

Small Commercial Energy Efficiency Program Impact Evaluation (July 2010–December 2013)

Final Report

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**The New York State
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ABSTRACT

This report describes the impact evaluation of New York State Energy Research and Development Authority's (NYSERDA's) Small Commercial Energy Efficiency Program (the Program). The program provides free energy audits to smaller commercial and not-for-profit organizations.

The Impact Evaluation Team assessed the net savings caused by Program-funded audits completed between July 1, 2010, and December 31, 2013. The analysis was based on a telephone survey of a sample of participants and included evaluation of the measure adoption rate, free ridership, spillover, and overlap. The savings realization rate of adopted measures and a phone survey correction factor were deemed from previous impact evaluation results.

The Program electric measure adoption rate is 0.54 and the fossil fuel rate is 0.33. The Program free ridership is 0.13, overlap is 0.05, and spillover is 0.11. This report also provides recommendations that seek to improve Program effectiveness, with consideration to forthcoming Program revisions associated with the Clean Energy Fund the Reforming the Energy Vision regulatory proceeding.

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SECTION 1: EXECUTIVE SUMMARY

This report describes the impact evaluation of the New York State Energy Research and Development Authority's (NYSERDA) Small Commercial Energy Efficiency Program (the Program) for audits that were completed between July 1, 2010 and December 31, 2013.

The objective of this impact evaluation was to estimate the evaluated gross savings for the Program, which includes electric energy and demand and fossil fuel energy savings, and to provide recommendations that seek to improve Program effectiveness, with consideration to forthcoming Program revisions associated with the Clean Energy Fund (CEF) and Reforming the Energy Vision (REV) regulatory proceedings.¹

1.1 APPROACH

Green Jobs Green New York (GJGNY) funded 1,941 audits that were completed through the Program between July 1, 2010, and December 31, 2013. The evaluators estimated gross and net savings based on data collected from a telephone survey of a statistically representative sample of 220 decision-makers who received completed audits. Prior to the survey, engineers reviewed 644 sampled reports to extract information to inform a customized script for each sampled audit to be used by the survey contractor for conducting professional interviews. The 220 completed interviews included batteries of questions regarding the adoption rate of recommended measures, free ridership (FR), spillover (SO), and the extent to which implemented projects recommended in the audits later received installation incentives from NYSERDA or other entities (program overlap). A short survey of current study providers followed the participant survey to corroborate or contradict findings and give context to the information. Reviews of measure adoption rates (MARs) as a function of measure type, building type, fuel type, and other factors were examined to identify trends and opportunities for improvement. The evaluators used deemed values for two factors that were not investigated as part of this effort from a previously completed impact evaluation: savings realization rate (evaluated/study-recommended savings for installed measures) and the MAR correction factor (evaluator on-site/decision-maker telephone survey MAR).

¹ *Clean Energy Fund Supplement*, filed by NYSERDA June 25, 2015, as part of proceedings for Case 14-M-0094 and *Reforming the Energy Vision*, NYS Department of Public Service Staff Report and Proposal – Case 14-M-0101, 4/24/14.

1.2 RESULTS

Table 1-1 summarizes the results of the evaluation.

Table 1-1. Impact Evaluation Results

Small Commercial Energy Efficiency Program	Electric Energy (kWh)	Demand (kW)	Fuel (MMBtu)¹
Study-recommended and tracked savings	13,431,113	11,062	113,329
Measure adoption rate (MAR)	0.54	0.54	0.33
Savings realization rate (SRR) and MAR correction factor (CF) ²	0.86	0.86	0.86
Installed savings (Adjusted gross impact)	6,239,923	5,139	32,453
Net-to-gross ratio	0.93	0.93	0.93
Net impact of 1,941 audits completed July 1, 2010 – December 31, 2013	5,809,369	4,785	30,214

¹Fuel savings are a mix of natural gas, oil, liquid propane, district steam, and coal.

²NYSERDA can use a combined factor of 0.46 for electric and 0.28 for gas to adjust the study-recommended and tracked savings and to calculate the adjusted gross impact.

1.2.1 Measure Adoption Rate Results

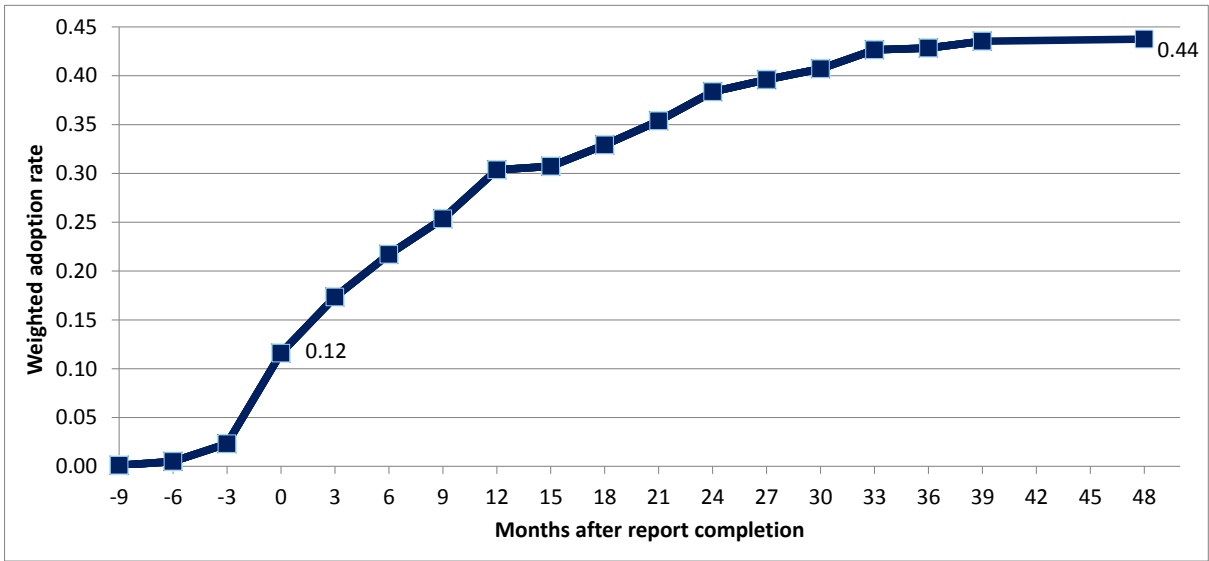
The total program long-term MAR for the combination of electricity and natural gas-saving measures is 0.44. The relative precision for the MAR result for all fuels was calculated to be 8.3% at 90% confidence.

The MAR varied based on measure type and fuel type with lighting and controls measures being the most commonly installed. The weighted MAR for controls and lighting were 0.67 and 0.65, respectively, while HVAC was at the low end with a 0.22 adoption rate. Additionally, electric measures were much more commonly installed than fossil fuel-saving measures, as can be seen in the MARs in Table 1-1.

Commercial properties were almost twice as likely to install measures as not-for-profit institutions (0.52 versus 0.28 MAR). Out of the four regions in the state, Region 1 had the highest installation rate at 0.56.

Figure 1 illustrates the MAR over time, based on customer responses associated with 954 measures recommended in the 220 audits. Eventually, 44% of the savings associated with recommended measures was implemented by study recipients. About three-quarters (70%) of those savings were realized within one year of the study completion and 87% within two years, but implementation continues through the third and fourth years.

Figure 1-1. Small Commercial Energy Efficiency MAR over Time



A significant proportion of the measures, 12%, was reportedly installed prior to the audit complete date. These measures are represented by negative values on the x-axis of the plot above. This finding is discussed further in Section 1.3 and Section 4.

1.2.2 Net-to-Gross Ratio Results

The total net-to-gross ratio (NTGR) was calculated to be 0.93 for the Program. This was calculated from the combination of free ridership, overlap and participant spillover. Nonparticipant spillover and market effects were not investigated. The results for each of the evaluated factors can be seen in Table 1-2.

Table 1-2. Net-to-Gross Ratio

Factors	Ratio
Free ridership	0.13
Overlap	0.05
Participant spillover	0.11
Total	0.93

All factors were derived from questions asked in the survey. Free ridership used a combination of questions asked regarding program influence as well as data collected on the measure installation dates to calculate a total factor.

The above factors are combined to calculate the total NTGR as:

$$(1 - 0.13 + 0.11) \times (1 - 0.05) = \mathbf{0.93}$$

1.2.3 Overall Precision

The analysts computed estimates of MAR, OL, FR, and SO, and the relative precision of each of them at 90% confidence based on sampling uncertainty. The net impact factor combines all of these factors and two others assumed from other research, CF and SRR, to represent the overall proportion of recommended savings that analysts estimate the program caused. Likewise the analysts estimated the combined uncertainty of the research variables associated with the net impact factor used propagation of error relationships. The overall relative precision of the net impact factor is 10.2%.²

1.3 FINDINGS AND RECOMMENDATIONS

The Impact Evaluation Team offers four findings and recommendations based on the impact evaluation research. These recommendations follow each explanatory paragraph in the list below.

1. **The Program has low overlap with installation incentive programs.** Overlap was found to be only 5%. This is a low number for a program that could work well as a feeder to other implementation programs within and outside of NYSEERDA. Increased overlap could potentially reduce savings attributed to this program but increase total savings statewide.

Recommendation: The evaluators recommend enhancing the scope of the technical services and audit to provide a more formal link of the audit process with installation/incentive programs. This could include links to the homepages of those incentive programs in the reports. It should also include enhanced discussion during the report presentation about the customer's plans to install measures, program eligibility, and information about implementation of program processes, such as how to apply. Last, it should ask if the customer would like additional follow-up and can provide contact information for staff from the most appropriate implementation program, inclusive of both NYSEERDA and non-NYSEERDA offerings as applicable.

2. **MAR varies markedly by region.** The two regions with the higher MARs (Region 1 at 0.56 and Region 3 at 0.48) substantially exceeded those of Regions 2 and 4 (0.31 and 0.37, respectively).

² While not an exact measure of the relative precision of the net impact factor, it is indicative. It is not exact because there is no uncertainty associated or propagated from the assumed variables and NPSO was excluded. Also, the propagation captures only the sampling uncertainty of the overall variable estimates from each respondent; it does not include measurement uncertainty associated with the individual components of the estimated research variables.

