Evaluation of Illinois Energy Now Building Operator Certification Program

June 2014 through May 2015

Prepared for:

Illinois Department of Commerce & Economic Opportunity

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Executive Summary

This report presents the results of the impact and process evaluations of the Building Operator Certification Program (BOC), which is administered by the Midwest Energy Efficiency Alliance (MEEA) under a license provided by the Northwest Energy Efficiency Council (NEEC), and which receives program support and tuition rebate funding from the Illinois Department of Commerce & Economic Opportunity (hereinafter referred to as the "Department of Commerce"). This report presents the results the evaluation of program activity occurring during the period June 2014 through May 2015, defined as electric program year seven and natural gas program year four (EPY7/GPY4).

The main features of the evaluation approach are as follows:

- Data used to perform the savings evaluation were collected through review of program materials and surveys and follow-up conversations with BOC participants.
- An approach based on review of the Illinois Statewide Technical Reference Manual (TRM), savings databases, and work papers was used to quantify savings associated with energy efficiency projects implemented by BOC participants as a result of program participation.
- Free ridership and program net savings were estimated using survey-based analysis methods applied to data collected through a survey of BOC participants.
- For the process evaluation, information about program performance, changes to program design, perspectives on program benefits, and program satisfaction levels were obtained through interviews with MEEA staff, surveys with BOC participants, surveys with supervisors of BOC participants, and a review of internal course assessment forms completed by participants.

The savings impact estimation process included a review of the energy efficiency measure information obtained through the participant survey effort as well as follow-up interviews with the appropriate participant and facility management staff members. The evaluators referred to sources listed in Table ES-1 in order to estimate savings for each measure type.

Table ES-1 Sources Referenced for Savings Calculations

Measure Category	*Energy Savings Sources*
Energy Efficient Lighting	Illinois Statewide TRM
Lighting Controls	Illinois Statewide TRM
Compressed Air System Maintenance	Illinois Statewide TRM
Ventilation System Maintenance	DEER eQUEST models for baseline usage. Southern California Edison (SCE) Work Paper for energy savings factors.

Table ES-2 presents the net savings associated with sampled participants for each measure and maintenance category that achieved net savings within the sampled participant group.

Table ES-2 Net Savings by Measure for Participant Sample

Measure Category	*Total Sampled Net Savings*		
	kWh	*kW*	*Therms*
Energy Efficient Lighting	90,086.28	21.93	-
Lighting Controls	188,513.44	57.55	-
Ventilation System Maintenance	4,903.71	-	-
Compressed Air System Maintenance	328,673.28	39.50	-
Total	612,176.71	118.98	0.00

The total savings shown above were extrapolated to represent the population of BOC participants who completed the MEEA BOC Program training during EPY7/GPY4. The evaluators were able to conduct participant surveys with 40 of the 122 BOC participants who completed the course during EPY7/GPY4. Based on participant survey responses, 18 of the 40 respondents reported energy saving projects that potentially qualified for net savings attributable to the BOC Program. Of the 18 sampled BOC participants who were associated with potential net savings through the program, evaluators were able to contact and verify savings for 12 facilities. The remaining six participants either could not be reached during the follow-up effort, or were not able to provide sufficient information to calculate savings for their projects. These six participants were removed from the sample and treated as part of the remaining population of BOC participants who were not reached during the survey effort.

Additionally, during engineering follow-up discussions the evaluators determined that the projects reported by four facilities had either not yet been implemented or had received an incentive through a utility program or DEPARTMENT OF COMMERCE grant; therefore net savings were calculated for a total of eight facilities.

This resulted in a total savings value representing the eight BOC participants who had implemented projects attributable to the program. This savings value was then divided by the total number of survey respondents (34 respondents, after subtracting out the participants with insufficient information) in order to determine the average savings per sampled participant. Once this savings value was determined, the savings were extrapolated to the program participant population.[1]

Savings were extrapolated based on the distribution of utility service providers within the participant population. Table ES-3 presents the net kWh savings by utility for the Building

[1] The sampled savings were extrapolated to a population of 117 total participants. The five veteran program participants who completed the BOC course were not included in the savings extrapolation, as the three veterans who completed the participant survey effort indicated that they are not currently employed in a building operator or facility management capacity.

Operator Certification Program during EPY7/GPY4. It should be noted that because some participants were serviced by non-EEPS electric utilities such as municipal utilities, electric savings generated through these participants are not attributed to the EEPS funded BOC Program.

Table ES-3 Summary of Net kWh Savings for BOC Program

Electric Utility	*Realized Net kWh Savings*
Ameren	521,991.38
ComEd	1,230,408.26
Total	1,752,399.65

Table ES-4 presents the program's EPY7/GPY4 net kW savings by utility.

Table ES-4 Summary of Net kW Savings for BOC Program

Utility	*Realized Net kW Savings*
Ameren	101.46
ComEd	239.15
Total	340.61

No gas savings were identified as evaluable and eligible for net savings during the participant survey effort or subsequent engineering follow-up calls.

The total net energy savings of the Building Operator Certification Program during EPY7/GPY4 are summarized in Table ES-5. During this period, net energy savings attributed to the program totaled 1,752,399.65 kWh and 340.61 kW. These values do not include savings generated through non-EEPS utilities, which totaled 354,208.44 kWh and 68.85 kW.

Table ES-5 Summary of Net Savings from EPY7/GPY4 Projects

Savings Level	*Total Net Savings*		
	kWh	*kW*	*Therms*
Per Participant	18,005.20	3.50	-
Extrapolated to EPY7/GPY4 Participants	1,752,399.65	25.57	-

The following section presents a summary of key findings from the process and impact evaluations of the Building Operator Certification (BOC) Program. These conclusions and recommendations are based on a combination of research activities including participant surveys, interviews with program staff, and reviews of program tracking data, documentation, and prior evaluation reports.

