Energy $mart Focus Benchmarking of Institutions and Commercial Real Estate Components Program Impact Evaluation Report

FINAL

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ABSTRACT

This report provides a detailed description of the impact evaluation of the benchmarking component associated with NYSERDA's Energy $mart Focus Program's ("Focus Program" "Energy $mart Focus", or "Program") Institutional (K-12 School) and Commercial Real Estate (CRE) activities. The evaluation focuses on benchmarking conducted within the Program between January 1, 2007 and December 31, 2009.

NYSERDA's Energy $mart Focus Program is a sector-specific program aimed at encouraging and facilitating greater energy efficiency awareness and penetration to targeted industry sectors. $mart

The purpose of this study is to develop an estimate of the evaluated gross and net savings from the Energy $mart Focus benchmarking activities in the K-12 School and CRE components of the Program. The mechanisms for achieving savings through benchmarking are not as well understood as those employed through other NYSERDA programs that provide direct services and/or incentives. Consequently, an objective of this evaluation has been to identify various approaches used to reduce energy consumption that were developed through the benchmarking process. Clarifying this process should provide valuable insights into the design of future impact evaluations, such as for NYSERDA's Energy Efficiency Portfolio Standard (EEPS) Benchmarking Program.

The evaluation was designed to assess impacts in terms of three primary metrics: 1) the percent of participants who pursue efficiency measures; 2) the magnitude of savings associated directly with the Focus Program and also the savings achieved by benchmarking participants who installed measures through other NYSERDA programs, and 3) the percent reduction in energy use achieved through benchmarking. In addition, the evaluation investigated whether the Focus Program acts as a gateway to other NYSERDA efficiency programs and to raising awareness of energy efficiency.

Through this evaluation effort, it was found that:

1. 95% of the K-12 School participants benchmarked through the Focus Program reported installing efficiency measures (48% of CREs).
2. It is estimated that approximately 1.1% and 1.9% of the annual kWh and MMBtu energy usage at participating K-12 Schools is being saved as a result of these participants' involvement with NYSERDA's Focus Program, including any quantifiable savings associated with measures they may have installed through other NYSERDA programs (1.3% kWh and 0.0% MMBtu's for CREs).
3. A total reduction of 0.1% in annual kWh and 1.8% in annual MMBtu was achieved across all K-12 Schools that can be attributed to participants' involvement with the benchmarking component of NYSERDA's Focus Program (0% kWh and 0% MMBtu for CREs). These estimates represent net savings percentages after removing savings associated with participation in other NYSERDA and non-NYSERDA programs, and after application of benchmarking attribution factors.

Based on these results, it appears that there is a small, but quantifiable amount of savings that can be attributed to the benchmarking component of NYSERDA's Focus Program. In addition it is clear that the Program is acting as a gateway to other NYSERDA efficiency programs and helping to raise awareness of energy efficiency in participating K-12 Schools. Recommendations to more accurately quantify these savings are provided at the end of this report.

ACKNOWLEDGEMENTS

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GLOSSARY OF ACRONYMS AND DEFINITIONS[1]

AAPOR - American Association for Public Opinion Research – A leading association of public opinion and survey research professionals.

ANCOVA (Analysis of Covariance) - A type of regression model also referred to as a "fixed effects" model. This model allows each individual to act as its own control. The unique effects of the stable but unmeasured characteristics of each customer are their "fixed effects" from which this method takes its name. These fixed effects are held constant.

Autocorrelation - Autocorrelation occurs when observations in a regression model are not independent; the consequence of uncorrected autocorrelation is typically higher calculated statistical precision than is actually the case

Billing Analysis - Estimation of program savings through the analysis of utility billing records comparing consumption prior to program participants and following program participation. This term encompasses a variety of types of analysis, from simple pre/post to complex regressions.

Collinearity - Collinearity refers to the situation where two or more independent variables in a model are highly correlated, such as when two measures tend to be installed together. Collinearity results in higher variances for both predicted and explanatory variables and creates difficulty in partitioning variance among the competing explanatory variables.

Contact Rate - This is one of the final disposition and outcome rates for surveys defined by the American Association for Public Opinion Research (AAPOR).[2] The contact rate has all outcomes where an eligible respondent was reached and the interview attempted divided by these plus those not contacted. The three contact rate outcomes are: completes, refusals and break-offs (the numerator of the contact rate).

Cooperation Rate - This is one of the final disposition and outcome rates for surveys defined by the American Association for Public Opinion Research (AAPOR).[3] The proportion of all cases interviewed of all eligible units ever contacted. Those contacted (the denominator) includes completes, refusals and break-offs.[4]

Coefficient of Determination (R^2) - Proportion of variability in a regression data set that can be explained by the model

Correlation Coefficient (R) - A measure of the linear association between two variables; in linear regression, it is the square root of the coefficient of determine and measures the linear relationship between the response (dependent) and predictor (independent) variables; the sign indicates whether the relationship is positive or negative.

Deemed Savings – An approach to estimating energy and demand savings, used with programs targeting simpler measures with well–known, and consistent performance characteristics. This method involves

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[1] Much of this report's Glossary is taken from the *2004 California Evaluation Framework*, which was prepared for the California Public Utilities Commission and the Project Advisory Group in September 2004 by a Team led by TecMarket Works and included a lead role by one of the authors of this report from Megdal & Associates.

[2] American Association for Public Opinion Research (AAPOR) 2011. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*, Revised 2011. Each of the rates presented here has multiple more specific categories and definitions provided by AAPOR. *Standard Definitions* on AAPOR website: www.aapor.org

[3] *Ibid.*

[4] *Ibid.*

multiplying number of installed measures by estimated (deemed) savings per measure, which is derived from historical evaluations. Deemed savings approaches may be complemented by on-site inspections.[5]

Evaluation-Based Gross Savings – total estimated program savings that are not claimed by other NYSERDA or non-NYSERDA programs

Evaluation-Based Net Savings – program savings not claimed by other NYSERDA or non-NYSERDA programs that can be directly attributed to the Focus Program; net savings are calculated by multiplying the evaluation-based gross savings by the influence factor.

Heteroskedasticity - Heteroskedasticity occurs in a regression model when there are subpopulations with the model with unequal variances; heteroskedasticity tends to increase the reported variance from the model and may be a sign of model misspecification.

Influence Factor – A factor developed through the survey results to account for the percent of savings that participants report were installed due to the Focus Program; this factor was applied to the evaluated gross savings to estimate the net savings that can be attributed to the Focus Program.

Model Misspecification - This covers large areas of regression misapplication in which the model chosen omits relevant explanatory variables, includes irrelevant explanatory variables, ignores qualitative changes in explanatory variables, or accepts regression equations with incorrect mathematical form.

Normalization – Adjustment of the results of a model due to changes in baseline assumptions (non-independent variables) during the test or post-retrofit period.

Refusal Rate – This is one of the final disposition and outcome rates for surveys defined by the American Association for Public Opinion Research (AAPOR).[6] The proportion of all cases in which an eligible respondent refuses to be interviewed, or breaks-off an interview, of all potentially eligible cases.

Response Rate - This is one of the final disposition and outcome rates for surveys defined by the American Association for Public Opinion Research (AAPOR).[7] The response rate estimates the fraction of all eligible working numbers where a request for an interview was made. The denominator of this ratio is inclusion of all possible components where a request for an interview could be attempted. More specifically the response rate is the number of completed interviews divided by the sum of: completes, refusals, break-offs, not contacted and the figure estimated for unknown eligibility. Response rate = (Completes)/(Completes+refusals+break-offs+not contacted+(e*(unknown eligibility)).

Site Energy – The amount of heat and electricity consumed by a building as reflected in utility bills.[8]

Source Energy – Source energy represents the total amount of raw fuel that is required to operate the building. It incorporates all transmission, delivery, and production losses, thereby enabling a complete assessment of energy efficiency in a building.[9]

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[5] EPA. State and Local Climate *and Energy Program.* Updated Jan 2012. Available at http://www.epa.gov/statelocalclimate/resources/glossary.html

[6] American Association for Public Opinion Research (AAPOR) 2011. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*, Revised 2011. Each of the rates presented here has multiple more specific categories and definitions provided by AAPOR. *Standard Definitions* on AAPOR website: www.aapor.org

[7] *Ibid.*

[8] ENERGY STAR. *ENERGY STAR Performance Ratings Methodology for Incorporating Source Energy Use*. 2011. Paper available on website http://www.energystar.gov/

[9] *Ibid.*

EXECUTIVE SUMMARY

This report provides a detailed description of the impact evaluation of the benchmarking component associated with NYSERDA's Energy $mart Focus Program's ("Focus Program", "Energy $mart Focus", or "Program") Institutional (K-12 School) and Commercial Real Estate (CRE) activities. The evaluation covers benchmarking conducted within the program between January 1, 2007 and December 31, 2009. The Executive Summary provides a brief overview of the evaluation-based estimates of gross and net savings from the Focus Program, followed by a description of the program, the evaluation approach, context and issues, and a discussion of the evaluation components.

The mechanisms for achieving savings through benchmarking are not as well understood as those employed through NYSERDA's programs that provide direct services and/or incentives. Typically, a critical component of impact evaluation is to develop rigorous estimates of the gross savings realization rates and the net-to-gross factors for electricity, demand, and MMBtu savings. This approach allows program reported gross savings to be translated to evaluated net savings.

However, no savings are currently claimed for the Focus Program. This study was conducted to assess the feasibility of developing an evaluation-based approach to estimating program savings from the benchmarking activities. Consequently, an objective of this evaluation was to identify the various approaches used to reduce energy consumption that were developed in response to the benchmarking process. Clarifying this process should provide valuable insights into the design of future impact evaluations, such as for NYSERDA's Energy Efficiency Portfolio Standard (EEPS) Benchmarking Program.

The evaluation was designed to assess impacts in terms of three primary metrics: 1) the percent of participants who pursue efficiency measures; 2) the magnitude of savings associated directly with the Focus Program and also the savings achieved by benchmarking participants who installed measures through other NYSERDA programs, and 3) the percent reduction in energy use achieved through benchmarking. In addition, the evaluation investigated whether the Focus Program acts as a gateway to other NYSERDA efficiency programs and to raising awareness of energy efficiency.

ES.1 OVERVIEW OF ESTIMATED SAVINGS

Evaluation-based savings due to the Focus Program were estimated through a combination of results from billing analysis, telephone survey self-reports, and deemed savings assessments based on measure installations and behavioral changes. As shown at the bottom of Table ES-1, the total estimated annual energy savings from K-12 schools participating in the benchmarking component of NYSERDA's Focus Program during program years 2007 through 2009, was 330,019 kWh and 39,005 MMBtu per year, respectively.[10] For the smaller and targeted population of CREs assessed, the impact evaluation indicates that there are no electric or fossil fuels savings that can be clearly attributed to the Program.[11]

[10] These savings were estimated by combining billing analysis results with deemed savings-based calculations from telephone survey responses from 22 individuals representing 79 specific school properties from a sample of 84 participating schools. To extrapolate results from this sample to the entire population of 366 participating schools that were benchmarked through NYSERDA's Focus Program between January 1st, 2007 and December 31st, 2009, savings factors from the sample population were averaged across all respondents on a square foot basis and extrapolated to the entire population of participating schools.

[11] Results for the CREs are based on telephone survey results from two individuals responsible for 23 specific properties from a sample of 23 properties. No billing analysis was conducted for CREs due to lack of available data and evaluation-based gross savings were not estimated. After analysis of the survey results, it was determined that

Table ES-1 explains the derivation of the Focus Program evaluation-based estimate of net savings. The total reduction in energy use from the billing records provides the upper cap on the total savings that could possibly be attributed to the Focus Program. From this starting value, estimated savings claimed by NYSERDA in other programs and savings from other non-NYSERDA programs were subtracted, leaving the potential evaluation-base estimate of gross savings that have not been counted elsewhere. The final step is to estimate the portion of these savings that can be attributed to the Focus Program by applying an influence factor of 0.466, estimated from the participant survey. This process produced a preliminary estimate of savings from benchmarking.

Table ES-1: Summary of Estimated Annual kWh and MMBtu Savings for Entire Schools Population

	Annual kWh[1]	**MMBtu[1]**
Total Reduction in Energy Use	**4,949,732**	**97,742**
Estimated Savings from Other NYSERDA Programs	2,954,558	1,614
Estimated Savings from Other Non-NYSERDA Programs	1,273,203	12,378
Focus Program Evaluation-Based Estimate of Gross Savings (Reduction in use not claimed as savings by other programs)	**721,971**	**83,750**
Focus Program Evaluation-Based Estimate of Net Savings (Focus evaluation-based estimate of gross savings times the influence factor)[2]	**330,019**	**39,005**

[1] Precision was not calculated as these savings estimates are preliminary in nature and the use of deemed savings to estimate savings from non-NYSERDA programs is likely to introduce more error to the final estimates than sampling.

[2] Program influence factors of 0.457 (for kWh) and 0.466 (for MMBtu) were applied to the evaluation-based estimate of gross savings to develop the evaluation-based estimate of net savings.

These results suggest that the evaluation-based estimates of net savings attributed to the Focus Program and not claimed by other NYSERDA or non-NYSERDA programs are on the order of 900 kWh and 100 MMbtu per school per year. However, if the savings that could be claimed by non-NYSERDA and NYSERDA programs are included, the savings per school increase to about 6,700 kWh and 133 MMBtu per year.

The savings can also be presented in terms of the reduction in consumption before and after the benchmarking was conducted, as is shown in Table ES-2.

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no savings could be attributed to the Focus Program. All savings achieved in the analysis period would be a result of other NYSERDA or non-NYSERDA programs or other market forces.

Table ES-2: Estimated Reduction in Annual kWh and MMBtu Consumption for Schools Population

	Percent Reduction in Annual kWh Consumption[1,2]	Percent Reduction in Annual MMBtu Consumption[1,2]
Total Reduction in Energy Use	1.6%	4.5%
Estimated Savings from Other NYSERDA Programs	1.0%	0.1%
Estimated Savings from Other Non-NYSERDA Programs	0.4%	0.6%
Focus Program Evaluated-Based Estimate of Gross Reduction in Energy Use (Total evaluation-based estimate of gross reduction less savings from other programs)	0.2%	3.9%
Focus Program Evaluation-Based Estimate of Net Reduction in Energy Use (Focus evaluation-based estimate of gross savings times the influence factor)[2]	0.1%	1.8%

[1] Precision was not calculated as these savings estimates are preliminary in nature and the use of deemed savings to estimate savings from non-NYSERDA programs is likely to introduce more error to the final estimates than sampling.

[2] Program influence factors of 0.457 (for kWh) and 0.466 (for MMBtu) were applied to the evaluation-based estimate of gross savings to develop the evaluation-based estimate of net savings.

These savings should be considered a preliminary estimate. As is consistent with the work plan and budget, the evaluation methods do not meet the standard of rigor applied to other NYSERDA evaluations. Some of the issues are explored below:

- Savings are based on a billing analysis comparing pre- and post-benchmark consumption; this method estimates the total reduction but does not account for external factors that could affect usage levels at the individual school level, such as an increase or decrease in the student population. This billing analysis method is categorized in the California Evaluation Protocols as "basic" rigor.[12]
- The savings are based only on participants' bills, and does not address larger market effects that could have an impact in energy usage across all schools, such as an increasing awareness of energy efficiency.
- Savings from non-NYSERDA programs were estimated using deemed savings, which may overstate or understate the impacts of these other programs. In the context of this evaluation, deemed savings are likely to overstate savings.

The evaluated savings provide an indication of the magnitude of savings available from benchmarking and the methods could be improved in future impact evaluations, if desired.

[12] "California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals," State of California Public Utilities Commission, April, 2006, p. 22.

ES.2 PROGRAM DESCRIPTION

NYSERDA's Energy $mart Focus Program is a sector-specific program aimed to encourage and facilitate greater energy efficiency awareness and penetration to targeted business sectors. Through a marketing and information transfer effort, the program uses existing **New York Energy $mart** programs and services to sponsor deployment, demonstration, research, and development projects in conjunction with sector customized strategies. These strategies may include any of the following: (1) outreach and one-on-one interactions; (2) targeted marketing materials and messages; (3) training; (4) partnerships with trade associations; (5) integration with regional and national efforts; (6) benchmarking; (7) development of tools and resources; and (8) limited technical assistance.

This evaluation focused exclusively on benchmarking efforts associated with the Institutional (K-12 Schools) and CRE sectors, over a three year period (2007 through 2009). A brief summary of these two industry specific programs is provided below.

Focus on Institutions: NYSERDA's Focus on Institutions works with Schools (K-12) and State Facilities. Activities include educational outreach, training, benchmarking, limited technical assistance, development of tools and resources, support of several executive orders, and direct assistance for the New York Collaborative for High Performance Schools Program (NY-CHPS). Benchmarking and technical analysis previously offered under Focus on Institutions may help inform NYSERDA's Energy Efficiency Portfolio Standard (EEPS) funded Benchmarking Program.

Focus on Commercial Real Estate: NYSERDA's Focus on CRE assists commercial building owners, managers and consultants with sector-specific guidance about improving energy efficiency and property value and facilitates NYSERDA participation by providing information about and participation support for funding opportunities. Benchmarking and technical analysis previously offered under Focus on CRE may help to inform NYSERDA's EEPS-funded FlexTech Benchmarking Pilot.

ES.3 EVALUATION APPROACH

The purpose of the impact evaluation was to investigate the efficiency actions taken to reduce energy in response to benchmarking through the Focus Program and to develop a preliminary estimate of energy savings achieved by benchmarking participants in Program Years (PY) 2007 through 2009. Assessing the source of the reduction in energy use is a critical aspect to estimating program savings. The evaluation design, therefore, called for a telephone survey to research the mechanisms used to reduce energy use and to identify participation in other programs. In addition, secondary data collection, billing analysis and deemed savings assessments were conducted.

The evaluation-based gross savings were estimated through the following activities:

(1) Review of the Focus Program tracking system

(2) Independent review of billing records and benchmarking analyses

(3) Telephone survey of participants to identify specific efficiency actions taken, and to assess the role that NSYERDA's Focus Program played in their decision to take those actions

(4) Review of all relevant NYSERDA program databases to identify and quantify measure installations completed through participation in other NSYERDA programs

(5) Estimation of savings through the application of deemed savings from NYSERDA's Technical Manual, the Deemed Savings Database, and billing analysis results

For attribution assessment, this evaluation used an enhanced self-report survey process incorporated into the telephone survey of participating schools and CRE properties. Draft survey instruments were provided for review and comment by NYSERDA and the Department of Public Service prior to fielding.

ES.4 EVALUATION CONTEXT AND ISSUES

No savings are currently claimed for the Focus Program. The benchmarking components of this program are intended to become a larger part of NYSERDA's future EEPS-funded program activities approved by the Public Service Commission in December 2009.

Prior to this evaluation, there was no direct information about how benchmarking participants achieve energy savings or why they decided to engage in the benchmarking process.

Understanding how benchmarking participants take actions to reduce energy and the role of the benchmarking process in these actions is a fundamental key to establishing savings for this program. Thus, this evaluation was designed to investigate the mechanisms used to achieve savings through the benchmarking process and to develop a preliminary estimate of the evaluation-based gross and net kWh and MMBtu savings from NYSERDA's Energy $mart Focus benchmarking activities in the Institutional (K-12 Schools) and CRE components of the Program.

This impact evaluation is based in large part on a telephone survey of participants, review of NYSERDA's program tracking databases, the application of deemed savings and a review of billing records. The sample frame for the telephone surveys consisted of benchmarked facilities with sufficient billing histories. Originally, it was envisioned that a random sample would be drawn from three groups of participants: schools with only one benchmark; schools with multiple benchmarks; and commercial real estate (CRE) properties. This approach worked reasonably well for schools. However, it needed to be substantially modified for CREs as NYSERDA was not able to obtain billing records from the utilities. As an alternative approach, NYSERDA contacted two of the CRE property contacts, accounting for 23 of the 62 commercial properties in the sample frame, and obtained billing data directly from these participants. While these CREs represent a substantial proportion of the total number of CREs in the population, they were not randomly selected and do not constitute a random sample. Consequently, this project conducted analyses only for these 23 commercial properties; results are only applicable to these properties and were not extrapolated to the larger population of CREs.

ES.5 EVALUATION COMPONENTS

The impact evaluation had five major components:

1. a review of the Focus Program tracking system to assess the level of information available for each site;
2. an independent review of billing records and the benchmarking analyses, using billing data collected through the program where available and supplemented with a data request to utilities to obtain more recent billing records, as needed;
3. a telephone survey of participants to identify the specific steps toward efficiency taken and to assess the role of the NYSERDA Energy $mart Focus Program in the decision to move ahead with the efficiency upgrades;
4. a complete review of all relevant NYSERDA program databases to determine whether the benchmarking participants installed measures through other NYSERDA programs; and

5. estimation of savings associated with actions taken as a result of the Energy $mart Focus Program through the application of deemed savings from the Technical Manual or the Deemed Savings Database

The telephone survey helped inform the billing analysis and also played a critical role in developing an understanding of the full spectrum of actions taken to reduce energy consumption at the facilities in the sample.

ES.6 RESULTS

This section covers the results in the context of the evaluation objectives for the schools and the CREs.

Schools

The participant telephone survey was designed to assess the specific actions taken to reduce energy use. Each of the major survey sections helped to asses each of the six survey objectives. Following is a summary of key findings of each survey objective.

1. Installation of energy efficiency measures

As can be seen in Table ES-3, 95% of schools installed energy efficiency measures. The survey found that more schools reported installing energy efficiency measures than making behavioral changes. While 52% of schools reported replacing computer office equipment (as noted in the "other" category in the table below), many respondents were unsure if these replacements are being done for energy efficiency reasons. In addition, two-thirds of the schools with efficient lighting upgrades reported that they had participated in another NYSERDA program.

Table ES-3: Summary of Energy Efficiency Measure Installations for Schools Sample

Energy Efficiency Measures	Percent of Surveyed Schools (n=79)
Building Envelope	24%
Lighting	32%
HVAC and Water Heating	37%
Cooking and Refrigeration	8%
Other (including office equipment)	52%
Total Schools Installing any Energy Efficiency Measure	**95%**

[1] Schools may have added efficiency measures in more than one category.

2. Type of behavioral actions occurring and what mechanisms are in place to maintain them

Seventy-six percent (76%) of schools reported making behavioral changes of some type and 46% established mechanisms to remind staff (see Table ES-4). These types of mechanisms include preventative maintenance systems, online scheduling systems for after-hours building use, educational programs that get students and staff involved in the energy conservation process, and reminders that are both verbal and written in publications like school newsletters. In combination, 97% of schools reported *at least* the installation of one energy efficiency measure or the implementation of a behavioral change.

Table ES-4: Behavioral Change Measure Summary for Schools Sample

Behavioral Changes	Percent of Surveyed Schools (n=79)
Changes to Building Systems	54%
Changes to Maintenance Practices	22%
Other Staff Behavioral Changes	54%
Total Schools Making any Behavioral Change	**76%**

[1] Schools may have adopted behavioral changes in more than one category.

The results of both the electric and natural gas billing analyses suggest that behavioral changes by maintenance personnel result in a reduction in energy use; however, no savings were found for behavioral changes made by staff and students.[13] As mentioned below, many schools reported that the behavioral changes by maintenance personnel were not influenced by benchmarking.

3. Impacts of other utility, federal or other non-NYSERDA programs on the decision to benchmark and install efficiency measures

Sixteen percent (16%) of schools reported participating in a local electric or gas utility program and 48% reported participating in other types of non-NYSERDA programs including educational programs for students and staff. Deemed values were used to estimate the savings associated with these other energy efficiency activities.

About a third (32%) of all surveyed schools reported that they participated in a non-NYSERDA program and that program was either influential or very influential in the decision to benchmark through the Focus Program. Similarly, schools were asked if their participation in a non-NYSERDA program had any influence in their decision to take energy efficiency actions or implement behavioral changes. Almost half (49%) of the respondents stated that participation in a non-NYSERDA program was influential or very influential in their decision to install efficiency measures or implement behavior changes.

4. Obtain self-reported information regarding participation in other NYSERDA programs

Seventy-two percent (72%) of schools reported participation in another NYSERDA program, including the New York State Clean Air School Bus Program. When restricting the responses to programs that are more specifically targeted to energy efficiency, 40% of schools reported participation in another NYSERDA program. Existing Facilities was widely reported with 16% of total respondents reporting participation in this Program. Thirty-two percent (32%) of respondents reported participation in another NYSERDA program but could not recall the program name, and several described services like studies and audits, suggesting they may have participated in the FlexTech Program.

5. Assess non-program-related changes

The most commonly occurring change reported by schools was a change to the hours of operation. This was reported by 39% of all the schools. Schools reported being open longer hours and on more weekends to accommodate the after school actives of students and the town. This was a general finding observed across multiple schools.

[13] The measure-level billing analyses were not as robust as the overall pre/post analysis due to the relatively small number of schools in the models. However, both the electric and natural gas models showed the same pattern regarding the relative impacts of behavioral changes by maintenance personnel as opposed to the general staff and students.

6. Assess the role of the NYSERDA Energy $mart Focus Program in the decision to move ahead with the efficiency upgrades

The findings of the Focus Program impact questions were varied. The responses suggest that the benchmarking was highly influential in the installation of envelope measures, efficient lighting, HVAC or water heating equipment, changes to maintenance schedules, and behavioral changes by the school staff. However, the benchmarking process had little impact on improving the efficiency of cooking, dishwashing and refrigeration equipment, office or other equipment, or changes to the HVAC settings by maintenance staff. The survey responses also suggest that the schools would be very likely to pursue similar energy efficiency and behavior change measures even in the absence of the Focus benchmarking.

CREs

A separate participant telephone survey was designed for the CRE properties, based on relevant sections and measures assessed through the schools survey instrument. The customized CRE survey was then used to assess the specific actions taken to reduce energy use. Findings and conclusions for CRE properties are not as robust as the findings and conclusions drawn from the school surveys. This was due in part to a much smaller and less diverse sample size and the fact that one, of the two total CRE respondents had trouble recalling their program participation altogether. Following is a summary of key findings of each CRE survey objective.

1. Installation of energy efficiency measures

Forty-eight percent (48%) of CREs took energy efficiency actions (Table ES-5). Although this figure, in theory includes all respondents reporting *either* the installation of an energy-efficiency measure or the implementation of a behavioral change though the survey, findings from the Energy Efficiency Measure section did not need to be combined with the Behavioral Change section because no CREs reported behavioral changes.

Table ES-5: Summary of Energy Efficiency Measures by CREs

Measures Type	Percent of Surveyed CRE Properties with Installations (n=23)
Building Envelope	9%
Lighting Efficiency	17%
HVAC and Water Heating	30%
Cooking and Refrigeration	0%
Office Equipment	0%
Other Equipment	4%
Total CREs installing an Energy Efficiency Measure	48%

[1] CREs may have installed measures in more than one category.

2. Type of behavioral actions occurring and what mechanisms are in place to maintain them

Unlike schools, the CREs are not pursuing behavioral changes as a means to reduce energy consumption. Potential reasons why they do not pursue these measures could include the following:

- tenant lease terms define the temperatures at which spaces are to be kept;
- tenants pay their own utility bills (some reported did pay their monthly utility bills); and
- it is too difficult to control tenant behavior (the property management company is not located on site and has no means to continually monitor behavior as can be done with the schools).

3. Assess impacts of other utility, federal or other non-NYSERDA programs on the decision to benchmark install efficiency measures

Both CRE respondents reported participating in a local gas or utility program, but only one reported that participation had an influence on their decision to move forward with energy efficiency measures. Neither reported that these programs had any influence on the decision to benchmark their properties.

4. Obtain self-reported information regarding participation in other NYSERDA programs

Both CRE contacts reported participating in another NYSERDA program. The Existing Facilities Program and FlexTech were the two NYSERDA programs reported by the CREs.

5. Assess non-program-related changes that occurred during the analysis period that may affect energy consumption

Only nine percent (9%) of CRE properties reported any type of non-program change (i.e., building schedules and occupancy rates) within the analysis period.

6. Assess the role of the NYSERDA Energy $mart Focus Program in the decision to move ahead with the efficiency upgrades

It is difficult to draw any conclusions regarding this assessment goal in the case of CREs. One respondent did believe that the benchmarking reports were influential in getting the property manager to seriously consider taking actions toward increasing energy efficiency. However, responses to the influence questions on measure-level installations suggest that the benchmarking was not very influential in the decision to move ahead with their specific projects.

ES.7 ESTIMATED SAVINGS AND ATTRIBUTION RESULTS

The following points summarized the key findings of the evaluation.

1. 95% of the K-12 School participants benchmarked through the Focus Program between January 1, 2007 and December 31, 2009, reported installing efficiency measures (48% of CREs).
2. The aggregated influence factor indicates that about 50% of the evaluation-based estimate of gross savings are directly due to the Program.
3. Including the quantifiable savings associated with measures they may have installed through other NYSERDA programs, schools participating in the Focus program achieved a reduction in energy use of approximately 1.1% and 1.9% of the annual kWh and MMBtu energy usage(1.3% kWh and 0.0% MMBtu's for CREs).
4. A total reduction of 0.1% in annual kWh and 1.8% in annual MMBtu was achieved across all participating schools that can be attributed to the benchmarking component of NYSERDA's Focus Program (0% kWh and 0% MMBtu for CREs). These estimates represent net savings percentages after removing savings associated with participation in other NYSERDA and non-NYSERDA programs, and after application of benchmarking attribution factors.

Based on these results, it appears that there is a small, but quantifiable amount of savings that can be attributed to the benchmarking component of NYSERDA's Focus Program.

In addition, the Program may be acting as a gateway to other NYSERDA efficiency programs and helping to raise awareness of energy efficiency in participating K-12 schools. Forty percent (40%) of the schools participated in another NYSERDA program, which is indicative of a high degree of cross-program activity. Due to the length of the telephone survey, evaluators did not carefully probe for the timing and

level of participation, which are key components to establishing Focus as the gateway to other NYSERDA programs. This issue may be explored more thoroughly in future evaluations.

More detailed results are provided in the Result section of this report.

ES.8 RECOMMENDATIONS AND CONCLUSIONS

ES.8.1 Conclusions

The ground-level question for this evaluation was whether benchmarking results in actions that can reasonably be expected to reduce energy use. The evaluation results conclusively demonstrate the effectiveness of benchmarking in that virtually all of the participating schools (95%) installed at least one energy efficiency measure and a large majority (76%) adopted behavioral changes to reduce energy use. Not only are schools installing measures and adopting behavioral changes, but 54% of schools reported that the benchmarking was either "important" or "very important" in getting the decision makers to seriously consider taking energy efficiency actions at the school. Thus, it appears that the measurement methods inherent in the benchmarking process provide the catalyst for specific actions and assist the decision makers in moving forward with energy efficiency measures and behavioral strategies. The billing analysis supports these findings by demonstrating that actual consumption decreased by 1.6% for electricity and 4.5% for natural gas.[14]

The evaluation also demonstrates that Focus Program impacts are heavily intertwined with other NYSERDA and non-NYSERDA programs and other market forces. The telephone survey found that 40% of schools participated in another NYSERDA program and about one third (32%) of schools participated in a non-NYSERDA program. In addition, the billing analysis indicated that lighting was one of the measures with the most robust savings, but about 67% of schools with lighting upgrades also participated in another NYSERDA program.

Survey results also indicate that non-NYSERDA programs were a major motivating factor in conducting benchmarking (32% of surveyed schools) and installing energy efficiency measures (49%). Forty percent (40%) of the benchmarked schools participated and installed measures through other NYSERDA energy efficiency programs. Survey respondents also stated that many of the efficiency actions would have occurred even in the absence of the Focus Program.

When the NYSERDA savings and estimated non-NYSERDA savings are backed out of the Focus savings, the net program savings adjusted for the influence of the Focus Program are quite small at 900 kWh and 100 MMBtu per school per year. In contrast, if the influence adjustment is made and the savings allocated to other programs were assumed to be associated with the Focus Program, the program savings increase to 6,700 kWh and 133 MMBtu per year. These findings point to the policy issues related to how to allocate the savings among the various entities that are providing energy efficiency services to schools.

Given these complexities, the question becomes how to allocate the savings from benchmarking. This evaluation was intended as a preliminary investigation to assess whether the Focus Program is achieving savings. The evaluation methods do not meet the rigor of other NYSERDA evaluations that are based on site specific M&V. However, the evaluated savings provide an estimate of the magnitude of savings from the benchmarked schools with and without the savings generated by other NYSERDA and non-NYSERDA programs and should provide sufficient information to assess whether more rigorous impact

[14] These figures were not compared to reduction levels identified by the benchmarking reports because the reports did not consistently outline the reduction goals for the schools.

evaluation is needed. If the NYSERDA and non-NYSERDA program savings are removed from the Focus Program savings, the remaining savings are small and it would probably not be worthwhile to try to pursue direct M&V.

Overall, the key outcome of this evaluation is that benchmarking is an effective tool for promoting and achieving energy savings. The low level of evaluated savings is related to the cross-program activity and the number of schools that participated in other NYSERDA and non-NYSERDA programs.

ES.8.2 Program Recommendations

Defining Energy Reduction Actions

The Focus Benchmarking program does not have as a part of the database any way to identify whether a benchmarked facility took energy reduction actions since previous benchmarks. A major goal of this evaluation was to identify the different ways that schools and CREs attempted to reduce energy consumption. As benchmarking practices continue and benchmarking programs are expanded, benchmarked facilities could be requested to re-submit data collection forms with each set of bills they desired to have benchmarked. The data collection form could be expanded to include some general questions about the actions pursued to reduce energy since the last benchmark was completed. This would provide a starting point for future evaluations about types of actions that facilities pursue that may contribute to an energy reduction. If using telephone surveys with future evaluations, if the surveyor already has an idea of what measures were pursued, more time could be spent on the details of those projects, rather than requiring the evaluators to spend time ruling out the measures that were not taken.

Recommendation: For participants with multiple benchmarks, inquire about energy reduction actions that were implemented since the previous benchmark.

Collecting Waivers

The collection of utility release waivers was an unexpectedly difficult step in this evaluation. The low percent of schools and CREs that signed waivers limited the size of the utility billing request that could be submitted. The attrition that occurred both prior to the formal submitted utility request (due to unsigned waivers) and after the billing records were received from the utility (from lack of data and missing reads) was higher than anticipated by the Impact Evaluation Team. The attrition limited the sample to a less than desired level and ultimately prevented the Impact Evaluation Team from reaching it sample goals.

Recommendation: Establish a process for obtaining waivers to request utility data at the time of the benchmarking.

Establishing the Link between Benchmarking and Adoption of Efficiency

Results from this evaluation support a finding that electric and gas energy usage savings are being achieved for some behavioral changes, particularly when implemented by maintenance staff. This evaluation demonstrates that the key question for this program is how to establish a causal link between the Program's benchmarking activities and these savings. To establish such a link, a variety of approaches could be considered, such as working more closely with other entities to promote and track the installation of specific measures and adoption of specific behavioral actions. In addition, as part of the Program's measure installation and behavioral actions implementation process, participants could be asked to rank the influence that benchmarking had on their decision to adopt efficiency recommendations.

Recommendation: Review program delivery approaches to establish a firmer link between the benchmarking process and the adoption of efficiency measures and practices

ES.8.3 Evaluation Recommendations

Assessing the Role of Benchmarking in Relation to Participants' Other NYSERDA-Supported Energy Efficiency Initiatives

One aspect of this future evaluation could be to further explore the effectiveness of the benchmarking component as a gateway to other NYSERDA programs and to the adoption of energy efficiency measures and behaviors. This investigation requires a more detailed review of the various paths taken from benchmarking to adoption of efficiency and the timing of these actions.

Recommendation: Design the next evaluation to investigate the relationship between benchmarking and other programs and do a more detailed assessment of whether benchmarking provides the impetus for the adoption of further efficiency measures and practices.

Section 1:

INTRODUCTION AND PROGRAM DESCRIPTION

The **New York Energy $mart**[SM] programs are funded by an electric distribution System Benefits Charge (SBC) paid by customers of Central Hudson Gas and Electric Corporation, Consolidated Edison Company of New York, Inc., New York State Electric and Gas Corporation, National Grid, Orange and Rockland Utilities, and Rochester Gas and Electric Corporation. The programs are available to all electric distribution customers that pay into the SBC. The New York State Energy Research and Development Authority (NYSERDA), a public benefit corporation established in 1975, began administering the SBC funds in 1998 through NYSERDA's **New York Energy $mart**[SM] Program.

This report provides a detailed description of the impact evaluation conducted of the benchmarking component of NYSERDA's Energy $mart Focus Program (specifically, *Focus on Institutions* and *Focus on Commercial Real Estate*), for benchmarking activities conducted between January 1, 2007 and December 31, 2009. In addition to the Executive Summary, there are four other sections to this report. This Introduction provides a brief description of the main objectives of the impact evaluation, the evaluation approach, and a discussion of the context for the evaluation. A description of the Focus Program is also included in this section. The next section (Section 2) provides a discussion of the Methods used in this evaluation. Section 3 presents detailed Results, followed by Recommendations and Conclusions presented in Section 4.

1.1 EVALUATION OBJECTIVES

The purpose of this study is to develop an estimate of the evaluation-based gross and net savings from the Energy $mart Focus benchmarking activities in the Institutional (K-12 Schools) and CRE components of the program. The mechanisms for achieving savings through benchmarking are not as well understood as those employed through NYSERDA's programs that provide direct services and/or incentives. Consequently, an objective of the evaluation has been to identify the various approaches used to reduce energy consumption that were developed through the benchmarking process. Clarifying this process should provide valuable insights into the design of future impact evaluations.

The evaluation was designed to assess impacts in terms of three primary metrics:

1. the percent of participants who pursue efficiency measures
2. the magnitude of savings associated directly with the Focus Program and also the savings achieved by benchmarking participants who installed measures through other NYSERDA programs
3. the percent reduction in energy use achieved through benchmarking

In addition, the evaluation investigated whether the Focus Program acts as a gateway to other NYSERDA efficiency programs and to raising awareness of energy efficiency.

1.2 EVALUATION APPROACH

The impact evaluation included both evaluation-based gross savings impact and attribution assessments. Evaluation-based gross savings were estimated through a participant telephone survey of a stratified random sample of schools (and a targeted, best available sample of CREs), combined with review of utility billing records, benchmarking data and deemed savings from other NYSERDA program databases. For the attribution assessment, this evaluation used an enhanced self-report survey process that was incorporated into the telephone survey of participating schools and commercial properties. The methods

established for estimating savings from benchmarking program activities will help inform future EEPS Benchmarking program planning and evaluation planning.

NYSERDA had multiple years of benchmarking data for some school buildings that were used to assess continued savings by benchmarked participants. However, similar multiyear data was not available on CRE properties.