Recommendation: The evaluators believe this to be an opportunity to translate lessons learned between regions. Topics to target would include whether or not there are techniques used in higher-performing regions that lower-performing regions could emulate. Or, conversely, perhaps the high performing regions are targeting more of the low-hanging fruit or already installed measures at the expense of deeper and more robust energy savings. Based on a review of the data compiled during this evaluation for projects with completed surveys, in Regions 1,3 and 4 lighting represented the highest level of recommended savings whereas in Region 2 HVAC was the highest. This difference could be one of the contributing factors to the varying MARs. Additional comparative research could identify opportunities to increase savings.

3. **Lighting and control measures have the highest rate of installation.** Adoption of lighting and controls measures was found to be the highest of the various technology end uses tracked in the dataset of record (DOR), with 67% of the recommended savings from controls measures and 65% of the recommended savings from lighting measures that would ultimately be installed were installed within 48 months of report completion. The evaluators believe that this is due to these measures being the most accessible, having the lowest up-front costs/fastest paybacks for customers to install and having the most favorable cost-effectiveness.

Recommendation: The evaluators recommend encouraging auditors to address concerns about performance risk or capital more aggressively for HVAC or other complex or expensive measures. This can be done through additional content in the report and in a discussion during the presentation of results.

4. **Financing is not attractive.** About 2% of the total program participants were found to have also participated in the financing option offered by the Program. Service providers reported that customers find this offering complicated and not accessible to the small commercial and not-for-profit market.

Recommendation: The Program should consider eliminating or redesigning the process for this class of customer. Alternately, simplification of the paperwork involved and additional outreach and education on the offerings would help to increase participation in financing, and potentially may increase measure adoption.

SECTION 2: INTRODUCTION

This section presents a program description, the evaluation goals, and a summary of the previous evaluations.

2.1 PROGRAM DESCRIPTION

The Program, made available by the GJGNY Act of 2009, offers free energy audits to small (no more than 10 full-time equivalent employees and no more than 100 kW average annual demand) business and not-for-profit organizations. Between November 2010 and September 2013 NYSERDA leveraged American Recovery and Reinvestment Act (ARRA) funding to offer energy audits to small business and not-for-profit organizations with 100 employees or less.

The Program funds between 500 and 800 audits per year. Four competitively selected consulting firms currently provide the audits in four geographical regions of the state. The most common recommendations included in the audits are for lighting upgrades with 94% of the projects having at least one lighting measure recommended.

Prior to January 2012, NYSERDA offered GJGNY services to small business and not-for-profit customers through two separate programs: the FlexTech Audit Program, which used GJGNY funding to provide free energy audits to small business and not-for-profit customers, and the GJGNY Energy Efficiency Financing Program, which offered low-interest energy efficiency financing to customers. This program design did not offer dedicated implementation services to help energy assessment recipients identify and access available incentives and financing to implement measures identified in energy assessment reports. The program began offering implementation and technical assistance to customers interested in implementing energy efficiency improvements recommended in a program energy assessment in January 2014.

The third separately contracted part of the program is financing. NYSERDA has partnered with lenders across New York State to offer low-interest loans to support implementation of measures identified in the audits. For the evaluation period, less than 2% of study recipients participated in NYSERDA's financing service.

2.1.1 Summary of Program-Estimated Savings

This evaluation covered audits completed between July 1, 2010, and December 31, 2013. The Program has not formally been evaluated in the past, and therefore program staff has used an

estimated adoption rate of 20% to estimate energy savings values for GJGNY Advisory Council³ reports, as shown in Table 2-1.

Table 2-1. Program-Estimated Savings (July 1, 2010 – December 31, 2013)

Parameter	Electric Energy (kWh)	Demand (kW)	Fuel (MMBtu)
Study-recommended and tracked savings	13,431,113	11,062	113,329
Program staff estimated savings achievement factor	20%	20%	20%
Program estimate of achieved savings	2,686,223	2,212	22,666
Evaluated savings	5,809,369	4,785	30,214

2.2 EVALUATION OBJECTIVES

The Impact Evaluation Team’s primary objectives were to:

1. Quantify the measure adoption rate (MAR) over time. The MAR is a ratio that quantifies the percentage of recommended savings that customers chose to adopt after receiving a free audit through the Program.
2. Quantify the degree of the Program’s influence on participants’ decision-making regarding recommended measures that they have installed (study and installation free ridership).
3. Quantify the proportion of installed measures for which customers received funding from NYSERDA or other sources (overlap).
4. Preliminary review of financing performance.

The evaluators included scope to quantify spillover. The savings realization rate (SRR) was not a subject of primary research.

2.3 PREVIOUS EVALUATIONS

This is the Program’s first impact evaluation, and the Program’s first process evaluation was completed in 2014. There have been no other evaluations performed for the Program. The plan

³ *Green Jobs – Green New York Annual Report* filed each year by NYSERDA as required by the Green Jobs-Green New York Act of 2009 and provides an update on the progress and achievements of GJGNY through each annual reporting period.

for this impact evaluation borrowed many principles and used deemed factors developed from the FlexTech impact evaluation completed in 2012.

SECTION 3: METHODS

Section 3 describes the methods used to develop impact estimates.

3.1 GROSS SAVINGS EVALUATION METHODS

This section describes the techniques used to estimate the savings that result from implementation of the measures recommended in the program audits.

3.1.1 Measure Adoption Rate

The primary objective of this evaluation was the development of the MAR. The MAR_{phone} is defined as follows:

$$MAR_{phone} = \frac{\text{Assessment's estimate of savings for measures reported installed by the phone interview respondent}}{\text{Assessment's estimate of savings for all measures recommended for installation}}$$

Measure adoption occurs over time as participants explore the measures further after the initial identification in the assessment and then solicit contractor quotes and prepare for construction, or perhaps wait for cash flow conditions to improve to allow for implementation. The evaluation design was to conduct a telephone survey of respondents that received audits between one and four years prior to the survey, collect information on which measures they implemented and when, and build an MAR curve (MAR over time). The final plateau represents the long-term MAR that can be used to project installed savings from the Program.

Preceding the calls, a team of engineers reviewed the project tracking database and the assessment reports themselves and wrote detailed and site-specific descriptions of the proposed measures for interviewers to use. The engineers also categorized each measure. These measure details were entered into a database integrated with other project tracking data that was used as the data source for the MAR surveys.

Interviewers asked respondents about the MAR separately for each recommended measure. Audits included as few as one and up to twenty different measures. To limit interview time the interviewer asked only about the five largest savings measures.

The survey results were then used to quantify the total estimated installed savings out of the total population-recommended savings. The evaluators calculated the overall MAR as a function of fuel type, market section, end-use category, and region.

3.1.2 Measure Adoption Rate On-Site Correction Factor

The telephone interview-based responses to the installation descriptions were not assumed to be perfect. The MAR on-site correction factor (CF) is a ratio used to account for the accuracy of the telephone MAR responses.⁴ It is defined as follows:

$$CF = \frac{\text{Assessment's estimate of savings for measures observed to be installed by the evaluator}}{\text{Assessment's estimate of savings for measures reported installed by the phone interview respondent}}$$

The numerator of the MAR and the denominator of the CF are the same.

On-site research was not in the scope of this evaluation. In order to still account for this phenomenon, the Impact Evaluation Team has estimated the CF based directly on the results of the prior FlexTech evaluation, which found a CF of 0.93.

3.1.3 Savings Realization Rate

The savings realization rate (SRR) is the proportion of assessment-estimated savings for installed measures that the evaluators find to be accruing to customers.

$$SRR = \frac{\text{Evaluator's estimate of savings for measures observed to be installed by the evaluator}}{\text{Assessment's estimate of savings for measures observed to be installed by the evaluator}}$$

The numerator of the MAR correction factor and the denominator of the SRR are the same.

The on-site research requisite for program-specific SRR estimation was not within the scope of this evaluation because of limited funding and the belief that it is not among the most uncertain parameters in the evaluation. As with the CF the Impact Evaluation Team has estimated the SRR based directly on the results of the prior FlexTech evaluation, which had an SRR of 0.92.

3.2 NET-TO-GROSS METHODS

The savings attributed to the Program are equal to the recommended and installed savings induced by the program effort, above and beyond what would have occurred in the absence of the Program. This requires estimating the proportion of direct program savings that would have occurred without the Program (free ridership (FR)) and the indirect savings induced by the

⁴In the FlexTech evaluation, the Impact Evaluation Team inspected projects installed in the field and compared what was observed as installed with what was described in the telephone interviews as being installed. Discrepancies between the two were identified and associated with the MAR on-site correction factor. It was not considered a factor that discounted or increased the SRR because it reflects error in the telephone MAR estimate, not under- or over-performance in savings by the installed measure, the traditional use of the realization rate metric.

Program for both participants and nonparticipants (participant SO and NPSO). It also includes accounting for measures that also received funding through other programs (OL). This section discusses the methods that were used to assess these four components of net savings: FR, SO, NPSO, and OL. These factors are combined to compute the NTGR through the following formula:

$$\text{NTGR} = (1 - \text{FR} + \text{SO} + \text{NPSO} + \text{ME}) \times (1 - \text{OL})$$

A single survey instrument was used to collect data for both the MAR and attribution. The Impact Evaluation Team also interviewed the current assessment providers to validate and give context to the recipient data.

3.2.1 Free Ridership

The Impact Evaluation Team examined FR using a basic self-report survey method for specific measures. The survey instrument was based upon those used for the FlexTech program's impact evaluation, which in turn is based on the program influence index model (PIIM). The evaluators simplified and adapted the FlexTech survey instrument for this program's audience of small business managers and conventional technologies. This participant questionnaire can be viewed in Appendix B of this report. The evaluators used the more open-ended discussions with the four service providers to probe FR from their perspective (see Appendix D), but this data was not used in the calculations.

The installation FR portion of the questionnaire was measure-specific. The influence of the Program on installation decision-making was posed separately for up to three installed measures. Separately, the respondent was asked about program influence on the decision to have a facility audit. These measure installation FR and study FR components were combined into one FR value for each site. The instrument contained a series of eight questions on the program influence of the measures and five questions on program influence of the audit. The algorithms used for this combination can be seen in Appendix C of this document.

In addition to the survey results, evaluators quantified FR that was the direct result of self-reported installation dates during the measure adoption portion of the survey. The MAR curve showed that there were negative values on the x-axis, which indicated that the measure installation date actually occurred prior to the audit complete date. The evaluators believe there are three possible reasons for this to occur:

- 1) Error in respondent's self-reported installation date or program tracking errors (the actual installation occurred after receipt of the completed study).

