that equates utility in the initial state to the utility after the purchase/installation:

$$U_0(y,x) = U_1(y - WTP, x + 1) \quad (1)$$

The random utility model is assumed. The utility of the i^{th} choice is a linear function of the income, y_i, and the characteristics of the choice, x_i:

$$U_i = \gamma y_i + \beta x_i + \varepsilon_i \qquad \text{for } i = 1, \ldots, m \quad (2)$$

where m is the number of choices, ε_i is a white-noise disturbance, and γ and β are parameters to be estimated.

Ignoring the error term, and employing this functional form in the definition of WTP (equation 1) gives:

$$\gamma y_i + \beta x_i = \gamma(y_i - WTP) + \beta(x_i + 1) \quad (3)$$

Solving for WTP yields:

$$WTP = \beta/\gamma \quad (4)$$

$\beta_1 - \beta_5$ and γ are determined with the probit regression model, as shown below.

Define the utility of choice A as:

$$U_A = \sum_{k=1}^{6} \beta_k x_k^A + \varepsilon^A \quad (5)$$

and the utility of choice B as:

$$U_B = \sum_{k=1}^{6} \beta_k x_k^B + \varepsilon^B \quad (6)$$

Then if the respondent chooses A over B, we have $U_A > U_B$.

In this case, ignoring the error term, for k = 1 to 6,

$$U_A > U_B \quad => \quad \Sigma \beta_k x_k^A > \Sigma \beta_k x_k^B$$

$$=> \quad \Sigma \beta_k (x_k^A - x_k^B) > 0 \quad (7)$$

The value $x_k^A - x_k^B$,(Δx_k) for k = 1 to 6, is simply the difference in the attribute levels as presented to the respondent for each question (*i.e.*, a value of 1, 0, or -1). These are the independent variables that are input to the probit model. The dependent variable is the choice of the respondent, which is 1 for choice A and 0 for choice B.

The data input into the probit model for j questions is therefore a table with the format:

$choice_1$ Δx_{11} Δx_{12} Δx_{13} Δx_{14} Δx_{15} Δx_{16}

$choice_2$ Δx_{21} Δx_{22} Δx_{23} Δx_{24} Δx_{25} Δx_{26}

…..

$choice_j$ Δx_{j1} Δx_{j2} Δx_{j3} Δx_{j4} Δx_{j5} Δx_{j6}

Note that each respondent answers eight questions, so the number of lines in the above table is eight multiplied by the number of respondents. The coefficients from equation (7) - values β_1 to β_6 - are found by running the probit model in STATA with the above data. These coefficients are then put into equation (4) to determine respondent WTP.

APPENDIX B:

FINAL NEI SURVEY INSTRUMENTS

NYSERDA New Construction Program – Survey of Non-Energy Impacts

NYSERDA Commercial/Industrial Performance Program – Survey of Non-Energy Impacts

NYSERDA Small Commercial Lighting Program – Survey of Non-Energy Impacts

NYSERDA ENERGY STAR® Homes – Survey of Non-Energy Impacts

NYSERDA ENERGY STAR® Compact Fluorescent Lightbulbs – Survey of Non-Energy Impacts

NYSERDA ENERGY STAR® Clothes Washers – Survey of Non-Energy Impacts

NYSERDA New Construction Program

Survey of Non-Energy Impacts

Growing evidence indicates that energy efficiency investments produce impacts aside from just energy savings. The value of these impacts (whether positive and negative) significantly affects your company's return on investment. This survey is being conducted on behalf of the New York State Energy Research and Development Authority (NYSERDA) by Summit Blue Consulting, an independent research firm. The purpose of the survey is to gain a better understanding of the role non-energy impacts may play in NYSERDA's New Construction Program.

Your project is one of only a small number that have been selected for review. The information you provide will be important in guiding NYSERDA's New Construction Program going forward and it will help NYSERDA to better serve companies like yours in the future.

Following is a summary of the project for which your company received funding under NYSERDA's New Construction Program:

Company Name: ______________________________ Total Incentive Paid: ______________________

Facility Name: ______________________________ Annual kWh saved: ______________________

Contact Name: ______________________________ Contact Title: ______________________________

Contact Phone: ______________________________ Contact Email: ______________________________

Year Project Completed: ______________________

Please provide any corrections to the above information in the space below:

____

____

[Note: If another person at your company is more knowledgeable about the energy-efficient features and impacts of your new building, please forward this questionnaire to that person, and provide their contact information above.]

It should take you about 15 minutes to complete this survey. As an independent research firm, Summit Blue Consulting does not intend to report your responses in any way that would reveal your identity or the identity of your company.

Thank you for taking the time to complete this survey!

GENERAL INSTRUCTIONS

Your judgments and opinions are important to this research effort. While you may not be able to provide precise answers to the questions, we ask that you reply using your best judgments and estimates. If you have no idea whatsoever, simply indicate that you don't know.

Part A

A1. a. NYSERDA estimates that you save ___ $/yr in energy costs due to the energy-efficient features of your new building when compared to a building that simply meets levels required by the State Energy Code. Is this approximately correct?

Y ☐ N ☐ [If no, proceed to b.] Don't Know ☐

b. If you answered no, please provide your own estimate of annual energy cost savings:

$ _________/yr

A2. Did the new building that received funding from NYSERDA's New Construction Program replace another older building?

Y ☐ [If yes, proceed to b] N ☐ [If no, skip to A3]

b. Your older building was constructed approximately ______ years ago.

c. Please indicate how the older building that was replaced compared to other similar buildings (same type and age) in your area:

	Much worse	Somewhat worse	Same	Somewhat better	Much better
HVAC Energy Efficiency **Much worse** = older building was more than 25% less efficient than new NCP building **Much better** = older building was more than 25% more efficient than new NCP building	☐	☐	☐	☐	☐
HVAC Comfort **Much worse** = older building had more excessively hot or cold periods than new NCP building **Much better** = older building was more comfortable regardless of outside conditions than new NCP building	☐	☐	☐	☐	☐
Lighting Energy Efficiency **Much worse** = older building was more than 25% less efficient than new NCP building **Much better** = older building was more than 25% more efficient than new NCP building	☐	☐	☐	☐	☐
Lighting Quality **Much worse** = older building had a significantly inhibited work environment compared to new NCP building **Much better** = older building had an enhanced work environment compared to new NCP building	☐	☐	☐	☐	☐

d. Please indicate how the older building that was replaced compares to the new building that received funding from NYSERDA's New Construction Program:

	much better	somewhat better	same	somewhat worse	much worse
HVAC energy efficiency **Much worse** = your building was more than 25% <u>less</u> efficient than other similar buildings **Much better** = your building was more than 25% <u>more</u> efficient than other similar buildings	☐	☐	☐	☐	☐
HVAC comfort **Much worse** = your building had more excessively hot or cold periods than other similar buildings **Much better** = your building was more comfortable than other similar buildings regardless of outside conditions	☐	☐	☐	☐	☐
Lighting energy efficiency **Much worse** = your building was more than 25% <u>less</u> efficient than other similar buildings **Much better** = your building was more than 25% <u>more</u> efficient than other similar buildings	☐	☐	☐	☐	☐
Lighting quality **Much worse** = your building had a significantly inhibited work environment compared to other similar buildings **Much better** = your building had an enhanced work environment compared to other similar buildings	☐	☐	☐	☐	☐

A3. Besides energy savings, have you noticed other positive or negative impacts resulting from the energy-efficient features of your new building that received funding from NYSERDA's New Construction Program? [*For example, positive impacts might include noise reduction from better windows; negative impacts might include the expense of training new staff about new equipment*.]

a. Please describe positive impacts:

____

____

b. Please describe negative impacts:

____

____

Part B

Instructions: For the following set of questions, please consider conditions in your new building that received funding from NYSERDA's New Construction Program and provide your best insights regarding:

a) Whether you experienced ***positive, zero,*** or ***negative*** impacts ***compared to other new buildings constructed only to meet (not exceed in any way) efficiency levels required by the State Energy Code***; and

b) How the value of the impacts (either positive or negative) ***compares, in percentage terms, to the value of the energy savings of your new building*** that received funding from NYSERDA's New Construction Program.

For example, for a positive impact, an answer of 25-50% would mean that the value of the impact is 25-50% *as valuable as* the energy savings. For a negative impact, an answer of 25-50% would mean that the attribute *detracts* from the value of the energy savings by 25-50%.

B1. **Energy Equipment Operation and Maintenance Costs** (*not including fuel costs*)

Your experience with this non-energy impact has been (*please check one*):

Positive	☐	And when compared to the value of energy savings from the new building, this is _____% as valuable (insert best estimate).
Zero	☐	**[Skip to B2]**
Negative	☐	And when compared to the value of energy savings from the new building, this detracts _____% (insert best estimate).
Don't know	☐	**[Skip to B2]**

B2. **Lighting Quality** (*i.e., evenness of light levels, amount of glare and occupant eye strain*)

Your experience with this non-energy impact has been (*please check one*):

Positive	☐	And when compared to the value of energy savings from the new building, this is _____% as valuable (insert best estimate).
Zero	☐	**[Skip to B3]**
Negative	☐	And when compared to the value of energy savings from the new building, this detracts _____% (insert best estimate).
Don't know	☐	**[Skip to B3]**

B3. **Thermal Comfort and HVAC Effectiveness** *(i.e. temperature settings, ventilation, etc.)*

Your experience with this non-energy impact has been (*please check one*):

Positive	☐	And when compared to the value of energy savings from the new building, this is _____% as valuable (insert best estimate).
Zero	☐	**[Skip to B4]**
Negative	☐	And when compared to the value of energy savings from the new building, this detracts _____% (insert best estimate).
Don't know	☐	**[Skip to B4]**

B4. **Occupant Productivity**

Your experience with this non-energy impact has been (*please check one*):

Positive	☐	And when compared to the value of energy savings from the new building, this is _____% as valuable (insert best estimate).
Zero	☐	**[Skip to B5]**
Negative	☐	And when compared to the value of energy savings from the new building, this detracts _____% (insert best estimate).
Don't know	☐	**[Skip to B5]**

B5. **Ease of Selling or Leasing the Building**

Your experience with this non-energy impact has been (*please check one*):

Positive	☐	And when compared to the value of energy savings from the new building, this is _____% as valuable (insert best estimate).
Zero	☐	**[Skip to B6]**
Negative	☐	And when compared to the value of energy savings from the new building, this detracts _____% (insert best estimate).
Don't know	☐	**[Skip to B6]**

B6. **Indoor Air Quality**

Your experience with this non-energy impact has been (*please check one*):

Positive	□	And when compared to the value of energy savings from the new building, this is _____% as valuable (insert best estimate).
Zero	□	**[Skip to B7]**
Negative	□	And when compared to the value of energy savings from the new building, this detracts _____% (insert best estimate).
Don't know	□	**[Skip to B7]**

B7. **Noise Levels**

Your experience with this non-energy impact has been (*please check one*):

Positive	□	And when compared to the value of energy savings from the new building, this is _____% as valuable (insert best estimate).
Zero	□	**[Skip to B8]**
Negative	□	And when compared to the value of energy savings from the new building, this detracts _____% (insert best estimate).
Don't know	□	**[Skip to B8]**

B8. **General Sense of Doing Good for the Environment**

Your experience with this non-energy impact has been (*please check one*):

Positive	□	And when compared to the value of energy savings from the new building, this is _____% as valuable (insert best estimate).
Zero	□	**[Skip to B9]**
Negative	□	And when compared to the value of energy savings from the new building, this detracts _____% (insert best estimate).
Don't know	□	**[Skip to B9]**

B9. **Overall Impacts**

Now please consider the ***overall*** value of all the non-energy impacts mentioned above, compared to another new building constructed only to meet efficiency levels required by the State Energy Code.

