Evaluation of Illinois Energy Now Public Sector Retro-Commissioning Program

June 2011 through May 2012

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 four (EPY4), the period June 2011 through May 2012.

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

- Data for the study were collected through review of program materials interviews with DCEO staff members, program implementation contractor staff members, and participating participants and retro-commissioning service providers.
- An analytical desk review was performed on program measures to verify gross savings estimates.

The realized gross energy savings of the Retro-Commissioning Program during the period June 2011 through May 2012 are summarized in Table ES-1. During this period, realized gross energy savings totaled 5,932,585 kWh. The gross realization rate for the program is 94%. During this period, realized net energy savings also totaled 5,932,585 kWh. The net-to-gross ratio for the program is 100%.

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

Utility	*Expected kWh Savings*	*Realized Gross kWh Savings*	*Gross Realization Rate*	*Realized Net kWh Savings*	*Net to Gross Ratio*
Ameren	1,336,740	1,058,326	79%	1,058,326	100%
ComEd	4,973,207	4,874,259	98%	4,874,259	100%
Total	6,309,947	5,932,585	94%	5,932,585	100%

The realized gross peak kW reductions of the Retro-Commissioning Program during the period June 2011 through May 2012 are summarized in Table ES-2. The achieved gross peak demand savings for the program are 222 kW. The achieved net peak demand savings for the program are also 222 kW.

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

Utility	*Expected kW Savings*	*Realized Gross kW Savings*	*Gross Realization Rate*	*Realized Net kW Savings*	*Net to Gross Ratio*
Ameren	9.20	8.35	91%	8.35	100%
ComEd	376.60	213.67	57%	213.67	100%
Total	385.80	222.02	58%	222.02	100%

Since its initial launch, the Retro-Commissioning Program has continued to develop and improve the efficiency of public sector buildings in Illinois. Program participants and service providers are generally satisfied with the program and program staff have implemented ways to improve operations.

The following presents a selection of key evaluation findings:

- **Funding is a Significant Barrier to Energy Efficiency Improvements in the Public Sector:** When asked what barriers they faced to making energy efficiency improvements, nearly all participants identified insufficient funds as a barrier. The absence of program free ridership is consistent with this customer narrative. Findings from interviews with service providers and program staff further corroborated the participant survey findings. Most service providers stated that the projects would likely not have been completed without program assistance, and program staff stated that a lack of funds is the primary barrier to energy efficiency improvements for public sector entities.
- **Incentive is Well Designed to Reduce Uncertainty about Retro-Commissioning:** Service providers reported that the participants, and prospective participants, are skeptical of the value of retro-commissioning and explained that more education is needed to inform the market of its benefits. Given the cost of the investment and the perceived lack of value of retro-commissioning, building operators are likely to associate a relatively high degree of risk with completing retro-commissioning projects. The program incentive structure mitigates this risk by providing the service at no cost in exchange for a commitment to invest $10,000 in the implementation of measures with a payback period of 1.5 years or less. Due to the short payback period for the measures implemented as part of their commitment, prospective participants are more likely to view participation as a worthwhile investment. It should be noted that during the program year, participants invested an average of over $25,000, which is more than double the $10,000 commitment requirement.
- **Participants Focus on Problem Resolution**: Service provider interview responses suggest that participants are more aware of equipment performance deficiencies than of the measures recommended to address them. This suggests that the primary value of the retro-commissioning study, the identification of solutions to known problems, is well-targeted.
- **No Direct Natural Gas Energy Savings**: Projects with verified savings during the program year were initiated during EPY3, prior to the availability of funds to target natural gas savings. Any natural gas savings resulting from recommended measures occurred because the electric measure also resulted in natural gas savings. However, none of the participants elected to implement the measures with coincidental natural gas savings.
- **The Retro-Commissioning Program is Marketed Well:** SEDAC / 360 Energy Group utilizes an adequate mix of marketing channels to inform, communicate, support, and provide guidance for the Retro-Commissioning Program. Program staff members use a variety of channels and are currently seeking to better understand the target audience in order to improve their communication about the program. The marketing channels used by program staff are largely consistent with the sources for information about energy improvements that participants report using.
- **Program Improving Regional Capacity for Energy Efficiency:** The growing number of service providers indicates that the Retro-Commissioning Program is building regional capacity in the energy efficiency and green building sectors. These changes in the market

may have market transformation effects on energy efficiency in Illinois that persist independently of the Retro-Commissioning Program. Additionally, increasing numbers of service providers and the continued efforts by program staff to promote the program are helping to inform and educate public sector building operators about the value of retro-commissioning. This will likely assist in reducing barriers to energy efficiency among public sector energy consumers, in particular.

While interviews with program staff suggest that the program organization and efficiency have continually improved, several recommendations have been developed based on interview findings and overall analysis of program processes. These recommendations may provide strategic advantage in future program years:

- **Align Marketing with Target Participant Segment:** The Retro-Commissioning Program is promoted through a variety of channels and "fine tuning" the message should be the primary focus for the continued development of the marketing strategy. A more effectively-targeted message to the audience will aid in understanding of program benefits and overall value. Effective marketing messages would focus on the variety of benefits associated with completing a retro-commissioning study. These benefits include reduced energy costs, improved performance of building systems, increased equipment life, improved thermal comfort, improved air quality, improvements to productivity and safety, as well as reduced labor costs. The marketing message should highlight the benefits that are most relevant to the target audience.

  Program staff should also consider developing "success stories" to help promote the benefits of retro-commissioning. The development of brief case studies highlighting benefits realized by program participants may be a particularly effective form of marketing. These stories should feature a variety of building types in order to allow various prospective participants to identify with past participants' facilities and learn about the benefits that may apply to their own buildings.

  Additionally, it may be useful for program staff to consider further advertising within relevant trade journals and magazines. One-quarter of survey respondents reported using these sources for information on energy efficiency improvements. However, staff should carefully gauge the relative costs and benefits of this approach.

- **Continue Developing Retro-commissioning Service Provider Network:** SEDAC / 360 Energy Group has continuously developed its network of service providers in order to effectively distribute program information and resources to participants. These efforts should continue as service providers are a critical resource for increasing program activity and educating public sector decision makers about the benefits of retro-commissioning. It may be beneficial to focus recruitment efforts on firms that have an established client base within Illinois. These service providers can capitalize on their existing professional relationships with clients in order to educate them about the benefits of retro-commissioning.

- **Consider Independent Verification of Measure Installation:** Independent verification of work performed by contractors is typically considered a best practice for the administration

of energy efficiency programs. Program implementation staff should consider independently verifying the measures implemented for a sample of participants, and incorporating language regarding this process into the program guidelines. Independent verifications will ensure that the measures are implemented as reported and that they are functioning properly. These visits should be performed during the service provider verification visit in order to minimize the impact on the participant.

1. Introduction

This report presents the results of the impact and process evaluations of the Public Sector Retro-Commissioning Program that DCEO offers to public sector entities in Illinois. This report presents results of the program for activity during electric program year four (EPY4), the period June 2011 through May 2012.

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 providing incentives for retro-commissioning studies.

During electric program year four (EPY4), the period June 2011 through May 2012, there were13 retro-commissioning incentive projects in the program which were expected to provide savings of 6,309,947 kWh. None of the participants elected to implement natural gas energy saving measures recommended in the retro-commissioning studies.

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 EPY4.

The approach for the impact 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 2011 through May 2012 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 decision makers.
- Appendix B presents the results from a survey of decision makers for participants that received incentives under the program.
- Appendix C provides a copy of the questionnaire used for the survey of retro-commissioning service providers.

2. Estimation of Gross Savings

This chapter addresses the estimation of gross kWh savings and peak kW reductions resulting from measures installed in facilities of participants that obtained incentives under the Retro-Commissioning Program during electric program year four (EPY4), the period June 2011 through May 2012. 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 contractor provided documentation pertaining to the projects. The first step in the evaluation effort was to review this documentation and other program materials that were relevant to the evaluation effort.

For each project, the available documentation (e.g., audit 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, data bases, 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 equipment changed, including (1) descriptions, (2) schematics, (3) performance data, and (4) other supporting information
- Documentation for the new equipment installed, 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 Analytical Desk Review

If there was uncertainty regarding a project, or apparently incomplete project documentation, ADM staff contacted the implementation contractor to seek further information.

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 and kW savings per measure.

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

Savings estimation activities produced two estimates of gross savings for each project: an ex ante estimate of gross savings (as reported in the project documentation and program tracking system) and the ex post gross savings calculations developed through the analysis conducted by ADM.

Energy savings realization rates[1] were calculated for each 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 and peak kW reductions of the program, data were collected and analyzed for 13 projects. The data were analyzed using the methods described in Section 2.1 to estimate project energy savings and peak kW 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 kWh savings of the Retro-Commissioning Program during the period June 2011 through May 2012 are summarized in Table 2-11. Overall, the achieved gross savings of 5,932,585 kWh were equal to 94% of the expected savings

Table 2-1 Expected and Gross Realized kWh Savings for Retro-Commissioning Program

Utility	*Expected kWh Savings*	*Realized Gross kWh Savings*	*Gross Realization Rate*
Ameren	1,336,740	1,058,326	79%
ComEd	4,973,207	4,874,259	98%
Total	6,309,947	5,932,585	94%

2.2.2 Realized Gross Peak kW Savings

The realized gross peak kW reductions of the Retro-Commissioning Program during the period June 2011 through May 2012 are shown in Table 2-2. The achieved gross peak demand savings for the program are 222.02 kW.

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

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

Utility	*Expected kW Savings*	*Realized Gross kW Savings*	*Gross Realization Rate*
Ameren	9.20	8.35	91%
ComEd	376.60	213.67	57%
Total	385.80	222.02	58%

2.2.3 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 2-3 below displays explanations for differences between project level ex ante and ex post gross savings calculations.

Table 2-3 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*	*Analysis Notes*
Project 1	Adjust fan system schedule	111,904	84,533	76%	50	0	0%	No exante calculations were given. Expost calculations estimate a cfm and hosepower for the square footage of the building to estimate savings. Realization rate is low, however, expost calculaion is very sensitive to assumptions ratios and 100% realization rate is acheviable and possibly reasonable. Zero kW savings because fans shut off at 5:30 instead of 9:30. DCEO peak hours are from 1-5.
	Complete lutron lighting system programing	1,750,000	1,879,989	107%	120	120	100%	Exante calculations specify "no schedule" for floors 5-10 and are instead manualy controlled. However, the expost calculations assume floors 5-10 are on the reasonable, similar schedule the rest of the building uses.
Project 2	Retrofit T8 and T12 with 28W T8	51,804	31,179	60%	10.9	5.34	49%	Exante calculations assumes year round operation, however, the expost calculations use 4,817 hours, based on the buildings occupation schedule. No siginificant change in connected load between exante and expost calculations. kW savings used Illinois TRM assumptions for an office: WHFe (waste heat factor for energy) = 1.25 and CF (coincidence factor) = 0.66
	De-lamp fixtures	533,324	426,859	80%	89	73.1	82%	Exante calculations assume 6,000 hour yearly operation, while expost calculations used 4,817 hours based on the given schedule, no siginificant change in connected load between exante and expost calculations. WHFe = 1.25 and CF = 0.66
Project 3	Reset occupied cooling temp setpoint	25,545	25,545	100%	11.7	11.7	100%	Given calculations deemed acceptable
	Supply air reduction for AHU-1	721,838	750,000	104%	0	0	-	The exante calculations use logging data to estimate savings from reduced usage during occupied times and no usage during unoccupied times. The expost calculations found actually most of the savings are from the schedule change to turn off during unoccupied times (8,760 to 4,000 hours)
	Supply air reduction for AHU-2	214,882	182,650	85%	0	0	-	Only 85% of exante savings realized because logging data was given but logged months cannot be directly compared because they were logged during significantly different temperature ranges adversly affecting the connected load and adding savings.
	Supply air reduction for AHU-3	157,815	134,143	85%	0	0	-	Only 85% of exante savings realized because logging data was given but logged months cannot be directly compared because they were logged during significantly different temperature ranges adversly affecting the connected load and adding savings.
	De-lamp hallway fixtures	6,890	5,581	81%	1.2	0.79	66%	Exante hours were not given, expost hours were based on given building occupancy schedule. Illinois TRM asumptions are based off a College/University. WHFe = 1.14, CF = 0.56
	Chilled water reset	14,283	14,283	100%	0	0	-	Given calculations deemed acceptable

