Evaluation of Illinois Energy Now Public Sector Retro-Commissioning Program

June 2013 through May 2014

Prepared for:
Illinois Department of Commerce and Economic Opportunity

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Executive Summary

This report presents the results of the impact and process evaluations of the Public Sector Retro-Commissioning Program that the Illinois Department of Commerce and Economic Development (DCEO) offers to public sector entities in Illinois. This report presents evaluation results for activity during electric program year six and natural gas program year three (EPY6/GPY3), the period from June 2013 through May 2014.

The main features of the approach used for the evaluation are as follows:

- Data for the study were collected through review of program materials, and interviews with program implementation staff members, participants, and retro-commissioning service providers.
- Based on data provided by DCEO and its program implementation partner, a sample design was developed for analysis. Samples were drawn for both the electricity and natural gas components that provide savings estimates with ±10% precision at the 90% confidence level for each component.
- An analytical desk review was performed to verify gross savings estimates.

The realized gross energy savings of the Retro-Commissioning Program during the period June 2013 through May 2014 are summarized in Table ES-1. During this period, realized gross energy savings totaled 6,866,644 kWh. The electric gross realization rate for the program is 98%. During this period, realized net energy savings totaled 6,681,664 kWh. The net-to-gross ratio for the program is 97%.

Table ES-1 Summary of Gross kWh Savings for Retro-Commissioning Program

Utility	*Ex Ante kWh Savings*	*Gross Ex Post kWh Savings*	*Gross Realization Rate*	*Net Ex Post kWh Savings*	*Net-to-Gross Ratio*
Ameren	1,868,660	1,771,795	95%	1,724,065	97%
ComEd	5,158,216	5,094,849	99%	4,957,599	97%
Total	7,026,876	6,866,644	98%	6,681,664	97%

The realized gross peak kW reductions of the Retro-Commissioning Program during the period June 2013 through May 2014 are summarized in Table ES-2. The achieved gross peak demand savings for the program are 275.84 kW. The gross realization rate for the program is 102%. The achieved net peak demand savings for the program are 267.00 kW.

Table ES-2 Summary of Gross Peak kW Savings for Retro-Commissioning Program

Utility	*Ex Ante kW Savings*	*Gross Ex Post kW Savings*	*Gross Realization Rate*	*Net Ex Post kW Savings*	*Net-to-Gross Ratio*
Ameren	18.60	20.83	112%	20.17	97%
ComEd	251.30	255.00	101%	246.84	97%
Total	269.90	275.84	102%	267.00	97%

The realized gross therms reductions of the Retro-Commissioning Program during the period June 2013 through May 2014 are summarized in Table ES-3. The achieved gross therms savings for the program are 757,046 therms. The natural gas realization rate for the program is 103%. The achieved net therm savings for the program are 755,620.

Table ES-3 Summary of Gross Therm Savings for Retro-Commissioning Program

Utility	*Ex Ante Therm Savings*	*Gross Ex Post Therm Savings*	*Gross Realization Rate*	*Net Ex Post Therm Savings*	*Net-to-Gross Ratio*
Ameren	242,095	245,110	101%	244,649	1.00
Nicor	177,437	221,245	125%	220,828	1.00
North Shore	80,344	81,572	102%	81,419	1.00
Peoples	232,652	209,119	90%	208,725	1.00
Total	732,528	757,046	103%	755,620	1.00

The following presents a selection of key evaluation findings based on review of program activity, staff interviews, and participant surveys:

- **Retro-Commissioning Program Savings Declined from Prior Years, although Several Participants Installed Additional Measures through the Incentive Programs:** EPY6/GPY3 gross electricity savings declined by 33% from the previous year, and gross natural gas savings declined by 15%. These differences were largely a result of the amount of savings associated with the implementation of measures that counted towards the participants Retro-Commissioning Program agreement. That is, the difference was not due to fewer projects completed during the program year or fewer saving opportunities identified. However, the savings counted toward the Retro-Commissioning program may not represent the full impact of the program. Participants are directed in both the study report and by program staff towards the DCEO incentive programs and data provided by program staff indicated that some of these participants implemented additional measures through these programs. Program staff estimated that these additional measures resulted in an additional 637,350 therms saved and 2,269,444 kWh saved.
- **Program Participants Remain Satisfied:** None of the program participants indicated dissatisfaction with the program. Thirty-three percent of program participants indicated that they were very satisfied with the program overall, and an additional 67% were somewhat satisfied. Sixty-seven percent of participants were satisfied with the retro-commissioning service provider's level of professionalism, and 33% were somewhat satisfied. Thirty-three percent of respondents were very satisfied with the quality of work performed by the

contractor implementing the measures, and 53% were somewhat satisfied with this work. No participants indicated that there were problems with the application process.

- **Retro-Commissioning Component being implemented during EPY7/GPY4:** DCEO is implementing a new small scale Retro-Commissioning pilot program during EPY7/GPY4. These projects will be implemented at the same time the SEDAC Energy Assessments will be performed for quick, low cost savings. Program staff indicated that many public sector building types would fit the program, but that the program is a particularly good fit for schools and municipalities.

ADM offers the following recommendation for the retro-commissioning program.

- **Include Available Savings Calculations and Additional Project Data in Documentation**: If available, including calculations and data collected for the project would facilitate the evaluation effort and enable better identification of the reasons for discrepancies between ex ante and ex post savings calculations.

1. Introduction

This report presents the results of the impact and a limited process evaluation of the Public Sector Retro-Commissioning Program that DCEO offers to public sector entities in Illinois. The report presents results of the program for activity during electric program year six and natural gas program year three (EPY6/GPY3), the period from June 2013 through May 2014.

1.1 Description of Program

The Retro-Commissioning Program offered by DCEO was designed to help public sector entities identify and implement energy saving projects through the completion of retro-commissioning studies. The program funds the full cost of the retro-commissioning studies in exchange for a commitment from participants to implement at least $10,000 worth of energy efficiency improvements.

During EPY6/GPY3, there were 33 retro-commissioning incentive projects in the program which were expected to provide savings of 7,026,876 kWh and 732,528 therms. Additionally, program documentation indicated that an additional 637,350 therms and 2,269,444 kWh were saved by program participants who implemented additional projects for which they received DCEO custom and standard incentives.

1.2 Overview of Evaluation Approach

The overall objective for the impact evaluation of the Retro-Commissioning Program was to determine the gross and net energy savings and peak demand (kW) reductions resulting from program projects implemented during EPY6/GPY3.

The approach for the evaluation had the following main features.

- Available documentation (e.g., audit reports, invoices, savings calculation work papers, etc.) was reviewed for projects, with particular attention given to the calculation procedures and documentation for savings estimates.
- Gross savings were verified via analytical desk review.
- A participant survey was conducted from a sample of program participants to gather information on their decision making, their likes and dislikes of the program, and factors determining net-to-gross savings ratios for the program.

1.3 Organization of Report

This report on the impact and process evaluation of the Retro-Commissioning Program for the period June 2013 through May 2014 is organized as follows:

- Chapter 2 presents and discusses the analytical methods and results of estimating gross savings for measures implemented under the program.

- Chapter 3 presents and discusses the analytical methods and results of estimating program net savings.
- Chapter 4 presents and discusses the analytical methods and results of the process evaluation of the program.
- Chapter 5 presents evaluation conclusions and recommendations for the program.
- Appendix A provides a copy of the questionnaire used for the survey of participant decision makers.
- Appendix B presents the results from the survey of participant decision makers.

2. Estimation of Gross Savings

This chapter addresses the estimation of gross kWh, peak kW, and therm reductions resulting from retro-commissioning projects during EPY6/GPY3. Section 2.1 describes the methodology used for calculating gross savings. Section 2.2 presents the results from the calculation of gross savings.

2.1 Methodology for Estimating Gross Savings

2.1.1 Review of Documentation

The DCEO's program implementation partner provided documentation pertaining to the projects completed during EPY6/GPY3.

For each project, the available documentation (e.g., RCx analysis reports, verification reports, savings calculation work papers, etc.) for each rebated measure was reviewed, with particular attention given to the calculation procedures and documentation for savings estimates. Documentation that was reviewed for all projects included program forms, databases, reports, billing system data, weather data, and any other potentially useful data. Each application was reviewed to determine whether the following types of information had been provided:

- Documentation for the energy efficiency improvements, including (1) descriptions, (2) schematics, (3) performance data, and (4) other supporting information
- Information about the savings calculation methodology, including (1) what methodology was used, (2) specifications of assumptions and sources for these specifications, and (3) correctness of calculations

2.1.2 Sampling Plan

Gross ex post savings were based on samples of projects completed during EPY6/GPY3. Data provided by the program implementer showed that during the program year, there were 33 retro-commissioning projects that were expected to provide savings of 7,026,876 kWh and 732,528 therms. Inspection of expected kWh and therm savings for individual projects provided indicated that the distribution of savings was generally positively skewed, with a small number of projects accounting for a high percentage of the estimated savings. Estimation of savings was based on a ratio estimation procedure, which allowed for precision/confidence requirements to be met with a smaller sample size.

The precision for gross ex post electricity and natural gas savings is ±8.33% and ±9.33% at the 90% confidence level.

Table 2-1 Relative Precision for Gross Ex Post Electricity and Natural Gas Savings

Fuel Type	*Precision for 90% Confidence Level*
Electricity	±8.33%
Natural Gas	±9.73%

Table 2-2 shows the number of projects and expected savings for the electric savings sample by stratum. Table 2-3 shows the number of projects and expected savings for the natural gas savings sample by stratum.

Table 2-2 Population Statistics Used for Sample Design for kWh Savings

	Stratum 1	*Stratum 2*	*Stratum 3*	*Stratum 4*	*Totals*
Strata boundaries (kWh)	< 80,000	80,000 - 225,000	225,001 - 400,000	> 3,000,000	
Number of projects	12	9	9	3	33
Total kWh savings	339,465	1,197,459	2,740,756	2,749,196	7,026,876
Average kWh savings	28,289	133,051	304,528	916,399	212,936
Standard deviation of kWh savings	19,626	31,210	63,597	514,928	285,117
Coefficient of variation	0.69	0.23	0.21	0.56	1.34
Final design sample	2	2	3	3	10

Table 2-3 Population Statistics Used for Sample Design for Therm Savings

	Stratum 1	*Stratum 2*	*Stratum 3*	*Stratum 4*	*Totals*
Strata boundaries (therms)	< 9,000	9,000 - 32,000	32,001 - 69,000	> 100,500	
Number of projects	12	7	6	3	28
Total therm savings	50,480	159,157	255,653	267,238	732528
Average therm savings	4,207	22,737	42,609	89,079	26,162
Standard deviation of therm savings	3,214	8,738	8,235	16,637	27,775
Coefficient of variation	0.76	0.38	0.19	0.19	1.06
Final design sample	4	4	2	2	12

As shown in Table 2-4, the sample projects account for approximately 56% the expected kWh savings. As shown in Table 2-4, the sample projects account for approximately 54% of standard incentive expected therm savings.

Table 2-4 Expected Savings for Electricity Saving Projects by Stratum

Stratum	*Sample Ex Ante kWh Savings*	*Total Ex Ante kWh Savings*	*Percent of Ex Ante kWh Savings in Sample*
4	2,749,196	2,749,196	100%
3	906,616	2,740,756	33%
2	241,082	1,197,459	20%
1	63,072	339,465	19%
Total	3,959,966	7,026,876	56%

Table 2-5 Expected Savings for Therm Incentives Sampled Projects by Stratum

Stratum	*Sample Ex Ante Therm Savings*	*Total Ex Ante Therm Savings*	*Percent of Ex Ante Therm Savings in Sample*
4	197,278	267,238	74%
3	81,782	255,653	32%
2	100,357	159,157	63%
1	18,372	50,480	36%
Total	397,789	732,528	54%

2.1.3 Procedures for Estimating Savings from Measures Installed through Retro-Commissioning Projects

Gross ex post electricity and natural gas savings were developed through an analytical desk review of sampled projects. Analyses were based on project documentation provided by the 360 Energy Group, DCEO's implementation partner. In cases of project uncertainty or incomplete project documentation, ADM staff contacted the implementation partner, service provider, or project site staff to get additional information.

When calculations were provided, evaluation staff reviewed the energy savings algorithms to verify that the assumptions were reasonable and the algorithm was correct for assigning ex ante gross kWh, kW and therm savings per measure.

Savings estimation was based on ex ante estimates of gross savings (as reported in the project documentation and program tracking system), and the ex post gross savings were developed through ADM's analysis. Energy savings realization rates[1] were calculated for each sampled project. Projects with relatively high or low realization rates were further analyzed to determine the reasons for the discrepancy between expected and realized energy savings.

2.2 Results of Gross Savings Estimation

To estimate gross kWh savings, peak kW and therm reductions of the program, data were collected and analyzed for a sample of 10 projects with expected electric savings and a sample of 12 projects with expected natural gas savings. Project data were analyzed using the methods described in Section 2.1 to estimate project energy savings, peak kW reductions and therm reductions, and to determine realization rates for the program. The results of that analysis are reported in this section.

2.2.1 Realized Gross kWh Savings

The gross ex post kWh savings of the Retro-Commissioning Program during EPY6/GPY3 are summarized in Table 2-6. Overall, the achieved gross electricity savings of 6,866,644 kWh are equal to 98% of the expected savings.

[1] The savings realization rate for a project is calculated as the ratio of the achieved savings for the original project to the expected savings (as determined through the project analysis and recorded in the tracking system for the program).

Table 2-6 Expected and Gross Realized kWh Savings for Retro-Commissioning Program

Utility	*Ex Ante kWh Savings*	*Gross Ex Post kWh Savings*	*Gross Realization Rate*
Ameren	1,868,660	1,771,795	95%
ComEd	5,158,216	5,094,849	99%
Total	7,026,876	6,866,644	98%

2.2.2 Realized Gross Peak kW Savings

The realized gross ex post peak kW reductions of the Retro-Commissioning Program during EPY6/GPY3 are shown in Table 2-7. The achieved gross peak demand savings of 275.84 kW are 102% of expected savings.