The ***overall*** value of all the non-energy impacts compared to another new building constructed only to meet efficiency levels required by the State Energy Code is (*please check one*):

Positive	☐	When compared to the value of energy savings from the new building, the overall value of all the non-energy impacts is _____% as valuable (insert best estimate).
Zero	☐	**[Skip to Part C]**
Negative	☐	When compared to the value of energy savings from the new building, the overall value of all the non-energy impacts detracts _____% (insert best estimate).
Don't know	☐	**[Skip to Part C]**

B10. **If the overall value of the non-energy impacts is positive**, and these positive impacts disappeared, approximately how much would you be willing to invest to gain back these benefits in terms of an annual dollar amount?

- ❑ $___________/yr
- ❑ Don't know/refused

OR

If the overall value of the non-energy impacts is negative, what would you be willing to invest to eliminate these negative impacts from your new building, as an annual dollar amount.

- ❑ $___________/yr
- ❑ Don't know/refused

Part C

C1. a. Did anticipated non-energy impacts influence your decision to increase the energy efficiency of your new building that received funding from NYSERDA's New Construction Program? (*please check one*)

_____ Non-energy impacts did not influence my decision **[Skip to C2]**

_____ Non-energy impacts slightly influenced my decision

_____ Non-energy impacts moderately influenced my decision

_____ Non-energy impacts significantly influenced my decision

b. Which installed measures or design features were most influenced by anticipated non-energy impacts?

____

____

C2. How did your experience with NYSERDA's New Construction Program affect your level of awareness of non-energy impacts? (*please check one*)

_____ Did not affect my awareness of non-energy impacts

_____ Slightly increased my awareness of non-energy impacts

_____ Moderately increased my awareness of non-energy impacts

_____ Significantly increased my awareness of non-energy impacts

Part D

This is the final section of the survey. In this section, you will be presented with a series of 8 comparisons of building attributes. In each comparison, please assume that the two buildings are identical in every way except for the variation presented among the listed attributes. You will then be asked to select which of the two building options you prefer.

Please consider the following example of two building options. In the example below, we compare the building attributes and highlight the differences in the levels of the attributes. Note that for some attributes, there may be no difference.

Example Comparison

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B	DIFFERENCE
Construction Costs Cost / ft^2	$144/$ft^2$	$140/$ft^2$	B has lower construction cost
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	3% of annual O&M expenses	5% of annual O&M expenses	A has lower O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	More than 20%	Less than 5%	B occupants are more satisfied with lighting quality
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	Less than 5 days per year	More than 25 days per year	A occupants are more comfortable
Occupant productivity (change in occupant productivity relative to previous work environment)	2% increase	10% increase	B occupants demonstrated greater increase in productivity
Ease of selling or leasing the building (average time on the market for vacant space)	30 days	60 days	A is easier to sell or lease
Please choose Building A or B	☐	☐	

In the series of questions that follow, please consider the two building options that are presented, labeled A and B, and select the option that you prefer. For each comparison, please select the option you prefer even if you do not consider either option to be ideal.

Comparison 1

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Construction Costs Cost / ft^2	$144/$ft^2$	$140/$ft^2$
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	3% of annual O&M expenses	3% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	More than 20%	Less than 5%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	Less than 5 days per year	More than 25 days per year
Occupant productivity (change in occupant productivity relative to previous work environment)	2% increase	10% increase
Ease of selling or leasing the building (average time on the market for vacant space)	30 days	60 days
Please choose Building A or B	☐	☐

Comparison 2

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Construction Costs Cost / ft^2	\$140/ft^2	\$144/ft^2
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	3% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	More than 20%	Less than 5%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	More than 25 days per year	More than 25 days per year
Occupant productivity (change in occupant productivity relative to previous work environment)	2% increase	2% increase
Ease of selling or leasing the building (average time on the market for vacant space)	30 days	30 days
Please choose Building A or B	☐	☐

Comparison 3

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Construction Costs Cost / ft^2	$148/$ft^2$	$144/$ft^2$
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	3% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	More than 20%	Less than 5%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	Less than 5 days per year	More than 25 days per year
Occupant productivity (change in occupant productivity relative to previous work environment)	10% increase	2% increase
Ease of selling or leasing the building (average time on the market for vacant space)	60 days	60 days
Please choose Building A or B	☐	☐

Comparison 4

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Construction Costs Cost / ft^2	$144/$ft^2$	$140/$ft^2$
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	3% of annual O&M expenses	5% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	More than 20%	Less than 5%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	More than 25 days	More than 25 days
Occupant productivity (change in occupant productivity relative to previous work environment)	2% increase	10% increase
Ease of selling or leasing the building (average time on the market for vacant space)	30 days	60 days
Please choose Building A or B	☐	☐

Comparison 5

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Construction Costs Cost / ft^2	$148/$ft^2$	$148/$ft^2$
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	3% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	More than 20%	More than 20%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	Less than 5 days per year	Less than 5 days per year
Occupant productivity (change in occupant productivity relative to previous work environment)	2% increase	2% increase
Ease of selling or leasing the building (average time on the market for vacant space)	60 days	30 days
Please choose Building A or B	☐	☐

Comparison 6

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Construction Costs Cost / ft^2	\$148/ft^2	\$144/ft^2
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	5% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	Less than 5%	More than 20%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	Less than 5 days per year	Less than 5 days per year
Occupant productivity (change in occupant productivity relative to previous work environment)	2% increase	10% increase
Ease of selling or leasing the building (average time on the market for vacant space)	60 days	60 days
Please choose Building A or B	☐	☐

Comparison 7

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Construction Costs Cost / ft^2	\$148/ft^2	\$144/ft^2
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	3% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	More than 20%	Less than 5%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	More than 25 days per year	Less than 5 days per year
Occupant productivity (change in occupant productivity relative to previous work environment)	10% increase	2% increase
Ease of selling or leasing the building (average time on the market for vacant space)	60 days	30 days
Please choose Building A or B	☐	☐

Comparison 8

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Construction Costs Cost / ft^2	$148/$ft^2$	$148/$ft^2$
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	3% of annual O&M expenses	5% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	More than 20%	Less than 5%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	More than 25 days per year	More than 25 days per year
Occupant productivity (change in occupant productivity relative to previous work environment)	10% increase	2% increase
Ease of selling or leasing the building (average time on the market for vacant space)	60 days	60 days
Please choose Building A or B	☐	☐

Would you like to offer any additional comments about the non-energy impacts associated with your participation in the NYSERDA New Construction Program?

____

____

Thank you for taking the time to complete this survey!

NYSERDA Commercial/Industrial Performance Program

Survey of Non-Energy Impacts

Growing evidence indicates that energy efficiency investments produce impacts aside from just energy savings. The value of these impacts (whether positive and negative), can significantly affect your company's return on investment. This survey is being conducted on behalf of the New York State Energy Research and Development Authority (NYSERDA) by Summit Blue Consulting, an independent research firm. The purpose of the survey is to gain a better understanding of the role non-energy impacts may play in NYSERDA's Commercial/Industrial Performance Program.

Your project is one of only a small number that have been selected for review. The information you provide will be important in guiding NYSERDA's Commercial/Industrial Performance Program going forward and it will help NYSERDA to better serve companies like yours in the future.

Following is a summary of the project for which your company received funding under NYSERDA's Commercial/Industrial Performance Program:

Company Name: ______________________________

Facility Name: ______________________________

Contact Name: ______________________________

Contact Phone: ______________________________

Year Project Completed: ________________________

Estimated Total Incentive: ________________________

Annual kWh saved: ________________________

Contact Title: ______________________________

Contact Email: ______________________________

Energy Service Company:_________________________

Please provide any corrections to the above information in the space below:

____

____

[Note: If another person at your company is more knowledgeable about the energy-efficient features and impacts of this project, please forward this questionnaire to that person, and provide their contact information above.]

It should take you about 15 minutes to complete this survey. As an independent research firm, Summit Blue Consulting does not intend to report your responses in any way that would reveal your identity or the identity of your company.

Thank you for taking the time to complete this survey!

GENERAL INSTRUCTIONS

Your judgments and opinions are important to this research effort. While you may not be able to provide precise answers to the questions, we ask that you reply using your best judgments and estimates. If you have no idea whatsoever, simply indicate that you don't know.

Part A

A1. a. The ESCO estimated that you will save approximately ___ $/yr in energy costs due to your energy-efficiency project. Is this approximately correct?

Y □ N □ [If no, proceed to b.] Don't Know □

b. If you answered no, please provide your own estimate of annual energy cost savings:

$ _________/yr

A2. Please indicate how the condition of your building prior to your company's participation in NYSERDA's Commercial/Industrial Performance Program compared to other similar buildings (same type and age) in your area:

	much better	somewhat better	same	somewhat worse	much worse
HVAC energy efficiency **Much worse** = your building was more than 25% <u>less</u> efficient than other similar buildings **Much better** = your building was more than 25% <u>more</u> efficient than other similar buildings	□	□	□	□	□
HVAC comfort **Much worse** = your building had more excessively hot or cold periods than other similar buildings **Much better** = your building was more comfortable than other similar buildings regardless of outside conditions	□	□	□	□	□
Lighting energy efficiency **Much worse** = your building was more than 25% <u>less</u> efficient than other similar buildings **Much better** = your building was more than 25% <u>more</u> efficient than other similar buildings	□	□	□	□	□
Lighting quality **Much worse** = your building had a significantly inhibited work environment compared to other similar buildings **Much better** = your building had an enhanced work environment compared to other similar buildings	□	□	□	□	□

A3. Besides energy savings, have you noticed other positive or negative impacts resulting from the energy-efficient features of your building? [*For example, positive impacts might include noise reduction from better windows; negative impacts might include the expense of training new staff about new equipment*.]

a. Please describe positive impacts:

____

____

b. Please describe negative impacts:

____

____

Part B

Instructions: For the following set of questions, please consider the conditions in your building after participating in NYSERDA's Commercial/Industrial Performance Program, and provide your best insights regarding:

c) Whether you experienced ***positive, zero,*** or ***negative*** non-energy impacts from the energy efficiency measures installed in your building ***compared to conditions in your building prior to participating in the Commercial/Industrial Performance Program***; and

d) How the value of the non-energy impacts (either positive or negative) ***compares, in percentage terms, to the value of the energy savings of the project*** that received funding from NYSERDA's Commercial/Industrial Performance Program.

For example, for a positive impact, an answer of 25-50% would mean that the value of the impact is 25-50% *as valuable as* the energy savings. For a negative impact, an answer of 25-50% would mean that the attribute *detracts* from the value of the energy savings by 25-50%.

B1. **Energy Equipment Operation and Maintenance Costs** (*not including fuel costs*)

Your experience with this non-energy impact has been (*please check one*):

Positive ☐ And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact is _____% as valuable (insert best estimate).

Zero ☐ **[Skip to B2]**

Negative ☐ And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact detracts _____% (insert best estimate).

Don't know ☐ **[Skip to B2]**

B2. **Lighting Quality** (*i.e., evenness of light levels, amount of glare and occupant eye strain*)

Your experience with this non-energy impact has been (*please check one*):

Positive ☐ And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact is _____% as valuable (insert best estimate).

Zero ☐ **[Skip to B3]**

Negative ☐ And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact detracts _____% (insert best estimate).