- 2) The audit report “recommends” and estimates savings for measures that are already being implemented, but for which the customer values the independent economic analysis.
- 3) Customers started installation immediately after the initial auditor site visit and because of it, but prior to the audit complete date.

Reason #2 reflects FR. If a customer installs a measure prior to program involvement, then that measure’s savings are not attributable to the program. Reasons #1 and #3 do not reflect FR. Due to the fact that there is uncertainty in the self-reported installation dates, as well as the fact that the facility may have started installation based on a verbal recommendation during the site visit but prior to the audit report being complete, which could still be considered attributable to the program, the evaluators did not include all of the measures that were reported on or before the audit complete date in the FR category. There also is likely overlap between early installation-based FR and survey response-based FR. In an effort to account for the report development and review time, overlap and other factors, evaluators increased the survey-based FR by the MAR% that occurred more than five months prior to the reported audit completion date.⁵

3.2.2 Assessment Recipient Spillover

The same participants were asked about whether any additional measures were installed independent of NYSERDA’s programs at the participating site or any of their other facilities located in New York State and to which they attribute the influence of their participation in the Program. Questions were also asked regarding the installation of measures that were studied as part of the audit, but ultimately were not recommended. If these measures were reported as installed they were also considered to be the result of program SO. The service providers were also asked their opinions about the potential for recipient SO for context.

3.2.3 Assessment Provider Outside Spillover

Each of the four service providers was asked about potential SO by their firms with nonparticipants. See Appendix D for this questionnaire.

3.2.4 Nonparticipant Spillover

Given the program design, NPSO was not researched and was assumed to be negligible.

⁵ Both the service providers and Program staff felt that three to five months was a typical time from site visit to the audit completion. As will be shown later in the results, the MAR curve supports the five-month time period, as it sharply increases about three months prior to the audit complete date. Evaluators believe that adoption occurring in the five months prior to audit report completion should not be added to program FR.

3.2.5 Market Effects

The Program is designed to support the market for technical assistance services by covering the costs of small-firm audits. Market effects (ME) could occur if these efforts can be linked to an expansion of market for such services or generally increasing customer awareness and acceptance of energy efficiency technology. The Impact Evaluation Team planned to interview any former service providers whose contracts expired and were not renewed to learn more about what these individuals are now doing. During the course of the evaluation, this plan was discussed further with NYSERDA and eliminated from the scope of work.

3.3 SAMPLE DESIGN

The evaluation's data collection centered on a telephone survey of a sample from the population of 1,941 decision-makers who received a completed assessment between July 1, 2010, and December 31, 2013. The population included only GJGNY-funded assessment recipients. The evaluators used stratified random sampling to select a sample of study recipients to call. The measure of size was the total source-equivalent energy savings of all measures recommended for implementation in the assessment. The upper-level stratification variables included three segments representing one-year groups to ensure accurate representation over time.

Size was used as the lower-level stratification variable. Four size categories were defined for each segment, and cutoffs were established using the method described in the *2004 California Evaluation Framework*.⁶

3.3.1 Measure Adoption Sample Design

The sample design excluded six projects with zero savings and one project with negative total source MMBtu savings⁷. Of the remaining 1,934 audits, the evaluators drew a sample of 644 of them to attempt calls, anticipating a 33% completion rate⁸ in order to complete 215 interviews.

⁶ TecMarket Works, et. al. *The California Evaluation Framework*. Project Number: K2033910. Prepared for the California Public Utilities Commission and the Project Advisory Group. June 2004. Pages 327–339 and 361–384.

⁷ Projects could have zero savings if the explored measures were found to have long paybacks or were not deemed cost effective and therefore were not recommended in the audit, or, if fuel savings that were recommended as negative (an increase in fuel use) outweighed recommended electric savings when these fuels were combined into source equivalent MMBtu units.

⁸ The 33% completion rate was based on the response rates observed in the previous process evaluation of the Program. NYSERDA's Process/Market Evaluation Team performed a census attempt of the population of interest in 2013 (926 qualified study recipients) and completed 318 interviews, a 34% response rate.

This was the necessary quantity to achieve 9% relative precision at 90% confidence on the program-level MAR and 12% to 15% relative precision for each of the program years, assuming a coefficient of variance of 0.6.⁹ Through the survey implementation a 34% response rate was achieved and 220 interviews were completed.

Table 3-1. Work Plan Sample Frame

Evaluation Year	Project Count	Project Count (Zero or negative savings)	Recommended Source-Equivalent MMBtu Savings	Sampled Audits	Expected Complete Interviews (33% response)
June 2010 – Dec 2011 ^a	576	2	81,313	220	73
Jan 2012 – Dec 2012	798	3	86,418	231	77
Jan 2013 – Dec 2013	567	2	81,529	193	64
Total	1,941	7	249,260	644	215

^aThere were only five energy-saving projects in 2010.

The actual survey completion rate averaged about 34% and 220 interviews were completed. Table 3-2 shows the breakdown of the number of completes by year. Due to some difficulty with the response rate, the expected number of completes could not be met in the June 2010 – December 2011 year bin, however additional completes were achieved in the other two-year bins.

Table 3-2. Completed Interviews

Evaluation Year	Expected Complete Interviews (33% response)	Actual Completed Interviews
June 2010 – Dec 2011	73	63
Jan 2012 – Dec 2012	77	83
Jan 2013 – Dec 2013	64	74
Total	215	220

Survey Disposition

Survey protocols required that each site in the sample be contacted up to 10 times at different times of the day and days of the week. Attempts were made to contact all 644 of the facilities in

NYSERDA Small Commercial Energy Efficiency Program Market and Process Evaluation Draft Report, prepared for NYSERDA by Research Into Action and Tetra Tech, January, 2014, pp. 2–3.

⁹ See Section 3 of *The Small Commercial Energy Efficiency Program Impact Evaluation (2010–2013) Work Plan*, ERS 11-13-14, for additional details on the sample design.

the sample frame. The overall response rate for the MAR survey was 34%, as shown in Table 3-3. Response rates were reviewed by groups to assess whether specific segments of the population were disproportionately represented in the survey responses. The likelihood of non-response bias was found to be low.

Table 3-3. Measure Adoption Rate Survey Disposition

Disposition	Random Stratum
Total number of studies in sample frame	644
Completed survey	220
Could not reach	354
Refusals	42
Incorrect or bad phone numbers	39
Response rate	34%

3.3.2 Attribution Sample Design

The evaluation of FR was based on self-reports of assessment recipients collected during the same phone survey as the MAR research. The FR battery was asked of every MAR-surveyed recipient that installed at least one measure.

FR depends on the respondent’s description of their experience in the context of both receiving the assessment and their later installation of measures. This had potential ramifications for the survey design, because the survey population had received their audits up to four years prior to the telephone interviews. This is a long time over which to recall the original decision-making context. The evaluation team assessed the quality of FR (and overlap) responses for older audits that led to the installation of measures more than three years prior to the attribution survey. This review consisted of looking at the number of responders who “did not know” relative to the total responses as well as the consistency of responses within individual surveys. The quality of the responses was found to be acceptable and no respondents were eliminated from the survey results in calculating FR.

The SO and OL sample were also from the same group of assessment recipients as the MAR sample.

3.3.3 Precision and Bias

The key attribution parameters were collected based on the same sample as the MAR. Table 3-1 above, therefore, is equally representative of attribution as the MAR. Assuming the same variability on the attribution parameters as with MAR, attribution parameter sampling precision

was planned to be 90/10 to 90/15 on each parameter at the upper-level strata and 90/6 at the program level.

Calculating the Program's net impact and its precision was not a primary objective, and the plan did not specify a target value for its associated precision.

SECTION 4: RESULTS, FINDINGS, AND RECOMMENDATIONS

This section presents the results and findings from the gross savings evaluation. The section concludes with recommendations.

4.1 GROSS ENERGY SAVINGS RESULTS

The primary factor developed as part of this effort to determine gross savings was the MAR.

4.1.1 Measure Adoption Rate and Program Energy Savings

The MAR for audits completed between July 1, 2010, and December 31, 2013, is calculated as the total savings reported as being installed over the total savings recommended by the Program. The long-term MAR and gross savings by fuel type are shown in Table 4-1.

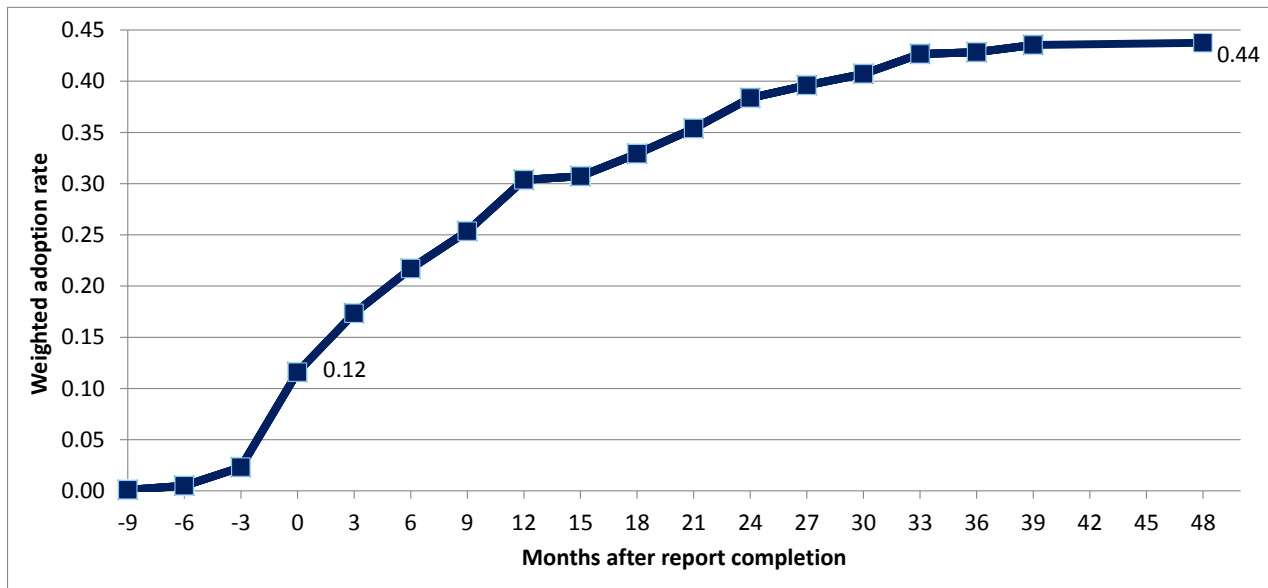
Table 4-1. Study Recommended and Evaluated Gross Energy Savings

Parameter	Study Recommended Savings	Measure Adoption Rate	Installed savings (Adjusted gross impact)
Electric energy (kWh/yr)	13,431,113	0.54	6,239,923
Electric demand (MW)	11.1	0.54	16.7
Fossil fuel (MMBtu)	113,329	0.33	32,453

The combined MAR for all energy sources is 0.44. The final relative precision on the combined MAR estimate is 8.4% at 90% confidence.