The following is a summary of key conclusions from the evaluation of BOC Program EPY7/GPY4 activity:

- **Few of the measure identified in the survey qualified for net savings.** As with prior program years, the savings estimation procedure determined that although participants reported implementing a wide range of projects after their participation in the BOC training, the total net savings impacts resulting from these projects were lower than may be expected based on the number of measures identified. These limitations are likely related to multiple issues:
    - As the participant survey was administered within a few months of training completion, many graduates may not have had enough time to either identify potential energy efficiency improvements in their facilities or have these improvements approved by their organization. Information gathered during the participant survey suggests that 52% of respondents currently have plans to implement at least one additional energy saving project within the near future. As the savings for these prospective projects cannot yet be attributed to the EPY7/GPY4 BOC Program, it is possible that BOC participants from the current program year will ultimately achieve greater energy savings than are reflected in this single-year evaluation. This may be particularly relevant for gas savings, as participants are more likely to identify and implement heating efficiency projects during the later fall and winter months.
    - Of the 103 non-maintenance measures reported by BOC participants in EPY7/GPY4, 56% were associated with other incentive programs according to survey responses. While the BOC training was likely influential for many of these projects, the incentivized savings are claimable by THE DEPARTMENT OF COMMERCE and the utilities and cannot also be attributed to the BOC Program. This issue has persisted through each evaluation year and is likely a consequence of one of the BOC Program's objectives: directing participants towards these types of incentive opportunities.
- **Net electricity savings increased dramatically during EPY7/GPY4.** Net kWh savings increased from approximately 88,000 kWh in EPY6/GPY3 to more than 1,700,000 kWh in EPY7/GPY4. This contrasts with the savings trend found during the previous three program years, where net savings steadily decreased over time. Due to the relatively small sample size available for evaluation, the presence of a single project with high savings significantly affects the total program savings. In the case of EPY7/GPY4, the majority of electric savings resulted from a single compressed air maintenance project. As stated in prior evaluation reports, the range of possible projects implemented by BOC participants is very wide in terms of scope, cost, and end use likely resulting in high savings variability across program years.
- **Participant and supervisor satisfaction is consistently high.** As was found during the prior program cycle, BOC graduates indicated a high level of satisfaction with all elements of their program experience and for the most part did not indicate any systematic or major issues with program structure, management, or operation. The majority of respondents cited specific courses or topics that had been particularly useful to them in their current employment roles,

and some respondents explained that they had been able to implement specific energy saving initiatives as a result of new information learned through BOC training. Participant supervisors unanimously indicated that the courses had been useful in adding value to their organization, and that their employees had made specific changes in the workplace as a result of attending the training. Although a few participants mentioned issues for consideration, such as that the class location could have been more convenient or that certain course topics were not relevant to them, the survey did not reveal any significant issues with program structure or delivery that require immediate attention.

- **Program outreach activities are comprehensive and continually updated.** MEEA and NEEC have consistently made improvements to how the BOC Program is promoted in order to increase program awareness and enrollment levels. In addition to traditional marketing media, MEEA has developed partnerships with entities such as community colleges, public sector organizations, and the City of Chicago, and these working relationships have been effective in facilitating participant enrollment and developing program interest. The upcoming marketing campaign being developed my NEEC is expected to further increase program awareness on a regional and national level, and the BOC Program is becoming more appealing in the City of Chicago for building owners who need to meet the requirements of the tiered benchmarking ordinance. Overall, the program has been widely promoted throughout the past several program years and is likely to generate an even higher level of interest among building owners moving forward.
- **MEEA is continually monitoring and improving program components.** MEEA and NEEC made continual changes to course structure and program resources during the prior program cycle and have demonstrated an ongoing commitment to doing so in future program years. This includes developing electronic informational tools, adding credential maintenance opportunities, and refining course content in order to reflect the most up-to-date building operation trends and practices. As the program moves forward, it will be important to have a proactive management structure that is able to modify program design and strategies as needed, and the current program administration staff appears to be well-suited to this role.

Overall, the evaluators found that the Building Operator Certification Program is well designed and delivered to participants, and is effectively meeting its objectives of educating facility staff on best practices for building operation and encouraging the implementation of energy saving improvements. Although the evaluation identified few significant issues with program structure or operation, the evaluators provide the following recommendations. These recommendations are based on the full range of evaluation activities conducted during EPY7/GPY4 and are intended as considerations for future program years.

- **Consider and plan for external incentive activity (Ongoing):** Throughout the past program cycle and into the current program year, BOC participants have sought and received additional measure incentives from external efficiency programs. As stated in prior evaluation reports, the BOC leads to energy savings through two channels: by directing participants towards utility incentive programs that will claim energy savings, and by causing participants to achieve non-incentivized energy savings. As the incentivized energy savings

are not attributed to the BOC program itself, the program savings goals should account for the fact that many BOC graduates will seek additional rebates for their energy efficiency implementations.