Don't know ☐ **[Skip to B3]**

B3. **Thermal Comfort and HVAC Effectiveness** *(i.e. temperature settings, ventilation, etc.)*

Your experience with this non-energy impact has been (please check one):

Positive ☐ And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact is _____% as valuable (insert best estimate).

Zero ☐ **[Skip to B4]**

Negative ☐ And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact detracts _____% (insert best estimate).

Don't know ☐ **[Skip to B4]**

B4. **Occupant Productivity**

Your experience with this non-energy impact has been (*please check one*):

Positive ☐

And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact is _____% as valuable (insert best estimate).

Zero ☐ **[Skip to B5]**

Negative ☐ And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact detracts _____% (insert best estimate).

Don't know ☐ **[Skip to B5]**

B5. **Ease of Selling or Leasing the Building**

Your experience with this non-energy impact has been (*please check one*):

Positive	☐	And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact is _____% as valuable (insert best estimate).
Zero	☐	**[Skip to B6]**
Negative	☐	And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact detracts _____% (insert best estimate).
Don't know	☐	**[Skip to B6]**

B6. **Indoor Air Quality**

Your experience with this non-energy impact has been (*please check one*):

Positive	☐	And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact is _____% as valuable (insert best estimate).
Zero	☐	**[Skip to B7]**
Negative	☐	And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact detracts _____% (insert best estimate).
Don't know	☐	**[Skip to B7]**

B7. **Noise Levels**

Your experience with this non-energy impact has been (*please check one*):

Positive	☐	And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact is _____% as valuable (insert best estimate).
Zero	☐	**[Skip to B8]**
Negative	☐	And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact detracts _____% (insert best estimate).
Don't know	☐	**[Skip to B8]**

B8. **General Sense of Doing Good for the Environment**

Your experience with this non-energy impact has been (*please check one*):

Positive □ And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact is _____% as valuable (insert best estimate).

Zero □ **[Skip to B9]**

Negative □ And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, this impact detracts _____% (insert best estimate).

Don't know □ **[Skip to B9]**

B9. **Overall Impacts**

Now please consider the ***overall*** value of all the non-energy impacts mentioned above, compared to conditions in the building prior to the program.

Your overall experience with all the non-energy impact has been (*please check one*):

Positive □ And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, the overall value of all the non-energy impacts is _____% as valuable (insert best estimate).

Zero □ **[Skip to Part C]**

Negative □ And when compared to the value of energy savings from your company's participation in NYSERDA's Commercial/Industrial Performance Program, the overall value of all the non-energy impacts detracts _____% (insert best estimate).

Don't know □ **[Skip to Part C]**

B10. **If the overall value of the non-energy impacts is positive**, and these positive impacts disappeared, approximately how much would you be willing to invest to gain back these benefits, in terms of an annual dollar amount?

- ❑ $___________/yr
- ❑ Don't know/refused

OR

If the overall value of the non-energy impacts is negative, what would you be willing to invest to eliminate these negative impacts from your new building, as an annual dollar amount.

- ❑ $___________/yr

❑ Don’t know/refused

Part C

C1. a. Did anticipated non-energy impacts influence your decision to increase the energy efficiency of your building that received funding from NYSERDA’s Commercial/Industrial Performance Program? (*please check one*)

_____ Non-energy impacts did not influence my decision **[Skip to C2]**

_____ Non-energy impacts slightly influenced my decision

_____ Non-energy impacts moderately influenced my decision

_____ Non-energy impacts significantly influenced my decision

b. Which installed measures were most influenced by anticipated non-energy impacts?

____

____

C2. How did your experience with NYSERDA’s Commercial/Industrial Performance Program affect your level of awareness of non-energy impacts? (*please check one*)

_____ Did not affect my awareness of non-energy impacts

_____ Slightly increased my awareness of non-energy impacts

_____ Moderately increased my awareness of non-energy impacts

_____ Significantly increased my awareness of non-energy impacts

Part D

This is the final section of the survey. In this section, you will be presented with a series of 8 comparisons of building attributes. In each comparison, please assume that the two buildings are identical in every way except for the variation presented among the listed attributes. You will then be asked to select which of the two building options you prefer.

Please consider the following example of two building options. In the example below, we compare the building attributes and highlight the differences in the levels of the attributes. Note that for some attributes, there may be no difference.

Example Comparison

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B	DIFFERENCE
Project Costs Cost / ft^2	$1.25/$ft^2$	$1.75/$ft^2$	A has lower project cost
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	3% of annual O&M expenses	B has lower O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	Less than 10%	More than 30%	A occupants more satisfied with lighting quality
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	Less than 5 days per year	More than 25 days per year	A occupants are more comfortable
Indoor air quality/safety (a building with reduced air infiltration and improved ventilation would help keep dust, pollen, humidity, and car exhaust out of the building, making the building safer in terms of carbon monoxide levels and gas leaks.)	Reduced air infiltration and improved ventilation	Normal air infiltration and ventilation	B has better air quality
Occupant productivity (change in occupant productivity relative to previous work environment)	10% increase	2% increase	A occupants demonstrated greater increase in productivity
Please choose Building A or B	☐	☐	

In the series of questions that follow, please consider the two building options that are presented, labeled A and B, and select the option that you prefer. For each comparison, please select the option you prefer even if you do not consider either option to be ideal.

Comparison 1

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Project Costs Cost / ft^2	$1.25/$ft^2$	$1.75/$ft^2$
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	5% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	Less than 10%	Less than 10%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	Less than 5 days per year	Less than 5 days per year
Indoor air quality/safety (a building with reduced air infiltration and improved ventilation would help keep dust, pollen, humidity, and car exhaust out of the building, making the building safer in terms of carbon monoxide levels and gas leaks.)	Reduced air infiltration and improved ventilation	Normal air infiltration and ventilation
Occupant productivity (change in occupant productivity relative to previous work environment)	10% increase	10% increase
Please choose Building A or B	☐	☐

Comparison 2

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Project Costs Cost / ft^2	$2.25/$ft^2$	$1.25/$ft^2$
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	3% of annual O&M expenses	5% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	Less than 10%	Less than 10%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	More than 25 days per year	Less than 5 days per year
Indoor air quality/safety (a building with reduced air infiltration and improved ventilation would help keep dust, pollen, humidity, and car exhaust out of the building, making the building safer in terms of carbon monoxide levels and gas leaks.)	Normal air infiltration and ventilation	Reduced air infiltration and improved ventilation
Occupant productivity (change in occupant productivity relative to previous work environment)	10% increase	2% increase
Please choose Building A or B	☐	☐

Comparison 3

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Project Costs Cost / ft^2	\$1.25/ft^2	\$2.25/ft^2
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	5% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	More than 30%	Less than 10%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	Less than 5 days per year	More than 25 days per year
Indoor air quality/safety (a building with reduced air infiltration and improved ventilation would help keep dust, pollen, humidity, and car exhaust out of the building, making the building safer in terms of carbon monoxide levels and gas leaks.)	Normal air infiltration and ventilation	Reduced air infiltration and improved ventilation
Occupant productivity (change in occupant productivity relative to previous work environment)	10% increase	2% increase
Please choose Building A or B	☐	☐

Comparison 4

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Project Costs Cost / ft^2	$1.75/$ft^2$	$2.25/$ft^2$
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	3% of annual O&M expenses	3% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	Less than 10%	More than 30%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	More than 25 days	Less than 5 days per year
Indoor air quality/safety (a building with reduced air infiltration and improved ventilation would help keep dust, pollen, humidity, and car exhaust out of the building, making the building safer in terms of carbon monoxide levels and gas leaks.)	Reduced air infiltration and improved ventilation	Normal air infiltration and ventilation
Occupant productivity (change in occupant productivity relative to previous work environment)	2% increase	2% increase
Please choose Building A or B	☐	☐

Comparison 5

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Project Costs Cost / ft^2	$2.25/$ft^2$	$1.25/$ft^2$
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	5% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	More than 30%	More than 30%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	Less than 5 days per year	Less than 5 days per year
Indoor air quality/safety (a building with reduced air infiltration and improved ventilation would help keep dust, pollen, humidity, and car exhaust out of the building, making the building safer in terms of carbon monoxide levels and gas leaks.)	Normal air infiltration and ventilation	Reduced air infiltration and improved ventilation
Occupant productivity (change in occupant productivity relative to previous work environment)	2% increase	2% increase
Please choose Building A or B	☐	☐

Comparison 6

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Project Costs Cost / ft^2	$2.25/$ft^2$	$1.75/$ft^2$
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	3% of annual O&M expenses	3% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	Less than 10%	Less than 10%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	More than 25 days per year	Less than 5 days per year
Indoor air quality/safety (a building with reduced air infiltration and improved ventilation would help keep dust, pollen, humidity, and car exhaust out of the building, making the building safer in terms of carbon monoxide levels and gas leaks.)	Normal air infiltration and ventilation	Normal air infiltration and ventilation
Occupant productivity (change in occupant productivity relative to previous work environment)	2% increase	60 days
Please choose Building A or B	☐	☐

Comparison 7

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Construction Costs Cost / ft^2	$2.25/$ft^2$	$2.25/$ft^2$
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	3% of annual O&M expenses	3% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	More than 30%	Less than 10%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	Less than 5 days per year	Less than 5 days per year
Indoor air quality/safety (a building with reduced air infiltration and improved ventilation would help keep dust, pollen, humidity, and car exhaust out of the building, making the building safer in terms of carbon monoxide levels and gas leaks.)	Reduced air infiltration and improved ventilation	Normal air infiltration and ventilation
Occupant productivity (change in occupant productivity relative to previous work environment)	2% increase	10% increase
Please choose Building A or B	☐	☐

Comparison 8

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Construction Costs Cost / ft^2	$2.25/$ft^2$	$1.25/$ft^2$
Energy equipment operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	3% of annual O&M expenses	5% of annual O&M expenses
Lighting quality (percentage of building occupants who express dissatisfaction with lighting quality, i.e. complain of dark spots, flickering, noise, etc.)	Less than 10%	Less than 10%
Thermal comfort and HVAC effectiveness (number of days per year that building occupants express dissatisfaction with conditioned space)	Less than 5 days per year	Less than 5 days per year
Indoor air quality/safety (a building with reduced air infiltration and improved ventilation would help keep dust, pollen, humidity, and car exhaust out of the building, making the building safer in terms of carbon monoxide levels and gas leaks.)	Normal air infiltration and ventilation	Normal air infiltration and ventilation
Occupant productivity (change in occupant productivity relative to previous work environment)	2% increase	10% increase
Please choose Building A or B	☐	☐

Would you like to offer any additional comments about the non-energy impacts associated with your participation in the NYSERDA Commercial/Industrial Performance Program?

____

____

Thank you for taking the time to complete this survey!

NYSERDA Small Commercial Lighting Program

Survey of Non-Energy Impacts

Growing evidence indicates that energy efficiency investments produce impacts aside from just energy savings. The value of these non-energy impacts (whether positive or negative) can significantly affect your company's return on investment.

Your organization recently installed a new effective, energy-efficient lighting system using an electrical contractor who participates in the **New York Energy $mart**SM Small Commercial Lighting Program (SCLP). The Program is funded by the New York State Energy Research and Development Authority (NYSERDA). This survey is being conducted on NYSERDA's behalf by Summit Blue Consulting, an independent research firm. The purpose of the survey is to gain a better understanding of the role non-energy impacts may play in NYSERDA's Small Commercial Lighting Program.

Your project is one of only a small number that have been selected for review. The information you provide will be important in guiding NYSERDA's Small Commercial Lighting Program going forward and it will help NYSERDA to work with organizations like yours in the future.