Analysts analyzed the MAR over time, as described in the methodology, using the sample design's expansion weight associated with the study multiplied by the source equivalent energy savings to represent the relative influence of each measure on the results. The MAR over time can be seen in Figure 4-1.

Figure 4-1. Measure Adoption Rate over Time (Months after audit completion date)



Thirty percent of the measures recommended were installed within one year of the audit complete date, and the long-term MAR is estimated at 0.44 and is reached within four years of an audit being completed. By two years after an audit is complete about 38% of the measures had been installed (86% of the eventual total). Within this market, the vast majority of any measures that will be installed are installed after two years of the audit completion.

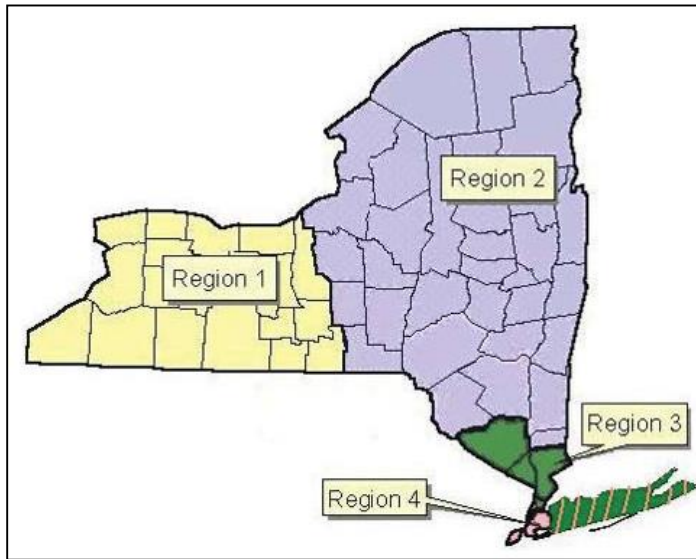
About 12% of measures were reported as being installed either on or prior to the Program-reported audit complete date. This phenomenon had a significant impact on FR and is discussed further in Section 4.2.1.

MAR Breakdowns

In addition to looking at the total program MAR, the evaluators also looked at the MAR by region, market sector, and technology end use.

Four consulting firms provided the audits in four geographic regions of the state, as shown in Figure 4-2. During the evaluation period, regions 1 through 4 were served by C. J. Brown Energy, L&S Energy Services, Daylight Savings, and EME, respectively.

Figure 4-2. Small Commercial Program Regions



The MAR did vary across the four regions. The region with the lowest installation rate was Region 2, while the region with the highest installation rate was Region 1. A breakdown of the MAR value by region can be seen in Table 4-2.

Table 4-2. Measure Adoption Rate by Region

Region	Weighted Measure Adoption Rate
1	0.56
2	0.31
3	0.48
4	0.37
Average	0.44

The MAR results were also stratified based on the market sector. These results can be seen in Table 4-3.

Table 4-3. Measure Adoption Rate by Market Sector

Market Type	Number of Completed Surveys	Weighted Measure Adoption Rate ¹
Commercial	137	0.52
Industrial	1	0.00
Institutional	1	1.00
Not for profit	81	0.31
Total	220	0.44

¹The total of 0.44 represents a weighted average based on savings

The evaluators used four different market sectors that were indicated in the tracking data; however, two of these sectors only had one completed interview in each. For the two more populated market types, it is clear that small commercial property managers are much more likely to implement the recommended measures than small not-for-profit institution site managers.

Finally, the evaluators looked at the MAR for each technology end use that was in the tracking data. The breakdown by end use is presented in Table 4-4.

Table 4-4. Measure Adoption Rate by End Use

End Use	Weighted Measure Adoption Rate¹
Controls	0.67
Lighting	0.65
Custom	0.38
DHW	0.30
Envelope	0.27
HVAC	0.22
Total	0.44

¹The total of 0.44 represents a weighted average based on savings

Controls and lighting measures were the measures most commonly adopted. HVAC had the lowest adoption rate. This is consistent with other evaluations of study programs. Controls and lighting measures generally have the lowest upfront cost and are considered the most accessible to customers. This phenomenon is addressed further in the recommendations section.

Measure Adoption Rate Outlier

During the evaluation, one audit in the sample was identified as having recommended conspicuously large natural gas savings compared to the rest of the projects in the sample. This site had recommended gas savings of 12,575 MMBtu. This figure represents 11% of the total fossil fuel recommended savings in the population, and over 30% of the MMBtu savings in the sample and was more than three times the savings of the next largest study in the sample. Upon investigation the evaluators found that the fuel type was entered incorrectly in the tracking data, and the value should have been 12,575 kWh. The evaluators reviewed the entire population, determined that this audit was indeed a unique outlier, and post-stratified the sample, effectively assigning this project its own stratum and an expansion weight of 1.0, and causing the weight for the stratum the study previously was in to become slightly larger. The study had a MAR of 0, so the removal of this audit from the sample slightly increased the program-level MAR, improved the relative precision, and had no effect on the attribution results or precision.

4.2 ATTRIBUTION AND NET SAVINGS RESULTS

The total NTGR was calculated to be 0.93 for the program. This was derived from a combination of free ridership (FR), overlap (OL) and participant spillover (SO). The results for each of these factors can be seen in Table 4-5.

Table 4-5. Net-to-Gross Ratio

Factors	Ratio ¹
Free ridership (FR)	0.13
Overlap (OL)	0.05
Participant spillover (SO)	0.11
Total	0.93

¹The total NTGR is calculated using the formula in Section 3.2

All factors were derived from questions asked in the survey. NPSO and ME were not investigated beyond qualitative questions asked of the four study contractors. They reported no such effects.

4.2.1 Free Ridership

The total survey-based FR was 10%. As discussed in Section 3.2.1 questions were asked regarding the influence of the program on the facility receiving an audit, as well as the influence of the program on the installation of measures (for those that were reported as being installed). The majority of the FR resulted from customers who otherwise would have purchased an energy study in the absence of program as opposed to measures that were going to be installed without the study.

FR did not vary significantly by fuel type, region, or measure type. Tables 4-6 through 4-8 provide the FR breakdown of each.

Table 4-6. Free-Ridership Breakdown by Fuel

Savings Type	Free Ridership Rate ¹
Electric (kWh)	0.10
Natural gas (MMBtu)	0.10
Other (MMBtu)	0.10
Total	0.10

¹The total of 0.10 represents a weighted average based on savings

Table 4-7. Free-Ridership Breakdown by Region

Geographic Region	Free Ridership Rate ¹
1	0.10
2	0.10
3	0.11
4	0.05
Total	0.10

¹The total of 0.10 represents a weighted average based on savings

Table 4-8. Free-Ridership Breakdown by Measure Type

Measure Category	Free Ridership Rate ¹
Controls	0.07
Custom	0.13
DHW	0.09
Envelope	0.12
HVAC	0.13
Lighting	0.10
Total	0.10

¹The total of 0.10 represents a weighted average based on savings

Measures with savings totaling 12% of recommended measure savings were adopted prior to the reported study completion date, as shown in the MAR curve. Three possible reasons for this phenomenon were discussed in the Section 3.2.1, one of which was indicative of FR.

Approximately 1% of the recommended measure savings, representing 3% of the installed savings, were installed more than five months prior to the reported study completion date. The evaluators considered this free-ridership in addition to self-reported free-ridership from the survey. Therefore the total free-ridership was increased to 13%.

4.2.2 Overlap

Overlap was researched via the survey through questions asking whether or not installed measures also received implementation funding through any other sources. If they did receive additional funding, they were asked about the source of this funding. Any measure receiving installation funding from another source was considered to be overlap between the two programs. This could include NYSERDA implementation programs, such as the Existing Facilities Program or the Industrial and Process Efficiency program, or investor-owned utility direct install programs, for example. Overlap with NYSERDA programs was found to be 3%, while overlap with programs outside of NYSERDA was found to be 2%.

4.2.3 Spillover

SO was the result of measures that were reported as being installed and having been influenced by the program, but not studied in the free audit as well as measures that were studied in the audit but not recommended. Questions were asked regarding both of these possibilities during the site survey.

Many of the audits listed measures that had analysis funded by the program, but the results of the analysis were unfavorable, such as having a long payback, and therefore were neither recommended for installation nor considered in the total program-reported savings. Several sites decided to go ahead and install these measures anyway. Since the analysis was provided through the program, the installation of these measures was assumed to be influenced by the program, with the resultant savings included as spillover. Total spillover was determined to be 0.11.

4.2.4 Nonparticipant Spillover and Market Effects

As discussed in Section 3.2.4 and 3.2.5, neither of these was included in the scope of this evaluation and therefore both were considered to be zero.

4.2.5 Net-to-Gross Summary

Table 4-9 summarizes the NTGR components, including a breakout of each of the contributing components to FR and OL.

Table 4-9. Net-to-Gross Ratio

Factors	Ratio¹
FR survey reported	0.10
FR due to negative MAR values	0.03
NYSERDA OL	0.03
Other OL	0.04
Participant SO	0.11
Total	0.93

¹The total NTGR is calculated using the formula in Section 3.2

The above factors are combined to calculate the total NTGR as:

$$(1 - 0.1 - 0.03 + 0.11) \times (1 - 0.03 - 0.02) = \mathbf{0.93}$$

4.2.6 Net Summary

For the Program from July 1, 2010 through December 31, 2013 the evaluated savings for both electric and fuel savings were greater than the reported savings for the same time period. The overall net summary can be seen in Table 4-10.

Table 4-10. Overall Net Summary

Small Commercial Energy Efficiency Program	Electric Energy (kWh)	Demand (kW)	Fuel (MMBtu)¹
Study-recommended and tracked savings	13,431,113	11,062	113,329
Measure adoption rate (MAR)	0.54	0.54	0.33
Savings realization rate (SRR) and MAR correction factor (CF)	0.86	0.86	0.86
Adjusted gross impact	6,239,923	5,139	32,453
Net-to-gross	0.93	0.93	0.93
Net impact of 1,941 audits completed July 1, 2010 – December 31, 2013	5,809,369	4,785	30,214

¹Fuel savings are a mix of natural gas, oil, liquid propane, district steam, and coal.