1.3 EVALUATION CONTEXT AND ISSUES

No savings are currently claimed for the Focus Program. The benchmarking components of this program are intended to become a larger part of NYSERDA's future EEPS-funded program activities approved by the Public Service Commission in December 2009. Thus this evaluation was designed to investigate the mechanisms used to achieve savings through the benchmarking process and to develop an estimate of the evaluation-based gross and net kWh and MMBtu savings from NYSERDA's Energy $mart Focus benchmarking activities in the Institutional (K-12 Schools) and CRE components of the program.

Prior to this evaluation, there was no direct information about how benchmarking participants achieve energy savings or why they decided to engage in the benchmarking process. Reductions in energy use could be related to direct energy efficiency upgrades, behavioral changes or incidental activity that was not undertaken to save energy. Participants may undertake benchmarking for a number of reasons, including being compelled by legal obligations or pressure from constituents or other interest groups.

Understanding how benchmarking participants take actions to reduce energy and the role of the benchmarking process in these actions is a fundamental key to establishing savings for this program. Thus, this evaluation was designed to investigate the mechanisms used to achieve savings through the benchmarking process and to develop a preliminary estimate of the evaluation-based gross and net kWh and MMBtu savings from NYSERDA's Energy $mart Focus benchmarking activities in the Institutional (K-12 Schools) and CRE components of the Program.

This impact evaluation is based in large part on a telephone survey of participants, review of NYSERDA's program tracking databases, the application of deemed savings and a review of billing records. The sample frame for the telephone surveys consisted of benchmarked facilities with sufficient billing histories and originally envisioned that a random sample would be drawn from three groups of participants: schools with only on benchmark, schools with multiple benchmarks, and commercial real estate (CRE) properties. This approach worked reasonably well for schools. However, as described below, it needed to be substantially modified for CREs.

NYSERDA was not able to obtain billing records for the entire population of CREs, due in part to difficulties in procuring the necessary releases from property managers and related utility logistical matters. As an alternative approach, NYSERDA contacted two of the CRE property contacts, accounting for 23 of the 62 commercial properties in the sample frame, and obtained billing data directly from the participants. While these CREs represent a substantial proportion of the total number of CREs in the population, they were not randomly selected and do not constitute a random sample. Consequently, this project conducted analyses only for these 23 commercial properties and results are only applicable to these properties and were not extrapolated to the larger population of CREs.

1.4 EVALUATION COMPONENTS

The impact evaluation has five major components:

1. a review of the Focus Program tracking system to assess the level of information available for each site

2. an independent review of billing records and the benchmarking analyses, using billing data collected through the program where available and supplemented with a data request to utilities to obtain more recent billing records, as needed
3. a telephone survey of participants to identify the specific steps toward efficiency taken and to assess the role of the NYSERDA Energy $mart Focus Program in the decision to move ahead with the efficiency upgrades
4. a complete review of all relevant NYSERDA program databases to determine whether the benchmarking participants *installed* measures through other NYSERDA programs
5. estimation of savings associated with actions taken as a result of the Energy $mart Focus Program through the application of deemed savings from the Technical Manual or the Deemed Savings Database

The telephone survey helped inform the billing analysis and also played a critical role in developing an understanding of the full spectrum of action taken to reduce energy consumption at the facilities in the sample.

Each of these five major evaluation components is described in detail in Section 2 of this report.

1.5 FOCUS PROGRAM DESCRIPTION

The Energy $mart Focus Program is a sector-specific program aimed to encourage and facilitate greater energy efficiency awareness and penetration to the targeted sectors. Through a marketing and information transfer effort, the program uses existing **New York Energy $mart** programs and services to sponsor deployment, demonstration, research, and development projects in conjunction with sector customized strategies. These strategies may include (1) outreach and one-on-one interactions, (2) targeted marketing materials and messages, (3) training, (4) partnerships with trade associations, (5) integration with regional and national efforts, (6) benchmarking, (7) development of tools and resources, and (8) limited technical assistance. Each sector's strategy is different and leveraged towards non-energy benefits such as environmental, indoor air quality, productivity, and maintenance savings. Below is a description of program activities in each sector.

Focus on Commercial Real Estate (Focus on CRE): NYSERDA's Focus on CRE assists commercial building owners, managers and consultants with sector-specific guidance about improving energy efficiency and property value, and facilitates NYSERDA participation by providing information about, and participation support for funding opportunities. Benchmarking and technical analysis previously offered under Focus on CRE may help to inform NYSERDA new EEPS-funded FlexTech Benchmarking Pilot.

Focus on Hospitality: NYSERDA's Focus on Hospitality addresses hotel and motel and restaurant facilities providing guidance on energy efficiency and NYSERDA Programs. NYSERDA works closely with the New York State Hospitality and Tourism Association and the New York Restaurant Associations to promote the programs and services offered by NYSERDA

Focus on Institutions: NYSERDA's Focus on Institutions works with Schools (K-12) and State Facilities. Activities include educational outreach, training, benchmarking, limited technical assistance, development of tools and resources, support of several executive orders, and direct assistance for the New York Collaborative for High Performance Schools Program (NY-CHPS). Benchmarking and technical analysis previously offered under Focus on Institutions may help inform NYSERDA's new EEPS-funded Benchmarking Program.

Focus on Water and Wastewater: NYSERDA's Focus on Municipal Water and Wastewater encourages municipal water and wastewater facilities to adopt technology that is more energy efficient and

economical, while preserving environmental standards. NYSERDA partners with institutions such as the New York Environmental Facilities Corporation, the New York State Department of Environmental Conservation, and the New York State Department of Health. Activities include training to provide new operators with exposure to the benefits and opportunities of energy efficiency in their plants, with an emphasis on identification of easily implemented energy efficiency improvements.

Focus on Industry: NYSERDA's Focus on Industry targets facilities used in manufacturing and information technology. It assists customers with identifying and implementing cost-effective projects that improve energy efficiency and productivity at manufacturing and data center facilities. Projects that reduce energy usage per unit of production or computing are encouraged.

Focus on Healthcare – NYSERDA's Focus on Healthcare addresses hospitals and other healthcare facilities. It assists the healthcare industry with reducing energy costs and improving the environment while enhancing the treatment of patients by communicating energy and non-energy benefits that align with the objectives and goals of New York State healthcare institutions.

Focus on Local Government – NYSERDA's Focus on Local Government addresses villages, town, city, and county level buildings and assists participants in the planning, financing and implementation of strategies to reduce their environmental footprint and lower their energy costs.

Focus on Universities – NYSERDA's Focus on Universities addresses private and public New York State colleges and universities. It provides assistance with energy efficiency opportunities and NYSERDA programs, helping colleges and universities to achieve their energy and environmental objectives while maintaining a healthy bottom line.

This evaluation covers the benchmarking efforts associated with the Institutional (K-12 Schools) and CRE sectors only.

1.6 FOCUS PROGRAM SAVINGS ACCOMPLISHMENTS

No savings are currently claimed for the Focus Program. The benchmarking components of this program are intended to become a larger part of NYSERDA's future EEPS-funded program activities approved by the Public Service Commission in December 2009.

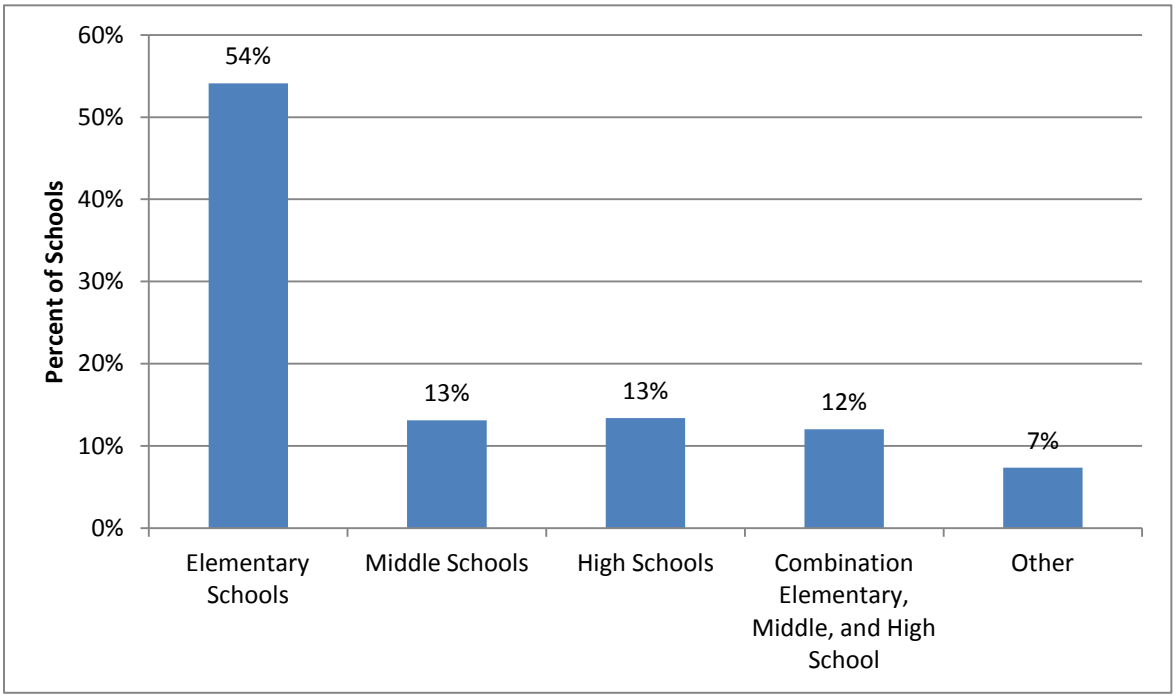
The schools component of the Focus Program has been in operation for over ten years and will be ongoing through 2012 with more than 1,000 public schools (over 30% of the population) having been benchmarked during this time. The Focus on CRE component (which was stopped in mid 2010) has directly supported benchmarking of 68 commercial properties, representing approximately 48 million evaluated gross square footage of space. While the original Focus on CRE benchmarking component ended, an EEPS-funded FlexTech Benchmarking pilot is being implemented that continues to providing benchmarking support.

1.7 FOCUS PARTICPANTS

The population of institutions (K-12 Schools) studied as part of this evaluation included 366 schools that conducted benchmarking activities between the years of 2007 and 2009 and used natural gas, steam, or electricity as their main heating fuel. Some characteristics of this population are described below.

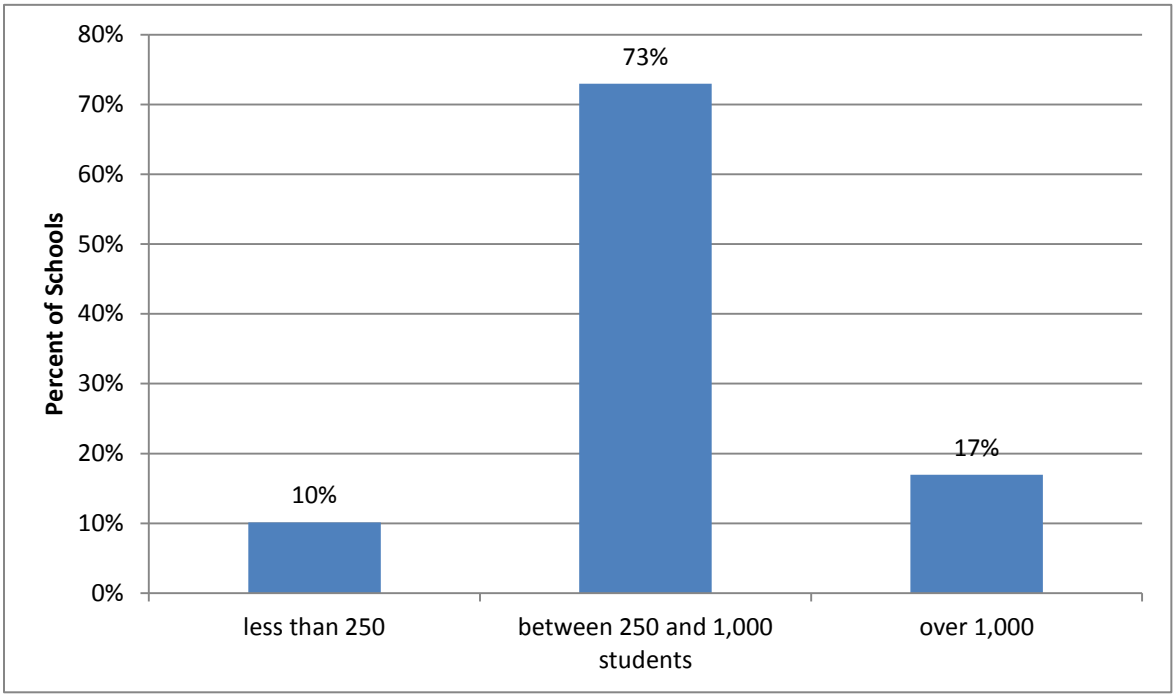
Public schools accounted for 341 (93%) of all benchmarked schools, while only 25 (7%) were private schools.

Figure 1-1: Breakdown of School Type for Population of Schools



As shown by Figure 1-1 about 54% of schools in the population are designated as Elementary Schools, about 13% are designated at Middle Schools, another 13% as High Schools, 12% are designated as a combination and 7% are designated as other.

Figure 1-2: Student Population Statistics for the Total Population of Schools



Shown by Figure 1-2, nearly three quarters of the schools (73%) have student populations between 250 and 1,000 students. Ten percent (10%) of schools reported have populations less than 250, and 16% have student populations over 1,000.

Figure 1-3: Building Size Statistics for the Total Population of Schools

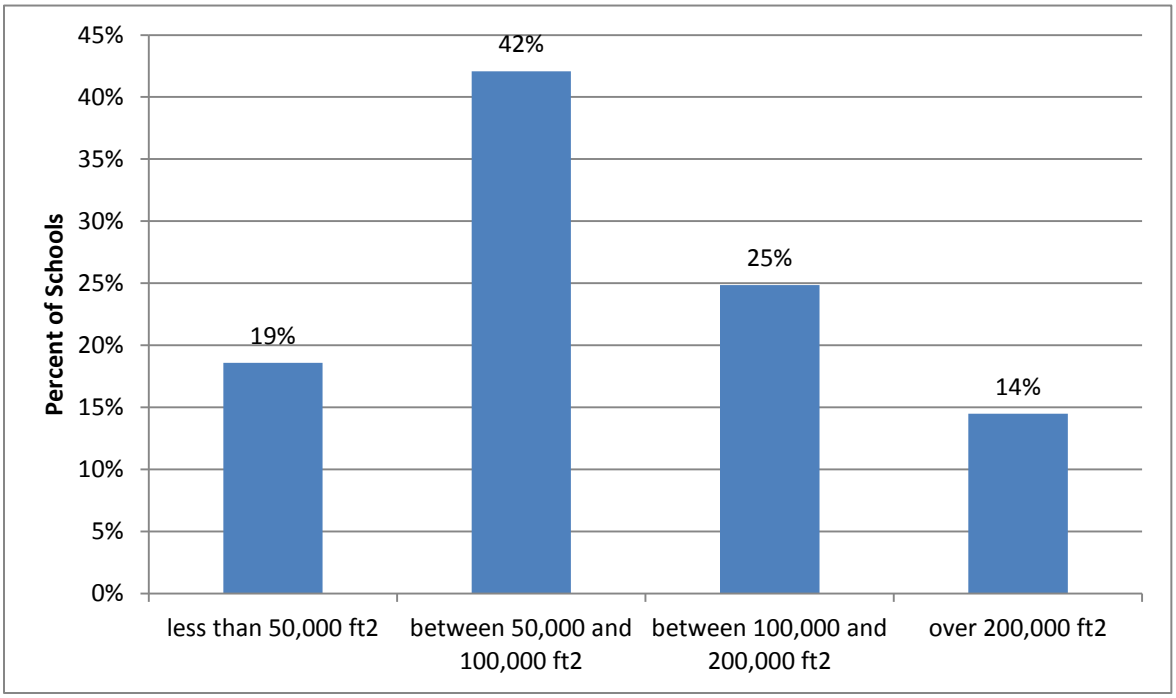
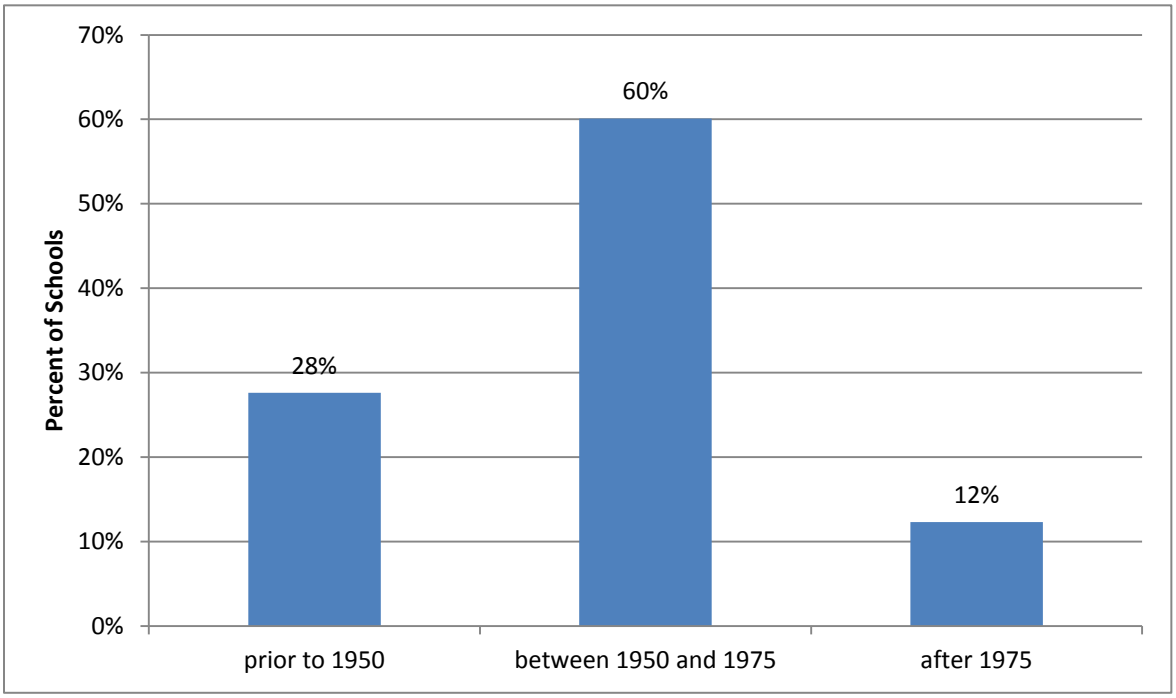


Figure 1-3 shows that 19% of the schools have building sizes less than 50,000 square feet. Forty-two percent (42%) have sizes between 50,000 and 100,000 square feet. Twenty-five percent (25%) have a building size between 100,000 and 200,000 square feet, and 14% have a building size over 200,000 square feet.

Figure 1-4: Building Age Statistics for the Total Population of Schools



Finally for schools Figure 1-4 illustrates the relative building ages for the school population. Twenty-eight percent (28%) of the schools were built prior to 1950. A majority of schools (60%), were built between 1950 and 1975 and 12% were built after 1975.

The population of CREs, while much smaller with a total population of 62 buildings, still represents more evaluated gross building square footage than the population of schools. Some characteristics of this population are described below.

The total square footage represented by Commercial Real Estate properties is 46,266,744 square feet. This total is further described below.

Figure 1-5: Building Size Statistics for the Total Population of CREs

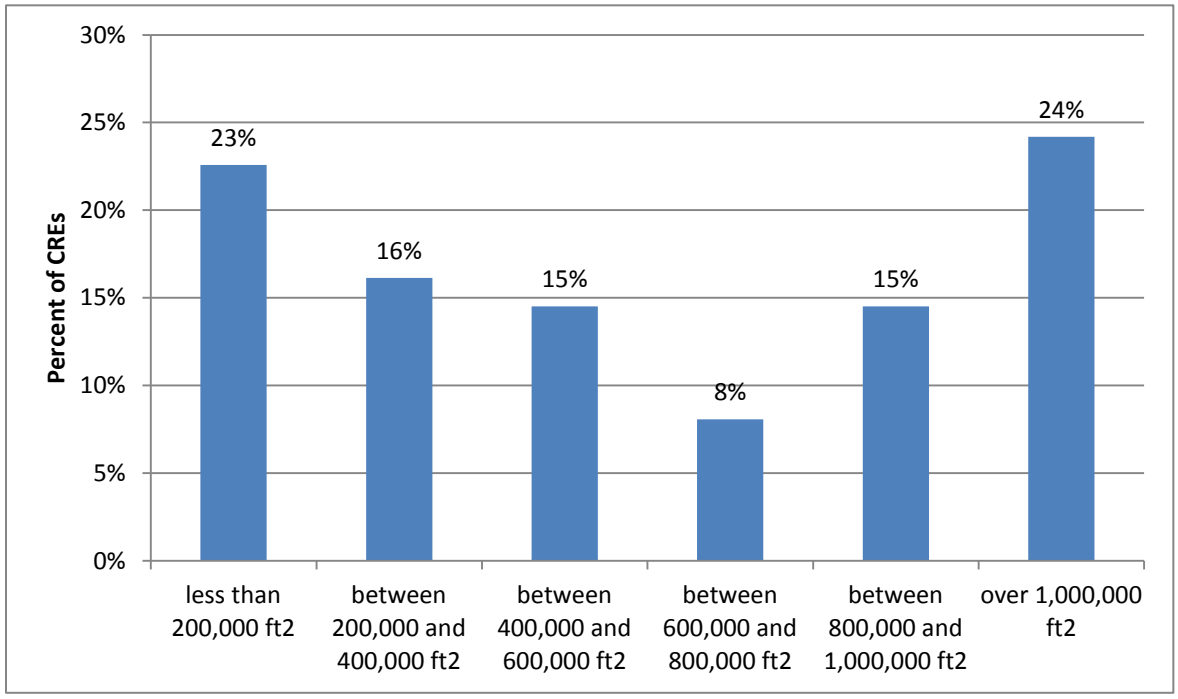
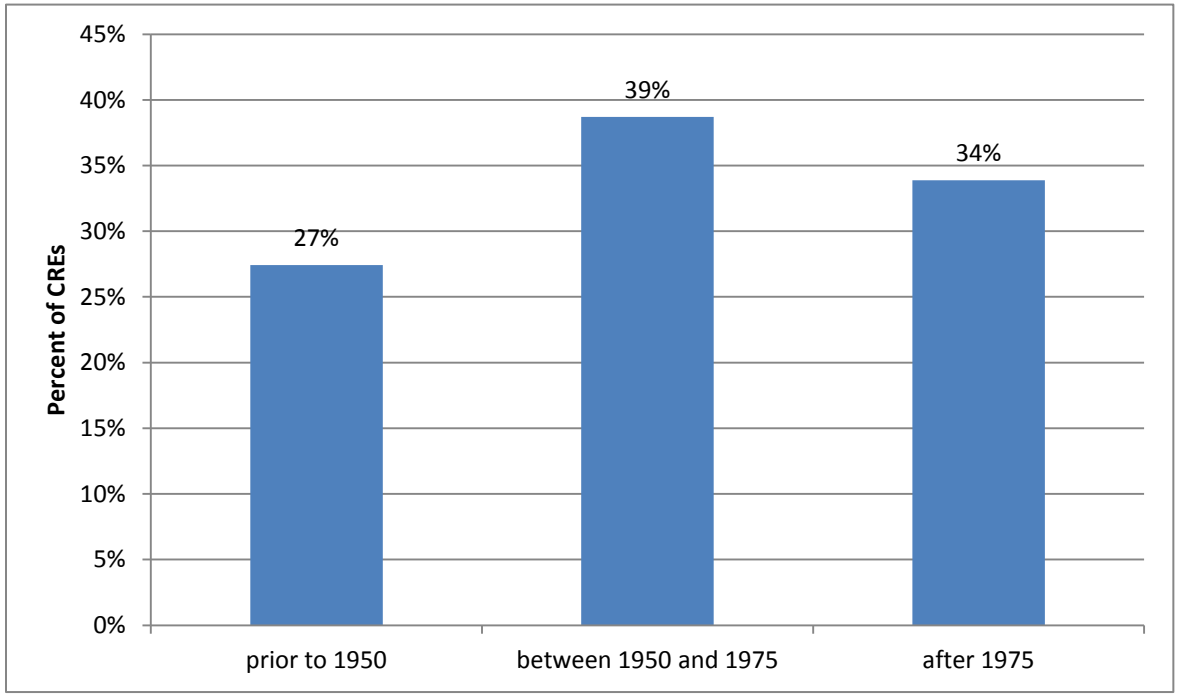


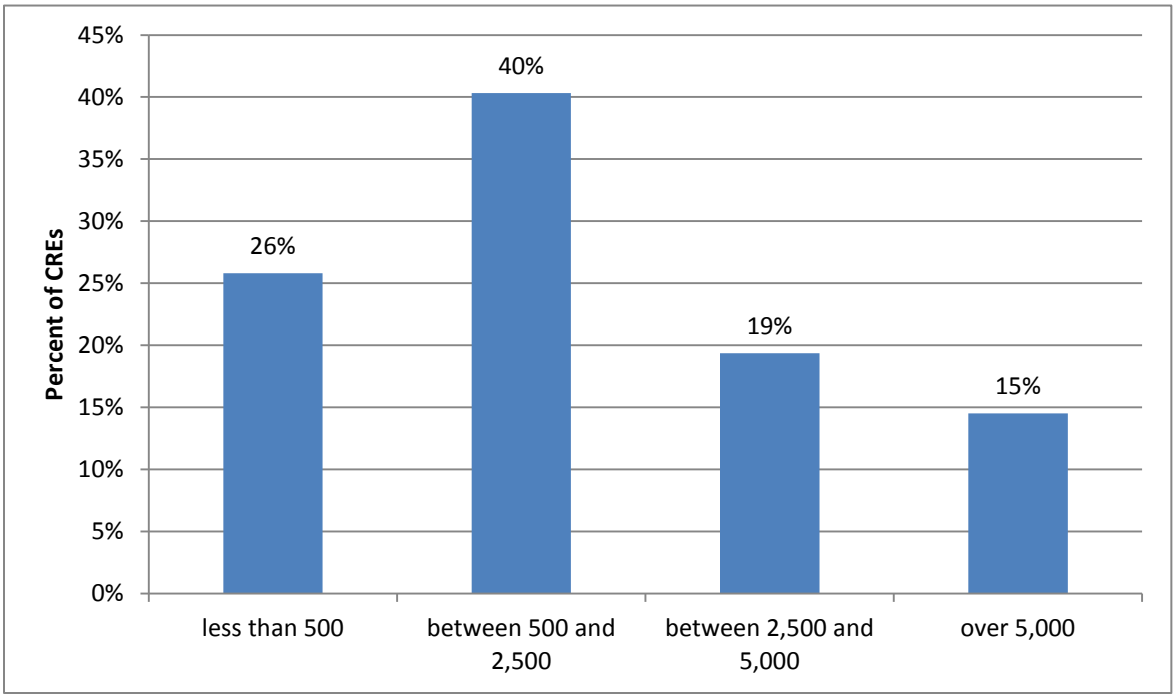
Figure 1-5 illustrates CRE building sizes throughout the population. Twenty-three percent (23%) of CREs are less than 200,000 square feet. Fifteen percent (15%) are between 200,000 and 400,000 square feet. Eight percent (8%) are between 600,000 and 800,000 square feet. Fifteen percent (15%) are between 800,000 and 1,000,000 square feet, and 24% of CRE properties are greater than 1,000,000 square feet.

Figure 1-6: Building Age Statistics for the Total Population of CREs



As shown by Figure 1-6, 27% of CRE buildings were constructed prior to 1950. Thirty-nine percent (39%), were built between 1950 and 1975, and 34% were built after 1950. When compared to schools, the CRE building population is considerably newer.

Figure 1-7: Building Occupant Statistics for the Total Population of CREs



Building occupant statistics for the population of CREs is illustrated by Figure 1-7. Twenty-six percent 26% of buildings have occupant populations of less than 500. Forty percent (40%) have populations between 500 and 2,500. Nineteen percent (19%) have occupant populations between 2,500 and 5,000, and 15% have populations greater than 5,000.

1.8 BENCHMARKING

Benchmarking is the process of comparing energy use (both electric and fossil fuel use) over the course of time. In contrast to an audit program or direct incentives, there are no site-specific recommendations for energy efficiency improvements, but rather the goal is to reduce energy consumption by a set percentage of total energy use. A wide variety of actions may be pursued to reduce overall energy consumption, and these actions may occur at various points in time. In general, benchmarking may result in savings from three possible sources:

1. replacement of equipment with energy –efficient products, either as a retrofit or at the time of replacement;
2. modifications to behavior or operations designed to reduce energy; and
3. incidental changes that are not directly related to energy savings but still result in a decrease in energy use, such as a decrease in the number of students or school programs.

1.8.1 What the Benchmark Provides

The product of the benchmark is a report or scorecard that the School or CRE receives after their bills and building information is submitted and analyzed. The reports sent to Schools and CREs are different and each is described below.

Cover Letter

The cover letter summarizes the energy use at each district building using select metrics including Portfolio Manager Score, total energy use in kBtu/ft^2, electric use in kWh/ft^2, heating fuel use in kBtu/ft^2, heating fuel use in Btu/ft^2/HDD, total energy costs in $/ ft^2, and total energy cost in $/student. All metrics except the U.S. EPA Portfolio Manager Score are specific to New York State. The cover letter provides a snapshot of all district building and how they compare to each other and to other schools in New York State and across the United States.

The cover letter also identifies all schools within the district that could potentially qualify for the U.S. EPA's ENERGY STAR® Building Label. The schools that potentially qualify for the label are highlighted for easy identification.

Schools Benchmarking Report

The report received by the participating schools includes three distinct sections. First the report explores the energy consumption of the school and discusses the multiple benchmarks that are used to compare the facility to other schools nationally, as well as across the state. The benchmarks that are included in the report are:

- U.S. EPA Portfolio Manager Score
- Total Energy Use
- Electric Use
- Heating Fuel Use
- Total Energy Cost

Each benchmark is normalized either by square footage or the number of students. The U.S. EPA Portfolio Manager Score is the only metric that compares the school to other K-12 schools on a national level. The remaining benchmarking metrics are calculated from a database of New York K-12 schools for which NYSERDA has received building characteristics data and at least one year of utility bills. The New York State Schools Database compares the usage of the benchmarking school, for each individual year of bills submitted, to the other schools in the dataset with bills from a similar time frame. For each year of bills submitted, the report lists each metric and how the school did within that year and how other schools did within that same year. These findings are summarized in a table near the beginning of the report.

After all energy benchmarks are discussed in more detail, the recommendations portion of the report begins. In this part, several general, none site-specific ways to reduce energy consumption are presented.

Following the recommendations, the third section of the report identifies some additional tools, rebates, and incentives the school may wish to pursue (all available through other NYSERDA programs) to help them further identify and finance ways to reduce energy consumption.

CRE Benchmarking Scorecard

The benchmarking report received by the Commercial Real Estate participants is different than the report received by the schools. While the schools receive a detailed report, the CRE benchmarking feedback

was designed to be shorter. The report is called a Benchmarking Scorecard and is a one page summary of energy consumption for the building. On the score card the following energy metrics are listed:

- U.S. EPA Portfolio Manager Score
- Total Energy Use

The U.S EPA Portfolio Manager Score allows the building owner to compare the energy use of their property to a peer group of commercial office building nationally. The second energy metric, total energy use, is converted into source energy use and is normalized by square footage. Source energy use accounts for the total amount of fuel required to operate a building, including all transmission, delivery, and production losses as compared to site energy use, which only accounts for the energy used at that building. This metric is compared to either other commercial real estate building across New York State or in New York City, depending upon the location of the building. The scorecard, unlike the school benchmarking report, does not include a recommendations section or a description of appropriate NYSERDA programs available for the CRE. These resources are, however, readily available within the online benchmarking toolkit. Prior to the end of the benchmarking component of the Focus CRE Program in 2010, each company was assigned a NYSERDA Account Manager to aid in the benchmarking process, help focus on the company's needs, and drive participation in other NYSERDA programs. In addition to benchmarking, cost sharing was provided for a one-day comprehensive building review called an Energy Scan.

Both the CRE Benchmarking Scorecard and the Schools Benchmarking Report include information on the carbon footprint of the building.

1.9 TIMING

The evaluation period of the study (January 1, 2007 – December 31, 2009) allowed for assessment and analysis of the energy use patterns of facilities that may have participated in the benchmarking process multiple times over the three year period. This special subset of participants, defined as multi-benchmarkers, was examined to determine whether trends in energy use over time could be established.

The long evaluation period also allowed the Impact Evaluation Team to determine whether savings achieved through behavioral and operational changes could be quantified and sustained over the course of time. Unlike savings achieved through installed measures, savings that occur as a result of behavior and operational changes rely on the actions of many individuals.

Section 2:

METHODS

To achieve the primary objectives of this study, a number of methods were used to ascertain the appropriate data required for analysis of the study group. This section of the report describes the methods used in detail. Lessons learned through implementation of this methodology will also help inform conclusions and recommendations in Section 4 of this report. The primary activities used to achieve the evaluation objectives included the following:

1. Review of the Focus Program tracking database
2. Review of benchmarking data
3. The participant telephone survey
4. Review of all relevant NYSERDA program databases
5. Billing analysis
6. Deemed savings analysis
7. Analysis of energy savings

Each of these objectives is discussed more thoroughly below.

2.1 FOCUS PROGRAM TRACKING DATABASE REVIEW

The source of the data for all schools and CREs was the program tracking database provided by NYSERDA. For schools, the database contains school name, total site and source[15] energy consumption, size of building, Portfolio Manager score, dates when the benchmark occurred, dates when benchmarking bills ended, total kWh, heating fuel use, and several other building specific details. For CREs, the database contains building name, owner, Portfolio Manager Score, size of building, and energy consumption (weather normalized site and source energy consumption in kBtu/ft^2).

These data sets were extensively reviewed and used to define the sample frames for both the schools and CREs. In addition to defining the sample frames, the program tracking database review provided insight into the unique benchmarking process and allowed us to anticipate challenges in the goal of estimating evaluation-based gross program savings.

The program tracking database was used in defining the sample frame, choosing the initial sample, and identifying issues in estimating savings that resulted from the benchmarking process, as described in the sections below.

2.2 INDEPENDENT REVIEW OF BENCHMARKING DATA

The Impact Evaluation Team was provided with the historical benchmarking reports received by the schools when they completed their benchmark. Corresponding to the school benchmarking reports were the benchmarking scorecards for CREs. The Impact Evaluation Team did not receive the one page scorecard summaries of the benchmarked CREs in the sample, thus these were not available for review,

[15] Source energy represents the total amount of fuel that is required to operate the building. It incorporates all transmission, delivery, and production losses.

but the Impact Evaluation Team was assured that all information that would be located in the scorecard was available in the CRE program tacking database provided.

2.2.1 Benchmarking Reports Review Findings

The main purpose of the benchmarking report review was to provide insight for the telephone surveys. Some unique site specific information was gleaned from this review and used for the telephone surveys as well as for cleaning of billing data. One example was two separate schools within the same district that were benchmarked together and separately. The buildings shared an electric meter and for one round of benchmarking had been counted as one site, while for a secondary round of benchmarking, estimates were made for each building's electric use. This information was not available in the Focus Program tracking database and cleared up uncertainties on these buildings.

The benchmarking reports also provided insights into the process of benchmarking. Through review of the benchmarking reports the Impact Evaluation Team learned that schools benchmark their buildings simultaneously and have the ability to make comparisons to other district buildings as well as across New York State and across the country. The Impact Evaluation Team also realized that many schools in our sample shared the school districts' staff. This information was useful for implementing the telephone survey.

2.3 PARTICIPANT TELEPHONE SURVEY

The overall approach to the telephone survey for the schools is described below.

- An initial sample of approximately three times the final desired sample size was selected.
- Waivers were requested to allow NYSERDA to request billing data from the utilities.
- Billing data was obtained for all schools that provided waivers.
- Billing data was cleaned and the schools with one year of billing records before and after the benchmark were identified.
- All participants with sufficient billing data were included in the sample frame for the telephone survey and attempts were made to interview all of these schools.

While the same approach was initially planned for the CREs, it was not possible to implement it. The issues and modification to the CRE approach are discussed below.

This section covers the initial sampling, survey instruments, survey content, second round of sampling, sample disposition and timing.

2.3.1 Initial Sampling

The overall plan was to select 186 schools with the intention of obtaining billing data from the utilities and completing 63 telephone surveys. This section discusses the sample frame, the primary sampling unit and stratification, selection of the initial sample and CREs.

<u>Defining the Sample Frame</u>

As specified in the work plan, this impact evaluation was to cover benchmarking activities occurring between January 1, 2007 and December 31, 2009. Defining when a "benchmarking activity" occurred was the first challenge in defining the sample frame. The database included more than 800 unique schools and included benchmarking dates as early as 2003 and as recent as 2011.

The database was narrowed to schools that had completed benchmarks within the January 1, 2007 through December 31, 2009 periods. Schools using an unregulated heating fuel, like fuel oil, were also eliminated

due to the difficulty in obtaining any supplemental billing data. After defining the time frame and removing those with unregulated fuels, the sample frame of all schools was reduced to 366 unique schools.

The CRE database was much smaller and more limited in information. A few of the CRE properties in NYSERDA's program database were identified as "test" projects and/or reported unreasonably high energy intensity values. Upon discussion with NYSERDA, these properties were left out of the sample frame. The total sample frame for CREs was found to be 62. Within the 62 properties, a few were benchmarked in 2010. They were left in as a part of the sample frame due to the relatively small number of CRE properties available for evaluation.

Primary Sampling Unit and Stratification

The primary sampling unit was the site (schools and CREs), and the primary stratification variable was program component (School, CRE). The upper level stratification variable for schools was whether the school had been benchmarked more than once. Schools with at least one completed benchmark inside the time frame of interest and additional benchmarks completed outside of the time frame of interest were considered multiple benchmarkers. All single benchmarkers had completed their benchmark within the time frame. The initial sample was selected randomly from each of the three strata (CREs, schools with one benchmark and schools with multiple benchmarks).

Stratifying on prior benchmarking ensured adequate coverage of benchmarking participation and allowed the leveraging of additional information through the telephone surveys. Per the work plan, the Impact Evaluation Team did not develop specific impact estimates based on the number of times the school was benchmarked. The population of schools that participated during the specified time frame and use electricity, natural gas or steam as the heating fuel was 366. Of this total, 155 participated for a single year and 211 participated in more than one year.