Project	*Measure*	*Ex Ante kWh*	*Ex Post kWh*	*Realization Rate*	*Ex Ante kW*	*Ex Post kW*	*Realization Rate*	*Analysis Notes*
Project 4	AHU Start/Stop schedule	190,318	198,831	104%	0	0	-	Expost used Affinity Laws to estimate the post savings at 50% speed during non-operating hours using the provided schedule, load factor = 70%, motor efficiency = 85%. To ind the average number of hours opeating at 50% speed below 40 degees F, TMY3 data was used. Exante used same method but provided no calculations.
	Exhaust Fans Start/Stop Schedule	19,541	19,541	100%	0	0	-	Expost calculations checked savings by back calculating to find exhaust fan horsepower. Estimated fan horsepower was reasonable therefore ex ante savings were deemed reasonable.
	Incororate automatice static pressure control	226,069	226,069	100%	42	0	0%	Expost confirmed kWh savings were reasonable, however no kW savings realized because it has a VFD
	De-lamp fixtures in office and coutrooms	82,469	53,235	65%	18.1	14.44	80%	Exante did not specify a schedule, therefore expost calculations assumed lights were on the HVAC schedule. No significant changes between connected load between ante and post calculations. Illinois TRM asumptions are based off an office. WHFe = 1.14, CF = 0.56
	Disconnect Radiant Heaters in Parking Garage	204,140	199,680	98%	0	0	-	Exante did not specify a schedule therefore, the expost calculations assumed the schedule to be 24 hours/5 days
Project 5	Toilet exhaust fans	7,250	6,205	86%	3	3	100%	ExAnte used equest. Found savings for 20% of building and 2,000 CFM for exhaust air, then aggregatd to whole building. Expost used 80% load and efficiency factors with the new schedule (8760 to 5063) to estimate the savings
	Ventilation air set points	24,250	13,500	56%	3	3	100%	Expost calculations are based on 5,155 CFM OA reduction for about 3,000 hours a year including sensible and latent load, estimated savings are 13,500 however this does not account for a reduction in load for periods that the OA temperature is low enough to help cool the building or actually work as an economizer
	Lighting Controls Upgrade	255,672	255,672	100%	0	0	-	Given calculations deemed acceptable
	Chilled Water valve	11,642	11,642	100%	0	0	-	Given calculations deemed acceptable
	VAV damper revisions	48,321	48,321	100%	0	0	-	Given calculations deemed acceptable
	Fan coil enhanced controls	36,980	36,980	100%	0.9	0.9	100%	If 4-5 kW cooling/sq ft, 20% alocated for perimeter, and 4kWh/year/sq ft exante estimation is an acceptable number
Project 6	Shut down water recirculation pumps at night	6,739	6,900	102%	0	0	-	Exante calculations do not specify a schedule therefore expost calculations assume savings based on 40 events/year 4 days each
	Repair OA dampers	4,320	4,320	100%	0	0	-	Given calculations deemed acceptable
	Increse setback shedule for PAC 1-1	20,790	23,591	113%	0	0	-	Exante calculations do not specify a schedule therefore expost calculations assume savings based on 40 events/year 4 days each
	Reduce heat trace outside air setpoint	35,577	35,577	100%	0	0	-	Given calculations deemed acceptable
	Retrofit exit signs with LEDs	10,841	10,841	100%	0	0	-	Expost calculations verified exante savings by calculating the wattage difference duing the given schedule

Project	*Measure*	*Ex Ante kWh*	*Ex Post kWh*	*Realization Rate*	*Ex Ante kW*	*Ex Post kW*	*Realization Rate*	*Analysis Notes*
Project 7	Optimize Auditorium HVAC	28,710	25,594	89%	0	0	-	Affinity Laws were used to calculate savings in the expost. Expost assumed a load factor of 80% and a motor efficiency of 95%. Summer (cooling) hours were estimated to be 1/3 of the year at 80% speed and winter (heating) hours estimated to be 2/3 of the year at 50% speed. Ex ante calculations used different energy savings equations based on temperature, operating hours, load factors, and efficiencies.
	Optimize condensor Water Pump	43,351	41,989	97%	33.7	0	0%	Expost calculations used Affinity Laws, calculating kWh at 40% speed while exante calculated savings from a deemed power fator. Expost estimated no kW savings because a vfd was installed
Project 8	Scheduling for HVAC system	393,593	393,593	100%	0	0	-	Given calculations deemed acceptable
	Optimize economizer	31,780	31,780	100%	0	0	-	Given calculations deemed acceptable
	Install time clock on hot water recirculation pump	2,553	2,461	96%	0	0	-	Expost savings were based on given pump horsepower and schedule. No exante calculations, but savings claimed to be calculated similarly.
Project 9	Modify External Lighting Schedule	22,870	21,316	93%	0	0	-	Exante stated hours were "off at night" therfore, the expost hours of operation were estimated to be 12 hours per night
	Install timers for window AC units	28,008	28,008	100%	0	0	-	Given calculations deemed acceptable
	Install occupancy sensors	10,140	10,140	100%	0	0	-	Given calculations deemed acceptable
	Replace AC units	2,635	2,635	100%	0	0	-	Given calculations deemed acceptable
Project 10	AHU Sequencing	80,883	56,618	70%	0	0	-	Expost used load factor = 80% and motor efficiency = 95% when converting hosepower to kW while the exante calculations did not
Project 11	Apply schedule to BAS	224,225	262,609	117%	0	0	-	Expost used load factor = 80% and motor efficiency = 95% when converting hosepower to kW while the exante calculations did not
	De-lapm fixtures	3,199	3,199	100%	0	0	-	Given calculations deemed acceptable
	Modify chilled water reset	74,385	74,385	100%	0	0	-	Given calculations deemed acceptable
Project 12	Optimize auditorium HVAC system	61,613	42,977	70%	0	0	-	Affinity Laws were used to calculate savings in expost. Expost assumed a load factor of 80% and a motor efficiency of 95%. Summer (cooling) hours were estimated to be 1/3 of the year at 80% speed and winter (heating) hours were estimated to be 2/3 of the year at 50% speed. Exante calculations used different energy savings equations based on temperature, operating hours, load factors, and efficiencies.
	Provide demand controlled ventilation	22,518	22,518	100%	0	0	-	Exante calculated procedure should be stated using % OA rather than fan use, however savings still lined up and claimed value was used

Project	*Measure*	*Ex Ante kWh*	*Ex Post kWh*	*Realization Rate*	*Ex Ante kW*	*Ex Post kW*	*Realization Rate*	*Analysis Notes*
Project 13	Cooling tower flow switch and fan interlock	6,436	6,445	100%	0	0	-	Expost savings used given hours, horsepwer, and load factor to verify ex ante savings, thus no significante change in connected load between ex ante and expost
	Adjust condensor water setpoint	354,375	189,000	53%	0	0	-	Exante calculations assumed the chiller was at 75% load for 6 months, however more accurate estimate used by the expost calculations is 40% load
	Chiller sequencing	126,000	14,175	11%	0	0	-	The expost calculations assumed if the chillers are sequenced, then the savings are 10% of the larger chiller kWh. The exante calculated the operating kWh of the second chiller, not the savings
	AHU-1 VFD and Hi efficiency motor installed	9,507	9,507	100%	0	0	-	Given calculations deemed acceptable
	T12 to T8 lights	9,962	7,970	80%	2.3	1.45	63%	Exante savings larger because it assumed switching lights on/off during the day and daylighing would save additional 25%. Expost calcualtions used Illinois TRM calculations/assumptions based off a College/University. WHFe = 1.14, CF = 0.56

3. Estimation of Net Savings

This chapter reports the results from estimating the net impacts of the Retro-Commissioning Program during June 2011 through May 2012, where net savings represents 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. The first criterion was based on the response to the question: "Would your organization have been financially able to retro-commission the facility without the assistance from the Retro-Commissioning Program?" If a participant answered "No" to this question, a free ridership score of 0 was assigned to the project. That is, if a participant required assistance from the program in the form of a no-cost retro-commissioning service, then that participant was not considered to be a free rider.

For decision makers that indicated that they were able to undertake implemented energy efficiency projects without financial assistance from the program, three factors were analyzed to determine what percentage of savings may be attributed to free ridership. The 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. A copy of the questionnaire is provided in Appendix A.

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 is 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 no 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 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?" or the respondent indicated that 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 or past experience with the program was influential in the decision to implement the project.

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

- The respondent answered "very important" to the following question: "How important was previous experience with the programs in making your decision to retro-commission the facility?
- The respondent answered "yes" to the following question: "Did a Retro-Commissioning Program or other DCEO representative recommend that you retro-commission the facility?"

The third factor required determining if a participant in the program indicated that he or she had previously implemented an energy efficiency measure similar to one that they implemented under the program without an energy efficiency program incentive during the last three years. A participant indicating that he or she had implemented a similar measure 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 just described 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 the period June 2011 through May 2012.

3.2.1 Realized Net kWh Savings

The data used to assign free ridership scores were collected through a participant survey of eight participant decision makers for retro-commissioning projects completed during the period June 2011 through May 2012. Individual free ridership rates were estimated for the program.

As discussed in Section 3.1, the first criteria used to determine what proportion of energy savings from a project should be assigned to free ridership was whether or not the participant was financially able to undertake the project without financial assistance from the Retro-Commissioning Program. If a decision maker respondent answered "No" to the question of "Would your organization have been financially able to retro-commission the facility without the assistance from the Retro-Commissioning Program?" a free ridership score of 0 was assigned to the project. That is, if a participant required financial assistance from the Retro-Commissioning Program to undertake a project, then that participant was determined not to be a free rider.

Under this criterion, the other free ridership scoring criteria were applied only to projects for participants who answered "Yes" to the question: "Would your organization have been financially able to retro-commission the facility without the assistance from the Retro-Commissioning Program?" Respondents who answered "No" to this question, however, would given a free ridership score of zero, even if the other free ridership criteria were applied, due to the nature of their specific survey responses.

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 previously performed retro-commissioning without a program incentive during the last three years. Percentages reported are averages weighted by project gross realized savings.

Table 3-2 Weighted Average Indicator Variable Values

Had Financial Ability	*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*
26%	0%	0%	100%	100%

Table 3-3 shows percentages of total realized gross energy savings that are associated with different combinations of free ridership indicator variable values. Twenty-six percent of the savings is associated with respondents who indicated that they were financially unable to implement the project in the absence of the program incentive.

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 Realized Gross kWh Savings*	*Free Ridership Score*
N	N	Y	Y	26%	0%
Required program incentive to implement measures.				74%	0%
Total				100%	0%

The realized energy savings of the Retro-Commissioning Program during the period June 2011 through May 2012 are summarized in Table 3-4. During this period, realized net energy savings totaled 5,932,585 kWh. The net to gross ratio is 100%.

Table 3-4 Summary of kWh Savings from Projects

Utility	*Expected kWh Savings*	*Realized Gross kWh Savings*	*Gross Realization Rate*	*Realized Net kWh Savings*	*Net to Gross Ratio*
Ameren	1,336,740	1,058,326	79%	1,058,326	100%
ComEd	4,973,207	4,874,259	98%	4,874,259	100%
Total	6,309,947	5,932,585	94%	5,932,585	100%

3.2.2 Realized Net Peak kW Savings

The realized net peak kW reductions of the Retro-Commissioning Program during the period June 2011 through May 2012 are summarized by utility Table 3-5. The achieved net peak demand savings are 222.02 kW.

Table 3-5 Summary of Peak kW Savings from Projects

Utility	*Expected kW Savings*	*Realized Gross kW Savings*	*Gross Realization Rate*	*Realized Net kW Savings*	*Net to Gross Ratio*
Ameren	9.20	8.35	91%	8.35	100%
ComEd	376.60	213.67	57%	213.67	100%
Total	385.80	222.02	58%	222.02	100%

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 4 (EPY4). 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 certain 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 cycles. Conclusions, recommendations, and other findings from the process evaluation are useful in comparing program years over time and in conducting planning efforts for future program cycles.

4.1 Evaluation Objectives

The purpose of the process evaluation is to examine program operations and results throughout the program year. This assessment allows evaluators to identify potential program improvements that are intended to increase program efficiency or effectiveness in terms of participation and satisfaction levels. This process evaluation was designed to document the operations and delivery of the Retro-Commissioning Program during the EPY4.

Key research questions to be addressed by this evaluation of EPY4 activity include:

- Is the Retro-Commissioning Program effectively reaching participants and meeting their energy efficiency needs?
- Is the program incentive appropriately structured to encourage participants to make energy efficiency improvements?
- Do service providers find the program to be operating effectively?
- Did the Retro-Commissioning Program reduce barriers to energy efficiency project implementation?

During the evaluation, data and information from numerous sources are analyzed to achieve research objectives. Insight into the participant experience with the Retro-Commissioning Program is developed from an online survey of program participants. The market perspective is developed through in-depth interviews with service providers that engage in marketing, consultation, and implementation efforts for the program. The program operations perspective is

developed through interviews with program staff from DCEO's implementation partner, SEDAC / 360 Energy.

4.2 Summary of Primary Data Collection

Multiple sources of information informed the process evaluation of the Retro-Commissioning Program.

- **Participant surveys:** Participant surveys are the primary data source for many components of this process evaluation, and serve as the foundation for understanding the participant perspective. The participant surveys provide participant 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.
- **Service provider interviews:** Interviews with service providers provide data with which the program is analyzed from the market perspective. The objective of the interviews is to gain insight into the application and project implementation process and to develop a sense of program satisfaction levels. Service providers report on their experiences with participants, program marketing, and provide opinions of how the program could be improved.
- **Interviews with implementation partner staff members:** Interviews with program implementation staff members provide information regarding program progress and observations regarding service providers and participants. Staff members report on recent program changes and future plans to improve program operational efficiency.

