Evaluation of Illinois Energy Public Sector Natural Gas Boiler Tune-Up Incentive Program

June 2011 through May 2012

Prepared for:

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Executive Summary

This report presents the results of the impact and process evaluations of the custom and standard incentive components of the Public Sector Natural Gas Boiler Tune-Up (Boiler Tune-Up) Program, a program that the Illinois state Department of Commerce and Economic Opportunity (DCEO) offers to public sector entities. This report presents results for activity during natural gas program year one (GPY1), the period from June, 2011 through May, 2012.

Data for the study were collected through review of program materials and interviews with DCEO staff members, program implementation contractor staff members, program participants, and contractors. The main features of the approach used for the evaluation are as follows:

- An analytical review of program measures was performed to verify gross savings estimates.
- In order to estimate free ridership and net savings of the program, survey-based techniques were applied to the data collected through a participant survey of decision makers.
- Relevant DCEO and University of Illinois at Chicago Energy Resources Center (ERC) program implementation staff members were interviewed to provide information for the process evaluation.

The realized gross natural gas energy savings of the Boiler Tune-Up Program during the period June, 2011 through May, 2012 are summarized in Table ES-1. Summary of Gross Therm Savings for Boiler Tune-Up Program1. During this period, gross realized natural gas energy savings totaled 1,471,958 therms, making the gross realization rate for the program 70%. The net-to-gross ratio for the program is 97%, and net realized natural gas energy savings totaled 1,422,270 therms.

Table ES-1. Summary of Gross Therm Savings for Boiler Tune-Up Program

Utility	*Expected Therm Savings*	*Realized Gross Therm Savings*	*Gross Realization Rate*	*Realized Net Therm Savings*	*Net to Gross Ratio*
Ameren	619,083	343,147	55%	342,816	100%
Nicor	633,664	557,210	88%	550,126	99%
Peoples	840,562	569,174	68%	527,118	93%
North Shore	3,968	2,427	61%	2,210	91%
Total	2,097,277	1,471,958	70%	1,422,270	97%

The following presents a selection of key findings from the program evaluation:

- **High Levels of Satisfaction:** All program participants reported that they were satisfied with the program delivery, incentive amounts, and contractors performing the work. Participants valued the information provided through the program and it is evident that the decision to perform the boiler efficiency projects was influenced by the program.

- **Effective Program Design and Delivery:** Although the program continues to develop, the initial delivery framework developed through ERC is working well. The implementation staff members have been responsive to participants' needs as new market sectors become aware of and involved in the program. The savings achieved through the program exceeded program implementation staff expectations.
- **Expected Savings were less than Realized Savings:** Realized savings were calculated using the procedures and assumptions presented in the Illinois Statewide Technical Reference Manual (TRM), which became effective after the program year concluded. Because the Illinois Statewide TRM was updated after the program began, the methodology for estimating ex ante savings differs somewhat from the ex post (TRM) methodology. As a result, the estimated savings were less than the savings calculated using the Illinois Statewide TRM methods. Program implementation staff indicated that they are now using the procedures and assumptions currently outlined in the Illinois Statewide TRM.
- **Program is Utilizing a Variety of Marketing Channels:** The Boiler Tune-Up Program is marketed using internet email communications, DCEO and partner networks, industry events, and a recently launched trade ally program. While the program has utilized a variety of marketing channels to promote the program, reaching out to public sector energy consumers and understanding their needs will be critical to future program success.
- **Market Potential:** There are large energy consumers in the public sector that have older, inefficient boilers. In particular, program staff noted that there is great savings potential in schools and universities. It was noted that schools and universities have their own facilities management staff who are aware of boiler maintenance issues. The understanding of this market potential has led implementation staff to develop marketing approaches for schools and universities that take this insight into consideration. Specifically, they are targeting their messages to improve their reception by these facility staff, as well as other market agents such as trade allies, vendors, and administrative decision makers.
- **Short Term Financial Concerns Guide Participant Decision Making:** Participant surveys indicated that the initial cost and the payback period are the primary financial considerations influencing participants' decisions about energy efficiency improvements. Furthermore, insufficient funding was the most frequently mentioned barrier to making energy efficiency improvements. These findings suggest that financial incentives are important factors in the decision to make energy efficiency improvements.
- **Increasing Awareness about Energy Efficiency:** The program is increasing awareness of boiler maintenance best practices and the benefits of energy efficiency. Half of the surveyed respondents indicated that, prior to participating in the program, they did not have boiler maintenance schedules, but have since developed them. The majority of participants also indicated that, given their experience, they would invest in energy efficiency improvements in the future. Interviews with program staff also indicate that, while facility staff and contractors have a high degree of technical acumen, the benefits of boiler and boiler room upgrades are not well known.

- **Participant Budget and Planning Processes:** Participant surveys indicate that the majority of funds used for energy efficiency projects come from maintenance and operations budgets, which are set at the beginning of the calendar year. Program staff suggested that it may be beneficial for the program year cycle to more closely align with typical participant budgeting cycles. Around the time the program year is coming to a close, public sector schools and universities are determining what they have money for and what project will be completed during the upcoming summer months.

Overall, the Boiler Tune-Up Program has been effectively implemented and is successfully delivering natural gas savings. In the interest of further program improvement, the following recommendations are offered:

- **Continue to Grow Existing Partnerships and Leverage DCEO's Network of Public Sector Participants:** DCEO has existing partnerships with entities in addition to ERC, including the Smart Energy Design and Assistance Center (SEDAC), the School of Architecture - Building Research Council at the University of Illinois, and the Midwest Energy Efficiency Alliance (MEEA). There may be opportunities for ERC to collaborate with these partners in order to identify key market segments and target specific participants that may benefit from the Boiler Tune-Up Program services and incentives.
- **Consider Multiple Year Planning Cycles:** Contract amendments and the approval time for additional funding has inevitably delayed projects and, at times, may have discouraged participation. Multiple year cycles would likely reduce the need for - or, at a minimum, would reduce the frequency of requests for - additional funding, thus reducing the delay of project completions. Additionally, multiple year planning cycles would potentially facilitate more participation by entities that have annual budgeting protocols.

  Alternatively, program staff may be able to anticipate funding short falls by carefully tracking program activity and requesting additional funding in advance of running out of funds.

1. Introduction

This report presents the results of the impact and process evaluations of the Public Sector Natural Gas Boiler Tune-Up Program (Boiler Tune-Up Program) offered by the Illinois Department of Commerce and Economic Opportunity (DCEO). This report presents results for program activity during the period June, 2011 through May, 2012.

1.1 Description of Program

The Boiler Tune-Up Program generates natural gas savings through efficiency improvements to boilers (i.e., boiler tune-ups), installation of pipe insulation, and steam trap repair or replacement. The program is available to local governments, municipal corporations, public school districts, community college districts, public universities, and state and federal facilities.

DCEO has partnered with the Energy Resources Center at the University of Illinois at Chicago to administer the Boiler Tune-Up Program. The Boiler Tune-Up Program was piloted during natural gas program year one (GPY1) and has since been included in DCEO's energy efficiency program portfolio. Incentives are available to encourage public sector operators of natural gas boilers to invest in efficiency improvements made by a qualified contractor. Boilers must be larger than 200,000 Btu/h to qualify for the program. The incentives available during GPY1 are described as follows:

- Incentives of $0.75 per kBtu/h for boiler tune-ups with a cap of $1,500. Tune-up incentives are available every 36 months.
- Incentives for steam trap repair or replacement for traps that are leaking. Leak detection can be performed using a pyrometer, ultrasound, or a visual inspection. The incentive levels range between $100 and $300 per steam trap. Steam trap replacements included under a scheduled maintenance program are not eligible for the incentives.
- Incentives for pipe insulation are available for missing or defective pipe insulation, but new pipes are not eligible. The level of the incentive is dependent on the pipe size, specifically:
  - $4 per foot for pipes of less than 1 inch in diameter;
  - $5 per foot for pipes of 1 ¼ to 2 inches in diameter;
  - $8 per foot for pipes of 2 ½ to 5 inches in diameter; and
  - $10 per foot for pipes larger than 5 inches in diameter.

Applicants for large projects are required to receive preapproval prior to beginning the project. Preapproval is required if any of the following conditions are met:

- Total requested incentives exceed $10,000;
- Total estimated number of failed steam traps exceeds 30; or
- Total estimated pipe insulation exceeds 300 linear feet.

Participants may also seek preapproval if they wish to confirm that they are eligible for the program or reserve incentive funds.

1.2 Expected Therm Savings

Expected therm savings by program are shown in Table 1-1. There were 46 incentive projects during the period June, 2011 through May, 2012, which were expected to provide savings of 2,097,277 therms annually.

Table 1-1 Expected Therm Savings for Tune-Up Program

Utility	*Expected Therm Savings*
Ameren	619,083
Nicor	633,664
Peoples	840,562
North Shore	3,968
Total	2,097,277

1.3 Overview of Evaluation Approach

The overall objective for the impact evaluation of the Boiler Tune-Up Program was to determine both the gross and net natural gas energy savings resulting from custom and standard projects during the period June, 2011 through May, 2012.

The approach for the impact evaluation was based on the following 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 through 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.

1.4 Organization of Report

This report on the impact and process evaluation of the Boiler Tune-Up 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 resulting from the program evaluation.
- Appendix A provides a copy of the questionnaire used for the survey of participant decision makers.
- Appendix B presents the results of the survey of participant decision makers for participants that received incentives under the program.

2. Estimation of Gross Savings

This chapter addresses the estimation of gross therm savings resulting from measures implemented in participants' facilities that obtained incentives under the Public Sector Natural Gas Boiler Tune-Up Program (Boiler Tune-Up Program) during the period June, 2011 through May, 2012. Section 2.1 describes the methodology used for estimating gross savings. Section 2.2 presents the program's gross realized natural gas energy savings.

2.1 Methodology for Estimating Gross Savings

The methodology used for estimating gross savings is described in this section.

2.1.1 Review of Documentation

The DCEO's program implementation contractor, University of Illinois at Chicago Energy Resources Center (ERC), provided documentation pertaining to the projects completed during the program year. The first step in the evaluation effort was to review this documentation and other relevant program materials..

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, databases, reports, billing system data, weather data, and any other potentially useful data.

2.1.2 Analytical Desk Review

If there was uncertainty regarding a project or seemingly incomplete project documentation, ADM staff contacted the implementation contractor to seek further information to ensure the development of accurate estimates of realized natural gas energy savings.

Evaluation staff reviewed the natural gas energy savings algorithms to verify that the assumptions were reasonable and that the algorithm was correct for assigning *ex ante* gross therm savings per measure, and aligned with the methodologies outlined in the Illinois Statewide Technical Reference Manual (TRM). ADM reviewed and verified the mathematical soundness of the savings calculations for each measure. Measure algorithm inputs were verified with the information provided by ERC. The calculations were checked to ensure that the reported results could be replicated. Once the calculation methods were verified, the reasonableness of the calculation was assessed. The assessment of reasonableness of the savings estimates was based on a comparison of the expected savings against the Illinois Statewide TRM deemed savings tables for the given measures, as well as against ADM's own engineering calculators for similar measures.

ADM calculates annual natural gas energy savings of each boiler tune-up per the following formula that is given in the Illinois TRM:

$$\Delta therms = Ngi * SF * EFLH/(Effpre * 100)$$

Where,

Ngi	=	*Boiler gas input size (kBTU/hr)*
SF	=	*Savings factor. Savings factor is the percentage reduction in gas consumption as a result of the tune-up. ADM applies 1-(Eff_{Pre}/Eff_{Post}) as the SF.*
EFLH	=	*Equivalent full load hours of heating per TRM*[1]
Eff_{pre}	=	*Boiler Combustion Efficiency Before Tune-Up*
Eff_{post}	=	*Boiler Combustion Efficiency After Tune-Up*

ADM calculates annual natural gas energy savings of each steam trap replacement or retrofit per the following formula that is given in the Illinois TRM:

$$\Delta therms = S * (Hv/B) * Hours * A * L / 100{,}000$$

Where,

S	=	*Maximum theoretical steam loss per trap*[2]
HV	=	*Heat of vaporization of steam*[3]
B	=	*Boiler efficiency, 0.8 or custom*
Hours	=	*Custom hours or TRM hours*[4]
A	=	*Adjustment factor, 50%*
L	=	*Leakage and blow through (1 if one trap, or TRM value)*

ADM calculates annual natural gas energy savings of pipe insulation per linear foot installed using the following formula that is given in the Illinois TRM:

$$\Delta therms = t * (Qp - Qi)/100{,}000 * Eb$$

Where,

t	=	*annual operating time, in hours*
Qp	=	*Heat loss from bare pipe (Btu/hr/ft)*[5]
Qi	=	*Heat loss from insulated pipe (Btu/hr/ft)*[6]

[1] From Illinois TRM, pg. 155. Equivalent full load hours for heating were developed using eQuest models for various building types averaged across each climate zones for Illinois for the following building types: office, healthcare/clinic, manufacturing, lodging, high school, hospital, elementary school, religious/assembly, restaurant, retail, college and warehouse. eQuest models were those developed for IL lighting interactive effects.