Other stratification variables such as size of the building, energy use and energy intensity (energy use per square foot) were considered for possible lower level stratification. However, the Impact Evaluation Team concluded that there was insufficient information to indicate that these variables would improve the efficiency of the sample.

Choosing an Initial Sample

The sampling process was designed to provide results at the 90% confidence/ ±10% precision level (90/10) for the two program components (Schools and CREs) combined. Based on the specified level of precision, an initial sample for the telephone survey would be 68 for each program component assuming a large population, i.e., 68 schools and 68 CREs for a total of 136 completed phone surveys. As noted previously, the initial adjusted population of schools was 366, but the population of CREs was only 62.

When the sample sizes were adjusted using the finite population correction factor, the overall sample size needed to achieve 90/10 precision for each component was reduced to 57 for schools and 32 for CREs. While a sample of 57 schools and 32 CREs would allow the 90/10 level to be achieved within each program component, these sample sizes were increased proportionally to 63 schools and 37 CREs in order to complete a total of 100 telephone surveys, in accordance with our initial work plan.

To ensure that the target of 100 completed telephone surveys for sites with utility billing data could be met, the initial sample needed to be larger to allow for non-response to the telephone survey and possible attrition in the process of obtaining the utility billing data. Sample sizes were doubled for schools and set to the total population for CREs (which is less than double the target sample site), resulting in an initial sample of 126 schools (50 single benchmarking and 76 multi-benchmarking) and 62 CREs (188 total).

The sample of schools was allocated to single and multiple benchmarks proportionally based on a review of NYSERDA's program tracking database which showed that about 40% of the schools were

benchmarked just once and 60% were benchmarked multiple times. An additional 60 schools were identified in case we were unable to achieve the targeted 63 completed surveys from the initial sample. The additional 60 schools were also allocated proportionally to the initial sample breakdown. Table 2-1 shows the target sample size, the proposed final sample breakdown, and the total utility billing data requests that were submitted.

Table 2-1: Target Sample Size, Final Sample Breakdown and Billing Request Totals

Site Type	Survey Targets	Initial Sample Size Goals	Billing Request Totals
Schools			
Schools benchmarking one time	25	50	74
Schools benchmarking multiple times	38	76	112
Total Schools	*63*	*126*	*186*
CREs			
CREs benchmarking one time	37	62	62
Total CREs	*37*	*62*	*62-*
Total Surveys	*100*		

School surveys were administered to 22 individuals representing 79 unique properties. Most school contacts were responsible for answering on behalf of two or three properties within the district, with the exception of one contact that was responsible for 27 different schools in the sample. The Impact Evaluation Team made every effort to work with this school contact to ensure that detailed individual school-level information could be collected where possible.

The overall sample goal of 63 school interviews was exceeded, but the goal of interviewing 25 single benchmarking schools was not met. After the cleaning and review of available billing data, the final sample frame of schools did not include sufficient single benchmarking schools to meet the initial goal of 25 properties.

CREs

NYSERDA was not able to obtain billing records for the entire population of CREs, due in part to difficulties in procuring the necessary releases from property managers and related utility logistical matters. As an alternative approach, NYSERDA contacted two of the CRE property contacts, accounting for 23 of the 62 commercial properties in the sample frame, and obtained billing data directly from the participants. While these CREs represent a substantial proportion of the total number of CREs in the population, they were not randomly selected and do not constitute a random sample. Consequently, this project conducted analyses only for these 23 commercial properties and results are only applicable to these properties and were not extrapolated to the larger population of CREs. The Impact Evaluation Team and NYSERDA agreed that although the sample was not representative of the greater CRE population, the surveys would still be administered.

Two contacts were made for the CRE properties: a property manager with responsibility for 20 of the benchmarked CREs and a contractor who was instrumental in the benchmarking for three other CREs. Surveys were administered to both contacts, one representing three properties and the other representing 20 properties. The contact representing three properties requested that the survey be sent through e-mail.

The contact felt that their schedule did not allow for an extended phone interview, but if the survey was provided it could fill out in their spare time.

The telephone interview with the CRE contact for 20 properties was not as successful at collecting the survey information as the interviews with the schools or with the other CRE contact. There are two main reasons that this survey effort was not successful:

1. The respondent did not recall the benchmarking effort done through NYSERDA's Focus Program. The contact had only a vague recollection of reading the benchmarking reports.
2. The number of properties was too great to discuss in detail during the telephone interview.

In addition, a new law was adopted in New York City (Local Law 84) on March 21, 2011 by the New York City Department of Buildings, requiring that all buildings in excess of 50,000 square feet be benchmarked and reporting their findings on an annual basis. This law has required the New York City contact to conduct benchmarking on their properties outside of the Focus Program. Although the law was adopted after the time period covered in this evaluation, it affected the respondent's perceptions and effectively blurred the line between benchmarking through the Focus Program and benchmarking due to legal requirements.

While many questions could not be asked for this CRE property contact, the discussion that occurred over the phone interview still provided insights into the workings of CRE properties and some of their decision making and could help inform future evaluations of the Focus on CRE Program.

2.3.2 Survey Instruments

The survey instrument was approved by NYSERDA and the DPS prior to fielding the survey. The CRE survey instrument was based on the schools survey instrument but had minor edits to address concerns of commercial real estate that were not of concern with the schools.[16] The survey was implemented by GDS Associates. Advance letters to introduce the school survey were sent to all potential primary participant contacts before they were contacted and an e-mail was sent to the two CRE property contacts. The schools survey instrument is attached as Appendix A and the CRE survey instrument is attached as Appendix B.

As described previously, survey participants were stratified into two primary groups. The first group was made up of participants who had only performed benchmarking on one occasion. The second group represented participants who performed benchmarking for multiple reporting periods over multiple years. Stratifying on past benchmarking activity was intended to ensure adequate coverage of benchmarking participation and allow the Impact Evaluation Team to leverage additional information through the telephone surveys.

The participant telephone survey was primarily designed to assess the specific actions taken to reduce energy use. The objectives of the participant telephone survey are listed below:

1. To identify the energy efficiency measures installed since the benchmarking was conducted
2. To determine whether, and what types of, behavioral or operational changes were made for the purposes of reducing energy consumption and what types of mechanisms are in place to maintain those changes

[16] All sections of the survey that were present within the schools surveys were included in the CRE survey, but select questions that were school specific were removed and additional questions on the location of upgrades (i.e. whether the measures was completed in a common area or tenant space) were added to the CRE survey.

3. To assess the impacts of other utility, federal or other non-NYSERDA programs on the decision to pursue benchmarking and install efficiency measures
4. To obtain self-reported information regarding participation in other NYSERDA programs
5. To assess non-program-related changes that occurred during the analysis period that may affect energy consumption
6. To assess the role of the NYSERDA Energy $mart Focus Program in the decision to move ahead with the efficiency upgrades

This information was used to ascertain the percent of facilities that installed efficiency measures, the impacts of external programs or factors on the decision to conduct benchmarking, and the reduction in energy use.

2.3.3 Survey Content

The telephone survey covered the following major topics:

- Energy efficiency measure adoption
- Behavioral changes
- NYSERDA and non-NYSERDA program participation
- Non-program related changes
- Attribution and influence

A description of these major survey categories is provided below.

Energy Efficiency Measures Changes

The first set of questions assessed the number of participants who had made facility improvements, what type of improvements they made, when they were made, and the magnitude of those improvements relative to the size of the system.

By identifying the time period when the upgrades were implemented, the Impact Evaluation Team was able to cross reference the implementation data with relevant NYSERDA program databases to determine whether Focus participants had also taken advantage of services or incentives offered through other NYSERDA programs. Additionally, the questions regarding the magnitude of the improvement were useful for quantifying approximate energy savings and determining whether the school would be included in the billing model for a particular measure. For example, if a facility had made a building envelope improvement such as replacing windows, the interview covered the percentage of all windows that were replaced. Assessing the magnitude of improvements was a critical component to quantifying approximate energy savings as part of the deemed savings analysis (as described later in this report).

To isolate and attribute specific facility improvements and their associated energy savings to the Focus Program initiatives, a number of other possible reasons for installation of new equipment had to be filtered out of the data. For example, if the facility replaced its failed boiler with a new high efficiency unit, only the energy savings from a new standard efficiency to the high efficiency boiler could be attributed to Focus Program initiatives.

Behavioral and Operational Changes

Assessing behavioral and operational changes was another important goal of the survey implementation. These require little to no capital to implement yet can still result in significant energy savings. Examples of behavioral changes may include a program where lighting is turned off in classrooms between periods

or during times when less light is needed. An example of operational changes includes changing air filters on HVAC equipment more often. To assess whether the behavioral and operational changes were likely to be ongoing, the survey also included questions about the mechanisms used to ensure the continuation of these behavioral efforts.

Impacts of Other NYSERDA and non-NYSERDA Programs

The survey section of Self-Reported Information and Other Program Impacts was included to address the third and fourth survey objectives. These sections covered participation in other NYSERDA and non-NYSERDA programs. The NYSERDA programs that offer direct incentives, such as the Existing Facilities Program and the New Construction Program were included as well as the study-based programs like FlexTech. Participation in several other programs, such as the New York State Clean Air School Bus Program, Energy $mart Students, Energy $mart Office Equipment, and Energy $mart Photovoltaic Programs, was also investigated.

Answers from this section of the survey were cross referenced with NYSERDA's program databases to identify measures installed through another NYSERDA program that were reported during the survey. This section was also designed to provide an overview of the NYSERDA programs schools and CREs most commonly used by Focus participants.

Respondent participation in other non-NYSERDA programs, such as local gas and electric utility programs, federal energy efficiency programs, and municipal energy efficiency programs, was assessed to determine the impacts of these programs in the decisions of schools and CREs to pursue energy efficiency measures and benchmarking. Table 2-2 below describes the two influence questions asked of respondents participating in non-NYERDA programs.

Table 2-2: Other Program Impact Questions

Survey Question #	Survey Question	Question Type
OI2a	On a scale of 0 to 4, where 0 means "No Influence" and 4 means "Very Influential" how would you rate these programs' influence in your decision to benchmark your school/CRE through NYERDA's Focus Program.	Influence
O13a	On a scale of 0 to 4, where 0 means "No Influence" and 4 means "Very Influential" how would you rate these programs' influence in your decision to take energy efficiency improvement actions, including behavioral and operational changes at your school/CRE?	Influence

Non-Program Related Changes

The final section of questions was asked to identify any non-program related changes that have occurred since benchmarking that might have an impact on energy consumption. Types of changes included the following:

- Changes to student/occupant population
- Changes to hours of operation or annual hours
- Changes to building square footage (i.e. was there an addition to the building)
- Changes to the size of HVAC equipment

These questions were used to help determine if any major trends were occurring in the population that would have an influence on energy consumption. For example, if many schools reported a decrease in

student population, and a decrease in energy use was found across all schools, there is the possibility that a portion of that energy reduction is attributable to the decrease in student population and not a result of energy efficiency measures or behavioral changes that are occurring. These responses were meant to further inform the billing analysis and help explain increases or decreases in energy consumption that cannot be attributed to energy efficiency measures or behavioral change actions.

Attribution Assessments and Focus Influences

The Focus CRE and Schools Programs provide education, training, tools and resources, benchmarking, limited technical assistance and referrals to NYSERDA's core incentive programs. As with all impact evaluations, the savings attributed to an efficiency program should be the savings induced by the program effort, above and beyond what would have occurred in the absence of the program. The primary question is what actions were induced by the program (at this school, commercial property or any other school or property) versus what would have occurred (naturally occurring adoption).

The Focus Program is not a resource acquisition[17] program and its program design probably should not use the standard free ridership and spillover paradigm or terminology. Nevertheless, all interventions still require an investigation of causal attribution to show that the intervention or program is at least partially responsible for obtaining the desired change (as has been discussed by many leaders in the overall field of evaluation). This component of evaluation is needed to validate the impacts of the Program and justify program expenditures.

The participant survey included questions, as shown in Table 2-3, designed to collect information about the Program's effect on the self-reported efficiency changes through installations or behavioral and operational changes. This analysis used several survey questions concerning different parts of the decision process in order to obtain a complete assessment of the Focus Program's likelihood of causing the desired outcomes.

[17] A resource acquisition program is designed to achieve immediate kWh or MMBtu savings and typically provide financial rebates or incentives substantial enough to motivate consumers to "act now". *Energy Efficiency Program Planning Workbook*, 12/2002. Prepared by D. Gilligan, for National Association of Energy Service Companies.

Table 2-3: Focus Impact Questions

Survey Question #	Survey Question	Question Type
PI1	On a scale of 0 to 4, where 0 means "No Influence" and 4 means "Very Influential" how would you rate the influence that the benchmarking process and reports your school.CRE received through of NYSERDA's Energy $mart Focus Program have on your school's/CRE's decision to do the following [MEASURE]	Influence by Measure
PI2	On a scale of 0 to 4, where 0 means "Very Unlikely" and 4 means "Very Likely" how likely would you have been to install similar energy efficiency measures and adopt similar behavioral and operational changes related to energy efficiency without the benchmarking report. Specifically how likely would you have been to do the following [MEASURE]	Likelihood by Measure
PI4b	There may be many different types of information that are used to capture the attention of the [DECISION MAKER(S)]to a point where they seriously consider taking actions to increase energy efficiency. On a scale of 0 to 4 where 0 means the benchmarking is "Not At All Important" and 4 means the benchmarking is "Very Important" how important was the benchmarking in getting them to seriously consider taking energy efficiency actions at the school/CRE?	Program Importance

2.3.4 Second Round of Sampling

Sampling was conducted for the telephone survey after the Impact Evaluation Team received the utility billing data and the billing data was cleaned. The sample frame consisted of all participants with completed utility billing data. In order to meet our goal of completing 63 school surveys and 37 CRE surveys, the Impact Evaluation Team estimated that a final sample size of double the targeted goals (at least 126 schools and 62[18] CREs) would be required to account for an assumed response rate of 50% in the telephone surveys. The final sample included all schools and CREs with available and complete billing data.

Table 2-4 identifies the final sample of the telephone survey, the initial sample size goals, survey targets, and the completed surveys for each group.

Table 2-4: Final Sample and Number of Completes

Site Type	Survey Targets	Initial Sample Size Goals	Final Sample Size	Number of Surveys Completed
Schools				
Schools benchmarking one time	25	50	15	10
Schools benchmarking multiple times	38	74	69	69
Total Schools	*63*	*124*	*84*	*79*
CREs				
CREs benchmarking one time	37	62	23	23
Total CREs	*37*	*62*	*23*	*23*

[18] The total population of CREs is 62.

2.3.5 Timing

In the process of developing the survey instrument, considerable discussion and thought was given to the challenges of fielding a survey to obtain information about energy use changes (i.e., energy efficiency measures or behavioral changes) made several years ago. The concern was that participants would not be able to answer the questions at all or would not provide reliable answers. Reliability is a common concern with self-reports, and the lag time may exacerbate the situation. Exact time frames for completing energy efficiency measures were loosened to allow for respondents to identify a season (i.e. spring, summer, fall, and winter) rather than month for the implementation of a measure.

For schools that benchmarked multiple times, this lag time between the implementation of a measure and the survey could be considerable. Because a multiple benchmarker could include a school that completed a benchmark prior to 2007[19], it was possible that any benchmarks that occurred prior to 2007 could have led to the implementation of efficiency measures. The survey did not specify a time frame for the measures pursued; it only stipulated that the measures or actions occurred after the building had been benchmarked.

Due to the wide ranges of time that measures could have been installed by the schools, the questions about timing of the measures were very important to accurately assess program savings for the time frame of interest, and not over or under estimate savings that occurred from measures implemented by a facility in response to benchmarks that were done prior to, or after the January 1, 2007 – December 31, 2009 cutoff.

2.3.6 Sample Disposition

School surveys were fielded in two separate phases. The final sample of schools included 84 unique sites represented by a total of 25 individuals. Some contacts were responsible for providing information on multiple schools within the same school district while other contacts only needed to provide information on one school. Phase I included calls to all school contacts who would be responsible for completing a survey for a single property. The Phase I calls began on June 13th, 2012 and extended through August 8th, 2012. The single property contacts were approached for surveys first so that the survey implementer could practice recording answers for single properties and ensures smooth interviews with all multi-property contacts.

The Phase II calls included those contacts that represented multiple properties and would be responsible for completing multiple surveys. The Phase II calls began one week later on June 20th, 2012 and also ended on August 8th, 2012.

Table 2-5 provides a complete sample disposition for the Schools surveys. The first set of numbers in this table shows the disposition by contact. There were a total of 84 schools in our final sample. GDS Associates fielded the survey and recorded responses on the survey during the interviews and created a database to store the responses of each completed survey.

[19] A multiple benchmarker only needed to include one benchmark within the desired time frame.

Table 2-5: Sample Disposition for the Schools Surveys

		Number of Participating Benchmarked Institutions In Sample Frame		Percent of Participating Benchmarked Institutions	
		By School	**By Contact**	**By School**	**By Contact**
Total Sample Used		84	25	100%	100%
Excluded Sample	Not working/Unusable number	0	0	0%	0%
Not Contacted	Respondent never available	0	0	0%	0%
	Answer Machine	3	2	4%	8%
	Call back/Left 800#	0	0	0%	0%
Unknown Eligibility	No Answer/Busy	0	0	0%	0%
	Records not yet called/Scr. Not complete	0	0	0%	0%
Not Eligible	Not Eligible/Not Qualified	2	1	1%	4%
Refused/	Refused	0	0	0%	0%
Break-off	Break-off	0	0	0%	0%
Completed interview		79	22	94%	88%
Contact rate (by school) = ((79+0)/(79+0+0+3+0)) = (79/82) = 0.9634 Contact rate (by contact) = ((22+0)/(22+0+2+0)) = (22/24) = 0.9167				96%	92%
Cooperation rate (by school) = 79/(79+0) = 1.0000 Cooperation rate (by contact) = 22/(22+0) = 1.0000				100%	100%
Response rate (by school) = 79/(79+0+0+3+0)) = 0.9634 Response rate (by contact) = 22/(22+0+0+2+0))=0.9565				96%	96%

Note: See the Glossary for definitions of Contact Rate, Cooperation Rate and Response Rate as defined by AAPOR.

Each of the two contacts for CRE properties were reached and surveyed on their selected properties. One of the contacts requested that the survey be sent through email so that it could be completed in any spare moments had by the contact. Disposition tables were not deemed necessary as each contact and building was surveyed.

2.4 REVIEW OF NYSERDA PROGRAM DATABASE

Extracting non-Focus Program related energy savings was required to accurately allocate savings to the appropriate programs. This step was not conducted for CREs as all savings were assumed to be attributed programs outside of the Focus Program Participation in other programs outside of the Focus Program was investigated through the telephone survey. Attributing specific measures to one program versus another proved to be more challenging. NYSERDA provided the Impact Evaluation Team with a database pull that included all measures installed through the Commercial/Industrial Performance

Program, Peak Load Reduction Program, $mart Equipment Choices Program, New Construction Program, and Existing Facilities Program starting on January 1, 2007 and continuing through June 6, 2012 (when the data pull was provided).

Extensive cross referencing of NYSERDA's tracking databases for the relevant programs was required to verify information about program participation and installed measures obtained through the survey. For participants who reported installing measures through a NYSERDA program within our evaluation period, efforts proved quite successful at matching program participation in the database. Any savings which resulted from efficiency measures installed as part of another NYSERDA or utility related incentive program were not claimed by the Focus Program and associated benchmarking efforts.

Findings from the survey (discussed in the results section of the report) indicated that nearly 40% of all interviewed schools reported participation in another NYSERDA program, and 60% of the evaluation-based gross kWh reduction could be attributed to another NYSERDA program. This evaluation step provided critical information about the amount of overlap occurring between the Focus Program and other NYSERDA programs.

2.5 BILLING ANALYSIS METHODOLOGY

The billing analysis was conducted in two parts: first, a pre/post analysis was performed to determine the overall reduction in energy use, and second, a fixed effects billing analysis was run to ascertain whether savings could be estimated for specific measures. The billing data sets were the same for both analyses. The remainder of this section covers the data sources, attrition, pre/post billing analysis, fixed effects billing analysis and the model selection process.

2.5.1 Data Sources

The evaluation required data from four primary sources:

1. program data on characteristics of the school
2. data collected through the participant telephone survey
3. billing records from the utilities
4. weather data

A description of the data sources is provided below.

<u>Program Data</u>

Since the Focus Program does not directly provide incentives to install energy efficiency equipment, no data was available on installed energy efficiency measures. The program tracking database included information on total site and source energy consumption, size of the building, Portfolio Manager score, dates when the benchmarking was completed, dates when the benchmarked bills ended, total kWh, total MMBtu, and other important details on the school that affect energy consumption.

The Impact Evaluation Team received an example of bills sent in by a school for benchmarking. The bills were hard copies, not in an easily workable format and did not cover the entire analysis period. The Impact Evaluation Team decided to request the billing data from the utilities. In addition to the logistical issues of working with the benchmarking bills, obtaining the data directly from the utilities guaranteed that the billing data was independent of the benchmarking process.

Utility Billing Data

It was necessary to obtain a signed waiver from each school allowing NYSERDA to request the billing data from their electric and natural gas utilities. The process of obtaining utility billing data was time consuming and the cause of some delay. Many schools and CREs simply did not respond to the request and were not easily reachable by phone for follow-up. This resulted in attrition prior to the official request to the utilities.

The Impact Evaluation Team requested signed waivers for 186 schools and all 62 CREs. The increase in schools, over the initial estimated sample size of 126, was to provide additional or back-up data in case of attrition within the waiver release and billing request process. An additional 60 schools were chosen, divided proportionally between single and multi-benchmarked facilities. No additional requests could be made to CREs because the population size was only 62.

Within the sample of 186 schools, 54% returned the signed release form and from the population of 62 CREs, 42% signed the release form. Billing data was requested for a total of 101schools and 26 CREs. The data request to the utilities included numerous fields. Some utilities provided most or all of the fields, other utilities provided just a subset, and some did not provide any data. The data request was for bills starting on January 1, 2006 and ending with the most current data available.

Weather Data

Weather data was obtained from the National Oceanographic and Atmospheric Administration (NOAA) for the weather stations in New York State to calculate the heating and cooling degree days. The base temperature was 65°F for heating degree days and 55°F for cooling degree days. Schools were mapped to the weather station by zip code, using the file provided by NYSERDA for this purpose.

2.5.2 Attrition in the Billing Analysis

The billing model requires participants with sufficient billing records throughout the pre- and post-participation periods to be able to estimate savings. Data cleaning is a critical component of any billing analysis and is generally the most time-consuming step in the process.

Data cleaning was conducted to identify schools that could be included in the billing analyses. The Impact Evaluation Team carefully reviewed the billing data for the following issues:

- sufficient period of pre- and post-installation billing records, generally at least nine months pre and nine months after the installation of all measures; for the natural gas model, both the pre and post periods where checked to ensure that winter months were included
- assess billing records for high variability or a see-saw pattern which may indicate estimated reads that were not labeled as such
- other anomalies, such as many estimated reads, zero reads and missing data.

Participating schools were removed if there was insufficient data or other anomalies. One school was removed as it was determined through the telephone survey that major renovation was occurring throughout the analysis period.

The results of this process are summarized in Table 2-6. Summary of Attrition in the Billing Models

	Schools with Electric or Natural Gas Service	**CREs with Electric or Natural Gas Service [1]**
2007-2009 Participants	366	62
Request for billing data	186a	62

# of Participants who signed waivers for utility data release	101	26
% of Participants who signed waivers for utility data release	54%	42%
# of Records received from utilities	75 electric, 82 natural gas	3 electric, 2 gas
# of Participants Removed	16 electric, 10 natural gas	N/A
Total Participants in Billing Analysis	59 electric, 71 natural gas	N/A
% of Participants with Signed Waivers in Billing Analysis	59% electric, 71% natural gas	

[1.] No Billing Model was done for CREs.

a. Chosen as part of a random stratified sample and includes the 60 additional schools proportionally allocated between single and multi-benchmarking facilities.

below. Comparing the number of participants with billing data to the participants determined to be eligible for inclusion in the billing analysis indicates an attrition rate in the range of 59% to 71% in comparing the number of schools in the billing analysis to the number of participating schools that provided the signed waiver.

Table 2-6. Summary of Attrition in the Billing Models

	Schools with Electric or Natural Gas Service	**CREs with Electric or Natural Gas Service [1]**
2007-2009 Participants	366	62
Request for billing data	186a	62
# of Participants who signed waivers for utility data release	101	26
% of Participants who signed waivers for utility data release	54%	42%
# of Records received from utilities	75 electric, 82 natural gas	3 electric, 2 gas
# of Participants Removed	16 electric, 10 natural gas	N/A
Total Participants in Billing Analysis	59 electric, 71 natural gas	N/A
% of Participants with Signed Waivers in Billing Analysis	59% electric, 71% natural gas	

[1.] No Billing Model was done for CREs.

a. Chosen as part of a random stratified sample and includes the 60 additional schools proportionally allocated between single and multi-benchmarking facilities.

2.5.3 Pre/Post Billing Analysis

The pre/post billing analysis consisted of a school-by-school regression conducted to estimate pre-benchmark and post-benchmark use. These two values were then subtracted to obtain the total reduction during the post-benchmark period over all schools in the model. The process was different for the natural gas and electric models, as described below.

<u>Natural Gas Pre/Post Model</u>

The process of conducting the natural gas pre/post billing analysis is described below.

- The data set was divided into two parts, with the first containing the billing records during the pre-benchmark period and the second part had the post-benchmark bills

- A simple regression analysis was run for each school to determine the intercept and heating slope for the pre-benchmark period; the process was repeated for the post-benchmark period.
- The annualized use was calculated separately for the pre- and post-benchmark periods from the regression results.
- The post-benchmark annualized use was subtracted from the pre-benchmark annualized use to determine the change in consumption for each home.
- The change in consumption for all schools were summed to determine the total reduction in energy use.

The response (dependent) variable for the school-by-school regressions was the average daily use (in therms) divided by the square footage of the building. The regression results were weather normalized to ensure that the comparison between the two periods is valid and does not inadvertently reflect changes in the weather patterns rather than actual changes in consumption.

Electric Pre/Post Model

Modeling of the electric billing data indicated that the electric use is not highly weather dependent. Thus, the process of weather normalizing was only necessary for the one school with electric space heat. Given the lack of a relationship between consumption and weather, the electric model was essentially a simple pre/post analysis. The total annual change in consumption was calculated for each school as follows:

$$\Delta U = U_{pre} - U_{post} \qquad (1)$$

Where

ΔU average annualized change in energy use per school (kWh)

U_{pre} average annualized pre-benchmark use (kWh)

U_{post} average annualized post- benchmark use (kWh)

In addition, a regression analysis was run for each school, which included the "heating" slope and pre- and post-benchmark cooling slopes for all homes. As with the natural gas model, the response (dependent) variable for the school-by-school regressions was the average daily use (in therms) divided by the square footage of the building. The cooling slopes were found to be negative for many schools, which also points to the lack of correlation between electric consumption and weather. The output from this school-specific regression was used to normalize the savings for the one school with electric space heat. The change in consumption for all schools was then summed to determine the total reduction in energy use.

One of the particular challenges with modeling school use is that the summer is often a period of lower use when school in not in session or not used to its full capacity. Thus, estimating cooling use and potential savings can be problematic. Despite incorporating cooling degree days calculated at different base temperatures and removing the two summer months with the lowest consumption, the billing data does not show a cooling load for most these schools.

2.5.4 Fixed Effects Billing Analysis

Weather effects and variables developed from the responses to the telephone surveys were included as predictor (independent) variables and the response (dependent) variable was the daily energy consumption per square foot. The regression coefficients for survey variables were used to estimate the

savings from energy efficiency measures and behavioral changes. Separate natural gas and electric models were developed.

The model was a generalized linear model with customer-specific intercept of the form shown in the equation below.

$$C_{it} = \alpha_i + \sum_{j=1}^{p} x_{ijt}\beta_j + \sum_{k=1}^{q} z_{ikt}\gamma_k + \varepsilon_{it}\ , \qquad (1)$$

where

C_{it} is the monthly consumption for the school *i* in period *t*, expressed in monthly kWh per day,

α_i is the "customer-specific" intercept (or error) for school *i*, accounting for unexplained difference in energy use between schools associated with the types of energy-intensive appliances and equipment, schedules and building stock

x_{ijt} are the predictor variables reflecting the adoption of energy efficiency measure or behavioral change *j* for school *i* in period *t*,

β_j are the slope coefficients that quantify the average influence of modeled efficiency measure or behavioral change *j* on monthly consumption,

p is the total number of energy efficiency measures or behavioral changes included in the model,

z_{it} are the predictor variables reflecting non-program related effect *k* (such as weather impacts) for school *i* in period *t*,

γ_k represents the slope coefficients that quantify the average influence of modeled non-program related effect *k* on monthly consumption,

q is the total number of non-program related effects included in the model, and

ε_{it} is the error term that accounts for the difference between the model estimate and actual consumption for household *i* in period *t.*

The model used dummy variables, in which the *x*'s for the installed measures are one or zero to indicate the installation and the coefficients reflect the savings for the measures.

The fixed effect model sometimes includes a time-specific term reflecting the unexplained difference in energy use between time periods. In larger models, this variable can account for widespread changes in energy consumption patterns. Since the number of schools in the models (71 for natural gas and 59 for electric) were quite low for this type of model, the time variable does not necessarily reflect broad changes in energy use. For the natural gas model, the inclusion of a year-specific time variable was included and did not have a substantial impact on the final estimators. Monthly variables are more commonly used in electric models as there is less seasonal variation. However, the inclusion of monthly time variables made it impossible to estimate the parameters of interest and the final electric model was run without the time variable.

Regression diagnostics were not conducted for the fixed effects model as this model was used only to provide context for some measure-level savings and was not used to estimate the evaluation-based program savings.

2.5.5 Model Selection Process

A component of the modeling process is to compare alternative models to determine the model that best fits the data and to assess the relative importance of specific variables or groups of variables. Standard statistics, such as the coefficient of determination (R^2) and T-values for specific parameters were

compared. In addition, the information-theoretic approach to model selection was employed to ensure that the selection of the final model is based on objective statistical standards.[20] This approach was used in conjunction with a review of the modeling results to ensure that the "best model" in terms of the statistical properties also allowed for improved estimation of the variables of interest. In these particular models, the key factor became whether the models were able to provide estimates of the variable of interest.

The information-theoretic approach is designed to allow a group of candidate models to be compared and ranked by use of Akaike's Information Criterion (AIC). The model with the lowest value of the AIC is the one that best fits the data set, *i.e.*, the model that minimizes the information loss. The AIC's of all models in the set of candidates are rescaled to simplify the comparison and ranking process.

2.6 DEEMED SAVINGS

2.6.1 Calculations and Methodology

The purpose of the deemed savings analysis was to provide a rough estimate of savings from benchmarking activities. Deemed savings were used to estimate energy savings associated with facility improvements reported through the surveys. These results were compared to the results obtained through billing analysis. It should be emphasized that, in the absence of formal measurement and verification efforts, the savings estimates presented in this report are only intended to be high level approximations.

Billing analysis is a more rigorous method of impact evaluation and was used to gauge the effectiveness of the deemed savings analysis.[21] The comparison of the billing analysis and the deemed savings results will help inform future evaluations with more effective ways of using data obtained from phone surveys and benchmarking to support energy savings estimates.

Measure-specific algorithms for each end-use category were based on the New York Technical Reference Manual (TRM) and the NYSERDA Deemed Savings Database. These algorithms were used to calculate savings for the measures and activities reported by participants in the telephone surveys. Although the Impact Evaluation Team attempted to account for interactive measures in the savings estimates, the deemed savings analysis cannot account for all interactive effects when multiple measures are being installed and are accompanied by behavioral changes. Additional steps taken to address interactive effects are explained in the Quality Assurance section below. Actual algorithms used in calculating the deemed savings are provided in Appendix C.

2.6.2 Quality Assurance

A quality assurance review (QA) of the analysis and survey data used in the deemed savings estimates included the following steps.

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[20] In billing analysis, the analyst makes many decisions regarding the statistical characteristics of the model and the specific parameters to be included. Thus, there are typically a number of possible models that could be used to estimate savings. The information-theoretic approach provides an objective framework for selecting the best model among a series of competing candidate models. Please refer to *Model Selection and Multi-model Inference* by Kenneth Burnham and David Anderson, Springer-Verlag, NY, 2002.

[21] The California Evaluation Protocols list the normalized annual consumption (NAC) billing models as "basic" rigor and the more complex billing models, such as the fixed effects model, as "enhanced" rigor. Applying deemed savings is not listed as an impact evaluation method. "California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals," State of California Public Utilities Commission, April, 2006, p. 22.

- Measures identified through the survey but not actually installed during the timeframe of interest were removed
- The ratio of total energy savings by school to total energy usage was calculated and savings were reduced when the percentage was greater than 40%
- Savings calculations were verified for unusual end uses such as gas cooling and electric space heating
- Savings were checked to avoid double-counting in some cases (*e.g.*, manually turning lights off and occupancy sensor installation)

These QA steps primarily resulted in a substantial reduction in the magnitude of the estimated deemed savings.

2.6.3 Data Sources

The deemed savings analysis used, and was informed by, numerous data sources. These data sources included the telephone surveys, the NYSERDA Focus Program Tracking Data, the NYSERDA Deemed Savings Database, the New York TRM and other data sources. The telephone surveys provided information on the quantity and type of installations and actions benchmarked facilities were pursuing to reduce energy use. The other sources provided the basis for assumptions used in the savings calculations. A more complete discussion and reference to the data sources and their role in the analysis can be found in Appendix D.

2.7 ANALYSIS OF ENERGY SAVINGS

The kWh and MMBtu savings estimates presented in the Executive Summary of this report included four key components: (1) total evaluation-based gross reduction in consumption, (2) other NYSERDA Program savings, (3) other non-NYSERDA savings, and (4) influence factor resulting in total evaluation-based net Focus Program savings. Developing these saving estimates required analysis and incorporation of results from each of the primary evaluation activities discussed previously in this Methods section, including the survey analysis, deemed savings analysis, billing analysis and review of the NYSERDA program database. The next section provides a discussion of the methodologies used to combine and derive the results within each of these savings areas and how they were combined to develop the net kWh and MMBtu savings estimates attributed to participation in the benchmarking component of NYSERDA's Focus Program.[22]

2.7.1 Evaluation-Based Gross Reduction in Consumption

Evaluation-based gross savings were initially calculated using the deemed savings approach, but once the billing analysis was complete the deemed kWh savings estimates were outside of the range of realistic savings for these properties (*i.e.,* one cannot achieve more savings than the billing analysis shows). The

[22] The methods described in this section were used to move from evaluated gross to net savings estimates for the schools population. For CREs, survey results revealed that very limited savings would be attributable to the Focus program for the properties interviewed. Very low reported influence of the Focus Program on decisions to install measures and high rates of participation in both NYSERDA and non-NYSERDA programs virtually eliminated all possible savings from the Focus CRE benchmarking effort. Therefore the steps described in this section, were not used or deemed appropriate for the CREs.

billing analysis calculated the total reduction in electric use for schools in the model to be 1,107,161 kWh per year.

The billing analysis also attempted to determine if changes in external forces, such as an increase in operation hours, would have an impact on the energy use of the school. This component of the analysis did not show that non-program effects had a clear and obvious impact on energy use.[23] These results led to the conclusion that the total reduction in electric and MMBtu use shown by the billing analysis was reasonably accurate and a better estimate of evaluation-based gross savings than savings found in the deemed savings analysis. The Impact Evaluation Team determined that it would be most realistic and appropriate to set this value as the upper limit of all potential kWh savings in the period. Similarly, an upper limit for the potential MMBtu savings was set by the results of the gas billing analysis.

To extrapolate results from the sample of schools used to conduct the billing analysis to the greater population of participating schools, the evaluation-based gross reduction was converted to a reduction per square foot value and this figure was multiplied across the square footage of the larger participant population.

2.7.2 Other NYSERDA Program Savings

Once the evaluation-based gross savings estimates were established, portions of the savings needed to be quantified that were found under other NYSERDA programs and non-NYSERDA programs). The total savings from other NYSERDA programs was calculated from the NYSERDA program database. This review determined that 660,879 kWh and 361 MMBtu were claimed for the Focus benchmarked schools in the billing analysis. To extrapolate these other NYSERDA program savings results to the greater population of participating schools, the NYSERDA program savings from the sample was converted to a savings per square foot figure and this figure was multiplied across the square footage of the larger participant population.

2.7.3 Other non-NYSERDA Program Savings

Estimating the impacts of other non-NYSERDA programs proved more challenging, since no searchable database was available.

Survey results were used to identify the specific schools that participated in other non-NYSERDA programs. Deemed savings were developed based on survey respondent self-reports of measures installed through participation in other non-NYSERDA programs to estimate savings on a school specific basis. Depending on the measures installed and the non-NYSERDA program, the measure level savings were reduced by a specified percentage.

The results were then extrapolated to the total population of schools, using a similar procedure to that used for calculating savings for other NYSERDA programs, with an additional step to adjust for the differences in savings from the deemed savings and billing analysis. Results from this section of the savings analysis are based on some broad generalizations, and identify an area where further study may be required that would benefit from the cooperation of utilities and other entities that offer energy efficiency product installation or education.

[23] The coefficients of the non-program variables were either not statistically significant or produced results that are counter to logic, such as an increase in energy use from actions that would be expected to result in a decrease use.

2.7.4 Measuring Focus Savings

After backing out non-NYSERDA program participation, a balance of savings remained. This balance included all potential Focus savings, as well as savings resulting from other market influences. Weighted average influence factors were created using the answers from the Program Impact section of the survey. Factors were weighted in accordance with the estimated savings that would result from the measure category under which they were reported.

For example, respondents used a 0-4 scale to reflect how influential the Focus Program was in the decision to install lighting, HVAC, cooking and refrigeration, or other measures. Some measure categories, such as cooking and refrigeration, result in fewer savings (as estimated through the deemed savings analysis) and were given less weight than influence factors reported for lighting and building envelope that could achieve substantial savings. As with the other components of the calculation, savings were calculated using a per square footage method and averaged across the sample, which in turn was extrapolated to the greater population.

Section 3:

RESULTS

This evaluation was designed to assess impacts in terms of three primary metrics: 1) the percent of participants who pursue efficiency measures; 2) the magnitude of savings associated directly with the Focus Program and also the savings achieved by benchmarking participants who installed measures through other NYSERDA programs, and 3) the percent reduction in energy use achieved through benchmarking. In addition, the evaluation investigated whether the Focus Program acts as a gateway to other NYSERDA efficiency programs and to raising awareness of energy efficiency.