- **Consider collecting additional participant characteristics during program enrollment:** As part of the savings impact analysis, the evaluators incorporate participant facility information such as square footage, percentage of facility for which the participant is responsible, and business type. Additionally, although the participant tracking data provides a facility address, this address may represent a mailing address rather than the address of the facility where the graduate may implement energy efficiency measures. Although many respondents provide this information during the survey, instances of missing facility information may cause issues during the savings calculation process. As some respondents appear non-responsive to engineering follow-up calls, it is important to gather as much information as possible from participant enrollment data and survey data. If MEEA is able to collect additional facility characteristics, including the specific address of the facility or facilities where the building operator would likely implement any energy efficiency improvements, this may increase the likelihood that the evaluators will be able to verify and calculate energy savings using only tracking data and survey data.
- **Consider providing additional resources to veteran participants.** The three veteran participants who completed the participant survey during EPY7/GPY4 all indicated that they were not employed at the time of the survey, and two of these respondents mentioned that they would have liked to receive additional employment assistance from the program. Although MEEA currently works with building owners and veteran participants to identify potential employment opportunities, it appears that some veteran participants expected some level of additional support after completing the BOC Program. The evaluators recommend contacting past veteran participants to inquire about this issue and determine whether there are any opportunities to easily provide additional attention to these BOC graduates.

1. Introduction

This report presents the results of the impact and process evaluation of the Building Operator Certification Program offered by the Department of Commerce. This report presents results of activity during the period June 2014 through May 2015.

1.1 Description of Program

The Building Operator Certification Program (BOC Program) is a nationally recognized competency based training and education program for building operators. The Department of Commerce provides funds for program administration, instructor fees and travel, training coordination fees and travel, marketing and outreach, and tuition rebates for program graduates. The program is administered in partnership with the Midwestern Energy Efficiency Alliance (MEEA), which administers a regional program in eight states through a license from the BOC copyright holder, the Northwest Energy Efficiency Council (NEEC).

The Department of Commerce and MEEA launched the B Program in Illinois in 2003. 2015 marks the first year of a new three-year program cycle.

1.1.1 Program Administration

MEEA is responsible for managing the grant from the Department of Commerce, marketing the program, and facilitating the course. Once NEEC approves the application and the certification is official, MEEA will provide the rebate for the course.

The majority of the course materials provided by NEEC are related to technical foundations. MEEA works with instructors to create course content specific to the region, e.g. weather impacts and utility program specifics. Some instructors are involved with the advisory committee that determines the strategic direction of the program including the certification standards, course content, and future program scope. Eligibility requirements for BOC instructors include:

- Instructors must have teaching experience and technical expertise in the course topic area for which they apply. NEEC evaluates applications for both instruction and industry experience.
- 3+ years of experience providing instruction to working professionals in the field(s) of commercial building energy management, facility management, building engineering, operations and maintenance, or a closely related field.
- 2+ years of employment in the field or industry related to the training topic(s) for which the applicant is seeking qualification (e.g., HVAC systems, electrical systems, indoor air quality, etc.)
- Bachelor's Degree. Work experience may be substituted.

The program is publicized through trade publications, industry associations, and industry groups such as ASHRAE and the State Board of Education.

1.2 Impact Evaluation Approach

The overall objective of the impact evaluation of the BOC Program was to estimate the electric and natural gas savings that resulted from participation in the program. The impact evaluation excludes savings achieved through projects for which the operator received an incentive through another Department of Commerce program.

The M&V approach includes the following main features:

- Surveys administered to EPY7/GPY4 BOC Program participants;[2]
- Telephone interviews to identify participants who implemented energy efficiency measures for which they did not receive an incentive;
- Telephone verification of claimed measures at sampled sites; and
- Site level savings extrapolation to program level savings.

1.2.1 Data Collection Procedures

Participants in the BOC Program for EPY7/GPY4 were contacted by telephone or email to ascertain what energy efficiency measures they had implemented since attending the training program. Participants were also asked questions to determine the probability that they were free riders (i.e., that they would have implemented the measures without the training) and questions related to process evaluation.

Although ADM attempted to contact all EPY7/GPY4 participants by telephone and email, some participants did not respond to the survey requests. Out of the 122 participants who completed the BOC Program training during the program year, 40 responded to the initial participant survey.

Follow-up telephone interviews were conducted for those participants who stated they implemented energy efficiency measures as a result of the training, and did not receive an incentive for these measures from another Department of Commerce program or EEPS utility rebate.

1.2.2 Data Collection and Estimation of Sample Site Gross Savings

During the follow-up telephone interviews, savings analysis staff accomplished three tasks:

- First, the implementation status of all measures referred to by interviewed participants was verified. ADM evaluation staff members verified that the energy efficiency measures were installed and functioning properly.

[2] ADM attempted to contact all EPY6/GPY3 participants for the purposes of telephone or online surveying. A total of 40 participants ultimately responded to the survey requests.

- Second, ADM staff members collected information regarding any details necessary for savings calculation. Data were collected based on the measure input requirements of the savings estimation methodology being referenced for the particular measure.
- Third, ADM staff members interviewed the contact personnel at the facility to obtain additional information on the project, such as project timing and other background details in order to further inform the savings estimation process.

1.3 Process Evaluation Approach

This section presents the key tasks that were included in the process evaluation for the program year. The EPY7/GPY4 evaluation included a limited process evaluation focused on identifying any significant changes to program design, course curriculum, and delivery, and on tracking the status of evaluation conclusions and recommendations that were identified in previous evaluation years. In order to accomplish this process evaluation, the evaluators conducted a review of current program documentation including course assessments, held in-depth interviews and ongoing discussions with MEEA staff, administered participant satisfaction and course feedback surveys, and administered surveys to supervisors of participants who had completed the BOC training during EPY7/GPY4.

1.3.1 Review Program Documentation

At the start of the process evaluation effort, the evaluators reviewed documentation and data for the BOC Program. This involved working with MEEA staff to identify and obtain relevant documents for review.

As with prior years, the evaluators reviewed participant tracking records. These data were used for several purposes.

- Preliminary analysis of the characteristics of the participant populations, to be used for planning purposes and provide an increased understanding of program participation.
- Extracting information about participant facility types and the types of businesses represented by program participants.
- Quantifying the total number of EPY7/GPY4 BOC Program participants for the purposes of savings extrapolation.