4.3 Summary of Conclusions and Recommendations

Since its initial launch, the Retro-Commissioning Program has continued to develop and improve the efficiency of public sector buildings in Illinois. Program participants and service providers are generally satisfied with the program and staff has sought ways to improve operations.

The following presents a selection of key evaluation findings:

- **Funding is a Significant Barrier to Energy Efficiency Improvements in the Public Sector:** When asked what barriers they faced to making energy efficiency improvements, nearly all participants identified insufficient funds as a barrier. The absence of program free ridership is consistent with this customer narrative. Findings from interviews with service providers and program staff further corroborated the participant survey findings. Most service providers stated that the projects would likely not have been completed without program assistance, and program staff stated that a lack of funds is the primary barrier to energy efficiency improvements for public sector entities.
- **Incentive is Well Designed to Reduce Uncertainty about Retro-Commissioning:** Service providers reported that the participants, and prospective participants, are skeptical of the value of retro-commissioning and explained that more education is needed to inform the

market of its benefits. Given the cost of the investment and the perceived lack of value of retro-commissioning, building operators are likely to associate a relatively high degree of risk with completing retro-commissioning projects. The program incentive structure mitigates this risk by providing the service at no cost in exchange for a commitment to invest $10,000 in the implementation of measures with a payback period of 1.5 years or less. Due to the short payback period for the measures implemented as part of their commitment, prospective participants are more likely to view participation as a worthwhile investment. It should be noted that during the program year, participants invested an average of over $25,000, which is more than double the $10,000 commitment requirement.

- **Participants Focus on Problem Resolution**: Service provider interview responses suggest that participants are more aware of equipment performance deficiencies than of the measures recommended to address them. This suggests that the primary value of the retro-commissioning study, the identification of solutions to known problems, is well-targeted.
- **No Direct Natural Gas Energy Savings**: Projects with verified savings during the program year were initiated during EPY3, prior to the availability of funds to target natural gas savings. Any natural gas savings resulting from recommended measures occurred because the electric measure also resulted in natural gas savings. However, none of the participants elected to implement the measures with coincidental natural gas savings.
- **The Retro-Commissioning Program is Marketed Well:** SEDAC / 360 Energy Group utilizes an adequate mix of marketing channels to inform, communicate, support, and provide guidance for the Retro-Commissioning Program. Program staff members use a variety of channels and are currently seeking to better understand the target audience in order to improve their communication about the program. The marketing channels used by program staff are largely consistent with the sources for information about energy improvements that participants report using.
- **Program Improving Regional Capacity for Energy Efficiency:** The growing number of service providers indicates that the Retro-Commissioning Program is building regional capacity in the energy efficiency and green building sectors. These changes in the market may have market transformation effects on energy efficiency in Illinois that persist independently of the Retro-Commissioning Program. Additionally, increasing numbers of service providers and the continued efforts by program staff to promote the program are helping to inform and educate public sector building operators about the value of retro-commissioning. This will likely assist in reducing barriers to energy efficiency among public sector energy consumers, in particular.

While interviews with program staff suggest that the program organization and efficiency have continually improved, several recommendations have been developed based on interview findings and overall analysis of program processes. These recommendations may provide strategic advantage in future program years:

- **Align Marketing with Target Participant Segment:** The Retro-Commissioning Program is promoted through a variety of channels and "fine tuning" the message should be the primary

focus for the continued development of the marketing strategy. A more effectively-targeted message to the audience will aid in understanding of program benefits and overall value. Effective marketing messages would focus on the variety of benefits associated with completing a retro-commissioning study. These benefits include reduced energy costs, improved performance of building systems, increased equipment life, improved thermal comfort, improved air quality, improvements to productivity and safety, as well as reduced labor costs. The marketing message should highlight the benefits that are most relevant to the target audience.

Program staff should also consider developing "success stories" to help promote the benefits of retro-commissioning. The development of brief case studies highlighting benefits realized by program participants may be a particularly effective form of marketing. These stories should feature a variety of building types in order to allow various prospective participants to identify with past participants' facilities and learn about the benefits that may apply to their own buildings.

Additionally, it may be useful for program staff to consider further advertising within relevant trade journals and magazines. One-quarter of survey respondents reported using these sources for information on energy efficiency improvements. However, staff should carefully gauge the relative costs and benefits of this approach.

- **Continue Developing Retro-commissioning Service Provider Network:** SEDAC / 360 Energy Group has continuously developed its network of service providers in order to effectively distribute program information and resources to participants. These efforts should continue as service providers are a critical resource for increasing program activity and educating public sector decision makers about the benefits of retro-commissioning. It may be beneficial to focus recruitment efforts on firms that have an established client base within Illinois. These service providers can capitalize on their existing professional relationships with clients in order to educate them about the benefits of retro-commissioning.
- **Consider Independent Verification of Measure Installation:** Independent verification of work performed by contractors is typically considered a best practice for the administration of energy efficiency programs. Program implementation staff should consider independently verifying the measures implemented for a sample of participants, and incorporating language regarding this process into the program guidelines. Independent verifications will ensure that the measures are implemented as reported and that they are functioning properly. These visits should be performed during the service provider verification visit in order to minimize the impact on the participant.

4.4 Retro-Commissioning Program Participant Profile

Table 4-1 presents the average energy and cost savings for recommendations made to the EPY4 Public Sector Retro-Commissioning Program participants. Thirteen retro-commissioning projects were completed during the program year. The EPY4 verified savings resulted from studies initiated during EPY3. During that program year, funds were not available to identify

natural gas savings. The recommended natural gas savings shown in the table are savings that would have also occurred if certain electric savings measures were implemented.

Program participants received recommendations estimated to produce an average energy savings of 3,833 Therms and 1,043,441 kWh. The recommendations were estimated to produce an average of $2,548 in natural gas cost savings and an average of $70,976 in electricity cost savings.

In exchange for receiving the retro-commissioning service at no cost, participants agree to implement $10,000 worth of recommended measures. The implementation of the selected recommendations is verified by the retro-commissioning service provider. Verified recommendations implemented by participants produced an estimated 446,415 kWh in electric savings. None of the participants implemented recommendations for electric measures that also generated natural gas energy saving. The average cost savings associated with the verified electric saving was $31,636. On average, program participants spent more than $25,000 on efficiency improvements.

Table 4-1 Average Recommended and Verified Savings

Fuel Type	*Recommended Energy Savings*	*Verified Energy Savings*	*Recommended Cost Savings*	*Verified Cost Savings*
Therms	3,833	-	$2,548	-
kWh	1,043,441	446,415	$70,976	$31,636

The total program energy and cost savings are presented in Table 4-2. The total verified estimated kWh savings was 5,803,391.

Table 4-2 Total Verified Savings

Verified Therms Savings	*Verified kWh Savings*	*Verified Cost Savings*
-	5,803,391	$411,272

4.5 Participant Outcomes

An online 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, eight 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.

4.5.1 How Participants Learn About the Program

Table 4-3 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, each mentioned by 25% of the respondents, were from a conference, workshop, or seminar, from a DCEO representative, and from architects, engineers, or energy consultants. Other less frequently mentioned sources for learning about the program, each mentioned by one respondent, were friends or colleagues, the DCEO website, a utility representative, and trade associations or public sector organizational groups. Other sources identified by respondents that were not included in the list of response options were internal organizational resources and the Smart Energy Design Assistance Center (SEDAC) newsletter.

These results suggest that participants are finding out about the program in a variety of ways. It may be noteworthy that none of the representatives indicated that they found about program from SEDAC representatives or service providers. This was unexpected because during interviews service providers reported that they are promoting the program with participants. Additionally, it is typical for activity in retro-commissioning programs to be driven by the businesses providing the service.

Table 4-3 How Participant Decision Makers Learned about the Program

	Response	*Percent of Respondents (n=8)**
How did you learn of the Public Sector Retro-Commissioning Program?	Attended a conference, workshop or seminar	25%
	A DCEO representative mentioned it	25%
	An architect, engineer, or energy consultant	25%
	Friends or colleagues	13%
	The DCEO website	13%
	From a utility representative	13%
	Trade association or business group you belong to	13%
	Other	25%

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

As shown in Table 4-4, more than half (63%) of respondents learned about the program before planning to retro-commission the facility and an additional participant learned of the program during the planning of the retro-commissioning. One participant who reported learning of the

program at some other time stated that they learned of the program during the retro-commissioning.

The finding that the majority of participants learned of the program prior to beginning the retro-commissioning is consistent with service provider comments, discussed in section 4.6, regarding the need to educate participants about the benefits of retro-commissioning.

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

	Response	*Percent of Respondents (n=8)*
When did you learn of the Retro-Commissioning Program?	Before planning to retro-commission the facility	63%
	While 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	-
	Some other time	13%
	Don't know	13%

4.5.2 Factors Affecting Participant Participation

Participants were asked about the influence of the Retro-Commissioning Program on their decision to retro-commission the facility. Fifty percent of the respondents reported that they had plans to retro-commission the facility before hearing of the program. Of these respondents, two stated that they would have completed the retro-commissioning even if they had not participated in the program. Although these respondents suggested that they would have completed the retro-commissioning had they not participated in the program, the program may have still influenced the timing and quantity of efficiency improvements. 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.

Respondents who indicated that they had pre-existing implementation plans were asked how long ago they had planned the project. As shown in Table 4-55, 75% of these participants stated that they had their plans for more than one year, suggesting that while they had prior plans to complete the retro-commissioning, the availability of the service incentive may have spurred the participant to complete the retro-commissioning earlier than they otherwise would have.

Table 4-5 Length of Time for Which Respondents Had Plans to Implement Energy Efficiency Measures

	Response	*Percent of Responses (n=5)*
How long before finding out about the Public Sector Retro-Commissioning Program did you have plans to retro-commission the facility?	Less than 6 months	-
	6-12 months	25%
	1-2 years	50%
	3-5 years	25%
	More than 5 years	-
	Don't know	-

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 or the DCEO or by its partner SEDAC. Respondents indicated that for 25% of the retro-commissioning projects, a Retro-Commissioning Program representative or other DCEO representative had recommended the retro-commissioning. One of these participants indicated that they probably would not have completed the project had it not been recommended in this manner. Additionally, 75% of respondents indicated that a SEDAC representative or SEDAC service provider recommended the retro-commissioning. Thirty-three percent of these respondents indicated that they probably would not have completed the retro-commissioning project had they not received the 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.

In cases where decision makers reported that they had prior plans for the projects, the program may have influenced various factors related to the measure installation. These factors include the timing of the installation and the number of efficiency improvements made. Table 4-6 cross-tabulates the respondents who indicated that the program influenced these factors with whether the participant had plans to complete the retro-commissioning before participating. All of the participants with prior plans to perform the retro-commissioning stated that they made more energy efficiency improvements than they otherwise would have without the program. Moreover, 75% of the participants reported that they retro-commissioned the facility sooner than they otherwise would have without the program.

Table 4-6 Reported Program Influences on Installation Factors by Whether There Were Plans to Install Equipment

Program Influence on Projects	*Number of Responses*	*Had plans to install measure before participating*
Yes, program increased quantity of energy efficiency improvements	4	100%
Yes, retro-commissioned facility earlier than otherwise would have	3	75%

These findings indicate that even when participants were already planning to retro-commission their facilities, the majority would have implemented fewer efficiency improvements and commenced the project at a later date had they not participated in the Retro-Commissioning Program.

4.5.3 Energy Efficiency Attitudes, Behaviors, and Decision Making

Respondents were asked about the importance of past experience with energy efficient equipment or practices and advice or recommendations from DCEO or its partners in their decisions about implementing energy efficiency projects. Their responses are shown in Table 4-7. Fifty-six percent of respondents considered advice or recommendations from DCEO to be "very important" to their decision making and 38% considered past experience with energy efficient equipment or practices to be very important.

Table 4-7 Factors Influencing the Decision to Participate

Energy Efficiency Decision Making Factor	*Very Important*	*Somewhat Important*	*Only Slightly Important*	*Not Important at All*	*Don't Know*	*n*
Past experience with energy efficient equipment or practices	38%	63%	0	0%	0%	8
Advice and/or recommendations received from DCEO or its partners (SEDAC or SEDAC Service Providers)	50%	50%	0	0	0%	8

Participant survey respondents were asked what kinds of energy efficiency policies and procedures their organizations have in place. As shown in Table 4-8, 63% of respondents stated that their organizations had policies that incorporate energy efficiency in operations and procurement. Other frequently mentioned policies and procedures respondents' organizations had in place were a staff member responsible for energy and energy efficiency (38%) and an energy management plan (25%). Respondents less frequently reported having active training of staff. One respondent stated that their organization did not have policies or resources for energy efficiency improvements.