As shown at the bottom of Table 3-1, the total estimated annual energy savings from K-12 schools participating in the benchmarking component of NYSERDA's Focus Program during program years 2007 through 2009, was 4,917,717 kWh and 98,354 MMBtu per year, respectively[24] For the smaller and targeted population of CREs assessed, the annual estimated savings during this same three-year period was 3,871,197 kWh and -419MMBtu.[25]

This table also provides information regarding evaluation-based gross savings, before savings associated with participation in other NYSERDA or non-NYSERDA programs were taken into consideration. Estimates associated with savings from NYSERDA and non-NYSEDA programs are also itemized in these tables, along with survey-developed, Focus benchmarking attribution factors leading to the net savings impacts shown at the bottom.

[24] These savings were estimated by combining billing analysis results with deemed savings-based calculations from telephone survey responses from 22 individuals representing 79 specific school properties from a sample of 84 participating schools. To extrapolate results from this sample to the entire population of 366 participating schools that what were benchmarked through NYSERDA's Focus Program between January 1st, 2007 and December 31st, 2009, savings factors from the sample population were averaged across all respondents on a square foot basis and applied to the entire population of participating schools.

[25] Results for the CREs are based on telephone survey results from 2 individuals responsible for 23 specific properties from a sample of 23 properties. Due to the small and non-representative sample size, these results were not extrapolated to a broader population of participating CREs.

Table 3-1: Summary of Annual kWh and MMBtu Savings – Participating K-12 Schools

	Sample				Population			
Schools Savings	**kWH**	**% [a]**	**MMBtu**	**%**	**kWH**	**%**	**MMBtu**	**%**
Total Evaluation-based gross Reduection	1,107,161	1.8%	21,863	4.1%	4,949,732	1.6%	97,742	4.5%
Other NYSERDA Program Savings	660,879	1.1%	361	0.1%	2,954,558	1.0%	1,614	0.1%
Balance (Evaluation-based gross - Other NYSERDA Savings)	446,282	0.7%	21,502	4.0%	1,995,173	0.7%	96,128	4.4%
Other non-NYSERDA Program Savings	284,791	0.5%	2,769	0.5%	1,273,203	0.4%	12,378	0.6%
Balance (less non-NYSERDA Savings)	161,491	0.3%	18,733	3.5%	721,971	0.2%	83,750	3.9%
Focus Program Savings	**73,819**	**0.1%**	**8,725**	**1.6%**	**330,019**	**0.1%**	**39,005**	**1.8%**

[a] % of Energy Use

Based on these results, it appears that there is a small, but quantifiable amount of savings that can be attributed to the benchmarking component of NYSERDA's Focus Program. It is clear that the Program is acting as a gateway to other NYSERDA efficiency programs and helping to raise awareness of energy efficiency. Recommendations to more accurately quantify these savings are provided at the end of this report.

Program savings estimates were derived through analysis of three major impact evaluation project activities: 1) telephone surveys, 2) deemed savings analysis, and 3) the billing analysis as described in the Section 2 of this report. Following is a more detailed presentation of findings from these three key areas of analysis. First, results from the telephone surveys will be summarized, followed by findings from the deemed savings analysis, and finally results from the billing analysis. This results section then ends with a description of how individual findings from each major analysis area were combined and used to help answer this evaluation's major research questions.

3.1 SCHOOL SURVEY RESULTS

The participant telephone survey was primarily designed to assess the specific actions taken to reduce energy use. This information was used to address six (6) key research objectives, detailed in the Methods section and restated below:

1. To identify the energy efficiency measures installed since the benchmarking was conducted
2. To determine whether, and what types of, behavioral or operational changes were made for the purposes of reducing energy consumption and what types of mechanisms are in place to maintain those changes
3. To assess the impacts of other utility, federal or other non-NYSERDA programs on the decision to pursue benchmarking and install efficiency measures
4. To obtain self-reported information regarding participation in other NYSERDA programs
5. To assess non-program-related changes that occurred during the analysis period that may affect energy consumption

6. To assess the role of the NYSERDA $mart Focus Program in the decision to move ahead with the efficiency upgrades

As discussed in the Methods section, the school sample was stratified by facilities with a single benchmark and those with multiple benchmarks with the intention of leveraging this information to see if there were substantive differences between the two groups. However, only ten of the completed school surveys were conducted with single benchmark schools, which was an insufficient sample size to be able to draw distinctions. As a result, the Impact Evaluation Team combined the results from both sub groups for the analysis and reporting of results, with the exception of select broad topics.

Following is a high level summary of the school survey findings, linked to each of the six objectives:

Installation of energy efficiency measures

Overall, 95% of participant schools reported installing one or more efficiency measures. Fifty-two percent (52%) of schools reported replacing other equipment, which included computers or office equipment; however, many respondents were unsure if these replacements of "other " equipment were done for energy efficiency reasons Table 3-2.

Table 3-2: Energy Efficiency Measure Summary for Schools Sample[1]

Energy Efficiency Measures	Percent of Surveyed Schools (n=79)
Building Envelope	24%
Lighting	32%
HVAC and Water Heating	37%
Cooking and Refrigeration	8%
Other	52%
Total Surveyed Schools Taking any Energy Efficiency Measure	95%

[1] Schools may have added efficiency measures in more than one category.

Type of behavioral actions occurring and what mechanisms are in place to maintain them

Seventy-six percent (76%) of schools reported making a behavioral change Table 3-3. Follow up questions confirmed that 46% have mechanisms in place to remind staff. These types of mechanisms include, preventative maintenance systems, online scheduling systems for after house building use, educational programs that get students and staff involved in the energy conservation process, and reminders that are bother verbal and written in publications like school newsletters.

Table 3-3: Behavioral Change Measure Summary for Schools Sample [1]

Behavioral Changes	Percent of Surveyed Schools (n=79)
Changes to Building Systems	54%
Changes to Maintenance Practices	22%
Other Staff Behavioral Changes	54%
Total Surveyed Schools Taking any Behavioral Change Action	76%

[1] Schools may have added efficiency measures in more than one category.

Assess impacts of other utility, federal or other non-NYSERDA programs on the decision to benchmark install efficiency measures

Sixteen percent (16%) of schools reported participating in a local gas or utility program and 48% reported participating in another type of non-NYSERDA programs including educational programs for students and staff. 32% of respondents reported that participation on a non-NYSERDA program was influential or very influential in their decision in their decision to benchmark.

Obtain self-reported information regarding participation in other NYSERDA programs

Seventy-two percent (72%) of schools reported participation in another NYSERDA program when counting the New York State Clean Air School Bus Program. When removing that program from the responses, 40% of schools reported participation in another NYSERDA program. Existing Facilities was widely reported with 16% of total respondents reporting participation in this program. 32% of respondents reported participation in another NYSERDA program but could not recall the program name, several described services like studies and audits, suggesting they may have been participating in the FlexTech program.

Assess non-program-related changes

The most commonly occurring change reported by schools was a change to the hours of operation. This was reported by 39% of all the schools. Schools reported being open longer hours and on more weekends to accommodate the after school actives of students and the town. This was a general finding observed across multiple schools.

Assess the role of the NYSERDA Energy $mart Focus Program in the decision to move ahead with the efficiency upgrades

The findings of the Focus Program Impact questions were somewhat confounding. The responses suggest that the benchmarking was highly influential in the installation of envelope measures, efficient lighting, HVAC or water heating equipment, changes to maintenance schedules and behavioral changes by the school staff. However, the benchmarking process had little impact on improving the efficiency of cooking, dishwashing and refrigeration equipment, office or other equipment or changes to the HVAC settings by maintenance staff. Questions on likelihood to install similar measures were then asked and these responses suggest that the schools would be very likely to pursue similar energy efficiency and behavior change measures even in the absence of the Focus benchmarking.

The presentation of detailed results is organized to cover the major objectives of the survey. The specific topics are listed below:

- general information (provided for context)

- energy efficiency measure installations
- behavioral actions taken
- participation in energy efficiency programs (NYSERDA and non-NYSERDA programs)
- influence on energy efficiency actions
- decision making process
- non-related program changes

3.1.1 General Information

This section of the survey gathered general information, about survey participant building characteristics, including square footage of the building, heating fuel type and water heating fuel type. All respondents reported that they recalled participating in the Energy $mart Focus Program and having their school(s) benchmarked.

The mean area of the surveyed schools was 120,356 square feet, with a median of 89,800. The distribution is bimodal, with 23 schools falling within the 50,000 square feet to 74,999 square feet range, and an additional 14 schools larger than 200,000 square feet. The greater population of 366 schools has an average square footage of 116,140, with a medial of 77,775 square feet.

Nearly all interviewed participants use natural gas as both their space heating and water heating sources. This outcome was expected since the initial sample of schools included only schools that used a regulated fuel such as natural gas, steam, or electricity so billing data could be collected from the utilities. The single school that reported using electricity for space heating primarily uses an air source heat pump to heat the building, and also uses a very small amount of natural gas for supplemental heating.

3.1.2 Energy Efficiency Measures

The survey identified specific energy efficiency measures and actions taken since the benchmarking. The major measure categories of building envelope, lighting, HVAC and water heating, cooking and refrigeration as well as other miscellaneous measures such as office equipment were investigated. A series of questions also covered whether energy efficiency upgrades were made to replace failed or failing equipment. The results are presented by major measure category below, followed by a discussion of equipment replacement strategies.

Building Envelope

Building envelope energy efficiency measures include insulation, air sealing, window or door replacement and other measures that improve the performance of the building shell. As shown by Table 3-4, 24% of all surveyed schools reported installing one or more building envelope measures.

Table 3-4: Schools with Building Envelope Measures

	Percent of All Surveyed Schools that Installed Building Envelope Measures
Single Benchmarking Schools[1] (n=10)	30%
Multi Benchmarking Schools[1] (n=69)	23%
Total Surveyed Schools (n=79)	24%

Table 3-5 provides a summary of the specific building envelope measure actions taken by schools. This analysis shows that 15% of the schools with conducted air sealing. Following air sealing, replacement of windows and doors was the second most frequently reported improvement, with 11% of participants. Attic and/or ceiling insulation and wall insulation was completed less often, with installation rates of 10% and 5% respectively. No schools reported adding foundation or basement insulation, and 1% reported taking "other" building envelope actions. The "other" action included the installation of tinted window films by one respondent.

Table 3-5: Building Envelope Details

	Percent of All Surveyed Schools that Installed Building Envelope Measures
Attic/ceiling insulation	10%
Wall insulation	5%
Foundation/basement insulation	0%
Windows/doors	11%
Sealing cracks/repairing holes	15%
Other	1%

Lighting

Survey participants reported installing lighting upgrades more frequently than building envelope measures. Table 3-6 shows 32% of total schools reported pursuing lighting measures.

Table 3-6: Schools with Lighting Systems Improvements

	Percent of All Surveyed Schools that Installed Lighting Measures
Single Benchmarking Schools (n=10)	40%
Multi Benchmarking Schools (n=69)	30%
Total Surveyed Schools (n=79)	32%

Table 3-7 provides a summary of the lighting measure actions taken by schools. This analysis shows that 28% of respondents replaced interior lighting fixtures with more efficient fixtures. Interior lighting projects ranged from whole building replacements to targeted areas such as gymnasiums and cafeterias. Sixteen percent of schools installed motion, occupancy or day-lighting sensors. Other lighting improvement actions were taken by 10% of respondents and included adjusting occupancy sensors for peak performance, adding existing lighting onto the building control system, and the piecemeal replacement of area lighting from incandescent to CFL technology.

Table 3-7: Lighting Details

	Percent of All Surveyed Schools that Installed Lighting Measures (n=79)
Interior fixtures	28%
Exterior fixtures	9%
Motion, occupancy or day-lighting sensors	16%
De-lamping	4%
Other	10%

Heating, Cooling, Ventilation and Water Heating

The percentage of schools that reported installing HVAC measures at 37% is higher than either the percentage of schools that reported installing building envelope or lighting measures. This is shown in Table 3-8 below.

Table 3-8: Schools with HVAC System Improvements

	Percent of All Surveyed Schools that Installed HVAC Measures
Single Benchmarking Schools (n=10)	40%
Multi Benchmarking Schools (n=69)	36%
Total Surveyed Schools (n=79)	37%

The specific HVAC measure actions taken by schools are summarized in Table 3-9. Of the schools pursuing HVAC improvements, replacement of the water heating system most frequently reported measure, representing 10% of surveyed schools. Other actions in this subsection included re-piping and insulating of heating system distribution lines, adding timers to the circulating pumps, and replacing a pool heater.

Table 3-9: HVAC Details

	Percent of All Surveyed Schools that Installed HVAC Measures (n=79)
Heating system replacement	10%
Water heating replacement	11%
Air conditioning	5%
Programmable thermostats	5%
Energy management system	5%
Ventilation	8%
Other	7%

Cooking and Refrigeration

Replacement of cooking and refrigeration equipment was the least often pursued measures category when compared to the broader sub-categories of building envelope, lighting, HVAC and water heating. As shown in Table 3-10, only 8% of total schools reported making improvements to cooking and refrigeration equipment. Refrigerator and freezer replacements were the most commonly installed.

Table 3-10: Schools with Cooking and Refrigeration Improvements

	Percent of All Surveyed Schools that Installed Measures
Single Benchmarking Schools (n=10)	30%
Multi Benchmarking Schools (n=69)	4%
Total Surveyed Schools (n=79)	8%

Other

The final sub-category under the Energy Efficiency Measures section was other measures. Included in the series of other measure questions was one for office equipment and another to capture any other energy efficiency systems, controls or equipment that had been installed at the school. As shown in Table 3-11, 52% of all schools reported that office equipment had been replaced with more efficient equipment. It is important to note that some respondents were not as familiar with these types of upgrades. Many noted that the Information Technology (IT) staff were more knowledgeable in this area and that they were unsure if the replacement of equipment was being done for improved efficiency or for improved technological reasons.

Table 3-11: Schools with Other Measures

	Percent of All Surveyed Schools with Installed Measures
Single Benchmarking Schools (n=10)	50%
Multi Benchmarking Schools (n=69)	52%
Total Surveyed Schools (n=79)	52%

A second and final question asked in the sub-category of other, was a broad question trying to capture any items that might have been missed in previous sections. Fifty-six percent (56%) of the surveyed schools reported some type of other measure. Most items reported here included vending machine controls, installations of automated computer controlling equipment, and reductions in the amount of office equipment, such as printers.

Failed Equipment and Renewable Energy

Respondents were asked about failed equipment, financial incentives, and renewable energy. When asked whether any of the items previously discussed through the Energy Efficiency Measures section of the survey had to be installed due to equipment that had failed or was about to fail, 17% of schools reported that at least one installed measure replaced failed or failing equipment. The remaining 83% indicated that energy efficiency measures did not replace failed or failing equipment.

The final topic covered in the Energy Efficiency Measures survey section was renewable energy. As shown in Table 3-12, only 3% of total schools switched some of their energy to a renewable source. These schools were from the same district and had 49kW solar photovoltaic systems installed. Many respondents expressed a desire to incorporate renewable fuel sources into their buildings energy use and some expressed that plans were underway to incorporate renewable energy technologies in the future.

Table 3-12: Renewable Energy

	YES	NO	n
Total Surveyed Schools	3%	97%	79

3.1.3 Behavioral Changes

The purpose of the Behavioral Changes section was to determine whether, and what types of, behavioral or operational changes were made for the purposes of reducing energy consumption. In addition, the types of mechanisms used to maintain those changes were explored.

The survey divided the behavioral changes in four categories, and then probed for detailed responses within each. The categories are described below with some examples:

1. Building Systems: heating, cooling and hot water settings
2. Maintenance Practices: cleaning air filters and heat exchangers, preventative maintenance
3. Changes Made by Staff: controlling lights, thermostats, closing windows, turning off equipment
4. Other Behavioral Changes: setting energy reduction goals, making a pledge to reduce energy use, form an energy team

The first two categories are specific to changes implemented by maintenance personnel, whereas the third category covers actions by other staff members. The responses within each of these major categories are presented below.

<u>Building Systems</u>

The questions in this section were worded to identify specific actions taken by maintenance staff such as changing heating control settings (i.e. lowering the temperatures set points in the winter), changing cooling control settings, and changing domestic hot water temperatures set points. Findings are reported in Table 3-13 and Table 3-14. Table 3-13 shows that 54% of all schools reported making changes to their existing building systems in order to reduce energy consumption.

Table 3-13: Schools with Behavioral Changes Relating to Building Systems by Maintenance Personnel

	YES	NO
Single Benchmarking Schools (n =10)	30%	70%
Multi Benchmarking Schools (n=69)	58%	42%
Total Surveyed Schools (n=79)	54%	46%

Table 3-14 provides a summary the specific actions taken by all schools under the category of making changes to building systems. Nearly a majority of schools (49%) reported a change captured by the other category. Many of these responses related to improving and adjusting the scheduling of HVAC equipment when the building is unoccupied. Some schools schedule after school activates around HVAC equipment so that as few units need to be run as possible. Other schools reported decreasing the amount

of time that equipment stayed on after students left the building and decreasing the time that exterior building lighting stayed on at night.

Table 3-14: Details of Behavioral Changes Relating to Building Systems by Maintenance Personnel

	Schools with Behavioral Changes Relating to Building Systems (n=79)
Heating control settings	16%
Cooling control settings	11%
Water heater set points	9%
Other	49%

Changes to Maintenance Practices

In contrast to the relatively large number of schools reporting making changes to building systems, few reported making changes to maintenance practices. Only 22% of all schools reported any changes to maintenance practices, as presented in Table 3-15. Many respondents already felt they were using superior practices. Most respondents also noted following a preventative maintenance schedule for routine maintenance practices.

Table 3-15: Changes to Maintenance Practices

	YES	NO
Single Benchmarking Schools (n=10)[1]	30%	70%
Multi Benchmarking Schools (n=69)[1]	20%	80%
Total Surveyed Schools (n=79)	22%	78%

Follow up questions indicated that 13% of all schools had a system in place to remind staff to continue with maintenance practices. The types of system described by respondents included online work-order systems, preventative maintenance schedules, and building management systems.

Changes Made by Staff

These types of changes include specified energy reduction actions taken by building staff (IT or cafeteria workers), teaching staff, and even possibly students. This section covered small behavioral based practices to achieve reductions in energy consumption. Table 3-16 below shows the percentages of schools reporting that staff and faculty have been instructed to reduce energy use through behavioral practices. Respondents were specifically requested to identify if these instructions to carry out behavior changes were provided orally, written, or both. Nearly all of the single benchmarking schools (90%) reported that no instructions either written or oral were provided to staff to make behavioral changes intended to reduce energy consumption. In contrast, two-thirds of the multiple benchmark schools reported providing written or oral instructions to staff. The difference between the schools with single and multiple benchmarks is statistically significant at the 90% confidence level.

Table 3-16: Schools with Behavioral Modifications by Staff

	YES- Both written and oral	YES- Written instructions only	YES- Oral instructions only	NO
Single Benchmarking Schools (n-10)	0%	10%	0%	90%
Multi Benchmarking Schools (n-69)	62%	0%	4%	33%
Total Surveyed Schools (n=79)	54%	1%	4%	41%

Respondents were asked whether staff followed through with the behavioral changes. Thirty-nine percent (39%) reported that staff followed through with the requested changes. Some schools (4%) reported that at least some of the changes were being done by staff, while 16% of respondents were unsure if the staff had followed through.

Table 3-17 identifies the types of actions that the staff was requested to perform, either verbally, written or a combination of both. The table shows that some actions are more often requested than others and there are wide variations of actions that are pursued by staff to help reduce energy use.

Some of the more popular requests to staff included clearing of items away from heating and cooling vents (56%), shutting down computer or office equipment when not being used or at the end of the day (54%), keeping windows closed during the heating or cooling season while HVAC equipment is running (44%), keeping window shades lowered to block solar gain during the cooling season (43%), and turning lights off when rooms are not being used (37%).

Only 37% of schools requested that lights be turned off when rooms are not in use. Some schools noted that the there was no need to ask staff to turn off the lights because of the occupancy sensors, while others admitted that they had occupancy sensors but still requested that staff turn lights off when leaving the room so that no additional kWh were wasted before the sensor had the opportunity to shut off the lights.

Other behavioral type actions were reported by 43% of respondents and included actions like reducing building and personal plug load through the consolidation of mini-refrigerators and coffee pots into a central location, involving students in the behavioral change activates and educating them on energy and conservation, and unplugging equipment prior to extended break and long weekends.

Table 3-17: Details of Behavioral Modifications Made by Staff

	Schools with Behavioral Modifications Made by Staff [1] (n=79)
Turn off lights	37%
Use bi-level lights	22%
Adjust thermostat settings	0%
Close windows during the heating season	44%
Close window shades during the cooling season	43%
Clear heating/cooling vents	56%
Run full dishwasher loads	4%
Use energy saving modes	23%
Turn equipment off	54%
Other	43%

[1] Multiple responses were accepted and percentages do not add up to 100%.

Follow up questions indicated that 33% of schools have a system in place to remind staff to continue with behavioral practices. The types of systems that are in place included curriculum based programs like Greener Schools and Energy Education, verbal reminders, reminders in newsletters, and e-mails to staff.

Other Behavioral Changes

The next series of questions focused on more generalized behavior and goal based activities. All of the surveyed schools reported taking at least one of the actions listed in Table 3-18. Almost all schools (89%) reported measuring reductions on a periodic basis. Whether this is accomplished through the benchmarking process, examining energy bills, or reviewing usage patterns from a building management system, schools are energy conscious and appear to have raised awareness of energy efficiency.

The high percentage of respondents taking the actions listed in Table 3-18 suggests that schools are increasingly aware of energy use and the importance of tracking energy and becoming more efficient. The most notable other action reported under this series was a cash incentive offered to schools based on the avoided energy costs resulting from staff and student behavioral modifications.

This set of questions highlights the difference between schools who benchmarked only once and those with multiple benchmarks. Schools with multiple benchmarks have a much higher incidence of setting and meeting energy reduction goals, forming an energy reduction team, and adopting other innovative strategies to save energy.

Table 3-18: Schools with Other Behavioral or Operational Changes[3]

	Single Benchmarking Schools (n=10)	Multi Benchmarking Schools (n=69)	Percent of Surveyed Schools (n=79)
Make a pledge	90%	70%	72%
Set a goal[1]	*10%*	*74%*	*66%*
Meet a goal[2]	*0%*	*88%*	*87%*
Form a team[1]	*0%*	*68%*	*59%*
Measure energy reduction	80%	90%	89%
Conduct benchmarking[1]	*10%*	*83%*	*73%*
Review purchasing standards	80%	90%	89%
Other[1]	*0%*	*38%*	*33%*

[1] For the types of activities in italics, the difference between the single and multiple benchmark schools is statistically significant at the 90% confidence level.

[2] Only one of the single benchmark schools provided a valid response to this question; 51 multi benchmark schools responded.

[3] Multiple responses were accepted and percentages do not add up to 100%.

3.1.4 Participation in Other Energy Efficiency Programs

A key objective of the survey was to assess whether schools benchmarked through Focus also participated in other energy efficiency programs, either programs implemented by NYSERDA or those offered by utilities, federal or municipal governments or other entities. This information was collected for two potential purposes: first, to determine whether measures installed in benchmarked schools may also have been incentivized and claimed by NYSERDA or other entities and second, to consider the possibility that Focus benchmarking may serve as a gateway to other NYSERDA programs.

As part of the implementation of the benchmarking component of the Focus Program, NYSERDA provides every participant with a benchmarking report that describes key NYSERDA programs, such as Existing Facilities, Flex Tech, Energy Audit Program, New Construction, Schools Power……Naturally, Energy $mart Students, along with some other programs. This outreach effort is a critical aspect of the Focus benchmarking effort.

When asked whether their school *has ever* participated in any other NYERDA program 40% of total schools responded in the affirmative. Table 3-19 summarizes the percentage of respondents that recalled participating in each program. Sixteen percent of all schools surveyed schools reported participating in the Existing Facilities Program, which offers incentives for a variety of energy-saving projects.

Many schools (44%) knew that they had participated in another NYSERDA program but could not name it. The descriptions of services provided under these other programs include: building envelope studies, gas incentives, incentives for cabin heaters, air quality assessments, incentives for solar arrays, and a one day audit assessment of district buildings. The New York State Clean Air School Bus Program was also reported by 42% of schools, but because one large district reported participation, this specific question was removed from the overall findings so it did not skew the results.

Table 3-19: Participation in Other NYSERDA Programs[26]

NYSERDA Program	Percent of Surveyed Schools[1] (n=79)
Flex Tech	3%
Energy Advisor	0%
Existing Facilities Program	16%
New Construction Program	3%
Peak Load Reduction Program	3%
Energy $mart Offices Program	0%
Energy $mart PV Program	0%
Energy $mart Students Program	0%
School Power……..Naturally	0%
Other	32%
Surveyed schools that participated in a NYSERDA Program	40%

[1] Multiple responses were accepted and percentages do not add up to 100%

When asked whether they had received financial incentives for any of the installed measures discussed, 22% of all schools reported that they had received financial incentives for the installation of energy efficiency measures. The reported sources of financial incentives included, NYSERDA, National Grid, ARRA funding, and State Building Aid.

Respondents were asked to recall non-NYSERDA programs in which they had participated. The survey results suggest that schools participated in utility programs and also in educational programs that are designed to influence behavioral changes.

Table 3-20 summarizes the percent of respondents that reported participating in non-NYSERDA programs. All of the single benchmarking schools reported that they did not participate in any other programs. Among the schools with multiple benchmarks, the most comment response was "other program." Some of these alternative programs are listed below:

- Energy Education Program
- Greener Schools Program
- a recycling education program
- State Building Aid
- grants from other sources that could not be identified

Sixteen percent of all surveyed schools reported that they had participated in a National Grid program, mostly lighting-based projects. One respondent mentioned receiving a rebate on a new boiler. Another mentioned that he had been attending educational classes provided by National Grid over the last ten years. Three percent of the surveyed schools reported participating in a federal government program. These schools had completed lighting projects with ARRA grants.

[26] The New York State Clean Air School Bus Program was also cited. The New York State Clean Air School Bus Program helps districts retrofit their diesel-fueled school buses with emission-reduction technology. As this program does not directly address energy savings, it was omitted from this table.

Table 3-20: Participation in Other Non-NYSERDA Programs

	Single Benchmarking Schools (n=10)	Multi Benchmarking Schools (n=67)	Percent of Surveyed Schools (n=77)
Local electric or gas utility program	0%	19%	16%
Federal government program	0%	3%	3%
Municipal government program	0%	0%	0%
Other	0%	48%	42%
Total survyed schools reporting participation in any non-NYSERDA program	0%	61%	53%

[1] Multiple responses were accepted.and percentages do not add up to 100%

3.1.5 Influence of Non-NYSERDA Programs

The survey was also designed to provide some insight into how the schools made the decision to benchmark and to pursue other efficiency improvements. The influence of non-NYSERDA and NYSERDA programs on the decision to benchmark and to install efficiency measures and/or make behavioral changes was investigated, as explained in more detail below.

Influence of Non-NYSERDA Programs

The two primary questions about non-NYSERDA programs are presented below.

1. To what extent did other non-NYSERDA programs influence schools to *benchmark* through the Focus Program?
2. To what extent did other non-NYSERDA programs influence schools to *install* energy efficiency measures or make behavioral changes to reduce energy?

About a third (32%) of all surveyed schools reported that they participated in a non-NYSERDA program and that program was either influential or very influential in the decision to benchmark through the Focus Program.

Similarly, schools were asked if their participation in a non-NYSERDA program had any influence in their decision to take energy efficiency actions or implement behavioral changes. Almost half (49%) of the respondents stated that participation in a non-NYSERDA program was influential or very influential in their decision to install efficiency measures or implement behavior changes.

3.1.6 Influence of the Focus Program

The next series of questions was designed to assess the role of NYSERDA's Focus Program on the decision to move ahead with the efficiency upgrades. The questions covered the following topics:

- How influential was the Focus benchmarking on the decision to install specific energy efficiency measures or adopt behavioral modifications to reduce energy use?
- How likely was it that the school would have taken specific energy efficiency actions in the absence of the Focus program?
- Who makes the decisions about participating in the Focus benchmarking process and adopting energy efficiency measures and/or behaviors?
- What are the reasons contributing to the decision to benchmark?

- The importance of benchmarking in encouraging decision makers to adopt energy efficiency measures and/or behaviors?

Influence of Focus on the Adoption of EE Measures and Behaviors

The results of the first set of questions about the influence of Focus on the adoption of specific energy efficiency measures and behaviors are provided in

Table 3-21. The influence questions were asked on a zero to four scale, where 0 was "No Influence" and 4 was "Very Influential." This analysis suggested that the benchmarking was highly influential in the installation of envelope measures, efficient lighting, efficiency HVAC or water heating equipment, changes to maintenance schedules and behavioral changes by the school staff. However, the benchmarking process had little impact on improving the efficiency of cooking, dishwashing and refrigeration equipment, office or other equipment or changes to the HVAC settings by maintenance staff.

Table 3-21: Influence of Focus Benchmarking on EE Measures and Behaviors[1]

Type of Efficiency Measure or Behavior	No or Little Influence (0 or 1)	Some Influence (2)	Influential or Very influential (3 or 4)	Not Asked
Building envelope (n=18)	26%	16%	58%	0%
Efficient lighting (n=25)	4%	0%	88%	8%
Heating, cooling, or water heating equipment (n=29)	31%	3%	59%	7%
Cooking, dishwashing or refrigeration equipment (n=6)	50%	17%	33%	0%
Office or other equipment (n=52)	85%	2%	14%	0%
Change HVAC control settings by maintenance staff (n=43)	63%	0%	37%	0%
Changes to maintenance schedules of building systems and equipment (n=17)	6%	35%	59%	0%
Behavioral changes adopted by other building staff (n=47)	0%	4%	96%	0%

[1] Multiple responses were accepted and percentages do not add up to 100%

Likelihood of Adopting EE Measures and Behaviors in the Absence of Focus Benchmark

The next set of questions inquired about how likely the school would have been to adopt specific energy efficiency measures and behaviors in the absence of the Focus benchmarking. Respondents were asked to rate the likelihood of adopting the measure or behavior in the absence of the Focus benchmark on a zero to four scale, where 0 is "very unlikely" and four is "very likely." The results to this series of questions are shown by Table 3-22. These responses suggest that the schools would be very likely to pursue similar energy efficiency and behavior change measures even in the absence of the Focus benchmarking.

Table 3-22: Likelihood of Adopting EE Measures and Behaviors in the Absence of Focus Benchmark[1]

Type of Efficiency Measure or Behavior	Unlikely or Very Unlikely (0 or 1)	Neither Likely nor Unlikely (2)	Likely or Very Likely (3 or 4)	Not Asked
Building envelope (n=18)	5%	32%	63%	0%
Efficient lighting (n=25)	12%	24%	56%	8%
Heating, cooling, or water heating equipment (n=29)	7%	21%	65%	7%
Cooking, dishwashing or refrigeration equipment (n=6)	17%	17%	67%	0%
Office or other equipment (n=52)	0%	0%	100%	0%
Change HVAC control settings by maintenance staff (n=43)	11%	19%	70%	0%
Changes to maintenance schedules of building systems and equipment (n=17)	26%	2%	73%	0%
Behavioral changes adopted by other building staff (n=47)	5%	32%	63%	0%

[1] Multiple responses were accepted and percentages do not add up to 100%

3.1.7 Decision Making Process

Understanding how the benchmarking process is initiated, and how energy efficiency measures or behavioral changes are adopted, is a critical component of the Focus benchmarking effort. The survey asked about the reasons for benchmarking and the individuals who make the decisions, as discussed below.

Reasons for Benchmarking

Program impact questions were included to assess the reasons why schools decide to benchmark. Table 3-23 summarizes the results of this inquiry. As shown in the table, comparing the schools energy use to that of similar schools or other schools within the district was the most popular reason, with 92% of all respondents reporting that as a contributing factor. Included in the "other" contributing factors were reduce costs, starting a new project, identify areas of savings, money, recognition for energy saving efforts, good for career, were not previously tracking energy use, and many others. One interesting outcome of this analysis was that 40% of schools with a single benchmark reported "previously benchmarked other buildings" as a reason for benchmarking through the Focus program, suggesting that these schools may be familiar with the benchmarking process.

Table 3-23: Primary and Secondary Reasons for Benchmarking

	Contributing Factor	Most Influential Factor
Reason for Benchmarking	**Percent of Surveyed Schools[1] (n=79)**	**Percent of Surveyed Schools (n=79)**
Previously benchmarked other buildings	6%	0%
Compare energy use to other schools	92%	34%
Prioritize energy reduction projects	51%	9%
Determine if energy reduction projects are necessary	51%	0%
Benchmark recommended by outside party	52%	0%
Other	75%	57%

[1] Multiple responses were accepted and percentages do not add up to 100%.

When respondents were asked to select the *most influential factor* in the decision to have their buildings benchmarked, 57% said their previous "other" response was the most influential factor, while 34% said to compare their energy use to similar schools or schools within the district was the most important.

Respondents were also asked to identify the reasons for installing energy efficiency measures or implementing behavioral and operational changes. Table 3-24 summarizes the results of this question series. Reducing operational costs and energy use were the two most frequently referenced reasons, with 96% and 90% of all respondents reporting that as a contributing factor, respectively. The availability of incentives was reported as a contributing factor by 84% of respondents. Included in the other category were reasons such as code compliance, maintenance savings, looking like a good citizen, improved air quality, improvements to infrastructure, fits in well with educating students, and public expectations.

When respondents were asked to select the *most influential factor* (in a follow up question) in the decision to have measures installed or implement behavioral or operational changes, an overwhelming major of 84% of the surveyed schools chose reduced operational costs.

Table 3-24: Reasons for Adopting Energy Efficiency Measures or Behaviors

	Contributing Factor	Most Influential Factor
Reason	**Percent of Surveyed Schools[1] (n=77)**	**Percent of Surveyed Schools (n=77)**
Reduced energy use	90%	4%
Reduced operational costs	96%	84%
Reduced green house gas emissions	39%	0%
Incentives available, lowered initial costs	84%	0%
Other	66%	8%
Not asked	4%	4%

[1] Multiple responses were accepted and percentages do not add up to 100%.

Decision Making

When asked who had the most influence on the decision for the school to participate in the benchmarking process of the NYSERDA Focus Program, an overwhelming majority of 90% replied that a school

employee, usually the interviewee, had the most influence. Those being interviewed most often held the title of Superintendent of Building and Grounds or something similar, while a few individuals were the district's Energy Manager. A smaller percent (13%) reported that a member of the administration or the school principal was the most influential in the decision to benchmark.

When asked the title of the person(s) who make the decision to install any energy efficiency measures or implement behavioral or operational changes, the responses are notably different. The results summarized in Table 3-25, show that more than one decision maker is often responsible for deciding on actions like energy efficiency measures and behavioral changes. In decisions concerning installing measures, which may require a significant capital investment, more schools reported that members of the administration and other school employees are often required in the decision making process. Many respondents noted that fewer decision makers are required to implement behavior changes.

Table 3-25: School Energy Efficiency Decision Makers

	Admin/ Principal	School Board	School Employee	Other School Employee	Supervisory Union	Muni. Gov.	Other
Total Surveyed Schools[1] (n=77)	30%	14%	62%	34%	0%	0.00%	10%

[1] Multiple responses were accepted and percentages do not add up to 100%.

Sixty percent (60%) of the surveyed schools reported that a written recommendation was required to move forward on energy efficiency measure or behavioral changes. Other respondents stated that a written recommendation may be required dependent on the scope and cost of the proposed project. Those responsible for producing this recommendation may include the Superintendent of Schools, an architect, the company hired for energy consulting, the Board of Education, district Energy Manager. NYSERDA reports were also mentioned as a contributing factor.

When asked about how important the Focus benchmarking was on encouraging the decision makers to seriously consider taking energy efficiency improvement actions, 54% of the total respondents gave benchmarking a score of 3 or 4, on a 0 to 4 scale, with 4 indicating "very important". All of the schools with a single benchmark scored it as 3 or higher. Only 4% of all schools felt that the benchmarking was not important.

3.1.8 Non-Program Changes

The survey was also used to assess whether there were changes occurring at the schools that would be expected to increase or reduce energy use and that are completely unrelated to energy efficiency. The information provides context to the findings from the billing analysis and was also used to define variables used in the regression models.

Respondents were asked questions about changes to the building, its occupants, and its operation, that might have an influence on energy usage. Topics covered changes to student population, changes to hours of operation, changes to annual schedules, additions to or closings of portions of buildings, the addition or removal of a swimming pool, adding or reducing HVAC equipment, making changes to cooking schedules, and other changes impacting energy usage. The most relevant findings are listed below.

- 39% of the surveyed schools had a change in hours of operation
- 22% changed the annual schedule
- 25% has an increase or decrease of more than 10% in student population

- 18% expanded the HVAC or water heating systems
- 13% built an addition

Many schools stated that their hours were steadily increasing to accommodate growing after school activates for students and for the community. An additional 13% reported "other" changes, including continual addition of plug load and smart boards, the removal of plug loads, the addition of surveillance systems and smart boards, the addition of a natural gas line into the building, the updating of controls to add the lighting system, and a policy to set building temperatures by building. Some of the "other" responses were previously discussed and captured by other sections of the survey.

3.2 CRE SURVEY FINDINGS

As discussed in the Methods section, two contacts were made for the CRE properties: a property manager with responsibility for 20 of the benchmarked CREs and a contractor who was instrumental in the benchmarking for three other CREs. The telephone interview with the CRE contact for 20 properties was not as successful at collecting the survey information as the interviews with the schools or with the other CRE contact. While many questions could not be asked for this CRE property contact, the discussion that occurred over the phone interview still provided insights into the workings of CRE properties and some of their decision making and could help inform future evaluations of the Focus on CRE Program.

The goals for the CRE survey were the same as those discussed above for the schools:

1. To identify the energy efficiency measures installed since the benchmarking was conducted
2. To determine whether, and what types of, behavioral or operational changes were made for the purposes of reducing energy consumption and what types of mechanisms are in place to maintain those changes
3. To assess the impacts of other utility, federal or other non-NYSERDA programs on the decision to pursue benchmarking and install efficiency measures
4. To obtain self-reported information regarding participation in other NYSERDA programs
5. To assess non-program-related changes that occurred during the analysis period that may affect energy consumption
6. To assess the role of the NYSERDA Focus Program in the decision to move ahead with the efficiency upgrades

Findings are presented in the dame order. First, a high level summary of findings within each of the surveys six key research objectives, followed by more detailed results on energy efficiency measures, behavioral changes, impacts of other programs, self-reported information, non-program related changes, and the role of NYSERDA's Focus Program in the decision to move ahead with the efficiency upgrades.

Installation of energy efficiency measures

Forty-eight (48%) of CREs reported installing an energy efficiency measure. Table 3-26 shows the percentage of CREs installing each measure type.