Following is a summary of the lighting project at your facility:

Company Name: ______________________________

Facility Name: ______________________________

Contact Name: ______________________________

Contact Phone: ______________________________

Year Project Completed: ______________________

Estimated Annual kWh saved: ____________________

Contact Title: ______________________________

Contact Email: ______________________________

Electrical Contractor: __________________________

Please provide any corrections to the above information in the space below:

____

____

[Note: If another person at your company is more knowledgeable about the new effective, energy-efficient lighting system that was installed at your facility, please forward this questionnaire to that person, and provide their contact information above.]

It should take you about 15 minutes to complete this survey. As an independent research firm, Summit Blue Consulting does not intend to report your responses in any way that would reveal your identity or the identity of your company.

Thank you for taking the time to complete this survey!

GENERAL INSTRUCTIONS

Your judgments and opinions are important to this research effort. While you may not be able to provide precise answers to the questions, we ask that you reply using your best judgments and estimates. If you have no idea whatsoever, simply indicate that you don't know.

Part A

A1. a. NYSERDA estimates that you save ___ $/yr in energy costs due to the effective, energy-efficient lighting system at your facility when compared to lighting designed only to meet the minimum energy efficiency levels required by the State Energy Code. Is this approximately correct?

Y □ N □ [If no, proceed to b.] Don't Know □

b. If you answered no, please provide your own estimate of annual energy cost savings:

$ _________/yr

A2. a. Please indicate how the lighting in your facility compared to other similar facilities (size and type) in your area ***prior*** to the lighting project:

	much better	somewhat better	same	somewhat worse	much worse	don't know
Lighting energy efficiency **Much worse** = lighting in your facility was more than 25% <u>less</u> efficient than other similar facilities **Much better** = lighting in your facility was more than 25% <u>more</u> efficient than other similar facilities	□	□	□	□	□	□
Lighting quality and effectiveness **Much worse** = lighting levels were insufficient and light was unevenly distributed compared to other similar facilities **Much better** = lighting levels appeared brighter and more evenly distributed compared to other similar facilities	□	□	□	□	□	□
Occupant comfort and satisfaction **Much worse** = you experienced excessive problems with glare, noise and flickering compared to other similar facilities **Much better** = lighting in your building caused fewer problems with comfort (noise, glare, flickering) compared to other similar facilities	□	□	□	□	□	□

b. Please indicate how the current lighting in your facility (after participating in NYSERDA's Small Commercial Lighting Program) compares to the lighting in your facility prior to completing the lighting project:

	much better	somewhat better	same	somewhat worse	much worse	don't know
Lighting energy efficiency **Much worse** = Current lighting in your facility is more than 25% less efficient than before the lighting project was completed **Much better** = Current lighting in your facility is more than 25% more efficient than before the lighting project was completed	☐	☐	☐	☐	☐	☐
Lighting quality and effectiveness **Much worse** = Current lighting quality in your facility is more than 25% worse than before the lighting project was completed **Much better** = Current lighting quality in your facility is more than 25% better than before the lighting project was completed	☐	☐	☐	☐	☐	☐
Occupant comfort and satisfaction **Much worse** = you experience many more problems with glare, noise, and flickering with the current lighting system compared to the prior lighting system **Much better** = you experience many fewer problems with glare, noise, and flickering with the current lighting system compared to the prior lighting system	☐	☐	☐	☐	☐	☐

A3. Besides energy savings, have you noticed other positive or negative impacts resulting from the new lighting at your facility? [*For example, positive impacts might include better distribution of light; negative impacts might include the expense of training staff about new equipment*.]

a. Please describe any positive impacts:

____

____

b. Please describe any negative impacts:

____

____

Part B

<u>Instructions</u>: For the following set of questions, please consider conditions associated with the new lighting in your facility and provide your best insights regarding:

a) Whether you experienced ***positive, zero,*** or ***negative*** non-energy impacts ***compared to other new lighting systems designed only to meet (not exceed in any way) efficiency levels required by the State Energy Code***; and

b) How the value of the non-energy impacts (either positive or negative) ***compares, in percentage terms, to the value of the energy savings*** of the new lighting in your facility.

For example, for a <u>positive</u> non-energy impact, an answer of 25-50% would mean that the value of the impact is 25-50% *as valuable as* the energy savings. For a <u>negative</u> non-energy impact, an answer of 25-50% would mean that the attribute *detracts* from the value of the energy savings by 25-50%.

B1. **Lighting System Operation and Maintenance Costs** (*not including electric costs*)

Your experience with this non-energy impact has been (*please check one*):

Positive □ And when compared to the value of energy savings from the new lighting in your facility, this impact is _____% as valuable (insert best estimate).

Zero □ **[Skip to B2]**

Negative □ And when compared to the value of energy savings from the new lighting in your facility, this impact detracts _____% (insert best estimate).

Don't know □ **[Skip to B2]**

B2. **Lighting Effectiveness** (*i.e., evenness of light distribution, appropriateness of lighting levels*)

Your experience with this non-energy impact has been (*please check one*):

Positive □ And when compared to the value of energy savings from the new lighting in your facility, this impact is _____% as valuable (insert best estimate).

Zero □ **[Skip to B3]**

Negative □ And when compared to the value of energy savings from the new lighting in your facility, this impact detracts _____% (insert best estimate).

Don't know □ **[Skip to B3]**

B3. **Occupant Comfort and Satisfaction** *(i.e. amount occupant eye strain and headaches, etc.)*

Your experience with this non-energy impact has been (*please check one*):

Positive ☐ And when compared to the value of energy savings from the new lighting in your facility, this impact is _____% as valuable (insert best estimate).

Zero ☐ **[Skip to B4]**

Negative ☐ And when compared to the value of energy savings from the new lighting in your facility, this impact detracts _____% (insert best estimate).

Don't know ☐ **[Skip to B4]**

B4. **Worker Productivity**

Your experience with this non-energy impact has been (*please check one*):

Positive ☐ And when compared to the value of energy savings from the new lighting in your facility, this impact is _____% as valuable (insert best estimate).

Zero ☐ **[Skip to B5]**

Negative ☐ And when compared to the value of energy savings from the new lighting in your facility, this impact detracts _____% (insert best estimate).

Don't know ☐ **[Skip to B5]**

B5. **Ease of Selling or Leasing the Building or Space**

Your experience with this non-energy impact has been (*please check one*):

Positive ☐ And when compared to the value of energy savings from the new lighting in your facility, this impact is _____% as valuable (insert best estimate).

Zero ☐ **[Skip to B6]**

Negative ☐ And when compared to the value of energy savings from the new lighting in your facility, this impact detracts _____% (insert best estimate).

Don't know ☐ **[Skip to B6]**

B6. **General Sense of Doing Good for the Environment**

Your experience with this non-energy impact has been (*please check one*):

Positive □ And when compared to the value of energy savings from the new lighting in your facility, this impact is _____% as valuable (insert best estimate).

Zero □ **[Skip to B7]**

Negative □ And when compared to the value of energy savings from the new lighting in your facility, this impact detracts _____% (insert best estimate).

Don't know □ **[Skip to B7]**

B7. **Overall Impacts**

Now please consider the ***overall*** value of all the non-energy impacts mentioned above, compared to another new lighting system designed only to meet efficiency levels required by the State Energy Code.

Your ***overall*** experience with all of the non-energy impacts has been (*please check one*):

Positive □ And when compared to the value of energy savings from the new lighting in your facility, the overall value of all the non-energy impacts is _____% as valuable (insert best estimate).

Zero □ **[Skip to B8]**

Negative □ And when compared to the value of energy savings from the new lighting in your facility, the overall value of all the non-energy impacts detracts _____% (insert best estimate).

Don't know □ **[Skip to B8]**

B8. **If the overall value of the non-energy impacts is positive**, and these positive impacts disappeared, approximately how much would you be willing to pay to gain back these benefits in terms of an annual dollar amount?

- ❑ $___________/yr
- ❑ Don't know/refused

B9. **If the overall value of the non-energy impacts is negative**, what would you be willing to invest to eliminate these negative impacts from your lighting project, as an annual dollar amount.

- ❑ $___________/yr
- ❑ Don't know/refused

Part C

C1. a. Did anticipated non-energy impacts influence your decision to install the effective, energy-efficient lighting system in your facility instead of replacing your lighting with standard-efficiency equipment? (*please check one*)

_____ Non-energy impacts did not influence my decision **[Skip to C2]**

_____ Non-energy impacts slightly influenced my decision

_____ Non-energy impacts moderately influenced my decision

_____ Non-energy impacts significantly influenced my decision

b. Which anticipated non-energy impacts most influenced your decision?

____

____

C2. How did your experience with the electrical contractor that installed the new lighting affect your level of awareness of non-energy impacts? (*please check one*)

_____ Did not affect my awareness of non-energy impacts

_____ Slightly increased my awareness of non-energy impacts

_____ Moderately increased my awareness of non-energy impacts

_____ Significantly increased my awareness of non-energy impacts

Part D

This is the final section of the survey. In this section, you will be presented with a series of 8 comparisons of building attributes. In each comparison, please assume that the two facilities are identical in every way except for the variation presented among the listed attributes. You will then be asked to select which of the two building options you prefer.

Please consider the following example of two building options. In the example below, we compare the building attributes and highlight the differences in the levels of the attributes. Note that for some attributes, there may be no difference.

Example Comparison

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B	DIFFERENCE
Project Costs Cost / ft^2	$1.25/$ft^2$	$1.33/$ft^2$	A has lower project cost
Lighting system operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	3% of annual O&M expenses	B has lower O&M expenses
Occupant Comfort and Satisfaction: Percent of building occupants expressing dissatisfaction with lighting quality (i.e. complain of headaches, dark spots, noise, insufficient light levels etc.)	Less than 5%	More than 20%	A occupants are more comfortable
Lighting Effectiveness: Uniformity of light levels, presence of glare and shadows. (Lighting includes direct, indirect and natural sources, as well as occupant and daylight dimming controls.)	Little uniformity in lighting levels	Little levels are uniform and appropriate	B has more effective lighting
Occupant productivity Change in occupant productivity relative to previous work environment	10% increase	2% increase	A occupants demonstrate a greater increase in productivity
Ease of selling or leasing the building Average time on the market for vacant space	30 days	60 days	A is easier to sell or lease
Please choose Building A or B	☐	☐	

In the series of questions that follow, please consider the two building options that are presented, labeled A and B, and select the option that you prefer. For each comparison, please select the option you prefer even if you do not consider either option to be ideal.