Table 4-8 Participant Energy Efficiency Policies and Activities

	Response	*Percent of Respondents (n=8)*
Which of the following policies or resources does your organization have in place regarding energy efficiency improvements at this facility?	Policies that incorporate energy efficiency in operations and procurement	63%
	A staff member responsible for energy and energy efficiency	38%
	An energy management plan	25%
	Active training of staff	22%
	Do not have policies or procedures for energy efficiency improvements	13%
	Other	-
	Don't know	-

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

Respondents who indicated that they had an energy management plan were asked whether the plan included goals for energy savings. Two respondents stated that their plans included energy savings goals. Although respondents did not provide quantitative goals for their energy management plans, both respondents stated that their objective was to reduce energy consumption. One participant also stated that their goal was to replace inefficient equipment as time and funding permitted.

Program participants were asked about their prior experience with purchasing and installing energy efficient equipment. Most participants reported that they had implemented energy efficiency improvements in the last three years. More specifically, 50% of respondents stated that they previously purchased energy efficient equipment for which they did not receive an incentive. Of these respondents, three stated that they did not apply for an incentive because none was available. One respondent was not sure if the project qualified for the incentives and one was not aware of incentives. Additionally, 38% of participants indicated that they had previously made energy efficiency improvements and applied for an incentive. The remaining participant had not previously made energy efficiency improvements.

Table 4-9 Incentives for Previous Equipment Purchased

	Response	*Percent of Responses (n=8)*
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.	50%
	No efficiency improvements were paid for by the organization.	13%
	No, an incentive was applied for.	38%
	Don't know	-

4.5.4 Barriers to Energy Efficiency Improvements and Purchasing Processes

The literature regarding public sector decision making and procurement of energy efficient equipment identifies a number of barriers to energy efficiency improvements in the public sector. These barriers include a lack of consideration of energy costs when making purchasing decisions, least-cost purchasing rules preventing purchase of higher cost energy efficient equipment, the perception that high efficiency equipment is a luxury item, risk aversion generated by low cost purchasing requirements and transparency of decision making, and a lack of technical expertise.[2] Some of these barriers were identified by participants in the Retro-Commissioning Program, as shown in Table 4-10.

Eighty eight percent of respondents cited that the most frequently mentioned barrier was insufficient funding to make the improvements. Although public sector organizations are often considered to have slow and difficult approval processes that hinder procurement of energy efficiency improvements, only 13% of respondents indicated that this was a significant barrier. Three respondents stated that there were other barriers to making energy efficiency

[2] *Barnes, P. and Wisniewski, E. J. (2000). Making it happen: Incorporating energy efficiency into government purchasing. American Council for an Energy-Efficient Economy Summer Study Proceedings.*

Harris, J., Brown, M., Deakin, J., Jurovics, S. Khan, A., et al. (2004). Energy-efficient purchasing by state and local government: Triggering a landslide down the slippery slope to market transformation. American Council for an Energy-Efficient Economy Summer Study Proceedings.

Kunkle, R., Lutzenhizer, L. and Dethman, L. (2000). Influencing the purchase of energy-efficient products in public organizations: It's not as easy it looks. American Council for an Energy-Efficient Economy Summer Study Proceedings.

Rose, A., Stimmel, J., Oyhenart, J., and Ahrens, A. (2008). Breaking down silos: Bridging the communications and knowledge gap between departments to implement energy efficiency in the public sector. American Council for an Energy-Efficient Economy Summer Study Proceedings.

improvements. The barriers they noted included a lack of direction from higher level management, staffing issues, and short payback requirements.

Table 4-10 Barriers to Making Energy Efficiency Improvements

	Response	*Percent of Respondents (n=8)**
What barriers does your organization face in making energy efficiency improvements?	Insufficient funding for improvements	88%
	Approval processes that are slow or make purchasing difficult	13%
	Lack of information on energy efficient equipment and practices	-
	Schedules that dictate when equipment is to be replaced or maintained regardless of efficiency levels	-
	Incentive program time requirements	-
	Current equipment is too new to be replaced with more efficient equipment	-
	Other	38%
	Don't know	13%

**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 4-11, 50% of respondents stated that decisions are based on staff recommendations to a decision maker. Other methods for making decisions included decision-making by a group or committee and decision-making by one or two key people. Each of these was mentioned by 25% of the respondents. These responses suggest that the majority of respondent's organizations have distributed decision processes that involve multiple people rather than centralized processes where decisions are made by one or two people.

Table 4-11 Decision Maker Characteristics

	Response	*Percent of Respondents (n=8)*
How does your organization decide to make energy efficiency improvements for this facility? Is the decision:	Based on staff recommendations to a decision maker	50%
	Made by one or two key people	25%
	Made by a group or committee	25%
	Made in some other way	-
	Don't know	-

4.5.5 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 4-12 are percentages of respondents.

Program participants reported using a wide variety of sources for information about energy efficiency projects. The most commonly mentioned sources for information about energy efficient equipment, materials, and design features was architects, engineers, or energy consultants. Thirty-eight percent of responding participants stated that this was a source that they used. Equipment vendors or contractors were a source for 38% of the respondents. The DCEO website, its partner organization SEDAC, trade associations and business groups, and trade journals were each cited by 25% of the respondents. Thirty-eight percent of respondents reported using other sources for information about energy efficiency, including internet resources for energy efficiency, information provided through the ENERGY STAR™ program, trade shows, and visits to other similar facilities.

Table 4-12 Who Respondents Rely on for Information

	Response	*Percent of Respondents (n=8)**
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	38%
	Equipment vendors or building contractors	38%
	The DCEO website	25%
	The Smart Energy Design Assistance Center (SEDAC) and SEDAC RCx Service Providers	25%
	Trade associations or business groups you belong to	25%
	Trade journals or magazines	25%
	A utility representative	13%
	Friends and colleagues	13%
	A DCEO representative	-
	The Energy Resource Center (ERC)	-
	Brochures or advertisements	-
	Other	38%
	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%.*

4.5.6 Financial Methods Used by Decision Makers

Table 4-13 displays the financial methods that respondents indicated using to review efficiency projects. All respondents reported that they use simple payback to evaluate energy efficiency improvements. Some of these respondents elaborated on their payback period requirement, with two participants stating that they look for a payback period of three years or less. Another participant stated that they expected payback periods of two to five years while another expected payback of one to seven years. Two respondents stated that they did not require a specific time period. Respondents also reported using other methods, such as initial cost (50%), life cycle cost (38%) and internal rate of return (25%).

Table 4-13 Methods Used to Evaluate Efficiency Improvements

	Response	*Percent of Respondents (n=8)**
Which financial methods does your organization typically use to evaluate energy efficiency improvements for this facility?	Simple payback	100%
	Initial Cost	50%
	Life cycle cost	38%
	Internal rate of return	25%
	None of these	-
	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%.*

4.5.7 Participant Satisfaction with the Program

Respondents rated their levels of satisfaction with selected aspects of the program on a scale of *1* to *5* where *1* was very dissatisfied and *5* was very satisfied. Participants were generally satisfied with the program. Survey respondents were most satisfied with the information provided by the retro-commissioning service provider and the service provider's level of professionalism. Specifically, fifty-seven percent of participants were very satisfied with the information provided by the service provider and 86% were very satisfied with the service provider's level of professionalism. The area of least satisfaction was the level of effort required for the application process. However, 85% of survey respondents were very satisfied or somewhat satisfied with this aspect of the program. None of the respondents reported dissatisfaction with any specific aspect of the program.

Table 4-14 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	14%	86%	-	-	-	-	7
Savings on your monthly bill	14%	57%	-	-	-	29%	7
Effort required for the application process	14%	71%	14%	-	-	-	7
Information provided by the retro-commissioning service provider	57%	29%	14%	-	-	-	7
Retro-commissioning service provider's level of professionalism	86%	14%	-	-	-	-	7
Quality of the work conducted by the contractor implementing the measures	14%	43%	14%	-	-	29%	7
Information provided by DCEO	14%	57%	14%	-	-	14%	7
Information provided by Smart Energy Design Assistance Center (SEDAC)	29%	57%	14%	-	-	-	7
Overall program experience	29%	57%	14%	-	-	-	7

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. More than half of respondents (57%) indicated that the energy efficiency measure had met their expectations, while 14% stated that it had exceeded their expectations. Twenty-nine percent of participants stated that their expectations were mostly met and were then asked why their expectations were not fully met. One respondent stated that they had not finished installing all of the measures but expected that their expectations would be met once the project was complete. The other respondent's expectations were not fully met because a recommendation to alter the thermostat setting in one building at the campus prompted questions from employees regarding why the temperature was different in that building as opposed to others.

Table 4-15 Energy Efficiency Improvements Satisfaction of Participant Expectations

	Response	*Percent of Respondents (n=7)*
Did the energy efficiency improvements implemented through your participation in the retro-commissioning meet your expectations?	My expectations were exceeded	14%
	My expectations were met	57%
	My expectations were mostly met	29%
	My expectations were not met	-
	Don't know	-

4.5.8 Installation and Incentives

As displayed in Table 4-16, survey respondents did not experience any problems with the application process for the Retro-Commissioning Program.

Table 4-16 Experience with the Application Process

	Response	*Percent of Respondents (n=7)*
Did you have any problems with the application process?	Yes	-
	No	100%
	Don't know	-

Participant experience with project implementation is summarized in Table 4-17. Eighty-six percent of the respondents felt that the implementation went smoothly, while one participant indicated that it was a mostly smooth process.

Table 4-17 Experience with Project Implementation

Question	*Yes*	*For the most part*	*No*	*Don't know*	*n*
Did the retro-commissioning project go smoothly?	86%	14%	-	-	7
Do you feel the retro-commissioning service provider did a good job of identifying efficiency improvements?	86%	14%	-	-	7
For those measures implemented by a contractor, do you feel you got a quality implementation?	100%	-	-	-	6

The respondent who indicated that the implementation process for the most part went smoothly was asked what part of the process did not go well. The respondent stated that the staff member leading the project left, which required additional effort to keep the project on track.

Nearly all participants stated that the retro-commissioning service provider did a good job identifying energy efficiency improvements. However, one participant who indicated that the service provider mostly did a good job stated that a recommendation to adjust the thermostat setting did not require any special expertise. All participants stated that the contractor implementing the measures provided a quality installation.

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.

4.5.9 Verifications

Participants were asked if the measures implemented through the program had been verified by a representative of SEDAC or a SEDAC service provider. All though 86% of the survey respondents indicated that the measures had been verified, the program requires that verification inspections are required for all projects. It is possible that the remaining respondent did not recall the verification visit, or that the visit was conducted when this respondent was away from the facility. None of the participants reported that changes were made as a result of the verification inspections.

Table 4-18 Measure Verifications

Question	*Percent of Respondents Saying Yes*	*n*
Have the measures you implemented through the retro-commissioning program been verified by a representative of SEDAC or a SEDAC Service Provider?	86%	7
Were any changes made to the measures as a result of this verification?	-	7

4.5.10 Additional Energy Efficiency Projects

Two participants reported implementing additional efficiency measures similar to those implemented through the program. Additionally, two participants indicated that they implemented measures that were not similar to the measures implemented through the program. One of these respondents elaborated and indicated that the measures implemented included energy management systems, controls, and preventative maintenance procedures.

Although these responses suggest that participation in the program is encouraging participants to adopt additional energy efficiency measures, these responses, in isolation, do not suggest a specific level of spillover attributable to the program.

Table 4-19 Additional Energy Efficiency Projects

Question	*Percent of Respondents Saying Yes*	*n*
Since participating in the Public Sector Energy Efficiency Program, have you implemented any additional energy measures similar to those you implemented through the program that you did not apply or receive an incentive for?	29%	7
Since participating in the Public Sector Energy Efficiency Program, have you implemented any additional energy efficiency equipment that was not similar to those you implemented through the program that you did not apply or receive an incentive for?	29%	7

4.5.11 Participant Recommendations and Overall Impressions

Survey respondents were provided an opportunity to make additional comments about the program or provide recommendations for program improvements. One of the participants suggested that the program should be promoted more effectively. Specifically, the respondent suggested that the program provide information to groups such as the Building Owners and Managers Association and the Chicago Real Estate Network to help inform property managers. Another participant suggested that the program make spreadsheet applications available.

Lastly one survey respondent stated a desire for the program to continue and noted that the program staff was very helpful.

Overall, participant commentary and responses suggest they are satisfied with the operation and delivery of the Retro-Commissioning Program and that they value the information and financial assistance that they have received. There were very few, if any, instances of issues with the participation process, including application submission measure implementation and verification visits.

4.6 Service Provider Outcomes

This section presents the key findings from interviews with Retro-Commissioning Program service providers who completed projects during EPY4. In total, five service providers were interviewed. Two service providers were no longer employed by the firms and the evaluators were unable to speak with another staff member knowledgeable about the completed projects. Additionally, one service provider did not respond to the interview requests. The five surveyed service providers completed six retro-commissioning projects during the program year.