[2] From Illinois TRM, pg. 207

[3] Ibid., pg. 208.

[4] Ibid., pg. 209.

[5] From Illinois TRM revision #2, pg. 15.

[6] Ibid.

Eb	=	*Efficiency, fraction from 0 to 1.0 (equivalent to 0% to 100% efficiency) of the boiler being used to generate the hot water or steam in the pipe, 0.8 or custom*
100,000	=	*Conversion factor (1 therm = 100,000 Btu)*

2.2 Results of Gross Savings Estimation

To estimate program gross therm savings, data were obtained and analyzed for 46 projects. The data were analyzed using the methods described in Section 2.1 to calculate project natural gas energy savings and to determine the program gross realization rate. The results of that analysis are reported in this section.

2.2.1 Realized Gross Therm Savings

Ex post, realized natural gas energy savings of the Boiler Tune-Up Program are provided in Table 2-1. Savings are reported by utility and measure type.

Table 2-1 Realized Savings by Utility and Measure Type

Utility	*Boiler Tune-Up*	*Steam Traps*	*Pipe Insulation*	*Total*
Ameren	3,704.85	174,031.56	165,411.04	343,147.46
Nicor	79,140.68	475,782.54	2,286.50	557,209.72
Peoples	469,833.89	n/a	99,340.17	569,174.06
North Shore	2,427.21	n/a	n/a	2,427.21
Total	555,106.62	649,814.11	267,037.72	1,471,958.45

Table 2-2 displays the expected and realized therm savings for the Boiler Tune-Up Program by measure type. Realization rates for steam traps were significantly greater than for boiler tune-ups and pipe insulation.

Table 2-2 Expected and Realized Gross Savings by Measure Type

Measure Type	*Expected Therm Savings*	*Realized Gross Therm Savings*	*Realization Rate*
Boiler Tune-Up	907,489	555,107	61%
Steam Traps	747,755	649,814	87%
Pipe Insulation	442,033	267,038	60%
Total	2,097,276.81	1,471,958.45	70%

2.2.2 Discussion of Gross Savings Analysis

ADM reviewed all project documentation to assess the reasonableness of ex ante therm savings. Ex ante savings figures for each measure were checked against the values and equations outlined in the Illinois Statewide TRM.

Expected natural gas energy savings for pipe insulation measures were based on outputs developed using a free software program offered by the North American Insulation Manufacturers Association (NAIMA), called 3E Plus. ADM reviewed the values for heat loss for both insulated and uninsulated pipes, annual operating hours, and efficiency percentages as presented in the 3E Plus output forms. ADM was not able to replicate the expected savings estimates for this measure using the data for the requisite variables (heat loss, annual hours of use, efficiency percentage) from the 3E Plus output forms using the calculation methodology outlined in the TRM. It is unclear what methodology the 3E Plus program uses to calculate natural gas energy savings for pipe insulation. Due to the uncertainty and variability of the heat loss variable for each length of pipe insulation presented in these output forms, ADM used the deemed values for insulated and bare pipe heat loss as given in the TRM, while using the more accurate annual hours of use and efficiency values as reflected in the 3E Plus outputs.

The difference between expected and realized gross natural gas energy savings of boiler tune-ups and steam traps is due to inconsistent calculation methodologies. ADM communicated this issue program staff, and ex ante savings methodologies have been updated to be consistent with those currently outlined in the Illinois TRM.

3. Estimation of Net Savings

This chapter reports the results of estimating the net impacts of the Public Sector Natural Gas Boiler Tune-Up Program (Boiler Tune-Up Program) during the period 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 Boiler Tune-Up Program that were net of free ridership. Information collected from a sample of program participants through a participant survey was used for the net savings analysis. 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 [implement the project] without the assistance from the Public Sector Natural Gas Boiler Tune-up 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 financial assistance from the Boiler Tune-Up Program to undertake a project, 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 implement a measure even without support from the program;

- Influence that the program had on the decision to implement a measure; and
- A participant's previous experience with a measure implemented under the program.

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 implement an energy efficiency measure 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 [implement the project] before finding out about the Public Sector Natural Gas Boiler Tune-up Program?" and "Would you have gone ahead with the [project implementation] even if you had not participated in the program?"
- The respondent answered "definitely would have" to the following question: "If the financial incentives from the Public Sector Natural Gas Boiler Tune-up Program had not been available, how likely is it that you would have [implemented the project] anyway?"
- The respondent answered "no" in response to the following question: "Did the availability of information and financial incentives through the Public Sector Natural Gas Boiler Tune-up Program affect the timing of the [project implementation]?"

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 [implement the project] before finding out about the Public Sector Natural Gas Boiler Tune-up Program?" and "Would you have gone ahead with the [project implementation] 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 financial incentives from the Public Sector Natural Gas Boiler Tune-up Program had not been available, how likely is it that you would have [implemented the project] anyway?"

- Either the respondent answered "no" in response to the following question: "Did the availability of information and financial incentives through the Public Sector Natural Gas Boiler Tune-up Program affect the timing of the [project implementation]?" or the respondent indicated that that while program information and financial incentives did affect the timing of equipment purchase and installation, in the absence of the program they would have purchased and installed the equipment within the next two years.

The second factor required determining if a participant reported that a recommendation from a Tune-up Program representative or past experience with the program was influential in the decision to implement a project.

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

- The respondent answered "very important" to the following question: "How important was previous experience with the programs in making your decision to [implement the project]?
- The respondent answered "yes" to the following question: "Did a Public Sector Natural Gas Boiler Tune-up Program or other DCEO representative recommend that you [implement the project]?"

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 Public Sector Natural Gas Boiler Tune-up Program, did you [implement the same measure as was implemented under the program]?"
- 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 Implement Measure without Tune-up Program? (Definition 1)	*Had Plans and Intentions to ImplementMeasure without Tune-up Program? (Definition 2)*	*Tune-up Program had influence on Decision to Implement Measure?*	*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 Boiler Tune-Up Program for the period June, 2011 through May, 2012.

3.2.1 Realized Net Therm Savings

The data used to assign free ridership scores were collected through a participant survey of 8 participant decision makers for projects completed during the period June, 2011 through May, 2012. Individual free ridership rates were estimated for the program.

Table 3-2 shows percentages of total realized gross natural gas energy savings that are associated with different combinations of free ridership indicator variable values. Sixty percent of the savings is associated with respondents who indicated that their organization was financially unable to implement the project in the absence of the program incentive.

Table 3-2 Estimated Program Free Ridership

Had Plans and Intentions to ImplementatMeasure without Tune-up Program? (Definition 1)	*Had Plans and Intentions to Implementat Measure without Tune-up Program? (Definition 2)*	*Tune-up Program had influence on Decision to Implement Measure?*	*Had Previous Experience with Measure?*	*Percentage of Total Realized Gross Therm Savings*	*Free Ridership Score*
Y	Y	N	Y	3.4%	100%
N	N	N	N	1.4%	100%
N	Y	Y	N	35.2%	100%
Required program incentive to implement measures.				60.0%	0%
Total				100.0%	

The realized natural gas energy savings of the Boiler Tune-Up Program during the period June, 2011 through May, 2012 are summarized in Table 3-3. During this period, realized net natural gas energy savings totaled 1,422,270 therms. The net to gross ratio is 97%.

Table 3-3 Summary of Program Natural Gas Energy Savings

Utility	*Expected Therm Savings*	*Realized Gross Therm Savings*	*Gross Realization Rate*	*Realized Net Therm Savings*	*Net to Gross Ratio*
Ameren	619,082.70	343,147.46	55%	342,815.84	100%
Nicor	633,664.25	557,209.72	88%	550,125.71	99%
Peoples	840,561.86	569,174.06	68%	527,118.46	93%
North Shore	3,968.00	2,427.21	61%	2,209.94	91%
Total	2,097,276.81	1,471,958.45	70%	1,422,269.94	97%

4. Process Evaluation

This chapter presents the results of the process evaluation for the Public Sector Boiler Tune-Up Program (Boiler Tune-Up Program) during natural gas program year one (GPY1). 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 and interviews and surveys of program participants and program tracking data.

The chapter begins with a discussion of the overall progress of the program. This is 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 the interviews of participant participants and program staff. The information in this chapter provides insight into 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 may be 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 operating year, and to identify potential program improvements that may prospectively increase program efficiency or effectiveness in terms of participant participation and satisfaction levels. This process evaluation was designed to document the operations and delivery of the Boiler Tune-Up Program during the natural gas program year one (GPY1).

Key research questions to be addressed by this evaluation of GPY1 activity include:

- Is the Boiler Tune-Up Program effectively reaching participants and meeting their energy efficiency needs?
- Is the program incentive appropriately structured to encourage participants to make energy efficiency improvements?
- Did the Boiler Tune-Up Program reduce barriers to increased energy efficiency project implementation?

During the evaluation, data and information from numerous sources are analyzed to achieve the stated research objectives. Insight into the participant experience with the Boiler Tune-Up Program is developed from an online survey of program participants. The program operations perspective is developed from interviews with program staff at DCEO and their implementation partner Energy Resources Center.

4.2 Summary of Primary Data Collection

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 Boiler Tune-Up Program. Respondents report on their satisfaction with the program, detail their motivations and the factors affecting their decision making process, and provide recommendations related to improving the program. Interviews with program staff provide insight into how the program developed, who it's indented to reach, and challenges faced.

4.3 Summary of Conclusions and Recommendations

Interviews and surveys were conducted with participants and program staff to better understand the effectiveness of program delivery. Overall, the findings suggest that the program is operating effectively in delivering natural gas savings. Participants reported high satisfaction with the program, and the program activity was greater than anticipated.

The following presents a selection of key findings from the program evaluation:

- **High Levels of Satisfaction:** All program participants reported that they were satisfied with the program delivery, incentive amounts, and contractors performing the work. Participants valued the information provided through the program and it is evident that the decision to perform the boiler efficiency projects was influenced by the program.
- **Effective Program Design and Delivery:** Although the program continues to develop, the initial delivery framework developed through ERC is working well. The implementation staff members have been responsive to participants' needs as new market sectors become aware and involved in the program. The savings achieved through the program exceeded program implementation staff expectations.
- **Expected Savings were less than Realized Savings:** Realized savings were calculated using the procedures and assumptions presented in the Illinois Technical Reference Manual (TRM), which became effective after the program year concluded. Because the TRM was updated after the program kicked off, the methodology for estimating ex ante savings differs somewhat from the ex post (TRM) methodology. As a result, the estimated savings were less than the savings calculated using the TRM methods. Program implementation staff indicated that they are now using the procedures and assumptions currently outlined in the TRM.
- **Program is Utilizing a Variety of Marketing Channels:** The Boiler Tune-Up Program is marketed using internet email communications, DCEO and partner networks, industry events, and a recently launched a trade ally program. While the program has utilized a variety of marketing channels to promote the program, reaching out to public sector energy consumers and understanding their needs will be critical to future program success.
- **Market Potential:** There are large energy consumers in the public sector that have older, inefficient boilers. In particular, program staff noted that there is great savings potential in schools and universities. Program implementation staff noted that these entities have their

own facilities management staff and that they are aware of boiler maintenance issues. The understanding of this market potential has led implementation staff to develop marketing approaches for schools and universities that take this insight into consideration. Specifically, they are targeting their messages to improve their reception by these facility staff, as well as other market agents, such as trade allies, vendors, and administrative decision makers.