Table 2-7 Expected and Gross Realized Peak kW Savings for Retro-Commissioning Program

Utility	*Ex Ante kW Savings*	*Gross Ex Post kW Savings*	*Gross Realization Rate*
Ameren	18.60	20.83	112%
ComEd	251.30	255.00	101%
Total	269.90	275.84	102%

2.2.3 Realized Gross Therm Savings

The gross ex post therm reductions of the Retro-Commissioning Program during EPY6/GPY3 are shown in Table 2-8. The achieved gross natural gas savings of 757,046 therms are 103% of expected savings.

Table 2-8 Expected and Gross Realized Therm Savings for Retro-Commissioning Program

Utility	*Ex Ante Therm Savings*	*Gross Ex Post Therm Savings*	*Gross Realization Rate*
Ameren	242,095	245,110	101%
Nicor	177,437	221,245	125%
North Shore	80,344	81,572	102%
Peoples	232,652	209,119	90%
Total	732,528	757,046	103%

Discussion of Gross Savings Analysis

The project realization rates were reviewed to assess whether there were factors that were causing systematic differences in the realization rates.

Table 2-9, shown below, displays project level realization rates.

Table 2-9 Project-Level Gross Realized Savings Analysis Results

Project	*Measure*	*Ex Ante kWh*	*Ex Post kWh*	*Realization Rate*	*Ex Ante kW*	*Ex Post kW*	*Realization Rate*	*Ex Ante Therm*	*Ex Post Therm*	*Realization Rate*
Project 1	Calibrate/replace malfunctioning sensors and institute thermostat driftpoints Institute occupied/unoccupied mode Conduct testing and balancing	238,023	72,571	30%	-	-	0%	30,078	32,575	108%
Project 2	VFD on the Auditorium AHU	38,016	35,163	92%	2.30	11.81	513%	-	-72*	0%
Project 3	Supply Air Temp Reset	722,569	1,145,655	159%	-	-68.50	0%	31,202	32,074	103%
Project 4	Air Handler Unit and Zone Terminal Unit Scheduling	125,688	307,518	245%	-	-28.88	0%	33,271	23,998	72%
	VAV Air handler Discharge Air Static Pressure Reset	53,490	32,879	61%	-	13.10	0%	-	-147	0%
	Air Handler Economizer Optimization	20,081	3,238	16%	-	-	0%	-	-1	0%
	Chiller/Condensor Pumps from Parallel to Duty-standby Operation	46,203	21,011	45%	5.60	8.16	146%	-	-	0%

Project	*Measure*	*Ex Ante kWh*	*Ex Post kWh*	*Realization Rate*	*Ex Ante kW*	*Ex Post kW*	*Realization Rate*	*Ex Ante Therm*	*Ex Post Therm*	*Realization Rate*
	VAV Air Handler HW Face & Bypass Damper Re-Sequencing	265,418	325,204	123%	-	-	0%	63,747	65,826	103%
	De-lamp Hallway Lighting Fixtures (Occupancy Sensors)	15,634	26,635	170%	-	0.87	0%	-	-	0%
Project 5	OA Optimum Start	4,196	8,995	214%	-	-0.61	0%	826	1,760	213%
	Optimum Start	48,812	38,193	78%	-	0.07	0%	1,179	8,886	754%
	Secondary HWST Reset	-	-	0%	-	-	0%	5,360	596	11%
	North and Charger Gym DCV	3,128	3,756	120%	-	4.35	0%	165	567	344%
	VAV Occupancy Operation	2,706	3,237	120%	-	-	0%	304	333	110%
	Pool Pump VFD	24,738	29,437	119%	3.00	-	0%	-	-	0%
Project 6	Steam Leak Repair	-	-	0%	-	-	0%	39,490	39,778	101%

Project	*Measure*	*Ex Ante kWh*	*Ex Post kWh*	*Realization Rate*	*Ex Ante kW*	*Ex Post kW*	*Realization Rate*	*Ex Ante Therm*	*Ex Post Therm*	*Realization Rate*
Project 7	Air Handling Unit Scheduling	41,532	41,532	100%	-	-	0%	-	-	0%
	VFD programming on Chilled Water Pump for Buildings F & G	55,961	45,634	82%	-	-	0%	-	-	0%
	Economizer Optimization	-	-	0%	-	-	0%	5,052	8,418	167%
	Holiday Schedule Programming	193,375	125,728	65%	-	-	0%	-	-	0%
	Repair Faulty Temperature Sensors	-	-	0%	-	-	0%	21,577	34,066	158%
Project 8	Schedule Equipment	107,107**	192,291**	180%	-	-1.43	0%	24,343	23,903	98%
	Supply Air Temp reset	4,564**	16,734**	367%	-	2.89	0%	5,591	2,308	41%
	Economizer Optimization	13,528**	26,391**	195%	3.00	9.16	305%	11,856	14,899	126%

Project	*Measure*	*Ex Ante kWh*	*Ex Post kWh*	*Realization Rate*	*Ex Ante kW*	*Ex Post kW*	*Realization Rate*	*Ex Ante Therm*	*Ex Post Therm*	*Realization Rate*
	Optimal Start	12,813**	15,482**	121%	-	-0.34	0%	502	535	107%
Project 9	Insulate Heat Exchanger	-	-	0%	-	-	0%	984	3,371	343%
	Install New Thermostat in Raw Water Room	-	-	0%	-	-	0%	690	338	49%
Project 10	Convert Multi-Zone Units to Single Zone Units	377,725	490,496	130%	-	149.93	0%	100,260	70,563	70%
Project 11	Hadley - Reduce AHU run time in the evenings	18,291	18,278	100%	-	3.33	0%	759	732	96%
	Homer - Reduce AHU run time in the evenings	6,765	8,729	129%	-	-	0%	2,065	2,123	103%
Project 12	Install VFDs and Schedule Operation of Chilled Water Pumps	1,500,113	1,200,089	80%	67.00	88.89	133%	-	-	0%
	Install VFDs and Schedule Operation of AC1 Fans									
	Replace Pneumatic Controls on AC1 with Digital Controls									
	Demand Control Ventilation on AC1									

Project	*Measure*	*Ex Ante kWh*	*Ex Post kWh*	*Realization Rate*	*Ex Ante kW*	*Ex Post kW*	*Realization Rate*	*Ex Ante Therm*	*Ex Post Therm*	*Realization Rate*
Project 13	AHU Morning Warm-up	17,238	-	0%	-	-	0%	6,040	11,578	192%
Project 14	Enable Optimal Start/Stop	54,051	9,710	18%	1.00	0.03	3%	5,593	3,117	56%
	Duct Static Pressure Reset	56,759	88,813	156%	16.00	12.50	78%	-268	-662	247%
	Economizer Lockouts	31,260	16,258	52%	14.00	1.35	10%	-	-679	0%
	Supply Air Reset Schedule	15,432	5,759	37%	10.00	-2.53	-25%	5,138	14,393	280%
	Reduce Summer Reheat	-	22,138	0%	-	14.15	0%	1,984	4,222	213%

*Not included in natural gas savings sample.
**Not included in electricity savings sample

3. Estimation of Net Savings

This chapter reports the results from estimating the net impacts of the Retro-Commissioning Program during EPY6/GPY3 where net savings represent the portion of gross savings achieved by program participants that can be attributed to the effects of the program.

3.1 Procedures Used To Estimate Net Savings

Net savings are defined as the portion of gross savings that can be attributed to the effects of the program. Net savings may be less than gross savings as a result of free ridership. Free riders of a program are defined as those participants that would have implemented the same energy efficiency measures and achieved the observed energy changes, even in the absence of the program.

In general, net savings can be considered to be gross savings less the impact of free ridership. That is, because the energy savings realized by free riders are not induced by the program, these savings should not be included in the estimates of the program's actual (net) impacts. Without an adjustment for free ridership, some savings that would have occurred naturally would be incorrectly attributed to the program.

ADM performed a net savings analysis to estimate the impacts of the energy efficiency measures attributable to the Retro-Commissioning Program that were net of free ridership. Information collected from a sample of program participants through a participant survey was used to estimate the extent of free ridership. Appendix A provides a copy of the survey instrument, and Appendix B presents tabulated responses for each survey question.

Based on a review of this information, the preponderance of evidence regarding free ridership inclinations was used to assess the likelihood of participant free ridership and in turn estimate net savings.

Several criteria were used for determining what portion, if any, of a participant's gross savings for a particular project should be attributed to free ridership. Specifically, three factors were analyzed to determine what percentage of savings may be attributed to free ridership. These three factors are:

- Plans and intentions of participant to perform the retro-commissioning without support from the program;
- Influence that the program had on the decision to perform the retro-commissioning; and
- A participant's previous experience with retro-commissioning.

For each of these factors, rules were applied to develop binary variables indicating whether or not a participant's behavior showed free ridership. These rules made use of answers to questions on the decision maker survey questionnaire.

The first factor required determining if a participant stated that his or her intention was to perform the retro-commissioning even without the program. The answers to a combination of several questions were used with a set of rules to determine whether a participant's behavior was indicative of free ridership. Two binary variables were constructed to account for participant plans and intentions: one, based on a more restrictive set of criteria that may describe a high likelihood of free ridership, and a second, based on a less restrictive set of criteria that may describe a relatively lower likelihood of free ridership.

The first, more restrictive criteria indicating participant plans and intentions that likely signify free ridership are as follows:

- The respondent answered "yes" to the following two questions: "Did you have plans to have this facility retro-commissioned before participating in the Retro-Commissioning Program?" and "Would you have gone ahead with this retro-commissioning even if you had not participated in the program?"
- The respondent answered "definitely would have" to the following question: "If the retro-commissioning service had not been provided at zero cost through the program, how likely is it that you would have had the facility retro-commissioned anyway?"
- The respondent answered "no" in response to the following question: "How did the availability of information and the service incentive provided through the Retro-Commissioning Program affect the timing of the retro-commissioning project? Did you retro-commission the facility earlier than you otherwise would have without the program?"

The second, less restrictive criteria indicating participant plans and intentions that likely signify free ridership are as follows:

- The respondent answered "yes" to the following two questions: "Did you have plans to have this facility retro-commissioned before participating in the Retro-Commissioning Program?" and "Would you have gone ahead with this retro-commissioning even if you had not participated in the program?"
- Either the respondent answered "definitely would have" or "probably would have" to the following question: "If the retro-commissioning service had not been provided at no cost through the program, how likely is it that you would have had the facility retro-commissioned anyway?
- Either the respondent answered "no" in response to the following questions "Did you retro-commission the facility earlier than you otherwise would have without the program?" or the respondent indicated that while program information and financial incentives did affect the timing of project implementation, in the absence of the program they would have implemented the project within the next two years.

The second factor required determining if a participant reported that a recommendation from a Retro-Commissioning Program representative influenced the decision to complete the project.

The criterion indicating that program influence may signify a lower likelihood of free ridership is met if the following conditions are true:

- The respondent answered "yes" to the following question: "Did a Retro-Commissioning Program or other DCEO representative recommend that you retro-commission the facility?" and "probably would not have" or "definitely would not have" to the question: "If the Public Sector Retro-commissioning Program or other DCEO representative had not recommended that you retro-commission the facility, how likely is it that you would have done it anyway?"

The third factor required determining if a participant in the program indicated that he or she had previously implemented a similar retro-commissioning project without an energy efficiency program incentive or if the organization had implemented any energy efficiency projects without applying for an incentive in the last three years. A participant indicating that he or she had implemented a similar project is considered to have a likelihood of free ridership.

The criteria indicating that previous experience may signify a higher likelihood of free ridership are as follows:

- The respondent answered "yes" to the following question: "Before participating in the Retro-Commissioning Program, had you completed similar retro-commissioning projects?"
- The respondent answered "yes" to the following question: "Has your organization completed any energy efficiency projects in the last three years for which you did not apply for a financial incentive through an energy efficiency program?"

The four sets of rules described above were used to construct four different indicator variables that address free ridership behavior. For each participant, a free ridership value was assigned based on the combination these variables. With the four indicator variables, there were 12 applicable combinations for assigning free ridership scores for each respondent, depending on the combination of answers to the questions creating the indicator variables. Table 3-1 shows these values.

Table 3-1 Free Ridership Scores for Combinations of Indicator Variable Responses

Indicator Variables				*Free Ridership Score*
Had Plans and Intentions to Perform Retro-Commissioning without RCx Program? (Definition 1)	*Had Plans and Intentions to Perform Retro-Commissioning without RCx Program? (Definition 2)*	*RCx Program had Influence on Decision to Perform Retro-Commissioning?*	*Had Previous Experience with Measure?*	
Y	N/A	Y	Y	100%
Y	N/A	N	N	100%
Y	N/A	N	Y	100%
Y	N/A	Y	N	67%
N	Y	N	Y	67%
N	N	N	Y	33%
N	Y	N	N	33%
N	Y	Y	Y	33%
N	Y	Y	N	0%
N	N	N	N	0%
N	N	Y	N	0%
N	N	Y	Y	0%

3.2 Results of Net Savings Estimation

The procedures described in the preceding section were used to estimate free ridership rates and net-to-gross ratios for the Retro-Commissioning Program for EPY6/GPY3 program year.

3.2.1 Realized Net Energy Savings

The data used to assign free ridership scores were collected through a survey of 15 participant decision makers who completed retro-commissioning projects completed during EPY6/EPY3. The survey respondents were associated with projects that represented 56% of the electricity savings and 45% of the natural gas savings. Individual free ridership rates were estimated for each respondent.

Table 3-2 shows the percentage of survey respondents who relayed the following: The participant had plans and intentions to perform the retro-commissioning without the assistance of the program (under two alternative definitions as described in the preceding section), the program influenced the participant's decision to perform the retro-commissioning, or that the participant had previous experience implementing energy saving improvements. Percentages reported are averages weighted by project gross realized savings.

Table 3-2 Weighted Average Indicator Variable Values

Savings Type	*Had Plans and Intentions to Perform Retro-Commissioning without RCx Program (Definition 1)*	*Had Plans and Intentions to Perform Retro-Commissioning without RCx Program (Definition 2)*	*RCx Program had Influence on Decision to Perform Retro-Commissioning*	*Had Previous Experience with Measure*
kWh	0%	9%	58%	0%
Therm	0%	0%	50%	9%

Table 3-3 shows percentages of total realized gross kWh savings that are associated with different combinations of free ridership indicator variable values.