Results indicate that there is demand for retro-commissioning services but that participants typically have to be educated about the benefits of retro-commissioning. Because more education is needed, there is potential for greater growth in the demand for retro-commissioning as more facility operations staff members begin to understand the process and its benefits.

Overall, service providers reported that their participants were satisfied with the retro-commissioning service and 60% of the service providers noted that they were very satisfied with the program.

Key topics discussed during the interviews include:

- Program awareness;
- Participation process;
- Program effects on the service provider's business;
- Retro-commissioning market demand, participation, and marketing efforts;
- Influence of Retro-Commissioning Program on participants;
- Service provider training;
- Barriers to participation; and
- Program feedback and recommendations.

4.6.1 Program Awareness and Interactions with Program Staff

Service providers reported hearing about the program from a variety of sources. These sources include the internet, word of mouth, from utilities, and through program marketing efforts. One service provider was aware of the program because of a previous relationship with DCEO. These findings suggest that service providers were generally not recruited by program staff to become service providers, but instead heard of the program through its marketing efforts.

Service providers were asked about their level of interaction with program staff. Most participants reported having regular interaction with program staff, including SEDAC / 360 Energy and DCEO staff. When asked who they would contact for answers to questions regarding the program, each service provider reported that they would contact SEDAC / 360 Energy staff, although one participant also mentioned DCEO staff. All of the service providers reported that the program staff has been responsive to inquiries.

4.6.2 Participation Process

Each of the interviewed service providers indicated that they were satisfied with the program overall. Despite their general satisfaction with the program, nearly all of survey respondents suggested that the program participation process should be modified. Moreover, as shown in Figure 4-1, a majority of the service providers suggested that each of the three phases of program participation could be improved.

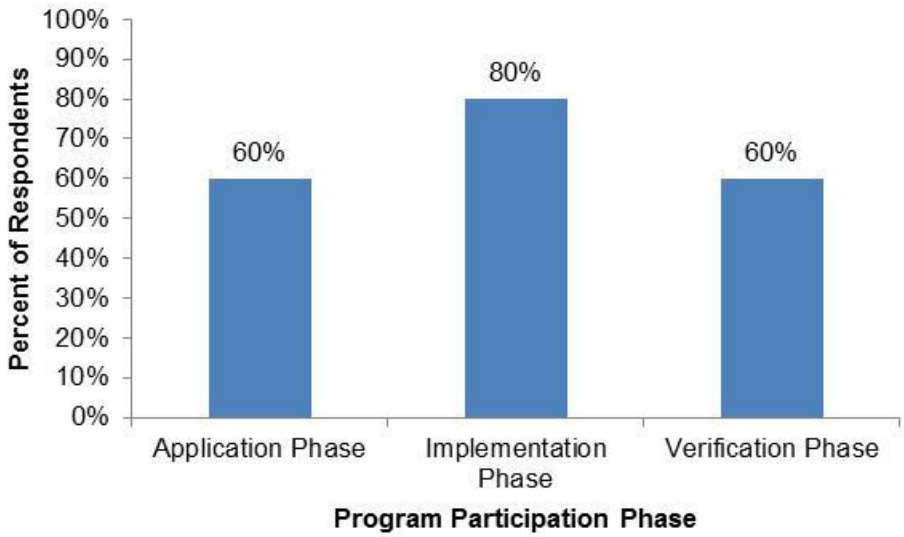

Figure 4-1 Phases of Participation Service Providers Thought Should be Modified

Two of the most frequently mentioned concerns were the period of time for completing projects and inadequate program funding. Service providers noted that the process of completing a retro-commissioning study is fairly lengthy and requires that the service provider educate the participant about the benefits, complete the study, and begin measure implementation efforts. Service providers noted that because program guidelines come out after the program year begins, and that the program tends to run out of funding before the end of the program year, the period to complete this process is often less than 12 months.

Service providers also stated that the application process and verification requirements were overly extensive. One service provider stated that stipends should be provided for completing time intensive activities such as the preliminary analysis and mentioned that private sector retro-commissioning programs provide these incentives.

4.6.3 Program Effects on Business

Four of the five interviewed serviced providers stated that they had completed retro-commissioning projects in the public sector prior to participating in the program. Figure 4-2 displays the share of interviewed service providers' business that comes public and private sectors. Two service providers indicated that a larger share of their business comes from providing retro-commissioning services for public sector clients than for private sector clients.

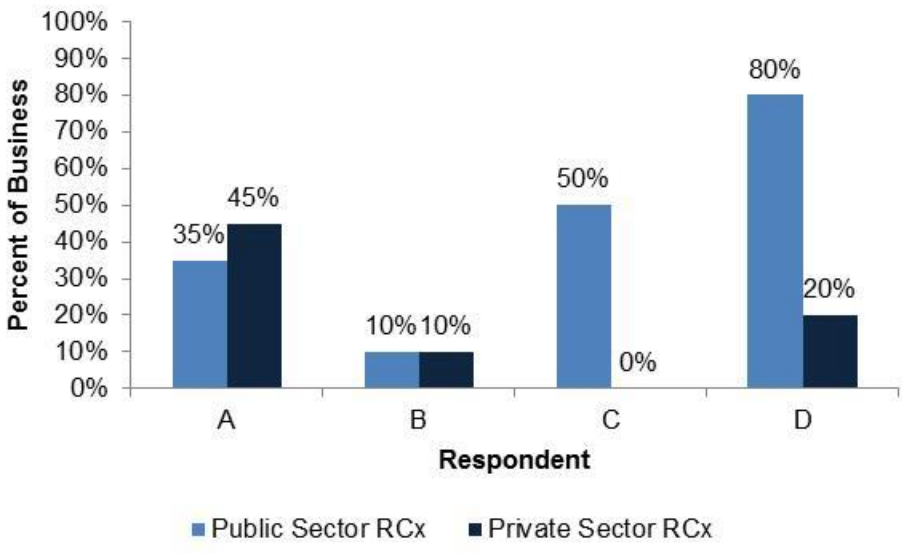

Figure 4-2 Percent of Business from Retro-Commissioning Services in Public and Private Sectors

The majority of service providers stated that they became involved with the program because it would generate more business for their firms. When asked what the benefits were to their firm, all of the respondents stated that the program increased their client base and allowed them to better serve their customers. Some service providers noted that the incentive provided by the Retro-Commissioning Program is valuable in overcoming the skepticism that many new participants have towards retro-commissioning, as the reduced cost increases the appeal of receiving these services.

As mentioned, the Retro-Commissioning Program benefited service providers by expanding their client base. Three service providers stated that they had not previously performed services for the businesses that completed retro-commissioning projects through the program. Additionally, one respondent stated that the program had substantially increased the completion rate for retro-commissioning projects.

4.6.4 Demand for Retro-Commissioning and Marketing Efforts

Three of service providers stated that there was a high demand for retro-commissioning or that the demand was growing. However, two service providers stated that there is a low level of demand for retro-commissioning because facility operators are not well informed of the potential benefits. One of the service providers emphasized that service providers have to engage participants and inform them of the benefits in order to generate demand for retro-commissioning services.

All service providers indicated that they were actively promoting the program to prospective participants. Four service providers stated that the program would benefit from more active promotional efforts on the part of implementation contractors. They stated that additional direct marketing of the program through advertisements and pamphlets would be beneficial.

4.6.5 Influence of Retro-Commissioning Program on Participants

Service providers were asked about participants' prior awareness of energy efficiency measures and practices, as well as about the program's influence on the participant decision making process... In cases where service providers completed multiple projects through the program, the questions were repeated for each completed project. In total, the interviewed service providers completed six projects during EPY4.

For five of the six projects, service providers indicated that it was unlikely that the participant would have completed the project without the program.

Table 4-20 displays service provider responses to questions regarding participants' prior awareness of the energy usage findings and efficiency improvements that were identified in the study. Service providers indicated that for 60% of the projects, the participant was at least somewhat aware of the performance issues. For the remaining projects, service providers stated that participants were not very aware or not at all aware of the performance issues. In contrast to the level of awareness of the performance issues, service providers indicated participants were not very aware of the measures recommended in the study. Specifically, for 75% of the projects completed, service providers indicated that the participant was not very aware of the measures. Another 25% stated that participants were somewhat aware of the recommended measures.

Table 4-20 Participant Prior Awareness of Performance Issues and Recommended Measures

Question	*Level of Awareness*				
	Very Aware	*Somewhat Aware*	*Not Very Aware*	*Not at all Aware*	*n**
In general, how aware was the participant of the equipment performance issues identified through retro-commissioning prior to the study?	-	60%	20%	20%	6
In general, how aware was the participant of the measure/upgrades recommended to them prior to conducting the study?	-	25%	75%	-	4

**Service providers were asked these questions for each project they completed*

Overall, service provider responses suggest that program participants would have been unlikely to complete the retro-commissioning project without the assistance from the program. Moreover, the retro-commissioning study likely provided valuable information to participants, as many were unaware of the findings that resulted from the services.

4.6.6 Service Provider Training

Interviewed service providers were asked if they had received any training as part of their participation in the Retro-Commissioning Program. Four of the service providers stated that they had received training and explained that the training primarily focused on program progresses rather than on the technical aspects of providing retro-commissioning. According to service providers, most of the training involved details regarding program details and requirements.

Service providers were asked about the usefulness of the training and if they had suggestions for training improvements. The majority of the service providers stated that the training was helpful, and two service providers identified possible training improvements. One of these service providers suggested that the training include presentations from retro-commissioning service providers about past experiences and lessons learned from performing the service.

4.6.7 Barriers to Participation

Interview respondents were asked several questions about barriers that their customers face in completing retro-commissioning projects. Service providers most commonly cited funding as a primary barrier to retro-commissioning, as well as a lack of understanding regarding the retro-commissioning process and potential benefits. According to one service provider, inadequate funding acts as barrier because the program runs of funds before the end of the program year.

Another barrier mentioned by respondents was that participants may not have the time to complete retro-commissioning projects. Most of the service providers did not cite significant differences in the barriers faced by different organizations, but it was noted that some organizations lack enough skilled workers to complete retro-commissioning projects. None of the service providers cited differences in barriers faced by public versus private sector organizations.

When asked what could be done to overcome these barriers the majority of the respondents suggested increased marketing efforts to promote the benefits of retro-commissioning, increased incentive levels, ensuring that funding is sufficient to allow for a 12-month window to complete retro-commissioning projects, and increasing the number of training programs for potential participants.

4.6.8 Service Provider Program Feedback and Recommendations

Service providers were asked to provide recommendations for the program. These recommendations include:

- In addition to energy savings, promote the non-energy benefits associated with retro-commissioning such as increased comfort and improved ventilation.
- Ensure that funding for projects is available for a 12 month period.
- Increase marketing and target specific segments such as community colleges.
- Improve education and communication about the benefits of retro-commissioning. Many prospective participants are skeptical about the savings potential.
- Increase funding for service providers so that they can lower their fees and expand their services

It should be noted that these recommendations were provided directly by the service providers and do not necessarily coincide with the conclusions and recommendations developed by evaluation staff. Program evaluator recommendations, which take into account the full scope of

the program evaluation, may be found in the Conclusions and Recommendations chapter of this report.

4.7 Program Operations Perspective

This section summarizes the core findings of interviews that were conducted with the Retro-Commissioning Program implementation staff.

In order to gather information regarding the operational efficiency and program delivery process, in-depth interviews were conducted with key program implementation staff from SEDAC / 360 Energy Group.

The SEDAC and the 360 Energy Group, in coordination with DCEO, implements the Retro-Commissioning Program. In 2007, 360 Energy Group was established to support DCEO's SEDAC Design Assistance program and in 2009, it expanded its offering to include the support of the Retro-Commissioning Program. Services provided by 360 Energy Group include implementation, oversight, outreach, education, and training.

Respondents discussed their perspective on program structure, operations, and marketing. The key findings from these discussions are summarized below.

- **Two Data Systems are Used to Facilitate Information Sharing:** 360 Energy Group uses two primary data systems, Microsoft SharePoint and Microsoft Access, to facilitate communication, share project documentation, and archive reports. The sites are hosted and maintained by 360 Energy Group. DCEO has access to these systems with a secure login.
- **Participation Process:** The first step to participation is completing a notice of interest, which can be downloaded from the SEDAC website. 360 Energy Group conducts prescreening to discuss program details and requirements and to ensure that prospective participants understand that they are committing to spend $10,000 on energy efficiency improvements. Once approved the project is assigned to a retro-commissioning service provider who is responsible for assisting the participant with the application. Beginning in electric program year 5 (EPY5), the program instituted a requirement that retro-commissioning service providers complete a scoping analysis to determine appropriate measures and their estimated energy savings impacts.

  After the application and scoping efforts are complete, 360 Energy Group, the service provider, and the participant engage in a project kick-off meeting. The three parties agree to a timetable for the project prior to work commencing. Service providers are required to provide weekly progress reports to 360 Energy Group until the project is completed. Once the retro-commissioning is completed, the service provider conducts a final presentation conveying implementation details and recommended maintenance practices that will ensure continued performance and energy savings. After implementation is completed, service providers are required to perform a verification of the measures installed.