- **Short Term Financial Concerns Guide Participant Decision Making:** Participant surveys indicated the initial cost and payback period are the primary financial considerations influencing participants' decisions about energy efficiency improvements. Furthermore, insufficient funding was the most frequently mentioned barrier to making energy efficiency improvements. These findings suggest that the financial incentives are important in the efficiency improvement decision making process.
- **Increasing Awareness about Energy Efficiency**: The Program is increasing awareness about boiler maintenance best practices and the benefits of energy efficiency. Half of the surveyed respondents indicated that, prior to participating in the program, they did not have boiler maintenance schedules but have since developed them. The majority of participants also indicated that, given their experience, they would invest in energy efficiency improvements in the future. Interviews with program staff also indicate that, while facility staff and contractors have a high degree of technical acumen, the benefits of boiler and boiler room upgrades are not well known.
- **Participant Budget and Planning Processes:** Participant surveys indicate that the majority of funds used for energy efficiency projects come from maintenance and operations budgets, which are set at the beginning of the calendar year. Program staff suggested that it may be beneficial for the program year cycle to more closely align with typical participant budgeting cycles. As the program is coming to a close, public sector schools and universities are determining what they have money for and what project will be completed during the upcoming summer months.

Overall, the Boiler Tune-Up Program has been effectively implemented and is successfully delivering natural gas savings. In the interest of further program improvement, the following recommendations are offered:

- **Continue to Grow Existing Partnerships and Leverage DCEO's Network of Public Sector Participants:** DCEO has existing partnerships with partner entities in addition to ERC, including the Smart Energy Design and Assistance Center (SEDAC), the School of Architecture - Building Research Council at the University of Illinois, and the Midwest Energy Efficiency Alliance (MEEA). There may be opportunities for ERC to collaborate with these partners in order to identify key market segments and target specific participants that may benefit from the Boiler Tune-Up Program services and incentives.
- **Consider Multiple Year Planning Cycles:** Contract amendments and the approval for additional funding has inevitably delayed projects and at times, may have discouraged participation. Multiple year cycles would likely reduce the need, or at a minimum, reduce the frequency of requests for additional funding, and therefore reduce the delay of project

completions. Additionally, multiple year planning cycles would potentially facilitate more participation by entities that have annual budgeting protocols.

Alternatively, program staff may be able to anticipate funding short falls by carefully tracking program activity and requesting additional funding in advance of running out of funds.

4.4 Public Sector Boiler Tune-Up Program Participant Profile

Table 4-1 presents the number of projects completed, the average incentive amount, and the expected therm savings by measure type for projects completed through the Boiler Tune-Up Program. The average incentive amount was highest for pipe insulation ($17,615) followed by steam traps ($14,682), and boiler tune-ups ($5,809). Expected savings were greatest for steam traps (83,084 therms) followed by pipe insulation (63,148 therms) and boiler tune-ups (32,410 therms).

Table 4-1 Summary of Program Activity by Measure Type

Measure	*Number of Projects*	*Average Incentive Amount*	*Average Expected Therm Savings*
Boiler Tune-Up	28	$5,809	32,410
Steam Traps	9	$14,682	83,084
Pipe Insulation	7	$17,615	63,148

The share of projects completed by different types of public sector organizations is shown in Figure 4-1. K-12 schools accounted for more than half of the projects (52%) completed through and universities accounted for another 20% of projects.

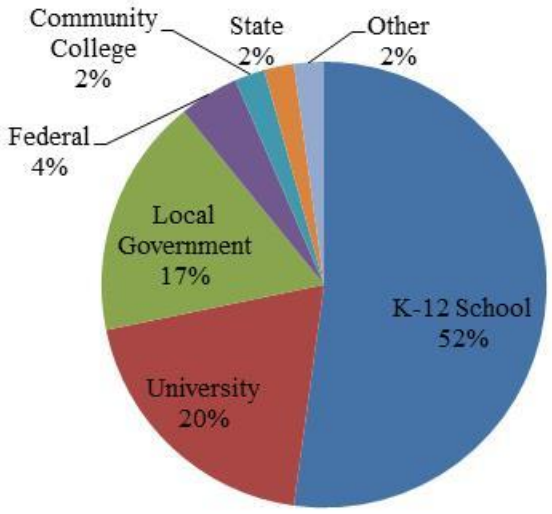

Figure 4-1 Projects by Participant Type

Figure 4-2 displays the share of realized therm savings by participant type. Universities accounted for a disproportionately large share of the savings relative to the number of projects completed. Although universities accounted for 20% of the projects completed, they accounted for 50% of the savings. K-12 schools accounted for 39% of the realized savings. All other participant types accounted for 11% of realized savings.

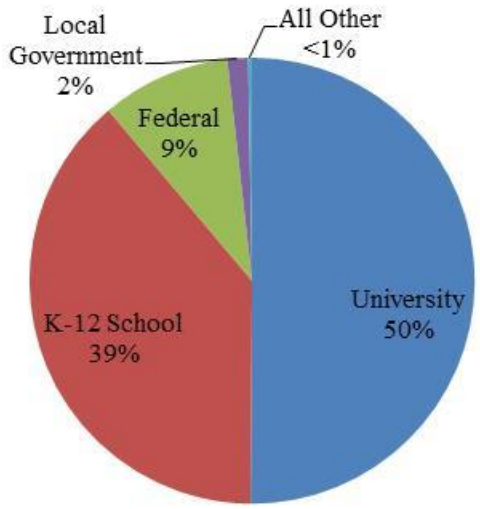

Figure 4-2 Distribution of Therm Savings by Participant Type

4.5 Participant Outcomes

An online survey was conducted to collect data about participant decision-making, preferences, and opinions of the Public Sector Boiler Tune-Up Program (Boiler Tune-Up Program). During GPY1, the program offered incentives for boiler tune-ups, steam trap replacement or repair, and pipe insulation. 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 Boiler Tune-Up 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 4-2 displays the ways in which survey respondents reported learning about the Public Sector Boiler Tune-Up Program. Nearly all respondents (88%) indicated that they learned about the program via vendors or building contractors. The DCEO website was the second most commonly means of hearing about the program.

Table 4-2 How Participant Decision Makers Learned about the Program

	Response	*Percentage of Respondents* (n=8)*
How did you learn of the Public Sector Natural Gas Boiler Tune-Up Program?	Equipment vendors or building contractors	88%
	The DCEO website	25%
	Approached directly by a representative of the Public Sector Natural Gas Boiler Tune-Up Program	13%
	Received an information brochure on the Public Sector Natural Gas Boiler Tune-Up Program	13%
	From a Smart Energy Design Assistance Center (SEDAC) representative	13%
	Past experience with the program	13%

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

Survey respondents were asked when they heard about the program relative to their planning and completion of the boiler tune-up measures. As shown in Table 4-3, 63% of respondents learned about the program before planning their tune-up and 38% learned of it during the planning stage of the tune-up.

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

	Response	*Percentage of Respondents (n=8)*
When did you learn of the Public Sector Natural Gas Boiler Tune-Up Program?	Before planning the [Project Description]	63%
	During your planning for the [Project Description]	38%
	Once a plan to [Project Description] was established, but before it was completed	-
	After completing the [Project Description]	-
	Don't know	-
	Some other time	-

4.5.2 Factors Affecting Participant Participation

Participants were asked about the influence of the Boiler Tune-Up Program on their decision to complete the tune-up projects. Participants were asked these questions for each type of Boiler Tune-Up Program project they completed, that is, boiler tune-up, pipe insulation, or steam trap replacement or repair. Consequently, the number of responses to these questions exceeds the number of participants and the percentages reflect that participants may have been asked the same questions multiple times for different types of measures they implemented.

Participants reported that they had plans to implement 56% of the projects prior to participating in the program and the participants with prior plans reported that they would have completed the projects had they not participated in the program. Although these respondents suggested that they would have completed the projects had they not participated in the program, the program may have still influenced the scope, timing, and level efficiency of the measures chosen. 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 plans to implement a project were asked for how long they had their plans. As shown in Table 4-4, 40% of participants stated that they had their plans for more than one year, suggesting that while they had prior plans to complete the projects, the availability of incentives may have made their implementation feasible.

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

	Response	*Percent of Responses (n=5)*
For about how long have you had plans to implement these measures prior to finding out about the program?	Less than 6 months	40%
	6-12 months	20%
	1-2 years	20%
	3-5 years	-
	More than 5 years	20%
	Don't know	-

In order to gather further information about what motivated participants to participate in the program, participants were asked whether the measure was recommended to them by a representative of the program or DCEO, or by its partner SEDAC. Respondents indicated that for one of the projects implemented, a Boiler Tune-Up Program or other DCEO representative had recommended the measures implementation. However, the respondent indicated that the project would have been completed without the recommendation. Similarly, respondents indicated that one of the projects was recommended by a representative of DCEO's partner the Smart Energy Design Assistance Center (SEDAC), although the respondent indicated that the project would have been completed without the recommendation. The lack of influence of recommendations provided by program staff and DCEO partners on tune-up projects is likely due to program staff primarily relying upon vendors promoting the program during the initial period of program operations. Since that period, program staff has been more involved in directly promoting the program and have worked on strengthening ties with DCEO's program partners at SEDAC and the School of Architecture at the University of Illinois.

In cases where decision makers reported that they had prior plans for the projects, the scope and timing of the project may have been influenced by the Boiler Tune-Up Program. Table 4-5 cross-tabulates the respondents who indicated that these factors were significantly affected by the program with whether the participant had plans to implement measures before participating. For the projects that respondents reported having plans to implement the measure before participating in the program, 80% stated that the quantity of implemented units increased because of the program. Additionally, 80% of the projects were implemented earlier than they otherwise would have been. These findings indicate that even when participants were already planning to complete the boiler tune-up projects, a large percentage of them would have completed a project of reduced scope or completed the project later if they had not participated in the program.

Table 4-5 Reported Program Influences on Implementation Factors by Whether There Were Plans to Implement Project

Program Influence on Projects	*Number of Responses*	*Had plans to implement measure before participating*
Increased quantity of implemented measures	4	80%
Implemented measures/measure earlier than otherwise would have	4	80%

4.5.3 Energy Efficiency Attitudes and Decision Making

Survey respondents were asked to rate the importance of several factors in their decision making process regarding energy efficiency improvements. Table 4-6 shows that all three factors were predominantly rated as "very important" by survey respondents and none were rated as "not important at all." All of the respondents stated that incentive payments from DCEO were "very important," while 88% rated their past experience with energy efficient measures and practices as "very important." When asked to rate the advice or recommendations they had received from DCEO, the distribution of responses varied somewhat more than for the other factors. The majority of respondents rated the advice as "very important" (63%), while the remaining respondents rated it "somewhat important" (25%) or "only slightly important" (13%).

Table 4-6 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*
Financial incentive payments from DCEO	100%	-	-	-	-	8
Past experience with energy efficient measures	88%	13%	-	-	-	8
Advice or recommendations received from DCEO	63%	25%	13%	-	-	8

Participants were asked what kinds of energy efficiency policies and activities their organizations have in place. Table 4-7 displays their responses. The largest share of respondents, 50%, said they did not have any energy efficiency policies in place. Additionally, one-quarter of respondents reported having policies that incorporate energy efficiency in operations and procurement, and one-quarter cited active training of staff as a strategy to control energy consumption.

Table 4-7 Energy Efficiency Policies and Activities

	Response	*Percentage of Respondents* (n=8)*
Which of the following policies or resources does your organization have in place regarding energy efficiency improvements at this facility?	Do not have policies or procedures for energy efficiency improvements	50%
	Policies that incorporate energy efficiency in operations and procurement	25%
	Active training of staff	25%
	An energy management plan	13%
	A staff member responsible for energy and energy efficiency	13%
	Other	13%

**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 4-8, most respondents indicated that they had completed energy efficiency projects in the last three years and about half of these respondents had not applied for an incentive. Specifically, 43% stated that they had completed energy efficiency projects but did not apply for an incentive, while another 43% had completed those types of projects and did apply for incentives. One respondent reported that their organization had not completed any energy efficiency projects over the last three years.

The three respondents who had completed projects but did not apply for an incentive were asked why they did not apply: 67% reported that they did not know whether the project qualified for any financial incentives and 33% cited too much paperwork involved for the incentive application. All three respondents who had completed projects and applied for an incentive reported that they had received all their incentives for these past projects.

Table 4-8 Incentives for Previous Measures Purchased

	Response	*Percentage of Respondents (n=7)*
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?	Yes, completed energy efficiency projects but did not apply for incentive.	43%
	No projects were completed by the organization.	14%
	No, an incentive was applied for.	43%
	Don't know	-

4.5.4 Barriers to Energy Efficiency Improvements and Purchasing Processes

The literature on public sector decision making and procurement of energy efficient measures identifies a number of barriers to purchasing and implementing energy efficiency measures. 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

measures, 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.[7]

Some of these barriers were identified by participants in the Public Sector Energy Efficiency Program, as shown in Table 4-9. By far the most frequently mentioned barrier was insufficient funding to make the improvements, which all of the respondents indicated was a barrier. Approval processes that slow down or make purchasing difficult was cited as a barrier by one-half of the respondents. Current equipment that is too new to replace, lack of information on energy efficiency improvements, schedules that dictate when equipment is to be replaced or maintained, and incentive program time requirements were also identified as barriers by survey respondents. One participant stated that another barrier, other than those listed, was the time it takes to write grant proposals.