Table 3-3 Estimated Free ridership for kWh Savings from Projects

Had Plans and Intentions to Perform Retro-Commissioning without RCx Program? (Definition 1)	*Had Plans and Intentions to Perform Retro-Commissioning without RCx Program? (Definition 2)*	*RCx Program had Influence on Decision to Perform Retro-Commissioning?*	*Had Previous Experience with Measure?*	*Percentage of Total Ex Post kWh Savings*	*Free Ridership Score*
N	N	Y	N	58%	0%
N	N	N	N	33%	0%
N	N	Y	Y	< 1%	0%
Total				100%	3%

Table 3-4 shows percentages of total realized gross therm savings that are associated with different combinations of free ridership indicator variable values.

Table 3-4 Estimated Free ridership for Therm Savings from Projects

Had Plans and Intentions to Perform Retro-Commissioning without RCx Program? (Definition 1)	*Had Plans and Intentions to Perform Retro-Commissioning without RCx Program? (Definition 2)*	*RCx Program had Influence on Decision to Perform Retro-Commissioning?*	*Had Previous Experience with Measure?*	*Percentage of Total Ex Post Therm Savings*	*Free Ridership Score*
N	N	N	N	47%	0%
N	N	Y	N	41%	0%
N	N	Y	Y	12%	0%
Total				100%	0%

The realized energy savings of the Retro-Commissioning Program during the EPY6/GPY3 are summarized in Table 3-5. During this period, realized net energy savings totaled 6,655,121 kWh. The net to gross ratio is 97%.

Table 3-5 Summary of kWh Savings from Projects

Utility	*Ex Ante kWh Savings*	*Gross Ex Post kWh Savings*	*Gross Realization Rate*	*Net Ex Post kWh Savings*	*Net-to-Gross Ratio*
Ameren	1,868,660	1,771,795	95%	1,717,216	97%
ComEd	5,158,216	5,094,849	99%	4,937,905	97%
Total	7,026,876	6,866,644	98%	6,655,121	97%

The realized energy savings of the Retro-Commissioning Program during EPY6/GPY3 are summarized in Table 3-5. During this period, realized net energy savings totaled 755,620 therms. The net to gross ratio rounded up to 100%.[2]

Table 3-6 Summary of Therm Savings from Projects

Utility	*Ex Ante Therm Savings*	*Gross Ex Post Therm Savings*	*Gross Realization Rate*	*Net Ex Post Therm Savings*	*Net-to-Gross Ratio*
Ameren	242,095	245,110	101%	244,649	100%
Nicor	177,437	221,245	125%	220,828	100%
North Shore	80,344	81,572	102%	81,419	100%
Peoples	232,652	209,119	90%	208,725	100%
Total	732,528	757,046	103%	755,620	100%

3.2.2 Realized Net Peak kW Savings

The realized net peak kW reductions of the Retro-Commissioning Program during EPY6/GPY3 are summarized by utility Table 3-7. The achieved net peak demand savings are 267.00 kW. The net to gross ratio is 97%.

Table 3-7 Summary of Peak kW Savings from Projects

Utility	*Ex Ante kW Savings*	*Gross Ex Post kW Savings*	*Gross Realization Rate*	*Net Ex Post kW Savings*	*Net-to-Gross Ratio*
Ameren	18.60	20.83	112%	20.17	97%
ComEd	251.30	255.00	101%	246.84	97%
Total	269.90	275.84	102%	267.00	97%

[2] The net to gross ratio is 99.81%.

4. Process Evaluation

This chapter presents the results of the process evaluation for the Public Sector Retro-Commissioning Program (Retro-Commissioning Program) during electric program year six and natural gas program year three (EPY6/GPY3). The process evaluation focuses on the effectiveness of program policies and organization, as well as the program delivery framework. The purpose of the process evaluation is to assess the design and recent results of the program in order to determine how effectively it is achieving its intended outcomes. This evaluation is based upon analysis of program structure, interviews with program staff and service providers, surveys of program participants, and a review of program tracking data.

The chapter begins with a discussion of the overall progress of the program, followed by an examination of issues that are critical to the future success of the program. This chapter also presents strategic planning and process recommendations and highlights key findings from participant and service provider interviews. The information in this chapter provides insight into service provider and participant decision making behaviors and identifies any key issues that may be addressed for future program years.

4.1 Evaluation Objectives

A limited process evaluation was performed for program year EPY6/GPY3. This limited evaluation was based on review of program tracking data, participant surveys, and an interview with the program manager. This process evaluation was designed to document the operations and delivery of the Retro-Commissioning Program during the EPY6/GPY3.

4.2 Summary of Primary Data Collection

Multiple sources of information informed the process evaluation of the Retro-Commissioning Program including the following:

- **Participant Surveys:** Data collected through participant surveys served as the foundation for understanding participant perspectives. Participant surveys provide feedback and insight regarding participant experiences with the Retro-Commissioning Program. Respondents report on their satisfaction with the program, detail their motivations and the factors affecting their decision making process, and provide recommendations related to improving the program.
- **Interviews with Implementation Partner Staff Members:** An interview was completed with the program manager at 360 Energy Group. The purpose of the interview was to understand any changes that had occurred to the program design or delivery and what the key program successes and challenges were.

4.3 Summary of Conclusions and Recommendations

The following presents a selection of key evaluation findings based on review of program activity, staff interviews, and participant surveys:

- **Retro-Commissioning Program Savings Declined from Prior Years, although Several Participants Installed Additional Measures through the Incentive Programs:** EPY6/GPY3 gross electricity savings declined by 33% from the previous year, and gross natural gas savings declined by 15%. These differences were largely a result of the amount of savings associated with the implementation of measures that counted towards the participants Retro-Commissioning Program agreement. That is, the difference was not due to fewer projects completed during the program year or fewer saving opportunities identified. However, the savings counted toward the Retro-Commissioning program may not represent the full impact of the program. Participants are directed in both the study report and by program staff towards the DCEO incentive programs and data provided by program staff indicated that some of these participants implemented additional measures through these programs. Program staff estimated that these additional measures resulted in an additional 637,350 therms saved and 2,269,444 kWh saved.
- **Program Participants Remain Satisfied:** None of the program participants indicated dissatisfaction with the program. Thirty-three percent of program participants indicated that they were very satisfied with the program overall, and an additional 67% were somewhat satisfied. Sixty-seven percent of participants were satisfied with the retro-commissioning service provider's level of professionalism, and 33% were somewhat satisfied. Thirty-three percent of respondents were very satisfied with the quality of work performed by the contractor implementing the measures, and 53% were somewhat satisfied with this work. No participants indicated that there were problems with the application process.
- **Retro-Commissioning Component being implemented during EPY7/GPY4:** DCEO is implementing a new small scale Retro-Commissioning pilot program during EPY7/GPY4. These projects will be implemented at the same time the SEDAC Energy Assessments will be performed for quick, low cost savings. Program staff indicated that many public sector building types would fit the program, but that the program is a particularly good fit for schools and municipalities.

ADM offers the following recommendation for the retro-commissioning program.

- **Include Available Savings Calculations and Additional Project Data in Documentation**: If available, including calculations and data collected for the project would facilitate the evaluation effort and enable better identification of the reasons for discrepancies between ex ante and ex post savings calculations.

4.4 Program Overview

The Retro-Commissioning Program is operated through the Smart Energy Design Assistance Center (SEDAC) and managed by staff at the 360 Energy Group (360 Energy).

4.4.1 Program Incentive Strategy

The Retro-Commissioning Program offers a service incentive that fully funds the cost of the retro-commissioning study if the participant agrees to implement $10,000 worth of energy saving measures with a payback of 18 months or less. The program does not provide incentives to the participant to implement the measures.

4.4.2 Project Eligibility Requirements

The Retro-Commissioning Program is available to public sector entities that receive electrical service from Ameren Illinois or ComEd. Natural gas saving measures may also be included in projects for public sector entities that receive natural gas from Ameren Illinois, Nicor, North Shore, or Peoples Gas.

To be eligible for the service incentive, buildings are generally required to have 150,000 square feet of conditioned space and be at least 5 years old. However, newer and smaller buildings with an energy use profile suggesting a large potential for savings are also eligible for inclusion. Regardless of size or age, buildings must have a functioning building automation system to which the participants will grant access.

In addition to the eligibility requirements, buildings with certain characteristics are given preference for selection. These characteristics are:

- Buildings with automation systems that include direct digital controls;
- Strong commitment by the facility owner to implement recommended measures and to be actively involved in the study;
- No planned major system renovations or retrofits; and
- Accessible and up to date building documentation and records.

4.5 Retro-Commissioning Program Participant Profile

Table 4-1 displays a summary of the total recommended and verified savings. EPY6/GPY3 recommended electricity savings totaled 30,102,260 kWh, a 3% increase from the prior year. The verified electricity savings counted towards the Retro-Commissioning Program totaled 7,026,876 kWh, a 42% decline from the prior year. In total, participants implemented 23% of the recommended electricity savings.

The recommended natural gas savings totaled 2,837,796 therms, which represents a 62% percent increase from the prior year. Verified natural gas savings counted towards the Retro-Commissioning program totaled 732,528 therms, a 24% decrease from the prior year. In total, program participants implemented 55% of the recommended savings as part of their program participation agreement.

Retro-Commissioning participants are directed towards the incentives offered by DCEO in the study report and by program staff, when they are eligible for those incentives. Table 4-1 also

displays verified savings associated with measures that were recommended in the retro-commissioning study but were implemented through the DCEO incentive programs. As shown, these measures resulted in an additional 637,350 therms saved and 2,269,444 kWh saved.[3]

Table 4-1 Average and Total Recommended and Verified Energy Savings by Fuel Type

Fuel Type	*Total Recommended Savings*	*Total Verified RCx Savings*	*RCx Savings as Percent of Recommended Savings*	*Verified Savings for Incentive Program Measures*	*Total Savings (RCx + Incentive Program Measures)*	*Total Savings as Percent of Recommended Savings*
kWh	30,102,260	7,026,876	23%	2,269,244	9,296,120	31%
Therms	2,837,796	732,528	26%	637,350	1,369,878	48%

As shown in Table 4-2, the average annual cost savings for the verified savings projects implemented by participants was $29,492. In total, participants in the program realized an estimated annual cost savings of $3,808,859.

Table 4-2 Average and Total Recommended and Verified Cost Savings

Average Recommended Cost Savings	*Average Verified Cost Savings*	*Total Recommended Cost Savings*	*Total Verified Cost Savings*
$115,420	$29,492	$3,808,859	$973,250

As shown in Table 4-3, the largest facilities accounted for a disproportionately large share of natural gas savings, while the smallest facilities accounted for a disproportionately large share of electricity savings.

Table 4-3 Distribution of Projects and Energy Savings by Facility Size

Facility Size (s.ft)	*Count*	*Percent of Total Projects*	*Percent of Total Verified Therm Savings*	*Percent of Total Verified kWh Savings*
200,000 or Less	9	27%	8%	36%
200,001 - 500,000	20	61%	68%	47%
500,001 - 1,000,000	2	6%	4%	12%
More than 1,000,000	2	6%	19%	6%

Figure 4-1 displays the financial investments in energy efficiency measures made by program participants.. Investments made that count towards the Retro-Commissioning Program agreement, for which no additional incentives were received, and investments made for measures that received DCEO incentives are shown. Regarding investments made that did not receive additional incentives, a large share of participants spent close to the $10,000 requirement,

[3] For comparison purposes, in EPY5/GPY6, the total verified savings counted towards the Retro-Commissioning Program were 12,42,889 kWh and 967,018 therms.

although almost a quarter nearly doubled that amount. Some organizations also made large additional investments in measures that they received DCEO incentives for. For example, Site 21 made an investment of $12,922 in measures that counted towards their program participation agreement but also made an additional investment of $158,048.

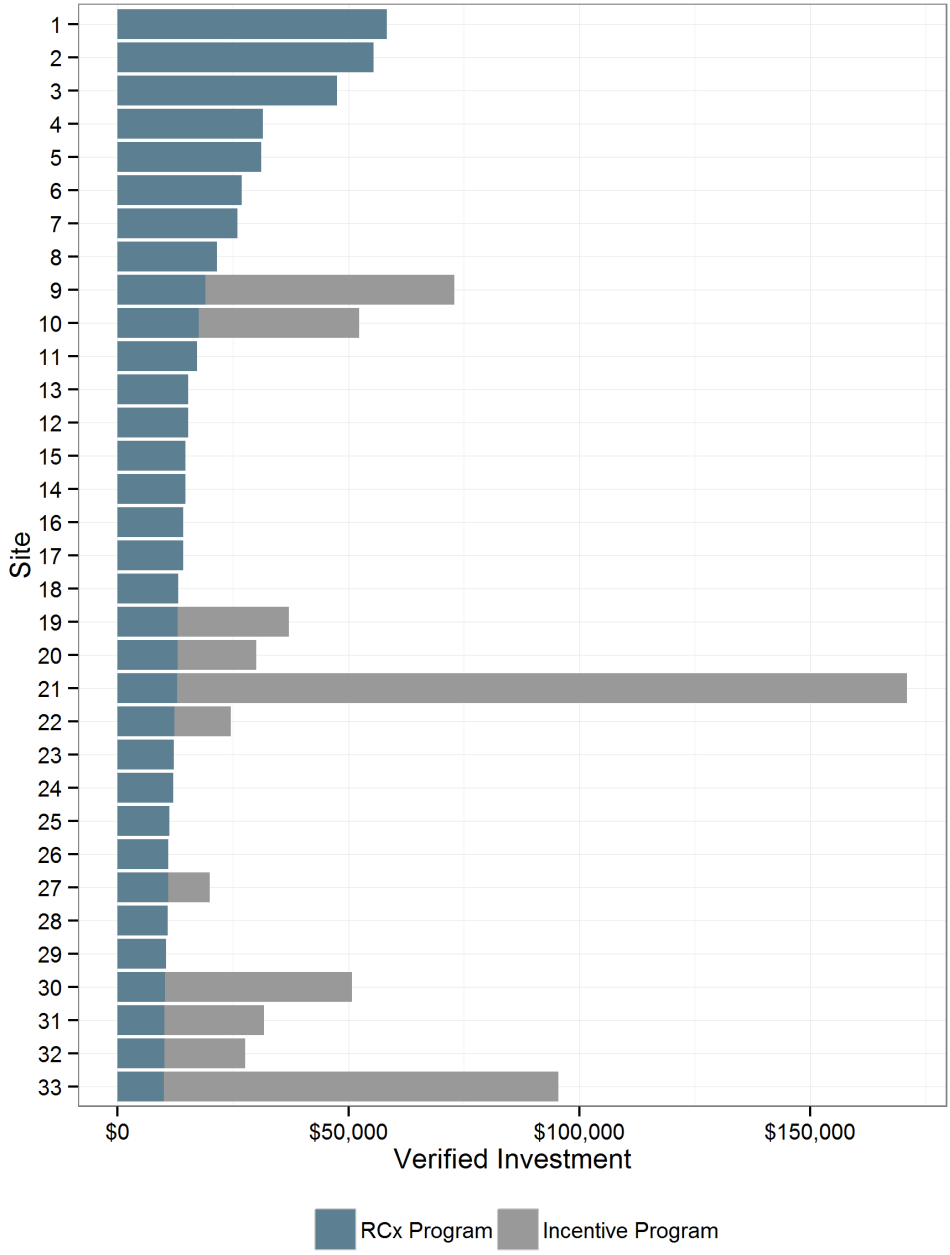

Figure 4-1 Verified Investments for Retro-Commissioning Projects

Figure 4-2 displays the relationship between the recommended energy savings and the verified energy savings (in therms). As shown, projects with the greatest recommended energy savings had the smallest ratio of verified savings to recommended savings.