Table 3-26: Summary of Energy Efficiency Measures by CREs

Measures Type	Percent of Surveyed CRE Properties with Installations (n=23)
Building Envelope	9%
Lighting Efficiency	17%
HVAC and Water Heating	30%
Cooking and Refrigeration	0%
Office Equipment	0%
Other Equipment	4%
Total CREs installing an Energy Efficiency Measure	48%

[1] CREs may have installed measures in multiple categories.

Unlike schools, the CREs are not pursuing behavioral changes as a means to reduce energy consumption. Potential reasons why they do not pursue these measures could include:

- Tenant lease terms define the temperatures at which spaces are to be kept
- Tenants pay their own utility bills
- Too difficult to control tenant behavior

Assess impacts of other utility, federal or other non-NYSERDA programs on the decision to benchmark install efficiency measures

Both contacts reported participating in a local gas or utility program but only one reported that participation had an influence on their decision to move forward with energy efficiency measures. Neither reported that these programs had any influence on the decision to benchmark their properties.

Obtain self-reported information regarding participation in other NYSERDA programs

Both contacts reported participating in another NYSERDA program. The Existing Facilities Program and Flex Tech were the NYSERDA programs reported by the CREs.

To assess non-program-related changes that occurred during the analysis period that may affect energy consumption

CRE properties and building use appear to be more stable over time than school building and usage patterns, with only two properties reporting any type of non-program change

Assess the role of the NYSERDA Energy $mart Focus Program in the decision to move ahead with the efficiency upgrades

It is difficult to draw any conclusions to this assessment goal in the case of CREs. One respondent did believe that the benchmarking reports were influential to get the property manager to seriously consider taking actions to increasing energy efficiency, however the influence on the measures level installations suggest that the benchmarking was not very influential in the decision to move ahead with the projects

3.2.1 Energy Efficiency

As shown earlier in Forty-eight (48%) of CREs reported installing an energy efficiency measure. Table 3-26 shows the percentage of CREs installing each measure type.

Table 3-26, HVAC and water heating measures were the most frequently installed measures, with 30% of CRE properties reporting installations. Building envelope (19%) and lighting efficiency (17%) were also installed. No cooking and refrigeration measures were reported by any CRE, nor were any replacements of office equipment. Cooking, refrigeration and office equipment were the responsibility of the tenants and the property managers did not have any information regarding upgrades to these items.

For building envelope measures, the only reported improvements were made to the windows. In discussions with the CRE property contacts, it became clear that adding insulation is not a measure likely to be pursued. Most of the CRE buildings were described as steel and glass façades with minimal space that could be insulated. Improvements focus on upgrading the façades with new glazing.

Lighting efficiency installations included upgrades of the existing interior common areas lighting to LED lamps. One large exterior project was discussed where the unique and identifiable lighting surrounding the top of one building was being upgraded. Some measures were described as on-going or currently under way.

A total of seven buildings reported measures ranging from the replacement of existing heating or cooling equipment, the replacement of a water heater, the installation or upgrading of a building management system, and other measures. The two buildings that comprise measures categorized as other both specified installing insulation blankets at the building's steam stations.

The only other efficiency measure reported by the CREs was equipment replacement of motors. The respondent with 20 properties made it clear that motors and VFDs are being installed throughout their portfolio; because the replacement of motors and installation of VFDs is occurring frequently, detailed records of these are not kept for each building.

3.2.2 Behavioral Changes

No behavioral changes could be identified by the CRE respondents interviewed, which is partly due to the relationship between the property managers and tenants. For example, changes to building systems, such as increasing or decreasing temperatures set points, does not occur because setpoint temperatures are outlined in the lease agreements.

Respondents reported that maintenance practices were not changed by at any property and no written or verbal requests had been made to the tenants or to building staff to reduce energy use. The respondent representing three properties reported that "while no specific practices have changed, maintenance staff are more aware of limiting the use of any supplemental electric heat in buildings and are better at repairing faulty sensors, etc." The CRE property contact representing 20 properties noted that "one tenant has agreed to use the energy savings modes on their computers." This did not appear to be a request made by the property management company.

3.2.3 Participation in NYSERDA Programs

Both CRE property contacts reported participation in other NYSERDA programs. The contact representing 20 CREs could not identify which buildings had participated in the NYSERDA programs, but it was made clear that pursuing NYSERDA programs for rebates and incentives is common practice when performing energy efficiency measures within their portfolio. Among the programs asked about in the survey, both contacts reported involvement in FlexTech and the Existing Facilities Programs.

3.2.4 Influence of the Focus Program

Many questions in this section could not be answered for the CRE properties. Many were simply not applicable because the first CRE respondent representing 20 properties had trouble recalling their program participation. The findings from the second CRE respondent representing 3 properties suggest that the benchmarking had limited influence in their decision to move forward with their projects. The second CRE respondent (for 3 properties) did believe that the benchmarking reports were influential to get the property manager to seriously consider taking actions to increasing energy efficiency.

3.2.5 Influence of Non-NYSERDA Programs

When asked about other program participation, from local utility programs, to federal government programs, to municipal and other programs, both respondents reported participation in other local utility programs. Similar to the Self-Reported section, it seems that the CRE contacts are active in seeking out ways to get rebates and incentives on projects they pursue, whether through a NYERDA program, a local utility program, or through a federal government program.

These other programs did not seem to be of much influence on one contact's decisions to move forward with measures, but in the case of the smaller three property contact, participation in the non-NYSERDA program was very influential in the decision to install measures. Neither contact reported that participation in these other programs had any influence on their decision to benchmark their properties.

3.3 DEEMED SAVINGS:

The deemed savings analysis attempted to quantify the savings achieved through self-reports of installed measures and behavioral changes identified by the telephone survey respondents. Final estimates of gross evaluation-based savings were found through the billing analysis and not through the deemed savings analysis presented below. The findings from the deemed savings analysis speak more to *where* the savings associated with benchmarking activities are coming from rather than *how much* can be saved from the activities. It is likely that not all interactive effects were accounted for in this type of analysis and site specific installation information was limited to self-reports. However, the findings from this analysis provide valuable insight into the relative importance of the actions taken to reduce energy and where savings can be achieved.

3.3.1 Total Deemed Energy Savings

Table 3-27 shows gross savings estimated through the deemed savings analysis by measure category as a percentage of total savings for the schools that completed the survey. The total kWh savings using the deemed values was estimated to be 3.9 million kWh and 19,630 MMBtu per year. The total gross electric savings as estimated through this deemed savings analysis was substantially higher than the total reduction in energy use as estimated from the billing analysis (3.98 GWh from deemed savings as compared to 1.1 GWh from the billing analysis). This result suggests that the deemed savings alone are not a reliable estimate of savings.[27]

[27] The billing analysis indicates that the total MMBtu reduction for all surveyed schools was 21,863 MMBtu, slightly higher than the estimated deemed savings.

Table 3-27: Estimated Deemed Savings by Measure Category for Surveyed Schools

	Annual kWh Saved[1]	% Total Savings[1]	Annual MMBtu Saved[1]	% Total Savings[1]
Envelope	32,009	1%	3,518	18%
Lighting	1,531,448	39%	0	0%
HVAC & Water	437,502	11%	4,466	23%
Cooking & Refrigeration	44,390	1%	179	2%
Other	609,795	15%	25	0%
Energy Efficiency Subtotals	**2,655,144**	**67%**	**8,187**	**42%**
Changes to Building Systems	261,855	7%	3,113	16%
Maintenance Practice Changes	169,285	4%	2,847	15%
Other Staff Changes	707,043	18%	4,271	22%
Other Behavior Changes	174,757	4%	1,212	6%
Behavioral Change Subtotals	**1,312,940**	**33%**	**11,443**	**58%**
Total	**3,968,084**		**19,630**	

Section 4: [1] Estimated deemed savings for the sample.

However, the deemed savings analysis is a useful tool for providing some insight into how savings can be achieved. The energy efficiency measures account for 67% of the total estimated deemed kWh savings from energy efficiency measures and behavioral changes. Within the energy efficiency measure category, deemed savings from lighting measures account for the greatest percentage of savings (39%). The behavioral change activities account for an additional 33% of kWh savings achieved. Within the behavioral changes category, behavioral changes made by other staff members account for the greatest percentage of savings (18%).[28]

Forty-two percent of all MMBtu savings attributed to energy efficiency measures. Within the energy efficiency measure category, HVAC and water account for the greatest percentage of savings (22.7%). The behavioral change activities account for the remaining 58.3% of MMBtu savings achieved.

4.1.1 Savings by Major Measure Categories

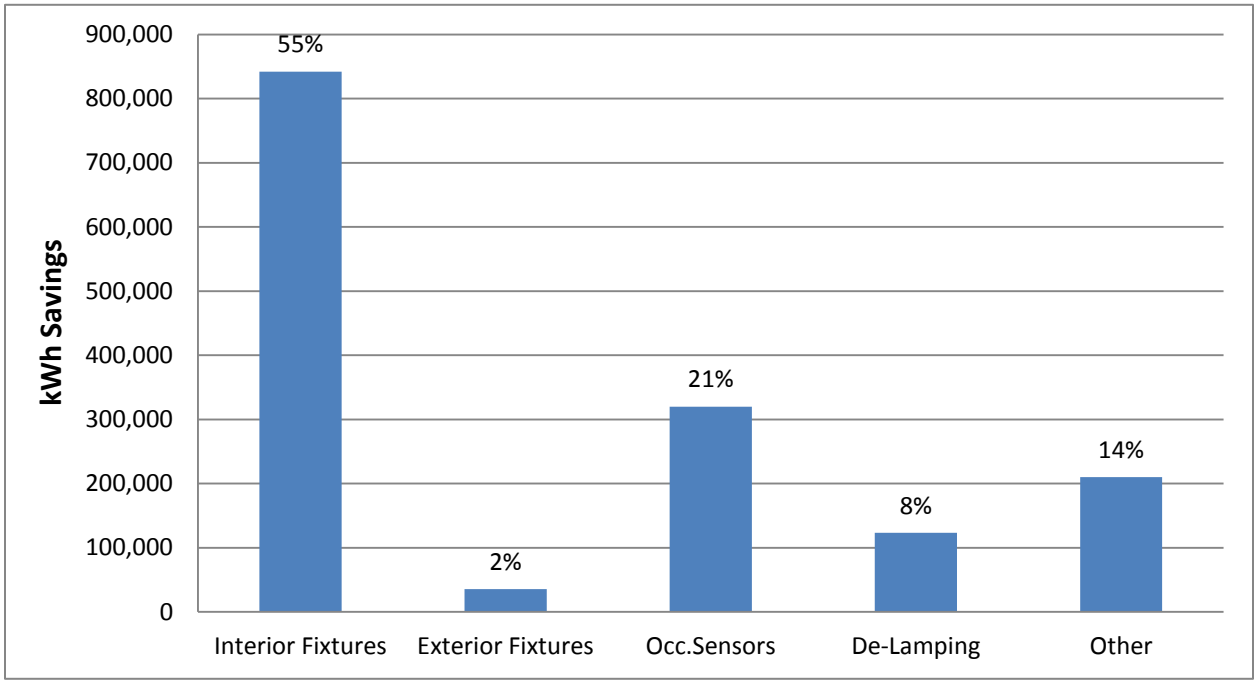
This section will further examine the specific actions and installed measures for the selected measures categories that show the most savings. For total kWh savings, the categories of lighting and other staff changes were broken down into measure and action level savings. Also included is a further examination of the MMBtu savings achieved through other staff changes. The following figures represent findings from the deemed savings analysis for the sample of 79 schools.

Figure 3-1 shows the total kWh savings from installing lighting measures based on each measures type within the lighting category. It shows that the majority of total kWh lighting savings (55%) are being achieved through the installation of new efficient lighting fixtures. Savings from the installation of occupancy sensors are also significant, account for 21% of kWh lighting savings. Remaining kWh

[28] The results of the measure-level billing analyses for both electricity and natural gas suggest that savings are only achieved when the behavioral actions are undertaken by the maintenance personnel.

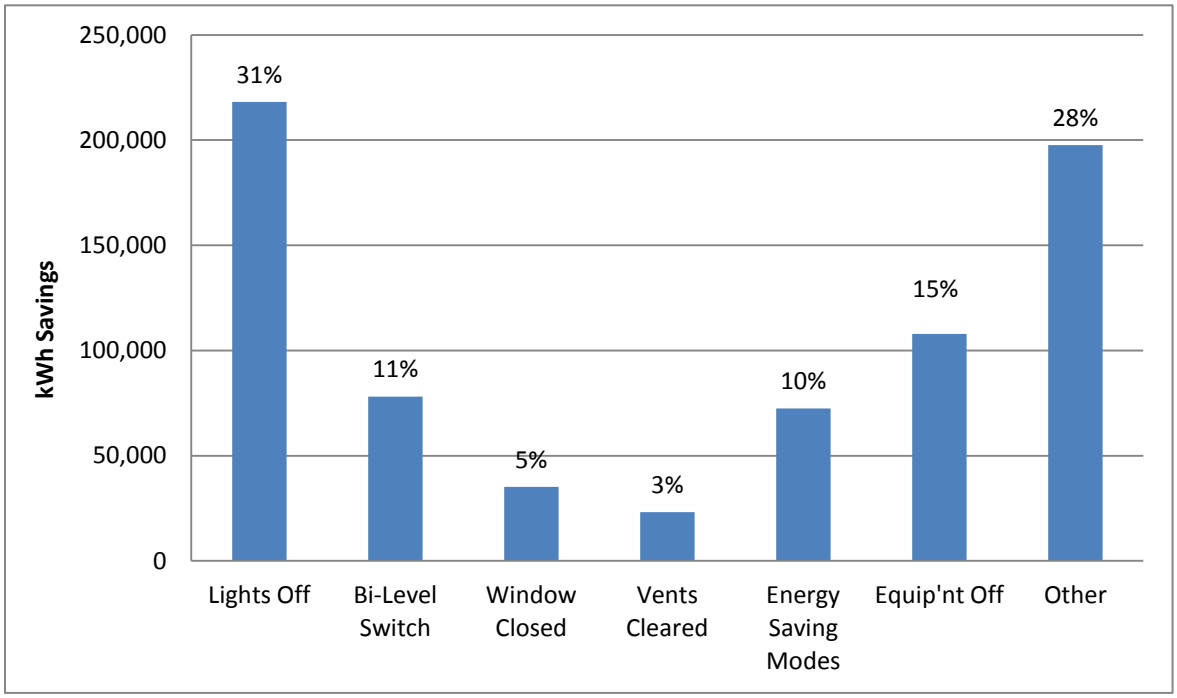
lighting savings are other lighting measures (14%), de-lamping (8%), and exterior fixture replacement (2%).

Figure 3-1: kWh Savings by Type of Lighting Measures for Schools Sample



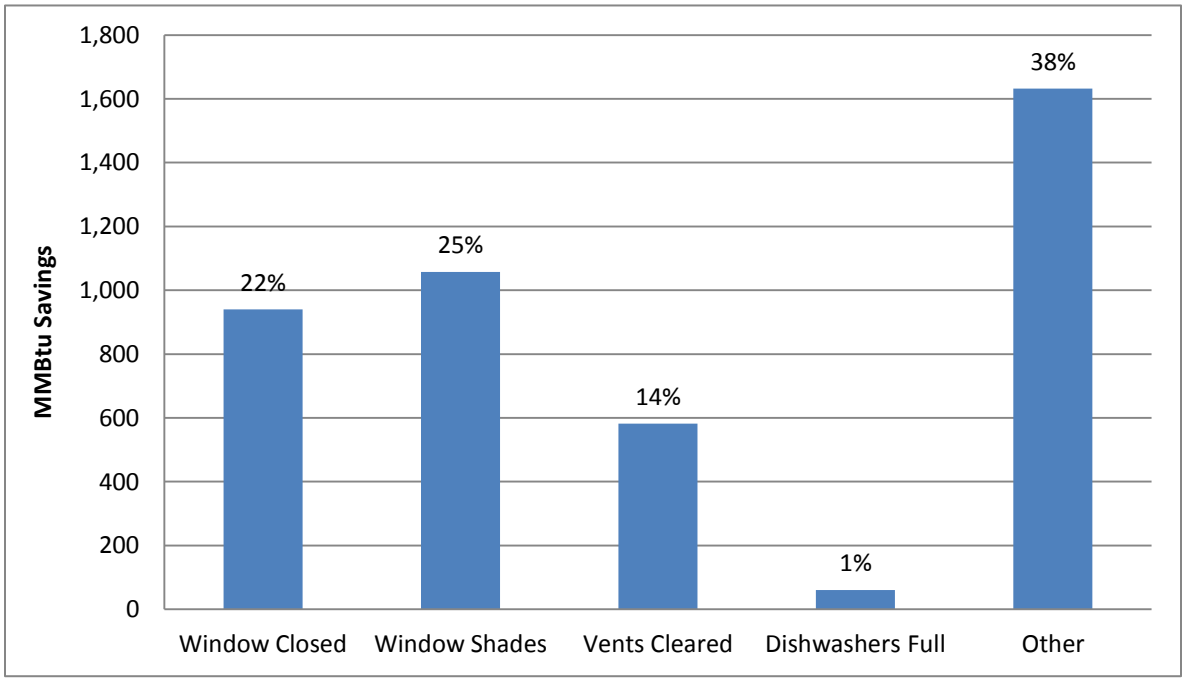
The measures contributing to the total kWh savings from other staff behavioral changes are illustrated in Figure 3-2. This analysis indicates that the other staff behavioral change savings (31%) are being achieved through the turning off of lights when rooms are not in use. Savings are also being achieved through other changes (28%), turning equipment off (15%), using bi-level switching (11%), using energy saving modes on computers (10%), and closing windows and clearing vents at 5% and 3% respectively. Additional staff changes that were reported but showed minimal show kWh savings include closing window shades, changing thermostat set points, and running full dishwasher loads. The other changes within this category included action like reducing personal plug loads and turning off major equipment before long weekends and vacations.

Figure 3-2: KWh Savings from Other Staff Behavioral Changes for Schools Sample



The same analysis was conducted for MMBtu savings from staff behavioral changes, as shown in Figure 3-3. This deemed savings analysis suggests that a substantial portion of these MMBtu savings (38%) are being achieved through other reported actions. Savings are also being achieved through closing window shades (25%), closing windows (22%), keeping vents cleared (14%), and ensuring dishwasher loads are full (1%).

Figure 3-3: Other MMBtu Savings from Staff Behavioral Changes for Schools Sample



4.1.2 Summary of Findings

While the magnitude of the deemed savings estimates may not be considered reliable and were not used to develop the evaluation-based estimates of gross savings, this analysis provides some insight into the types of measures and actions taken through the Focus Program. Findings presented in the deemed savings results section are described below.

- Thirty-nine percent (39%) of total kWh deemed savings appear to be coming from lighting upgrades. Within the lighting category, the installation of new fixtures may constitute a majority of savings.
- Eighteen percent (18%) of kWh savings may be achieved through staff actions of turning off lights and equipment when not in use. All other staff behavior changes including changes to building systems and maintenance practice changes account for 15% of the total kWh savings achieved.
- Of the total MMBtu savings, 42% was estimated to be achieved through energy efficiency measures, while 58% was achieved through behavioral change activities. The majority of MMBtu savings may occur through behavioral actions rather than through energy efficiency. This is the opposite of our observation for kWh savings.
- Twenty-three percent (23%) of total deemed MMBtu savings appear to be coming from HVAC and water heating measures. Within the HVAC and water heating category, a majority of savings is achieved through the installation of new heating system.
- Other categories where MMBtu savings were noticeable include other staff behavior changes, building envelope measures, changes to building systems, and maintenance practice changes.
- Finally, when comparing kWh and MMBtu savings, it appears that kWh savings are more concentrated among fewer categories of actions while MMBtu savings are being achieved through more measure categories.

4.2 SCHOOLS BILLING ANALYSIS

A billing analysis was conducted for the schools to estimate gross savings for the Focus Program. Billing analysis was not conducted for the sample of CRE properties as the results of the telephone survey indicated there are no savings for the CREs.

4.2.1 Natural Gas Models

Two approaches were used to estimate savings from the natural gas bills: first, a school-by-school regression was conducted to estimate pre-benchmark and post-benchmark use. These two values were then subtracted to obtain the total reduction during the post-benchmark period over all schools in the model. The second model was a fixed effects model with customer-specific intercepts and specific effects identified through the participant surveys were incorporated into the model. The results from both models were weather normalized to ensure that the comparison between the two periods is valid and does not inadvertently reflect changes in the weather patterns rather than actual changes in consumption.

The pre/post analysis measures the total reduction between the two periods and sets the maximum value of the savings that could possibly be attributed to the program. The statement is based on the assumption is that the schools on average did not experience an unrelated *increase* in energy use (such as building an

addition) that occurred at the same time as the benchmarking. This assumption was supported by the results of the fixed effects billing analysis.[29]

Pre-Post Results

The results of the pre/post analysis are provided in Table 3-28 below. The total reduction in natural gas use for schools in the model was 21,863 MMBtu per year. The results are statistically significant at the 99% confidence level.

Table 3-28: Summary of Natural Gas Pre/Post Billing Analysis

	Annualized Consumption (MMBtu/Year)[1] (n=71)	Standard Error	Lower 90% Confidence Limit	Upper 90% Confidence Limit
Pre-Benchmark	329,934	502	3,291,078	3,307,595
Post-Benchmark	308,070	462	3,073,103	3,088,302
Total Reduction	21,863	682	20,741	22,985
Percent of Pre-Benchmark Consumption	7%			

[1] Pre- and post-benchmarking consumption was normalized using the most recent six years of weather data.

Measure Level Results

The measure-level results were less robust than the overall pre/post analysis due to the high variability in consumption among the schools and the relatively small sample size for this type of analysis. The data from the participant telephone survey was used to define variables for the fixed effects regression model and a number of different models were tested. The findings from this analysis are provided below.

- Savings from building envelope were found in the model and reasonably stable; savings from hot water upgrades were also found but were not statistically significant, which is most likely related to the small number of schools (four) with the measure.
- No savings were found from heating system upgrades and cooking/refrigeration measures.
- Effects from non-program related changes that would be expected to increase or decrease consumption could not be reliably estimated.
- Savings from heating related behavioral changes that were initiated by maintenance staff could be estimated and the estimator was statistically significant at the 90% confidence level; non-seasonal behavioral changes by maintenance personnel also shows savings, but the statistical significance was low.
- Estimators related to behavioral changes by other staff and students were highly unstable.

[29] The possibility that the non-program changed identified through the participant surveys affected the results of the billing analysis was tested in the fixed effects billing. For each school, the non-program related survey responses were carefully reviewed to determine whether unrelated factors would be likely to result in an overall increase or decrease in consumption. When these variables were incorporated into the billing analysis, the results did not show the expected pattern of increase or decrease, suggesting that the identified changes in schedule or non-program related factors were not coincident with the benchmarking.

- For schools with self-reported participation NYSERDA programs, it was not possible to independently estimate savings for the measures that may have been installed through the other NYSERDA programs.

The final model included the following measure-level variables: hot water upgrades, envelope measures, both non-seasonal and heating related behavioral changes by maintenance personnel and non-seasonal behavioral changes by general staff and students.[30] Time variables, heating degree days and a variable to account for the low summer consumption were also included. The R-squared for the model was 0.68; fixed effects models tend to have a high R-squared value as the fixed effects terms generally account for much of the variation in the model. The regression statistics for the final model are presented in Table 3-29 below.

Table 3-29: Variables in the Natural Gas Fixed Effects Billing Analysis

Variable	Estimator[1]	Standard Error	t-Value[2]	P-Value
year1	-3.2089	1.2182	-2.63	0.0085
year2	-2.7943	0.8169	-3.42	0.0006
year3	-1.5000	0.6345	-2.36	0.0182
Water Heating Upgrades	-1.4567	1.5126	-0.96	0.3357
Staff Non-Seasonal Behavioral Changes	0.4151	0.7218	0.58	0.5653
Maintenance Staff Non-Seasonal Behavioral Changes	-0.6464	0.9577	-0.67	0.4998
Envelope Measures Installed *Heating Degree Days	-0.1357	0.0256	-5.31	<.0001
Maintenance Staff Heating Changes* Heating Degree Days	-0.0619	0.0201	-3.07	0.0022
Heating Degree Days * Presence of Gas Heat[3]	0.4714	0.0148	31.87	<.0001
Low Summer Use	-4.1767	0.5957	-7.01	<.0001

[1] Negative estimators indicate a drop in consumption; positive estimators indicate an increase in consumption.

[2] A t-value of about 1.8 or greater indicates the estimator is statistically significant at the 90% confidence level.

[3] This variable reflects the linear relationship between heating degree days and natural gas use.

The envelope and heating system behavioral changes by maintenance personnel are the two measures with savings that are statistically significant at the 90% confidence interval. The total savings for all schools in the natural gas fixed effects billing analysis for these measures was estimated to be about 93% of the total reduction in consumption as estimated from the pre/post model described above. This result suggests that a high percentage of the overall reduction is related to specific energy efficiency measures and behavioral changes made at the school.

In this type of model, the overall savings per school are likely to be reasonably accurate, although savings for specific measure groups tend to be less reliable. For envelope measures, the savings estimated from

[30] The non-seasonal behavioral changes by general staff and students was included as this variable was showing savings in a previous model. However, it shows increased use in the final model as this variable tended to be highly unstable. Its inclusion in the final model did not affect the magnitude of the estimators for the measures of interest.

the fixed effect model (about 1,000 MMBtu per school or 0.009 MMBtu/square foot) were found to be substantially higher than the estimated deemed savings for the same measure group. Savings from behavioral changes were found to be about 500 MMBtu per school or 0.004 MMBtu/square foot, which is also unexpectedly high. These variations may be a result of the relatively small number of schools in the model. Only 16 schools installed envelope measures and six schools adopted heating-related behavioral changes initiated by maintenance personal.

4.2.2 Electric Models

As with the natural gas billing analysis, electric savings were also estimated using the school-by-school regression and a fixed effects model with customer-specific intercepts. The electric use was not found to be highly correlated to weather. The drop in consumption during the warmer summer months when schools are not in session made it impossible to estimate cooling use, and ultimately the summer months when school is out of session were removed from the analysis. Consequently, the electric consumption was only weather normalized for the one school with electric space heat.

The total reduction between the two periods was estimated by the pre/post analysis and sets the maximum value of the savings that could possibly be attributed to the program. The fixed effects model indicated that the schools on average did not experience an unrelated *increase* in energy use (such as building an addition) that occurred at the same time as the benchmarking.[31]

Pre-Post Results

The results of the pre/post analysis are provided in

[31] As with the natural gas billing analysis, the possibility that the non-program changed identified through the participant surveys affected the results of the billing analysis was tested in the fixed effects billing. For each school, the non-program related survey responses were carefully reviewed to determine whether unrelated factors would be likely to result in an overall increase or decrease in consumption. When these variables were incorporated into the billing analysis, the results did not show the expected pattern of increase or decrease and the estimators were not statistically significant, suggesting that the identified changes in schedule or non-program related factors were not coincident with the benchmarking.

Table 3-30 below. The total reduction in electric use for schools in the model was 1,107,161 kWh per year. The results are statistically significant at the 99% confidence level.

Table 3-30: Summary of Electric Pre/Post Billing Analysis

	Annualized Consumption (kWh/Year)[1] (n=59)	Standard Error	Lower 90% Confidence Limit	Upper 90% Confidence Limit
Pre-Benchmark	24,525,789	77,005	24,399,116	24,652,462
Post-Benchmark	23,418,628	73,402	23,297,883	23,539,374
Total Reduction	1,107,161	106,384	932,159	1,282,162
Percent of Pre-Benchmark Consumption	5%			

[1] Pre- and post-benchmarking consumption for the school with electric space heat was normalized using the most recent six years of weather data.

Measure Level Results

As with the natural gas billing analysis, the measure-level electric results were more variable than the pre/post analysis, most likely due to the small number of schools in the model. Program related variables were defined using the responses from the participant telephone survey and various models were tested. The findings from this analysis are provided below.

- Savings from lighting measures were found and were significant at the 90% confidence interval.
- Hot water upgrades were found marginally statistically significant at the 85% confidence level; however, none of the schools with the hot water upgrades used electricity for heating water, and the connection between the measure and the savings was too tenuous to support the estimation of program savings.
- Effects from non-program related changes that would be expected to increase or decrease consumption did not have the expected sign and were not statistically significant.
- Non-seasonal behavioral changes by maintenance personnel show savings, but the estimators were not statistically significant.
- Estimators related to behavioral changes by other staff and students showed an increase in energy use.
- For schools with self-reported participation in other NYSERDA programs, the estimator for the NYSERDA other program activity showed savings, but it was not statistically significant and it was accompanied by a reduction in the estimated lighting savings.

The final model included the following measure-level variables: lighting measures, hot water upgrades, non-seasonal behavioral changes by maintenance personnel.[32] Heating degree days were also included. The R-squared for the model was 0.96; fixed effects models tend to have a high R-squared value as the fixed effects terms generally account for much of the variation in the model. The regression statistics for the final model are presented in Table 3-31 below.

[32] While lighting measures are the only stable and statistically significant savings in the model, the hot water upgrades and non-seasonal behavioral changes by maintenance staff were included as there were savings for these measures in previous models. The inclusion of these variables does not affect the magnitude of the estimated savings from lighting measures.

Table 3-31: Variables in the Electric Fixed Effects Billing Analysis

Variable	Estimator[1]	Standard Error	t-Value[2]	P-Value
Lighting	-6.417	3.468	-1.85	0.0645
Water Heating Upgrades	-10.329	6.895	-1.5	0.1344
Maintenance Staff Non-Seasonal Behavioral Changes	-2.289	2.152	-1.06	0.2879
Heating Degree Days * Presence of Electric Heat[3]	3.140	0.451	6.97	<.0001
Heating Degree Days	0.807	0.057	14.12	<.0001

[1] Negative estimators indicate a drop in consumption; positive estimators indicate an increase in consumption.

[2] A t-value of about 1.8 or greater indicates the estimator is statistically significant at the 90% confidence level.

[3] This variable reflects the linear relationship between heating degree days and natural gas use.

The lighting savings were found to be reasonably stable over the various candidate models and statistically significant in the final model. As discussed above, the four schools with hot water upgrades showed savings (as also occurred in the natural gas model), but in the absence of electric space heat, it is not possible to establish a clear link between the measures installed and the associated savings from the billing analysis. The savings from non-seasonal behavioral changes by maintenance staff were not found to be statistically significant. A summary of the overall electric savings from the fixed effects model is shown in Table 3-32.

Table 3-32: Summary of Fixed Effects Billing Analysis and Comparison to Pre/Post Results

Measure Group/Action	Number of Schools	Total Savings (kWh/Year)
Lighting	12	341,406
Non-Seasonal Maintenance	33	204,377
Total Lighting Only	12	341,406
Total Both Measures	45	545,783
Total Reduction from Pre/Post	--	1,107,161
% of Total Reduction Lighting Only	--	31%
% of Total Reduction Both Measures	--	49%

This analysis indicates that the fixed effects billing analysis found savings from specific measures or actions accounting for between 31% and 49% of the total reduction estimated from the pre/post billing analysis. The remaining reduction in energy use could be due to unknown non-program effects or from measures and actions that could not be effectively estimated in the model.

4.3 COMBINING FINDINGS

As shown in Table 3-33, the evaluation-based gross total reduction in energy use for the schools when extrapolated to the entire population are 4,949,732 kWh of electricity and 97,742 MMBtu of natural gas, which consist of 1.6% and 4.5% of the total energy use for the population, respectively.[33] The evaluation-based gross savings apportioned for the sample of 79 schools surveyed are 1,107,161 kWh and 21,863 MMBtu, or 1.8% and 4.1% energy usage respectively. The estimated savings attributed to the Focus Program after influence factors (0.466) were applied was calculated as 330,019 kWh and 39,005 MMBtu, or 0.1% and 1.8% energy usage respectively.

Table 3-33: Summary of Annual kWh and MMBtu Savings – Participating K-12 Schools[1]

Schools Savings	Annual kWh	% of Annual kWh Use	Annual MMBtu	% of Annual MMBtu Use
Total Evaluation-based Gross Reduction	4,949,732	1.6%	97,742	4.5%
Other NYSERDA Program Savings	2,954,558	1.0%	1,614	0.1%
Balance (Evaluation-based Gross - Other NYSERDA Savings)	1,995,173	0.7%	96,128	4.4%
Other non-NYSERDA Program Savings	1,273,203	0.4%	12,378	0.6%
Balance (less non-NYSERDA Savings)	721,971	0.2%	83,750	3.9%
Focus Program Savings	330,019	0.1%	39,005	1.8%

[1] Savings extrapolated to the population of schools.

[33] The population of schools consists of 366 unique buildings that participated in the benchmarking process during the January 1, 2007 through December 31, 2009 time frame and used a regulated fuel (such as natural gas, stream or electricity) for space heating.

Section 5:

CONCLUSIONS AND RECOMMENDATIONS

The section covers the conclusions, program recommendations and evaluation recommendations. The program recommendations are meant to help inform future EEPS benchmarking program efforts, and thus are not necessarily specific to the Focus on Institutions and CRE Programs evaluated by this report. The Impact Evaluation Team also made recommendations with FlexTech's new Benchmarking Pilot program in mind, and some recommendations are geared toward that benchmarking effort. Evaluation recommendations were designed to be applicable across multiple benchmarking programs.

5.1 CONCLUSIONS

The ground-level question for this evaluation was whether benchmarking results in actions that can reasonably be expected to reduce energy use. The evaluation results conclusively demonstrate the effectiveness of benchmarking in that virtually all of the participating schools (95%) installed at least one energy efficiency measure and a large majority (76%) adopted behavioral changes to reduce energy use. Not only are schools installing measures and adopting behavioral changes but, 54% of schools reported that the benchmarking was either "important" or "very important" in getting the decision makers to seriously consider taking energy efficiency actions at the school. Thus, it appears that the measurement methods inherent in the benchmarking process provide the catalyst for specific actions and assist the decision makers in moving forward with energy efficiency measures and behavioral strategies. The billing analysis supports these findings by demonstrating that actual consumption decreased by 1.6% for electricity and 4.5% for natural gas.

The evaluation also demonstrates that the Focus Program is heavily intertwined with other NYSERDA and non-NYSERDA programs and other market forces. This was identified through the telephone survey which found that 40% of schools participated in another NYSERDA program and about one third (32%) of schools participated in a non-NYSERDA program. This was also supported through the billing analysis. The billing analysis indicated that lighting was one of the measures with the most robust savings, but about 67% of schools with lighting upgrades also participated in another NYSERDA program.

Survey results also indicate that non-NYSERDA programs were a major motivator to conduct benchmarking (32%) and install energy efficiency measures (49%) for a substantial minority of schools. Forty percent (40%) of the benchmarked schools participated and installed measures through other NYSERDA energy efficiency programs. Survey respondents also stated that many of the efficiency actions would have occurred even in the absence of the Focus Program.

When the NYSERDA savings and estimated non-NYSERDA savings are backed out of the Focus savings, the net program savings adjusted for the influence of the Focus Program are quite small at 900 kWh and 100 MMBtu per school per year. In contrast, if the influence adjustment is made and the savings allocated to other programs were assumed to be associated with the Focus Program, the program savings increase to 6,700 kWh and 133 MMBtu per year. These findings point to the policy issues related to how to allocate the savings among the various entities that are providing energy efficiency services to schools.

Given these complexities, the question becomes how to allocate the savings from benchmarking. This evaluation was intended as a preliminary investigation to assess whether the Focus Program is achieving savings. The evaluation methods do not meet the rigor of other NYSERDA evaluations that are based on site specific M&V. However, the evaluation-based savings provide an estimate of the magnitude of savings from the benchmarked schools with and without the savings generated by other NYSERDA and non-NYSERDA programs and should provide sufficient information to assess whether more rigorous

impact evaluation is needed. If the NYSERDA and non-NYSERDA program savings are removed from the Focus Program savings, the remaining savings are small and it would probably not be worthwhile to try to pursue direct M&V. The danger is that removing all of the other program savings from Focus may well lead to the conclusion that benchmarking does not have merit.

Overall, the key outcome of this evaluation is that benchmarking is an effective tool for promoting and achieving energy savings. The low level of the evaluation-based savings is related to the cross-program activity and the number of schools that participated in other NYSERDA and non-NYSERDA programs.

5.2 RECOMMENDATIONS FOR FUTURE BENCHMARKING EFFORTS

The following recommendations are made from the findings of the evaluation of the Focus on Institutions and CRE benchmarking programs. While investigating these specific programs the Impact Evaluation Team was able to compile these recommendations believed to be useful in future benchmarking program efforts, not directly related to the Focus on Institutions or CRE programs.

5.2.1 Defining Energy Reduction Actions

The Focus Benchmarking program does not have as a part of the database any way to identify whether a benchmarked facility took energy reduction actions since previous benchmarks. A major goal of this evaluation was to identify the different ways that schools and CREs attempted to reduce energy consumption. As benchmarking practices continue and benchmarking programs are expanded, benchmarked facilities could be requested to re-submit data collection forms with each set of bills they desired to have benchmarked. The data collection form could be expanded to include some general questions about the actions pursued to reduce energy since the last benchmark was completed. This would provide a starting point for future evaluations about types of actions that facilities pursue that may contribute to an energy reduction. If using telephone surveys with future evaluations, if the surveyor already has an idea of what measures were pursued, more time could be spent on the details of those projects, rather than requiring the evaluators to spend time ruling out the measures that were not taken.

Recommendation: For participants with multiple benchmarks, inquire about energy reduction actions that were implemented since the previous benchmark.

5.2.2 Collecting Waivers

The collection of utility release waivers was an unexpectedly difficult step in this evaluation. The low percent of schools and CREs that signed waivers limited the size of the utility billing request that could be submitted. The attrition that occurred both prior to the formal submitted utility request (due to unsigned waivers) and after the billing records were received from the utility (from lack of data and missing reads) was higher than anticipated by the Impact Evaluation Team. The attrition limited the sample to a less than desired level and ultimately prevented the Impact Evaluation Team from reaching it sample goals.

Recommendation: Establish a process for obtaining waivers to request utility data at the time of the benchmarking.

5.2.3 Establishing the Link between Benchmarking and Adoption of Efficiency

Results from this evaluation support a finding that electric and gas energy usage savings are being achieved for some behavioral changes, particularly when implemented by maintenance staff. This evaluation demonstrates that the key question for this program is how to establish a causal link between the Program's benchmarking activities and these savings. To establish such a link, a variety of approaches could be considered, such as working more closely with other entities to promote and track

the installation of specific measures and adoption of specific behavioral actions. In addition, as part of the Program's measure installation and behavioral actions implementation process, participants could be asked to rank the influence that benchmarking had on their decision to adopt efficiency recommendations.