4.3 FINDINGS AND RECOMMENDATIONS

The Impact Evaluation Team offers four findings and recommendations based on the impact evaluation research. These recommendations follow each explanatory paragraph in the list below.

1. **The Program has low overlap with installation incentive programs.** Overlap was found to be only 5%. This is a low number for a program that could work well as a feeder to other implementation programs within and outside of NYSERDA. Increased overlap could potentially reduce savings attributed to this program but increase total savings statewide.

Recommendation: The evaluators recommend enhancing the scope of the technical services and audit to provide a more formal link of the audit process with installation/incentive programs. This could include links to the homepages of those incentive programs in the reports. It should also include enhanced discussion during the report presentation about the customer's plans to install measures, program eligibility, and information about implementation of program processes, such as how to apply. Last, it should ask if the customer would like additional follow-up and can provide contact information for the program staff from the most appropriate implementation program.

2. **MAR varies markedly by region.** The two regions with the higher MARs (Region 1 at 0.56 and Region 2 at 0.48) substantially exceeded those of Regions 2 and 3 (0.31 and 0.37, respectively).

Recommendation: The evaluators believe this to be an opportunity to translate lessons learned between regions. Topics to target would include whether or not there are techniques used in higher-performing regions that lower-performing regions could emulate. Or, conversely, perhaps the high performing regions are targeting more of the low-hanging fruit or already installed measures at the expense of deeper and more robust energy savings. Based on a review of the data

compiled during this evaluation for projects with completed surveys, in Regions 1,3 and 4 lighting represented the highest level of recommended savings whereas in Region 2 HVAC was the highest. This difference could be one of the contributing factors to the varying MARs.

Additional comparative research could identify opportunities to increase savings.

3. Lighting and control measures have the highest rate of installation. Adoption of lighting and controls measures was found to be the highest of the various technology end uses tracked in the dataset of record (DOR), with 67% of the recommended savings from controls measures and 65% of the recommended savings from lighting measures that would ultimately be installed were installed within 48 months of report completion. The evaluators believe that this is due to these measures being the most accessible, and having the lowest up-front costs for customers to install.

Recommendation: The evaluators recommend encouraging auditors to address concerns about performance risk or capital more aggressively for HVAC or other complex or expensive measures. This can be done through additional content in the report and in a discussion during the presentation of results.

4. Financing is not attractive. About 2% of the total program participants were found to have also participated in the financing option offered by the Program. Service providers reported that customers find this offering complicated and not accessible to the small commercial and not-for-profit market.

Recommendation: The Program should consider eliminating or redesigning the process for this class of customer. Alternately, simplification of the paperwork involved and additional outreach and education on the offerings would help to increase participation in financing, and potentially may increase measure adoption.

APPENDIX A: GLOSSARY OF TERMS¹⁰

Appendix M¹¹ – An appendix to the New York Technical Manual (NYTM) that provides guidance to PAs and evaluators for the use of early replacement baseline versus normal replacement baseline. Appendix M does not directly apply to most of the projects in this evaluation population; however, its guidance will allow the evaluators to define preexisting equipment as the evaluation baseline when appropriate.

assessment – Energy study (audit) completed as part of the Small Commercial Energy Efficiency Program.

coefficient of variation – The coefficient of variation (*cv*) is a measure of variability parameter for a population or survey group. It is the standard deviation divided by the mean.

census – All individuals in a group. In evaluations of energy efficiency programs, census typically refers to all projects in a stratum of program projects.

evaluated gross savings – The change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program, regardless of why they participated, as calculated by the program evaluators.

evaluated net savings – The total change in load that is attributable to an energy efficiency program, as calculated by the program evaluators. This change in load may include, implicitly or explicitly, the effects of free drivers, free riders, energy efficiency standards, changes in the level of energy service, and other causes of changes in energy consumption or demand.

free rider, free ridership (FR) – A free rider is a program participant who would have implemented the program measure or practice in the absence of the program. Free ridership refers to the percentage of savings attributed to customers who participate in an energy efficiency

¹⁰ NYSERDA generally follows and uses the terms as defined in the “Northeast Energy Efficiency Partnerships Glossary of Terms,” found at http://neep.org/uploads/EMV%20Forum/EMV%20Products/EMV_Glossary_Terms_Acronyms.pdf. This glossary defines those terms absent from the NEEP report or provides more-specific definitions to generalized NEEP terms.

¹¹ Appendix M can be found at: [http://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/06f2fee55575bd8a852576e4006f9af7/\\$FILE/Appendix%20M%20final%205-05-2011.pdf](http://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/06f2fee55575bd8a852576e4006f9af7/$FILE/Appendix%20M%20final%205-05-2011.pdf)

program but would have, at least to some degree, installed the same measure(s) on their own if the program had not been available.

measure adoption rate (MAR) – A ratio that quantifies the percentage of ERP-recommended savings that customers chose to adopt after the MPP had ceased involvement in the project.

net savings – The total change in load that is attributable to an energy efficiency program. This change in load may include, implicitly or explicitly, the effects of spillover (SO), free riders, energy efficiency standards, changes in the level of energy service, and other causes of changes in energy consumption or demand.

net to gross, net-to-gross ratio (NTG, NTGR) – The relationship between net energy and/or demand savings, where net is measured as what would have occurred without the program, what would have occurred naturally, and gross savings (often evaluated savings). The NTGR is a factor represented as the ratio of net savings actually attributable to the program divided by program gross savings. For NYSERDA programs the NTGR is defined as the product of 1 minus free ridership plus spillover and 1 minus program overlap. $(1 - FR + SO) \times (1-OL)$.

nonparticipants/nonparticipating – Any customer or contractor who was eligible but did not participate in the program under consideration. Nonparticipating contractors can include contractors who have never participated in the program and contractors who formerly participated prior to the year(s) being evaluated but have not participated since.

normal replacement – The replacement of equipment that has reached or passed the end of its measure-prescribed expected useful life (EUL).

overlap (OL) – The proportion of installed measures for which customers received funding from other NYSERDA programs or other sources.

participant – An end user who receives an assessment or a service provider—assessment provider, expeditor, or finance partner—associated with the program.

population expansion weight – The total number of units in a population divided by the number of units in the sample.

relative precision – Relative precision reflects the variation due to sampling as compared to the magnitude of the mean of the variable being estimated. It is a normalized expression of a sample's standard deviation from its mean. It represents only sampling precision, which is one of the contributors to reliability and rigor, and should be used solely in the context of sampling precision when discussing evaluation results.

Relative precision is calculated as shown below. It must be expressed for a specified confidence level. The relative precision (rp) of an estimate at 90% confidence is given below:

$$rp = 1.645 \frac{sd(\mu)}{\mu}$$

$$rp = 1.645 \frac{sd(\mu)}{\mu}$$

where,

μ = The mean of the variable of interest

$sd(\mu)$ = The standard deviation of μ

1.645 = The z critical value for the 90% confidence interval

For the 90% confidence interval, the error bound is set at 1.645 standard deviations from the mean. The magnitude of the z critical value varies depending on the level of confidence required.

savings realization rate (SRR) – The ratio of the evaluated gross savings to the savings reported during the MAR calls. This will be different from program reported savings for projects where not all measures are installed or partial measures are installed.

$$SRR = \frac{kWh_{evaluation}}{kWh_{MAR}}$$

$$SRR = \frac{kWh_{evaluation}}{kWh_{MAR}}$$

where,

SRR = The savings realization rate

$kWh_{evaluation}$ = The evaluation M&V kWh savings (by evaluation M&V contractor)

kWh_{MAR} = The kWh savings resulting from the MAR calls

spillover (SO) – Refers to the energy savings associated with energy efficient equipment installed by consumers who were influenced by an energy efficiency program, but without direct financial or technical assistance from the program. SO includes additional actions taken by a program participant as well as actions undertaken by nonparticipants who have been influenced by the program. Sometimes SO is referred to as “market effects.” Market effects are program-induced impacts or program-induced changes in the market. Market effects include impacts over time. These market effects may be current or may occur after a program ends. When market effects occur after a program ends, they are referred to as “momentum” effects or as “post-program market effects.” SO

is often a narrower definition because it does not include impacts that accrue due to program-induced market structure change and seldom looks for effects that occur well after program intervention or effects that occur after a program ends. This evaluation addresses participant inside spillover (ISO), participant outside spillover (OSO), and nonparticipant spillover (NPSO), but not the broader definition of program effects within market effects.

inside spillover (ISO)– Occurs when, due to the project, additional actions are taken to reduce energy use at the same site, but these actions are not included as program savings, such as when, due to the program, participants add efficiency measures to the same building where program measures were installed but did not participate in the program for these measures.

outside spillover (OSO) – Occurs when an actor participating in the program initiates additional actions that reduce energy use at other sites that are not participating in the program. This can occur when a firm installs energy efficiency measures they learned about through the program at another of their sites without having that other site participate in a NYSERDA program. OSO is also generated when participating vendors install or sell energy efficiency to nonparticipating sites because of their experience with the program.¹²

nonparticipant spillover (NPSO) – The reduction in energy consumption and/or demand from measures installed and actions taken at nonparticipating sites due to the program but not through participation in the program and not induced by program participants – either building owners/managers or Program Performance Partners. These actions could be program-induced decision-making of nonparticipating building owners or encouraged by nonparticipating vendors or contractors because of the influence of the program.

summer coincident peak demand period – For this evaluation NYSERDA defined the summer coincident peak demand period as the energy reduction during the hottest non-holiday summer (June through August) weekday during the hour ending at 5 p.m.

¹² This definition is one that NYSERDA has used throughout its history with energy efficiency programs. There may be other states where the latter circumstance of participating vendors influencing nonparticipating sites is defined as a type of nonparticipant spillover.