Comparison 1

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Project Costs Cost / ft^2	\$1.25/ft^2	\$1.33/ft^2
Lighting system operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	5% of annual O&M expenses
Occupant Comfort and Satisfaction: Percent of building occupants expressing dissatisfaction with lighting quality (i.e. complain of headaches, dark spots, noise, insufficient light levels etc.)	Less than 5%	More than 20%
Lighting Effectiveness: Uniformity of light levels, presence of glare and shadows. (Lighting includes direct, indirect and natural sources, as well as occupant and daylight dimming controls.)	Little uniformity in lighting levels	Little uniformity in lighting levels
Occupant productivity Change in occupant productivity relative to previous work environment	10% increase	10% increase
Ease of selling or leasing the building Average time on the market for vacant space	30 days	60 days
Please choose Building A or B	☐	☐

Comparison 2

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Project Costs Cost / ft^2	\$1.29/ft^2	\$1.33/ft^2
Lighting system operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	3% of annual O&M expenses
Occupant Comfort and Satisfaction: Percent of building occupants expressing dissatisfaction with lighting quality (i.e. complain of headaches, dark spots, noise, insufficient light levels etc.)	More than 20%	More than 20%
Lighting Effectiveness: Uniformity of light levels, presence of glare and shadows. (Lighting includes direct, indirect and natural sources, as well as occupant and daylight dimming controls.)	Little uniformity in lighting levels	Little uniformity in lighting levels
Occupant productivity Change in occupant productivity relative to previous work environment	2% increase	2% increase
Ease of selling or leasing the building Average time on the market for vacant space	30 days	60 days
Please choose Building A or B	☐	☐

Comparison 3

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Project Costs Cost / ft^2	$1.33/$ft^2$	$1.29/$ft^2$
Lighting system operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	3% of annual O&M expenses
Occupant Comfort and Satisfaction: Percent of building occupants expressing dissatisfaction with lighting quality (i.e. complain of headaches, dark spots, noise, insufficient light levels etc.)	More than 20%	More than 20%
Lighting Effectiveness: Uniformity of light levels, presence of glare and shadows. (Lighting includes direct, indirect and natural sources, as well as occupant and daylight dimming controls.)	Lighting levels are uniform and appropriate	Little uniformity in lighting levels
Occupant productivity Change in occupant productivity relative to previous work environment	2% increase	10% increase
Ease of selling or leasing the building Average time on the market for vacant space	60 days	30 days
Please choose Building A or B	☐	☐

Comparison 4

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Project Costs Cost / ft^2	$1.29/$ft^2$	$1.33/$ft^2$
Lighting system operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	3% of annual O&M expenses	3% of annual O&M expenses
Occupant Comfort and Satisfaction: Percent of building occupants expressing dissatisfaction with lighting quality (i.e. complain of headaches, dark spots, noise, insufficient light levels etc.)	Less than 5%	Less than 5%
Lighting Effectiveness: Uniformity of light levels, presence of glare and shadows. (Lighting includes direct, indirect and natural sources, as well as occupant and daylight dimming controls.)	Lighting levels are uniform and appropriate	Little uniformity in lighting levels
Occupant productivity Change in occupant productivity relative to previous work environment	2% increase	10% increase
Ease of selling or leasing the building Average time on the market for vacant space	30 days	60 days
Please choose Building A or B	☐	☐

Comparison 5

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Project Costs Cost / ft^2	$1.29/$ft^2$	$1.25/$ft^2$
Lighting system operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	5% of annual O&M expenses
Occupant Comfort and Satisfaction: Percent of building occupants expressing dissatisfaction with lighting quality (i.e. complain of headaches, dark spots, noise, insufficient light levels etc.)	Less than 5%	Less than 5%
Lighting Effectiveness: Uniformity of light levels, presence of glare and shadows. (Lighting includes direct, indirect and natural sources, as well as occupant and daylight dimming controls.)	Little uniformity in lighting levels	Little uniformity in lighting levels
Occupant productivity Change in occupant productivity relative to previous work environment	2% increase	2% increase
Ease of selling or leasing the building Average time on the market for vacant space	30 days	30 days
Please choose Building A or B	☐	☐

Comparison 6

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Project Costs Cost / ft^2	$1.33/$ft^2$	$1.29/$ft^2$
Lighting system operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	5% of annual O&M expenses
Occupant Comfort and Satisfaction: Percent of building occupants expressing dissatisfaction with lighting quality (i.e. complain of headaches, dark spots, noise, insufficient light levels etc.)	More than 20%	More than 20%
Lighting Effectiveness: Uniformity of light levels, presence of glare and shadows. (Lighting includes direct, indirect and natural sources, as well as occupant and daylight dimming controls.)	Lighting levels are uniform and appropriate	Lighting levels are uniform and appropriate
Occupant productivity Change in occupant productivity relative to previous work environment	2% increase	2% increase
Ease of selling or leasing the building Average time on the market for vacant space	30 days	60 days
Please choose Building A or B	☐	☐

Comparison 7

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Project Costs Cost / ft^2	$1.29/$ft^2$	$1.29/$ft^2$
Lighting system operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	3% of annual O&M expenses
Occupant Comfort and Satisfaction: Percent of building occupants expressing dissatisfaction with lighting quality (i.e. complain of headaches, dark spots, noise, insufficient light levels etc.)	More than 20%	Less than 5%
Lighting Effectiveness: Uniformity of light levels, presence of glare and shadows. (Lighting includes direct, indirect and natural sources, as well as occupant and daylight dimming controls.)	Little uniformity in lighting levels	Little uniformity in lighting levels
Occupant productivity Change in occupant productivity relative to previous work environment	10% increase	10% increase
Ease of selling or leasing the building Average time on the market for vacant space	30 days	60 days
Please choose Building A or B	☐	☐

Comparison 8

ATTRIBUTE / DESCRIPTION	BUILDING A	BUILDING B
Project Costs Cost / ft^2	$1.29/$ft^2$	$1.25/$ft^2$
Lighting system operation & maintenance (O&M) costs (as a percentage of annual operating expenses)	5% of annual O&M expenses	3% of annual O&M expenses
Occupant Comfort and Satisfaction: Percent of building occupants expressing dissatisfaction with lighting quality (i.e. complain of headaches, dark spots, noise, insufficient light levels etc.)	More than 20%	More than 20%
Lighting Effectiveness: Uniformity of light levels, presence of glare and shadows. (Lighting includes direct, indirect and natural sources, as well as occupant and daylight dimming controls.)	Little uniformity in lighting levels	Lighting levels are uniform and appropriate
Occupant productivity Change in occupant productivity relative to previous work environment	10% increase	10% increase
Ease of selling or leasing the building Average time on the market for vacant space	60 days	30 days
Please choose Building A or B	☐	☐

Would you like to offer any additional comments about the non-energy impacts associated with your effective, energy-efficient lighting upgrade?

____

____

Thank you for taking the time to complete this survey!

NYSERDA Energy Star® HOMES SURVEY OF NON ENERGY IMPACTS

New York Energy Smart℠
Public Service Commission — NYSERDA
George E. Pataki, Governor

[redacted]GENERAL INSTRUCTIONS

Your judgments and opinions are important to this research effort. While you may not be able to provide precise answers in all cases, we ask that you answer the questions using your best estimates. If you have no idea whatsoever, simply indicate that you don't know.

PART A

A1. Comparing your current home to the last home you lived in, would you say your current home is (*please check one*):

- ❑ More energy-efficient
- ❑ Less energy-efficient [***Skip to Part D***]
- ❑ Same level of energy efficiency [***Skip to Part D***]
- ❑ Don't know [***Skip to Part D***]

A2. What features would you say are most responsible for the increased energy efficiency of your new home compared to the last home you lived in (*please check all that apply*)?

- ❑ Heating system
- ❑ Cooling system
- ❑ Water heating
- ❑ Windows
- ❑ Insulation
- ❑ Appliances
- ❑ Lighting
- ❑ Other (please specify) ____

A3. Comparing your new home to the last home you lived in, how much do you estimate you save each year due to the energy-efficient features of your new home? (*As a point of reference, NYSERDA estimates that an ENERGY STAR®-rated home saves about $600 per year compared to another new home constructed only to meet the minimum State Energy Code requirements.*) $_________ /year

A4. In what year was your last home constructed? ______
How many months have you lived in your new home? ______ months

A5. Besides energy savings, have you noticed other positive or negative impacts resulting from the energy efficient features of your home? (*For example, positive impacts could include reduced draftiness; negative impacts could include confusion about how to operate or maintain equipment.*)

Please describe any positive impacts:

____

____

____

Please describe any negative impacts:

____

____

____

PART B

Instructions: *For each of the questions in Part B, please:*

c) *Check one box to indicate how your new home compares to* ***the last home you lived in*** *(each question will be worded differently); and*

d) *Fill in a percentage to indicate how the value of any positive or negative impact compares to the value of your annual energy cost savings* ***compared to the last home you lived in.*** *For example, an answer of 50% would mean that the value of the impact is half as much as the energy savings. An answer of 25% would mean that the attribute adds or detracts from the value of the energy savings by 25%.*

B1. **Durability** *(i.e., heating and cooling equipment and structural materials)*

Your new home is…

- ❑ **Less durable** than your old home, and when compared to the total value of energy savings from your new home, this impact is _____% as valuable (*insert best estimate*).
- ❑ **Just as durable** as your old home.
- ❑ **More durable** than your old home, and when compared to the total value of energy savings from your new home, this impact detracts _____% (*insert best estimate*).
- ❑ **Don't know**.

B2. **Equipment or Appliance Maintenance Requirements**

Equipment and appliances in your new home require…

- ❑ **Less maintenance** than those in your old home, and when compared to the total value of energy savings from your new home, this impact is _____% as valuable (*insert best estimate*).
- ❑ **The same amount of maintenance** as those in your old home.
- ❑ **More maintenance** than those in your old home, and when compared to the total value of energy savings from your new home, this impact detracts _____% (*insert best estimate*).
- ❑ **Don't know**.

B3. **Thermal Comfort**

In terms of temperatures and draftiness, your new home is…

- ❑ **More comfortable** than your old home, and when compared to the total value energy savings from your new home, this impact is _____% as valuable (*insert best estimate*).
- ❑ **Just as comfortable** as your old home.
- ❑ **Less comfortable** than your old home, and when compared to the total value of energy savings from your new home, this impact detracts _____% (*insert best estimate*).
- ❑ **Don't know**.

B4. **Air Quality**

The quality of air in your new home is …

- ❑ **Better** than your old home, and when compared to the total value of energy savings from your new home, this impact is _____% as valuable (*insert best estimate*).
- ❑ **The same** as your old home.
- ❑ **Worse** than your old home, and when compared to the total value of energy savings from your new home, this impact detracts _____% (*insert best estimate*).
- ❑ **Don't know**.

B5. **Noise Levels**

In terms of the amount of outdoor noise you can hear from within your home, your new home is…

- ❑ **Less noisy** than your old home, and when compared to the total value of energy savings from your new home, this impact is _____% as valuable (*insert best estimate*).
- ❑ **Just as noisy** as your old home.
- ❑ **More noisy** than your old home, and when compared to the total value of energy savings from your new home, this impact detracts _____% (*insert best estimate*).
- ❑ **Don't know**.

B6. **Anticipated Ease of Selling Home**

You anticipate that your new home will be…

- ❑ **Easier to sell** than your old home, and when compared to the total value of energy savings from your new home, this impact is _____% as valuable (*insert best estimate*).
- ❑ **Just as easy to sell** as your old home.
- ❑ **Harder to sell** than your old home, and when compared to the total value of energy savings from your new home, this impact detracts _____% (*insert best estimate*).
- ❑ **Don't know.**

B7. **Safety** (*i.e., the safety features of your heating system*)

Your new home is …

- ❑ **Safer,** and when compared to the total value of energy savings from your new home, the impact is _____% as valuable (*insert best estimate*).
- ❑ **Just as safe**.
- ❑ **Less safe,** and when compared to the total value of energy savings from your new home, this impact detracts _____% (insert best estimate).
- ❑ **Don't know**.

B8. **Overall Impacts**

The ***overall*** value of all the non-energy impacts mentioned above is…

- ❑ **Positive,** and when compared to the total value of energy savings from your new home, the overall value of all the non-energy impacts is _____% as valuable (*insert best estimate*). **[*Go to C1*]**
- ❑ **Zero. [*Skip to Part D*]**
- ❑ **Negative,** and when compared to the total value of energy savings from your new home, the overall value of all the non-energy impacts detracts _____% (*insert best estimate*). **[*Go to C2*]**
- ❑ **Don't know**. **[*Skip to Part D*]**

PART C

C1. **If the overall value of the non-energy impacts is positive** and these positive impacts disappeared, approximately how much would you be willing to invest to gain back these benefits in terms of an annual dollar amount?