Other reviewed documentation included certification maintenance activities completed by past participants, updated course curriculum summaries, and internal course assessment forms that were filled out by EPY7/GPY4 participants upon course completion.

1.3.2 Conduct Program Staff Interviews

The evaluators interviewed MEEA program management staff in order to gain insight into changes to program structure or operation, to identify current program issues and trends, and to determine the status of issues identified during prior evaluations.

For EPY7/GPY4, topics addressed by the in-depth interview included:

- Organizational changes to the program since EPY6/GPY3;
- Marketing activity and strategy for the current program year;
- Current strengths and weaknesses of the program;
- Areas where the program has been changed or strengthened; and
- Anticipated changes to the program.

1.3.3 Conduct Participant Surveys

The evaluators collected data from BOC Program participants to support the process evaluation. As with the EPY6/GPY3 evaluation, the goal of these surveys was to obtain a detailed understanding of the participant perspective of the BOC Program, the process involved in participants' making the decision to attend training, participants' perceptions of the process, the effect of the training programs on participants' knowledge and behavior, and the benefits the participants perceive. In total, 40 of the 122 BOC participants responded to the participant survey.

The content of the survey was similar to that of prior program years and focused on the following issues:

- Motivations for participating in the program;
- Factors that influenced the participant to enroll in the program;
- Perceived benefits from completing the training courses;
- Satisfaction with the program;
- Suggestions for program improvement;
- Whether the participant has engaged in energy efficient practices since participating in the program;
- Whether the participant made additional energy efficient purchases since participating in the program; and
- Firmographics and occupation details.

The results from the participant survey are used to inform both the process and impact components of the evaluation. The evaluators used information provided by participants to identify potential energy saving projects and follow-up with facilities as needed in order to

collect necessary project details. Additionally, the participant survey provided insight into the participant perspective, allowing the evaluators to identify trends in program performance and any issues regarding program structure, operation, and delivery that may require attention.

1.3.4 Conduct Supervisor Surveys

ADM administered an online survey to supervisors of employees who attended the BOC training during EPY7/GPY4. The purpose of the survey was to assess the value of the training to the organization, identify any impacts on employees' job behaviors and performance that the supervisor may have observed, barriers to completing efficiency improvements, and barriers to participation in the program. ADM received the contact information for 13 supervisors, of whom 5 responded to the survey.

1.4 Organization of Report

This report on the impact and process evaluation of the Building Operator Certification Program for the period June 2014 through May 2015 is organized as follows:

- Chapter 2 presents and discusses the methods used for estimating savings for measures installed under the program.
- Chapter 3 presents and discusses the methods used for and results obtained from estimating net savings the program.
- Chapter 4 presents and discusses the results obtained from the process evaluation of the program.
- Chapter 5 presents evaluation conclusions and recommendations for the program.
- Appendix A provides a copy of the questionnaire used for the participant survey.
- Appendix B presents tabulated results from the participant survey.
- Appendix C provides a copy of the questionnaire used for the supervisor survey.

2. Savings Calculation Methodology

This chapter addresses the estimation of kWh and peak kW reductions resulting from measures implemented in facilities of participants that obtained tuition rebates from the Department of Commerce for participating in the Building Operator Certification Program in electric program year seven and natural gas program year four (EPY7/GPY4) during the period of June 2014 through May 2015. Section 2.1 through Section 2.3 describe the steps taken to identify energy saving projects, select the appropriate data reference sources, and calculate the resulting energy savings. Chapter 3 describes the net savings estimation methodology and presents the total EPY7/GPY4 net savings for the program.

2.1 Review of Participant Survey Responses

The participant survey administered to BOC training participants served as the initial source for data regarding projects implemented during EPY7/GPY4. Participants provided information related to measures installed and equipment changes implemented after participating in the training program. Participants provided available inputs such as measure type, facility square footage, and other details. The evaluators reviewed these results and identified all projects that would potentially generate savings for EPY7/GPY4 of the program.

2.2 Selection of Data Sources for Savings Calculation

Upon completion of the data collection process, the evaluators performed a desk review of the available data and determined the optimal savings calculation methodology. The evaluators referred to several sources in order to estimate savings for each measure type. This process included referring to the Illinois TRM for deemed savings values and stipulated savings calculations, as well as reviewing deemed savings databases and work papers as necessary for certain measures. The data sources referenced during the EPY7/GPY4 savings estimation process are listed in Table 2-1 below.

Table 2-1 Sources Referenced for Savings Calculations

Measure Category	*Energy Savings Sources*
Energy Efficient Lighting	Illinois Statewide TRM
Lighting Controls	Illinois Statewide TRM
Compressed Air System Maintenance	Illinois Statewide TRM
Ventilation System Maintenance	DEER eQUEST models for baseline usage. Southern California Edison (SCE) Work Paper for energy savings factors.

2.3 Savings Methodologies by Measure

The following section lists each measure type, along with the formula or deemed savings determination used during the impact evaluation.

2.3.1 Occupancy Sensor Lighting Controls Savings

The energy savings associated with lighting occupancy sensors were quantified using the deemed calculations shown in the Illinois Statewide TRM. The calculations are as follows:

Electric Energy Savings

$$\Delta kWh = kW_{Controlled} * Hours * ESF * WHF_e$$

Summer Coincident Peak Demand Savings

$$\Delta kW = kW_{controlled} * WHF_d * (CF_{baseline} - CF_{os})$$

Where,

$kW_{Controlled}$ = Total lighting load connected to the control in kilowatts. Savings shown are savings per control. The total connected load per control should be collected from the participant or the default values presented below used;

Lighting Control Type	*Default kW controlled*
Wall mounted occupancy sensor	0.350[3]
Remote mounted occupancy sensor	0.587[4]
Fixture mounted sensor	0.073[5]

Hours = total operating hours of the controlled lighting circuit before the lighting controls are installed. This number should be collected from the participant. Average hours of use per year are provided in the TRM for each building type if participant-specific information is not collected. If unknown buidling type, the evaluators used the provided 'Miscellaneous' value.