- **Multiple marketing channels:** 360 Energy Group is responsible for marketing the program and engaging in outreach efforts. The primary means of marketing the program include the SEDAC website, presentations at partner association events, industry workshops, email blasts, and training sessions. The effectiveness of these methods is supported by comments from participant survey respondents, who mentioned learning of the program through these channels. Moreover, participant survey respondents cited several of these channels as being their primary sources for information about energy efficiency.

  One of the challenges faced by implementation staff in marketing the program at industry events and workshops is a lack of information about the attendees. The professionals attending these events hold a variety of positions including executives, administrators, building operators, and engineers. Implementation staff would prefer to have additional information about event attendees, such as employment role and energy efficiency interests, in order to tailor their efforts to the needs of the audience.

- **Increasing Number of Retro Commissioning Service Providers:** 360 Energy Group currently works with approximately 100 different architecture and design companies who are interested in providing retro-commissioning services. These firms are remaining current with industry best practices and are interested in networking with peers and potential clients.

  360 Energy Group has succeeded in increasing the number of retro-commissioning service providers affiliated with the program. The number of retro-commissioning service providers has more than doubled since EPY3, from 54 individuals in EPY3 to 116 individuals in EPY5. The growth in the number of service providers is critical to the future success of the program due to the role they play in the marketing and promotion process.

- **"Word of Mouth" is Highly Valued:** Public sector entities collaborate, network and share resources to a greater extent than is typical within the private sector. Furthermore, program implementation staff noted that information shared by peers from other public entities has a particularly large influence on program awareness and appeal. Although many of the program's efforts to promote the program involve fostering collaboration and networking opportunities among prospective participants, implementation staff noted that the program could benefit from increasing these efforts in future program years.

- **Access to Funds Remains a Major Barrier to Program Participation:** Although additional funding mechanisms such as performance contracting have been introduced in recent program years, implementation staff noted that the impact of these mechanisms on participation rates remains unclear. Furthermore, staff noted that insufficient funding within the customer base remains a barrier to participating in the program. Participant survey responses and interviews with retro-commissioning service providers corroborate the assertion that funding remains a significant barrier.

5. Conclusions and Recommendations

Since its initial launch, the Retro-Commissioning Program has continued to develop and to improve the efficiency of public sector buildings in Illinois. Program participants and service providers are generally satisfied with the program and staff has implemented methods that are designed to improve program operation and delivery.

5.1 Key Conclusions

The following presents a selection of key findings from the most recent program year and full program cycle:

- **Funding is a Significant Barrier to Energy Efficiency Improvements in the Public Sector:** When asked what barriers they faced to making energy efficiency improvements, nearly all participants identified insufficient funds as a barrier. The absence of program free ridership is consistent with this customer narrative. Findings from interviews with service providers and program staff further corroborated the participant survey findings. Most service providers stated that the projects would likely not have been completed without program assistance, and program staff stated that a lack of funds is the primary barrier to energy efficiency improvements for public sector entities.
- **Incentive is Well Designed to Reduce Uncertainty about Retro-Commissioning:** Service providers reported that the participants, and prospective participants, are skeptical of the value of retro-commissioning and explained that more education is needed to inform the market of its benefits. Given the cost of the investment and the perceived lack of value of retro-commissioning, building operators are likely to associate a relatively high degree of risk with completing retro-commissioning projects. The program incentive structure mitigates this risk by providing the service at no cost in exchange for a commitment to invest $10,000 in the implementation of measures with a payback period of 1.5 years or less. Due to the short payback period for the measures implemented as part of their commitment, prospective participants are more likely to view participation as a worthwhile investment. It should be noted that during the program year, participants invested an average of over $25,000, which is more than double the $10,000 commitment requirement.
- **Participants Focus on Problem Resolution**: Service provider interview responses suggest that participants are more aware of equipment performance deficiencies than of the measures recommended to address them. This suggests that the primary value of the retro-commissioning study, the identification of solutions to known problems, is well-targeted.
- **No Direct Natural Gas Energy Savings**: Projects with verified savings during the program year were initiated during EPY3, prior to the availability of funds to target natural gas savings. Any natural gas savings resulting from recommended measures occurred because the electric measure also resulted in natural gas savings. However, none of the participants elected to implement the measures with coincidental natural gas savings.

- **The Retro-Commissioning Program is Marketed Well:** SEDAC / 360 Energy Group utilizes an adequate mix of marketing channels to inform, communicate, support, and provide guidance for the Retro-Commissioning Program. Program staff members use a variety of channels and are currently seeking to better understand the target audience in order to improve their communication about the program. The marketing channels used by program staff are largely consistent with the sources for information about energy improvements that participants report using.
- **Program Improving Regional Capacity for Energy Efficiency:** The growing number of service providers indicates that the Retro-Commissioning Program is building regional capacity in the energy efficiency and green building sectors. These changes in the market may have market transformation effects on energy efficiency in Illinois that persist independently of the Retro-Commissioning Program. Additionally, increasing numbers of service providers and the continued efforts by program staff to promote the program are helping to inform and educate public sector building operators about the value of retro-commissioning. This will likely assist in reducing barriers to energy efficiency among public sector energy consumers, in particular.

5.2 Recommendations

While interviews with program staff suggest that the program organization and efficiency have continually improved, several recommendations have been developed based on interview findings and overall analysis of program processes. These recommendations may provide strategic advantage in future program years:

- **Align Marketing with Target Participant Segment:** The Retro-Commissioning Program is promoted through a variety of channels and "fine tuning" the message should be the primary focus for the continued development of the marketing strategy. A more effectively-targeted message to the audience will aid in understanding of program benefits and overall value. Effective marketing messages would focus on the variety of benefits associated with completing a retro-commissioning study. These benefits include reduced energy costs, improved performance of building systems, increased equipment life, improved thermal comfort, improved air quality, improvements to productivity and safety, as well as reduced labor costs. The marketing message should highlight the benefits that are most relevant to the target audience.

  Program staff should also consider developing "success stories" to help promote the benefits of retro-commissioning. The development of brief case studies highlighting benefits realized by program participants may be a particularly effective form of marketing. These stories should feature a variety of building types in order to allow various prospective participants to identify with past participants' facilities and learn about the benefits that may apply to their own buildings.

  Additionally, it may be useful for program staff to consider further advertising within relevant trade journals and magazines. One-quarter of survey respondents reported using

these sources for information on energy efficiency improvements. However, staff should carefully gauge the relative costs and benefits of this approach.

- **Continue Developing Retro-commissioning Service Provider Network:** 360 Energy Group has continuously developed its network of service providers in order to effectively distribute program information and resources to participants. These efforts should continue as service providers are a critical resource for increasing program activity and educating public sector decision makers about the benefits of retro-commissioning. It may be beneficial to focus recruitment efforts on firms that have an established client base within Illinois. These service providers can capitalize on their existing professional relationships with clients in order to educate them about the benefits of retro-commissioning.
- **Consider Independent Verification of Measure Installation:** Independent verification of work performed by contractors is typically considered a best practice for the administration of energy efficiency programs. Program implementation staff should consider independently verifying the measures implemented for a sample of participants, and incorporating language regarding this process into the program guidelines. Independent verifications will ensure that the measures are implemented as reported and that they are functioning properly. These visits should be performed during the service provider verification visit in order to minimize the impact on the participant.

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 to implement the measure
   ( ) Was not part of the decision process *(If Checked, go to 3A)*

3A. Who was the main decision maker?

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

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

4. What are the main sources your organization relies on for information about energy efficient equipment, materials, practices and design features? (Check all that apply)
   ( ) A DCEO Representative
   ( ) The DCEO Website
   ( ) Utility representatives
   ( ) Brochures or advertisements
   ( ) Trade associations or business groups you belong to
   ( ) Trade journals or magazines
   ( ) Friends and colleagues
   ( ) Representatives of the Smart Energy Design Assistance Center (SEDAC / 360 Energy Group) and SEDAC / 360 Energy Group RCx Service Providers
   ( ) Representatives of the Energy Resource Center (ERC)
   ( ) Architects, engineers or energy consultants
   ( ) Equipment vendors or building contractors
   ( ) Other (please describe)

5. Which of the following policies or procedures does your organization have in place regarding energy efficiency improvements at this facility? *(Check all that apply)*
   ( ) An energy management plan *(If checked, go to 5A)*
   ( ) A designated staff member responsible for energy tracking and energy efficiency
   ( ) Policies that incorporate energy efficiency in operations and procurement
   ( ) Active training of staff

( ) Other (please specify)
( ) None

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. What is your approach to maintenance for HVAC equipment at this facility?
( ) 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

10. What barriers does your organization face in making energy efficiency improvements? *(Select all that apply)*
( ) Insufficient funding for improvements
( ) Lack of information on energy efficient equipment and practices
( ) Approval processes that 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 replace with more efficient equipment
( ) Don't know
( ) Other _____

11. How important is past experience with energy efficient equipment or practices for your decision making regarding energy efficiency improvements?
    ( ) Very important
    ( ) Somewhat important
    ( ) Only slightly important
    ( ) Not important at all
    ( ) Don't know

12. How important is advice and/or recommendations received from DCEO or its partners (SEDAC / 360 Energy Group or SEDAC / 360 Energy Group Service Providers) for your decision making regarding energy efficiency improvements?
    ( ) Very important
    ( ) Somewhat important
    ( ) Only slightly important
    ( ) Not important at all
    ( ) Don't know

13. Which financial methods does your organization typically use to evaluate energy efficiency improvements for this facility? (Select all that apply)
    ( ) Initial Cost
    ( ) Simple payback *(If checked, go to 13A)*
    ( ) Internal rate of return *(If checked, go to 13B)*
    ( ) Life cycle cost *(If checked, go to 13C)*
    ( ) None of these

13A. 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.

13B. 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.

13C. What discount rate do you normally apply when determining life cycle costs? Please provide either a specific value or an estimated range.

14. 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, go to 14A)*
    ( ) No efficiency improvements were paid for by the organization.
    ( ) No, an incentive was applied for. *(If checked, go to 14B)*
    ( ) Don't know

    14A. Why didn’t you apply for an incentive for that equipment?

( ) 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)

14B. Did you receive all of your incentives for these past energy efficiency projects?
( ) Yes
( ) No
( ) Don't know

15. When did you learn of the Retro-Commissioning Program?
( ) 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 performed
( ) After the retro-commissioning was performed
( ) Some other time (please describe)
( ) Don't know

16. How did you learn of the Public Sector Retro-Commissioning Program? (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 information brochure on the Public Sector Retro-commissioning Program
( ) Trade association or business group you belong to
( ) Trade journal or magazine
( ) Friend or colleague
( ) From a representative of Smart Energy Design Assistance Center (SEDAC / 360 Energy Group) or a SEDAC / 360 Energy Group Service Provider
( ) From a representative of the Energy Resource Center (ERC)
( ) 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)

17. Before participating in the Retro-Commissioning Program, had you completed similar retro-commissioning projects?
( ) Yes

( ) No
( ) Don't know

18. Did you have plans to have this facility retro-commissioned before participating in 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?
( ) Less than 6 months before
( ) 6-12 months before
( ) 1-2 years before
( ) 3-5 years before
( ) More than 5 years before
( ) Don’t know

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

19. Did you have experience with DCEO energy efficiency programs prior to participating in the Retro-Commissioning Program?
( ) Yes*(If checked, go to 19A)*
( ) No

19A. How important was previous experience with the DCEO programs in making your decision to have this facility retro-commissioned?
( ) Very important
( ) Somewhat important
( ) Only slightly important
( ) Not at all important
( ) Don't know

20. Did a Retro-Commissioning Program or other DCEO representative recommend that you retro-commission the facility?
( ) Yes *(If checked, go to 20A)*
( ) No
( ) Don't know

20A. 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?
( ) Definitely would have
( ) Probably would have
( ) Probably would not have
( ) Definitely would not have
( ) Don't know

21. Did a representative of the Smart Energy Design Assistance Center (SEDAC / 360 Energy Group) or a SEDAC / 360 Energy Group Service Provider recommend that you perform the retro-commissioning?
( ) Yes *(If checked, go to 21A)*
( ) No
( ) Don't know

21A. If the SEDAC / 360 Energy Group or SEDAC / 360 Energy Group Service Provider representative had not recommended that you retro-commission the facility, how likely is it that you would have done it anyway?
( ) Definitely would have installed
( ) Probably would have installed
( ) Probably would not have installed
( ) Definitely would not have installed
( ) 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

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?
( ) Definitely would have
( ) Probably would have
( ) Probably would not have
( ) Definitely would not have
( ) Don't know

24. 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 24A)*
( ) No, program did not affect quantity of improvements implemented.

24A. What additional improvements did you implement?

25. 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 25A)*
( ) No, program did not affect the timing of the retro-commissioning.