Recommendation: Review program delivery approaches to establish a firmer link between the benchmarking process and the adoption of efficiency measures and practices.

5.3 EVALUATION RECOMMENDATIONS

The following recommendations for future evaluations of benchmarking programs are meant to be applicable to different types of benchmarking programs and represent solutions to the problems encountered while evaluation the Focus benchmarking efforts for Schools and CREs. Our recommendations also highlight the aspects of the evaluation method we found to be informative and successful during the impact evaluation.

5.3.1 Assessing the Role of Benchmarking in Relation to Participants' Other NYSERDA-Supported Energy Efficiency Initiatives

One aspect of this future evaluation could be to further explore the effectiveness of the benchmarking component as a gateway to other NYSERDA programs and to the adoption of energy efficiency measures and behaviors. This investigation requires a more detailed review of the various paths taken from benchmarking to adoption of efficiency and the timing of these actions.

Recommendation: Design the next evaluation to investigate the relationship between benchmarking and other programs and do a more detailed assessment of whether benchmarking provides the impetus for the adoption of further efficiency measures and practices.

Energy $mart Focus Benchmarking of Institutions and Commercial Real Estate Components Program Impact Evaluation Report Appendices

FINAL

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Appendix A

School Survey Instrument

APPENDIX A.

SCHOOL SURVEY INSTRUMENT

NYSERDA Energy $mart Focus Program

Impact Evaluation Telephone Interview

Benchmarked Schools Participants

(V8-REVISED 6/5/2012)

PURPOSE & BACKGROUND:

The participant telephone interview is primarily designed to assess the specific actions taken to reduce energy use that are caused by the benchmarking effort from NYSERDA's Energy $mart Focus Program either directly, or through NYSERDA's other programs. This information will be used to ascertain the percent of facilities that installed efficiency measures and the impacts of external programs or factors on the decision to conduct benchmarking and the reduction in energy use. The components of the participant telephone interview are listed below:

- General Program Respondent Information (GI)
- Energy Efficiency Measures (EE) - To identify the energy efficiency measures installed since the benchmarking was conducted
- Behavioral Changes (BC) - To determine whether, and what types of behavioral or operational changes were made for the purposes of reducing energy consumption and what types of mechanisms are in place to maintain those changes.
- Self Reported Information (SR) - To obtain self-reported information regarding participation in other NYSERDA programs
- Program Impact (PI) - To assess the role of the NYSERDA Energy $mart Focus Program in the decision to move ahead with the efficiency upgrades
- Other Program Impacts (OI) - To assess the impacts of other utility, federal or other NYSERDA and non-NYSERDA programs on the decision to pursue benchmarking and install efficiency measures.
- Non Program Related Changes (NP) - To assess non-program-related changes that occurred during the analysis period that may affect energy consumption

The table below identifies the number of Schools to be targeted by this instrument:

Site Type	Number
Schools	
Schools benchmarking one time	25
Schools benchmarking multiple times	38
Total Schools	*63*

A total of 63 completes has been targeted for this interview and will be based on a stratified random sample of Schools to ensure representation across the entire population – stratification variables and approach are described in the sampling memo.

ASK TO SPEAK WITH NAMED SAMPLE MEMBER. WHEN PERSON COMES TO THE PHONE OR IF PERSON ANSWERING PHONE ASKS WHAT THIS IS ABOUT, READ:

SCREENER FOR CONTACT

SCR-1.

Hello my name is _____ and I'm calling on behalf of NYSERDSA (the New York State Energy Research and Development Authority).

We're calling today because someone at the **[school name(s)]** has participated in NYSERDA's Energy $mart Focus Program. Our records indicate that your **[_____school(s)]** was/were benchmarked through the Program. This is the process of comparing your school's energy performance to schools that use the industry's best practices.

Are you the person familiar with the benchmarking effort?

1. YES **[SKIP to SCR-3]**
2. NO **[GO to SCR-2]**
96. DON'T KNOW **[GO to SCR-2]**
97. REFUSED **[GO to SCR-2]**

SCR-2. We sent you a letter recently telling you that we would be calling and explaining the research we are doing. Can you provide me with a contact name and phone number for a person in your organization who was involved in the benchmarking?

1. YES – **RESPONDENT PROVIDES NEW CONTACT INFORMATION**

   [RECORD PERSON'S NAME OR NEW CONTACT INFORMATION]

   Name:_____

   Phone:_____

2. YES – **NEW RESPONDENT COMING TO PHONE [SCR-1]**

3. YES **– NEW RESPONDENT NOT AVAILABLE [SCHEDULE CALLBACK]**

   APPOINTMENT DATE AND TIME:_____

4. NO – **RESPONDENT CANNOT PROVIDE ANOTHER CONTACT [LEAVE OUR INFORMATION FOR FOLLOW UP IF THEY THINK OF APPROPRIATE CONTACT THEN THANK AND TERMINATE]**

   GDS CONTACT INFORMATION:

   NAME: **[GIVE THEM YOUR NAME]**

   PHONE: 603-656-0336

96. REFUSED **[THANK AND TERMINATE]**

97. DON'T KNOW **[LEAVE OUR INFORMATION FOR FOLLOW UP IF THEY THINK OF APPROPRIATE CONTACT THEN THANK AND TERMINATE]**

SCR-3. We sent you a letter recently telling you that we would be calling and explaining the research we are doing. We're calling today to ask you some questions about your experience with NYSERDA's Energy $mart Focus Program to help us evaluate how the program might serve people better. This interview will take about 30 minutes to complete. Your responses will be kept confidential to the extent permitted by law. Can we discuss the project now, or is there a better time when I can call you back?

1. CAN DISCUSS NOW **[PROCEED TO SECTION GI: General Program Information]**
2. CALL BACK ON:_____ AT TIME:_____

[READ]: Great! Thank you very much! Your feedback is very important to this research and can enable NYSERDA to improve its program for organizations such as yours.

[NOTE TO INTERVIEWER: FOR CASES WHERE MULTPLE SCHOOLS WITHIN THE RESPONDENT'S SCHOOL DISTRICT WERE BENCHMARKEED, AND PART OF THE SAMPLE TO BE INTERVIEWED, RECORD SEPARATE ANSWERS, WHERE APPLICABLE FOR EACH SCHOOL]

GENERAL PROGRAM INFORMATION (GI)

GI1. Our records indicate that someone at the **[____ school(s)]** participated in NYSERDA's Energy $mart Focus on Institutions**]** program, specifically the benchmarking component, with formal report(s) issued on **[specify date(s)]** . Do you recall that your school(s) was/were benchmarked at this time/these times through the Energy $mart Focus Program?

1. YES
2. YES, CAN CONFIRM SOME OF THE YEARS
3. NO **[REPEAT SCR-2 UNTIL DESIRED PERSON IS ON PHONE, OR THANK AND TERMINATE IF CAN"T GET TO A DESIRED PERSON]]**
96. REFUSED [**REPEAT SCR-2 UNTIL DESIRED PERSON IS ON PHONE, OR THANK AND TERMINATE IF CAN"T GET TO A DESIRED PERSON]]**
97. DON'T KNOW **[REPEAT SCR2 UNTIL DESIRED PERSON IS ON PHONE, OR THANK AND TERMINATE IF CAN"T GET TO A DESIRED PERSON]]**

[READ]: The remainder of this interview will focus only on the [_____ **school(s)]**

GI2. Can you confirm that the total area of conditioned (heated or cooled) interior spaces of the _____ **school** buildings is approximately [xxx] square feet **[obtain from benchmarking report data]**?

1. YES **[SKIP TO GI3]**
2. NO **[SKIP TO GI2a]**

3. DON'T KNOW **[SKIP TO GI3]**

GI2a. Approximately what would you estimate the total area of conditioned interior spaces of the _____ **school** buildings to be?

1. _____ **[ENTER ESTIMATED SQUARE FOOTAGE]**
2. DON'T KNOW **[SKIP TO GI3]**

G13. What is the primary fuel used to heat the **____ school(s)**? **[READ LIST, RECORD ONE]**

1. Natural Gas
2. Steam
3. Electricity
4. Fuel Oil **[THANK AND TERMINATE]**
5. Other **[RECORD AND THANK AND TERMINATE IF NOT NATURAL GAS, STEAM OR ELECTRICITY]**

96. REFUSED
97. DON'T KNOW

GI4. What fuel is used for water heating in your building? **[READ LIST, RECORD ONE]**

1. Natural Gas
2. Steam
3. Electricity
4. Fuel Oil
5. Other **[RECORD]** _____

96. REFUSED
97. DON'T KNOW

[PLEASE READ TO RESPONDENT] There are many types of energy efficiency improvement-related actions that can be taken in buildings. These types of actions can include the installation of specific energy efficiency measures like improvements to the building envelope, lighting, heating and cooling, cooking and refrigeration, water heating, and other building systems. Actions can also include switching to renewable fuel sources such as solar, wind or wood. Finally, actions can include behavioral and maintenance practice changes.

ENERGY EFFICIENCY MEASURES (EE)

[PLEASE READ TO RESPONDENT] For this next part of the interview, I am going to read through a short list of energy using equipment and efficiency measure categories and then I will ask about any specific improvements that may have been made at the **_____ school**. Categories could include: building envelope, lighting, heating and cooling, cooking and refrigeration, water heating, and others. Please remember, the following questions are in response to what you've done **since your school was benchmarked.**

[REMINDER NOTE TO INTERVIEWER: FOR CASES WHERE MULTPLE SCHOOLS WITHIN THE RESPONDENT'S SCHOOL DISTRICT WERE BENCHMARKEED, AND PART OF THE SAMPLE TO BE INTERVIEWED, RECORD SEPARATE ANSWERS, WHERE APPLICABLE FOR EACH SCHOOL]

[NOTE TO INTERVIEWER: PLEASE MAKE NOTE OF EEM DATES THAT FALL OUTSIDE OF AVAILABLE BILLING DATA RANGE]

EE1. Were changes made to improve the efficiency of the **building envelope**?

[IF NECESSARY]

Examples of building envelope efficiency upgrades include adding wall, ceiling, attic, or basement insulation, replacing windows, or sealing cracks to reduce drafts.

1. Yes
2. No **[SKIP TO EE2.]**
96. REFUSED **[SKIP TO EE2.]**
97. DON'T KNOW **[SKIP TO EE2]**

I am going to read a list of specific building envelope efficiency improvements. Please let me know if any of these improvements were made to your building and the percent of conditioned floor space of the building that was affected. For example, if the entire attic was insulated, then the percent of floor space affected would be 100%. Also, I would like you to provide a best estimate as to the month and year of the improvement's completion. If the improvement was done in phases, over time, please note the month and year for each phase's completion.

EE1a. Were improvements made to attic or ceiling insulation?

1. YES
2. NO **[SKIP TO EE1b]**
96. REFUSED **[SKIP TO EE1b]**
97. DON'T KNOW **[SKIP TO EE1b]**

EE1a1. Month or Season: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1a2. Year: _____ **[ENTER VALUE OR MULTIPLE VALUE IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1a3. Percent of total conditioned floor space that was impacted: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE1a4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE1b. Were improvements made to wall insulation?

1. YES

2. NO **[SKIP TO EE1c]**

96. REFUSED **[SKIP TO EE1c]**

97. DON'T KNOW **[SKIP TO EE1c]**

EE1b1. Month**[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE1b2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1b3. Percent of total conditioned floor space that was impacted: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1b4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE1c. Were improvements made to <u>foundation or basement</u> insulation?

1. YES

2. NO **[Skip to EE1d]**

96. REFUSED **[Skip to EE1d]**

97. DON'T KNOW **[Skip to EE1d]**

EE1c1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1c2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1c3. Percent of total conditioned floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE1c4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE1d. Were existing windows or doors replaced with high efficiency ones?

1. YES

2. NO **[Skip to EE1e]**

96. REFUSED **[Skip to EE1e]**

97. DON'T KNOW **[Skip to EE1e]**

EE1d1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1d2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1d3. Percent of conditioned floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE1d4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE1e. Were drafts reduced by sealing cracks and repairing holes?

1. YES
2. NO **[Skip to EE1f]**
96. REFUSED **[Skip to EE1f]**
97. DON'T KNOW **[Skip to EE1f]**

EE1e1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1e2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1e3. Percent of the total conditioned floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE1e4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE1f. Were any other improvements made to the building envelope?

1. YES [Please describe: _____]
2. NO **[Skip to EE1g]**
96. REFUSED **[Skip to EE1g]**
97. DON'T KNOW **[Skip to EE1g]**

EE1f1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1f2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1f3. Percent of the total conditioned floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE1f4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE1g. **[IF ALL RESPONSES TO EE1a – EE1f ARE "NO", "REFUSED", or "DON'T KNOW", THEN CONFIRM, OTHERWISE, SKIP TO EE2]** Just to confirm, there were no improvements made to the building envelope in the building since it was benchmarked?

1. YES
2. NO [Please specify: _____]
96. REFUSED
97. DON'T KNOW

EE2. Were changes made to improve the efficiency of the **lighting systems** in the **_____ school** since participating in the benchmarking component of NYSERDA's Energy $mart Focus Program?

[IF NECESSARY]

Examples of efficiency improvements include replacing fixtures or adding occupancy sensors.

1. YES
2. NO **[SKIP TO EE3]**
96. REFUSED **[SKIP TO EE3]**
97. DON'T KNOW **[SKIP TO EE3]**

EE2a. Were existing interior light fixtures replaced with more efficient fixtures?

1. YES
2. NO **[Skip to EE2b]**
96. REFUSED **[Skip to EE2b]**
97. DON'T KNOW **[Skip to EE2b]**

EE2a1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2a2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2a3. Percent of the total interior lighting that was replaced: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE2a4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE2b. Were existing exterior light fixtures replaced with more efficient fixtures?

1. YES
2. NO **[Skip to EE2c]**
96. REFUSED **[Skip to EE2c]**
97. DON'T KNOW **[Skip to EE2c]**

EE2b1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2b2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2b3. Percent of the total exterior lighting that was replaced: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE2b4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE2c. Were occupancy, motion or daylight sensors added?

1. YES
2. NO **[Skip to EE2d]**
96. REFUSED **[Skip to EE2d]**
97. DON'T KNOW **[Skip to EE2d]**

EE2c1. Type of sensor:**_____ [ENTER SENSOR TYPE]**

EE2c2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2c3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2c4. Percent of the total lighting that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE2c5. Additional Comments [**RECORD IF PROVIDED]**

_____

EE2d. Were unneeded lamps or fixtures removed?

1. YES
2. NO **[Skip to EE2e]**
96. REFUSED **[Skip to EE2e]**
97. DON'T KNOW **[Skip to EE2e]**

EE2d2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2d2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2d3. Percent of total lamps or fixtures that were removed: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE2d4. Additional Comments [**RECORD IF PROVIDED]**

_____

EE2e. Were any other improvements to the lighting systems made?

1. YES [Please describe: _____]
2. NO **[Skip to EE2f]**
96. REFUSED **[Skip to EE2f]**
97. DON'T KNOW **[Skip to EE2f]**

EE2e1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2e2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2e3. Percent of the total lighting that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE2e4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE2f. **[IF ALL RESPONSES TO EE2a – EE2e ARE "NO", "REFUSED", or "DON'T KNOW", THEN CONFIRM, OTHERWISE, SKIP TO EE3]** Your responses indicated there were no efficiency improvements made to the lighting system in the building since it was benchmarked. Is this correct?

1. YES
2. NO [Please specify: _____]
96. REFUSED
97. DON'T KNOW

EE3. Was the efficiency of the **heating, cooling, ventilation or water heating systems** improved at the **_____ school**?

[IF NECESSARY]

Examples of efficiency improvements include replacing space heating or cooling equipment, or water heating equipment with a more efficient model, repairing or improving ventilation systems, or adding programmable thermostats or an energy management system.

1. YES
2. NO **[SKIP TO EE4.]**
96. REFUSED **[SKIP TO EE4.]**
97. DON'T KNOW **[SKIP TO EE4.]**

EE3a. Was the space heating system replaced with a more efficient system?

1. YES
2. NO **[Skip to EE3b]**
96. REFUSED **[Skip to EE3b]**
97. DON'T KNOW **[SKIP to EE3b]**

EE3a1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3a2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3a3. Percent of the total conditioned floor space that was impacted: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3a4. Additional Comments **[RECORD IF PROVIDED]**

EE3b. Were water heaters replaced with more efficient models?

1. YES
2. NO **[SKIP TO EE3c]**
96. REFUSED **[SKIP TO EE3c]**
97. DON'T KNOW **[SKIP TO EE3c]**

EE3b1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3b2. Year: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW**]

EE3b3. Percent of the total water heating that was impacted: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3b4. Additional Comments **[RECORD IF PROVIDED]**

EE3c. Were the building's air conditioning systems or units replaced with more efficient systems?

1. YES
2. NO **[SKIP TO EE3d]**
96. REFUSED **[SKIP TO EE3d]**
97. DON'T KNOW **[SKIP TO EE3d]**

EE3c1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3c2. Year: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3c3. Percent of the total air conditioned floor area that was impacted: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3c4. Additional Comments **[RECORD IF PROVIDED]**

EE3d. Did you add programmable thermostats to control heating and/or cooling use?

1. YES – Both heating and cooling controls
2. YES – Heating controls only
3. YES – Cooling controls only

4. NO **[SKIP TO EE3e]**

96. REFUSED **[SKIP TO EE3e]**

97. DON'T KNOW **[SKIP TO EE3e]**

EE3d1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3d2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3d3. Percent of building's heating floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3d4. Percent of building's cooling floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3d5. Additional Comments **[RECORD IF PROVIDED]**

EE3e. Was an energy management system added to control heating and/or cooling use?

1. YES – For both heating and cooling
2. YES – Heating only
3. YES – Cooling only
4. NO **[SKIP TO EE3f]**
96. REFUSED **[SKIP TO EE3f]**
97. DON'T KNOW **[SKIP TO EE3f]**

EE3e1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3e2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3e3. Percent of building's heating floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3e4. Percent of building's cooling floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3e5. Additional Comments **[RECORD IF PROVIDED]**

EE3f. Was work done to improve the efficiency of your building's ***ventilation*** systems including sealing any ductwork, adding ductwork insulation or adding other controls, such as demand controlled ventilation?

1. YES
2. NO **[SKIP TO EE3g]**
96. REFUSED **[SKIP TO EE3g]**

97. DON'T KNOW **[SKIP TO EE3g]**

EE3f1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3f2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3f3. Percent of the total conditioned floor space affected: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3f4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE3g. Were any other improvements made to the heating, cooling, water heating or ventilation systems, including changing fuel sources?

1. YES [Please describe**: _____**]
2. NO **[SKIP TO EE3h]**
96. REFUSED **[SKIP TO EE3h]**
97. DON'T KNOW **[SKIP TO EE3h]**

EE3g1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3g2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3g3. Percent of total conditioned floor space impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3g4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE3h. **[IF ALL RESPONSES TO EE3a – EE3g ARE "NO", "REFUSED" or "DON'T KNOW" THEN CONFIRM, OTHERWISE, SKIP TO EE4]** Your previous responses indicate that no efficiency improvements were made to the heating, cooling or water heating systems in this building since it was benchmarked. Is this correct?

1. YES
2. NO [Please specify: _____]
96. REFUSED
97. DON'T KNOW

EE4. Was work done to improve the efficiency of the **cooking or refrigeration** systems in the **_____ school**?

[IF NECESSARY]

Examples of efficiency improvements include installing new refrigeration units or stoves to replace inefficient models or adding an economizer to an existing refrigeration unit.

1. YES
2. NO **[SKIP TO EE5.]**
96. REFUSED **[SKIP TO EE5.]**
97. DON'T KNOW **[SKIP TO EE5.]**

EE4a. Was one or more refrigerators replaced with a more efficient unit?

1. YES
2. NO **[SKIP TO EE4b]**
96. REFUSED **[SKIP TO EE4b]**
97. DON'T KNOW **[SKIP TO EE4b]**

EE4a1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4a2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4a3. Percent of all refrigerators that were replaced: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE4a4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE4b. Was one or more freezers replaced with a more efficient unit?

1. YES
2. NO **[SKIP TO EE4c]**
96. REFUSED **[SKIP TO EE4c]**
97. DON'T KNOW **[SKIP TO EE4c]**

EE4b1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4b2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4b3. Percent of all freezers that were replaced: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE4b4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE4c. Was an economizer, ECM fan motor, or control added to an existing walk-in refrigerator or walk-in freezer?

1. YES
2. NO **[SKIP TO EE4d]**
96. REFUSED **[SKIP TO EE4d]**
97. DON'T KNOW **[SKIP TO EE4d]**

EE4c1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4c2. Year: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4c3. Percent of equipment that was impacted: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE4c4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE4d. Was one or more cooking stoves replaced with a more efficient unit?

1. YES
2. NO **[SKIP TO EE4e]**
96. REFUSED **[SKIP TO EE4e]**
97. DON'T KNOW **[SKIP TO EE4e]**

EE4d1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4d2. Year: _____ [**ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4d3. Percent of all cooking equipment that was replaced: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE4d4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE4e. Was one or more dishwashers replaced with a more efficient unit?

1. YES
2. NO **[SKIP TO EE4f]**
96. REFUSED **[SKIP TO EE4f]**
97. DON'T KNOW **[SKIP TO EE4f]**

EE4e1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4e2. Year: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4e3. Percent of all dishwashers that were replaced: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE4e4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE4f. Did you make any other improvements to the cooking or refrigeration systems?

1. YES [Please describe: _____]
2. NO **[SKIP TO EE4g]**
96. REFUSED **[SKIP TO EE4g]**
97. DON'T KNOW **[SKIP TO EE4g]**

EE4f1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4f2. Year: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4f3. Percent of equipment that was impacted: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE4f4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE4g. **[IF ALL RESPONSES TO EE4a – EE4f ARE "NO", "REFUSED" or "DON'T KNOW" THEN CONFIRM, OTHERWISE SKIP TO EE5]** Your previous responses indicate that no efficiency improvements were made to the refrigeration or cooking systems in this building since it was benchmarked. Is this correct?

1. YES
2. NO, [Please specify: _____]
96. REFUSED
97. DON'T KNOW

EE5. There are a variety of **other types of efficiency improvements** that may apply to your building, such as replacing motors, pumps or office equipment. Please let me know if any of these other upgrades were made since your school was benchmarked, the approximate month and year of the installation and the percentage of the equipment that was affected. For example, if the building has fifty computers and ten monitors were replaced with efficient units, then the percent affected would be 20%.

EE5a. Was office equipment replaced with more efficient equipment?

1. YES

2. NO **[SKIP TO EE5b]**

96. REFUSED **[SKIP TO EE5b]**

97. DON'T KNOW **[SKIP TO EE5b]**

EE5a1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE5a2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE5a3. Percent of all office equipment that was replaced: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE5a4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE5b. Were any other energy efficiency systems, control or equipment, including vending machines installed in the **_____** school?

1. YES [Please describe: _____]

2. NO **[SKIP TO EE6]**

96. REFUSED **[SKIP TO EE6]**

97. DON'T KNOW **[SKIP TO EE6]**

EE5b1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE5b2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE5b3. Percent of equipment that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE5b4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE6. **[IF "YES" TO ANY OF EE1, EE2, EE3, EE4, or EE5]** Thinking back to all of the energy efficiency measure just discussed (from building envelop, to office equipment and anything in between), were any of these measures necessary to replace equipment that had failed or was about to fail?

1. YES [Please identify the equipment: _____]

2. NO

96. REFUSED

97. DON'T KNOW

EE7. **[IF "YES" TO ANY OF EE1, EE2, EE3, EE4, EE5]** Did you receive financial incentives for any of these measures?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

EE8. Has the **_____ school** switched some of its energy use to a renewable technology like a solar water heater, solar photovoltaic, wind, wood, wood chips or pellets?

1. YES [please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

BEHAVIORAL CHANGES (BC)

[PLEASE READ TO RESPONDENT] In addition to actual energy efficiency measures that can be installed, there are many types of behavioral and operational changes that can be made with the intention to reduce energy use. Some of these need to be done by building maintenance personnel, and may include changing the programming of the energy management system, or lowering the temperature of the water heater or modifying maintenance practices. Some may be implemented by other staff members in your school, such as turning off lights or computers when rooms are not in use, keeping windows closed when the air conditioning or heating is in use, or manually lowering the thermostat set point.

[NOTE TO INTERVIEWER: PLEASE MAKE NOTE OF BC IMPLEMENTATION DATES THAT FALL OUTSIDE OF AVAILABLE BILLING DATA RANGE]

This next set of questions is about operational **changes to building systems** that need to be done by building maintenance personnel.

BC1. Since the time the **_____ school** was benchmarked, did maintenance staff change any of the settings on equipment in the building to reduce energy consumption?

1. YES
2. NO **[SKIP TO BC2.]**
96. REFUSED **[SKIP TO BC2.]**
97. DON'T KNOW **[SKIP TO BC2.]**

BC1a Were the modifications to building settings successful in reducing energy?

1. YES
2. NO [SKIP TO BC2]
96. REFUSED

97. DON'T KNOW

BC1a1 Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC1b. Were the **heating** control settings or heating-related energy management systems changed to reduce energy use?

1. YES [Please describe: _____]
2. NO [SKIP TO BC1c]
3. NOT APPLICABLE [SKIP TO BC1c]
96. REFUSED [SKIP TO BC1c]
97. DON'T KNOW [SKIP TO BC1c]

BC1b1 Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC1b2. Year: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC1b3 . Additional Comments **[RECORD IF PROVIDED]**

_____

BC1c. Were the **cooling** control settings or cooling-related energy management systems changed to reduce energy use?

1. YES [Please describe: _____]
2. NO [SKIP TO BC1d]
3. NOT APPLICABLE [SKIP TO BC1d]
96. REFUSED [SKIP TO BC1d]
97. DON'T KNOW [SKIP TO BC1d]

BC1c1 Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC1c2. Year: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC1c3 . Additional Comments **[RECORD IF PROVIDED]**

_____

BC1d. Were temperature set points for hot water changed to reduce energy use?

1. YES
2. NO [SKIP TO BC1e]
3. NOT APPLICABLE [SKIP TO BC1e]

96. REFUSED [SKIP TO BC1e]

97. DON'T KNOW [SKIP TO BC1e]

BC1d1 Month **[or prompt with "Season" if respondent cannot recall a specific month]**: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC1d2. Year: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC1d3 . Additional Comments **[RECORD IF PROVIDED]**

_____

BC1e. Were any other building system settings modified to reduce energy use?

1. YES – Heating related [Please describe: _____]
2. YES – Cooling related [Please describe: _____]
3. YES – Other [Please describe: _____]
4. NO
5. NOT APPLICABLE
96. REFUSED
97. DON'T KNOW

BC1e1 . Additional Comments **[RECORD IF PROVIDED]**

_____

The next questions are about **maintenance practices** that may have changed since you received the Benchmarking report. Examples of this type of change include increased frequency of cleaning or changing HVAC filters.

BC2. Have the maintenance schedules or practices at **the _____school** been changed to reduce energy use?

1. YES
2. NO **[SKIP TO BC3]**
96. REFUSED **[SKIP TO BC3]**
97. DON'T KNOW **[SKIP TO BC3]**

BC2a. Were the changes to maintenance practices successful in reducing energy use?

1. YES
2. NO [SKIP TO BC3]
96. REFUSED [SKIP TO BC2b]
97. DON'T KNOW [SKIP TO BC2b]

BC2a1. Additional Comments **[DO NOT PROMPT - RECORD ONLY IF PROVIDED]**

_____

BC2b. Does maintenance staff change the air filters on HVAC equipment more often?

1. YES – Heating system
2. YES – Cooling system
3. NO [SKIP TO BC2c]
4. NOT APPLICABLE [SKIP TO BC2c]
96. REFUSED [SKIP TO BC2c]
97. DON'T KNOW [SKIP TO BC2c]

BC2b1 . Additional Comments **[RECORD IF PROVIDED]**

_____

BC2c. Does maintenance staff clean heat exchangers on heating, cooling or refrigeration equipment more often?

1. YES – Heating equipment
2. YES – Cooling equipment
3. YES – Refrigeration equipment
4. NO [SKIP TO BC2c]
5. NOT APPLICABLE [SKIP TO BC2d]
96. REFUSED [SKIP TO BC2d]
97. DON'T KNOW [SKIP TO BC2d]

BC2c1. Additional Comments **[RECORD IF PROVIDED]**

_____

BC2d. Has maintenance staff changed any other practices to reduce energy use?

1. YES [Please specify: _____]
2. NO [SKIP TO BC2e]
96. REFUSED [SKIP TO BC2e]
97. DON'T KNOW [SKIP TO BC2e]

BC2d1 . Additional Comments **[RECORD IF PROVIDED]**

_____

BC2e. **[IF "YES" TO ANY BC2a to BC2d]** Do you have a system in place to remind maintenance staff to continue these practices?

1. YES

2. NO
96. REFUSED
97. DON'T KNOW

BC2e1.Additional Comments **[RECORD IF PROVIDED]**

_____

The next category is **behavioral changes that are implemented by other staff members**, such as turning off lights or computers when rooms are not in use, keeping windows closed when the air conditioning or heating is in use or manually lowering the thermostat set point.

BC3. Was staff provided any oral or written instructions to reduce energy use through behavioral modifications since participating in the benchmarking component of NYSERDA's Energy $mart Focus Program?

1. YES – Both oral and written instructions
2. YES – Written instructions only
3. YES – Oral instructions only
4. NO **[SKIP TO BC4]**
96. REFUSED **[SKIP TO BC4]**
97. DON'T KNOW **[SKIP TO BC4]**

BC3a. Did staff follow through with the behavioral changes ?

1. YES
2. YES, But only some
3. NO [SKIP TO BC4]
96. REFUSED
97. DON'T KNOW

BC3a1.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3b. Was staff instructed to turn off lights when rooms are not in use?

1. YES
2. NO [SKIP TO BC3c]

96. REFUSED [SKIP TO BC3c]
97. DON'T KNOW [SKIP TO BC3c]

BC3a1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC3b2.Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC3b3.Additional Comments **[RECORD IF PROVIDED]**

_____

BC3c. Was staff instructed to use existing bi-level switching in rooms when possible?

1. YES
2. NO [SKIP TO BC3d]
3. NOT APPLICABLE
96. REFUSED [SKIP TO BC3d]
97. DON'T KNOW [SKIP TO BC3d]

BC3c1.Additional Comments **[RECORD IF PROVIDED]**

_____

BC3d. Was staff instructed to manually lower the thermostat setting during the heating season or raise the setting during the cooling season?

1. YES – Heating season lower
2. YES – Cooling season raise
3. NO [SKIP TO BC3e]
96. REFUSED [SKIP TO BC3e]
97. DON'T KNOW [SKIP TO BC3e]

BC3d1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC3d2.Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC3d3.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3e. Was staff instructed to keep windows closed during the heating season or the cooling season when the air conditioner is on?

1. YES – Both heating and cooling season
2. YES – Heating season only

3. YES – Cooling season only
4. NO [SKIP TO BC3f]
3. NOT APPLICABLE [SKIP TO BC3f]
96. REFUSED [SKIP TO BC3f]
97. DON'T KNOW [SKIP TO BC3f]

BC3e1.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3f. Was staff instructed to lower the window shades to block solar gain during the cooling season?

1. YES
2. NO [SKIP TO BC3g]
3. NOT APPLICABLE [SKIP TO BC3g]
96. REFUSED [SKIP TO BC3g]
97. DON'T KNOW [SKIP TO BC3g]

BC3f1.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3g. Was staff instructed to keep obstructions away from heaters and cooling vents to ensure that air flow is not impeded?

1. YES – Heaters and cooling vents
2. YES – Heater only
3. YES – Cooling vents only
4. NO [SKIP TO BC3h]
4. NOT APPLICABLE
96. REFUSED [SKIP TO BC3h]
97. DONT KNOW [SKIP TO BC3h]

BC3g1.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3h. Was kitchen staff instructed to ensure the dishwasher loads are completely full?

1. YES
2. NO [SKIP TO BC3i]
96. REFUSED [SKIP TO BC3i]
97. DON'T KNOW [SKIP TO BC3i]

BC3h1.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3i. Was information technology or computer staff instructed to ensure that energy-saving modes were activated in all computers and monitors in the building?

1. YES
2. NO [SKIP TO BC3j]
3. NOT APPLICABLE
96. REFUSED [SKIP TO BC3j]
97. DON'T KNOW [SKIP TO BC3j]

BC3i1.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3j. Was staff instructed to ensure that all computers, monitors and related equipment are physically turned off when not in use, or at the end of each day?

1. YES
2. NO [SKIP TO BC3k]
96. REFUSED [SKIP TO BC3k]
97. DON'T KNOW [SKIP TO BC3k]

BC3i1.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3k. Were any other behavioral modifications made in the building?

1. YES [Please describe: _____]
2. NO [SKIP TO BC3l]
96. REFUSED [SKIP TO BC3l]
97. DON'T KNOW [SKIP TO BC3l]

BC3k1.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3l. **[IF "YES" TO ANY BC3b-BC3k]** Do you have a system in place to remind staff to continue with these practices?

1. YES [Please describe: _____]
2. NO

96. REFUSED
97. DON'T KNOW

BC3l1.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC4. I'm going to read you a number of **additional behavioral and operational changes** that may have been made since participating in the benchmarking component of NYSERDA's Program. For each item, please say whether, or not it was done. Did the **_____ school**…

1. YES
2. NO
3. PLANNED OR IN PROCESS

96. REFUSED
97. DON'T KNOW

BC4a1-BC4h1.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC4a. Make a pledge to reduce energy?

BC4b. Set an energy reduction goal?

BC4c. Meet an energy reduction goal?

BC4d. Form an Energy Team or Committee?

BC4e. Measure reduction in energy use on a periodic basis?

BC4f. Conduct additional benchmarking after the end of NYSERDA' program?

BC4g. Review the purchasing standards for new equipment?

BC4h. Were any other behavioral or operational changes implemented? [IF YES, Please specify: _____]

Self Reported Information (SR)

1. SR1. Has the **_____ school** *ever* participated in any other NYSERDA programs? Yes
2. NO **[SKIP TO PI SECTION]**

For the next question, I'm going to name a number of NYSERDA programs. For each program, please indicate whether the **_____ school** has received services through the program. If you have received program services please provide a brief description of any energy efficiency or energy reduction measures taken under that program. First is…

SR1a. Flex Tech?

1. YES [Please describe services received or measures installed through the program: _____]
2. NO
96. REFUSED

97. DON'T KNOW

SR1b. Energy Advisor?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

SR1c. Existing Facilities Program?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

SR1d. New Construction Program?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

SR1e. Peak Load Reduction Program?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

SR1f. Energy $mart Offices Program?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

SR1g. Energy $mart Photovoltaic (PV) or Solar-Electric System Incentive Program?

1. YES [Please describe: _____]
2. NO

96. REFUSED
97. DON'T KNOW

SR1h. New York State Clean Air School Bus Program?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

SR1i. Energy $mart Students Program?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

SR1j. School Power……..Naturally?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

[IF THERE ARE NO "YES" RESPONSES TO AT LEAST ONE OF THE SR1a – SR1j QUESTIONS, ASK SR1k, OTHERWISE SKIP TO PI SECTION]

SR1k. Please identify the NYSERDA Program(s) that your school participated in.

1. [RECORD PROGARM NAME: _____]
97. DON'T KNOW

PROGRAM IMPACT (PI)
[ASK FOLLOWING ONLY IF AT LEAST ONE RESPONSE TO EE1 THROUGH EE5 = "YES." OR BC1 THROUGH BC4 = "YES"]

PI1. On a scale of 0 to 4, where 0 means "No Influence" and 4 means "Very Influential", how would you rate the influence that the benchmarking process and report(s) your school received through NYSERDA's Energy $mart Focus program has on your school's decision to do the following: **[INSERT ITEM – ROTATE LIST]**

0. NO INFLUENCE
1.

2. NEUTRAL

3.

4. VERY INFLUENTIAL

96. REFUSED

97. DON'T KNOW

PI1a. [ASK IF EE1="YES"] Improve the efficiency of the building envelope?

PI1b. [ASK IF EE2="YES"] Install efficient lighting?

PI1c. [ASK IF EE3="YES"] Improve the efficiency of the heating, cooling or water heating system?

PI1d. [ASK IF EE4="YES"] Improve the efficiency of the cooking, dishwashing or refrigeration equipment?

PI1e. [ASK IF EE5="YES"] Improve the efficiency of office or other equipment?

PI1f. [ASK IF BC1="YES"] Get maintenance staff to change the control settings for existing HVAC systems?

PI1g. [ASK IF BC2="YES"] Improve maintenance schedules of building systems and equipment?

PI1h. [ASK IF BC3="YES"] Reduce energy use through behavioral changes adopted by other building staff?

PI2. On a scale of 0 to 4, where 0 means "Very Unlikely" and 4 means "Very Likely" how likely would you have been to install similar energy efficiency measures and adopt similar behavioral and operational changes related to energy efficiency without the benchmark report? Specifically how likely would you have been to **[INSERT ITEM – ROTATE LIST]**

0. VERY UNLIKELY

1.

2. NEUTRAL

3.

4. VERY LIKELY

96. REFUSED

97. DON'T KNOW

PI3a. [ASK IF EE1A="YES"] Improve the efficiency of the building envelope?

PI3b. [ASK IF EE2A="YES"] Install efficient lighting?

PI3c. [ASK IF EE3A="YES"] Improve the efficiency of the heating, cooling or water heating system?

PI3d. [ASK IF EE4A="YES"] Improve the efficiency of the cooking, dishwashing or refrigeration equipment?

PI3e. [ASK IF EE5A="YES"] Improve the efficiency of office or other equipment?

PI3g. [ASK IF BC2a="YES"] Improve maintenance schedules or control of building systems and equipment?

PI3h. [ASK IF BC3a="YES"] Reduce energy use through behavioral changes adopted by other building staff?

[ASK OF ALL PARTICIPANTS]

PI3. What is the title of the person who had the most influence on the decision for your **_____ school** to participate in the benchmarking process of the NYSERDA Focus program?

[RECORD ALL THAT APPLY]

1. Administration/principal
2. School Board
3. School Employee (such as Facilities or Buildings and Grounds Department Head)
4. Supervisory Union
5. Municipal government
6. Other, please specify _____
96. REFUSED
97. DON'T KNOW

PI3a. I'm going to read you a number of reasons the **_____ school** might have been benchmarked. Please indicate whether each reason contributed to the **[ENTER RESPONSE TO PI3]** decision to have the school benchmarked? **[INSERT ITEM – ROTATE LIST] [RECORD ALL THAT APPLY]**

1. YES
2. NO
96. REFUSED
97. DON'T KNOW

PI3a1. Your school district had already benchmarked other buildings

PI3a2. To compare the school's energy use with similar schools or to other schools within the district.