APPENDIX B: DECISION-MAKER QUESTIONNAIRE

Small Commercial Measure Adoption Rate and Attribution Survey

SURVEY OVERVIEW

Parameter	Profile
Respondents	Small commercial audit participants that received completed audits between June 2010 and Dec 2013
Survey type	In-depth interview
Objectives	Measure adoption rate, free ridership, spillover, market assessment
Target number of completes	215
Targeted completion rate	33%
Estimated time to complete	15 to 30 minutes
Fielding firm	Abt SRBI

QUESTIONNAIRE GUIDE, BY COLOR AND LABEL

Introduction, General, Market Research, Finance and Closing, questions labeled without alpha characters and black

MAR, questions labeled "MAx" and black

Free Ridership, questions labeled "FRx" and blue

Spillover, questions labeled "SOx" and dark orange

Overlap, questions labeled "OLx" and green

Financing, questions labeled "Fx" and purple

INTRODUCTION AND FINDING CORRECT RESPONDENT

1. Hello, this is <INTERVIEWER NAME> calling from Abt on behalf of the New York State Energy Research and Development Authority, also known as NYSERDA. This is not a sales call. I am calling to follow up regarding an energy audit that your facility received that was funded by NYSERDA. May I please speak with &PROGRAM_CONTACT? [IF NEEDED]: my understanding is that PROGRAM_CONTACT is responsible for making energy-related decisions at &SERV_ADDR – may I please speak with him/her?

1. No, this person no longer works here
2. No, this person is not available right now
3. Yes
4. No, Other reason (specify)

SECTION 5: SCREENER

2. Do you recall a NYSERDA Consultant [state name of consultant] visiting your facility and completing an energy survey as part of NYSERDA’s Small Commercial Audit Program on or about &SURV_DATE?

[IF NEEDED: this survey involved a service provider who came to your facility, examined your energy using equipment and asked questions about your energy use and your equipment. The Consultant would have left energy saving information at the time of the audit and mailed you a written feasibility study with energy saving recommendations. Do you remember this on-site survey?]

- 1. Yes [Skip to next section on Measures in Feasibility Study]
- 2. No

3. It sounds like someone else at your location may be more familiar with your firm’s participation in the Small Commercial program? IF YES: Can you tell me who that person might be?

- 1. Yes [RECORD NAME/PHONE FOR CALLBACK]
- 2. No [THANK AND TERMINATE]

COMMENT: Most of these questions concern the energy efficiency recommendations resulting from the feasibility study and on-site audit conducted by the NYSERDA Small Commercial Consultant for &SERV_ADDR on &SURV_DATE. Throughout the remainder of this survey we will refer to this audit and the resulting energy efficiency recommendations as “the audit”. [INTERVIEWERS SHOULD RE-READ THIS STATEMENT AS NEEDED THROUGHOUT THE SURVEY TO REMIND THE RESPONDENTS]

MEASURES IN FEASIBILITY STUDY

4. Our records show that the following types of measures were recommended in the feasibility study

No.	Measure Group Short Name
1	<i>Auto-insert drop-down list text from “Measure Group Short Name” (col R) Examples: Lighting, HVAC, the NYSERDA assigned measure “groups”</i>
2	<i>Auto-insert drop-down list text from “Measure Group Short Name” (col R)</i>
3	<i>Auto-insert drop-down list text from “Measure Group Short Name” (col R)</i>
4	<i>Auto-insert drop-down list text from “Measure Group Short Name” (col R)</i>
5	<i>Auto-insert drop-down list text from “Measure Group Short Name” (col R)</i>

5. Does that sound right?

- 1 Yes [Skip to next section on MAR]
- 2 No

6. What measures do you remember being recommended in the feasibility study conducted by the NYSERDA Consultant?

77 Record verbatim

<If the description sounds nothing like the table above, terminate. Otherwise proceed.>

MEASURE ADOPTION BATTERY

Recommended Measures

We would like to ask you a few questions about these recommendations.

<REPEAT FOR EACH MEASURE OR FOR THE FIVE LARGEST SAVINGS MEASURES IF THERE ARE MORE THAN FIVE. ERS RESPONSIBILITY TO SELECT.>

MA1. Auto-insert "Individual Measure Description" (col U). Example:

Did you replace 30 T12 fluorescent fixtures for T8s?

1. Yes [Skip to MA2]
2. Yes, but only partially
3. Yes, but differently than recommended
4. No [Skip to MA4]

Partial or Differently

We anticipate that the next three partial install questions will be hard to pose, but also rarely asked.

MA1a. How was your installation different than the recommendation?

1. The quantity was different.
 - a. Can you estimate how much it was different, in terms of a percentage or count? *Record description verbatim.*
2. The efficiency level was different.
 - a. Can you describe how the efficiency differed? *Record description verbatim.*
3. The configuration was different.
 - a. Please explain. *Record description verbatim.*
4. Other
 - a. *Record verbatim*

MA2. Approximately when did you complete the installation? [IF NEEDED: We are looking for the month and year in which the measure was installed. If the installation took place over a number of months, please indicate which months/years.]

77 ___ month ___ year [Skip to next section on Overlap if MA1=1 or 3]

Partial (MA1=2)

MA3. Do you plan to implement the remainder of this measure in the future?

1. Yes
2. Not sure
3. No [Skip to next section on Overlap]

MA3a. About how long do you think it will be before you implement the remainder of the measure, in years, [Add if MA3=2] "if you do so"?

1. _____ years
2. Don't know

Not Installed (MA1=4)

MA4. Do you plan to implement this measure in the future?

1. Yes
2. Not Sure
3. No [Skip to next section on Overlap]

MA4a. About how long do you think it will be before you implement this measure, in years, [Add if MA4=2] “if you do so”??

1. _____ years
2. Don’t know

OVERLAP

Full, Partial

OL1. Did you receive an incentive from a NYSERDA program for the installation of this measure?

1. Yes
2. No [Skip to OL3]

OL2. Which NYSERDA program did you receive an incentive from?

77 Record verbatim

OL3. Did you receive funding, financing, or technical support for installation from any other sources, such as your utility company, state or federal grants or tax benefits?

1. Yes
2. No [skip to next section on Measure Specific Free Ridership]
3. Don’t know [skip to next section on Measure Specific Free Ridership]

OL4. Which sources did you receive funding or other support from?

1. Utility company *Describe* _____
2. Parent company *Describe* _____
3. Local, state, or federal government or agency *Describe* _____
4. Commercial bank *Describe* _____
5. Other *Describe* _____
6. Don’t know

FOR EACH SOURCE NAMED ASK THE FOLLOWING

OL5. How much funding, financing, or other support did you receive?

1. Record \$ funding amount and any other description verbatim [skip to next section on Measure Specific Free Ridership]
2. Don’t know

OL6. Can you estimate the total percentage of the project cost that the incentive or incentives if multiple, covered?

FYI Utility “Small Biz Direct Install” or SBDI programs commonly pay 70%

1. Record % funding amount

2. Don't know

MEASURE-SPECIFIC FREE RIDERSHIP

FR1. Did you ask the auditor to evaluate the measure or did the auditor suggest it?

1. We asked [Skip to FR3]
2. Auditor suggested
3. We had been considering it but didn't tell the auditor [skip to FR3]
4. Other / Don't know

FR2. Had you considered the measure or something similar to it before the audit suggested it?

1. Yes
2. No [skip to next section on spillover]
3. Don't know [skip to next section on spillover]

FR3. Why hadn't it been implemented, yet?

1. We were unsure of the economics (payback time, cost, savings, rate of return, etc.)
2. We were unsure about technical details (equipment specification, quantities, efficiencies, design, etc.)
3. We didn't have approval to spend the money (upper management, bank, owner, etc.)
4. We didn't have the money available, yet
5. Scheduling issues (waiting for business downtime, seasonal issues, weather, staff availability, equipment backlog, etc.)
6. Other _____
7. Don't know [skip to FR5]

FR4. On a scale of 1 to 10, how much did the audit help you overcome this/these issues?
10 means that the audit helped a great deal and 0 not at all.

1. _____
If FR4<4 Read "It sounds like you were pretty likely to take action anyway."
Then skip to FR6
2. Don't know [skip to FR6]

FR5. On a scale of 1 to 10, how likely is it that your firm would have installed the measure without the audit? 10 means very likely and 1 means very unlikely.

1. _____ [If FR5<4, skip to end of FR, otherwise continue]
2. Don't know

FR6. You said before that you installed the measure in month, year. If you hadn't received the audit but decided to install the measure independently, when do you estimate you would have installed it?

1. Same time
2. ____mo ____ year
3. Unspecified, but more than three years later
4. Never [skip to end of FR section]
5. Don't know

FR7.If you had not received the audit but decided to install anyway, would you have installed substantially the same measure as you actually did?

1. Yes [skip to end of FR section]
2. No
3. Don't know [skip to end of FR section]

FR8. Would the measure have saved more or less or about the same amount of energy?

1. The same [skip to end of FR section]
2. More
3. Less
4. Don't know [skip to end of FR section]

FR9. Can you estimate a percentage more/less?

1. __%
3. Don't know

FR10. Can you describe what was different about what you actually did compared to what you had been planning to do?

[REPEAT FOR EACH RECOMMENDED MEASURE, UP TO FIVE.]

SPILOVER – From Measures Observed in the Report but Not Part of the Recommendations

There were additional measures that were also evaluated in the study, but were ultimately not recommended. They were:

No.	Measure Group Short Name
1	<i>Auto-insert text</i>
2	<i>Auto-insert text</i>
3	<i>Auto-insert text</i>

SO1. Have you implemented any of these MEASURES?

1. Yes
2. No [skip to SO3]
3. Don't know [skip to SO3]

SO2. Which specific measures did you implement?

77 Record measure description(s) and cross-check against report

IF SO1=1, ASK THE FOLLOWING QUESTIONS FOR EACH MEASURE NAMED IN SO2.

SO3. Did you implement MEASURE ____ fully or partially?

1. Fully
2. Partially
3. Don't know

SO4. Do you plan to implement any of the other measures in the future?

1. Yes
2. No [Skip to Free Ridership-Non-Measure Specific]
3. Don't know

SO5. Which specific measures do you plan to implement?

77 Record measure description(s) and cross-check against report

For each measure named in SO5,

SO6. About how long do you think it will be before you implement this measure, in years, if you do so?

1. _____ years
2. Don't know

FREE RIDERSHIP – NON MEASURE-SPECIFIC

FR11. How did you hear about the NYSERDA Small Commercial audit service?

FR12. Had you ever had a non-NYSERDA energy audit for this facility before getting the NYSERDA audit?

1. Yes
2. No [skip to FR14]
3. Don't know [skip to FR14]

FR13. About what year was your most recent other audit?

FR14. On a scale of 1 to 10, how likely is it that you would have paid for the audit from an independent consultant if NYSERDA's free audit program did not exist? 1 means unlikely and 10 means very likely.