- ❑ $__________ /year
- ❑ Don't know/refuse

C2. **If the overall value of the non-energy impacts is negative**, what would you be willing to invest to eliminate these negative impacts from your new home terms of an annual dollar amount?

- ❑ $__________ /year
- ❑ Don't know/refuse

C3. Did the anticipated non-energy impacts of your new home influence your decision to buy a more energy-efficient home (*please check one*)?

- ❑ Non-energy impacts did not influence my decision. [***Skip to Part D***]
- ❑ Non-energy impacts slightly influenced my decision.
- ❑ Non-energy impacts moderately influenced my decision.
- ❑ Non-energy impacts significantly influenced my decision.

Which anticipated non-energy impacts most influenced your decision?

____

____

C4. Would you like to offer any additional comments about the non-energy impacts associated with your new home?

____

____

____

PART D

In this final section of the survey, you will be shown a series of eight comparisons of home attributes. In each comparison, please assume that the two homes are identical in every way except for the differences *presented. For some attributes, there may be no difference. You will then be asked to select which of the two homes you prefer. Please choose one home even if neither option is your ideal choice.*

Comparison 1

ATTRIBUTE / DESCRIPTION	HOME A	HOME B	DIFFERENCE
Cost / Resale Value Value of house compared to similar-sized homes in the same location and condition	Same value as other similar homes	Valued at $4,000 more than other similar homes	*B is more valuable than A*
Comfort Amount of insulation and quality of windows *(Note: Improved insulation and windows help keep out excess heat and cold, maintaining a more consistent temperature throughout the house.)*	Improved insulation and windows	Improved insulation and windows	*No difference*
Noise Amount of street and outdoor noise heard inside the home	Some noise	Very little noise	*B is quieter than A*
Indoor Air Quality Amount of air infiltration and ventilation *(Note: Reduced air infiltration and improved ventilation helps keep dust, pollen, humidity, and car exhaust out of the house and also makes the home safer in terms of carbon monoxide levels and gas leaks.)*	Standard air infiltration and ventilation	Standard air infiltration and ventilation	*No difference*
Durability Use of best practices versus standard practices in equipment installation and construction *(Note: Use of best practices may mean that the heating and cooling equipment and structural materials are less prone to failure and may exceed their expected lifetimes.)*	Best installation and construction practices	Standard installation and construction practices	*A is more durable than B*
Safety Existence of backdraft protection for heating system *(Note: Backdraft protection makes the home safer in terms of carbon monoxide levels.)*	No backdraft protection	Backdraft protection	*B is safer than A*
Please choose Home A or B	☐	☐	

Comparison 2

ATTRIBUTE / DESCRIPTION	HOME A	HOME B	DIFFERENCE
Cost / Resale Value Value of house compared to similar-sized homes in the same location and condition	Valued at $2,000 more than other similar homes	Valued at $2,000 more than other similar homes	*No difference*
Comfort Amount of insulation and quality of windows *(Note: Improved insulation and windows help keep out excess heat and cold, maintaining a more consistent temperature throughout the house.)*	Improved insulation and windows	Improved insulation and windows	*No difference*
Noise Amount of street and outdoor noise heard inside the home	Some noise	Some noise	*No difference*
Indoor Air Quality Amount of air infiltration and ventilation *(Note: Reduced air infiltration and improved ventilation helps keep dust, pollen, humidity, and car exhaust out of the house and also makes the home safer in terms of carbon monoxide levels and gas leaks.)*	Reduced air infiltration and improved ventilation	Standard air infiltration and ventilation	*A has better air quality than B*
Durability Use of best practices versus standard practices in equipment installation and construction *(Note: Use of best practices may mean that the heating and cooling equipment and structural materials are less prone to failure and may exceed their expected lifetimes.)*	Standard installation and construction practices	Standard installation and construction practices	*No difference*
Safety Existence of backdraft protection for heating system *(Note: Backdraft protection makes the home safer in terms of carbon monoxide levels.)*	Backdraft protection	No backdraft protection	*A is safer than B*
Please choose Home A or B	☐	☐	

Comparison 3

ATTRIBUTE / DESCRIPTION	HOME A	HOME B	DIFFERENCE
Cost / Resale Value Value of house compared to similar-sized homes in the same location and condition	Valued at $2,000 more than other similar homes	Valued at $2,000 more than other similar homes	*No difference*
Comfort Amount of insulation and quality of windows *(Note: Improved insulation and windows help keep out excess heat and cold, maintaining a more consistent temperature throughout the house.)*	Improved insulation and windows	Standard insulation and windows	*A is more comfortable than B*
Noise Amount of street and outdoor noise heard inside the home	Very little noise	Very little noise	*No difference*
Indoor Air Quality Amount of air infiltration and ventilation *(Note: Reduced air infiltration and improved ventilation helps keep dust, pollen, humidity, and car exhaust out of the house and also makes the home safer in terms of carbon monoxide levels and gas leaks.)*	Reduced air infiltration and improved ventilation	Reduced air infiltration and improved ventilation	*No difference*
Durability Use of best practices versus standard practices in equipment installation and construction *(Note: Use of best practices may mean that the heating and cooling equipment and structural materials are less prone to failure and may exceed their expected lifetimes.)*	Best installation and construction practices	Standard installation and construction practices	*A is more durable than B*
Safety Existence of backdraft protection for heating system *(Note: Backdraft protection makes the home safer in terms of carbon monoxide levels.)*	No backdraft protection	Backdraft protection	*B is safer than A*
Please choose Home A or B	☐	☐	

Comparison 4

ATTRIBUTE / DESCRIPTION	HOME A	HOME B	DIFFERENCE
Cost / Resale Value Value of house compared to similar-sized homes in the same location and condition	Valued at $4,000 other similar homes	Same value as other similar homes	*A is more valuable than B*
Comfort Amount of insulation and quality of windows *(Note: Improved insulation and windows help keep out excess heat and cold, maintaining a more consistent temperature throughout the house.)*	Improved insulation and windows	Standard insulation and windows	*A is more comfortable than B*
Noise Amount of street and outdoor noise heard inside the home	Some noise	Very little noise	*B is quieter than A*
Indoor Air Quality Amount of air infiltration and ventilation *(Note: Reduced air infiltration and improved ventilation helps keep dust, pollen, humidity, and car exhaust out of the house and also makes the home safer in terms of carbon monoxide levels and gas leaks.)*	Standard air infiltration and ventilation	Reduced air infiltration and improved ventilation	*B has better air quality than A*
Durability Use of best practices versus standard practices in equipment installation and construction *(Note: Use of best practices may mean that the heating and cooling equipment and structural materials are less prone to failure and may exceed their expected lifetimes.)*	Standard installation and construction practices	Best installation and construction practices	*B is more durable than A*
Safety Existence of backdraft protection for heating system *(Note: Backdraft protection makes the home safer in terms of carbon monoxide levels.)*	Backdraft protection	Backdraft protection	*No difference*
Please choose Home A or B	☐	☐	

Comparison 5

ATTRIBUTE / DESCRIPTION	HOME A	HOME B	DIFFERENCE
Cost / Resale Value Value of house compared to similar-sized homes in the same location and condition	Same value as other similar homes	Valued at $4,000 more than other similar homes	*B is more valuable than A*
Comfort Amount of insulation and quality of windows *(Note: Improved insulation and windows help keep out excess heat and cold, maintaining a more consistent temperature throughout the house.)*	Improved insulation and windows	Standard insulation and windows	*A is more comfortable than B*
Noise Amount of street and outdoor noise heard inside the home	Very little noise	Very little noise	*No difference*
Indoor Air Quality Amount of air infiltration and ventilation *(Note: Reduced air infiltration and improved ventilation helps keep dust, pollen, humidity, and car exhaust out of the house and also makes the home safer in terms of carbon monoxide levels and gas leaks.)*	Standard air infiltration and ventilation	Reduced air infiltration and improved ventilation	*B has better air quality than A*
Durability Use of best practices versus standard practices in equipment installation and construction *(Note: Use of best practices may mean that the heating and cooling equipment and structural materials are less prone to failure and may exceed their expected lifetimes.)*	Standard installation and construction practices	Best installation and construction practices	*B is more durable than A*
Safety Existence of backdraft protection for heating system *(Note: Backdraft protection makes the home safer in terms of carbon monoxide levels.)*	Backdraft protection	No backdraft protection	*A is safer than B*
Please choose Home A or B	☐	☐	

Comparison 6

ATTRIBUTE / DESCRIPTION	HOME A	HOME B	DIFFERENCE
Cost / Resale Value Value of house compared to similar-sized homes in the same location and condition	Same value as other similar homes	Valued at $2,000 more than other similar homes	*B is more valuable than A*
Comfort Amount of insulation and quality of windows *(Note: Improved insulation and windows help keep out excess heat and cold, maintaining a more consistent temperature throughout the house.)*	Standard insulation and windows	Standard insulation and windows	*No difference*
Noise Amount of street and outdoor noise heard inside the home	Some noise	Very little noise	*B is quieter than A*
Indoor Air Quality Amount of air infiltration and ventilation *(Note: Reduced air infiltration and improved ventilation helps keep dust, pollen, humidity, and car exhaust out of the house and also makes the home safer in terms of carbon monoxide levels and gas leaks.)*	Standard air infiltration and ventilation	Reduced air infiltration and improved ventilation	*B has better air quality than A*
Durability Use of best practices versus standard practices in equipment installation and construction *(Note: Use of best practices may mean that the heating and cooling equipment and structural materials are less prone to failure and may exceed their expected lifetimes.)*	Best installation and construction practices	Best installation and construction practices	*No difference*
Safety Existence of backdraft protection for heating system *(Note: Backdraft protection makes the home safer in terms of carbon monoxide levels.)*	Backdraft protection	No backdraft protection	*A is safer than B*
Please choose Home A or B	☐	☐	

Comparison 7

ATTRIBUTE / DESCRIPTION	HOME A	HOME B	DIFFERENCE
Cost / Resale Value Value of house compared to similar-sized homes in the same location and condition	Same value as other similar homes	Valued at $2,000 more than other similar homes	*B is more valuable than A*
Comfort Amount of insulation and quality of windows *(Note: Improved insulation and windows help keep out excess heat and cold, maintaining a more consistent temperature throughout the house.)*	Improved insulation and windows	Improved insulation and windows	*No difference*
Noise Amount of street and outdoor noise heard inside the home	Some noise	Some noise	*No difference*
Indoor Air Quality Amount of air infiltration and ventilation *(Note: Reduced air infiltration and improved ventilation helps keep dust, pollen, humidity, and car exhaust out of the house and also makes the home safer in terms of carbon monoxide levels and gas leaks.)*	Standard air infiltration and ventilation	Standard air infiltration and ventilation	*No difference*
Durability Use of best practices versus standard practices in equipment installation and construction *(Note: Use of best practices may mean that the heating and cooling equipment and structural materials are less prone to failure and may exceed their expected lifetimes.)*	Best installation and construction practices	Best installation and construction practices	*No difference*
Safety Existence of backdraft protection for heating system *(Note: Backdraft protection makes the home safer in terms of carbon monoxide levels.)*	Backdraft protection	No backdraft protection	*A is safer than B*
Please choose Home A or B	☐	☐	

Comparison 8

ATTRIBUTE / DESCRIPTION	HOME A	HOME B	DIFFERENCE
Cost / Resale Value Value of house compared to similar-sized homes in the same location and condition	Valued at $2,000 more than other similar homes	Valued at $2,000 more than other similar homes	*No difference*
Comfort Amount of insulation and quality of windows *(Note: Improved insulation and windows help keep out excess heat and cold, maintaining a more consistent temperature throughout the house.)*	Improved insulation and windows	Improved insulation and windows	*No difference*
Noise Amount of street and outdoor noise heard inside the home	Very little noise	Some noise	*A is quieter than B*
Indoor Air Quality Amount of air infiltration and ventilation *(Note: Reduced air infiltration and improved ventilation helps keep dust, pollen, humidity, and car exhaust out of the house and also makes the home safer in terms of carbon monoxide levels and gas leaks.)*	Reduced air infiltration and improved ventilation	Standard air infiltration and ventilation	*A has better air quality than B*
Durability Use of best practices versus standard practices in equipment installation and construction *(Note: Use of best practices may mean that the heating and cooling equipment and structural materials are less prone to failure and may exceed their expected lifetimes.)*	Best installation and construction practices	Standard installation and construction practices	*A is more durable than B*
Safety Existence of backdraft protection for heating system *(Note: Backdraft protection makes the home safer in terms of carbon monoxide levels.)*	Backdraft protection	Backdraft protection	*No difference*
Please choose Home A or B	☐	☐	

Thank you for taking the time to complete this survey!
Please return your completed survey in the enclosed, postage-paid envelope.