Table 4-9 Barriers to Making Energy Efficiency Improvements

	Response	*Percentage of Respondents* (n=8)*
What barriers does your organization face in making energy efficiency improvements?	Insufficient funding for improvements	100%
	Approval processes that are slow or make purchasing difficult	50%
	Current equipment is too new to be replaced with more efficient equipment	25%
	Lack of information on energy efficient equipment and practices	13%
	Schedules that dictate when equipment is to be replaced or maintained regardless of efficiency levels	13%
	Incentive program time requirements	13%
	Other	13%
	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%.*

[7] *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.

When asked what their organization's approval process for equipment purchases was, most participants (88%) stated that the process depends on the amount of the purchase, as shown in Table 4-10. Additionally, 63% stated that they follow procurement rules specific to their organization, while 25% stated that there are state or federal procurement guidelines that they follow. Thirty-eight percent of respondents indicated that an open bid was required and the remaining 25% said that they were required to select the lowest bidder.

Table 4-10 Respondent Approval Processes for Equipment Purchases

	Response	*Percent of Respondents* (n=8)*
What is the approval process for maintenance expenditures or equipment purchases in your organization?	Depends on the amount of purchase	88%
	Follow procurement rules specific to our organization	63%
	An open bid is required	38%
	Required to select lowest bidder	25%
	Follow state or federal procurement guidelines	25%
	Use a specific vendor	-
	Don't know	-
	Other	-

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

Nearly two-thirds of respondents stated that funds for energy efficiency improvements are taken from the operation and maintenance budget, while approximately one-third stated that the funds come through a capital request.

Table 4-11 How Energy Efficiency Improvements are Funded

	Response	*Percent of Respondents* (n=8)*
How does your organization fund energy efficiency improvements?	Funds are taken from operation and maintenance budget	63%
	Through a capital request	38%
	Dedicated funding for energy efficient projects	-
	Other	25%

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

Participants who indicated that they fund energy efficiency improvements through a capital request were asked if there was a specific dollar threshold that determined when a project required a capital request. Two respondents stated that there was a dollar threshold for determining if a project requires a capital request while one respondent stated that all projects

require a capital request. The two respondents who indicated that there was a dollar threshold stated that the thresholds were $5,000 and $30,000, respectively.

Two respondents provided a length of time required for a capital approval request. One respondent stated that the process took three months and the other said the time could take from between one week to a month.

Survey respondents were asked whether or not they are able to utilize incentive payments to fund additional energy efficiency improvements or other facility improvements. Approximately one-third (38%) stated that they were able to use the incentive payments to fund additional facility improvements. Another 50% stated that the payments return to the facility general operating fund and 13% stated that the incentive payments go into the state general revenue fund. Regardless of how incentive payments are used, all respondents indicated that incentives were very important to their decisions about making energy efficiency improvements.

Table 4-12 Utilization of Incentive Payments

	Response	*Percent of Respondents (n=8)*
Is your organization able to utilize incentive or grant payments you receive for energy efficiency improvements, or are the payments placed in a general fund?	We are able to use the incentive payments for additional facility improvements including additional energy efficiency improvements	38%
	Incentive payments return to the facility general operating fund	50%
	Incentive payments go into the state general revenue fund	13%
	Don't know	-
	Other	-

4.5.5 The Decision Makers

Table 4-13 below shows that the majority of survey respondents (63%) reported that one or two key people in their organization decide how to make energy efficient improvements at their facility. One-quarter of respondents indicated that these decisions are based on staff recommendations to a decision maker.

Table 4-13 Decision Maker Characteristics

	Response	*Percent of Respondents (n=8)*
How does your organization decide to make energy efficiency improvements for this facility?	Made by one or two key people	63%
	Based on staff recommendations to a decision maker	25%
	Made by a group or committee	13%
	Made in some other way	0%

4.5.6 Where Decision Makers Get Their Information

Respondents were asked whom they rely on for information about energy efficient equipment, materials, practices, and design features. Table 4-14 below shows that they most often cited equipment vendors or building contractors as a source of information (50% of respondents). Other frequently reported sources for information were a DCEO representative, the Smart Energy Design Assistance Center, and a utility representative (38% of respondents cited each source). These results suggest that respondents count on multiple sources to obtain energy efficiency information, but that vendors and contractors, program implementers, and their utility companies are key sources. It is noteworthy that 38% of participants reported relying upon the Smart Energy Design Assistance Center (SEDAC) for information about energy efficiency improvements. This finding suggests that program plans to improve promotion of the program by increasing ties with SEDAC may pay off in additional program activity.

Table 4-14 Who Respondents Rely on for Information

	Response	*Percentage of Respondents* (n=8)*
What are the main sources your organization relies on for information about energy efficient equipment, materials, practices, and design features?	Equipment vendors or building contractors	50%
	A DCEO representative	38%
	The Smart Energy Design Assistance Center (SEDAC)	38%
	A utility representative	38%
	An architect, engineer, or energy consultant	25%
	The DCEO website	13%
	Trade associations or business groups you belong to	13%
	Trade journals or magazines	13%
	The Energy Resource Center (ERC)	-
	Brochures or advertisements	-
	Friends and colleagues	-
	Other	-

**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 Financial Methods used by Decision Makers

Survey respondents were asked about the financial methods used by their organization to determine the economic feasibility of energy efficiency improvements at their facilities. Table 4-15 below shows the two most common methods reported were the initial cost of the equipment and simple payback (75% of respondents for each). The respondents who reported using simple payback were asked what payback period of time they require in order to proceed with an energy efficiency project. Five of the six respondents that used simple payback to evaluate efficiency projects provided further information on the length of payback period that they require. Although the average payback period reported was 3.1 years, three of the respondents stated that they require relatively longer term payback periods of four or five years. In contrast, one respondent indicated that their organization requires a payback period of less than one year and that they are dependent on grant funds. The last respondent said they require a payback period of one to two years.

Table 4-15 Financial Methods Used to Evaluate Efficiency Improvements

	Response	*Percentage of Respondents (n=8)**
Which financial methods does your organization typically use to evaluate energy efficiency improvements for this facility?	Initial Cost	75%
	Simple payback	75%
	Life cycle cost	38%
	Internal rate of return	25%
	None of these	0%

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

The financial methods used to evaluate energy efficiency projects emphasize the relatively short-term financial concerns and objectives of program participants. Most participants used the initial cost or a payback period of less than five years to evaluate efficiency projects. In contrast, fewer participants reported that their organizations use longer term criteria such as the life cycle cost, which consider costs relatives to the savings over the lifetime of the improvement.

4.5.8 Participant Satisfaction with the Program

Survey respondents were asked to rate their level of satisfaction with the program. Table 4-16 shows that respondents were satisfied with all the aspects of the program, and none of the respondents stated they were dissatisfied or very dissatisfied. Satisfaction levels were highest for the performance of the energy efficiency improvements made through the program and the work performed by their contractor.

Approximately three-quarters of participants stated that they were satisfied with the incentive amount and the effort required for the application process, with the remainder reporting that they were very satisfied. In terms of program processes, the length of time required to receive incentive payments was one of the areas participants were least satisfied with. Lower satisfaction with the length of time to receive incentive payments is a common finding and it should be emphasized that none of the participants reported that they were dissatisfied with this aspect of the program.

Table 4-16 Decision Maker Satisfaction with Selected Aspects of Program Experience

Element of Program Experience	*Very satisfied*	*Satisfied*	*Neither Satisfied nor Dissatisfied*	*Dissatisfied*	*Very Dissatisfied*	*Don't Know*	*n*
Performance of the [boiler tune-up/ pipe insulation/ steam trap repair or replacement] since the project was completed	75%	25%	-	-	-	-	8
Quality of the contractor's work	50%	38%	-	-	-	13%	8
Savings on your monthly bill	25%	38%	-	-	-	38%	8
Incentive amount	25%	75%	-	-	-	-	8
The effort required for the application process	29%	71%	-	-	-	-	7
Information provided by the DCEO	25%	50%	-	-	-	25%	8
Overall program experience	29%	71%	-	-	-	-	7
Information provided by the ERC	13%	25%	13%	-	-	50%	8
The elapsed time until you received the incentive	13%	63%	25%	-	-	-	8
Information provided by SEDAC	13%	25%	25%	-	-	38%	8

Respondents were also asked whether or not the boiler tune-up project met their expectations. As shown in Table 4-17, none of the participants indicated that the boiler improvements failed to meet or only partially met their expectations.

Table 4-17 Respondent Expectations of Program

	Response	*Percentage of Respondents (n=8)*
Did the [boiler tune-up/ pipe insulation/ steam trap repair or replacement] meet your expectations?	My expectations were exceeded	38%
	My expectations were met	50%
	My expectations were mostly met	-
	My expectations were not met	-
	Don't know	13%

4.5.9 Incentives and Project Implementation

Survey respondents were asked questions regarding the receipt of incentive payments and the application process for the program. Table 4-18 below shows the percentage of respondents that said "Yes" to each question. Eighty-eight percent of respondents reported that the incentive

amount they received was what they had expected (one other respondent had responded "Don't know"). None of the respondents cited any issues with receiving the program incentive or any problems with the application process.

Table 4-18 Experience with Application and Incentive Processes

Question	*Percentage of Respondents Saying Yes*	*n*
Was the incentive amount what you expected?	88%	8
Any issues receiving the program incentive?	-	8
Any problems with the application process?	-	8

Respondent experience with the implementation of their energy efficiency improvement is summarized in Table 4-19. All respondents stated that the project implementation went smoothly. Seven of the eight respondents indicated that the contractor did a good job and the remaining respondent reported not knowing if the contractor did a good job. All of the respondents indicated that the incentive they received met their expectations. Overall, respondent feedback about project implementation was very positive.

Table 4-19 Experience with Project Implementation

Question	*Yes*	*For the most part*	*No*	*Don't know*	*n*
Did the [boiler tune-up/ pipe insulation/ steam trap repair or replacement] go smoothly?	100%	-	-	-	8
Do you feel that the contractor did a good job?	88%	-	-	13%	8
Did the incentive that you received meet your expectations?	100%	-	-	-	8

4.5.10 Boiler Tune-Up Maintenance Practices

Participants were asked about their maintenance schedule for performing boiler tune-ups, those responses are displayed below in Table 4-20. Less than half of the participants reported that they had a schedule for completing boiler tune-ups prior to participating in the program. Those participants with plans for regular maintenance indicated that they perform maintenance at intervals ranging from annually to every three years.

One-half of the participants who did not have plans to perform regular maintenance on boilers prior to participating in the program stated that they have since developed plans to perform boiler tune-ups.

Table 4-20 Maintenance Practices

Question	*Percentage of Respondents Saying Yes*	*n*
Did you have a regular maintenance schedule for performing boiler tune-ups prior to participating in the program?	43%	7
Since participating in the program, have you developed plans to have the boilers tuned-up on a regular basis?	50%	4

4.5.11 Future Energy Efficiency Plans

Table 4-21 below shows participant responses to questions about how the program may have influenced their decision making about additional energy efficiency improvements.

Two survey respondents reported that since participating in the program they had implemented additional energy efficiency projects. 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. Determining participant spillover would require verification of the measures implemented and the quantification of the savings as well as the portion of the savings attributable to the program.

Additionally, 63% of respondents stated that given their experience with the program, in the future, they would implement energy efficiency improvements even if financial incentives were not available. These findings suggest that participants' participation in the Boiler Tune-Up Program may persuade them of the benefits of making energy efficiency improvements in the future.

Table 4-21 Non-Incentivized Project Implementation

Question	*Percent of Respondents Saying Yes*	*n*
Since participating in the program, have you implemented any additional energy efficiency projects for which you did not apply or receive an incentive?	25%	8
Given your experience with the program, would you [tune-up boilers / install pipe insulation / repair or replace steam traps] in the future even if financial incentives for such projects were not being offered through a DCEO program?	63%	8

4.5.12 Participant Recommendations and Overall Impressions

At various points in the survey, respondents provided open-ended feedback about their experience with the Boiler Tune-Up Program and recommendations for improving the program. One participant suggested that the program needed to provide a contact for questions about

possible projects before submitting a request for program funding. However, the program website and application form provide telephone number and email address information for a program contact. Another participant asked for more information on other incentive programs.