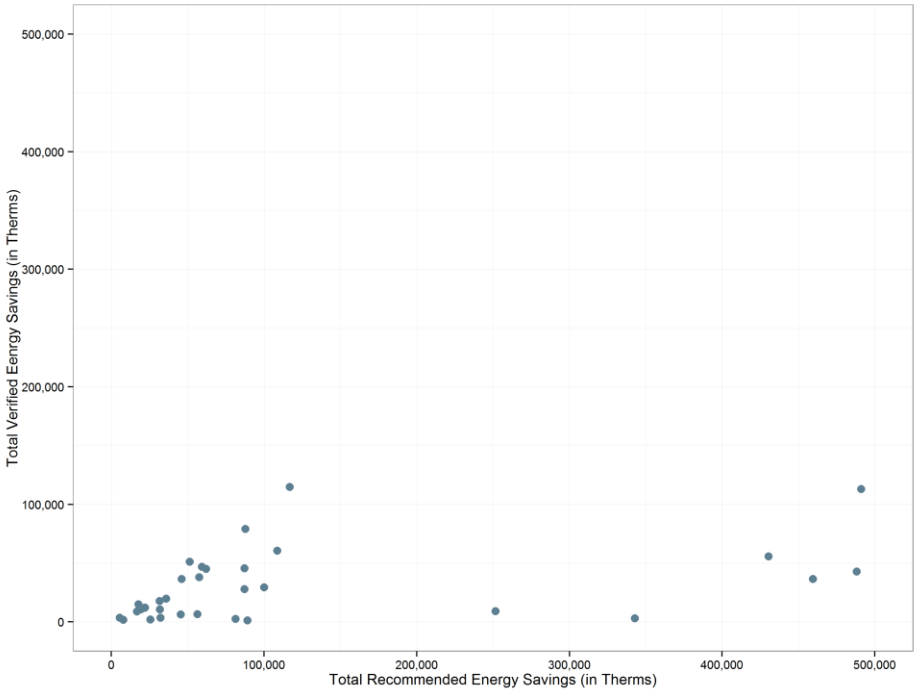

Figure 4-2 Relationship between Recommended and Verified Savings

4.6 Participant Outcomes

An email survey was conducted to collect data about participant decision-making, preferences, and opinions of the Retro-Commissioning Program. The program offered the retro-commissioning service at no cost in exchange for an agreement by the participant to implement $10,000 of energy efficiency improvements. In total, fifteen participants who implemented a project under the program responded to the survey.

Information in this section is intended to characterize participant decision making behaviors and identify notable trends within participant responses. Some of the comments and issues raised by participants are anecdotal in nature, and may reflect individual participant opinions. The conclusions and recommendations section of the process evaluation chapter provides an overall distillation of key findings from the process evaluation activities that were performed for the Retro-Commissioning Program.

It is important to note that, while the survey results discussed below are used as inputs for the calculation of estimated free ridership, participant responses to individual survey items do not, in isolation from additional factors, infer specific levels of free-ridership. Chapter 3 details the methodology used to estimate free ridership based on survey response data, while this chapter provides a qualitative discussion of participant responses.

4.6.1 How Participants Learn About the Program

Table 4-4 displays the participant responses regarding how they learned about the program. The percentages shown are percentages of survey respondents. Participants heard of the program in a

wide variety of ways. The most frequently mentioned sources for learning about the program were from a DCEO representative, an architect, engineer, or energy consultant, or from attending a conference, workshop or seminar. Other frequently mentioned sources for learning about the program, each mentioned by 20% of the respondents, were approached directly from a public sector retro-commissioning representative, the DCEO website, or friends or colleagues. A single participant learned of the program from each of the following: utility representative, past experience with the program, equipment vendors or building contractors, or other way.

Table 4-4 How Participant Decision Makers Learned about the Program

	Response	*Percent of Respondents (n=15)*
How did you learn of the Public Sector Retro-Commissioning Program?	A DCEO representative mentioned it	33%
	An architect, engineer, or energy consultant	27%
	Attended a conference, workshop or seminar	27%
	Approached directly by a representative of the Public Sector Retro-commissioning Program	20%
	The DCEO website	20%
	Friends or colleagues	20%
	From a representative of Smart Energy Design Assistance Center (SEDAC) or a SEDAC Service Provider	20%
	Received an information brochure on the Public Sector Retro-commissioning Program	13%
	From a utility representative	7%
	Past experience with the program	7%
	Equipment vendors or building contractors	7%
	Other	7%

As shown in Table 4-5, sixty-seven percent of the respondents learned about the program before planning to retro-commission the facility, 20% learned at some other time, and 13% learned during their planning to retro-commission the facility.

Table 4-5 When Participant Decision Makers Learned about the Program

	Response	*Percent of Respondents (n=15)*
When did you learn of the Retro-Commissioning Program?	Before planning to retro-commission the facility	67%
	Some other time	20%
	During your planning to retro-commission the facility	13%
	Once a retro-commissioning plan was established but before it was implemented	-
	After the retro-commissioning was completed	-
	Don't know	-

4.6.2 Factors Affecting Participation

Participants were asked about the influence of the Retro-Commissioning Program on their decision to retro-commission the facility. The one respondent who had retro-commissioning plans before hearing of the program stated that their organization would have completed the retro-commissioning even if they had not participated in the program. However, other responses may indicate that the program was influential in participants' decision making processes. For example, the program may have still influenced the timing of the retro-commissioning study, or the participants' prior experience with the program may have influenced the decision. Consequently, these responses do not, in isolation, designate a specific level of free-ridership. Responses to individual survey items may be used to characterize certain aspects of a decision maker's program perspective or implementation behavior, but it is necessary to analyze the full set of a respondent's survey responses in order to estimate an accurate and reliable net-to-gross percentage. In addition to gauging participants' preexisting plans and intentions, it is important to consider how the program affected factors such as the timing and overall efficiency level of the project. Chapter 3 outlines the full net-to-gross estimation methodology that is applied to survey results for this evaluation.

In order to further understand participants' motivation for participating in the program, participants were asked whether the retro-commissioning was recommended to them by a representative of the program, a representative of DCEO, or by the program partner SEDAC. Fifty-three percent of respondents reported that a DCEO representative recommended the retro-commissioning project for their facility. Seventy-five percent of these individuals reported that they probably would have not conducted retro-commissioning projects at their facility if not for this recommendation. These findings emphasize the importance of non-monetary program influences on participant decision making. While the availability of the service incentives may be a key factor to influencing participants to undertake retro-commissioning projects, information about the service and the potential energy savings likely motivate participation as well.

4.6.3 Energy Efficiency Attitudes, Behaviors, and Decision Making

Participant survey respondents were asked what kinds of energy efficiency policies and procedures their organizations have in place. As shown in Table 4-6, 47% of respondents stated that their organizations had a procurement staff member responsible for energy and energy efficiency. Another 67% indicated that they had a staff member responsible for energy and energy efficiency. Other frequently mentioned policies and procedures respondents' organizations had in place were policies that incorporate energy efficiency in operations and procurement (27%), an energy management plan (27%), and an active training staff (20%). Four respondents stated that their organization did not have policies or resources for energy efficiency improvements.

Table 4-6 Participant Energy Efficiency Policies and Activities

	Response	*Percent of Respondents* (n=15)*
Which of the following policies or resources does your organization have in place regarding energy efficiency improvements at this facility?	A staff member responsible for energy and energy efficiency	47%
	Do not have policies or procedures for energy efficiency improvements	27%
	An energy management plan	27%
	Policies that incorporate energy efficiency in operations and procurement	27%
	Active training of staff	20%
	Other	7%
	Don't know	0%

**Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.*

Respondents who indicated that they had an energy management plan were asked whether the plan included goals for energy savings. All four respondents stated that their plans included energy savings goals. Some of the energy savings goals respondents gave are as follows:

> *"[Our company] continues to look at various ways to reduce energy usage through converting to LED lighting, energy efficient motors, temperature setback, day light harvesting, motion sensors in all areas and the use of water saver fixtures throughout the campus."*

> *"1% per year for 5 years"*

> *"Demand management, depending on month, we choose a number and try to stay below predetermined level by using various techniques."*

Program participants were asked about their prior experience with paying for energy efficiency improvements. As shown in Table 4-7, most participants reported that they had implemented energy efficiency improvements in the last three years. More specifically, 40% of respondents

stated that they previously purchased energy efficient equipment for which they did not receive an incentive. When asked why they had not applied for incentives, two of these respondents stated that they felt the incentive amount was insufficient. One respondent reported that they didn't have enough time to complete the paperwork for the incentive application. Additionally, 40% of participants indicated that they had previously made energy efficiency improvements and applied for an incentive. The remaining 13% of participants had not previously made energy efficiency improvements. Overall, these responses indicate an inclination by respondents to implement efficiency improvements without financial assistance. However, in nearly half of these cases, participants indicated that they did not apply for incentives because the effort was not worth the incentive, i.e., they stated the incentive was insufficient or that it required too much paperwork. This suggests that these past improvements may have been minor, with participants assuming that the available incentives would not be large enough to justify the application effort.

Table 4-7 Incentives for Previous Equipment Purchased

	Response	*Percent of Respondents (n=15)*
Has your organization paid for any energy efficiency improvements in the last three years for which you did not apply for a service or financial incentive through an energy efficiency program?	Yes, paid for energy efficiency projects but did not apply for incentive.	40%
	No efficiency improvements were paid for by the organization.	13%
	No, an incentive was applied for.	40%
	Don't know	7%

4.6.4 Barriers to Energy Efficiency Improvements and Purchasing Processes

As shown in Table 4-8 some barriers were identified by participants in the Retro-Commissioning Program. Eighty percent of respondents cited insufficient funding to make the improvements as a barrier. The second most cited barrier to energy efficiency improvements was the incentive program time requirements (33%). Other barriers to energy efficiency improvements included that current equipment is too new to be replaced with more efficient equipment (27%) and approval processes that are too slow or make purchasing difficult (20%). Thirteen percent of respondents said lack of information on energy efficient equipment and practices was also a barrier for their organization to make energy efficiency improvements.

Table 4-8 Barriers to Making Energy Efficiency Improvements

	Response	*Percent of Respondents* (n=15)*
What barriers does your organization face in making energy efficiency improvements?	Insufficient funding for improvements	80%
	Incentive program time requirements	33%
	Current equipment is too new to be replaced with more efficient equipment	27%
	Approval processes that are slow or make purchasing difficult	20%
	Lack of information on energy efficient equipment and practices	13%
	Schedules that dictate when equipment is to be maintained regardless of efficiency levels	-
	Other	-
	Don't know	-

**Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.*

Respondents were asked how their organizations make decisions about energy efficiency improvements. As shown in Table 4-9, 47% of respondents stated that decisions are made by one or two key people. Other methods for making decisions included decision-making by a group or committee (27%) and decision making based on staff recommendations to a decision maker (27%). These responses suggest that the majority of respondent's organizations have centralized decision processes that involve only one or two key people.

Table 4-9 Decision Maker Characteristics

	Response	*Percent of Respondents (n=15)*
How does your organization decide to make energy efficiency improvements for this facility? Is the decision:	Made by one or two key people	47%
	Made by a group or committee	27%
	Based on staff recommendations to a decision maker	27%
	Made in some other way	-
	Don't know	-

4.6.5 Where Decision Makers Get Their Information

Respondents were asked whom they rely on for information about energy efficient equipment, materials, and design features. Respondents were able to provide multiple responses and the percentages shown in Table 4-10 are percentages of respondents.

Program participants reported using a wide variety of sources for information about energy efficiency projects. The most commonly mentioned sources were architects, engineers, or energy consultants, cited by sixty-seven percent of respondents. The Smart Energy Design Assistance Center (SEDAC) and SEDAC RCx Service providers were cited by 47% of respondents. Friends

and colleagues were a main source of information for 40% of respondents. A DCEO representative, the DCEO website, trade associations or business groups the respondent belongs to, and equipment vendors or building contractors were each cited by 27% of the respondents. Other cited sources of information included: the Energy Recourse Center (ERC) and brochures or advertisements. Lastly, one respondent said they used a facility consultant as a source for information about energy efficiency.