ESF = Energy Savings factor (represents the percentage reduction to the operating Hours from the non-controlled baseline lighting system).

[3] Goldberg et al, State of Wisconsin Public Service Commission of Wisconsin, Focus on Energy Evaluation, Business Programs, Incremental Cost Study, KEMA, October 28, 2009

[4] Ibid

[5] Efficiency Vermont TRM 2/19/2010

Lighting Control Type	*Energy Savings Factor*[6]
Wall or Ceiling-Mounted Occupancy Sensors	41% or custom
Fixture Mounted Occupancy Sensors	30% or custom

WHF_e = Waste heat factor for energy to account for cooling energy savings from efficient lighting is provided in the Reference Table in Section 4.5 of the TRM for each building type. If building is un-cooled, the value is 1.0.

WHF_d = Waste Heat Factor for Demand to account for cooling savings from efficient lighting in cooled buildings is provided in the Reference Table in Section 4.5 of the TRM. If the building is un-cooled WHFd is 1.

$CF_{baseline}$ = Baseline Summer Peak Coincidence Factor for the lighting system without Occupancy Sensors installed selected from the Reference Table in Section 4.5 of the TRM for each building type. If the building type is unknown, the evaluators used the 'Miscellaneous' value of 0.66.

CF_{os} = Retrofit Summer Peak Coincidence Factor. This factor is 0.15 for the lighting system with Occupancy Sensors installed, of building type.[7]

2.3.2 Daylight Controls Savings

The energy savings associated with daylight controls were quantified using the deemed calculations shown in the Ohio TRM. The Illinois Statewide TRM does not have deemed calculations for daylight controls. The calculations are as follows:

Energy Savings

$$\Delta kWh = kW_{controlled} * HOURS * (1 + IFkWh) * ESF$$

Where,

$kW_{controlled}$ = total lighting load connected to the control in kilowatts

= Actual installed

[6] Kuiken, Tammy eta al, State of Wisconsin/Public Service Commission of Wisconsin, Focus on Energy Evaluation, Business Programs, Deemed Savings Manual V1.0, PA Consulting Group and KEMA, March 22, 2010 pp 4-192-194.

[7] Coincidence Factor Study Residential and Commercial Industrial Lighting Measures, RLW Analytics, Spring 2007. Note, the connected load used in the calculation of the CF for occupancy sensor lights includes the average ESF.

Hours = total operating hours of the controlled lighting before the lighting controls are installed.

2.3.3 High Performance T8 Lighting Savings

The energy savings associated with T8 light retrofits were quantified using the deemed calculations shown in the Illinois Statewide TRM. The calculations are as follows:

Electric Energy Savings

$$\Delta kWh = ((Watts_{base} - Watts_{EE})/1000) * Hours * WHF_e * ISR$$

Summer Coincident Demand Savings

$$\Delta kW = ((Watts_{base} - Watts_{EE})/1000) * WHF_d * CF * ISR$$

Where,

$Watts_{base}$ = Input wattage of the existing system which depends on the baseline fixture configuration (number and type of lamp) and number of fixtures.

$Watts_{EE}$ = New Input wattage of EE fixture which depends on new fixture configuration (number of lamps) and ballast factor and number of fixtures.

Hours = Average hours of use per year as provided by the participant or selected from the Reference Table in Section 4.5 of the TRM, Fixture annual operating hours.

WHF_e = Waste heat factor for energy to account for cooling energy savings from efficient lighting is selected from the Reference Table in Section 4.5 of the TRM for each building type. If building is un-cooled, the value is 1.0.

WHF_d = Waste Heat Factor for Demand to account for cooling savings from efficient lighting in cooled buildings is selected from the Reference Table in Section 4.5 of the TRM for each building type. If the building is not cooled WHFd is 1.

ISR = In Service Rate or the percentage of units rebated that get installed.

CF= Summer Peak Coincidence Factor for measure is selected from the Reference Table in Section 4.5 of the TRM for each building type.

2.3.4 LED Energy Savings

The energy savings associated with LEDs were quantified using the deemed calculations shown in the Illinois Statewide TRM. The calculations are as follows:

$$\Delta kWh = (Watts_{base} - Watts_{ee} * HOURS * WHF_e * ISR$$

Where,

$Watts_{base}$ = input wattage of the existing or baseline system.

$Watts_{ee}$ = actual wattage of LED purchased/installed.

Hours = total operating hours of the lighting.

WHF_e = waste heat factor for energy to account for cooling energy savings from efficient lighting

ISR = in Service Rate (assumed to be 100%)

Summer Coincident Peak Demand Savings

$$\Delta kW = ((Watts_{base}-Watts_{EE})/1000) * WHF_d*CF$$

Where,

WHF_d = Waste Heat Factor for Demand to account for cooling savings from efficient lighting in cooled buildings.

CF = Summer Peak Coincidence Factor

2.3.5 Ventilation System Maintenance: Air Filter Replacements

The energy savings associated with air filter replacements were calculated from DEER prototypical eQUEST models and deemed energy savings factors found in a SCE work paper. The work paper stated a dirty air filter consumed 3.61% more energy than a clean air filter. The DEER eQUEST models were used to determine the baseline fan energy usage of typical buildings. The energy usage was normalized and used to determine the savings for each participant location.