PI3a3. To prioritize energy reduction projects within the school district

PI3a4. To determine if energy reduction projects were necessary at the property

PI3a5. Benchmarking was recommended by an outside party

PI3a6. Other **[PLEASE RECORD]**_____

[ASK IF MULTIPLE RESPONSES WERE GIVEN IN PI4b]

PI3b1. Which reason was the most influential in the decision to benchmark the _____ school? **[PLEASE RECORD ONE]**

1. Your school district had already benchmarked other buildings
2. To compare the school's energy use with similar schools or to other schools within the district.

3. To prioritize energy reduction projects within the school district
4. To determine if energy reduction projects were necessary at the property
5. Benchmarking was recommended by an outside party
6. Other
96. REFUSED
97. DON'T KNOW

[ASK FOLLOWING ONLY IF ENERGY EFFICIENCY MEASERES WERE INSTALLED AT THE BUILDING - EE1a, EE2a, EE3a, EE4a OR EE5a = "YES" OR BC1, BC2, BC3 OR BC4 = "YES"]

PI4. What is the title of the person who made the decision for your school [IF ANY EE=YES to install the energy efficiency measures] or [IF ANY BC = YES] to implement behavior or operational changes at this benchmarked building?

[RECORD ALL THAT APPLY]

1. Administration/principal
2. School Board
3. Facilities or Buildings and Grounds Department Head
4. Other school employee, please specify _____
5. Supervisory Union
6. Municipal government
7. Other, please specify _____
96. REFUSED
97. DON'T KNOW

[ASK OF ALL PARTICIPANTS]

PI4a. Is a written recommendation required to get a decision to install any energy efficiency measures or to implement behavioral or operational changes at this benchmarked building?

1. YES [Please describe who is responsible for producing the recommendation: _____]
2. NO
96. REFUSED
97. DON'T KNOW

PI4b. There may be many different types of information that are used to capture the attention of the **[ENTER RESPONSE TO PI4 OR PI4a]** to a point where they seriously consider taking actions to increase energy efficiency. On a scale of 0 to 4 where 0 means the benchmarking is "Not At All Important" and 4 means the benchmarking is "Very Important", how important was the

benchmarking in getting them to seriously consider taking energy efficiency improvement actions at the **_____ school**?

0. NOT AT ALL IMPORTANT
1.
2. NEUTRAL
3.
4. VERY IMPORTANT
96. REFUSED
97. DON'T KNOW

[ASK FOLLOWING ONLY IF ENERGY EFFICIENCY MEASERES WERE INSTALLED OR BEHAVIOR CHANGES IMPLEMENTED AT THE BUILDING - EE1a, EE2a, EE3a, EE4a OR EE5a = "YES" OR BC1, BC2, BC3, OR BC4 = "YES"]

PI4c. I'm going to read you number factors that could contribute to a decision to install energy efficiency measures or implement behavioral/operational changes intended to reduce energy use. Please indicate whether each of the following were contributing factors to the **[ENTER RESPONSE TO PI4 OR PI4a]**'s decision to install energy efficiency measures or implement behavioral or operational changes at the benchmarked building?**[INSERT ITEM – ROTATE LIST] [RECORD ALL THAT APPLY] First is… Next is…**

1. YES
2. NO
96. REFUSED
97. DON'T KNOW

PI4c1. It will reduce energy use

PI4c2. It will reduce operational costs

PI4c3. It will reduce greenhouse gas emissions

PI4c4. Incentives were available that lowered initial costs

PI4c5. Are there any other factors that contributed to the decision to install energy efficiency measures or implement behavioral changes? IF YES
[SPECIFY]_____

[ASK IF MULTIPLE YES RESPONSES WERE GIVEN IN PI4c]

PI5. Which of the factors you just mentioned was the most influential in the decision to install energy efficiency measures or implement behavioral/operational changes? **[PLEASE RECORD ONE]**

1. Reduce energy use
2. Reduce operational costs
3. Reduce green house gas emissions
4. Incentives were available that lowered initial costs

5. Other
96. REFUSED
97. DON'T KNOW

OTHER PROGRAM IMPACTS (OI)

Next, I'm going to name a number of efficiency programs that are *not* implemented by NYSERDA. For each type of program, please indicate whether or not the **____ school** has participated. If you have participated in the program, please provide a very brief description of any energy efficiency or energy reduction actions taken under that program, along with the approximate year and month that measures were installed.

OI1a. Has your **school** participated in any energy efficiency programs delivered by your local electric or gas utility?

1. YES [Please describe program name and actions taken: _____]
2. NO **[SKIP TO OI1b]**
96. REFUSED **[SKIP TO OI1b]**
97. DON'T KNOW **[SKIP TO OI1b]**

OI1a1. Year: [Please specify: _____]

96. REFUSED
97. DON'T KNOW

OI1a2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____]

96. REFUSED
97. DON'T KNOW

OI1b. Has your **school** participated in any energy efficiency programs delivered by the federal government (including tax incentives)?

1. YES [Please describe program name and actions taken: _____]
2. NO **[SKIP TO OI1c]**
96. REFUSED **[SKIP TO OI1c]**
97. DON'T KNOW **[SKIP TO OI1c]**

OI1b1. Year: [Please specify: _____]

96. REFUSED
97. DON'T KNOW

OI1b2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____]

96. REFUSED

97. DON'T KNOW

OI1c. Has your **school** participated in any energy efficiency programs delivered by your municipal government (including tax incentives)?

1. YES [Please describe program name and actions taken: _____]

2. NO **[SKIP TO OI1d]**

96. REFUSED **[SKIP TO OI1d]**

97. DON'T KNOW **[SKIP TO OI1d]**

OI1c1. Year: [Please specify: _____]

96. REFUSED

97. DON'T KNOW

OI1c2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____]

96. REFUSED

97. DON'T KNOW

OI1d. Are there any other non-NYSERDA programs that I have not already mentioned in which your school has participated?

1. YES [Please describe program name and actions taken: _____]

2. NO **[SKIP TO OI2]**

96. REFUSED **[SKIP TO OI2**

97. DON'T KNOW **[SKIP TO OI2]**

OI1d1. Year: [Please specify: _____]

96. REFUSED

97. DON'T KNOW

OI1d2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____]

96. REFUSED

97. DON'T KNOW

[ASK FOLLOWING ONLY IF AT LEAST ONE RESPONSE TO OI1a THROUGH OI1d = "YES"]

OI2. Did any of the programs we just discussed have any influence on your decision to benchmark?

1. YES
2. NO **[SKIP TO OI3]**
96. REFUSED **[SKIP TO OI3]**
97. DON'T KNOW **[SKIP TO OI3]**

OI2a. On a scale of 0 to 4, where 0 means "No Influence" and 4 means "Very Influential" how would you rate these program's influence on the decision **to benchmark** your **school** through NYSERDA's Focus Program?

0. NO INFLUENCE
1.
2. NEUTRAL
3.
4. VERY INFLUENTIAL
96. REFUSED
97. DON'T KNOW

[ASK FOLLOWING ONLY IF AT LEAST ONE RESPONSE TO OI1a THROUGH OI1d = "YES"]

OI3. Did any of the programs we just discussed have any influence on the decision **to take energy efficiency improvement actions, including behavioral and operational changes** at your school?

1. YES
2. NO **[SKIP TO NP SECTION]**
96. REFUSED **[SKIP TO NP SECTION]**
97. DON'T KNOW **[SKIP TO NP SECTION]**

OI3a. On a scale of 0 to 4, where 0 means "No Influence" and 4 means "Very Influential" how would you rate these program's influence on the decision **to take energy efficiency improvement actions, including behavioral and operational changes** at your school**?**

0. NO INFLUENCE
1.
2. NEUTRAL

3.

4. VERY INFLUENTIAL

96. REFUSED

97. DON'T KNOW

NON-PROGRAM RELATED CHANGES (NP)

For this final set of questions, I'm going to list a number of potential changes that may have occurred at your building since taking part in NYSERDA's benchmarking process. For each potential change, please indicate whether or not it has been experienced in the **_____ school**. If your school has seen this change, please provide a very brief description of the change along with the approximate year and month that it was experienced.

NP1a. First, has your school experienced an increase in **student** population of at least 10%?

1. YES [Please specify percentage or the student population before and after the change: _____]

2. NO **[SKIP TO NP1c]**

96. REFUSED **[SKIP TO NP1b]**

97. DON'T KNOW **[SKIP TO NP1b]**

NP1a1. In what year did this increase occur? [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF CHANGE OCCURRED OVER TIME**

96. REFUSED

97. DON'T KNOW

NP1a2. In what month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]? [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF CHANGE OCCURRED OVER TIME**

96. REFUSED

97. DON'T KNOW

NP1b. How about a decrease in **student** population of at least 10%?

1. YES [Please specify percentage or the student population before and after the change: _____]

2. NO **[SKIP TO NP1c]**

3. NOT APPLICABLE

96. REFUSED **[SKIP TO NP1c]**

97. DON'T KNOW **[SKIP TO NP1c]**

NP1b1. In what year did this decrease occur: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF CHANGE OCURRED OVER TIME**

96. REFUSED

97. DON'T KNOW

NP1b2. In what month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]? [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF CHANGE OCCURRED OVER TIME**

96. REFUSED

97. DON'T KNOW

NP1c. Has your school changed its hours of operation?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP1d]**

96. REFUSED **[SKIP TO NP1d]**

97. DON'T KNOW **[SKIP TO NP1d]**

NP1c1. In what year did this change occur? [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1c2. In what month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]? [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1d. Has your school had a change in annual schedule, such as increasing summer hours?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP1d]**

3. NOT APPLICABLE

96. REFUSED **[SKIP TO NP1d]**

97. DON'T KNOW **[SKIP TO NP1d]**

NP1d1. In what year did this change occur? [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1d2. In what month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]? [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1e Has there been an addition to the building?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP1e]**

3. NOT APPLICABLE

96. REFUSED **[SKIP TO NP1e]**

97. DON'T KNOW **[SKIP TO NP1e]**

NP1e1. Year: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1e2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1f. Has a section of the building been closed off or demolished?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP1f]**

3. NOT APPLICABLE

96. REFUSED **[SKIP TO NP1f]**

97. DON'T KNOW **[SKIP TO NP1f]**

NP1f1. Year: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1f2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1g. Has there been an addition or removal of a swimming pool?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP1g]**

3. NOT APPLICABLE

96. REFUSED **[SKIP TO NP1g]**

97. DON'T KNOW **[SKIP TO NP1c]**

NP1g1. Year: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1g2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1h. Has the building added or expanded heating, air conditioning or water heating system(s)?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP1h]**

3. NOT APPLICABLE

96. REFUSED **[SKIP TO NP1h]**

97. DON'T KNOW **[SKIP TO NP1h]**

NP1h1. Year: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1h2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1i. How about removal of heating, air conditioning or water heating system(s)?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP1i]**

3. NOT APPLICABLE

96. REFUSED **[SKIP TO NP1i]**

97. DON'T KNOW **[SKIP TO NP1i]**

NP1i1. Year: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1i2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1j. Has there been a change in cooking schedule?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP1j]**

3. NOT APPLICABLE

96. REFUSED **[SKIP TO NP1j]**

97. DON'T KNOW **[SKIP TO NP1j]**

NP1j1. Year: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1j2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1k. Finally, has there been some other change that may have occurred at your building that might impact energy usage?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP2]**

96. REFUSED **[SKIP TO NP2]**

97. DON'T KNOW **[SKIP TO NP2]**

NP1k1. Year: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1k2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

[IF THE SCHOOL DOES NOT REPORT ANY OPERATIONAL CHANGES DURING THE TIME SINCE BENCHMARKING, DOES NOT KNOW OF ANY THAT OCCURRED OR DID NOT IMPLEMENT ANY ENERGY EFFICENCY MEASURES, BUT WE KNOW FROM THE BILLING ANALYSIS THAT A MAJOR CHANGE IN ENERGY USE DID OCCUR, PLEASE USE NP2 TO ASK ABOUT THE SPECIFIC TIME WHEN THE ENERGY USE CHANGED AND ASK FOR AN OPINION ON WHY IT HAPPENED.]

NP2. Our records indicated that there was a substantial **[DROP OR INCREASE]** in energy use around **[MONTH]** of **[YEAR]** at your school. Can you tell us why you think that occurred?

[OPEN ENDED PLEASE RECORD RESPONSE]

96. REFUSED

97. DON'T KNOW

Those are all the questions I have for you today. Thank you very much for your participation in the interview. Have a wonderful day!

Appendix B

CRE Survey Instrument

APPENDIX B.

CRE SURVEY INSTRUMENT

NYSERDA Energy $mart Focus Program

Impact Evaluation Telephone Interview

Benchmarked Commercial Real Estate Participants

(REVISED 7/18/2012)

PURPOSE & BACKGROUND:

The participant telephone interview is primarily designed to assess the specific actions taken to reduce energy use that are caused by the benchmarking effort from NYSERDA's Energy $mart Focus Program either directly, or through NYSERDA's other programs. This information will be used to ascertain the percent of facilities that installed efficiency measures and the impacts of external programs or factors on the decision to conduct benchmarking and the reduction in energy use. The components of the participant telephone interview are listed below:

- General Program Respondent Information (GI)
- Energy Efficiency Measures (EE) - To identify the energy efficiency measures installed since the benchmarking was conducted
- Behavioral Changes (BC) - To determine whether, and what types of behavioral or operational changes were made for the purposes of reducing energy consumption and what types of mechanisms are in place to maintain those changes.
- Self Reported Information (SR) - To obtain self-reported information regarding participation in other NYSERDA programs
- Program Impact (PI) - To assess the role of the NYSERDA Energy $mart Focus Program in the decision to move ahead with the efficiency upgrades
- Other Program Impacts (OI) - To assess the impacts of other utility, federal or other NYSERDA and non-NYSERDA programs on the decision to pursue benchmarking and install efficiency measures.
- Non Program Related Changes (NP) - To assess non-program-related changes that occurred during the analysis period that may affect energy consumption

The table below identifies the number of CREs to be targeted by this instrument:

Site Type	Number
CREs	
CRE initial sample	37
CREs with billing data	25
Total CREs targeted with this instrument	*25*

A total of 25 completes has been targeted for this interview and will be based on available billing data provided directly by two participating property managers.

ASK TO SPEAK WITH NAMED SAMPLE MEMBER. WHEN PERSON COMES TO THE PHONE OR IF PERSON ANSWERING PHONE ASKS WHAT THIS IS ABOUT, READ:

SCREENER FOR CONTACT

SCR-1.

Hello my name is _____ and I'm calling on behalf of NYSERDSA (the New York State Energy Research and Development Authority).

We're calling today because someone at the **[property management company]** has participated in NYSERDA's Energy $mart Focus Program. Our records indicate that your **[_____property]** was benchmarked through the Program. This is the process of comparing your property's energy performance to other buildings that use the industry's best practices.

Are you the person familiar with the benchmarking effort?

2. YES **[SKIP to SCR-3]**
2. NO **[GO to SCR-2]**
96. DON'T KNOW **[GO to SCR-2]**
97. REFUSED **[GO to SCR-2]**

SCR-2. We sent you a letter recently telling you that we would be calling and explaining the research we are doing. Can you provide me with a contact name and phone number for a person in your organization who was involved in the benchmarking?

1. YES – **RESPONDENT PROVIDES NEW CONTACT INFORMATION**

   [RECORD PERSON'S NAME OR NEW CONTACT INFORMATION]

   Name:_____

   Phone:_____

2. YES – **NEW RESPONDENT COMING TO PHONE [SCR-1]**

3. YES **– NEW RESPONDENT NOT AVAILABLE [SCHEDULE CALLBACK]**

   APPOINTMENT DATE AND TIME:_____

4. NO – **RESPONDENT CANNOT PROVIDE ANOTHER CONTACT [LEAVE OUR INFORMATION FOR FOLLOW UP IF THEY THINK OF APPROPRIATE CONTACT THEN THANK AND TERMINATE]**

   GDS CONTACT INFORMATION:

   NAME: **[GIVE THEM YOUR NAME]**

   PHONE: 603-656-0336

96. REFUSED **[THANK AND TERMINATE]**

97. DON'T KNOW **[LEAVE OUR INFORMATION FOR FOLLOW UP IF THEY THINK OF APPROPRIATE CONTACT THEN THANK AND TERMINATE]**

SCR-3. We sent you a letter recently telling you that we would be calling and explaining the research we are doing. We're calling today to ask you some questions about your experience with NYSERDA's Energy $mart Focus Program to help us evaluate how the program might serve people better. This interview could take more than 30 minutes to complete. Your responses are very important and will be kept confidential to the extent permitted by law. Can we discuss the project now, or is there a better time when I can call you back?

1. CAN DISCUSS NOW **[PROCEED TO SECTION GI: General Program Information]**

2. CALL BACK ON:_____ AT TIME:_____

[READ]: Great! Thank you very much! Your feedback is very important to this research and can enable NYSERDA to improve its program for organizations such as yours.

[NOTE TO INTERVIEWER: FOR CASES WHERE MULTIPLE BUILDINGS WERE BENCHMARKED BY THE PROPERTY MANAGER, AND ARE PART OF THE SAMPLE TO BE INTERVIEWED, RECORD SEPARATE ANSWERS, WHERE APPLICABLE FOR EACH BUILDING]

GENERAL PROGRAM INFORMATION (GI)

GI1. Our records indicate that someone at the **[property management company]** participated in NYSERDA's Energy $mart Focus on Institutions program, specifically the benchmarking component. Do you recall that your property was benchmarked through the Energy $mart Focus Program?

4. YES

5. NO **[REPEAT SCR-2 UNTIL DESIRED PERSON IS ON PHONE, OR THANK AND TERMINATE IF CAN"T GET TO A DESIRED PERSON]]**

96. REFUSED [**REPEAT SCR-2 UNTIL DESIRED PERSON IS ON PHONE, OR THANK AND TERMINATE IF CAN"T GET TO A DESIRED PERSON]]**

97. DON'T KNOW **[REPEAT SCR2 UNTIL DESIRED PERSON IS ON PHONE, OR THANK AND TERMINATE IF CAN"T GET TO A DESIRED PERSON]]**

[READ]: The remainder of this interview will focus only on the [_____ **property]**

GI2. Can you confirm that the total area of conditioned (heated or cooled) interior spaces of the **_____ property** is approximately [xxx] square feet **[obtain from benchmarking report data]**?

1 YES **[SKIP TO GI3]**

2 NO **[SKIP TO GI2a]**

3 DON'T KNOW **[SKIP TO GI3]**

GI2a. Approximately what would you estimate the total area of conditioned interior spaces of the _____ property to be?

1 _____ **[ENTER ESTIMATED SQUARE FOOTAGE]**

2 DON'T KNOW **[SKIP TO GI3]**

3 REFUSED **[SKIP TO GI3]**

G13. What is the primary fuel used to heat the **____ property**? **[READ LIST, RECORD ONE]**

1. Natural Gas
2. Steam
3. Electricity
4. Fuel Oil **[THANK AND TERMINATE]**
5. Other **[RECORD AND THANK AND TERMINATE IF NOT NATURAL GAS, STEAM OR ELECTRICITY]**

96. REFUSED

97. DON'T KNOW

GI4. What fuel is used for water heating in the _____ property? **[READ LIST, RECORD ONE]**

1. Natural Gas
2. Steam
3. Electricity
4. Fuel Oil
5. Other **[RECORD] _____**

96. REFUSED

97. DON'T KNOW

GI5. Is the building master metered?

1. YES
2. NO

96. REFUSED

97. DON'T KNOW

GI6. Do tenants pay for their monthly utility bills?

1. YES

2. NO
96. REFUSED
97. DON'T KNOW

[PLEASE READ TO RESPONDENT] There are many types of energy efficiency improvement-related actions that can be taken in buildings. These types of actions can include the installation of specific energy efficiency measures like improvements to the building envelope, lighting, heating and cooling, cooking and refrigeration, water heating, and other building systems. Actions can also include switching to renewable fuel sources such as solar, wind or wood. Finally, actions can include behavioral and maintenance practice changes.

ENERGY EFFICIENCY MEASURES (EE)

[PLEASE READ TO RESPONDENT] For this next part of the interview, I am going to read through a short list of energy using equipment and efficiency measure categories and then I will ask about any specific improvements that may have been made at the **_____property**. Categories could include: building envelope, lighting, heating and cooling, cooking and refrigeration, water heating, and others. Please remember, the following questions are in response to what you've done **since your property was benchmarked.**

[READ IF RESPONSE TO GI5. IS NO] Also please note that we are only interested in efficiency measures that have been completed that would impact the billing data that was provided by your property. If the account you released to NYSERDA only covers shared or common spaces, then we would only be interested in efficiency improvements made in those locations.

[REMINDER NOTE TO INTERVIEWER: FOR CASES WHERE MULTPLE PROPERTIES WERE BENCHMARKEED BY THE PROPERTY MANAGER, AND ARE PART OF THE SAMPLE TO BE INTERVIEWED, RECORD SEPARATE ANSWERS, WHERE APPLICABLE FOR EACH BUILDING]

[NOTE TO INTERVIEWER: PLEASE MAKE NOTE OF EEM DATES THAT FALL OUTSIDE OF AVAILABLE BILLING DATA RANGE AND MAKE NOTE OF PROJECTS THAT ARE COMPLETED IN COMMON SPACES VS IN UNIT FOR BUILDINGS THAT ARE NOT MASTER METERED AND TENENTS PAY UTILITY BILLS]

EE1. Were changes made to improve the efficiency of the **building envelope at your property**?

[IF NECESSARY]

Examples of building envelope efficiency upgrades include adding wall, ceiling, attic, or basement insulation, replacing windows, or sealing cracks to reduce drafts.

1. Yes
2. No **[SKIP TO EE2.]**
96. REFUSED **[SKIP TO EE2.]**
97. DON'T KNOW **[SKIP TO EE2]**

I am going to read a list of specific building envelope efficiency improvements. Please let me know if any of these improvements were made to your property and the percent of conditioned floor space of the property that was affected. For example, if the entire attic was insulated, then the percent of floor space affected would be 100%. Also, I would like you to provide a best estimate as to the month and year of the improvement's completion. If the improvement was done in phases, over time, please note the month and year for each phase's completion.

EE1a. Were improvements made to attic or ceiling insulation at your property?

1. YES
2. NO **[SKIP TO EE1b]**
96. REFUSED **[SKIP TO EE1b]**
97. DON'T KNOW **[SKIP TO EE1b]**

EE1a1. Month [or prompt with "Season" of respondent cannot recall a specific month]: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1a2. Year: _____ **[ENTER VALUE OR MULTIPLE VALUE IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1a3. Percent of total conditioned floor space that was impacted: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE1a4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE1b. Were improvements made to wall insulation **at the property**?

1. YES
2. NO **[SKIP TO EE1c]**
96. REFUSED **[SKIP TO EE1c]**
97. DON'T KNOW **[SKIP TO EE1c]**

EE1b1. Month**[or prompt with "Season" if respondent cannot recall a specific month]**: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE1b2. Year: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1b3. Percent of total conditioned floor space that was impacted: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1b4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE1c. Were improvements made to foundation or basement insulation? 1. YES

2. NO **[Skip to EE1d]**
96. REFUSED **[Skip to EE1d]**

97. DON'T KNOW **[Skip to EE1d]**

EE1c1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1c2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1c3. Percent of total conditioned floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE1c4. Additional Comments **[RECORD IF PROVIDED]**

EE1d. Were existing windows or exterior doors replaced with high efficiency units?

1. YES
2. NO **[Skip to EE1e]**
96. REFUSED **[Skip to EE1e]**
97. DON'T KNOW **[Skip to EE1e]**

EE1d1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1d2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1d3. Percent of conditioned floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE1d4. Additional Comments **[RECORD IF PROVIDED]**

EE1e. Were drafts reduced by sealing cracks and repairing holes?

1. YES
2. NO **[Skip to EE1f]**
96. REFUSED **[Skip to EE1f]**
97. DON'T KNOW **[Skip to EE1f]**

EE1e1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1e2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1e3. Percent of the total conditioned floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE1e4. Additional Comments **[RECORD IF PROVIDED]**

EE1f. Were any other improvements made to the building envelope?

1. YES [Please describe: _____]
2. NO **[Skip to EE1g]**
96. REFUSED **[Skip to EE1g]**
97. DON'T KNOW **[Skip to EE1g]**

EE1f1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1f2. Year: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE1f3. Percent of the total conditioned floor space that was impacted: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE1f4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE1g. **[IF ALL RESPONSES TO EE1a – EE1f ARE "NO", "REFUSED", or "DON'T KNOW", THEN CONFIRM, OTHERWISE, SKIP TO EE2]** Just to confirm, there were no improvements made to the building envelope at the property since it was benchmarked?

1. YES
2. NO [Please specify: _____]
96. REFUSED
97. DON'T KNOW

[NOTE TO INTERVIEWER: PLEASE MAKE NOTE OF EEM DATES THAT FALL OUTSIDE OF AVAILABLE BILLING DATA RANGE AND MAKE NOTE OF PROJECTS THAT ARE COMPLETED IN COMMON SPACES V. IN UNIT FOR BUILDINGS THAT ARE NOT MASTER METERED OR TENENTS PAY UTILITY BILLS]

EE2. Were changes made to improve the efficiency of the **lighting systems** at the property since participating in the benchmarking component of NYSERDA's Energy $mart Focus Program?

[IF NECESSARY]

Examples of efficiency improvements include replacing fixtures or adding occupancy sensors.

1. YES
2. NO **[SKIP TO EE3]**
96. REFUSED **[SKIP TO EE3]**
97. DON'T KNOW **[SKIP TO EE3]**

EE2a. Were existing interior light fixtures replaced with more efficient fixtures?

1. YES
2. NO **[Skip to EE2b]**

96. REFUSED **[Skip to EE2b]**

97. DON'T KNOW **[Skip to EE2b]**

EE2a1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH IF, REFUSED OR DON'T KNOW]**

EE2a2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2a3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2a4. Percent of the total interior lighting that was replaced: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE2a5. Additional Comments **[RECORD IF PROVIDED]**

_____

EE2b. Were existing exterior light fixtures replaced with more efficient fixtures?

1. YES

2. NO **[Skip to EE2c]**

96. REFUSED **[Skip to EE2c]**

97. DON'T KNOW **[Skip to EE2c]**

EE2b1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2b2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2a3. Percent of the total interior lighting that was replaced: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE2b4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE2c. Were occupancy, motion or daylight sensors added?

1. YES

2. NO **[Skip to EE2d]**

96. REFUSED **[Skip to EE2d]**

97. DON'T KNOW **[Skip to EE2d]**

EE2c1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE2c2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2c3. Year: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2c4. Percent of the total interior lighting that was replaced: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE2c5. Additional Comments **[RECORD IF PROVIDED]**

_____

EE2d. Were unneeded lamps or fixtures removed?

1. YES
2. NO **[Skip to EE2e]**
96. REFUSED **[Skip to EE2e]**
97. DON'T KNOW **[Skip to EE2e]**

EE2d1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE2d2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2d3. Year: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2d4. Percent of the total interior lighting that was removed: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE2d5. Additional Comments **[RECORD IF PROVIDED]**

_____

EE2e. Were any other improvements to the lighting systems made? 1. YES [Please describe: _____]

2. NO **[Skip to EE2f]**
96. REFUSED **[Skip to EE2f]**
97. DON'T KNOW **[Skip to EE2f]**

EE2e1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE2e2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2e3. Year: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE2e4. Percent of the total interior lighting that was replaced: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE2e5. Additional Comments **[RECORD IF PROVIDED]**

_____

EE2f. **[IF ALL RESPONSES TO EE2a – EE2e ARE "NO", "REFUSED", or "DON'T KNOW", THEN CONFIRM, OTHERWISE, SKIP TO EE3]** Your responses indicated there were no efficiency improvements made to the lighting system at the property in the building since it was benchmarked. Is this correct?

1. YES
2. NO [Please specify: _____]
96. REFUSED
97. DON'T KNOW

[NOTE TO INTERVIEWER: PLEASE MAKE NOTE OF EEM DATES THAT FALL OUTSIDE OF AVAILABLE BILLING DATA RANGE AND MAKE NOTE OF PROJECTS THAT ARE COMPLETED IN COMMON SPACES V. IN UNIT FOR BUILDINGS THAT ARE NOT MASTER METERED AND TENENTS PAY UTILITY BILLS]

EE3. Was the efficiency of the **heating, cooling, ventilation or water heating systems** improved at the property?

[IF NECESSARY]

Examples of efficiency improvements include replacing space heating or cooling equipment, or water heating equipment with a more efficient model, repairing or improving ventilation systems, or adding programmable thermostats or an energy management system.

1. YES
2. NO **[SKIP TO EE4.]**
96. REFUSED **[SKIP TO EE4.]**
97. DON'T KNOW **[SKIP TO EE4.]**

EE3a. Was the space heating system replaced with a more efficient system?

1. YES
2. NO **[Skip to EE3b]**
96. REFUSED **[Skip to EE3b]**
97. DON'T KNOW **[SKIP to EE3b]**

EE3a1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE3a2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE3a3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3a4. Percent of the total conditioned floor space that was impacted: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3a5. Additional Comments **[RECORD IF PROVIDED]**

_____

EE3b. Were water heaters replaced with more efficient models?

1. YES
2. NO **[SKIP TO EE3c]**
96. REFUSED **[SKIP TO EE3c]**
97. DON'T KNOW **[SKIP TO EE3c]**

EE3b1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE3b2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3b3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3b4. Percent of the total water heating that was impacted: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3b5. Additional Comments **[RECORD IF PROVIDED]**

_____

EE3c. Were the building's air conditioning systems or units replaced with more efficient systems?

1. YES
2. NO **[SKIP TO EE3d]**
96. REFUSED **[SKIP TO EE3d]**
97. DON'T KNOW **[SKIP TO EE3d]**

EE3c1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE3c2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3c3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3c4. Percent of the total air conditioned floor area that was impacted: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3c5. Additional Comments **[RECORD IF PROVIDED]**

_____

EE3d. Did you add programmable thermostats to control heating and/or cooling use **in the property's building(s)**?

1 YES – Both heating and cooling controls
2 YES – Heating controls only

3 YES – Cooling controls only

4. NO **[SKIP TO EE3e]**

96. REFUSED **[SKIP TO EE3e]**

97. DON'T KNOW **[SKIP TO EE3e]**

EE3d1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE3d2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3d3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3d4. Percent of building's heating floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3d5. Percent of building's cooled floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3d6. Additional Comments **[RECORD IF PROVIDED]**

EE3e. Was an energy management system added to control heating and/or cooling use?

1 YES – For both heating and cooling

2 YES – Heating only

3 YES – Cooling only

4. NO **[SKIP TO EE3f]**

96. REFUSED **[SKIP TO EE3f]**

97. DON'T KNOW **[SKIP TO EE3f]**

EE3e1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE3e2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3e3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3e4 Percent of building's heating floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3e5. Percent of building's cooled floor space that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3e6. Additional Comments **[RECORD IF PROVIDED]**

EE3f. Was work done to improve the efficiency of your buildings' ***ventilation*** systems including sealing any ductwork, adding ductwork insulation or adding other controls, such as demand controlled ventilation?

1. YES
2. NO **[SKIP TO EE3g]**
96. REFUSED **[SKIP TO EE3g]**
97. DON'T KNOW **[SKIP TO EE3g]**

EE3f1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE3f2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3f3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3f4. Percent of the total conditioned floor space that was impacted: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3f5. Additional Comments **[RECORD IF PROVIDED]**

_____

EE3g. Were any other improvements made to the heating, cooling, water heating or ventilation systems, including changing fuel sources?

1. YES [Please describe**: _____**]
2. NO **[SKIP TO EE3h]**
96. REFUSED **[SKIP TO EE3h]**
97. DON'T KNOW **[SKIP TO EE3h]**

EE3g1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE3g2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3g3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE3g4. Percent of the total conditioned floor space that was impacted: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE3g5. Additional Comments **[RECORD IF PROVIDED]**

_____

EE3h. **[IF ALL RESPONSES TO EE3a – EE3g ARE "NO", "REFUSED" or "DON'T KNOW" THEN CONFIRM, OTHERWISE, SKIP TO EE4]** Your previous responses indicate that no

efficiency improvements were made to the heating, cooling or water heating systems at the property since it was benchmarked. Is this correct?

1. YES
2. NO [Please specify: _____]
96. REFUSED
97. DON'T KNOW

EE4. Was work done to improve the efficiency of the **cooking or refrigeration** systems in the _____ property's **building(s)**?

[IF NECESSARY]

Examples of efficiency improvements include installing new refrigeration units or stoves to replace inefficient models or adding an economizer to an existing refrigeration unit.

1. YES
2. NO **[SKIP TO EE5.]**
3. **NOT APPLICABLE [SKIP TO EE5]**
96. REFUSED **[SKIP TO EE5.]**
97. DON'T KNOW **[SKIP TO EE5.]**

EE4a. Were refrigerators replaced with more efficient units?

1. YES
2. NO **[SKIP TO EE4b]**
3. **NOT APPLICABLE [SKIP TO EE4b]**
96. REFUSED **[SKIP TO EE4b]**
97. DON'T KNOW **[SKIP TO EE4b]**

EE4a1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE4a2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4a3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4a4. Percent of all refrigerators that were replaced: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE4a5. Additional Comments **[RECORD IF PROVIDED]**

_____

EE4b. Were freezers replaced with more efficient units?

1. YES
2. NO **[SKIP TO EE4c]**
3. **NOT APPLICABLE [SKIP TO EE4c]**
96. REFUSED **[SKIP TO EE4c]**
97. DON'T KNOW **[SKIP TO EE4c]**

EE4b1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE4b2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4b3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4b4. Percent of all freezers that were replaced: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE4b5. Additional Comments **[RECORD IF PROVIDED]**

EE4c. Was an economizer, ECM fan motor, or control added to an existing walk-in refrigerator or walk-in freezer?

1. YES
2. NO **[SKIP TO EE4d]**
3. **NOT APPLICABLE [SKIP TO EE4d]**
96. REFUSED **[SKIP TO EE4d]**
97. DON'T KNOW **[SKIP TO EE4d]**

EE4c1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE4c2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4c3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4c4. Percent of equipment that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE4c5. Additional Comments **[RECORD IF PROVIDED]**

EE4d. Were cooking stoves replaced with more efficient units?

1. YES
2. NO **[SKIP TO EE4e]**

3. NOT APPLICABLE [SKIP TO EE4e]

96. REFUSED **[SKIP TO EE4e]**

97. DON'T KNOW **[SKIP TO EE4e]**

EE4d1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE4d2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4d3. Year: _____ [**ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4d4. Percent of all cooking equipment that was replaced: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE4d5. Additional Comments **[RECORD IF PROVIDED]**

_____

EE4e. Were dishwashers replaced with more efficient units?

1. YES

2. NO **[SKIP TO EE4f]**

3. NOT APPLICABLE [SKIP TO EE4f]

96. REFUSED **[SKIP TO EE4f]**

97. DON'T KNOW **[SKIP TO EE4f]**

EE4e1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE4e2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4e3. Year: _____ **[ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4e4. Percent of all dishwashers that were replaced: _____ **[ENTER VALUE, REFUSED OR DON'T KNOW]**

EE4e5. Additional Comments **[RECORD IF PROVIDED]**

_____

EE4f. Did you make any other improvements to the cooking or refrigeration systems?

1. YES [Please describe: _____]

2. NO **[SKIP TO EE4g]**

96. REFUSED **[SKIP TO EE4g]**

97. DON'T KNOW **[SKIP TO EE4g]**

EE4f1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE4f2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4f3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE4f4. Percent of equipment that was impacted: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE4f5. Additional Comments **[RECORD IF PROVIDED]**

_____

EE4g. **[IF ALL RESPONSES TO EE4a – EE4f ARE "NO", "REFUSED" or "DON'T KNOW" THEN CONFIRM, OTHERWISE SKIP TO EE5]** Your previous responses indicate that no efficiency improvements were made to the refrigeration or cooking systems at this property since it was benchmarked. Is this correct?

1. YES
2. NO, [Please specify: _____]
96. REFUSED
97. DON'T KNOW

EE5. There are a variety of **other types of efficiency improvements** that may apply to your buildings, such as replacing motors, pumps or office equipment. Please let me know if any of these other upgrades were made since your _____ property was benchmarked, the approximate month and year of the installation and the percentage of the equipment that was affected. For example, if the building has fifty computers and ten monitors were replaced with efficient units, then the percent affected would be 20%.

EE5a. Was office equipment replaced with more efficient equipment in common or shared spaces?

1. YES
2. NO **[SKIP TO EE5b]**
3. **NOT APPLICABLE [SKIP TO EE5b]**
96. REFUSED **[SKIP TO EE5b]**
97. DON'T KNOW **[SKIP TO EE5b]**

EE5a1. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE5a2. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE5a3. Percent of all office equipment that was replaced: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE5a4. Additional Comments **[RECORD IF PROVIDED]**

_____

EE5b. Were any other energy efficiency systems, control or equipment, including vending machine controls installed in the **_____ property**?

1. YES [Please describe: _____]
2. NO **[SKIP TO EE6]**
96. REFUSED **[SKIP TO EE6]**
97. DON'T KNOW **[SKIP TO EE6]**

EE5b1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

EE5b2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE5b3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

EE5b4. Percent of all equipment that was replaced: **_____ [ENTER VALUE, REFUSED OR DON'T KNOW]**

EE5b5. Additional Comments **[RECORD IF PROVIDED]**

_____

EE6. **[IF "YES" TO ANY OF EE1, EE2, EE3, EE4, or EE5]** Thinking back to all of the energy efficiency measure just discussed (from building envelop, to office equipment and anything in between), were any of these measures necessary to replace equipment that had failed or was about to fail?

1. YES [Please identify the equipment: _____]
2. NO
96. REFUSED
97. DON'T KNOW

EE7. **[IF "YES" TO ANY OF EE1, EE2, EE3, EE4, EE5]** Did you receive financial incentives for any of these measures?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

EE8. Has the **_____ property** switched some of its energy use to a renewable technology like a solar water heater, solar photovoltaic, wind, wood, wood chips or pellets?