One participant remarked that he or she did not have a means of measuring the effectiveness of the tune-ups. This type of remark is not uncommon in surveys of energy efficiency program participants. The effect of energy efficiency improvements on utility bills may be masked by other factors such as seasonal changes in operations. This variation in energy consumption is typically the reason why a large share of participants indicates that they do not know how satisfied they are with the impact of the efficiency improvements on their utility bills. Consistent with this, 38% of the Boiler Tune-Up Program survey respondents stated that they did not know how satisfied they were with the savings on their monthly bill.

Lastly, one respondent noted that the contractor performing the work on the boilers informed them of the program and that the contractor did a good job.

4.6 Program Operations Perspective

This section summarizes the core findings of interviews that were conducted with the Energy Resources Center (ERC) Boiler Tune-Up Program staff. The ERC is DCEO's implementation partner and is primarily responsible for the administration and development of the Boiler Tune-Up Program.

In order to gather information regarding the operational efficiency and program delivery process for the Boiler Tune-Up Program, in-depth interviews were conducted by telephone with key ERC and DCEO program staff to better understand how the program sets goals, administers program offerings, manages data, and facilitates partnerships.

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

- Considerations during Program Design: The Boiler Tune-Up Program was first piloted in June of 2011 by the Energy Resource Center (ERC) located at the University of Illinois, Chicago. The program was developed to utilize Energy Efficiency Portfolio Standard (EEPS) funds, which were eligible for gas measures beginning in 2011. ERC, with the assistance from a private strategy consultant who provided recommendations regarding appropriate eligible measures, designed the Boiler Tune-Up Program with both prospective public sector participants and contractors in mind. Due to the capital expenditures required to replace old boilers and the financial constraints on the public sector, it was determined that the program should focus on smaller measures and efficiency gains achieved through improved boiler maintenance. Natural gas program year one measures include boiler tune-ups, steam trap replacement or repair, and pipe insulation. More recently, reset controls and parallel positioning control systems (PPC) were added to the program.
- ERC and DCEO Program Staffing: Boiler Tune-Up Program staff includes one full-time staff member, one part-time intern, and two additional staff members that devote 20 to 40 percent of their time to oversight and outreach activities. The staff members are responsible for

strategic planning and marketing functions. Utilivate, a third-party contractor, manages the financial incentive process.

- Effective Communication between ERC and DCEO: ERC and DCEO staff communicates on a weekly or daily basis, primarily via email and/or telephone. Quarterly summary reports are submitted to DCEO, and an internal project tracking database, hosted by ERC, enables DCEO to access up-to-date information regarding project status, ex ante savings, budgets, and other relevant project information.
- Marketing Approach: Education of prospective participants about the potential energy efficiency benefits and the incentives available drives program participation. DCEO and ERC developed a presentation entitled "What is a Boiler Tune Up?" that DCEO and ERC staff members present at industry events or through scheduled webinars. Industry events where the presentation is delivered include trade ally rallies, trade shows, and "Lunch and Learn" sessions. At these events, program staff provides an overview of the program, details about the participation process and incentives, and information regarding potential energy and costs savings. These presentations were the primary drivers of participation during GPY1 and PY5.

  Webinar invitations are sent to the ERC and DCEO mailing lists approximately three times per year. The mailing list comprises previous DCEO program participants, near participants (those that submitted an application but did not complete a project), trade allies, and utility partners.

  ERC also leverages its extensive mailing list of approximately 7,000 recipients to provide program updates, industry happenings, and details about educational presentations and how to become involved. The ERC is also continuing to work with the Smart Energy Design Assistance Center and the School of Architecture at the University of Illinois in order to align outreach efforts and possibly augment current Boiler Tune-Up Program offerings.

  Program staff indicated that contractors and program participants highly value their relationships with the ERC and appreciate the valuable information and personal attention they receive during ERC's outreach activities
- Administrative Barriers to Participation: Program staff identified two primary barriers to participating in the Boiler Tune-Up Program: the perceived complexity of the application and the misalignment of the program planning cycle with the fiscal planning cycles of key target markets. Regarding the application requirements, program staff report that participants perceive the application as technical and cumbersome and that it requires more detailed information than they can provide. The misalignment of the program cycle with participant planning cycles is particularly problematic for schools. The program year ends in May and funds for the following year are not typically dispersed until late summer. The late summer dispersal of funds is problematic for school facilities because maintenance is typically performed during summer months.
- Planning Assumptions: Initial ERC projections indicated that the program could save approximately 826,000 therms with a budget of $400,000. These savings were estimated

using a bottom up approach in which ERC staff estimated savings based on the number and type of boiler measures that could be implemented with the available funds. By the end of the program year, the program impact was considerably higher than original projections. According to ERC program staff, the higher than expected natural gas energy savings is attributable to three key assumptions: a specified boiler size, current operating levels of the boilers, and equipment efficiency levels. Once projects were underway, it became apparent that the boilers serviced through the program were larger than what was initially anticipated, were performing at lower levels of efficiency than expected, and the savings associated with certain measures were higher than expected.

- Operational/Maintenance Concerns: Program staff indicated that a major factor indicating inefficient boiler operation is a high level of carbon monoxide (CO) being emitted from the boiler. High CO emissions suggest sub-optimal operating conditions and are a cause for concern among contractors because of the potential hazards from exhaust build-up. The age of the boilers also tends to be an issue because contractors have to be mindful not to implement measures that may strain boiler operation. Efficiency improvements may result in operational changes to boilers that create a risk for operational problems that would not have occurred otherwise.
- Additional Funding Requests Require Contract Amendments: The Boiler Tune-Up Program is currently in its early stages. Program staff have pointed out that it has been difficult to plan for participation as indicated by their underestimates of program activity. Greater than expected activity caused the program to exhaust its funds mid-way through the program year. In order to receive additional funding, an amendment to the original contract with DCEO must be requested. The time required for contract amendments and the approval of additional funding has inevitably delayed projects.
- On-Site Verification Procedures: DCEO staff manages and schedules on-site verification activity and the ERC subsequently performs it. The verification process varies depending on the size of the project. Each completed "large" project qualifies for on-site verification. Large projects are defined as projects that meet one or more of the following criteria: incentives greater than $10,000, 30 steam traps installed or repaired, or 300 linear feet of pipe insulation installed. All other projects are considered small and are verified based on analysis of boiler pre- and post-combustion data that is recorded by contractors. The combustion data is submitted in the final application for the project.
- Savings Estimation Methodologies Vary by Measure: In the beginning of GPY1, the Illinois TRM was not available to the public. Because specific methodologies were not previously specified by a TRM, natural gas energy savings were calculated using other industry standards. Boiler tune-ups were calculated according to algorithms deemed appropriate by the ERC. Energy savings from pipe insulation was calculated using a software program called 3E Plus; a commonly used industry software application. Savings resulting from steam traps were derived using an equation that includes line pressure and trap size inputs. Program staff indicated that a current version of the TRM is currently being used to calculate savings for PY5.

5. Conclusions and Recommendations

The interviews that were conducted over the course of the program cycle provided a year-to-year perspective on program operations and effectiveness. As the program developed over the course of the three years, key stakeholders provided commentary that depicted the Boiler Tune-Up Program as a continually improving process that was gaining momentum. While program participation was relatively low in the first program year, the substantial increases in completed projects during each subsequent year illustrate this momentum and suggest that changes related to program operations and awareness have taken effect. Participants and trade allies who participated in the current program year indicated that they are looking forward to future program years and to participating in additional measures. It is clear that the Boiler Tune-Up Program has taken hold as an important factor for energy efficiency in the DCEO service territory, and that there is a high potential for continued program awareness, acceptance, and participation in future years.

5.1 Key Conclusions

The following presents a selection of key findings from the program evaluation:

- High Levels of Satisfaction: All program participants reported that they were satisfied with the program delivery, incentive amounts, and contractors performing the work. Participants valued the information provided through the program and it is evident that the decision to perform the boiler efficiency projects was influenced by the program.
- Effective Program Design and Delivery: Although the program continues to develop, the initial delivery framework developed through ERC is working well. The implementation staff members have been responsive to participants' needs as new market sectors become aware and involved in the program. The savings achieved through the program exceeded program implementation staff expectations.
- Expected Savings were less than Realized Savings: Realized savings were calculated using the procedures and assumptions presented in the Illinois Technical Reference Manual (TRM), which became effective after the program year concluded. Because the TRM was updated after the program kicked off, the methodology for estimating ex ante savings differs somewhat from the ex post (TRM) methodology. As a result, the estimated savings were less than the savings calculated using the TRM methods. Program implementation staff indicated that they are now using the procedures and assumptions currently outlined in the TRM.
- Program is Utilizing a Variety of Marketing Channels: The Boiler Tune-Up Program is marketed using internet email communications, DCEO and partner networks, industry events, and a recently launched a trade ally program. While the program has utilized a variety of marketing channels to promote the program, reaching out to public sector energy consumers and understanding their needs will be critical to future program success.
- Market Potential: There are large energy consumers in the public sector that have older, inefficient boilers. In particular, program staff noted that there is great savings potential in

schools and universities. Program implementation staff noted that these entities have their own facilities management staff and that they are aware of boiler maintenance issues. The understanding of this market potential has led implementation staff to develop marketing approaches for schools and universities that take this insight into consideration. Specifically, they are targeting their messages to improve their reception by these facility staff, as well as other market agents, such as trade allies, vendors, and administrative decision makers.

- Short Term Financial Concerns Guide Participant Decision Making: Participant surveys indicated the initial cost and payback period are the primary financial considerations influencing participants' decisions about energy efficiency improvements. Furthermore, insufficient funding was the most frequently mentioned barrier to making energy efficiency improvements. These findings suggest that the financial incentives are important in the efficiency improvement decision making process.
- Increasing Awareness about Energy Efficiency: The Program is increasing awareness about boiler maintenance best practices and the benefits of energy efficiency. Half of the surveyed respondents indicated that, prior to participating in the program, they did not have boiler maintenance schedules but have since developed them. The majority of participants also indicated that, given their experience, they would invest in energy efficiency improvements in the future. Interviews with program staff also indicate that, while facility staff and contractors have a high degree of technical acumen, the benefits of boiler and boiler room upgrades are not well known.
- Participant Budget and Planning Processes: Participant surveys indicate that the majority of funds used for energy efficiency projects come from maintenance and operations budgets, which are set at the beginning of the calendar year. Program staff suggested that it may be beneficial for the program year cycle to more closely align with typical participant budgeting cycles. As the program is coming to a close, public sector schools and universities are determining what they have money for and what project will be completed during the upcoming summer months.

Overall, the Boiler Tune-Up Program has been effectively implemented and is successfully delivering natural gas savings. In the interest of further program improvement, the following recommendations are offered:

- Continue to Grow Existing Partnerships and Leverage DCEO's Network of Public Sector Participants: DCEO has existing partnerships with partner entities in addition to ERC, including the Smart Energy Design and Assistance Center (SEDAC), the School of Architecture - Building Research Council at the University of Illinois, and the Midwest Energy Efficiency Alliance (MEEA). There may be opportunities for ERC to collaborate with these partners in order to identify key market segments and target specific participants that may benefit from the Boiler Tune-Up Program services and incentives.
- Consider Multiple Year Planning Cycles: Contract amendments and the approval for additional funding has inevitably delayed projects and at times, may have discouraged participation. Multiple year cycles would likely reduce the need, or at a minimum, reduce

the frequency of requests for additional funding, and therefore reduce the delay of project completions. Additionally, multiple year planning cycles would potentially facilitate more participation by entities that have annual budgeting protocols.

Alternatively, program staff may be able to anticipate funding short falls by carefully tracking program activity and requesting additional funding in advance of running out of funds.

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 (Project Description) through the program?
   ( ) Main decision maker
   ( ) Assisted with the decision
   ( ) Was not part of the decision making process (If checked, ask 3A)

3A. Who was the main decision maker? If multiple people were responsible for the decision, please provide the name of the person you think is most knowledgeable about the decision making process regarding the (Project Description).