2.3.6 Compressed Air System Maintenance: Pressure Optimization and Filter Replacements

The energy savings associated with pressure optimization and filter replacements were quantified using the deemed calculations shown in the Illinois Statewide TRM. The calculations are as follows:

$$\Delta kWh = (kW_{typical} \times \Delta P \times SF \times Hours / HP_{typical}) \times HP_{real}$$

Where,

$kW_{typical}$ = Adjusted compressor power (kW) based on typical compressor loading and operating profile. Use Use actual compressor control type if known:

Compressor $kW_{typical}$

Control Type	*kWtypical*
Reciprocating - On/off Control	70.2
Reciprocating - Load/Unload	74.8
Screw - Load/Unload	82.3
Screw - Inlet Modulation	82.5
Screw - Inlet Modulation w/ Unloading	82.5
Screw - Variable Displacement	73.2
Screw - VFD	70.8

= If the actual compressor control type is not known, then use a weighted average based on the following market assumptions:

Control Type	*Share %*	*kWtypical*
Market share estimation for load/unload control compressors	40%	74.8
Market share estimation for modulation w/unloading control compressors	40%	82.5
Market share estimation for variable displacement control compressors	20%	73.2
Weighted Average		77.6

ΔP = Reduced filter loss (psi) =2 psi

SF=1% reduction in power per 2 psi reduction in system pressure4 is equal to 0.5% reduction per 1 psi, or a Savings Factor of 0.005

Hours = depending on shifts

Single shift (8/5) – 1976 hours (7 AM – 3 PM, weekdays, minus some holidays and scheduled down time) + 500 hrs maintenance = 2476 hrs

2-shift (16/5) – 3952 hours (7AM – 11 PM, weekdays, minus some holidays and scheduled down time) + 500 hrs maintenance = 4452 hrs

3-shift (24/5) – 5928 hours (24 hours per day, weekdays, minus some holidays and scheduled down time) + 500 hrs maintenance = 6428 hrs

4-shift (24/7) – 8320 hours (24 hours per day, 7 days a week minus some holidays and scheduled down time)

HPtypical = Nominal HP for typical compressor = 100 hp2

HPreal = Total HP of real compressors distributing air through filter

Summer Coincident Peak Demand Savings

$$\Delta kW = \Delta kWh / HOURS * CF$$

To account for the pressure optimization savings, ΔP was adjusted to reflect actual change in operating pressures.

3. Estimation of Net Savings

This chapter reports the results from estimating the net impacts of the Building Operator Certification (BOC) Program during EPY7/GPY4, where net savings represents the savings achieved by program participants that can be attributed to the effects of the program (i.e. savings that are not associated with free-ridership).

As the savings calculation methodology was based on responses received from the participant survey and required follow-up calls with participants who reported implementing measures, the evaluators determined net savings levels prior to contacting participants for follow-up data collection. This allowed the evaluators to contact only those participants who indicated that they had implemented a project, and who were not determined to be full free riders. As the savings calculation methodology did not involve following up with participants who were identified as full free riders, the evaluation focused exclusively on net savings rather than estimating net and gross savings.

Additionally, evaluation of energy efficiency incentive programs typically involves a discussion or calculation of savings spillover. However, the Building Operator Certification training is structured so that any net savings associated with training participants are attributable to the program, and are not further incentivized by the BOC, MEEA, or the Department of Commerce. There is no distinction between net realized savings and spillover savings for this type of program.

3.1 Procedures Used To Estimate Net Savings

For the BOC Program, the evaluators assessed the net savings attribution of each measure by assessing whether the Building Operator Certification training influenced the implementation of the measure.

Net savings analysis for training programs would typically involve determining whether a participant had plans and intentions to attend the training independent of program support such as tuition rebates. However, for the purposes of the BOC evaluation, it was determined that the Department of Commerce provides multiple forms of financial and non-financial support that are instrumental to the operation of the BOC program.

Thus, even if a participant states that he or she would have attended the training without receiving the Department of Commerce tuition rebate, it is not possible to determine whether the Department of Commerce was indirectly influential in the participants' decision making. For example, MEEA staff has stated that some BOC training courses would not have taken place, or that they would have had to limit enrollment, if the Department of Commerce had not provided financial and non-financial support to the program structure.

The evaluators determined that while the Department of Commerce tuition rebate is likely an important factor in participant decision-making, its importance to participants would not be considered for the purposes of the net savings analysis. This determination has been implemented for all evaluation years including EPY7/GPY4.

Thus, savings from the action of a participant are attributable to the program as long as the participant would not have taken the same energy saving action without attending the BOC training. In order to assess this factor, "Building Operator Certification training influence on project implementation", participant survey respondents were asked the following two questions for each reported measure:

- Net Savings Question 1: "How important was your experience in the Building Operator Certification Program in your decision to implement [MEASURE], using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?"
- Net Savings Question 2: "If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented [MEASURE], using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?"

Savings associated with reported measures were considered evaluable and fully attributable to the BOC Program if all of the following conditions were met for the measure:

- The respondent provided a response of 8, 9 or 10 to Net Savings Question 1.
- The respondent provided a response of 0, 1, 2, or 3 to Net Savings Question 2.

If these conditions are met, the evaluators determined that the specific measures referenced in the question are attributable to the program; otherwise, the evaluator determines that the specific measures referenced in the questions are not attributable to the program. The attribution criteria represent a threshold approach, in which energy impacts associated with measures implemented by program participants are either 100% program-attributable or 0% program-attributable.