25A. When would you otherwise have retro-commissioned the facility?
( ) Less than 6 months later
( ) 6-12 months later
( ) 1-2 years later
( ) 3-5 years later
( ) More than 5 years later

26. Did you have any problems with the application process?
( ) Yes
( ) No
( ) Don't know

26A. What problems did you have?

27. Did the retro-commissioning project go smoothly?
( ) Yes
( ) For the most part *(If checked, go to 27A)*
( ) No *(If checked, go to 27A)*
( ) Don't know

27A. Please explain in what ways the retro-commissioning did not go smoothly.

28. Did the energy efficiency improvements from the retro-commissioning meet your expectations?
( ) My expectations were exceeded
( ) My expectations were met
( ) My expectations were mostly met *(If checked, go to 28A)*
( ) My expectations were not met *(If checked, go to 28A)*
( ) Don't know

28A. Please explain in what ways the energy efficiency improvements did not meet your expectations.

29. 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 29A)*
( ) No *(If checked, go to 29A)*
( ) Don't know

29A. Please explain in what ways you do not feel the service provider did a good job.

30. Did you have any of the retro-commissioning measures implemented by a contractor?
( ) Yes *(If checked, go to 30A)*
( ) We used a contractor to install some of the measures *(If checked, go to 30A)*
( ) No
( ) Don't know

30A. 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 30B)*
( ) No *(If checked, go to 30B)*
( ) Don't know

30B. Please explain in what ways you did not receive a quality implementation.

31. Have the measures you implemented through the retro-commissioning program been verified by a representative of SEDAC / 360 Energy Group or a SEDAC / 360 Energy Group Service Provider?
( ) Yes *(If checked, go to 31A, then 31B, then 31C)*
( ) No
( ) Don't know

31B. Were any additional changes made as a result of this verification?
( ) Yes *(If checked, go to 31C)*
( ) No
( ) Don't know

31C. Please explain what changes were made.

32. Since participating in the Retro-Commissioning Program, have you made any additional energy efficiency improvements similar to those implemented through the program that you did not apply or receive an incentive for?
( ) Yes *(If checked, go to 32A-32G)*
( ) No
( ) Don't know

32A. Did the additional energy efficiency improvements result in the same or higher level of efficiency as the improvements implemented through the program?
( ) Yes
( ) No
( ) Don't know

32B. Were these additional improvements implemented at the same facility (or facilities) as the retro-commissioning project that you received an incentive for?

( ) Yes
( ) No; Where were the improvements made? _____
( ) Don't know

32D. Did a recommendation from a program staff member or contractor influence your decision to implement the additional measures?
( ) Yes *(If checked, go to 32D.1)*
( ) No
( ) Don't know

32D.1 How important was this recommendation to your decision to implement the additional energy efficiency improvements
( ) Very important
( ) Somewhat important
( ) Neither important or unimportant
( ) Somewhat unimportant
( ) Unimportant
( ) Don’t know

32E. How important was your experience with the Public Sector Retro-commissioning Program to your decision to implement the additional energy efficiency project?
( ) Very important
( ) Somewhat important
( ) Neither important or unimportant
( ) Somewhat unimportant
( ) Unimportant
( ) Don’t know

32F. How important was any past experience with energy efficiency programs to your decision to implement the additional efficiency improvements?
( ) Did not participate in any other programs in the past
( ) Very important
( ) Somewhat important
( ) Neither important or unimportant
( ) Somewhat unimportant
( ) Unimportant
( ) Don’t know

32G. Why didn’t you apply for or receive financial assistance or incentives for the improvements? [Check all that apply]
( ) Didn’t know whether the improvements qualified for financial incentives
( ) Financial incentive was insufficient
( ) No financial incentive was offered
( ) Too much paperwork for the financial incentive application

( ) For some other reason (please describe) _____

33. Since participating in the program, have you implemented any other energy efficiency improvements that were not similar to what you implemented through the program and that you did not apply or receive an incentive for?
( ) Yes *(If checked, go to 33A-33G)*
( ) No
( ) Don't know

33A. What energy efficiency improvements did you implement?

33B. Were these improvements made at the same facility (or facilities) as the retro-commissioning project that you received an incentive for?
( ) Yes
( ) No; Where was the equipment installed? _____
( ) Don't know

33C. Did a recommendation from a program staff member or contractor influence your decision to implement the additional measures?
( ) Yes *(If checked, go to 33D.1)*
( ) No
( ) Don't know

33D.1 How important was this recommendation to your decision to implement the additional energy efficiency improvements
( ) Very important
( ) Somewhat important
( ) Neither important or unimportant
( ) Somewhat unimportant
( ) Unimportant

33E. How important was your experience with the Public Sector Retro-commissioning Program to your decision to implement the additional energy efficiency project?
( ) Very important
( ) Somewhat important
( ) Neither important or unimportant
( ) Somewhat unimportant
( ) Unimportant
( ) Don’t know

33F. How important was any past experience with energy efficiency programs to your decision to implement the additional efficiency improvements?
( ) Did not participate in any other programs in the past

( ) Very important
( ) Somewhat important
( ) Neither important or unimportant
( ) Somewhat unimportant
( ) Unimportant
( ) Don't know

33G. Why didn't you apply for or receive financial assistance or incentives for the improvements? [Check all that apply]
( ) Didn't know about financial incentives
( ) Didn't know whether the measures qualified for financial incentives
( ) Financial incentive was insufficient
( ) No financial incentive was offered
( ) Too much paperwork for the financial incentive application
( ) For some other reason (please describe) _____

34. 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 34A)*

- The energy efficiency of the facility since the retro-commissioning
- Savings on your monthly bill
- Incentive amount
- 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 the contractor implementing the measures
- Information provided by DCEO
- Information provided by Smart Energy Design Assistance Center (SEDAC / 360 Energy Group)
- The elapsed time until you received the incentive
- Overall program experience

34A. Please describe in what ways you were not satisfied with the program.

35. 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 work effort, a survey was made of a sample of decision makers for facilities that received under the Retro-Commissioning Program. That 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. The surveys were conducted by internet. During the survey, a participant was 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 (*n)*.

3. What was your role in the decision to retro-commission the facility?	*Response*	*(n=8)*	*Percent of Respondents*
	Main decision maker	3	38%
	Assisted with the decision	5	63%
	Was not part of the decision making process	0	0%

4. What are the main sources your organization relies on for information about energy efficient equipment, materials, practices, and design features?	*Response*	*(n=8)*	*Percent of Respondents**
	A DCEO representative	0	0%
	The DCEO website	2	25%
	The Smart Energy Design Assistance Center (SEDAC) and SEDAC RCx Service Providers	2	25%
	The Energy Resource Center (ERC)	0	0%
	A utility representative	1	13%
	Brochures or advertisements	0	0%
	Trade associations or business groups you belong to	2	25%
	Trade journals or magazines	2	25%
	Friends and colleagues	1	13%
	Architects, engineers, or energy consultants	3	38%
	Equipment vendors or building contractors	3	38%
	Other (please describe)	3	38%
	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%.*

5. Which of the following policies or resources does your organization have in place regarding energy efficiency improvements at this facility?	*Response*	*(n=8)*	*Percent of Respondents**
	An energy management plan	2	25%
	A staff member responsible for energy and energy efficiency	3	38%
	Policies that incorporate energy efficiency in operations and procurement	5	63%
	Active training of staff	2	25%
	Do not have policies or procedures for energy efficiency improvements	1	13%
	Other (please specify)	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%.*

5a. Does your energy management plan include goals for energy savings?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	2	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=8)*	
	Average	72.3

7. Are the facility operators responsible for general facility maintenance such as painting and cleaning?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	6	75%
	No	2	25%
	Don't know	0	0%

8. How would you describe the approach to HVAC maintenance at this facility? Would you say...	*Response*	*(n=8)*	*Percent of Respondents*
	Reactive, we run equipment to failure and then repair or replace it	0	0%
	Preventative, we perform maintenance at scheduled periods to maintain equipment	7	88%
	Predictive, we monitor equipment and use the information to determine maintenance needed	1	13%
	Other (please describe)	0	0%
	Don't know	0	0%

9. How does your organization decide to make energy efficiency improvements for this facility? Is the decision:	*Response*	*(n=8)*	*Percent of Respondents*
	Made by one or two key people	2	25%
	Made by a group or committee	2	25%
	Based on staff recommendations to a decision maker	4	50%
	Made in some other way	0	0%
	Don't know	0	0%

10. What barriers does your organization face in making energy efficiency improvements?	*Response*	*(n=8)*	*Percent of Respondents**
	Insufficient funding for improvements	7	88%
	Lack of information on energy efficient equipment and practices	0	0%
	Approval processes that are slow or make purchasing difficult	1	13%
	Schedules that dictate when equipment is to be maintained regardless of efficiency levels	0	0%
	Incentive program time requirements	0	0%
	Current equipment is too new to be replaced with more efficient equipment	0	0%
	Other (please specify)	3	38%
	Don't know	1	13%

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

11. How important is past experience with energy efficient equipment or practices for your decision making regarding energy efficiency improvements? Would you say...	*Response*	*(n=8)*	*Percent of Respondents*
	Very important	3	38%
	Somewhat important	5	63%
	Only slightly important	0	0%
	Not important at all	0	0%
	Don't know	0	0%

12. How important is advice and/or recommendations received from DCEO or its partners (SEDAC or SEDAC Service Providers) for your decision making regarding energy efficiency improvements? Would you say...	*Response*	*(n=8)*	*Percent of Respondents*
	Very important	4	50%
	Somewhat important	4	50%
	Only slightly important	0	0%
	Not important at all	0	0%
	Don't know	0	0%

13. Which financial methods does your organization typically use to evaluate energy efficiency improvements for this facility?	*Response*	*(n=8)*	*Percent of Respondents**
	Initial Cost	4	50%
	Simple payback	8	100%
	Internal rate of return	2	25%
	Life cycle cost	3	38%
	None of these	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%.*

13a. What payback length of time do you normally require in order to proceed with an energy efficiency project?	*Average Years, (n=6)*
	Average 2.8

14. 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=8)*	*Percent of Respondents*
	Yes, paid for energy efficiency projects but did not apply for incentive.	4	50%
	No efficiency improvements were paid for by the organization.	1	13%
	No, an incentive was applied for.	3	38%
	Don't know	0	0%

14a. Why didn't you apply for an incentive for that project?	*Response*	*(n=4)*	*Percent of Respondents*
	Didn't know whether improvements qualified for incentives	1	25%
	Didn't know about incentives until after efficiency improvements were completed	1	25%
	Didn't have time to complete paperwork for the incentive application	0	0%
	Too much paperwork for the incentive application	0	0%
	The incentive was insufficient	0	0%
	Other (please specify)	2	50%
	Don't know	0	0%

14b. Did you receive all of your incentives for these past energy efficiency projects?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	1	33%
	No	2	67%
	Don't know	0	0%

15. When did you learn of the Retro-Commissioning Program? Was it…	*Response*	*(n=8)*	*Percent of Respondents*
	Before planning to retro-commission the facility	5	63%
	While planning to retro-commission the facility	1	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 (please explain)	1	13%
	Don't know	1	13%

16. How did you learn of the Public Sector Retro-Commissioning Program?	*Response*	*(n=8)*	*Percent of Respondents**
	Approached directly by a representative of the Public Sector Retro-commissioning Program	0	0%
	A DCEO representative mentioned it	2	25%
	The DCEO website	1	13%
	From a utility representative	1	13%
	Received an information brochure on the Public Sector Retro-commissioning Program	0	0%
	Trade journal or magazine	0	0%
	Trade association or business group you belong to	1	13%
	Friends or colleagues	1	13%
	A Smart Energy Design Assistance Center representative or a SEDAC Service Provider	0	0%
	From an Energy Resource Center (ERC) representative	0	0%
	An architect, engineer, or energy consultant	2	25%
	Attended a conference, workshop or seminar	2	25%
	An energy service company	0	0%
	Past experience with the program	0	0%
	Equipment vendors or building contractors	0	0%
	Other (please describe)	2	25%
	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%.*

17. Before participating in the Retro-Commissioning Program, had you completed similar retro-commissioning projects?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	1	13%
	No	7	88%
	Don't know	0	0%

18. Did you have plans to have the facility retro-commissioned before hearing about the Retro-Commissioning Program?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	4	50%
	No	3	38%
	Don't know	1	13%

18a. How long before finding out about the Public Sector Retro-Commissioning Program did you have plans to retro-commission the facility?	*Response*	*(n=4)*	*Percent of Respondents*
	Less than 6 months before	0	0%
	6 months to less than one year before	1	25%
	1 year to less than 2 years before	2	50%
	2 years to less than 5 years before	1	25%
	More than 5 years before	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=4)*	*Percent of Respondents*
	Yes	2	50%
	No	2	50%
	Don't know	0	0%

19. Did you have experience with DCEO energy efficiency programs prior to participating in the Retro-Commissioning Program?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	6	75%
	No	1	13%
	Don't know	1	13%