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
   ( ) The Smart Energy Design Assistance Center (SEDAC)
   ( ) The Energy Resource Center (ERC)
   ( ) A utility representative
   ( ) Brochures or advertisements
   ( ) Trade associations or business groups you belong to
   ( ) Trade journals or magazines
   ( ) Friends and colleagues
   ( ) An architect, engineer, or energy consultant
   ( ) Equipment vendors or building contractors
   ( ) Other (please specify)

5. Which of the following policies or resources 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 staff member responsible for energy and energy efficiency
   ( ) Policies that incorporate energy efficiency in operations and procurement
   ( ) Active training of staff
   ( ) Do not have policies or procedures for energy efficiency improvements
   ( ) Other (please specify)

5A. Does your energy management plan include goals for energy savings?
   ( ) Yes (If checked, go to 5B)
   ( ) No

( ) Don't know

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

6. How does your organization decide to make energy efficiency improvements for this facility? Is the decision:
   ( ) Made by one or two key people
   ( ) Made by a group or committee
   ( ) Based on staff recommendations to a decision maker
   ( ) Made in some other way

7. How does your organization fund energy efficiency improvements? (select all that apply)
   ( ) Through a capital request (If checked, go to 7A)
   ( ) Funds are taken from operation and maintenance budget
   ( ) Dedicated funding for energy efficient projects
   ( ) Other (please specify)

7A. Is there a dollar threshold for when a project requires a capital request? If so, what is it?

7B. How long does it take to receive approval for the capital request?

8. In your organization, how long does it typically take to get approval for maintenance expenditures or equipment purchases?

9. What is the approval process for maintenance expenditures or equipment purchases in your organization? (select all that apply)
   ( ) An open bid is required
   ( ) Required to select lowest bidder
   ( ) Use a specific vendor
   ( ) Depends on the amount of purchase
   ( ) Follow state or federal procurement guidelines
   ( ) Follow procurement rules specific to our organization
   ( ) Don't know
   ( ) Other (please specify)

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 are slow or make purchasing difficult
   ( ) Schedules that dictate when equipment is to be replaced or maintained regardless of efficiency levels
   ( ) Incentive program time requirements
   ( ) Current equipment is too new to be replaced with more efficient equipment
   ( ) Don't know
   ( ) Other (please specify)

11. Is your organization able to utilize incentive or grant payments you receive for energy efficiency improvements, or are the payments placed in a general fund?
    - ( ) We are able to use the incentive payments for additional facility improvements including additional energy efficiency improvements
    - ( ) Incentive payments return to the facility general operating fund
    - ( ) Incentive payments go into the state general revenue fund
    - ( ) Don't know
    - ( ) Other (please specify)

12. How important are financial incentive payments from DCEO for your decision making regarding energy efficiency improvements?
    - ( ) Very important
    - ( ) Somewhat important
    - ( ) Only slightly important
    - ( ) Not important at all
    - ( ) Don't know

13. 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

14. How important is advice and/or recommendations received from DCEO for your decision making regarding energy efficiency improvements?
    - ( ) Very important
    - ( ) Somewhat important
    - ( ) Only slightly important
    - ( ) Not important at all
    - ( ) Don't know

15. 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 15A)
    - ( ) Internal rate of return (If checked, go to 15B)
    - ( ) Life cycle cost (If checked, go to 15C)
    - ( ) None of these

15A. 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.

15B. 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.

15C. What discount rate do you normally apply when determining life cycle costs? Please provide either a specific value or an estimated range.

16. 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?
- ( ) Yes, completed energy efficiency projects but did not apply for incentive. (If checked, go to 16A)
- ( ) No projects were completed by the organization.
- ( ) No, an incentive was applied for. (If checked, go to 16B)
- ( ) Don't know

16A. Why didn't you apply for a financial incentive for that project?
- ( ) Didn't know whether project qualified for financial incentives
- ( ) Financial incentive was insufficient
- ( ) Didn't have time to complete paperwork for financial incentive application
- ( ) Too much paperwork for the financial incentive application
- ( ) Didn't know about financial incentives until after project was paid for
- ( ) Other (please specify)

16B. Did you receive all of your incentives for these past energy efficiency projects?
- ( ) Yes
- ( ) No
- ( ) Don't know

17. How did you learn of the Public Sector Natural Gas Boiler Tune-Up Program? (select all that apply)
- ( ) Approached directly by a representative of the Public Sector Natural Gas Boiler Tune-Up Program
- ( ) Received an information brochure on the Public Sector Natural Gas Boiler Tune-Up Program
- ( ) A DCEO representative mentioned it
- ( ) The DCEO website
- ( ) From a Smart Energy Design Assistance Center (SEDAC) representative
- ( ) From an Energy Resource Center (ERC) representative
- ( ) A utility representative
- ( ) Friends or colleagues
- ( ) An architect, engineer, or energy consultant
- ( ) Attended a conference, workshop or seminar
- ( ) An energy service company
- ( ) Past experience with the program
- ( ) Equipment vendors or building contractors

( ) Other (please specify)

18. When did you learn of the Public Sector Natural Gas Boiler Tune-Up Program?
    ( ) Before planning the (Project Description)
    ( ) During your planning for the (Project Description)
    ( ) Once a plan to (Project Description) was established, but before it was completed
    ( ) After completing the (Project Description)
    ( ) Don't know
    ( ) Some other time (please explain)

19. Did you have a regular maintenance schedule for performing boiler tune-ups prior to participating in the program?
    ( ) Yes (If checked, go to 19A)
    ( ) No (If checked, go to 19B)
    ( ) Don't know

19A. What was the maintenance schedule?

19B. Since participating in the program, have you developed plans to have the boilers tuned-up on a regular basis?
    ( ) Yes (If checked, go to 19B1)
    ( ) No
    ( ) Don't know

19B1. How frequently do you plan on performing boiler tune ups in the future?

(Ask if implemented boiler tune-ups)

20. Before participating in the Public Sector Natural Gas Boiler Tune-Up Program, did you tune up any boilers?
    ( ) Yes
    ( ) No
    ( ) Don't know

21. Did you have plans to perform the boiler tune-up(s) before finding out about the Public Sector Natural Gas Boiler Tune-Up Program?
    ( ) Yes (If checked, go to 21A)
    ( ) No
    ( ) Don't know

21A. How long before finding out about the Public Sector Natural Gas Boiler Tune-Up Program did you have plans to tune up the boiler(s)?
    ( ) 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

21B. Would you have gone ahead with the boiler tune-ups even if you had not participated in the program?
( ) Yes
( ) No

22. How important was your previous experience with the DCEO programs in making your decision to tune up the boilers?
( ) Did not have previous experience with DCEO programs
( ) Very important
( ) Somewhat important
( ) Only slightly important
( ) Not at all important
( ) Don't know

23. Did a Public Sector Natural Gas Boiler Tune-Up Program or other DCEO representative recommend that you perform the boiler tune up(s)?
( ) Yes (If checked, go to 23A)
( ) No
( ) Don't know

23A. If the Public Sector Natural Gas Boiler Tune-Up Program or other DCEO representative had not recommended that you perform the boiler tune-up(s), 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

24. Did a representative of the Smart Energy Design Assistance Center (SEDAC) recommend that you perform the boiler tune-up(s)?
( ) Yes (If checked, go to 24A)
( ) No
( ) Don't know

24A. If the SEDAC representative had not recommended that you perform the boiler tune-up(s), 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

25. Would your organization have been financially able to perform the boiler tune-up(s) without the assistance from the Public Sector Natural Gas Boiler Tune-Up Program?
    ( ) Yes
    ( ) No

26. If the financial incentives from the Public Sector Natural Gas Boiler Tune-Up Program had not been available, how likely is it that you would have performed the boiler tune-ups anyway?
    ( ) Definitely would have
    ( ) Probably would have
    ( ) Probably would not have
    ( ) Definitely would not have
    ( ) Don't know

27. Did the availability of information and financial incentives through the Public Sector Natural Gas Boiler Tune-Up Program affect the quantity of boiler tune-up(s) that you performed? Did you tune-up more boilers than you otherwise would have without the program?
    ( ) Yes (If checked, go to 27A)
    ( ) No

27A. How many more tune-ups were performed because of the program?

28. Did the availability of information and financial incentives through the Public Sector Natural Gas Boiler Tune-Up Program affect the timing of the boiler tune-ups? Did you tune up the boilers sooner than you would have without the program?
    ( ) Yes (If checked, go to 28A)
    ( ) No

28A. When would you otherwise have tuned up the boiler(s)?
    ( ) Less than 6 months later
    ( ) 6-12 months later
    ( ) 1-2 years later
    ( ) 3-5 years later
    ( ) More than 5 years later

(Ask if installed pipe insulation)

29. Before participating in the Public Sector Natural Gas Boiler Tune-Up Program, did you install any pipe insulation?
    ( ) Yes
    ( ) No
    ( ) Don't know

30. Did you have plans to install the pipe insulation before finding out about the Public Sector Natural Gas Boiler Tune-Up Program?
    ( ) Yes (If checked, go to 30A)
    ( ) No

( ) Don't know

30A. How long before finding out about the Public Sector Natural Gas Boiler Tune-Up Program did you have plans to install the pipe insulation?

( ) 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

30B. Would you have gone ahead with the installation of pipe insulation even if you had not participated in the program?

( ) Yes
( ) No

31. How important was your previous experience with the DCEO programs in making your decision to install the pipe insulation?

( ) Did not have previous experience with the DCEO programs
( ) Very important
( ) Somewhat important
( ) Only slightly important
( ) Not at all important
( ) Don't know

32. Did a Public Sector Natural Gas Boiler Tune-Up Program or other DCEO representative recommend that you install the pipe insulation?

( ) Yes (If checked, go to 32A)
( ) No
( ) Don't know

32A. If the Public Sector Natural Gas Boiler Tune-Up Program or other DCEO representative had not recommended that you install pipe insulation, 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

33. Did a representative of the Smart Energy Design Assistance Center (SEDAC) recommend that you install the pipe insulation?

( ) Yes (If checked, go to 33A)
( ) No
( ) Don't know

33A. If the SEDAC representative had not recommended that you install the pipe insulation, 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

34. Would your organization have been financially able to install the pipe insulation without the assistance from the Public Sector Natural Gas Boiler Tune-Up Program?
- ( ) Yes
- ( ) No

35. If the financial incentives from the Public Sector Natural Gas Boiler Tune-Up Program had not been available, how likely is it that you would have installed the pipe insulation anyway?
- ( ) Definitely would have
- ( ) Probably would have
- ( ) Probably would not have
- ( ) Definitely would not have
- ( ) Don't know

36. Did the availability of information and financial incentives through the Public Sector Natural Gas Boiler Tune-Up Program affect the quantity of pipe insulation that you installed? Did you install more pipe insulation than you otherwise would have without the program?
- ( ) Yes (If checked, go to 36A)
- ( ) No

36A. How much more pipe insulation was installed because of the program?

37. Did the availability of information and financial incentives through the Public Sector Natural Gas Boiler Tune-Up Program affect the timing of the installation of pipe insulation? Did you install the pipe insulation sooner than you would have without the program?
- ( ) Yes (If checked, go to 37A)
- ( ) No

37A. When would you otherwise have installed the pipe insulation?
- ( ) Less than 6 months later
- ( ) 6-12 months later
- ( ) 1-2 years later
- ( ) 3-5 years later
- ( ) More than 5 years later

(Ask if installed steam traps)

38. Before participating in the Public Sector Natural Gas Boiler Tune-Up Program, did you repair or replace any malfunctioning steam traps?
- ( ) Yes

( ) No
( ) Don't know

39. Did you have plans to repair or replace the steam trap(s) before finding out about the Public Sector Natural Gas Boiler Tune-Up Program?
( ) Yes (If checked, go to 39A)
( ) No
( ) Don't know

39A. How long before finding out about the Public Sector Natural Gas Boiler Tune-Up Program did you have plans to repair or replace the steam trap(s)?
( ) 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

39B. Would you have gone ahead with the steam trap repair or replacement(s) even if you had not participated in the program?
( ) Yes
( ) No

40. How important was your previous experience with the DCEO programs in making your decision to repair or replace the steam trap(s)?
( ) Did not have previous experience with DCEO programs
( ) Very important
( ) Somewhat important
( ) Only slightly important
( ) Not at all important
( ) Don't know

41. Did a Public Sector Natural Gas Boiler Tune-Up Program or other DCEO representative recommend that you repair or replace the steam trap(s)?
( ) Yes (If checked, go to 41A)
( ) No
( ) Don't know

41A. If the Public Sector Natural Gas Boiler Tune-Up Program or other DCEO representative had not recommended that you repair or replace the steam trap(s), 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

42. Did a representative of the Smart Energy Design Assistance Center (SEDAC) recommend that you repair or replace the steam trap(s)?
    ( ) Yes (If checked, go to 42A)
    ( ) No
    ( ) Don't know

42A. If the SEDAC representative had not recommended that you repair or replace the steam trap(s), 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

43. Would your organization have been financially able to repair or replace the steam trap(s) without the assistance from the Public Sector Natural Gas Boiler Tune-Up Program?
    ( ) Yes
    ( ) No

44. If the financial incentives from the Public Sector Natural Gas Boiler Tune-Up Program had not been available, how likely is it that you would have repaired or replaced the steam trap(s) anyway?
    ( ) Definitely would have
    ( ) Probably would have
    ( ) Probably would not have
    ( ) Definitely would not have
    ( ) Don't know

45. Did the availability of information and financial incentives through the Public Sector Natural Gas Boiler Tune-Up Program affect the quantity of steam traps that you repaired or replaced? Did you repair or replace more steam traps than you otherwise would have without the program?
    ( ) Yes (If checked, go to 45A)
    ( ) No

45A. How many more steam traps were repaired or replaced because of the program?