In addition to the criteria outlined above, the evaluators referenced available data including consistency check data and information gathered during follow-up telephone calls to perform documented modifications to individual attribution determinations.

To prevent double counting savings across programs, participants were asked if they received an incentive for the energy saving project that was implemented. If they did, these savings are not attributed to the BOC program.

The data used to determine net savings were collected through a participant survey of 40 program participants for projects completed during or after participant attendance of BOC training courses in EPY7/GPY4.

3.2 Results of Net Savings Estimation

The procedures described in the preceding section were used to estimate net savings for the Building Operator Certification (BOC) Program during EPY7/GPY4.

Eighteen of the 40 surveyed participants indicated that they implemented at least one project due to their experience in the BOC Program (e.g. a project that met the above program attribution criteria). Savings were calculated only for projects that met the net savings criteria described in Section 3.1.

As many survey respondents provided inconsistent or incomplete information regarding whether they had received an incentive for implemented measures, the evaluators used the follow-up telephone calls to verify whether an incentive had been received, rather than relying on the incomplete survey data.

The following table presents the number of reported projects by measure type or maintenance category. The first column displays the total number of measures reported by survey respondents, regardless of incentive receipt or program influence. The second column displays the number of reported measures for which survey respondents reported that they had not applied for or received an external incentive. Follow-up telephone interviews were conducted to determine the savings for projects identified in the "Reported Measures that were BOC Training Influenced" column of the table. The right-most column identifies the number of measures that were verified as evaluable and that generated savings attributable to the BOC Program.

Table 3-1 Reported Projects by Measure Type and Influence Level

Measure/Maintenance Type	Number of Projects			
	Total Reported Measures	Reported Measures without External Incentive[8]	Reported Measures that were BOC Training Influenced[9]	Verified and Evaluable Net Savings Measures[10]
Lighting Controls	17	6	7	4
Lighting	20	5	4	2
Motors	5	3	1	-

[8] These values are based on survey responses. The final determination regarding whether an incentive was received for a specified measure was made during the follow-up telephone conversations between the evaluators and facility staff.

[9] These values represent measures where the participant survey responses met the program attribution criteria specified in Section 3.1. These values are independent of whether an incentive was received for the measure, and some of the measures represented in this column were disqualified for net savings based on information (such as learning that an incentive was received or that the project had not yet been implemented) gained through the evaluators' follow-up telephone conversations with participants.

[10] These values represent measures that were verified during engineering follow-up telephone calls and were determined to be eligible for non-zero net savings attributable to the BOC Program. Savings from these measures were extrapolated to the full participant population.

Measure/Maintenance Type	Number of Projects			
VSD	6	1	2	-
EMS	10	5	2	-
Economizer	8	4	2	-
Heating System	14	8	2	-
Air Conditioning	14	7	3	-
Water Heating	2	-	-	-
Compressed Air	3	2	-	-
Other Improvements	4	2	3	-
Cooling Maintenance	8	-	4	-
Heating Maintenance	9	-	5	
Ventilation Maintenance	9	-	5	1
Air Compressor maintenance	3	-	1	1
Other Maintenance	8	-	6	-
Total	140	43	47	8

The evaluators attempted to conduct follow-up verification and data collection telephone calls with each participant to ensure that measures cited during the survey effort were accurately recorded and were associated with BOC Program influences.

The above values are based on responses gathered through the participant survey effort, and do not necessarily reflect the number of projects that achieved savings through the verification and measurement effort. Some of the above projects, including EMS measures, heating system improvements, air conditioning improvements, and some types of maintenance, were determined to have been implemented prior to the participant enrolling in the BOC training, or had not yet been implemented at the time of the follow-up verification telephone call. Additionally, during the follow-up call several respondents indicated that they actually had received an incentive for their project.

Specifically, a total of 14 measures were screened out as ineligible for net savings during the follow-up calls due to the following reasons:

- The measure was implemented prior to the participant attending BOC training;
- The measure had not yet been implemented at the time of the follow-up call;
- The participant stated that the measure received an EEPS or Department of Commerce incentive;
- The evaluators determined that the measure did not result in any calculable energy savings.

Table 3-2 displays the percentage of measures that met the net savings criterion for each question outlined in Section 3.1. As per the stated net savings methodology, measures must meet the net savings criteria for both the Program Importance Score and No-Program Score in order to be evaluated for net savings attributable to the BOC Program.

The values shown below represent all reported measures in the survey, regardless of whether a separate utility or Department of Commerce incentive was received for the project.

Table 3-2 Distribution of Net-to-Gross Respondents for Cited Projects

Program Attribution Question	*Percentage of Measures Meeting Net Savings Criterion (N = 140)*
Net Savings Question 1 (Program Importance Score)	41%
Net Savings Question 2 (No-Program Score)	19%

3.2.1 Discussion of Net-to-Gross Findings

While the BOC Program was stated to be an important factor in the decision to install 41% of measures, participant responses indicated that only 19% of reported measures were unlikely to be installed in the absence of the BOC Program and training courses. This is due to some projects having already been planned prior to the training, and to some projects having been implemented in the facility independent of any input from the BOC participant.

As with prior years, the percentage of projects receiving utility or Department of Commerce incentives remained high. Of the 103 non-maintenance measures reported by BOC participants in EPY7/GPY4, 56% were associated with other incentive programs according to survey responses. While the BOC training was likely influential for many of these projects, the incentivized savings are claimable by the Department of Commerce and the utilities and cannot also be attributed to the BOC Program. This issue has persisted through each evaluation year and is likely a consequence of one of the BOC Program's objectives: directing participants towards these types of incentive opportunities.