Table 4-10 Who Respondents Rely on for Information

	Response	*Percent of Respondents* (n=15)*
What are the main sources your organization relies on for information about energy efficient equipment, materials, practices, and design features?	Architects, engineers, or energy consultants	67%
	The Smart Energy Design Assistance Center (SEDAC) and SEDAC RCx Service Providers	47%
	Friends and colleagues	40%
	Trade journals or magazines	33%
	A DCEO representative	27%
	The DCEO website	27%
	Trade associations or business groups you belong to	27%
	Equipment vendors or building contractors	27%
	The Energy Resource Center (ERC)	13%
	Brochures or advertisements	7%
	Other	7%
	A utility representative	0%
	Don't know	0%

**Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.*

4.6.6 Financial Methods Used by Decision Makers

Table 4-11 displays the financial methods that respondents indicated using to review efficiency projects. Eighty-seven percent of respondents reported that they use simple payback to evaluate energy efficiency improvements for their facility, while 60% use initial cost. Thirteen percent of respondents reported that they use life cycle cost to evaluate energy efficiency improvements. The thirteen participants that reported using a simple payback period were asked what payback length of time they normally require in order to proceed with an energy efficient project. Participants cited required payback periods ranging from 2 to 6 years, with an average of 3 years. Seven percent of the respondents reported that they use an internal rate of return to evaluate energy efficiency improvements for their facility, and cited expected rates of return was 3 years.

Table 4-11 Methods Used to Evaluate Efficiency Improvements

	Response	*Percent of Respondents* (n=15)*
Which financial methods does your organization typically use to evaluate energy efficiency improvements for this facility?	Simple payback	87%
	Initial Cost	60%
	Life cycle cost	13%
	Internal rate of return	7%
	None of these	0%

**Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.*

4.6.7 Participant Satisfaction with the Program

Respondents rated their levels of satisfaction with selected aspects of the program on a scale ranging from very dissatisfied to very satisfied. As displayed in Table 4-12, participants were generally satisfied with the program. Survey respondents were most satisfied with the service provider's level of professionalism and the information provided by DCEO. Specifically, 100% of participants were satisfied with the service provider's level of professionalism and 93% of participants were satisfied with the information provided by DCEO. The areas with relatively lower satisfaction ratings were the savings on their monthly bill and the effort require for the application process. However, 80% of survey respondents were satisfied with these aspects of the program.

Table 4-12 Decision Maker Satisfaction with Selected Aspects of Program Experience

Element of Program Experience	*Very Satisfied*	*Somewhat Satisfied*	*Neither Satisfied nor Dissatisfied*	*Somewhat Dissatisfied*	*Very Dissatisfied*	*Don't Know / Not Applicable*	*n*
Energy efficiency of the facility since the retro-commissioning	20%	73%	7%	-	-	-	15
Savings on your monthly bill	20%	60%	13%	-	-	7%	15
Effort required for the application process	27%	53%	20%	-	-	-	15
Information provided by the retro-commissioning service provider	36%	64%	-	-	-	-	14
Retro-commissioning service provider's level of professionalism	67%	33%	-	-	-	-	15
Quality of the work conducted by the contractor implementing the measures	33%	53%	7%	-	-	7%	15
Information provided by DCEO	40%	53%	7%	-	-	-	15
Information provided by Smart Energy Design Assistance Center (SEDAC)	47%	40%	13%	-	-	-	15
Overall program experience	33%	67%	-	-	-	-	15

In addition to satisfaction levels, respondents were also asked whether or not the energy efficiency improvements implemented through the Retro-Commissioning Program had met their expectations. As shown in Table 4-13, more than half of respondents (60%) indicated that the energy efficiency measure had met their expectations, while 33% stated that it had exceeded their expectations. None of the participants stated that their expectations were mostly or not at all met.

Table 4-13 Energy Efficiency Improvements Satisfaction of Participant Expectations

	Response	*Percent of Respondents (n=15)*
Did the energy efficiency improvements implemented through your participation in the retro-commissioning meet your expectations?	My expectations were exceeded	33%
	My expectations were met	60%
	My expectations were mostly met	-
	My expectations were not met	-
	Don't know	7%

4.6.8 Installation and Incentives

As displayed in Table 4-14, 93% survey respondents did not experience any problems with the application process for the Retro-Commissioning Program. One participant responded that they

didn't know if they had problems with the application process which accounts for the remaining 7%.

Table 4-14 Experience with the Application Process

	Response	*Percent of Respondents (n=15)*
Did you have any problems with the application process?	Yes	-
	No	93%
	Don't know	7%

Participant experience with project implementation is summarized in Table 4-15. Sixty-seven percent of the respondents stated that the implementation went smoothly, while five participants indicated that it was a mostly smooth process.

Table 4-15 Experience with Project Implementation

Question	*Yes*	*For the most part*	*No*	*Don't know*	*n*
Did the retro-commissioning project go smoothly?	67%	33%	-	-	15
Do you feel the retro-commissioning service provider did a good job of identifying efficiency improvements?	93%	7%	-	-	15
For those measures implemented by a contractor, do you feel you got a quality implementation?	92%	8%	-	-	13

These five participants were asked to describe the ways in which the process did not go smoothly. One respondent stated that the retro-commissioning project did not go as smoothly as it could have because of contractor delays. Another respondent explained that there were complications with the building automation system (BAS) which prevented measures from being fully implemented.

Fourteen out of fifteen participants stated that the retro-commissioning service provider did a good job identifying energy efficiency improvements. The one participant that felt the retro-commissioning service provider did mostly a good job of identifying efficiency improvements did not give an explanation.

Of the participants who had their retro-commissioning measures implemented by a contractor, ninety-two percent stated that the contractor implementing the measures provided a quality installation. No explanation was given by the one person who indicated that they received a quality installation for the most part. Overall, program participants reported few problems with

the participation process. There were a few reports of problems that occurred during the process, but these appeared to be anecdotal instances rather than reflections of a systematic issue with program delivery.

4.6.9 Participant Overall Impressions

Survey respondents were provided an opportunity to make additional comments about the program or provide recommendations for program improvements. Three of the fifteen respondents left feedback for DCEO. The feedback is as follows:

> *"Great program, schools who are not participating in this program and missing the boat. From top to bottom, this is a great program and our school district has taken full advantage of the money and expertise offered."*

> *"While I am well aware of the energy efficiency programs and participate in them I don't believe our higher level administration is aware."*

> *"SEDAC is fantastic service that has greatly advanced our energy efficiency efforts at Union Station. [SEDAC Staff Member] and his team are very professional and their reports are first class! SEDAC is a very well run organization! It was a pleasure working with them!"*

Overall, participants were satisfied with the program and most gave positive feedback. Most participants were satisfied with the professionalism of the installer and were satisfied with the implementation.

5. Conclusions and Recommendations

The following presents the conclusions and recommendations for the EPY7/GPY4 Program Year.

5.1 Key Conclusions

- **Retro-Commissioning Program Savings Declined from Prior Years, although Several Participants Installed Additional Measures through the Incentive Programs:** EPY6/GPY3 gross electricity savings declined by 33% from the previous year, and gross natural gas savings declined by 15%. These differences were largely a result of the amount of savings associated with the implementation of measures that counted towards the participants Retro-Commissioning Program agreement. That is, the difference was not due to fewer projects completed during the program year or fewer saving opportunities identified. However, the savings counted toward the Retro-Commissioning program may not represent the full impact of the program. Participants are directed in both the study report and by program staff towards the DCEO incentive programs and data provided by program staff indicated that some of these participants implemented additional measures through these programs. Program staff estimated that these additional measures resulted in an additional 637,350 therms saved and 2,269,444 kWh saved.
- **Program Participants Remain Satisfied:** None of the program participants indicated dissatisfaction with the program. Thirty-three percent of program participants indicated that they were very satisfied with the program overall, and an additional 67% were somewhat satisfied. Sixty-seven percent of participants were satisfied with the retro-commissioning service provider's level of professionalism, and 33% were somewhat satisfied. Thirty-three percent of respondents were very satisfied with the quality of work performed by the contractor implementing the measures, and 53% were somewhat satisfied with this work. No participants indicated that there were problems with the application process.
- **Retro-Commissioning Component being implemented during EPY7/GPY4:** DCEO is implementing a new small scale Retro-Commissioning pilot program during EPY7/GPY4. These projects will be implemented at the same time the SEDAC Energy Assessments will be performed for quick, low cost savings. Program staff indicated that many public sector building types would fit the program, but that the program is a particularly good fit for schools and municipalities.

5.2 Recommendations

ADM offers the following recommendation for the retro-commissioning program.

- **Include Available Savings Calculations and Additional Project Data in Documentation**: If available, including calculations and data collected for the project would facilitate the evaluation effort and enable better identification of the reasons for discrepancies between ex ante and ex post savings calculations.

Appendix A: Questionnaire for Decision Maker Survey

1. Name of Public Entity

2. Your name *(please correct if necessary)*

3. What was your role in the decision to retro-commission the facility?
   ( ) Main decision maker
   ( ) Assisted with the decision
   ( ) Was not part of the decision process *(go to 3A-3C)*

   3A. Who was the main decision maker?

   3B. What is this person's telephone number?

   3C. What is this person's email address?

1. What are the main sources your organization relies on for information about energy efficient equipment, materials, practices and design features? *Please select all that apply.*
   ( ) A DCEO Representative
   ( ) The DCEO Website
   ( ) A utility representative
   ( ) Brochures or advertisements
   ( ) Trade associations or business groups you belong to
   ( ) Trade journals or magazines
   ( ) Friends and colleagues
   ( ) The Smart Energy Design Assistance Center (SEDAC) and SEDAC RCx Service Providers
   ( ) The Energy Resource Center (ERC)
   ( ) Architects, engineers or energy consultants
   ( ) Equipment vendors or building contractors
   ( ) Other (please describe)
   ( ) Don't know / refused

5. Which of the following policies or resources, if any, does your organization have in place regarding energy efficiency improvements at this facility? *Please select all that apply.*
   ( ) Do not have policies or procedures for energy efficiency improvements
   ( ) An energy management plan (If checked, go to 5A)
   ( ) A staff member responsible for energy and energy efficiency
   ( ) Policies that incorporate energy efficiency in operations and procurement
   ( ) Active training of staff
   ( ) Other (please specify)
   ( ) Don't know

   5A. Does your energy management plan include goals for energy savings?

( ) Yes *(If checked, go to 5B)*
( ) No
( ) Don't know

5B. Could you briefly describe the goals specified in your energy management plan?

6. How many facility operations staff members are employed at this facility?

7. Are the facility operators also tasked with general facility maintenance such as painting and cleaning?
   ( ) Yes
   ( ) No
   ( ) Don't know

8. How would you describe the approach to HVAC maintenance at this facility? Would you say that it is…
   ( ) Reactive, we run equipment to failure and then repair or replace it
   ( ) Preventative, we perform maintenance at scheduled periods to maintain equipment
   ( ) Predictive, we monitor equipment and use the information to determine when maintenance is needed
   ( ) Other (please describe)
   ( ) Don't know

9. How does your organization decide to make energy efficiency improvements for this facility? Is the decision:
   ( ) Made by one or two key people
   ( ) Based on staff recommendations to a decision maker
   ( ) Made by a group or committee
   ( ) Made in some other way
   ( ) Don't know

10. Which financial methods does your organization typically use to evaluate energy efficiency improvements for this facility?
    ( ) Initial Cost
    ( ) Simple payback *(If checked, go to 10A)*
    ( ) Internal rate of return *(If checked, go to 10B)*
    ( ) Life cycle cost *(If checked, go to 10C)*
    ( ) None of these

    10A. What payback length of time do you normally require in order to proceed with an energy efficiency project? Please provide either a specific value or an estimated range.

    10B. What rate of return do you normally require in order to proceed with an energy efficiency project? Please provide either a specific value or an estimated range.

10C. What discount rate do you normally apply when determining life cycle costs? Please provide either a specific value or an estimated range.

11. What barriers does your organization face in making energy efficiency improvements? *(Do not read list. Use as possible prompts. Select all that apply)*
    ( ) Insufficient funding for improvements
    ( ) Lack of information on energy efficient equipment and practices
    ( ) Approval processes that are slow or make purchasing difficult
    ( ) Schedules that dictate when equipment is to be replaced or maintained regardless of efficiency levels
    ( ) Incentive program time requirements
    ( ) Current equipment that is too new to be replaced with more efficient equipment
    ( ) Other *(please specify)*
    ( ) Don't know

12. Has your organization paid for any energy efficiency improvements in the last three years for which you did not apply for a service or financial incentive through an energy efficiency program?
    ( ) Yes, paid for energy efficiency improvements but did not apply for incentive. *(If checked, got to 12A)*
    ( ) No efficiency improvements were paid for by the organization.
    ( ) No, an incentive was applied for. *(If checked, go to 12B)*
    ( ) Don't know

12A. Why didn't you apply for an incentive for that project? *Please select all that apply.*
    ( ) Didn't know whether improvements qualified for incentives
    ( ) Didn't know about incentives until after efficiency improvements were completed
    ( ) Didn't have time to complete paperwork for the incentive application
    ( ) Too much paperwork for the incentive application
    ( ) The incentive was insufficient
    ( ) Other *(please specify)*
    ( ) Don't know

12B. Did you receive all of your incentives for these past energy efficiency projects?
    ( ) Yes
    ( ) No
    ( ) Don't know

Next, I would like to ask you to answer some questions about your decision to retro-commission the facility located at [FACILITY LOCATION].

13. What was the main factor that prompted you to start thinking about performing retro-commissioning at your facility?

14. Please rate the importance of several factors that might have influenced your decision to conduct the study and commit to funding energy saving recommendations. On a scale from 0 to 10, where 0 means 'not at all important' and 10 means 'extremely important', how important were the following in your decision to conduct the study and commit the funding to perform the retro-commissioning.

    a. The free retro-commissioning study
    b. The recommendation from the retro-commissioning service provider
    c. The information from the Retro-Commissioning Program
    d. The recommendation from your utility Account Manager
    e. The continued technical assistance provided by the RSP after the study phase

15. Were there any other factors that we haven't discussed that were influential in your decision to perform retro-commissioning?

    ( ) Yes *(If checked, go to 15A and B)*
    ( ) No
    ( ) Don't know

    15A. What other factors were influential to your decision to perform retro-commissioning?

    15B. On a scale from 0 to 10, where 0 means 'not at all important' and 10 means 'extremely important', how would you rate the influence of this factor?