FR15. Alternately, on a scale of 1 to 10, how likely is it that you would have sought a free audit or paid for one from an equipment vendor or from a utility company program if NYSERDA's free audit program did not exist? Again, 1 means unlikely and 10 means very likely.

FR16. The NYSERDA audit was completed in 20xx. In what year do you estimate this audit otherwise would have occurred?

1. _____
2. Don't know

SPILOVER BEYOND NON-RECOMMENDED MEASURES

SO7. Did you implement any additional energy efficiency measures at this or any other facility during the last 24 months?

1. Yes
2. No [Skip to SO_]
3. Don't know [Skip to SO_]

SO8. Please describe what you did. *Record each measure separately if multiple*

1. _____
2. _____
3. _____

SO9. Did your firm receive incentives through either NYSERDA's programs or any utility program, for installation?

1. No, none [Skip to SO11]
2. Yes, some
3. Yes, all [Skip to next section on Finance]
4. Don't know [Skip to SO11]

SO10. For which ones?

For each measure that did not receive other funding only, (up to three)

SO11. How much would estimate the 1st/2nd/3rd additional measure is saving you, in dollars per year?

1. \$ _____ [Skip to SO13]
2. Too hard to estimate

SO12. Would you estimate that the measure is saving more or less or the same amount as the biggest recommendation you implemented from in the audit report?

1. Much more
2. More
3. About the same
4. Less
5. Much less
6. Don't know

SO13. In what year did you install it?

Next measure

Read if SO9=2: For measures that did not get an incentive

Ask if SO9=1 or 2

SO14. Why did you not get an incentive through any other NYSERDA or Utility program?

If you had not participated in the Small Commercial Program, how likely is it that you would have known about and have implemented this measure? Please estimate a 1 to 10 scale with 10 being very likely.

How significant was your experience in the Small Commercial Program in your decision to implement this/these measure(s), using the same 1 to 10 importance scale we discussed earlier?

FINANCING

<F1 – F3 is just for the ~1% of customers that took this option. For the other 99% skip to F4>

F1. Our records show that you participated in the financing part of the program. Is this right?

1. Yes
2. No [Skip to next section on Market & Firmographics]
3. Don't know [Skip to next section on Market & Firmographics]

F2. Did the financing influence your ability to do the project?

1. Yes
2. No
3. Don't know

F3. More specifically, on a scale of 1 to 10, how likely is it that you would have completed the project with your own capital or with a loan from another source, if NYSERDA financing had not been available? 10 means very likely.

F4. Did you investigate financing from any sources other than NYSERDA?

1. Yes
2. No
3. Don't know

F5. With whom?

1. Utility company
2. Bank
3. Other _____

F6. Did you receive financing from them?

1. Yes
2. No [Skip to end of section]
3. Don't know [Skip to end of section]

F7. On a scale of 1 to 10, how likely is it that you would have completed the project with your own if that financing had not been available? 10 means very likely.

MARKET AND FIRMOGRAPHICS

<expeditor role and effectiveness was addressed in the process evaluation>

<financing effectiveness was addressed in the process evaluation>

<Scope of section could vary with long term program plans. If it is not in the long term plans, then probably omit all of the non-OL questions>

7. What was the most valuable aspect of the audit-the recommendations they made, the energy use analysis, the inspection of your facility, their independence from vendors, or something else?
8. What would you have liked more of from the study, if anything?
9. What would you have been willing to pay for the study if it was not free?

If OL4=1 for any measure

OL7. You mentioned previously that you participated in a utility program related to the installation. Can you describe the interaction between the NYSERDA and utility programs for your firm?

If OL4=1 for any measure

OL8. Do you think your firm needed both the NYSERDA and the utility program in order to be confident to proceed, or would just the NYSERDA program have been sufficient, or just the utility program, or were neither necessary?

1. Both NYSERDA and utility program
2. NYSERDA only
3. Utility company only
4. Neither
5. Don't know

If OLA<>1 for all measures

OL9. Have you participated in a local utility "Small Business Direct Install" program, at this facility or any others, either before or after the NYSERDA study? If "Yes" and necessary, prompt for Before or After.

1. Yes, before
2. Yes, after
3. No
4. Don't know

10. Are you aware of other entities that offer a similar service? Who?

11. Do you lease the space at this facility or do you own it?

12. What is the majority of the space at this location used for? [DO NOT READ LIST]

- 1 Office/professional
- 2 Data center/computer server farm
- 3 Warehouse or distribution center.
- 4 Food sales or service
- 5 Retail
- 6 Education
- 7 Religious worship
- 8 Health care
- 9 Service
- 10 Lodging
- 11 Public order and safety
- 12 Industrial/Manufacturing (SPECIFY)
- 13 Agricultural (SPECIFY)
- 14 Vacant (SPECIFY)
- 15 Laboratory
- 16 Other (SPECIFY IN DETAIL)
- 98 DON'T KNOW
- 99 REFUSED

CLOSING

13. Those are all the questions I have. Do you have any comments or suggestions for ways to improve the program or other input before we wrap up?

THANK YOU AGAIN FOR YOUR TIME.