46. Did the availability of information and financial incentives through the Public Sector Natural Gas Boiler Tune-Up Program affect the timing of the repair or replacement of the stream trap(s)? Did you repair or replace the steam trap(s) sooner than you would have without the program?
    ( ) Yes (If checked, go to 46A)
    ( ) No

46A. When would you otherwise have repaired or replaced the steam trap(s)?
    ( ) Less than 6 months later
    ( ) 6-12 months later

( ) 1-2 years later
( ) 3-5 years later
( ) More than 5 years later

47. Did you have any problems with the application process?
( ) Yes (If checked, go to 47A)
( ) No
( ) Don't know

47A. What problems did you have?

48. Did the (Project Description) go smoothly?
( ) Yes
( ) For the most part (If checked, go to 48A)
( ) No (If checked, go to 48A)
( ) Don't know

48A. Please explain in what ways the project did not go smoothly.

49. Did the (Project Description) meet your expectations?
( ) My expectations were exceeded
( ) My expectations were met
( ) My expectations were mostly met (If checked, go to 49A)
( ) My expectations were not met (If checked, go to 49A)
( ) Don't know

49A. Please explain in what ways the (Project Description) did not meet your expectations.

50. Do you feel that the contractor did a good job?
( ) Yes
( ) For the most part (If checked, go to 50A)
( ) No (If checked, go to 50A)
( ) Don't know
( ) Did not use a contractor

50A. Please explain in what ways you do not feel that the contractor did a good job.

51. Did the incentive that you received meet your expectations?
( ) Yes
( ) No (If checked, go to 51A)
( ) Don't know

51A. Please explain in what ways the incentive you received did not meet your expectations.

52. Were there any issues receiving the Public Sector Natural Gas Boiler Tune-Up Program incentive?
( ) Yes (If checked, go to 52A)

( ) No
( ) Don't know

52A. Please describe the issues you had with receiving the Public Sector Natural Gas Boiler Tune-Up Program incentive.

53. Was the incentive amount what you expected?
( ) Yes
( ) No (If checked, go to 53A)
( ) Don't know

53A. Please explain how the incentive amount differed from what you expected.

54. Since participating in the program, have you implemented any additional energy efficiency projects for which you did not apply or receive an incentive?
( ) Yes (If checked, go to 54A)
( ) No
( ) Don't know

54A. Please describe this energy efficiency project?

54B. Was this project implemented at the same facility (or facilities) as the (Project Description)?
( ) Yes
( ) No
( ) Don't know

54C. Did a recommendation from Public Sector Natural Gas Boiler Tune-Up Program or DCEO staff member, or from a contractor influence your decision to implement the additional project?
( ) Yes (If checked, go to 54C1)
( ) No
( ) Don't know

54C1. How important was this recommendation to your decision to implement the additional energy efficiency project?
( ) Very important
( ) Somewhat important
( ) Neither important or unimportant
( ) Somewhat unimportant
( ) Unimportant
( ) Don't know

54D. How important was your experience with the Public Sector Natural Gas Boiler Tune-Up 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

54E. How important was any past experience with energy efficiency programs to your decision to implement the additional energy efficiency project?
( ) Did not participate in any other programs in the past
( ) Very important
( ) Somewhat important
( ) Neither important or unimportant
( ) Somewhat unimportant
( ) Unimportant
( ) Don't know

54F. Why didn't you apply for or receive financial assistance or incentives for this project? (Check all that apply)
( ) Didn't know about financial incentives
( ) Didn't know whether the project qualified for financial incentives
( ) Financial incentive was insufficient
( ) No financial incentive was offered
( ) Too much paperwork for the financial incentive application
( ) Other reason (please describe)

55. Given your experience with the Public Sector Natural Gas Boiler Tune-Up Program, would you have (Project Description) in the future even if financial incentives for such projects were not being offered through a DCEO program?
( ) Yes
( ) No
( ) Don't know

56. How would you rate your satisfaction with the following - Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied?

- Performance of the (project description) since the project was completed
- Savings on your monthly bill
- Incentive amount
- The effort required for the application process
- Quality of the contractor's work
- Information provided by the DCEO
- Information provided by the Smart Energy Design Assistance Center (SEDAC)
- Information provided by the Energy Resource Center (ERC)
- The elapsed time until you received the incentive
- Overall program experience

56A. (If dissatisfied or very dissatisfied for any) Please explain in what ways you were not satisfied with the program.

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

THANK YOU!

Thank you for taking our survey. Your response is very important to us.

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 incentives under the Boiler Tune-Up Program. That survey provided the information used in Chapter 3 to estimate the Boiler Tune-Up Program net-to-grosss ratio. 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 implementing energy efficient measures, (2) his or her knowledge of and satisfaction with the program, and (3) the influence that the program had on his or her decision to implement energy efficiency measures.

The following tabulations summarize participant survey responses. 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 perform boiler tune-ups / install pipe insulation / repair or replace steam traps through the program?	*Response*	*(n=8)*	*Percent of Respondents*
	Main decision maker	5	63%
	Assisted with the decision	3	38%
	Was not part of the decision process	0	0%

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)	*Response*	*(n=8)*	*Percent of Respondents**
	A DCEO representative	3	38%
	The DCEO website	1	13%
	The Smart Energy Design Assistance Center (SEDAC)	3	38%
	The Energy Resource Center (ERC)	0	0%
	A utility representative	3	38%
	Brochures or advertisements	0	0%
	Trade associations or business groups you belong to	1	13%
	Trade journals or magazines	1	13%
	Friends and colleagues	0	0%
	An architect, engineer, or energy consultant	2	25%
	Equipment vendors or building contractors	4	50%
	Other (please describe)	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? (check all that apply)	*Response*	*(n=8)*	*Percent of Respondents**
	An energy management plan	1	13%
	A staff member responsible for energy and energy efficiency	1	13%
	Policies that incorporate energy efficiency in operations and procurement	2	25%
	Active training of staff	2	25%
	Do not have policies or procedures for energy efficiency improvements	4	50%
	Other (pleae specify)	1	13%

**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=1)*	*Percent of Respondents*
	Yes	1	100%
	No	0	0%
	Don't Know	0	0%

6. 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	5	63%
	Made in some other way	0	0%
	Based on staff recommendations to a decision maker	2	25%
	Made by a group or committee	1	13%

	Response	*(n=8)*	*Percent of Respondents**
7. How does your organization fund energy efficiency improvements? (select all that apply)	Through a capital request	3	38%
	Funds are taken from operation and maintenance budget	5	63%
	Dedicated funding for energy efficient projects	0	0%
	Other (please specify)	2	25%

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

	Response	*(n=3)*	*Percent of Respondents*
7a. Is there a dollar threshold for when a project requires a capital request? If so, what is it?	Yes	2	67%
	Average Threshold if "Yes" (in Dollars)	$17,500	

	Average Number of Days, (n=2)	
7b. How long does it take to receive approval for the capital request?	Average	56.0

	Average Number of Days, (n=5)	
8. In your organization, how long does it typically take to get approval for maintenance expenditures or equipment purchases?	Average	99.8

	Response	*(n=8)*	*Percent of Respondents**
9. What is the approval process for maintenance expenditures or equipment purchases in your organization? (select all that apply)	An open bid is required	3	38%
	Required to select lowest bidder	2	25%
	Use a specific vendor	0	0%
	Depends on the amount of purchase	7	88%
	Follow state or federal procurement guidelines	2	25%
	Follow procurement rules specific to our organization	5	63%
	Don't know	0	0%
	Other (please specify)	0	0%

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

	Response	*(n=28)*	*Percent of Respondents**
10. What barriers does your organization face in making energy efficiency improvements? (select all that apply)	Insufficient funding for improvements	8	29%
	Lack of information on energy efficient equipment and practices	1	4%
	Approval processes that are slow or make purchasing difficult	4	14%
	Schedules that dictate when equipment is to be replaced or maintained regardless of efficiency levels	1	4%
	Incentive program time requirements	1	4%
	Current equipment is too new to be replaced with more efficient equipment	2	7%
	Don't know	0	0%
	Other (please specify)	1	4%

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

	Response	*(n=8)*	*Percent of Respondents*
11. Is your organization able to utilize incentive or grant payments you receive for energy efficiency improvements, or are the payments placed in a general fund?	We are able to use the incentive payments for additional facility improvements including additional energy efficiency improvements	3	38%
	Incentive payments return to the facility general operating fund	4	50%
	Incentive payments go into the state general revenue fund	1	13%
	Don't know	0	0%
	Other (please specify)	0	0%

	Response	*(n=8)*	*Percent of Respondents*
12. How important are financial incentive payments from DCEO for your decision making regarding energy efficiency improvements?	Very important	8	100%
	Somewhat important	0	0%
	Only slightly important	0	0%
	Not important at all	0	0%
	Don't know	0	0%

	Response	*(n=8)*	*Percent of Respondents*
13. How important is past experience with energy efficient equipment or practices for your decision making regarding energy efficiency improvements?	Very important	7	88%
	Somewhat important	1	13%
	Only slightly important	0	0%
	Not important at all	0	0%
	Don't know	0	0%

	Response	*(n=8)*	*Percent of Respondents*
14. How important is advice and/or recommendations received from DCEO for your decision making regarding energy efficiency improvements?	Very important	5	63%
	Somewhat important	2	25%
	Only slightly important	1	13%
	Not important at all	0	0%
	Don't know	0	0%

	Response	*(n=8)*	*Percent of Respondents**
15. Which financial methods does your organization typically use to evaluate energy efficiency improvements for this facility? (Select all that apply)	Initial Cost	6	75%
	Simple payback	6	75%
	Internal rate of return	2	25%
	Life cycle cost	3	38%
	None of these	0	0%

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

15a. 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.	*Average Number of Years, (n=5)*	
	Average	3.1

16. 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?	*Response*	*(n=7)*	*Percent of Respondents*
	Yes, completed energy efficiency projects but did not apply for incentive.	3	43%
	No projects were completed the by organization.	1	14%
	No, an incentive was applied for.	3	43%
	Don't know	0	0%

16a. Why didn't you apply for a financial incentive for that project?	*Response*	*(n=3)*	*Percent of Respondents**
	Didn't know whether project qualified for financial incentives	2	67%
	Financial incentive was insufficient	0	0%
	Didn't have time to complete paperwork for financial incentive application	0	0%
	Too much paperwork for the financial incentive application	1	33%
	Didn't know about financial incentives until after project was paid for	0	0%
	Other (please specify)	0	0%

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

16b. Did you receive all of your incentives for these past energy efficiency projects?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	3	100%
	No	0	0%
	Don't Know	0	0%

	Response	*(n=8)*	*Percent of Respondents**
17. How did you learn of the Public Sector Natural Gas Boiler Tune-up Program? (select all that apply)	Approached directly by a representative of the Public Sector Natural Gas Boiler Tune-up Program	1	13%
	Received an information brochure on the Public Sector Natural Gas Boiler Tune-up Program	1	13%
	A DCEO representative mentioned it	0	0%
	The DCEO website	2	25%
	From a Smart Energy Design Assistance Center (SEDAC) representative	1	13%
	From an Energy Resource Center (ERC) representative	0	0%
	A utility representative	0	0%
	Friends or colleagues	0	0%
	An architect, engineer, or energy consultant	0	0%
	Attended a conference, workshop or seminar	0	0%
	An energy service company	0	0%
	Past experience with the program	1	13%
	Equipment vendors or building contractors	7	88%
	Other (please specify)	0	0%

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

	Response	*(n=8)*	*Percent of Respondents*
18. When did you learn of the Public Sector Natural Gas Boiler Tune-up Program?	Before planning the boiler project	0	0%
	During your planning for the boiler project	0	0%
	Once a plan to implement was established, but before it was completed	0	0%
	After completing the boiler project	0	0%
	Don't know	0	0%
	Some other time (please explain)	0	0%