16. Before learning about the Retro-Commissioning Program, had you ever conducted retro-commissioning at this facility or any of your other facilities?

    ( ) Yes, at this facility *(If checked, go to 16A)*
    ( ) Yes, at another facility (If checked, go to 16A)
    ( ) Yes, at both this and another facility (If checked, go to 16A)
    ( ) No
    ( ) Don't know

    16A. Did you receive an incentive or another form of financial support for performing this previous retro-commissioning work?

    ( ) Yes
    ( ) No
    ( ) Don't know

17. And before learning about the Retro-Commissioning Program, had you ever considered performing retro-commissioning at this particular facility?

    ( ) Yes
    ( ) No
    ( ) Don't know

18. Did you have plans to have this facility retro-commissioned before hearing about the Retro Commissioning Program?
    ( ) Yes *(If checked, go to 18A)*
    ( ) No
    ( ) Don't know

    18A. How long before finding out about the Public Sector Retro-commissioning Program did you have plans to retro-commission the [FACILITY]? Did you have plans for:
    ( ) Less than 6 months before
    ( ) 6 months to less than 1 year
    ( ) 1 year to less than 2 years
    ( ) 2 years to less than 5 years
    ( ) 5 or more years
    ( ) Don't know

    18B. Would you have gone ahead with this retro-commissioning even if you had not participated in the program?
    ( ) Yes
    ( ) No
    ( ) Don't know

19. When did you learn of the Retro-Commissioning Program? Was it…
    ( ) Before planning to retro-commission the facility
    ( ) During your planning to retro-commission the facility
    ( ) Once a retro-commissioning plan was established but before it was implemented
    ( ) After the retro-commissioning was complete
    ( ) Some other time (please explain)
    ( ) Don't know

20. Did you have experience with DCEO energy efficiency programs prior to participating in the Retro-Commissioning Program?
    ( ) Yes *(If checked, go to 20A)*
    ( ) No
    ( ) Don't know

    20A. How important was previous experience with the DCEO programs in making your decision to have this facility retro-commissioned? Would you say…
    ( ) Very important
    ( ) Somewhat important
    ( ) Only slightly important
    ( ) Not at all important
    ( ) Don't know

21. Did a DCEO or SEDAC representative recommend that you retro-commission the facility?
    ( ) Yes *(If checked, go to 26A)*
    ( ) No

( ) Don't know

21A. If the DCEO or SEDAC representative had not recommended that you retro-commission the facility, how likely is it that you would have done it anyway? Would you say…
( ) Definitely would have
( ) Probably would have
( ) Probably would not have
( ) Definitely would not have
( ) Don't know

22. Would your organization have been financially able to retro-commission the facility without the assistance from the Retro-Commissioning Program?
( ) Yes
( ) No
( ) Don't know

23. If the retro-commissioning service had not been provided at no cost through the program, how likely is it that you would have had the facility retro-commissioned anyway? Would you say… *(Read list)*
( ) Definitely would have
( ) Probably would have
( ) Probably would not have
( ) Definitely would not have
( ) Don't know

24. The next questions are about your awareness of the equipment performance issues identified through your retro-commissioning study PRIOR to conducting it. Would you say you were aware of all, some, or none of the issues before the study?
( ) All
( ) Some *(If checked, go to 25A)*
( ) None
( ) Don't know

24A.Which of the following issues were you previously aware of? Were you aware of the issues with your…

	Yes	No	Don't know
Air handler (*Ask if air handler*)			
Boiler (*Ask if boiler*)			
Chiller (*Ask if chiller*)			
Compressed air system (*Ask if compressed air system*)			
Cooling tower (*Ask if cooling tower*)			
Economizer (*Ask if economizer*)			
Fans (*Ask if fans*)			

Heating system (*Ask if heating system*)			
Lighting system (*Ask if lighting system*)			
Pumps (*Ask if pumps*)			

25. The next questions are about your awareness of the recommended measures and/or actions to rectify the issues identified in the study. Would you say you were aware of all, some, or none of the recommended measures before the study?

( ) All
( ) Some *(If checked, go to 26A)*
( ) None
( ) Don't know

25A.Which measures or actions were you aware of? Were you aware of the measures or actions related to the …

	Yes	No	Don't know
Air handler (*Ask if air handler*)			
Boiler (*Ask if boiler*)			
Chiller (*Ask if chiller*)			
Compressed air system (*Ask if compressed air system*)			
Cooling tower (*Ask if cooling tower*)			
Economizer (*Ask if economizer*)			
Fans (*Ask if fans*)			
Heating system (*Ask if heating system*)			
Lighting system (*Ask if lighting system*)			
Pumps (*Ask if pumps*)			

26. And if the Retro-commissioning program had not been available, would you have taken all, some, or none of the retro-commissioning actions that were implemented as a result of study?

( ) All *(If checked, go to 28)*
( ) Some *(If checked, go to 27A)*
( ) None *(If checked, go to 32)*
( ) Don't know *(If checked, go to 32)*

26A. Which measures or actions would you have implemented? Would you have implemented the measures of actions related to the…

	Yes	No	Don't know
Air handler (*Ask if air handler*)			
Boiler (*Ask if boiler*)			
Chiller (*Ask if chiller*)			
Compressed air system (*Ask if compressed air system*)			
Cooling tower (*Ask if cooling tower*)			
Economizer (*Ask if economizer*)			
Fans (*Ask if fans*)			

Heating system (*Ask if heating system*)			
Lighting system (*Ask if lighting system*)			
Pumps (*Ask if pumps*)			

27. Without the program, when do you think you would have performed these actions? Would you say…
    ( ) At the same time
    ( ) Earlier
    ( ) Later *(If checked, go to 28A)*
    ( ) Never
    ( ) Don't know

    27A. Would you say…
    ( ) Less than 1 year later
    ( ) 1 year later
    ( ) 2 years later
    ( ) 3 years later
    ( ) 4 or more years later
    ( ) Don't know

28. How did the availability of information and the service incentive provided through the Retro-Commissioning Program affect the quantity of energy efficiency improvements you implemented? Did you implement more energy efficiency improvements than you otherwise would have without the program?
    ( ) Yes *(If checked, go to 29A)*
    ( ) No
    ( ) Don't know

    28A. What additional improvements did you implement?

29. How did the availability of information and the service incentive provided through the Retro-Commissioning Program affect the timing of the retro-commissioning project? Did you retro-commission the facility earlier than you otherwise would have without the program?
    ( ) Yes *(If checked, go to 30A)*
    ( ) No
    ( ) Don't know

    29A. When would you otherwise have retro-commissioned the [FACILITY]? Would you have done it in… *(Read if needed)*
    ( ) Less than 6 months before
    ( ) 6 months to less than 1 year
    ( ) 1 year to less than 2 years
    ( ) 2 years to less than 5 years
    ( ) 5 or more years
    ( ) Don't know

30. (Ask if # of projects >1) Our records indicate that your company completed [# of projects] through the program. Was your decision to participate in the program the same for each project?
    ( ) Yes
    ( ) No
    ( ) Don't know

Next I would like to ask you a few questions about your experience with participating in the retro-commissioning program.

31. How did you learn of the Public Sector Retro-Commissioning Program? *(Do not read list. Select all that apply)*
    ( ) Approached directly by a representative of the Public Sector Retro-Commissioning Program
    ( ) A DCEO representative mentioned it
    ( ) The DCEO Website
    ( ) From a utility representative
    ( ) Received an informational brochure on the Public Sector Retro-commissioning Program
    ( ) Trade association or business group you belong to
    ( ) Trade journal or magazine
    ( ) Friends or colleagues
    ( ) From a representative of Smart Energy Design Assistance Center (SEDAC) or a SEDAC Service Provider
    ( ) From an Energy Resource Center (ERC) representative
    ( ) An architect, engineer or energy consultant
    ( ) Equipment vendor or building contractor
    ( ) Attended a conference, workshop or seminar
    ( ) Past experience with the program
    ( ) An energy service company
    ( ) Other (please describe)

32. Did you have any problems with the application process?
    ( ) Yes *(If checked, go to 33A)*
    ( ) No
    ( ) Don't know

    32A. What problems did you have?

33. Did the retro-commissioning project go smoothly?
    ( ) Yes
    ( ) For the most part *(If checked, go to 34A)*
    ( ) No *(If checked, go to 34A*)
    ( ) Don't know

    33A. Please explain in what ways the retro-commissioning did not go smoothly.

34. Did you have any problems adhering to the agreement to install $10,000 worth of measures?
    ( ) Yes *(If checked, go to 35A)*
    ( ) No
    ( ) Don't know

    34A. What problems did you have?

35. Did the energy efficiency improvements from the retro-commissioning meet your expectations? *(Read list)*
    ( ) My expectations were exceeded
    ( ) My expectations were met
    ( ) My expectations were mostly met *(If checked, go to 36A)*
    ( ) My expectations were not met *(If checked, go to 36A)*
    ( ) Don't know

    35A. Please explain in what ways the energy efficiency improvements did not meet your expectations.

36. Do you feel that the retro-commissioning service provider did a good job of identifying energy efficiency improvements?
    ( ) Yes
    ( ) For the most part *(If checked, go to 37A)*
    ( ) No *(If checked, go to 37A)*
    ( ) Don't know

    36A. Please explain in what ways you do not feel the service provider did a good job.

37. Did you have any of the retro-commissioning measures implemented by a contractor?
    ( ) Yes *(If checked, go to 38A)*
    ( ) No
    ( ) Don't know

    37A. For those measures implemented by a contractor, do you feel you got a quality implementation of the identified improvements?
    ( ) Yes
    ( ) For the most part *(If checked, go to 38B)*
    ( ) No *(If checked, go to 38B)*
    ( ) Don't know

    37B. Please explain in what ways you did not receive a quality implementation.

38. Now we would like to know about any other energy saving improvements that you may have made that were NOT recommended in the retro-commissioning study.

Because of your experience with the retro-commissioning program, have you bought, or are you likely to buy, energy efficient equipment without applying for a financial incentive or rebate?

( ) Yes, have already bought non-incentivized efficiency equipment because of the experience with the program. *(If checked, go to Question 39B)*
( ) Yes, likely to buy efficiency equipment because of the experience with the program. *(If checked, go to Question 39A)*
( ) No
( ) Don't know (*If checked, go to Question 39A)*

38A. We'd like to call you in a few months for a very short follow-up about other efficiency purchases, if that would be alright. Please provide us with the best person to contact and their phone number.

38B. What energy efficient equipment did you purchase?

38C. What motivated you to purchase this equipment?

38D. Have you installed the equipment?

( ) Yes *(If checked, go to Question 39D.1)*
( ) No
( ) Don't know

39D.1 In what month and year did you install that equipment?

39E. Was this equipment installed, or will it be installed, at the same facility (or facilities) as where the incentive project was completed?

( ) Yes
( ) No (*If checked, go to Question 39E.1)*
( ) Don't know

39E.1. Where was (or will be) the equipment installed?

39F. How important was your experience with the program to your decision to implement the additional energy efficiency measures?

( ) Very important
( ) Somewhat important
( ) Only slightly important
( ) Not at all important
( ) Don't know

39G. How important was your past participation in any programs offered by DCEO to your decision to implement the additional energy efficiency measures?

( ) Did not participate in any other programs in the past
( ) Very important
( ) Somewhat important
( ) Only slightly important

( ) Not at all important
( ) Don't know

39H. Why didn't you apply for or receive incentives for those items?
( ) Didn't know whether equipment qualified for financial incentives
( ) Equipment did not qualify for financial incentives
( ) Too much paperwork for the financial incentive application
( ) Financial incentive was insufficient
( ) Didn't have time to complete paperwork for financial incentive application
( ) Didn't know about financial incentives until after equipment was purchased
( ) Other reason *(please describe)*: _____

39. How would you rate your satisfaction with the following - *Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied*? *(If dissatisfied, go to 40A)*
( ) The energy efficiency of the facility since the retro-commissioning
( ) Savings on your monthly bill
( ) The effort required for the application process
( ) Information provided by the retro-commissioning service provider
( ) Quality of the retro-commissioning service provider's work
( ) The retro-commissioning service provider's level of professionalism
( ) Quality of the work conducted by the contractor implementing the measures
( ) Information provided by DCEO
( ) Information provided by Smart Energy Design Assistance Center (SEDAC)
( ) Overall program experience

39A. Please describe in what ways you were not satisfied with the program.

Finally, there are just a few more questions about your facility.

40. What type facility is the <project location>?
( ) Airport
( ) Community College
( ) Correctional Facility
( ) K-12 School
( ) Public Library
( ) Medical Facility
( ) Municipal Facility
( ) Park District Facility
( ) Police or Fire Station
( ) Public Works Facility
( ) State University
( ) Wastewater Treatment Facility
( ) Other *(Please specify)*

41. Does <Public Sector Entity> pay the full cost of the natural gas bill?

( ) Yes
( ) No *(If checked and Municipality, go to 42A)*
( ) Don't know

41A. How are natural gas costs paid for?

42. Does <Public Sector Entity> pay the full cost of the electric bill?
( ) Yes
( ) No *(If checked and Municipality, go to 43A)*
( ) Don't know

42A. How are electricity costs paid for?

43. Do you have any other comments that you would like to relay to DCEO about energy efficiency in public entities or about their programs?

Appendix B: Decision Maker Survey Responses

As part of the evaluation, ADM administered a survey to a sample of decision makers for facilities that received incentives under the Retro-Commissioning Program. The survey provided the information used in Chapter 3 to estimate free ridership for projects in the Retro-Commissioning Program. The survey also provided information used to perform the program process evaluation.

Each participant was surveyed using the survey instrument provided in Appendix A. Decision makers were contacted by email and completed the survey online. During the survey participants were asked questions about (1) his or her general decision-making regarding purchasing and installing energy efficient equipment, (2) his or her knowledge of and satisfaction with the Retro-Commissioning Program, and (3) the influence that the Retro-Commissioning Program had on his or her decision to implement the retro-commissioning project.

The following tabulations summarize DCEO participant survey responses. Two columns of data are presented. The first column presents the number of survey respondents (*n).* The second column presents the percentage of survey respondents.