APPENDIX C: ANALYSIS LOGIC FLOWCHARTS

Figure C-1. Free-Ridership Flowchart

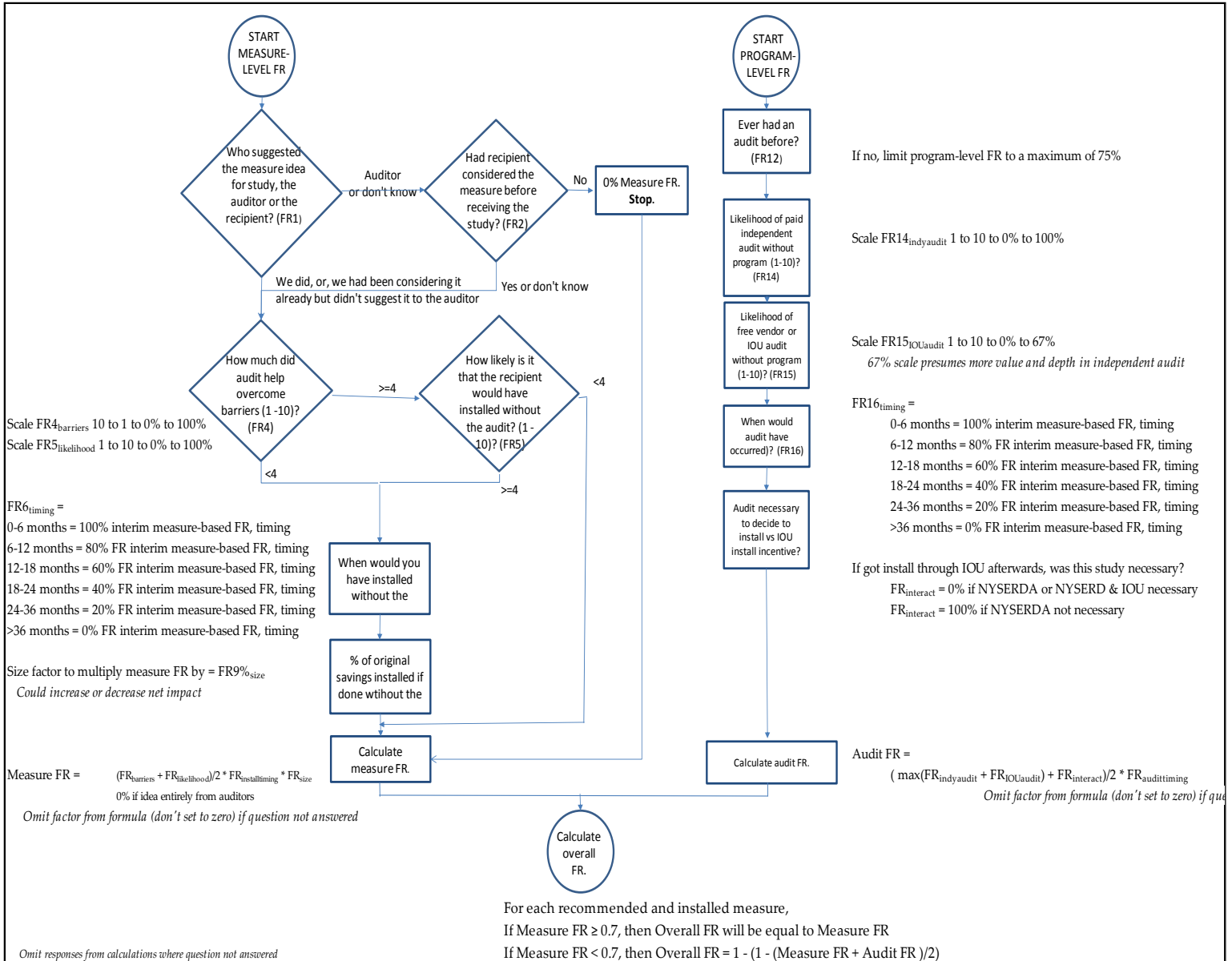


Figure C-2. Overlap Flowchart

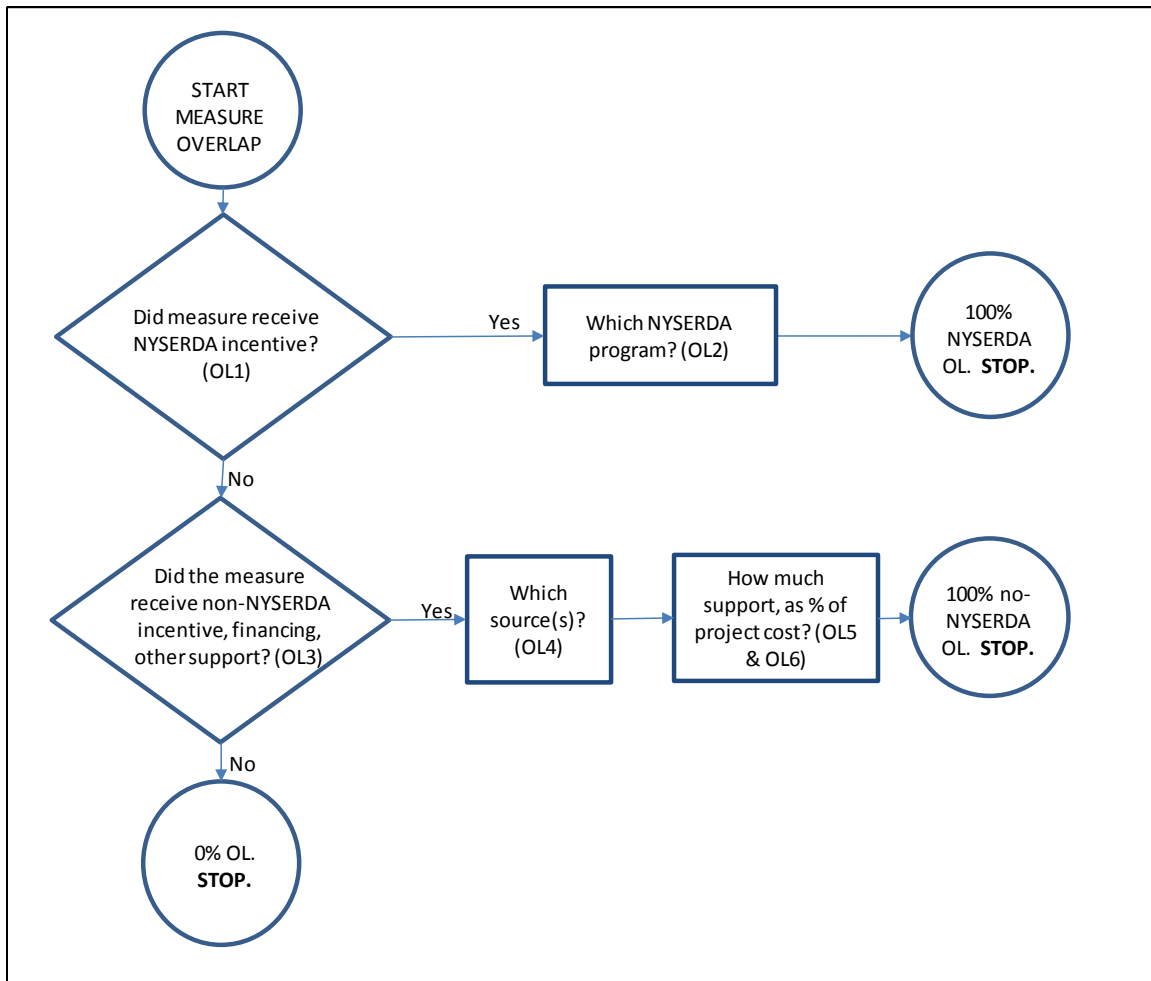
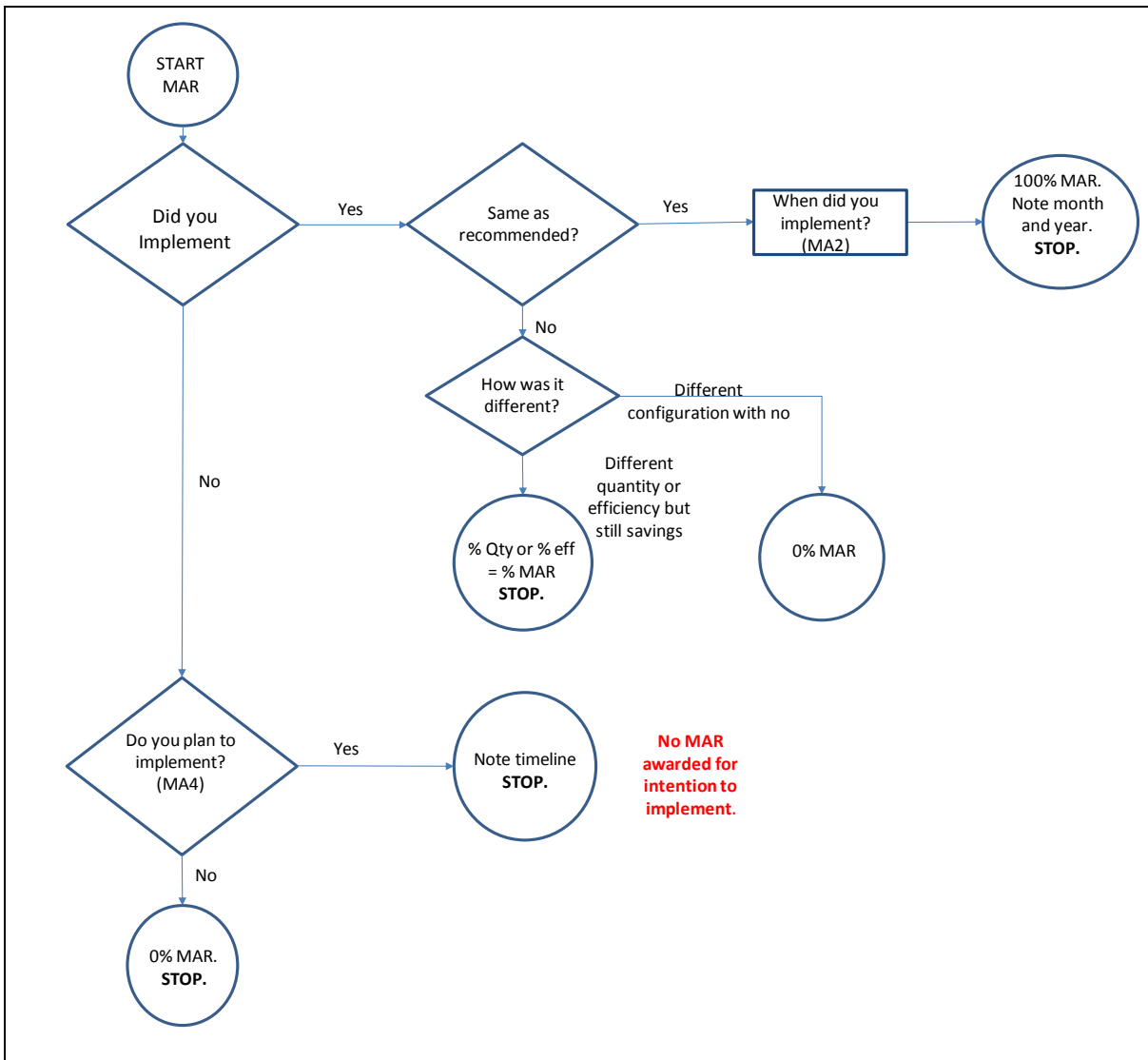


Figure C-3. Measure Adoption Rate Flowchart



APPENDIX D: SERVICE PROVIDER QUESTIONNAIRE

NYSERDA Small Commercial Program Impact Evaluation 2014 Service Provider Survey *Draft*

Hello, may I please speak to [NAME1]? I'm calling on behalf of the New York State Energy Research and Development Authority (or NYSERDA). We are conducting research for NYSERDA's Small Commercial Audit Program.

INTRO

We would like to conduct an interview regarding your experience with the general decision-making process for program participants. Our records have [COMPANY1] listed as the Service Provider for [REGION] and indicate that you may be the best contact at your firm for this project. I'd like to ask you some questions regarding the decision-making process for this project or projects similar to this one.

- Q1. Are you the appropriate person to discuss issues related to the Small Commercial Program at [COMPANY1]?
- 01 YES
 - 02 NO, NOT CORRECT RESPONDENT
 - 96 REFUSED
 - 97 DON'T KNOW

[LIST NAME AND PHONE # IN SPACE BELOW]

Name: _____

Phone: (____) _____ ext. _____

[CONTACT THIS PERSON, REPEAT INITIAL INTRODUCTION AND CONTINUE WITH THE FOLLOWING QUESTION]

[SCHEDULING]

SCR-1. This survey will take about 20 minutes to complete. Can we discuss the project now, or can we schedule a time when I can call you back?

- 1. CAN DISCUSS NOW [PROCEED TO INFLUENCE OF AUDIT]
- 2. CALL BACK ON: _____ AT TIME: _____

INFLUENCE OF AUDIT

A couple of months ago we conducted a Measure Adoption Rate interview regarding equipment adoption relating to the NYSERDA Small Commercial Audit Program. That prior survey provided us with current information as to what recommendations were adopted and differences

between what was adopted versus what was recommended at a sample of sites that have participated in the program.

AUD1. Generally speaking, if the Small Commercial Program or its assistance had not been available, what is the likelihood that these customers would have performed a study of the same or similar quality than the study performed under the Small Commercial Program? Please rate the likelihood in percentage terms with 0% being not likely at all and 100% being extremely likely.

- 01 **[[RECORD PERCENT. ACCEPT [0-100]]**
- 96 REFUSED
- 97 DON'T KNOW

AUD2. Overall, who influenced the scope of the audit, you as the technical assistance provider, or the customers who were receiving the audit?

- 01 TA Provider
- 02 Customers
- 03 Varied
- 96 REFUSED
- 97 DON'T KNOW

AUD3. Was it your experience that the financing offering had much influence on the implementation of the measures recommended in your reports?

SECTION: FR – FREE RIDERSHIP

FR1. Prior to participating in the Small Commercial Program, would you estimate that there were plans to install any of the energy efficiency or demand measures that you recommended at your customer's sites?

- 01 YES
- 02 NO
- 96 REFUSED
- 97 DON'T KNOW

FR2. Could you please estimate the percentage of your customers that had plans to incorporate the adopted measures prior to participating in the Small Commercial Program?

FR3. Had any customers started installation of a measure that you were investigating prior to the completion of the audit?

FR4. Can you please describe the process of completing an audit and providing the recommendations to the customers?

[RECORD VERBATIM]

FR3. For sites that you believe had plans in place did the participation in the Small Commercial Program in any way influence the type, efficiency level, or amount of measures that were incorporated?

- 01 YES
- 02 NO (all equipment would have been incorporated at the same high efficiencies)

- 96 REFUSED
- 97 DON'T KNOW

- FR4. Please generally describe how you think the Small Commercial Program influenced the decision to incorporate high efficiency measures.

- FR5. On a scale of 0 to 4, where 0 = “not at all important” and 4 = “very important,” please indicate how important you think the Small Commercial Program was in your various clients decisions to incorporate high efficiency measures at their sites?

**[NOT AT ALL
IMPORTANT]**

[VERY IMPORTANT]

0

1

2

3

4

- 00 NOT AT ALL IMPORTANT
- 01
- 02
- 03
- 04 VERY IMPORTANT

SECTION: CONTRSCTOR SO

- SO1. Have the offerings of your firm changed based on, or since your experience with the Small Commercial program? For example do you offer any services that you did not prior to providing TA services through this program?

- SO2. Do you have reason to believe that your audits may have inspired the installation of any other sites that did not participate in the program directly based on their experience with the audit?

That completes this telephone survey. Thank you very much for your assistance!