NYSERDA Energy Star® COMPACT FLUORESCENT LIGHTBULBS SURVEY OF NON ENERGY IMPACTS

New York Energy Smart[SM]
Public Service Commission NYSERDA
George E. Pataki, Governor

GENERAL INSTRUCTIONS

Your judgments and opinions are important to this research effort. While you may not be able to provide precise answers in all cases, we ask that you answer the questions using your best estimates. If you have no idea whatsoever, simply indicate that you don't know.

PART A

A1. How many compact fluorescent light bulbs (CFLs) are you currently using in your home? ______

A2. For how long have you been using these CFLs?

- ❑ Less than 6 months
- ❑ 6 months to 1 year
- ❑ 1 to 2 years
- ❑ more than 2 years

A3. A typical CFL is expected save $14 per year in electricity costs compared to an incandescent light bulb.

If this is inconsistent with your experience, please estimate the amount of money you believe you save each year as a result of using CFLs in your home: _______ $/year

A3. Besides electricity savings, have you noticed other positive or negative impacts resulting from the use of CFLs (*For example, the quality of light, the frequency with which you need to change your bulbs, etc.*)?

a. Please describe any positive impacts:

____

____

b. Please describe any negative impacts:

____

____

PART B

Instructions: *For each of the questions in Part B, please:*

e) *Check one box to indicate how your* ***compact fluorescent lightbulbs compare to incandescent lightbulbs*** *(each question will be worded differently); and*

f) *Fill in a percentage to indicate how the value of any positive or negative impact* ***compares to the value of your annual energy cost savings resulting from your use of CFLs.*** *For example, an answer of 50% would mean that the value of the impact is half as much as the energy savings. An answer of 25% would mean that the attribute adds or detracts from the value of the energy savings by 25%.*

B1. **Bulb Lifetime**

Your CFLs last…

- ❑ **Longer** than incandescent bulbs, and when compared to the total value of energy savings from your CFLs,* this impact is _____% as valuable (insert best estimate).
- ❑ **The same length of time** as incandescent bulbs. [Skip to B2]
- ❑ **Less time** than incandescent bulbs, and when compared to the total value of energy savings from your CFLs,* this impact detracts _____% (insert best estimate).
- ❑ **Don't know**. [Skip to B2]

B2. **Lighting Quality**

The light from your CFLs is…

- ❑ **Higher quality** than incandescent bulbs**,** and when compared to the total value of energy savings from your CFLs,* this impact is _____% as valuable (insert best estimate).
- ❑ **The same quality** as incandescent bulbs. [Skip to B3]
- ❑ **Lower quality** than incandescent bulbs, and when compared to the total value of energy savings from your CFLs,* this impact detracts _____% (insert best estimate).
- ❑ **Don't know.** [Skip to B3]

B3. **Delay in Turning On**

When you flip the light switch, the delay before the light comes on is …

- ❑ **Shorter** than for incandescent bulbs, and when compared to the total value of energy savings from your CFLs,* this impact is _____% as valuable (insert best estimate).
- ❑ **The same length of time** as for incandescent bulbs. [Skip to B4].
- ❑ **Longer** than for incandescent bulbs, and when compared to the total value of energy savings from your CFLs,* this impact detracts _____% (insert best estimate).
- ❑ **Don't know**. [Skip to B4]

---

* These energy savings are based on the performance of CFLs compared to incandescent bulbs.

B4. **Warm Up Period**

After you turn the light on, the amount of time until the bulb reaches full light output is …

- ❑ **Shorter** than for incandescent bulbs, and when compared to the value of total energy savings from your CFLs,* this impact is _____% as valuable (insert best estimate).
- ❑ **The same length of time** as for incandescent bulbs. [Skip to B5]
- ❑ **Longer** than for incandescent bulbs, and when compared to the value of total energy savings from your CFLs,* this impact detracts _____% (insert best estimate).
- ❑ **Don't know**. [Skip to B5]

B5. **Heat Generated**

Your CFLs produce …

- ❑ **Less heat** than incandescent bulbs, and when compared to the value of total energy savings from your CFLs,* this impact is _____% as valuable (insert best estimate).
- ❑ **The same amount of heat** as incandescent bulb [Skip to B6]
- ❑ **More heat** than incandescent bulbs, and when compared to the value of total energy savings from your CFLs,* this impact detracts _____% (insert best estimate).
- ❑ **Don't know**. [Skip to B6]

B6. **General Sense of Doing Good for the Environment**

When it comes to the environmental impacts of using CFLs as opposed to incandescent bulbs, you feel …

- ❑ **Good,** and when compared to the value of total energy savings from your CFLs,* this impact is _____% as valuable (insert best estimate).
- ❑ **Indifferent**. [Skip to B7]
- ❑ **Bad**, and when compared to the value of total energy savings from your CFLs,* this impact detracts _____% (insert best estimate).
- ❑ **Don't know.** [Skip to B7]

B7. **Overall Impacts**

The ***overall*** value of all the non-energy impacts of using CFLs as opposed to incandescent bulbs is …

- ❑ **Positive,** and when compared to the value of total energy savings from your CFLs, * the overall value of all the impacts is ____% as valuable (insert best estimate).
- ❑ **Zero**. [Skip to C2]
- ❑ **Negative,** and when compared to the value of total energy savings from your CFLs,* the overall value of all the impacts detracts _____% (insert best estimate).
- ❑ **Don't know**. [Skip to C2]

* These energy savings are based on the performance of CFLs compared to incandescent bulbs.

PART C

C1. **If the overall value of the non-energy impacts is positive** and these positive impacts disappeared, approximately how much would you be willing to invest to gain back these benefits in terms of an annual dollar amount?

- ❑ $__________ /year
- ❑ Don't know/refuse

C2. **If the overall value of the non-energy impacts is negative**, what would you be willing to invest to eliminate these negative impacts from your CFLs terms of an annual dollar amount?

- ❑ $__________ /year
- ❑ Don't know/refuse

C3. Did the anticipated non-energy impacts of your CFLs influence your decision to purchase them (*please check one*)?

- ❑ Non-energy impacts did not influence my decision. [***Skip to Part D***]
- ❑ Non-energy impacts slightly influenced my decision.
- ❑ Non-energy impacts moderately influenced my decision.
- ❑ Non-energy impacts significantly influenced my decision.

Which anticipated non-energy impacts most influenced your decision?

____

____

____

C4. Would you like to offer any additional comments about the non-energy impacts associated with your CFLs?

____

____

____

PART D

In this final section of the survey, you will be shown a series of eight comparisons of lightbulb attributes. In each comparison, please assume that the two lightbulbs are identical in every way except for the differences presented. For some attributes, there may be no difference. You will then be asked to select which of the two lightbulbs you prefer. Please choose one lightbulb even if neither option is your ideal choice.

Comparison 1

ATTRIBUTE / DESCRIPTION	LIGHTBULB A	LIGHTBULB B	DIFFERENCE
Purchase Price Per Bulb	$6.00	$0.35	*B costs less than A*
Turn On When the switch is turned on…	The light comes on instantly.	The light comes on instantly.	*No difference*
Warm Up Period When the switch is turned on…	The bulb is at full light output immediately.	The bulb takes 90 seconds to reach full light output.	*A has no delay in reaching full light output*
Lifetime	Replace every 8 **years**	Replace every 6 **months**	*A lasts longer than B*
Heat Generated When bulb is left on for a long period of time…	The bulb stays cool, having little impact on heating or cooling costs.	The bulb gets very hot to the touch, lowering heating costs in the winter but increasing cooling costs in the summer.	*A stays cooler than B*
Please choose A or B	☐	☐	

Comparison 2

ATTRIBUTE / DESCRIPTION	LIGHTBULB A	LIGHTBULB B	DIFFERENCE
Purchase Price Per Bulb	$6.00	$0.35	*B costs less than A*
Turn On When the switch is turned on…	There is a 1 second delay before the light comes on.	There is a 1 second delay before the light comes on.	*No difference*
Warm Up Period When the switch is turned on…	The bulb is at full light output immediately.	The bulb takes 90 seconds to reach full light output.	*A has no delay in reaching full light output*
Lifetime	Replace every 6 **months**	Replace every 6 **months**	*No difference*
Heat Generated When bulb is left on for a long period of time…	The bulb gets very hot to the touch, lowering heating costs in the winter but increasing cooling costs in the summer.	The bulb gets very hot to the touch, lowering heating costs in the winter but increasing cooling costs in the summer.	*No difference*
Please choose A or B	☐	☐	

Comparison 3

ATTRIBUTE / DESCRIPTION	LIGHTBULB A	LIGHTBULB B	DIFFERENCE
Purchase Price Per Bulb	$2.00	$2.00	*No difference*
Turn On When the switch is turned on…	There is a 1 second delay before the light comes on.	The light comes on instantly.	*B has no delay in turning on.*
Warm Up Period When the switch is turned on…	The bulb provides full light output immediately.	The bulb takes about 90 seconds to reach full light output.	*A has no delay in reaching full light output*
Lifetime	Replace every 8 **years.**	Replace every 6 **months.**	*A lasts longer than B*
Heat Generated When bulb is left on for a long period of time…	The bulb gets very hot to the touch, lowering heating costs in the winter but increasing cooling costs in the summer.	The bulb gets very hot to the touch, lowering heating costs in the winter but increasing cooling costs in the summer.	*No difference*
Please choose A or B	☐	☐	

Comparison 4

ATTRIBUTE / DESCRIPTION	LIGHTBULB A	LIGHTBULB B	DIFFERENCE
Purchase Price Per Bulb	$2.00	$2.00	*A costs less than B*
Turn On When the switch is turned on…	The light comes on instantly.	The light comes on instantly.	*No difference*
Warm Up Period When the switch is turned on…	The bulb takes 90 seconds to reach full light output.	The bulb is at full light output immediately.	*A has no delay in reaching full light output*
Lifetime	Replace every 8 **years**	Replace every 6 **months**	*B lasts longer than A*
Heat Generated When bulb is left on for a long period of time…	The bulb stays cool, having little impact on heating or cooling costs.	The bulb stays cool, having little impact on heating or cooling costs.	*No difference*
Please choose A or B	☐	☐	