	Response	*(n=15)*	*Percent of Respondents*
3. What was your role in the decision to retro-commission the facility?	Main decision maker	7	47%
	Assisted with the decision	8	53%
	Was not part of the decision making process	0	0%

	Response	*(n=15)*	*Percent of Respondents**
4. What are the main sources your organization relies on for information about energy efficient equipment, materials, practices, and design features?	A DCEO representative	4	27%
	The DCEO website	4	27%
	The Smart Energy Design Assistance Center (SEDAC) and SEDAC RCx Service Providers	7	47%
	The Energy Resource Center (ERC)	2	13%
	A utility representative	0	0%
	Brochures or advertisements	1	7%
	Trade associations or business groups you belong to	4	27%
	Trade journals or magazines	5	33%
	Friends and colleagues	6	40%
	Architects, engineers, or energy consultants	10	67%
	Equipment vendors or building contractors	4	27%
	Other	1	7%
	Don't know	0	0%

**Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.*

	Response	*(n=15)*	*Percent of Respondents**
5. Which of the following policies or resources does your organization have in place regarding energy efficiency improvements at this facility?	Do not have policies or procedures for energy efficiency improvements	4	27%
	An energy management plan	4	27%
	A staff member responsible for energy and energy efficiency	7	47%
	Policies that incorporate energy efficiency in operations and procurement	4	27%
	Active training of staff	3	20%
	Other	1	7%
	Don't know	0	0%

**Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.*

	Response	*(n=4)*	*Percent of Respondents*
5a. Does your energy management plan include goals for energy savings?	Yes	4	100%
	No	0	0%
	Don't know	0	0%

6. How many facility operations staff members are employed at this facility?	*Average Number of Staff Members, (n=14)*	
	Average	14.1

7. Are the facility operators responsible for general facility maintenance such as painting and cleaning?	*Response*	*(n=15)*	*Percent of Respondents*
	Yes	14	93%
	No	1	7%
	Don't know	0	0%

8. How would you describe the approach to HVAC maintenance at this facility? Would you say that it is...	*Response*	*(n=15)*	*Percent of Respondents*
	Reactive, we run equipment to failure and then repair or replace it	1	7%
	Preventative, we perform maintenance at scheduled periods to maintain equipment	11	73%
	Predictive, we monitor equipment and use the information to determine maintenance needed	0	0%
	Other	2	13%
	Don't know	0	0%

9. How does your organization decide to make energy efficiency improvements for this facility? Is the decision:	*Response*	*(n=15)*	*Percent of Respondents*
	Made by one or two key people	7	47%
	Made by a group or committee	4	27%
	Based on staff recommendations to a decision maker	4	27%
	Made in some other way	0	0%
	Don't know	0	0%

10. Which financial methods does your organization typically use to evaluate energy efficiency improvements for this facility?	*Response*	*(n=15)*	*Percent of Respondents**
	Initial Cost	9	60%
	Simple payback	13	87%
	Internal rate of return	1	7%
	Life cycle cost	2	13%
	None of these	0	0%

*Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.

10a. What payback length of time do you normally require in order to proceed with an energy efficiency project?	*Average Years, (n=10)*	
	Average	3.1

10b. What rate of return do you normally require in order to proceed with an energy efficiency project?	*Average Years, (n=1)*	
	Average	3.0

10c. What discount rate do you normally apply when determining life cycle costs?	*Average Years, (n=0)*	
	Average	0%

11. What barriers does your organization face in making energy efficiency improvements?	*Response*	*(n=15)*	*Percent of Respondents**
	Insufficient funding for improvements	12	80%
	Lack of information on energy efficient equipment and practices	2	13%
	Approval processes that are slow or make purchasing difficult	3	20%
	Schedules that dictate when equipment is to be maintained regardless of efficiency levels	0	0%
	Incentive program time requirements	5	33%
	Current equipment is too new to be replaced with more efficient equipment	4	27%
	Other	0	0%
	Don't know	0	0%

*Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.

12. Has your organization paid for any energy efficiency improvements in the last three years for which you did not apply for a service or financial incentive through an energy efficiency program?	*Response*	*(n=15)*	*Percent of Respondents*
	Yes, completed energy efficiency projects but did not apply for incentive.	6	40%
	No efficiency improvements were paid for by the organization.	2	13%
	No, an incentive was applied for.	6	40%
	Don't know	1	7%

12a. Why didn't you apply for an incentive for that project?	*Response*	*(n=6)*	*Percent of Respondents*
	Didn't know whether improvements qualified for incentives	0	0%
	Didn't know about incentives until after efficiency improvements were completed	0	0%
	Didn't have time to complete paperwork for the incentive application	1	17%
	Too much paperwork for the incentive application	0	0%
	The incentive was insufficient	2	33%
	Other	3	50%
	Don't know	0	0%

12b. Did you receive all of your incentives for these past energy efficiency projects?	*Response*	*(n=6)*	*Percent of Respondents*
	Yes	6	100%
	No	0	0%
	Don't know	0	0%

14a. How important were the following in your decision to conduct the study and commit the funding to perform the retro-commissioning: the free retro-commissioning study?	*Response*	*(n=15)*	*Percent of Respondents*
	0	0	0%
	1	0	0%
	2	0	0%
	3	0	0%
	4	0	0%
	5	1	7%
	6	0	0%
	7	1	7%
	8	1	7%
	9	0	0%
	10	12	80%
	Don't know	0	0%

14b. How important were the following in your decision to conduct the study and commit the funding to perform the retro-commissioning: the recommendation from the retro-commissioning service provider?	*Response*	*(n=15)*	*Percent of Respondents*
	0	0	0%
	1	0	0%
	2	1	7%
	3	0	0%
	4	1	7%
	5	3	20%
	6	0	0%
	7	1	7%
	8	2	13%
	9	1	7%
	10	6	40%
	Don't know	0	0%

	Response	*(n=15)*	*Percent of Respondents*
14c. How important were the following in your decision to conduct the study and commit the funding to perform the retro-commissioning: the information from the Retro-Commissioning Program?	0	0	0%
	1	0	0%
	2	0	0%
	3	0	0%
	4	0	0%
	5	2	13%
	6	1	7%
	7	1	7%
	8	5	33%
	9	2	13%
	10	4	27%
	Don't know	0	0%

	Response	*(n=15)*	*Percent of Respondents*
14d. How important were the following in your decision to conduct the study and commit the funding to perform the retro-commissioning: the recommendation from your utility Account Manager?	0	6	40%
	1	1	7%
	2	0	0%
	3	0	0%
	4	1	7%
	5	1	7%
	6	2	13%
	7	0	0%
	8	3	20%
	9	1	7%
	10	0	0%
	Don't know	0	0%

	Response	*(n=15)*	*Percent of Respondents*
14e. How important were the following in your decision to conduct the study and commit the funding to perform the retro-commissioning: the continued technical assistance provided by the RSP after the study phase?	0	1	7%
	1	0	0%
	2	1	7%
	3	1	7%
	4	0	0%
	5	2	13%
	6	0	0%
	7	3	20%
	8	1	7%
	9	2	13%
	10	4	27%
	Don't know	0	0%

15. Were there any other factors that we haven't discussed that were influential in your decision to perform retro-commissioning?	*Response*	*(n=15)*	*Percent of Respondents*
	Yes	1	7%
	No	13	87%
	Don't know	1	7%

15b. On a scale from 0 to 10, where 0 means 'not at all important' and 10 means 'extremely important', how would you rate the influence of this factor?	*Response*	*(n=1)*	*Percent of Respondents*
	0	0	0%
	1	0	0%
	2	0	0%
	3	0	0%
	4	0	0%
	5	0	0%
	6	0	0%
	7	1	100%
	8	0	0%
	9	0	0%
	10	0	0%

16. Before learning about the Retro-Commissioning Program, had you ever conducted retro-commissioning at this facility or any of your other facilities?	*Response*	*(n=15)*	*Percent of Respondents*
	Yes, at this facility	0	0%
	Yes, at another facility	3	20%
	Yes, at both this and another facility	1	7%
	No	11	73%
	Don't know	0	0%

16a. Did you receive an incentive or another form of financial support for performing this previous retro-commissioning work?	*Response*	*(n=4)*	*Percent of Respondents*
	Yes	2	50%
	No	2	50%
	Don't know	0	0%

17. And before learning about the Retro-Commissioning Program, had you ever considered performing retro-commissioning at this particular facility?	*Response*	*(n=15)*	*Percent of Respondents*
	Yes	7	47%
	No	8	53%
	Don't know	0	0%

18. Did you have plans to have [LOCATION] retro-commissioned before hearing about the Retro-Commissioning Program?	*Response*	*(n=15)*	*Percent of Respondents*
	Yes	1	7%
	No	14	93%
	Don't know	0	0%

18a. How long before finding out about the Public Sector Retro-Commissioning Program did you have plans to retro-commission the [ADDRESS] location? Did you have plans for...	*Response*	*(n=1)*	*Percent of Respondents*
	Less than 6 months	1	100%
	6 months to less than 1 year	0	0%
	1 year to less than 2 years	0	0%
	2 years to less than 5 years	0	0%
	More than 5 years	0	0%
	Don't know	0	0%

18b. Would you have gone ahead with the retro-commissioning even if you had not participated in the program?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	1	100%
	No	0	0%
	Don't know	0	0%

19. When did you learn of the Retro-Commissioning Program? Was it…	*Response*	*(n=15)*	*Percent of Respondents*
	Before planning to retro-commission the facility	10	67%
	During your planning to retro-commission the facility	2	13%
	Once a retro-commissioning plan was established but before it was implemented	0	0%
	After the retro-commissioning was completed	0	0%
	Some other time	3	20%
	Don't know	0	0%

20. Did you have experience with DCEO energy efficiency programs prior to participating in the Retro-Commissioning Program?	*Response*	*(n=15)*	*Percent of Respondents*
	Yes	10	67%
	No	5	33%
	Don't know	0	0%

20a. How important was previous experience with the DCEO programs in making your decision to have [LOCATION] retro-commissioned? Would you say...	*Response*	*(n=10)*	*Percent of Respondents*
	Very important	7	70%
	Somewhat important	2	20%
	Only slightly important	1	10%
	Not important at all	0	0%
	Don't know	0	0%

21. Did a DCEO or SEDAC representative recommend that you retro-commission the facility?	*Response*	*(n=15)*	*Percent of Respondents*
	Yes	8	53%
	No	5	33%
	Don't know	2	13%

21a. If the Retro-Commissioning Program or other DCEO representative had not recommended that you retro-commission the facility, how likely is it that you would have done it anyway? Would you say...(Read list.)	*Response*	*(n=8)*	*Percent of Respondents*
	Definitely would have	0	0%
	Probably would have	1	13%
	Probably would not have	6	75%
	Definitely would not have	0	0%
	Don't know	1	13%

22. Would your organization have been financially able to retro-commission the facility without the assistance from the Retro-Commissioning Program?	*Response*	*(n=15)*	*Percent of Respondents*
	Yes	1	7%
	No	11	73%
	Don't know	3	20%

23. If the retro-commissioning service had not been provided at no cost through the program, how likely is it that you would have had the [LOCATION] retro-commissioned anyway? Would you say...(Read list.)	*Response*	*(n=15)*	*Percent of Respondents*
	Definitely would have	1	7%
	Probably would have	1	7%
	Probably would not have	12	80%
	Definitely would not have	1	7%
	Don't know	0	0%

24. The next questions are about your awareness of the equipment performance issues identified through your retro-commissioning study PRIOR to conducting it. Would you say you were aware of all, some, or none of the issues before the study?	*Response*	*(n=15)*	*Percent of Respondents*
	All	0	0%
	Some	12	80%
	None	3	20%
	Don't know	0	0%

25a. Were you aware of the issues with your air handler?	*Response*	*(n=10)*	*Percent of Respondents*
	Yes	4	40%
	No	4	40%
	Don't know	2	20%

25a. Were you aware of the issues with your boiler?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	1	50%
	No	0	0%
	Don't know	1	50%

25a. Were you aware of the issues with your chiller?	*Response*	*(n=4)*	*Percent of Respondents*
	Yes	1	25%
	No	1	25%
	Don't know	2	50%

25a. Were you aware of the issues with your compressed air system?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	-
	No	0	-
	Don't know	0	-

25a. Were you aware of the issues with your cooling tower?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	-
	No	0	-
	Don't know	0	-

25a. Were you aware of the issues with your economizer?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	0	0%
	No	1	50%
	Don't know	1	50%

25a. Were you aware of the issues with your fans?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	2	67%
	No	1	33%
	Don't know	0	0%

25a. Were you aware of the issues with your heating system?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	-
	No	0	-
	Don't know	0	-

25a. Were you aware of the issues with your lighting system?	*Response*	*(n=5)*	*Percent of Respondents*
	Yes	5	100%
	No	0	0%
	Don't know	0	0%

25a. Were you aware of the issues with your pumps?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	1	33%
	No	1	33%
	Don't know	1	33%

25a. Were you aware of the issues with your HVAC Scheduling or Setpoints?	*Response*	*(n=5)*	*Percent of Respondents*
	Yes	4	80%
	No	1	20%
	Don't know	0	0%

25a. Were you aware of the issues with your HVAC Temperature Sensors?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	0	0%
	No	1	100%
	Don't know	0	0%

25a. Were you aware of the issues with your HVAC Testing and Balancing?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	1	100%
	No	0	0%
	Don't know	0	0%

25a. Were you aware of the issues with your PC Power Management?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	1	100%
	No	0	0%
	Don't know	0	0%

26. The next questions are about your awareness of the recommended measures and/or actions to rectify the issues identified in the study. Would you say you were aware of all, some, or none of the recommended measures before the study?	*Response*	*(n=15)*	*Percent of Respondents*
	All	0	0%
	Some	12	80%
	None	3	20%
	Don't know	0	0%

26a. Were you aware of the measures or actions related to the air handler?	*Response*	*(n=10)*	*Percent of Respondents*
	Yes	2	20%
	No	4	40%
	Don't know	4	40%

25a. Were you aware of the issues with your boiler?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	0	0%
	No	1	100%
	Don't know	0	0%