1. YES [please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

BEHAVIORAL CHANGES (BC)

[PLEASE READ TO RESPONDENT] In addition to actual energy efficiency measures that can be installed, there are many types of behavioral and operational changes that can be made with the intention to reduce energy use. Some of these need to be done by building maintenance personnel, and may include changing the programming of the energy management system, or lowering the temperature of the water heater or modifying maintenance practices. Some may be implemented by other staff or building tenants, such as turning off lights or computers when rooms are not in use, keeping windows closed when the air conditioning or heating is in use, or manually lowering the thermostat set point. Also please note that we are only interested in behavioral changes that have been completed that would impact the billing data that was provided for your property. If the account you released to NYSERDA only covers shared or common spaces, then we would only be interested in behavioral changes made that would impact those locations. On the other hand, behavioral and operational changes made by tenants would also be of interest if your building is master-metered where tenants do not get their own electric or other energy (natural gas, steam, etc.) monthly bills.

[NOTE TO INTERVIEWER: PLEASE MAKE NOTE OF BEHAVIORAL CHANGE DATES THAT FALL OUTSIDE OF AVAILABLE BILLING DATA RANGE AND MAKE NOTE OF BEHAVIORAL CHANGES THAT APPLY TO COMMON SPACES V. IN UNIT SPACE WHERE DIFFERENCES ARE APPLICABLE]

This next set of questions is about operational **changes to building systems** that need to be done by building maintenance personnel.

BC1. Since the time the **_____ property** was benchmarked, did maintenance staff change any of the settings on equipment in the building to reduce energy consumption?

1. YES
2. NO **[SKIP TO BC2.]**
96. REFUSED **[SKIP TO BC2.]**
97. DON'T KNOW **[SKIP TO BC2.]**

BC1a Were the modifications to building settings successful in reducing energy?

1. YES
2. NO [SKIP TO BC2]
96. REFUSED
97. DON'T KNOW

BC1a1 Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC1b. Were the **heating** control settings or heating-related energy management systems changed to reduce energy use **at the property**?

1. YES [Please describe: _____]
2. NO [SKIP TO BC1c]
3. NOT APPLICABLE [SKIP TO BC1c]
96. REFUSED [SKIP TO BC1c]
97. DON'T KNOW [SKIP TO BC1c]

BC1b1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC1b2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC1b3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC1b4. Additional Comments **[RECORD IF PROVIDED]**

_____

BC1c. Were the **cooling** control settings or cooling-related energy management systems changed to reduce energy use?

1. YES [Please describe: _____]
2. NO [SKIP TO BC1d]
3. NOT APPLICABLE [SKIP TO BC1d]
96. REFUSED [SKIP TO BC1d]
97. DON'T KNOW [SKIP TO BC1d]

BC1c1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC1c2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC1c3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC1c4. Additional Comments **[RECORD IF PROVIDED]**

_____

BC1d. Were temperature set points for hot water changed to reduce energy use?

1. YES

2. NO [SKIP TO BC1e]
3. NOT APPLICABLE [SKIP TO BC1e]
96. REFUSED [SKIP TO BC1e]
97. DON'T KNOW [SKIP TO BC1e]

BC1d1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC1d2. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC1d3. Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC1d4. Additional Comments **[RECORD IF PROVIDED]**

_____

BC1e. Were any other building system settings modified to reduce energy use?

4. YES – Heating related [Please describe: _____]
5. YES – Cooling related [Please describe: _____]
6. YES – Other [Please describe: _____]
4. NO
5. NOT APPLICABLE
96. REFUSED
97. DON'T KNOW

BC1e1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC1e2. Additional Comments **[RECORD IF PROVIDED]**

_____

The next questions are about **maintenance practices** that may have changed since you received the Benchmarking report(s) for the _____ property. Examples of this type of change include increased frequency of cleaning or changing HVAC filters.

BC2. Have the maintenance schedules or practices at **the _____ property** been changed to reduce energy use?

1. YES
2. NO **[SKIP TO BC3]**
96. REFUSED **[SKIP TO BC3]**
97. DON'T KNOW **[SKIP TO BC3]**

BC2a. Were the changes to maintenance practices successful in reducing energy use at the property?

1. YES
2. NO [SKIP TO BC3]
96. REFUSED [SKIP TO BC2b]
97. DON'T KNOW [SKIP TO BC2b]

BC2a1. Additional Comments **[DO NOT PROMPT - RECORD ONLY IF PROVIDED]**

_____

BC2b. Does maintenance staff change the air filters on HVAC equipment more often?

3. YES – Heating system
4. YES – Cooling system
3. NO [SKIP TO BC2c]
4. NOT APPLICABLE [SKIP TO BC2c]
96. REFUSED [SKIP TO BC2c]
97. DON'T KNOW [SKIP TO BC2c]

BC2b1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC2b2. Additional Comments **[RECORD IF PROVIDED]**

_____

BC2c. Does maintenance staff clean heat exchangers on heating, cooling or refrigeration equipment more often?

4. YES – Heating equipment
5. YES – Cooling equipment
6. YES – Refrigeration equipment
4. NO [SKIP TO BC2c]
5. NOT APPLICABLE [SKIP TO BC2d]
96. REFUSED [SKIP TO BC2d]
97. DON'T KNOW [SKIP TO BC2d]

BC1c1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC2c2. Additional Comments **[RECORD IF PROVIDED]**

_____

BC2d. Has maintenance staff changed any other practices to reduce energy use?

1. YES [Please specify: _____]

2. NO [SKIP TO BC2e]

96. REFUSED [SKIP TO BC2e]

97. DON'T KNOW [SKIP TO BC2e]

BC1d1. Common area or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC2d2. Additional Comments **[RECORD IF PROVIDED]**

_____

BC2e. **[IF "YES" TO ANY BC2a to BC2d]** Do you have a system in place to remind maintenance staff to continue these practices?

1. YES

2. NO

96. REFUSED

97. DON'T KNOW

BC2e1.Additional Comments **[RECORD IF PROVIDED]**

_____

[NOTE TO INTERVIEWER: PLEASE MAKE NOTE OF BEHAVIORAL CHANGE DATES THAT FALL OUTSIDE OF AVAILABLE BILLING DATA RANGE AND PLEASE MAKE NOTE OF BEHAVIORAL CHANGES THAT APPLY TO BUILDING STAFF V TENANTS WHERE DIFFERENCES ARE APPLICABLE]

The next category is **behavioral changes that are implemented by other staff members or other tenants**, such as turning off lights or computers when rooms are not in use, keeping windows closed when the air conditioning or heating is in use or manually lowering the thermostat set point.

BC3. Were the building staff provided any oral or written instructions to reduce energy use through behavioral modifications since participating in the benchmarking component of NYSERDA's Energy $mart Focus Program?

1. YES – Both oral and written instructions

2. YES – Written instructions only

3. YES – Oral instructions only

4. NO

96. REFUSED

97. DON'T KNOW

BC3a. Were the building tenants provided any oral or written instructions to reduce energy use through behavioral modifications since participating in the benchmarking component of NYSERDA's Energy $mart Focus Program?

1. YES – Both oral and written instructions

2. YES – Written instructions only
3. YES – Oral instructions only
4. NO **[IF BC3 ALSO IS NO THEN SKIP TO BC4]**
96. REFUSED **[SKIP TO BC4]**
97. DON'T KNOW **[IF BC3 ALSO IS NO THEN SKIP TO BC4]**

[NOTE TO INTERVIEWER: PLEASE ASK QUESTIONS BC3b-BC3i AS APPLICABLE TO REPONDENTS ANSWER IN BC3 AND BC3a. PLEASE MAKE NOTE OF BEHAVIORAL CHANGES THAT APPLY TO BUILDING STAFF V TENANTS WHERE THERE ARE DIFFERNECES AND BOTH BUILDING STAFF AND TENANTS MADE BEHAVIORAL CHANGES.]

BC3b. Did building staff and/or tenants follow through with the behavioral changes?

1. YES **[PLEASE RECORD IF STAFF OR TENANTS]**
2. YES, But only some **[PLEASE RECORD IF STAFF OR TENANTS]**
3. NO **[IF NEITHER FOLLOWED THROUGH THEN SKIP TO BC4]**
96. REFUSED
97. DON'T KNOW

BC3b1. Building staff or tenants: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC3b2.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3c. Were building staff or tenants instructed to turn off lights when rooms are not in use in common spaces or within units?

1. YES
2. NO [SKIP TO BC3d]
96. REFUSED [SKIP TO BC3d]
97. DON'T KNOW [SKIP TO BC3d]

BC3c1. Building staff or tenants: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC3c2. Common areas or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC3c3. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC3c4.Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC3c5.Additional Comments **[RECORD IF PROVIDED]**

_____

BC3d. Were building staff or tenants instructed to manually lower the thermostat setting during the heating season or raise the setting during the cooling season in common spaces or within units?

1. YES – Heating season lower
2. YES – Cooling season raise
3. NO [SKIP TO BC3e]
96. REFUSED [SKIP TO BC3e]
97. DON'T KNOW [SKIP TO BC3e]

BC3d1. Building staff or tenants: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC3d2. Common areas or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC3d3. Month **[or prompt with "Season" if respondent cannot recall a specific month]**: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC3d4.Year: **_____ [ENTER VALUE OR MULTIPLE VALUES IF DONE IN PHASES, REFUSED OR DON'T KNOW]**

BC3d5.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3e. Were building staff or tenants instructed to keep windows closed during the heating season or the cooling season when the air conditioner is on in common spaces or within units ?

1. YES – Both heating and cooling season
2. YES – Heating season only
3. YES – Cooling season only
4. NO [SKIP TO BC3f]
3. NOT APPLICABLE [SKIP TO BC3f]
96. REFUSED [SKIP TO BC3f]
97. DON'T KNOW [SKIP TO BC3f]

BC3e1. Building staff or tenants: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC3e2. Common areas or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC3e3.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3f. Were building staff or tenants instructed to lower the window shades to block solar gain during the cooling season in common spaces or within units?

1. YES
2. NO [SKIP TO BC3fg]
3. NOT APPLICABLE [SKIP TO BC3g]
96. REFUSED [SKIP TO BC3g]
97. DON'T KNOW [SKIP TO BC3g]

BC3f1. Building staff or tenants: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC3f2. Common areas or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC3f3.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3g. Were building staff or tenants instructed to keep obstructions away from heaters and cooling vents in common spaces or within units to ensure that air flow is not impeded?

1. YES – Heaters and cooling vents
2. YES – Heater only
3. YES – Cooling vents only
4. NO [SKIP TO BC3h]
5. NOT APPLICABLE
96. REFUSED [SKIP TO BC3h]
97. DONT KNOW [SKIP TO BC3h]

BC3g1. Building staff or tenants: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC3g2. Common areas or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC3g3.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3h. Were any other behavioral modifications made **in the _____ property's building(s)**?

1. YES [Please describe: _____]
2. NO [SKIP TO BC3i]
96. REFUSED [SKIP TO BC3i]
97. DON'T KNOW [SKIP TO BC3i]

BC3h1. Building staff or tenants: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC3h2. Common areas or In-Unit: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC3h3.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC3i. **[IF "YES" TO ANY BC3b-BC3k]** Do you have a system in place at the property to remind building staff or tenants to continue with these practices?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

BC3i1. Building staff or tenants: **_____ [ENTER VALUE OR BOTH, REFUSED OR DON'T KNOW]**

BC3i2.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC4. I'm going to read you a number of **additional behavioral and operational changes** that may have been made since participating in the benchmarking component of NYSERDA's Program. For each item, please say whether, or not it was done. Did the _____ property…

1. YES
2. NO
3. PLANNED OR IN PROCESS
96. REFUSED
97. DON'T KNOW

BC4a1-BC4h1.Additional Comments **[DO NOT PROMPT, RECORD ONLY IF PROVIDED]**

_____

BC4a. Make a pledge to reduce energy?

BC4b. Set an energy reduction goal?

BC4c. Meet an energy reduction goal?

BC4d. Form an Energy Team or Committee?

BC4e. Measure reduction in energy use on a periodic basis?

BC4f. Conduct additional benchmarking after the end of NYSERDA' program?

BC4g. Review the purchasing standards for new equipment?

BC4h. Were any other behavioral or operational changes implemented? [IF YES, Please specify: _____]

Self Reported Information (SR)

SR1. Has the **_____ property** *ever* participated in any other NYSERDA programs?

1. Yes
2. NO **[SKIP TO PI SECTION]**

For the next question, I'm going to name a number of NYSERDA programs. For each program, please indicate whether the **_____ property** has received services through the program. If you have received program services please provide a brief description of any energy efficiency or energy reduction measures taken under that program. First is…

SR1a. Flex Tech?

1. YES [Please describe services received or measures installed through the program: _____]
2. NO
96. REFUSED
97. DON'T KNOW

SR1b. Energy Advisor?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

SR1c. Existing Facilities Program?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

SR1d. New Construction Program?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

SR1e. Peak Load Reduction Program?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

SR1f. Energy $mart Offices Program?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

SR1g. Energy $mart Photovoltaic (PV) or Solar-Electric System Incentive Program?

1. YES [Please describe: _____]
2. NO
96. REFUSED
97. DON'T KNOW

[IF THERE ARE NO "YES" RESPONSES TO AT LEAST ONE OF THE SR1a – SR1g QUESTIONS, ASK SR1k, OTHERWISE SKIP TO PI SECTION]

SR1h. Please identify the NYSERDA Program(s) in which your property has participated..

1. [RECORD PROGARM NAME: _____]
97. DON'T KNOW

PROGRAM IMPACT (PI)
[ASK FOLLOWING ONLY IF AT LEAST ONE RESPONSE TO EE1 THROUGH EE5 = "YES." OR BC1 THROUGH BC4 = "YES"]

PI1. On a scale of 0 to 4, where 0 means "No Influence" and 4 means "Very Influential", how would you rate the influence that the benchmarking process and report(s) your property received through NYSERDA's Energy $mart Focus program had on your property's decision to do the following: **[INSERT ITEM – ROTATE LIST]**

0. NO INFLUENCE
1.
2. NEUTRAL
3.
4. VERY INFLUENTIAL

96. REFUSED

97. DON'T KNOW

PI1a. [ASK IF EE1="YES"] Improve the efficiency of the building envelope?

PI1b. [ASK IF EE2="YES"] Install efficient lighting?

PI1c. [ASK IF EE3="YES"] Improve the efficiency of the heating, cooling or water heating system?

PI1d. [ASK IF EE4="YES"] Improve the efficiency of the cooking, dishwashing or refrigeration equipment?

PI1e. [ASK IF EE5="YES"] Improve the efficiency of office or other equipment?

PI1f. [ASK IF BC1="YES"] Get maintenance staff to change the control settings for existing HVAC systems?

PI1g. [ASK IF BC2="YES"] Improve maintenance schedules of building systems and equipment?

PI1h. [ASK IF BC3="YES"] Reduce energy use through behavioral changes adopted by other building staff or other building tenants?

PI2. On a scale of 0 to 4, where 0 means "Very Unlikely" and 4 means "Very Likely" how likely would you have been to install similar energy efficiency measures and adopt similar behavioral and operational changes related to energy efficiency without the benchmark report? Specifically how likely would you have been to **[INSERT ITEM – ROTATE LIST]**

0. VERY UNLIKELY

1.

2. NEUTRAL

3.

4. VERY LIKELY

96. REFUSED

97. DON'T KNOW

PI2a. [ASK IF EE1A="YES"] Improve the efficiency of the building envelope?

PI2b. [ASK IF EE2A="YES"] Install efficient lighting?

PI2c. [ASK IF EE3A="YES"] Improve the efficiency of the heating, cooling or water heating system?

PI2d. [ASK IF EE4A="YES"] Improve the efficiency of the cooking, dishwashing or refrigeration equipment?

PI2e. [ASK IF EE5A="YES"] Improve the efficiency of office or other equipment?

PI2f. [ASK IF BC1="YES"] Get maintenance staff to change the control settings for existing HVAC systems?

PI2g. [ASK IF BC2a="YES"] Improve maintenance schedules or control of building systems and equipment?

PI2h. [ASK IF BC3a="YES"] Reduce energy use through behavioral changes adopted by other building staff or other building tenants?

[ASK OF ALL PARTICIPANTS]

PI3. What is the title of the person who had the most influence on the decision for your **_____ property** to participate in the benchmarking process of the NYSERDA Focus program?

[RECORD ALL THAT APPLY]

1. Property Owner
2. Property Manager
3. Tenant or Tenant Organization
4. Other, please specify _____
96. REFUSED
97. DON'T KNOW

PI3a. I'm going to read you a number of reasons the **_____ property** might have been benchmarked. Please indicate whether each reason contributed to the **[ENTER RESPONSE TO PI3]** decision to have the property benchmarked? **[INSERT ITEM – ROTATE LIST] [RECORD ALL THAT APPLY]**

1. YES
2. NO
96. REFUSED
97. DON'T KNOW

PI3a1. Your property management company had already benchmarked other buildings in its portfolio.

PI3a2. To compare the buildings' energy use with similar buildings within the property management company.

PI3a3. To prioritize energy reduction projects within the property management company's portfolio.

PI3a4. To determine if energy reduction projects were necessary at the property

PI3a5. Benchmarking was recommended by an outside party

PI3a6. Other **[PLEASE RECORD]**_____

[ASK IF MULTIPLE RESPONSES WERE GIVEN IN PI4b]

PI3b. Which reason was the most influential in the decision to benchmark the _____ property? **[PLEASE RECORD ONE]**

1. Your property management company had already benchmarked other buildings.
2. To compare the property's energy use with similar buildings or to other buildings within the property management company's portfolio.
3. To prioritize energy reduction projects within the property management company's portfolio.
4. To determine if energy reduction projects were necessary at the property

5. Benchmarking was recommended by an outside party
6. Other
96. REFUSED
97. DON'T KNOW

[ASK FOLLOWING ONLY IF ENERGY EFFICIENCY MEASERES WERE INSTALLED AT THE SUBJECT PROPERTY - EE1a, EE2a, EE3a, EE4a OR EE5a = "YES" OR BC1, BC2, BC3 OR BC4 = "YES"]

PI4. What is the title of the person who made the decision for your property [IF ANY EE=YES] to install the energy efficiency measures or [IF ANY BC = YES] to implement behavior or operational changes at this benchmarked property?

[RECORD ALL THAT APPLY]

1. Property Owner
2. Property Manager
3. Tenant or Tenant Organization
4. Other, please specify _____
96. REFUSED
97. DON'T KNOW

[ASK OF ALL PARTICIPANTS]

PI4a. Is a written recommendation required to get a decision to install any energy efficiency measures or to implement behavioral or operational changes at this benchmarked property?

1. YES [Please describe who is responsible for producing the recommendation: _____]
2. NO
96. REFUSED
97. DON'T KNOW

PI4b. There may be many different types of information that are used to capture the attention of the **[ENTER RESPONSE TO PI4 OR PI4a]** to a point where they seriously consider taking actions to increase energy efficiency. On a scale of 0 to 4 where 0 means the benchmarking is "Not At All Important" and 4 means the benchmarking is "Very Important", how important was the benchmarking in getting them to seriously consider taking energy efficiency improvement actions at the **_____ property**?

0. NOT AT ALL IMPORTANT
1.
2. NEUTRAL

3.

4. VERY IMPORTANT

96. REFUSED

97. DON'T KNOW

[ASK FOLLOWING ONLY IF ENERGY EFFICIENCY MEASERES WERE INSTALLED OR BEHAVIOR CHANGES IMPLEMENTED AT THE BUILDING - EE1a, EE2a, EE3a, EE4a OR EE5a = "YES" OR BC1, BC2, BC3, OR BC4 = "YES"]

PI4c. I'm going to read you number factors that could contribute to a decision to install energy efficiency measures or implement behavioral/operational changes intended to reduce energy use. Please indicate whether each of the following were contributing factors to the **[ENTER RESPONSE TO PI4 OR PI4a]**'s decision to install energy efficiency measures or implement behavioral or operational changes at the benchmarked building(s)?**[INSERT ITEM – ROTATE LIST] [RECORD ALL THAT APPLY] First is… Next is…**

1. YES

2. NO

96. REFUSED

97. DON'T KNOW

PI4c1. It will reduce energy use

PI4c2. It will reduce operational costs

PI4c3. It will reduce greenhouse gas emissions

PI4c4. Incentives were available that lowered initial costs

PI4c5. Are there any other factors that contributed to the decision to install energy efficiency measures or implement behavioral changes? IF YES
[SPECIFY]_____

[ASK IF MULTIPLE YES RESPONSES WERE GIVEN IN PI4c]

PI5. Which of the factors you just mentioned was the most influential in the decision to install energy efficiency measures or implement behavioral/operational changes? **[PLEASE RECORD ONE]**

1. Reduce energy use

2. Reduce operational costs

3. Reduce green house gas emissions

4. Incentives were available that lowered initial costs

5. Other

96. REFUSED

97. DON'T KNOW

OTHER PROGRAM IMPACTS (OI)

Next, I'm going to name a number of efficiency programs that are *not* implemented by NYSERDA. For each type of program, please indicate whether or not the **____ property** has participated. If you have participated in the program, please provide a very brief description of any energy efficiency or energy reduction actions taken under that program, along with the approximate year and month that measures were installed.

OI1a. Has your property participated in any energy efficiency programs delivered by your local electric or gas utility?

1. YES [Please describe program name and actions taken: _____]
2. NO **[SKIP TO OI1b]**
96. REFUSED **[SKIP TO OI1b]**
97. DON'T KNOW **[SKIP TO OI1b]**

OI1a1. Year: [Please specify: _____]

96. REFUSED
97. DON'T KNOW

OI1a2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____]

96. REFUSED
97. DON'T KNOW

OI1b. Has your property participated in any energy efficiency programs delivered by the federal government (including tax incentives)?

1. YES [Please describe program name and actions taken: _____]
2. NO **[SKIP TO OI1c]**
96. REFUSED **[SKIP TO OI1c]**
97. DON'T KNOW **[SKIP TO OI1c]**

OI1b1. Year: [Please specify: _____]

96. REFUSED
97. DON'T KNOW

OI1b2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____]

96. REFUSED
97. DON'T KNOW

OI1c. Has your property participated in any energy efficiency programs delivered by your municipal government (including tax incentives)?

1. YES [Please describe program name and actions taken: _____]
2. NO **[SKIP TO OI1d]**
96. REFUSED **[SKIP TO OI1d]**
97. DON'T KNOW **[SKIP TO OI1d]**

OI1c1. Year: [Please specify: _____]

96. REFUSED
97. DON'T KNOW

OI1c2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____]

96. REFUSED
97. DON'T KNOW

OI1d. Are there any other non-NYSERDA programs that I have not already mentioned in which your property has participated?

1. YES [Please describe program name and actions taken: _____]
2. NO **[SKIP TO OI2]**
96. REFUSED **[SKIP TO OI2**
97. DON'T KNOW **[SKIP TO OI2]**

OI1d1. Year: [Please specify: _____]

96. REFUSED
97. DON'T KNOW

OI1d2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____]

96. REFUSED
97. DON'T KNOW

[ASK FOLLOWING ONLY IF AT LEAST ONE RESPONSE TO OI1a THROUGH OI1d = "YES"]

OI2. Did any of the programs we just discussed have any influence on your decision to benchmark the property?

1. YES
2. NO **[SKIP TO OI3]**
96. REFUSED **[SKIP TO OI3]**
97. DON'T KNOW **[SKIP TO OI3]**

OI2a. On a scale of 0 to 4, where 0 means "No Influence" and 4 means "Very Influential" how would you rate these program's influence on the decision **to benchmark** your **property** through NYSERDA's Focus Program?

0. NO INFLUENCE
1.
2. NEUTRAL
3.
4. VERY INFLUENTIAL
96. REFUSED
97. DON'T KNOW

[ASK FOLLOWING ONLY IF AT LEAST ONE RESPONSE TO OI1a THROUGH OI1d = "YES"]

OI3. Did any of the programs we just discussed have any influence on the decision **to take energy efficiency improvement actions, including behavioral and operational changes** at your property?

1. YES
2. NO **[SKIP TO NP SECTION]**
96. REFUSED **[SKIP TO NP SECTION]**
97. DON'T KNOW **[SKIP TO NP SECTION]**

OI3a. On a scale of 0 to 4, where 0 means "No Influence" and 4 means "Very Influential" how would you rate these program's influence on the decision **to take energy efficiency improvement actions, including behavioral and operational changes** at your property**?**

0. NO INFLUENCE
1.
2. NEUTRAL
3.
4. VERY INFLUENTIAL
96. REFUSED

97. DON'T KNOW

NON-PROGRAM RELATED CHANGES (NP)

For this final set of questions, I'm going to list a number of potential changes that may have occurred at your property since taking part in NYSERDA's benchmarking process. For each potential change, please indicate whether or not it has been experienced in the **_____ property**. If your property has seen this change, please provide a very brief description of the change along with the approximate year and month that it was experienced.

NP1a. First, has your property experienced an increase in **occupant** population of at least 10%?

1. YES [Please specify percentage or the student population before and after the change: _____]
2. NO **[SKIP TO NP1c]**
96. REFUSED **[SKIP TO NP1b]**
97. DON'T KNOW **[SKIP TO NP1b]**

NP1a1. In what year did this increase occur? [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF CHANGE OCCURRED OVER TIME**

96. REFUSED
97. DON'T KNOW

NP1a2. In what month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]? [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF CHANGE OCCURRED OVER TIME**

96. REFUSED
97. DON'T KNOW

NP1b. How about a decrease in **occupant** population of at least 10%?

1. YES [Please specify percentage or the student population before and after the change: _____]
2. NO **[SKIP TO NP1c]**
96. REFUSED **[SKIP TO NP1c]**
97. DON'T KNOW **[SKIP TO NP1c]**

NP1b1. In what year did this decrease occur: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF CHANGE OCURRED OVER TIME**

96. REFUSED
97. DON'T KNOW

NP1b2. In what month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]? [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF CHANGE OCCURRED OVER TIME**

96. REFUSED

97. DON'T KNOW

NP1c. Has your property changed its hours of operation?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP1d]**

96. REFUSED **[SKIP TO NP1d]**

97. DON'T KNOW **[SKIP TO NP1d]**

NP1c1. In what year did this change occur? [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1c2. In what month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]? [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1d Has there been an addition to the property?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP1e]**

96. REFUSED **[SKIP TO NP1e]**

97. DON'T KNOW **[SKIP TO NP1e]**

NP1d1. Year: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1d2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1e. Has a section of the property been closed off or demolished?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP1f]**

96. REFUSED **[SKIP TO NP1f]**

97. DON'T KNOW **[SKIP TO NP1f]**

NP1e1. Year: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1e2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1f. Has the property added or expanded heating, air conditioning or water heating system(s)?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP1g]**

96. REFUSED **[SKIP TO NP1g]**

97. DON'T KNOW **[SKIP TO NP1g]**

NP1f1. Year: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1f2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1g. How about removal of heating, air conditioning or water heating system(s)?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP1h]**

96. REFUSED **[SKIP TO NP1h]**

97. DON'T KNOW **[SKIP TO NP1h]**

NP1g1. Year: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1g2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1h. Has there been a change in cooking schedule at the property?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP1i]**

3. NOT APPLICABLE

96. REFUSED **[SKIP TO NP1i]**

97. DON'T KNOW **[SKIP TO NP1i]**

NP1h1. Year: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1h2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1i. Finally, has there been some other change that may have occurred at your property that might impact energy usage?

1. YES [Please describe: _____]

2. NO **[SKIP TO NP2]**

96. REFUSED **[SKIP TO NP2]**

97. DON'T KNOW **[SKIP TO NP2]**

NP1i1. Year: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

NP1i2. Month [PROMPT FOR SEASON IF RESPONDENT CAN'T IDENTIFY SPECIFIC MONTH]: [Please specify: _____] **ALLOW FOR MULTIPLE VALUES IF PHASED**

96. REFUSED

97. DON'T KNOW

[IF THE PROPERTY DOES NOT REPORT ANY OPERATIONAL CHANGES DURING THE TIME SINCE BENCHMARKING, DOES NOT KNOW OF ANY THAT OCCURRED OR DID NOT IMPLEMENT ANY ENERGY EFFICENCY MEASURES, BUT WE KNOW FROM THE BILLING ANALYSIS THAT A MAJOR CHANGE IN ENERGY USE DID OCCUR, PLEASE USE NP2 TO ASK ABOUT THE SPECIFIC TIME WHEN THE ENERGY USE CHANGED AND ASK FOR AN OPINION ON WHY IT HAPPENED.]

NP2. Our records indicated that there was a substantial **[DROP OR INCREASE]** in energy use around **[MONTH]** of **[YEAR]** at your property. Can you tell us why you think that occurred?

[OPEN ENDED PLEASE RECORD RESPONSE]

_____

96. REFUSED

97. DON'T KNOW

Those are all the questions I have for you today. Thank you very much for your participation in the interview. Have a wonderful day!

Appendix C

Example Deemed Savings Calculations

APPENDIX C.

EXAMPLE DEEMED SAVINGS CALCULATIONS

Survey results were utilized in the deemed calculations to determine which schools installed which measures, % area affected, and other specifics about existing and replacement equipment and conditions where available . The analysis formulas are standard engineering calculations based on survey results and other estimates. Examples for deemed savings calculations within each measure category within the energy and behavioral sections are shown be the following tables.

Table C- 1: Building Envelope Calculation Example

Category Type	**Measure Type**
Building Envelope	**Attic Insulation**
kWh Savings	Savings = % AC x Area x % Area x (kWh savings / 1000 ft2)
MMBtu Savings	MMBtu Savings = Area x % Area (% AC x therm savingsAC w/gas heat/1000ft2 / + (1 - % AC) x therm savingsgas heat only/1000ft2) / (10 therm/MMBtu)
Sources	kWh Savings/1000ft2 & therm savings/1000ft2 – New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs October 2010 Appendix E

Table C- 2: Lighting Efficiency Calculation Example

Category Type	**Measure Type**
Lighting	**Efficient Light Fixtures – Interior**
kWh Savings	Savings = (Installed Watts – Base Watts) x Annual Hours / (1000 W/kW) Base Watts = % Replaced x Lighting Power Density x Area Installed Watts = Base Watts x Installed Lamp Watts / Base Lamp Watts Annual Hours = Hours/Week x 4.3333 Weeks/Month x Months/Year
MMBtu Savings	N/A
Sources	Lighting Power Density – *New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs* October 2010 p225, Installed Lamp Watts – 13W compact fluorescent (or 32W T8 fluorescent, or T5HO fluorescent), Base Lamp Watts – 60W incandescent (or 34-40W T12, or 250W HID),

Table C- 3: HVAC & Water Heating Calculation Example

Category Type	**Measure Type**
HVAC & Water Heating	**Space Heating System Efficiency Upgrade**
kWh Savings	N/A
MMBtu Savings	Savings = MMBtu Usage x % Area x % Space Heating x (1 – (Eff%base/Eff%efficient))
Sources	% Space Heating – ENERGY STAR Building Manual Chapter on K-10 Schools, Eff%base & Eff%efficient – New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs October 2010 p136-138

Table C- 4: Cooking and Refrigeration Calculation Example

Category Type	**Measure Type**
Cooking & Refrigeration	**Refrigerator Upgrade**
kWh Savings	Savings = Quantity x (Baseline Daily kWh – Maximum Daily Energy Consumption kWh) x 365 days/year x (1+HVACc) Quantity = estimated based on % replaced and other comments Baseline Daily kWh = Volume x 0.1 + 2.04 Maximum Daily Energy Consumption kWh = Volume x 0.056 + 1.635 Volume = 5.5’ x 2’ x 3’ = 33 ft3 (standard commercial refrigerator)
MMBtu Savings	N/A
Sources	Baseline Daily kWh & Maximum Daily Energy Consumption kWh & HVAC – New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs October 2010 p116-118

Table C- 5: Other/Office Equipment Calculation Example

Category Type	**Measure Type**
Other	**Office Equipment**
kWh Savings	Savings = # PC’s x % Replaced x kWh savings per unit
MMBtu Savings	N/A
Sources	kWh savings per unit – Massachusetts Technical Reference Manual for Estimating Savings from Energy Efficiency Measures August 2012 p36

Table C- 6: Changes to Building Systems Calculation Example

Category Type	**Measure Type**
Building Systems	**Heating Control Settings**
kWh Savings	N/A
MMBtu Savings	Savings = % Area Affected x % Savings x Space Heating MMBtu Usage after EC's Space Heating MMBtu Usage after EC's = Space Heating MMBtu Usage – MMBtu Savings from Space Heating EC's Space Heating MMBtu Usage = MMBtu Usage x % Space Heating Savings Reduction if Programmable Thermostats or EMS System installed = 75%
Sources	% Savings – estimated as 20% for turning off/down completely, 3% for setpt limit and scheduling, 2% for setback and setpt limit or setback or setpt limit, 1% for boiler output change or scheduling only; % Space Heating – ENERGY STAR Building Manual Chapter on K-10 Schools

Table C- 7: Maintenance Practice Changes Calculation Example

Category Type	**Measure Type**
Maintenance Practices	**Change Air Filters More Often**
kWh Savings	Savings = % Cooling Area x % Savings x Space Cooling kWh Usage after EC's/BC's Space Cooling kWh Usage after EC's/BC's = Space Cooling kWh Usage – kWh Savings from Space Cooling EC's/BC's Space Cooling kWh Usage = kWh Usage x % Space Cooling
MMBtu Savings	Savings = % Heating Area x % Savings x Space Heating MMBtu Usage after EC's/BC's Space Heating MMBtu Usage after EC's/BC's = Space Heating MMBtu Usage – MMBtu Savings from Space Heating EC's/BC's Space Heating MMBtu Usage = MMBtu Usage x % Space Heating
Sources	% Savings – "Life-Cycle Costing of Air Filtration," ASHRAE Journal November 2005, 4-5% savings claimed in journal, GDS estimated 2% savings from air filter changing more often; % Space Cooling & % Space Heating – ENERGY STAR Building Manual Chapter on K-10 Schools

Table C- 8: Other Staff Changes Calculation Example

Category Type	**Measure Type**
Other Staff Changes	**Turn Lights Off**
kWh Savings	Savings = % Area Affected % Savings x Lighting kWh Usage after EC's Lighting kWh Usage after EC's = Area x Lighting Power Density x Hours x (1 kW / 1000 W) – Lighting kWh Savings Savings Reduction if Occupancy Sensors installed = 100% (savings reduced to 0)
MMBtu Savings	N/A
Sources	Lighting Power Density – New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs, October 2010, p225; Lighting kWh Savings – Results from other related EC's

Table C- 9: Other Behavioral Changes Calculation Example

Category Type	**Measure Type**
Additional Changes	**Pledge to Reduce Energy**
kWh Savings	Savings = % Savings x kWh Usage after EC's/BC's
MMBtu Savings	Savings = % Savings x MMBtu Usage after EC's/BC's
Sources	Sources: % Savings – 0.25% savings due to a pledge being less effective than a goal, http://www.epa.gov/statelocalclimate/documents/pdf/k-12_guide.pdf ; kWh Usage & MMBtu Usage after EC's/BC's – (Energy Usage – Results from other related EC's/BC's)

Appendix D

Data Sources for Deemed Savings Analysis

APPENDIX D.

DATA SOURCES FOR DEEMED SAVINGS ANALYSIS

D.1.1.1 Telephone Surveys

The survey instrument was essential as a starting point to determine what analysis would be required and what data sources would be utilized to estimate savings. Through the survey instrument, a list of measure to analyze was defined in addition to the magnitude of the install. The magnitude of the install as a percentage of overall system affected was a major factor in our analysis and helped inform the team of measures that were very minor and would result in minimal savings and of measures that were substantial and would result in greater savings.

D.1.1.2 NYSERDA Focus Program Tracking Database

This source provided basic information for each facility that can be used to inform savings estimates for a number of measure types. This data included things like facility square footage, number of faculty students and staff, facility age, occupied hours, heating and cooling degree days and number of computers. This data in tandem with other sources provided the necessary tools to approximate energy savings. The program tacking database also provides a total energy consumption figure for both annual kWh and MMBtu use. This figures was used in the deemed savings analysis as a check in the overall estimates of savings. If the savings for a school was found to be greater than the total reported annual energy usage, a revision of the underlying assumptions was changed to appropriately calibrate expected savings figures.

D.1.1.3 NYSERDA Deemed Savings Databases

NYSERDA's deemed savings database was used to estimate energy savings associated the following measure types:

- Tank insulation increase on hot water heaters
- Air Source Unitary or Split System HVAC (HVAC system upgrade)
- Programmable Thermostats
- Dishwasher Upgrades

D.1.1.4 New York (State) Technical Reference Manual

The New York TRM is a useful resource for estimating energy savings for a number of efficiency improvements. Several measures in the TRM also have deemed savings factors. The New York TRM was heavily relied on and often the first source of information used in creating savings estimates. Examples of the types of measures this resource was used on include:

- Insulation Measures
- Windows and Doors
- Air Sealing
- Efficient Lighting
- Water Heating
- Energy Management Systems
- Freezer and Refrigeration

- Fan Motors
- Others

D.1.1.5 Historical Weather Data

Historical weather data such as heating and cooling degree days assisted with calculating energy savings associated with heating or cooling system improvements. This data was often used in tandem with deemed savings data from the TRM. The historical weather data was found in the NYERDA Focus Program Tracking Database.

D.1.1.6 Other Data Sources

Other data sources used include the ENERGY STAR web site which provides useful data by facility type. This data includes information such as the percentage of energy consumption by end use for a given facility. Additionally, the ENERGY STAR commercial cooking equipment estimator was used to estimate savings associated with kitchen improvements.

Appendix E

Influence Factors by Measure Category

APPENDIX E.

INFLUENCE FACTORS BY MEASURE CATEGORY

E-1: Influence Factor by Measure Category, kWh

Measure Category	Average Influence Factor for Category	% kWh Deemed Savings	Influence Factor * % kWh Savings
Energy Conservation Measures			
Building Envelope	39.7%	1.0%	0.0041
Lighting	59.9%	49.6%	0.2972
HVAC and Water Heating	45.1%	14.2%	0.0639
Cooking and Refrigeration	35.6%	1.4%	0.0051
Other	7.0%	19.8%	0.0139
Behavioral Change Measures			
Changes to Building Systems	51.8%	8.5%	0.0439
Changes to Maintenance Practices	52.7%	5.5%	0.0289
Weighted Influence Factor (kWh)	--	--	.4571

E-2: Influence Factor by Measure Category, MMBtu

Measure Category	Average Influence Factor for Category	% MMBtu Deemed Savings	Influence Factor * % MMBtu Savings
Energy Conservation Measures			
Building Envelope	39.7%	24.9%	0.0988
Lighting	59.9%	0.0%	0.0000
HVAC and Water Heating	45.1%	31.6%	0.1423
Cooking and Refrigeration	35.6%	1.3%	0.0045
Other	7.0%	0.2%	0.0001
Behavioral Change Measures			
Changes to Building Systems	51.8%	22.0%	0.1139
Changes to Maintenance Practices	52.7%	20.1%	0.1061
Weighted Influence Factor (MMBtu)	--	--	.4657