Comparison 5

ATTRIBUTE / DESCRIPTION	LIGHTBULB A	LIGHTBULB B	DIFFERENCE
Purchase Price Per Bulb	$6.00	$6.00	*No difference*
Turn On When the switch is turned on…	The light comes on instantly.	There is a 1 second delay before the light comes on.	*A has no delay in turning on*
Warm Up Period When the switch is turned on…	The bulb is at full light output immediately.	The bulb is at full light output immediately.	*No difference*
Lifetime	Replace every 8 **years**	Replace every 6 **months**	*A lasts longer than B*
Heat Generated When bulb is left on for a long period of time…	The bulb gets very hot to the touch, lowering heating costs in the winter but increasing cooling costs in the summer.	The bulb stays cool, having little impact on heating or cooling costs.	*A stays cooler than B*
Please choose A or B	☐	☐	

Comparison 6

ATTRIBUTE / DESCRIPTION	LIGHTBULB A	LIGHTBULB B	DIFFERENCE
Purchase Price Per Bulb	$6.00	$0.35	*B costs less than A*
Turn On When the switch is turned on…	The light comes on instantly.	There is a 1 second delay before the light comes on.	*A has no delay in turning on*
Warm Up Period When the switch is turned on…	The bulb takes 90 seconds to reach full light output.	The bulb takes 90 seconds to reach full light output.	*No difference*
Lifetime	Replace every 6 **months**	Replace every 8 **years**	*B lasts longer than A*
Heat Generated When bulb is left on for a long period of time…	The bulb stays cool, having little impact on heating or cooling costs.	The bulb gets very hot to the touch, lowering heating costs in the winter but increasing cooling costs in the summer.	*A stays cooler than B*
Please choose A or B	☐	☐	

Comparison 7

ATTRIBUTE / DESCRIPTION	LIGHTBULB A	LIGHTBULB B	DIFFERENCE
Purchase Price Per Bulb	$2.00	$2.00	*No difference*
Turn On When the switch is turned on…	There is a 1 second delay before the light comes on.	There is a 1 second delay before the light comes on.	*No difference*
Warm Up Period When the switch is turned on…	The bulb takes 90 seconds to reach full light output.	The bulb takes 90 seconds to reach full light output.	*No difference*
Lifetime	Replace every 6 **months**	Replace every 8 **years**	*B lasts longer than A*
Heat Generated When bulb is left on for a long period of time…	The bulb gets very hot to the touch, lowering heating costs in the winter but increasing cooling costs in the summer.	The bulb gets very hot to the touch, lowering heating costs in the winter but increasing cooling costs in the summer.	*No difference*
Please choose A or B	☐	☐	

Comparison 8

ATTRIBUTE / DESCRIPTION	LIGHTBULB A	LIGHTBULB B	DIFFERENCE
Purchase Price Per Bulb	$0.35	$0.35	*No difference*
Turn On When the switch is turned on…	The light comes on instantly.	The light comes on instantly.	*No difference*
Warm Up Period When the switch is turned on…	The light is at full intensity immediately.	The light is at full intensity immediately.	*No difference*
Lifetime	Replace every 8 **years**	Replace every 8 **years**	*No difference*
Heat Generated When bulb is left on for a long period of time…	The bulb gets very hot to the touch, lowering heating costs in the winter but increasing cooling costs in the summer.	The bulb stays cool, having little impact on heating or cooling costs.	*A stays cooler than B*
Please choose A or B	☐	☐	

Thank you for taking the time to complete this survey!

NYSERDA Energy Star® CLOTHES WASHERS SURVEY OF NON ENERGY IMPACTS

New York Energy Smart[SM]
PUBLIC SERVICE COMMISSION NYSERDA
George E. Pataki, Governor

GENERAL INSTRUCTIONS

Your judgments and opinions are important to this research effort. While you may not be able to provide precise answers in all cases, we ask that you answer the questions using your best estimates. If you have no idea whatsoever, simply indicate that you don't know.

PART A

A1. In what year did you purchase your clothes washer? ______

A2. Does your clothes washer bear the ENERGY STAR® label (the label would be some variation on the logo shown here)?

- ❑ Yes
- ❑ No
- ❑ Don't Know

A3. Besides electricity savings, have you noticed other positive or negative impacts resulting from the use of your ENERGY STAR®-labeled clothes washer? (For example, more or less noise, change in water bills, wear and tear on clothes, amount of detergent used, etc.)?

Please describe any positive impacts:

____

____

____

Please describe any negative impacts:

____

____

____

A4. IS YOUR CLOTHES WASHER A FRONT-LOADING OR TOP-LOADING UNIT?

- ❑ Front-loading
- ❑ Top-loading

Part B

You will be presented with a series of 8 comparisons of clothes washer attributes. In each comparison, please assume that the two washers are identical in every way except for the variations presented. For some attributes, there may be no difference. You will then be asked to select which of the two clothes washers you prefer. Please choose one even if neither option is your ideal choice.

Comparison 1

ATTRIBUTE / DESCRIPTION	WASHER A	WASHER B	DIFFERENCE
Purchase Price	$500	$800	*A is less expensive than B*
Energy Cost Cost of running washer per year	$55	$190	*A has lower energy costs than B*
Water Use Amount of water used per year	13,700 gallons	8,600 gallons	*B uses less water than A*
Wear and Tear Presence or absence of an agitator (the spinning device found in most top-loading washers). An agitator can contribute to wear and tear.	No agitator	Has agitator	*A has no agitator*
Drying Time The amount of water left in clothes after the wash cycle can affect drying time.	60 minutes	60 minutes	*No difference*
Noise Whether or not the washer can be heard from the next room	**Cannot** be heard from the next room	**Cannot** be heard from the next room	*No difference*
Please choose A or B	☐	☐	

Comparison 2

ATTRIBUTE / DESCRIPTION	WASHER A	WASHER B	DIFFERENCE
Purchase Price	$1,300	$800	*B is less expensive than A*
Energy Cost Cost of running washer per year	$55	$55	*No difference*
Water Use Amount of water used per year	8,600 gallons	13,700 gallons	*A uses less water than B*
Wear and Tear Presence or absence of an agitator (the spinning device found in most top-loading washers). An agitator can contribute to wear and tear.	Has agitator	No agitator	*B has no agitator*
Drying Time The amount of water left in clothes after the wash cycle can affect drying time.	60 minutes	60 minutes	*No difference*
Noise Whether or not the washer can be heard from the next room	**Can** be heard from the next room	**Can** be heard from the next room	*No difference*
Please choose A or B	☐	☐	

Comparison 3

ATTRIBUTE / DESCRIPTION	WASHER A	WASHER B	DIFFERENCE
Purchase Price	$800	$1,300	*A is less expensive than B*
Energy Cost Cost of running washer per year	$55	$190	*A has lower energy costs than B*
Water Use Amount of water used per year	13,700 gallons	8,600 gallons	*B uses less water than A*
Wear and Tear Presence or absence of an agitator (the spinning device found in most top-loading washers). An agitator can contribute to wear and tear.	No agitator	Has agitator	*A has no agitator*
Drying Time The amount of water left in clothes after the wash cycle can affect drying time.	40 minutes	60 minutes	*A has shorter drying time than B*
Noise Whether or not the washer can be heard from the next room	**Can** be heard from the next room	**Can** be heard from the next room	*No difference*
Please choose A or B	☐	☐	

Comparison 4

ATTRIBUTE / DESCRIPTION	WASHER A	WASHER B	DIFFERENCE
Purchase Price	$500	$500	*No difference*
Energy Cost Cost of running washer per year	$190	$55	*B has lower energy costs than A*
Water Use Amount of water used per year	8,600 gallons	13,700 gallons	*A uses less water than B*
Wear and Tear Presence or absence of an agitator (the spinning device found in most top-loading washers). An agitator can contribute to wear and tear.	No agitator	Has agitator	*A has no agitator*
Drying Time The amount of water left in clothes after the wash cycle can affect drying time.	40 minutes	60 minutes	*A has shorter drying time than B*
Noise Whether or not the washer can be heard from the next room	**Cannot** be heard from the next room	**Can** be heard from the next room	*A is quieter than B*
Please choose A or B	☐	☐	

Comparison 5

ATTRIBUTE / DESCRIPTION	WASHER A	WASHER B	DIFFERENCE
Purchase Price	$1,300	$1,300	*No difference*
Energy Cost Cost of running washer per year	$190	$55	*B has lower energy costs than A*
Water Use Amount of water used per year	13,700 gallons	13,700 gallons	*No difference*
Wear and Tear Presence or absence of an agitator (the spinning device found in most top-loading washers). An agitator can contribute to wear and tear.	No agitator	No agitator	*No difference*
Drying Time The amount of water left in clothes after the wash cycle can affect drying time.	40 minutes	40 minutes	*No difference*
Noise Whether or not the washer can be heard from the next room	**Cannot** be heard from the next room	**Can** be heard from the next room	*A is quieter than B*
Please choose A or B	☐	☐	

Comparison 6

ATTRIBUTE / DESCRIPTION	WASHER A	WASHER B	DIFFERENCE
Purchase Price	$800	$500	*B is less expensive than A*
Energy Cost Cost of running washer per year	$190	$190	*No difference*
Water Use Amount of water used per year	13,700 gallons	8,600 gallons	*B uses less water than A*
Wear and Tear Presence or absence of an agitator (the spinning device found in most top-loading washers). An agitator can contribute to wear and tear.	Has agitator	No agitator	*B has no agitator*
Drying Time The amount of water left in clothes after the wash cycle can affect drying time.	40 minutes	60 minutes	*A has shorter drying time than B*
Noise Whether or not the washer can be heard from the next room	**Cannot** be heard from the next room	**Cannot** be heard from the next room	*No difference*
Please choose A or B	☐	☐	

Comparison 7

ATTRIBUTE / DESCRIPTION	WASHER A	WASHER B	DIFFERENCE
Purchase Price	$800	$1,300	*A is less expensive than B*
Energy Cost Cost of running washer per year	$190	$55	*B has lower energy costs than A*
Water Use Amount of water used per year	13,700 gallons	8,600 gallons	*B uses less water than A*
Wear and Tear Presence or absence of an agitator (the spinning device found in most top-loading washers). An agitator can contribute to wear and tear.	Has agitator	No agitator	*B has no agitator*
Drying Time The amount of water left in clothes after the wash cycle can affect drying time.	60 minutes	60 minutes	*No difference*
Noise Whether or not the washer can be heard from the next room	**Can** be heard from the next room	**Can** be heard from the next room	*No difference*
Please choose A or B	☐	☐	

Comparison 8

ATTRIBUTE / DESCRIPTION	WASHER A	WASHER B	DIFFERENCE
Purchase Price	$800	$500	*B is less expensive than A*
Energy Cost Cost of running washer per year	$55	$55	*No difference*
Water Use Amount of water used per year	13,700 gallons	13,700 gallons	*No difference*
Wear and Tear Presence or absence of an agitator (the spinning device found in most top-loading washers). An agitator can contribute to wear and tear.	Has agitator	Has agitator	*No difference*
Drying Time The amount of water left in clothes after the wash cycle can affect drying time.	60 minutes	40 minutes	*B has shorter drying time than A*
Noise Whether or not the washer can be heard from the next room	**Can** be heard from the next room	**Can** be heard from the next room	*No difference*
Please choose A or B	☐	☐	

Thank you for taking the time to complete this survey!