26a. Were you aware of the measures or actions related to the chiller?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	1	33%
	No	0	0%
	Don't know	2	67%

26a. Were you aware of the measures or actions related to the compressed air system?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	-
	No	0	-
	Don't know	0	-

26a. Were you aware of the measures or actions related to the cooling tower?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	-
	No	0	-
	Don't know	0	-

26a. Were you aware of the measures or actions related to the economizer?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	0	0%
	No	1	100%
	Don't know	0	0%

26a. Were you aware of the measures or actions related to the fans?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	1	50%
	No	0	0%
	Don't know	1	50%

26a. Were you aware of the measures or actions related to the heating system?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	-
	No	0	-
	Don't know	0	-

26a. Were you aware of the measures or actions related to the lighting system?	*Response*	*(n=5)*	*Percent of Respondents*
	Yes	5	100%
	No	0	0%
	Don't know	0	0%

26a. Were you aware of the measures or actions related to the pumps?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	1	50%
	No	1	50%
	Don't know	0	0%

26a. Were you aware of the measures or actions related to the HVAC Scheduling or Setpoints?	*Response*	*(n=5)*	*Percent of Respondents*
	Yes	4	80%
	No	1	20%
	Don't know	0	0%

26a. Were you aware of the measures or actions related to the HVAC Temperature Sensors?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	0	0%
	No	1	100%
	Don't know	0	0%

26a. Were you aware of the measures or actions related to the HVAC Testing and Balancing?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	1	100%
	No	0	0%
	Don't know	0	0%

26a. Were you aware of the measures or actions related to the PC Power Management?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	0	0%
	No	0	0%
	Don't know	1	100%

27. And if the Retro-commissioning program had not been available, would you have taken all, some, or none of the retro-commissioning actions that were implemented as a result of study?	*Response*	*(n=15)*	*Percent of Respondents*
	All	0	0%
	Some	7	47%
	None	4	27%
	Don't know	4	27%

27a. Would you have implemented the measures of actions related to the air handler?	*Response*	*(n=5)*	*Percent of Respondents*
	Yes	1	20%
	No	3	60%
	Don't know	1	20%

27a. Would you have implemented the measures of actions related to the boiler?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	0	0%
	No	1	100%
	Don't know	0	0%

27a. Would you have implemented the measures of actions related to the chiller?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	0	0%
	No	2	100%
	Don't know	0	0%

27a. Would you have implemented the measures of actions related to the compressed air system?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	-
	No	0	-
	Don't know	0	-

27a. Would you have implemented the measures of actions related to the cooling tower?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	-
	No	0	-
	Don't know	0	-

27a. Would you have implemented the measures of actions related to the economizer?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	0	0%
	No	2	100%
	Don't know	0	0%

27a. Would you have implemented the measures of actions related to the fans?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	1	100%
	No	0	0%
	Don't know	0	0%

27a. Would you have implemented the measures of actions related to the heating system?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	-
	No	0	-
	Don't know	0	-

27a. Would you have implemented the measures of actions related to the lighting system?	*Response*	*(n=4)*	*Percent of Respondents*
	Yes	4	100%
	No	0	0%
	Don't know	0	0%

27a. Would you have implemented the measures of actions related to the pumps?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	1	50%
	No	1	50%
	Don't know	0	0%

27a. Would you have implemented the measures of actions related to the HVAC Scheduling or Setpoints?	*Response*	*(n=5)*	*Percent of Respondents*
	Yes	3	60%
	No	1	20%
	Don't know	1	20%

27a. Would you have implemented the measures of actions related to the HVAC Temperature Sensors?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	1	100%
	No	0	0%
	Don't know	0	0%

27a. Would you have implemented the measures of actions related to the HVAC Testing and Balancing?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	-
	No	0	-
	Don't know	0	-

27a. Would you have implemented the measures of actions related to the PC Power Management?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	0	0%
	No	0	0%
	Don't know	1	100%

28. Without the program, when do you think you would have performed these actions? Would you say…	*Response*	*(n=7)*	*Percent of Respondents*
	At the same time	0	0%
	Earlier	0	0%
	Later	7	100%
	Never	0	0%
	Don't know	0	0%

28a. Would you say…	*Response*	*(n=7)*	*Percent of Respondents*
	Less than 1 year later	0	0%
	1 year later	2	29%
	2 years later	5	71%
	3 years later	0	0%
	4 or more years later	0	0%
	Don’t know	0	0%

29. How did the availability of information and the service incentive provided through the Retro-Commissioning Program affect the quantity of energy efficiency improvements you implemented? Did you implement more energy efficiency improvements than you otherwise would have without the program?	*Response*	*(n=15)*	*Percent of Respondents*
	Yes	9	60%
	No	5	33%
	Don't know	1	7%

30. How did the availability of information and the service incentive provided through the Retro-Commissioning Program affect the timing of the retro-commissioning project? Did you retro-commission the facility earlier than you otherwise would have without the program?	*Response*	*(n=15)*	*Percent of Respondents*
	Yes	14	93%
	No	0	0%
	Don't know	1	7%

30a. When would you otherwise have retro-commissioned the facility?	*Response*	*(n=14)*	*Percent of Respondents*
	Less than 6 months later	0	0%
	6 months to less than 1 year later	0	0%
	1 year to less than 2 years later	5	36%
	3 years to less than 5 years later	2	14%
	More than 5 years later	2	14%
	Don't know	5	36%

31. Our records indicate that your company completed [# of projects] through the program. Was your decision to participate in the program the same for each project?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	2	100%
	No	0	0%
	Don't know	0	0%

	Response	*(n=15)*	*Percent of Respondents**
32. How did you learn of the Public Sector Retro-Commissioning Program?	Approached directly by a representative of the Public Sector Retro-commissioning Program	3	20%
	A DCEO representative mentioned it	5	33%
	The DCEO website	3	20%
	From a utility representative	1	7%
	Received an information brochure on the Public Sector Retro-commissioning Program	2	13%
	Trade journal or magazine	0	0%
	Trade association or business group you belong to	0	0%
	Friends or colleagues	3	20%
	From a representative of Smart Energy Design Assistance Center (SEDAC) or a SEDAC Service Provider	3	20%
	From an Energy Resource Center (ERC) representative	0	0%
	An architect, engineer, or energy consultant	4	27%
	Attended a conference, workshop or seminar	4	27%
	An energy service company	0	0%
	Past experience with the program	1	7%
	Equipment vendors or building contractors	1	7%
	Other	1	7%
	Don't know	0	0%

*Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.

	Response	*(n=15)*	*Percent of Respondents*
33. Did you have any problems with the application process?	Yes	0	0%
	No	14	93%
	Don't know	1	7%

	Response	*(n=15)*	*Percent of Respondents*
34. Did the retro-commissioning project go smoothly?	Yes	10	67%
	For the most part	5	33%
	No	0	0%
	Don't know	0	0%

	Response	*(n=15)*	*Percent of Respondents*
35. Did you have any problems adhering to the agreement to install $10,000 worth of measures?	Yes	0	0%
	No	15	100%
	Don't know	0	0%

36. Did the energy efficiency improvements implemented through your participation in the retro-commissioning meet your expectations? Would you say…	*Response*	*(n=15)*	*Percent of Respondents*
	My expectations were exceeded	5	33%
	My expectations were met	9	60%
	My expectations were mostly met	0	0%
	My expectations were not met	0	0%
	Don't know	1	7%

37. Do you feel that the retro-commissioning service provider did a good job of identifying energy efficiency improvements?	*Response*	*(n=15)*	*Percent of Respondents*
	Yes	14	93%
	For the most part	1	7%
	No	0	0%
	Don't know	0	0%

38. Did you have any of the retro-commissioning measures implemented by a contractor?	*Response*	*(n=15)*	*Percent of Respondents*
	Yes	13	87%
	No	2	13%
	Don't know	0	0%

39. For those measures implemented by a contractor, do you feel you got a quality implementation of the identified improvements?	*Response*	*(n=13)*	*Percent of Respondents*
	Yes	12	92%
	For the most part	1	8%
	No	0	0%
	Don't know	0	0%

40. Because of your experience with the retro-commissioning program, have you bought, or are you likely to buy, energy efficient equipment without applying for a financial incentive or rebate?	*Response*	*(n=15)*	*Percent of Respondents*
	Yes, have already bought non-incentivized efficiency equipment because of the experience with the program.	3	20%
	Yes, likely to buy efficiency equipment because of the experience with the program.	0	0%
	No	7	47%
	Don't know	2	13%

40d. Have you installed the equipment?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	2	100%
	No	0	0%
	Don't know	0	0%

40e. Was this equipment installed, or will it be installed, at the same facility (or facilities) as where the incentive project was completed?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	-
	No	0	-
	Don't know	0	-

40f. How important was your experience with the program to your decision to implement the additional energy efficiency measures?	*Response*	*(n=2)*	*Percent of Respondents*
	Very important	0	0%
	Somewhat important	1	50%
	Only slightly important	0	0%
	Neither important or unimportant	1	50%
	Not at all important	0	0%
	Don't know	0	0%

40g. How important was your past participation in any programs offered by DCEO to your decision to implement the additional energy efficiency measures?	*Response*	*(n=2)*	*Percent of Respondents*
	Did not participate in any other programs in the past	1	50%
	Very important	1	50%
	Somewhat important	0	0%
	Only slightly important	0	0%
	Not at all important	0	0%
	Don't know	0	0%

40h. Why didn't you apply for or receive financial assistance or incentives for the improvements?	*Response*	*(n=2)*	*Percent of Respondents**
	Didn't know about financial incentives	0	0%
	Didn't know whether the project qualified for financial incentives	0	0%
	Financial incentive was insufficient	0	0%
	No financial incentive was offered	0	0%
	Too much paperwork for the financial incentive application	0	0%
	Other reason	2	100%
	Don't know	0	0%

*Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.

41a. How would you rate your satisfaction with the energy efficiency of the facility since the retro-commissioning?	*Response*	*(n=15)*	*Percent of Respondents*
	Very Satisfied	3	20%
	Satisfied	11	73%
	Neither Satisfied nor Dissatisfied	1	7%
	Dissatisfied	0	0%
	Very Dissatisfied	0	0%
	Don't know / Not applicable	0	0%
	Average		4.1

	Response	*(n=15)*	*Percent of Respondents*
41b. How would you rate your satisfaction with the savings on your monthly bill?	Very Satisfied	3	20%
	Satisfied	9	60%
	Neither Satisfied nor Dissatisfied	2	13%
	Dissatisfied	0	0%
	Very Dissatisfied	0	0%
	Don't know / Not applicable	1	7%
	Average		4.1

	Response	*(n=15)*	*Percent of Respondents*
41c. How would you rate your satisfaction with the effort required for the application process?	Very Satisfied	4	27%
	Satisfied	8	53%
	Neither Satisfied nor Dissatisfied	3	20%
	Dissatisfied	0	0%
	Very Dissatisfied	0	0%
	Don't know / Not applicable	0	0%
	Average		4.1

	Response	*(n=14)*	*Percent of Respondents*
41d. How would you rate your satisfaction with the information provided by the retro-commissioning service provider?	Very Satisfied	5	36%
	Satisfied	9	64%
	Neither Satisfied nor Dissatisfied	0	0%
	Dissatisfied	0	0%
	Very Dissatisfied	0	0%
	Don't know / Not applicable	0	0%
	Average		4.4

	Response	*(n=15)*	*Percent of Respondents*
41e. How would you rate your satisfaction with the retro-commissioning service provider's level of professionalism?	Very Satisfied	10	67%
	Satisfied	5	33%
	Neither Satisfied nor Dissatisfied	0	0%
	Dissatisfied	0	0%
	Very Dissatisfied	0	0%
	Don't know / Not applicable	0	0%
	Average		4.7

	Response	*(n=15)*	*Percent of Respondents*
41f. How would you rate your satisfaction with the quality of the work conducted by the contractor implementing the measures?	Very Satisfied	5	33%
	Satisfied	8	53%
	Neither Satisfied nor Dissatisfied	1	7%
	Dissatisfied	0	0%
	Very Dissatisfied	0	0%
	Don't know / Not applicable	1	7%
	Average		4.3

	Response	*(n=15)*	*Percent of Respondents*
41g. How would you rate your satisfaction with the information provided by DCEO?	Very Satisfied	6	40%
	Satisfied	8	53%
	Neither Satisfied nor Dissatisfied	1	7%
	Dissatisfied	0	0%
	Very Dissatisfied	0	0%
	Don't know / Not applicable	0	0%
	Average		4.3

	Response	*(n=15)*	*Percent of Respondents*
41h. How would you rate your satisfaction with the information provided by Smart Energy Design Assistance Center (SEDAC)?	Very Satisfied	7	47%
	Satisfied	6	40%
	Neither Satisfied nor Dissatisfied	2	13%
	Dissatisfied	0	0%
	Very Dissatisfied	0	0%
	Don't know / Not applicable	0	0%
	Average		4.3

	Response	*(n=15)*	*Percent of Respondents*
41i. How would you rate your satisfaction with the overall program experience?	Very Satisfied	5	33%
	Satisfied	10	67%
	Neither Satisfied nor Dissatisfied	0	0%
	Dissatisfied	0	0%
	Very Dissatisfied	0	0%
	Don't know / Not applicable	0	0%
	Average		4.3

	Response	*(n=15)*	*Percent of Respondents*
42. What type of facility is the [LOCATION]?	Airport	0	0%
	Community College	1	7%
	Correctional Facility	0	0%
	K-12 School	9	60%
	Public Library	1	7%
	Medical Facility	1	7%
	Municipal Facility	0	0%
	Park District Facility	0	0%
	Police or Fire Station	0	0%
	Public Works Facility	0	0%
	State University	2	13%
	Wastewater Treatment Facility	0	0%
	Other	1	7%

	Response	*(n=15)*	*Percent of Respondents*
43. Does [PUBLIC SECTOR ENTITY] pay the full cost of the natural gas bill?	Yes	13	87%
	No	1	7%
	Don't know	1	7%

	Response	*(n=15)*	*Percent of Respondents*
43. Does [PUBLIC SECTOR ENTITY] pay the full cost of the electric bill?	Yes	13	87%
	No	1	7%
	Don't know	1	7%