	Response	*(n=7)*	*Percent of Respondents*
19. Did you have a regular maintenance schedule for performing boiler tune-ups prior to participating in the program?	Yes	3	43%
	No	4	57%
	Don't Know	0	0%

	Response	*(n=4)*	*Percent of Respondents*
19b. Since participating in the program, have you developed plans to have the boilers tuned-up on a regular basis?	Yes	2	50%
	No	2	50%
	Don't Know	0	0%

20, 29, & 38. Before participating in the Public Sector Natural Gas Boiler Tune-up Program, did you tune up any boilers / install pipe insulation / repair or replace steam traps?	*Response*	*(n=9)*	*Percent of Respondents**
	Yes	6	67%
	No	3	33%
	Don't Know	0	0%

**Each decision maker may have answered more than one time. Questions may have been repeated for each measure type implemented.*

21, 30, & 39. Did you have plans to perform the boiler tune-up(s)/ install pipe insulation / repair or replace steam traps before finding out about the Public Sector Natural Gas Boiler Tune-up Program?	*Response*	*(n=9)*	*Percent of Respondents**
	Yes	5	56%
	No	3	33%
	Don't Know	1	11%

**Each decision maker may have answered more than one time. Questions may have been repeated for each measure type implemented.*

21a, 30a, & 39a. How long before finding out about the Public Sector Natural Gas Boiler Tune-up Program did you have plans to tune up the boiler(s) / install pipe insulation / repair or replace steam traps?	*Response*	*(n=5)*	*Percent of Respondents**
	Less than 6 months	2	40%
	6-12 months	1	20%
	1-2 years	1	20%
	3-5 years	0	0%
	More than 5 years	1	20%
	Don't know	0	0%

**Each decision maker may have answered more than one time. Questions may have been repeated for each measure type implemented.*

21b, 30b, & 39b. Would you have gone ahead with the boiler tune-ups / installation or pipe insulation / repair or replace steam traps even if you had not participated in the program?	*Response*	*(n=5)*	*Percent of Respondents**
	Yes	5	100%
	No	0	0%
	Don't Know	0	0%

**Each decision maker may have answered more than one time. Questions may have been repeated for each measure type implemented.*

22, 31, & 40. How important was your previous experience with the DCEO programs in making your decision to tune up the boilers / install pipe insulation / repair or replace steam traps?	*Response*	*(n=9)*	*Percent of Respondents**
	Very important	5	56%
	Somewhat important	2	22%
	Only slightly important	0	0%
	Did not have previous experience with DCEO programs	2	22%
	Not important at all	0	0%
	Don't know	0	0%

**Each decision maker may have answered more than one time. Questions may have been repeated for each measure type implemented.*

23, 32, & 41. Did a Public Sector Natural Gas Boiler Tune-up Program or other DCEO representative recommend that you perform the boiler tune up(s) / install pipe insulation / repair or replace steam traps?	*Response*	*(n=9)*	*Percent of Respondents**
	Yes	1	11%
	No	6	67%
	Don't Know	2	22%

**Each decision maker may have answered more than one time. Questions may have been repeated for each measure type implemented.*

23a, 32a, & 41a. If the Public Sector Natural Gas Boiler Tune-up Program or other DCEO representative had not recommended that you perform the boiler tune-up(s) / install pipe insulation / repair or replace steam traps, how likely is it that you would have done it anyway?	*Response*	*(n=1)*	*Percent of Respondents**
	Definitely would have	0	0%
	Probably would have	1	100%
	Probably would not have	0	0%
	Definitely would not have	0	0%
	Don't know	0	0%

**Each decision maker may have answered more than one time. Questions may have been repeated for each measure type implemented.*

24, 33, & 42. Did a representative of the Smart Energy Design Assistance Center (SEDAC) recommend that you perform the boiler tune-up(s) / install pipe insulation / repair or replace steam traps?	*Response*	*(n=8)*	*Percent of Respondents**
	Yes	1	13%
	No	4	50%
	Don't Know	3	38%

**Each decision maker may have answered more than one time. Questions may have been repeated for each measure type implemented*.

24a, 33a, & 42a. If the SEDAC representative had not recommended that you perform the boiler tune-up(s) / install pipe insulation / repair or replace steam traps, how likely is it that you would have done it anyway?	*Response*	*(n=1)*	*Percent of Respondents**
	Definitely would have	1	100%
	Probably would have	0	0%
	Probably would not have	0	0%
	Definitely would not have	0	0%
	Don't know	0	0%

**Each decision maker may have answered more than one time. Questions may have been repeated for each measure type implemented.*

25, 34, & 43. Would your organization have been financially able to perform the boiler tune-up (s) / install pipe insulation / repair or replace steam traps without the assistance from the Public Sector Natural Gas Boiler Tune-up Program?	*Response*	*(n=9)*	*Percent of Respondents**
	Yes	3	33%
	No	6	67%
	Don't Know	0	0%

**Each decision maker may have answered more than one time. Questions may have been repeated for each measure type implemented.*

26, 35, & 44. If the financial incentives from the Public Sector Natural Gas Boiler Tune-up Program had not been available, how likely is it that you would have performed the boiler tune-up (s) / install pipe insulation / repair or replace steam traps anyway?	*Response*	*(n=9)*	*Percent of Respondents**
	Definitely would have	2	22%
	Probably would have	2	22%
	Probably would not have	3	33%
	Definitely would not have	0	0%
	Don't know	2	22%

**Each decision maker may have answered more than one time. Questions may have been repeated for each measure type implemented.*

27, 36, & 45. Did the availability of information and financial incentives through the Public Sector Natural Gas Boiler Tune-up Program affect the quantity of boiler tune-up(s) performed / pipe insulation installed / steam traps repaired or replaced? Did you tune-up more boilers / install more pipe insulation / replace or repair more equipment than you otherwise would have without the program?	*Response*	*(n=9)*	*Percent of Respondents**
	Yes	6	67%
	No	3	33%
	Don't Know	0	0%

**Each decision maker may have answered more than one time. Questions may have been repeated for each measure type implemented.*

28, 37, & 46. Did the availability of information and financial incentives through the Public Sector Natural Gas Boiler Tune-up Program affect the timing of the boiler tune-up(s) / installation of pipe insulation / repair or replacement steam traps? Did you complete the project sooner than you would have without the program?	*Response*	*(n=9)*	*Percent of Respondents**
	Yes	7	78%
	No	2	22%
	Don't Know	0	0%

**Each decision maker may have answered more than one time. Questions may have been repeated for each measure type implemented.*

28a., 37a, & 46a When would you otherwise tuned up the boiler(s) / installed pipe insulation / repaired or replaced steam traps?	*Response*	*(n=7)*	*Percent of Respondents**
	Less than 6 months later	2	29%
	6-12 months later	0	0%
	1-2 years later	3	43%
	3-5 years later	1	14%
	More than 5 years later	1	14%
	Don't know	0	0%

**Each decision maker may have answered more than one time. Questions may have been repeated for each measure type implemented.*

47. Did you have any problems with the application process?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	0	0%
	No	8	100%
	Don't Know	0	0%

48. Did the project go smoothly?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	8	100%
	No	0	0%
	For the most part	0	0%
	Don't Know	0	0%

49. Did the project meet your expectations?	*Response*	*(n=8)*	*Percent of Respondents*
	My expectations were exceeded	3	38%
	My expectations were met	4	50%
	My expectations were mostly met	0	0%
	My expectations were not met	0	0%
	Don't know	1	13%

50. Do you feel that the contractor did a good job?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	7	88%
	For the most part	0	0%
	No	0	0%
	Don't know	1	13%
	Did not use a contractor	0	0%

51. Did the incentive that you received meet your expectations?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	8	100%
	No	0	0%
	Don't Know	0	0%

52. Were there any issues receiving the Public Sector Natural Gas Boiler Tune-up Program incentive?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	0	0%
	No	7	88%
	Don't Know	1	13%

53. Was the incentive amount what you expected?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	7	88%
	No	0	0%
	Don't Know	1	13%

54. Since participating in the program, have you implemented any additional energy efficiency projects for which you did not apply or receive an incentive?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	2	25%
	No	6	75%
	Don't Know	0	0%

54b. Was this project implemented at the same facility (or facilities) as the [Project Description]?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	1	50%
	No	1	50%
	Don't Know	0	0%

54c. Did a recommendation from Public Sector Natural Gas Boiler Tune-up Program or DCEO staff member, or from a contractor influence your decision to implement the additional project?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	1	50%
	No	1	50%
	Don't Know	0	0%

54c1. How important was this recommendation to your decision to implement the additional energy efficiency project?	*Response*	*(n=1)*	*Percent of Respondents*
	Very important	1	100%
	Somewhat important	0	0%
	Neither important or unimportant	0	0%
	Somewhat unimportant	0	0%
	Unimportant	0	0%
	Don't know	0	0%

54d. How important was your experience with the Public Sector Natural Gas Boiler Tune-up Program to your decision to implement the additional energy efficiency project?	*Response*	*(n=2)*	*Percent of Respondents*
	Very important	2	100%
	Somewhat important	0	0%
	Neither important or unimportant	0	0%
	Somewhat unimportant	0	0%
	Unimportant	0	0%
	Don't know	0	0%

54E. How important was any past experience with energy efficiency programs to your decision to implement the additional energy efficiency project?	*Response*	*(n=2)*	*Percent of Respondents*
	Did not participate in any other programs in the past	0	0%
	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%

	Response	*(n=2)*	*Percent of Respondents**
54f. Why didn't you apply for or receive financial assistance or incentives for this project? [Check all that apply]	Didn't know about financial incentives	2	100%
	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)	0	0%

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

	Response	*(n=8)*	*Percent of Respondents*
55. Given your experience with the Public Sector Natural Gas Boiler Tune-up Program, would you tune-up boilers / install pipe insulation / repair or replace steam traps in the future even if financial incentives for such projects were not being offered through a DCEO program?	Yes	5	63%
	No	0	0%
	Don't Know	3	38%

	Response	*(n=8)*	*Percent of Respondents**
56a. How would you rate your satisfaction with the following - Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied - Performance of the [boiler tune-up(s)/ install pipe insulation / repair or replacement of steam traps] since the project was completed?	5	6	75%
	4	2	25%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know	0	0%
	Not Applicable	0	0%
	Average		4.8

**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=8)*	*Percent of Respondents**
56b. How would you rate your satisfaction with the following - Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied - Savings on your monthly bill?	5	2	25%
	4	3	38%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know	3	38%
	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=8)*	*Percent of Respondents**
56c. How would you rate your satisfaction with the following - Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied - Incentive amount?	5	2	25%
	4	6	75%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know	0	0%
	Not Applicable	0	0%
	Average		4.3

**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**
56d. How would you rate your satisfaction with the following - Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied - The effort required for the application process?	5	2	29%
	4	5	71%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know	0	0%
	Not Applicable	0	0%
	Average		4.3

**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=8)*	*Percent of Respondents**
56e. How would you rate your satisfaction with the following - Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied - Quality of the contractor's work?	5	4	50%
	4	3	38%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know	1	13%
	Not Applicable	0	0%
	Average		4.6

**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=8)*	*Percent of Respondents**
56f. How would you rate your satisfaction with the following - Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied - Information provided by DCEO?	5	2	25%
	4	4	50%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know	2	25%
	Not Applicable	0	0%
	Average		4.3

**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=8)*	*Percent of Respondents**
56g. How would you rate your satisfaction with the following - Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied - Information provided by the Smart Energy Design Assistance Center (SEDAC)?	5	1	13%
	4	2	25%
	3	2	25%
	2	0	0%
	1	0	0%
	Don't know	3	38%
	Not Applicable	0	0%
	Average		3.8

**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=8)*	*Percent of Respondents**
56h. How would you rate your satisfaction with the following - Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied - Information provided by the Energy Resource Center?	5	1	13%
	4	2	25%
	3	1	13%
	2	0	0%
	1	0	0%
	Don't know	4	50%
	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=8)*	*Percent of Respondents**
56i. How would you rate your satisfaction with the following - Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied - The elapsed time until you received the incentive?	5	1	13%
	4	5	63%
	3	2	25%
	2	0	0%
	1	0	0%
	Don't know	0	0%
	Not Applicable	0	0%
	Average		3.9

**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**
56j. How would you rate your satisfaction with the following - Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied - Overall program experience?	5	2	29%
	4	5	71%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know	0	0%
	Not Applicable	0	0%
	Average		4.3

**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)*