19a. How important was previous experience with the DCEO programs in making your decision to have the facility retro-commissioned? Would you say...	*Response*	*(n=6)*	*Percent of Respondents*
	Very important	2	33%
	Somewhat important	3	50%
	Only slightly important	0	0%
	Not important at all	0	0%
	Don't know	1	17%

20. Did a Public Sector Retro-commissioning Program or other DCEO representative recommend that you retro-commission the facility?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	2	25%
	No	5	63%
	Don't know	1	13%

20a. 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? Would you say…	*Response*	*(n=2)*	*Percent of Respondents*
	Definitely would have	0	0%
	Probably would have	1	50%
	Probably would not have	1	50%
	Definitely would not have	0	0%
	Don't know	0	0%

21. Did a representative of the Smart Energy Design Assistance Center (SEDAC) or a SEDAC Service Provider recommend that you retro-commission the facility?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	6	75%
	No	2	25%
	Don't know	0	0%

21a. If the SEDAC or SEDAC Service Provider representative had not recommended that you retro-commission the facility, how likely is it that you would have done it anyway? Would you say…	*Response*	*(n=6)*	*Percent of Respondents*
	Definitely would have	0	0%
	Probably would have	3	50%
	Probably would not have	2	33%
	Definitely would not have	0	0%
	Don't know	1	17%

22. Would your organization have been financially able to retro-commission the facility without the assistance from the Retro-Commissioning Program?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	2	25%
	No	5	63%
	Don't know	1	13%

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...	*Response*	*(n=8)*	*Percent of Respondents*
	Definitely would have	1	13%
	Probably would have	2	25%
	Probably would not have	3	38%
	Definitely would not have	0	0%
	Don't know	2	25%

24. 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=8)*	*Percent of Respondents*
	Yes	7	88%
	No	1	13%
	Don't know	0	0%

25. 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=8)*	*Percent of Respondents*
	Yes	6	75%
	No	1	13%
	Don't know	1	13%

	Response	*(n=6)*	*Percent of Respondents*
25a. When would you otherwise have retro-commissioned the facility?	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	1	17%
	3 years to less than 5 years later	2	33%
	More than 5 years later	1	17%
	Don't know	2	33%

	Response	*(n=7)*	*Percent of Respondents*
26. Did you have any problems with the application process?	Yes	0	0%
	No	7	100%
	Don't know	0	0%

	Response	*(n=7)*	*Percent of Respondents*
27. Did the retro-commissioning project go smoothly?	Yes	6	86%
	For the most part	1	14%
	No	0	0%
	Don't know	0	0%

	Response	*(n=7)*	*Percent of Respondents*
28. Did the energy efficiency improvements implemented through your participation in the retro-commissioning meet your expectations? Would you say…	My expectations were exceeded	1	14%
	My expectations were met	4	57%
	My expectations were mostly met	2	29%
	My expectations were not met	0	0%
	Don't know	0	0%

	Response	*(n=7)*	*Percent of Respondents*
29. Do you feel that the retro-commissioning service provider did a good job of identifying energy efficiency improvements?	Yes	6	86%
	For the most part	1	14%
	No	0	0%
	Don't know	0	0%

	Response	*(n=7)*	*Percent of Respondents*
30. Did you have any of the retro-commissioning measures implemented by a contractor?	Yes	5	71%
	No	2	29%
	Don't know	0	0%

	Response	*(n=5)*	*Percent of Respondents*
30a. For those measures implemented by a contractor, do you feel you got a quality implementation of the identified improvements?	Yes	5	100%
	For the most part	0	0%
	No	0	0%
	Don't know	0	0%

31. Have the measures you implemented through the retro-commissioning program been verified by a representative of SEDAC or a SEDAC Service Provider?	*Response*	*(n=7)*	*Percent of Respondents*
	Yes	6	86%
	No	1	14%
	Don't know	0	0%

31b. Were any changes made to the measures as a result of this verification?	*Response*	*(n=6)*	*Percent of Respondents*
	Yes	0	0%
	No	5	83%
	Don't know	1	17%

32. Since participating in the Retro-Commissioning Program, have you made any additional energy efficiency improvements similar to those implemented through the program that you did not apply or receive an incentive for?	*Response*	*(n=7)*	*Percent of Respondents*
	Yes	2	29%
	No	4	57%
	Don't know	1	14%

32a. Did the additional energy efficiency improvements result in the same or higher level of efficiency as the improvements implemented through the program?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	0	0%
	No	1	50%
	Don't know	1	50%

32b. Were these additional improvements implemented at the same facility (or facilities) as the retro-commissioning project that you received an incentive for?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	2	100%
	No	0	0%
	Don't know	0	0%

32d. Did a recommendation from a program staff member or contractor influence your decision to implement the additional measures?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	0	0%
	No	2	100%
	Don't know	0	0%

32e. How important was your experience with the Public Sector Retro-commissioning Program to your decision to implement the additional energy efficiency project? Would you say...	*Response*	*(n=2)*	*Percent of Respondents*
	Very important	1	50%
	Somewhat important	1	50%
	Neither important or unimportant	0	0%
	Somewhat unimportant	0	0%
	Unimportant	0	0%
	Don't know	0	0%

32f. How important was any past experience with energy efficiency programs to your decision to implement the additional energy efficiency improvements? Would you say...	*Response*	*(n=2)*	*Percent of Respondents*
	Very important	1	50%
	Somewhat important	1	50%
	Neither important or unimportant	0	0%
	Somewhat unimportant	0	0%
	Unimportant	0	0%
	Don't know	0	0%

32g. 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	1	50%
	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 (please describe)	1	50%
	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%.*

33. Since participating in the program, have you implemented any other energy efficiency improvements that were not similar to what you implemented through the program and that you did not apply or receive an incentive for?	*Response*	*(n=7)*	*Percent of Respondents*
	Yes	2	29%
	No	5	71%
	Don't know	0	0%

33b. Were these improvements made at the same facility (or facilities) as the retro-commissioning project that you received an incentive for?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	1	50%
	No	1	50%
	Don't know	0	0%

33c. Did a recommendation from a program staff member or contractor influence your decision to implement the additional measures?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	0	0%
	No	1	50%
	Don't know	1	50%

33d. How important was this recommendation to your decision to implement the additional energy efficiency improvements? Would you say...	*Response*	*(n=0)*	*Percent of Respondents*
	Very important	0	0%
	Somewhat important	0	0%
	Neither important or unimportant	0	0%
	Somewhat unimportant	0	0%
	Unimportant	0	0%
	Don't know	0	0%

33e. How important was your experience with the Public Sector Retro-commissioning Program to your decision to implement the additional energy efficiency project? Would you say…	*Response*	*(n=2)*	*Percent of Respondents*
	Very important	0	0%
	Somewhat important	0	0%
	Neither important or unimportant	1	50%
	Somewhat unimportant	0	0%
	Unimportant	0	0%
	Don't know	1	50%

33f. How important was any past experience with energy efficiency programs to your decision to implement the additional energy efficiency improvements? Would you say...	*Response*	*(n=2)*	*Percent of Respondents*
	Very important	1	50%
	Somewhat important	0	0%
	Neither important or unimportant	1	50%
	Somewhat unimportant	0	0%
	Unimportant	0	0%
	Don't know	0	0%

33g. 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	2	100%
	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 (please describe)	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%.*

34a. On a scale of very satisfied to very dissatisfied, how satisfied were you with the energy efficiency of the facility since the retro-commissioning?	*Response*	*(n=7)*	*Percent of Respondents**
	5	1	14%
	4	6	86%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	0	0%
	Average		4.1

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=7)*	*Percent of Respondents**
34b. On a scale of very satisfied to very dissatisfied, how satisfied were you with the savings on your monthly bill?	5	1	14%
	4	4	57%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	2	29%
	Average		4.2

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=7)*	*Percent of Respondents**
34c. On a scale of very satisfied to very dissatisfied, how satisfied were you with the effort required for the application process?	5	1	14%
	4	5	71%
	3	1	14%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	0	0%
	Average		4.0

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=7)*	*Percent of Respondents**
34d. On a scale of very satisfied to very dissatisfied, how satisfied were you with the information provided by the retro-commissioning service provider?	5	4	57%
	4	2	29%
	3	1	14%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	0	0%
	Average		4.4

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=7)*	*Percent of Respondents**
34e. On a scale of very satisfied to very dissatisfied, how satisfied were you with the retro-commissioning service provider's level of professionalism?	5	6	86%
	4	1	14%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	0	0%
	Average		4.9

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=7)*	*Percent of Respondents**
34f. On a scale of very satisfied to very dissatisfied, how satisfied were you with the quality of the work conducted by the contractor implementing the measures?	5	1	14%
	4	3	43%
	3	1	14%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	2	29%
	Average		4.0

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=7)*	*Percent of Respondents**
34g. On a scale of very satisfied to very dissatisfied, how satisfied were you with the information provided by DCEO?	5	1	14%
	4	4	57%
	3	1	14%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	1	14%
	Average		4.0

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=7)*	*Percent of Respondents**
34h. On a scale of very satisfied to very dissatisfied, how satisfied were you with the information provided by Smart Energy Design Assistance Center (SEDAC)?	5	2	29%
	4	4	57%
	3	1	14%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	0	0%
	Average		4.1

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=7)*	*Percent of Respondents**
34i. On a scale of very satisfied to very dissatisfied, how satisfied were you with the overall program experience?	5	2	29%
	4	4	57%
	3	1	14%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	0	0%
	Average		4.1

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

Appendix C: Questionnaire for Service Provider Survey

Responses from service providers for the following questions are discussed in detail in Section 4.6.

1. How did you learn about the DCEO Retro-Commissioning Program?

2. How much interaction did you have with program staff?

3. Who do you interact with?
   ( ) DCEO staff
   ( ) SEDAC staff
   ( ) Other

4. If you had a question about the program, where do you go to find the information?

5. Was the program staff responsive and helpful?
   ( ) Yes
   ( ) No

5A. Please explain.

6. Are there any aspects of the participation process that you would recommend be modified?
   ( ) Yes
   ( ) No

7. Which main phases of the participation process would you recommended be modified?
   ( ) Application phase
   ( ) Planning phase
   ( ) Implementation phase
   ( ) Verification phase
   ( ) Other

7A. Please explain.

8. What worked well with DCEO's Retro-commissioning program?

9. What were some of the challenges with the participation process?

10. Have you received any feedback from participants about the program?
   ( ) Yes
   ( ) No

10A. Please elaborate

11. Why did you become a service provider with the DCEO Retro-Commissioning program? What are the benefits of participation?

12. Did you have a prior working relationship with any of the participants for whom you have performed retro-commissioning services in the second year of the program [EPY4 (June 2011 to May 2012)]?
    ( ) Yes
    ( ) No

12A. Please explain.

13. Before participating in the program, did you have experience performing RCx services in public sector buildings?
    ( ) Yes
    ( ) No

14. What percent of your business involves performing RCx services in public sector buildings?

15. What percent of your business involves performing RCx services in private sector buildings?

16. How often did you promote DCEO's retro-commissioning program to your public sector participants?

17. Is there anything the program could do to help you be more effective in promoting the program?

18. I have a few questions about specific retro-commissioning projects you may have completed through the DCEO Retro-Commissioning program. [Ask questions 18A through 18E for each project completed by the service provider]

18A. How likely is it that the participant would have had the same retro-commissioning services performed if the program had not been available?
    ( ) Very likely
    ( ) Somewhat likely
    ( ) Not very likely
    ( ) Not at all likely

18B. In general, how aware was the participant of the equipment performance issues identified through the retro-commissioning study PRIOR to conducting the study?
    ( ) Very aware
    ( ) Somewhat aware
    ( ) Not very aware
    ( ) Not at all aware

18C. Are there any issues that participants are typically more/less aware of?

18D. In general, how aware was the participant of the measures and/or upgrades recommended to them prior to the retro-commissioning study?

( ) Very aware
( ) Somewhat aware
( ) Not very aware
( ) Not at all aware

18E. In your opinion, why were the measures not previously implemented?

19. Have you participated in any training provided by the program?

( ) Yes (If checked, ask 19A and19B)
( ) No

19A. Was this training about how the program works or about technical aspects of completing retro-commissioning projects?

19B. How useful was the training? Could it be improved? If so, how?

20. What do you view as the main barriers to retro-commissioning as a service for public sector clients?

21. Are the barriers different for different kinds of organizations?

( ) Yes (If checked, ask 22A and 22B)
( ) No

21A. Please explain.

21B. What could be done to overcome these barriers?

22. What do you view as the main barriers to public sector clients' participation in the Retro-Commissioning Program?

23. What could be done to overcome these barriers?

24. Are there different barriers for public sector organization than for private sector organizations? [Probe for awareness, budget restrictions, timelines]

25. What do you perceive the demand to be for the services provided by the program?

26. Overall, how satisfied are you with your experiences working with the DCEO Retro-Commissioning program?

26A. Please explain

27. Do you have any recommendations on how to improve the program or the role that service providers play in the program?