It should be noted that the evaluators referenced additional commentary and information provided by survey respondents in order to make a final determination regarding the net savings potential for each measure. This included examining responses to consistency checks and open-ended commentary. Although only 19% of measures passed the criterion in place for Net Savings Question 2, 34% of the initially reported 140 measures were determined to qualify for net savings.

3.3 Net Savings Summary

Table 3-3 presents the sampled net savings, by measure, for each measure and maintenance category that achieved net savings within the sampled participant group. Compressed air system maintenance accounted for the largest portion of kWh savings in the sample group; this was the result of a single compressed air low pressure drop filter project implemented at a participant facility. Additionally, one ventilation system maintenance project was identified as evaluable and eligible for net savings. In the non-maintenance category, the evaluators identified four lighting

controls projects and two energy efficient lighting projects during follow-up engineering telephone discussions that qualified for net savings.

No gas savings were identified as evaluable and eligible for net savings during the participant survey effort or subsequent engineering follow-up calls.

Table 3-3 Net Savings by Measure for Participant Sample

Measure Category	*Total Sampled Net Savings*		
	kWh	*kW*	*Therms*
Energy Efficient Lighting	90,086.28	21.93	-
Lighting Controls	188,513.44	57.55	-
Ventilation System Maintenance	4,903.71	-	-
Compressed Air System Maintenance	328,673.28	39.50	-
Total	612,176.71	118.98	0.00

The total savings shown above were extrapolated to represent the population of BOC participants who completed the MEEA BOC Program training during EPY7/GPY4. The evaluators were able to conduct participant surveys with 40 of the 122 BOC participants who completed the course during EPY7/GPY4. Based on participant survey responses, 18 of the 40 respondents reported energy saving projects that potentially qualified for net savings attributable to the BOC Program. Of the 18 sampled BOC participants who were associated with potential net savings through the program, evaluators were able to contact and verify savings for 12 facilities. The remaining six participants either could not be reached during the follow-up effort, or were not able to provide sufficient information to calculate savings for their projects. These six participants were removed from the sample and treated as part of the remaining population of BOC participants who were not reached during the survey effort.

Additionally, during engineering follow-up discussions the evaluators determined that the projects reported by four facilities had either not yet been implemented or had received an incentive through a utility program or Department of Commerce grant; therefore net savings were calculated for a total of eight facilities.

This resulted in a total savings value representing the eight BOC participants who had implemented projects attributable to the program. This savings value was then divided by the total number of survey respondents (34 respondents, after subtracting out the participants with insufficient information) in order to determine the average savings per sampled participant. Once this savings value was determined, the savings were extrapolated to the program participant population.[11]

[11] The sampled savings were extrapolated to a population of 117 total participants. The five veteran program participants who completed the BOC course were not included in the savings extrapolation, as the three veterans who completed the participant survey effort indicated that they are not currently employed in a building operator or facility management capacity.

Savings were extrapolated based on the distribution of utility service providers within the participant population. Table 3-4 presents the percentage of BOC participants serviced by each electric utility during EPY7/GPY4. These proportions were applied to the net savings value in order to develop savings by utility.

Table 3-4 Distribution of Electric Utilities among BOC Participants

Utility	*Percentage of Total Participants*
Ameren	24.8%
ComEd	58.4%
Other	16.8%
Total	100%

Table 3-5 presents the net kWh savings by utility for the Building Operator Certification Program during EPY7/GPY4. It should be noted that because some participants were serviced by non-EEPS electric utilities such as municipal utilities, electric savings generated through these participants were not claimable by the BOC Program investor utilities.

Table 3-5 Summary of Net kWh Savings for BOC Program

Electric Utility	*Realized Net kWh Savings*
Ameren	521,991.38
ComEd	1,230,408.26
Total	1,752,399.65

Table 3-6 presents the net kW savings by utility for the Building Operator Certification Program during EPY7/GPY4.

Table 3-6 Summary of Net kW Savings for BOC Program

Utility	*Realized Net kW Savings*
Ameren	101.46
ComEd	239.15
Total	340.61

The total net energy savings of the Building Operator Certification Program during EPY7/GPY4 are summarized in the following table. During this period, net energy savings attributed to the program totaled 1,752,399.65 kWh and 340.61 kW. These values do not include savings generated through non-EEPS utilities, which totaled 354,208.44 kWh and 68.85 kW.

Table 3-7 Summary of Net Savings from EPY7/GPY4 Projects

Savings Level	*Total Net Savings*		
	kWh	*kW*	*Therms*
Per Participant	18,005.20	3.50	-
Extrapolated to EPY7/GPY4 Participants	1,752,399.65	25.57	-

Although the electric savings values are much higher than either EPY6/GPY3 or EPY5/GPY2 savings, no gas savings were identified for EPY7/GPY4. Two main factors likely account for these savings characteristics:

1. Due to the relatively small sample size available for evaluation, the presence of a single project with high savings significantly affects the total program savings. In the case of EPY7/GPY4, the majority of electric savings resulted from a single compressed air maintenance project.
2. The EPY7/GPY4 evaluation occurred during the summer months of 2015, and building operators may not yet be focused on implementing gas heating improvements in their buildings. Although several participants indicated that they would likely be implementing heating projects that would result in gas savings in the near future, these projects were not yet implemented at the time of evaluation and cannot be attributed to the program at this time.

As stated in prior evaluation reports, the range of possible projects implemented by BOC participants is very wide in terms of scope, cost, and end use likely resulting in high savings variability across program years.

4. Process Evaluation

This chapter discusses results of the Building Operator Certification Program process evaluation for electric program year seven and natural gas program year four (EPY7/GPY4).

The purpose of the process evaluation is to assess the program from a structural, operational, and managerial perspective in order to identify program strengths, weaknesses, and opportunities. This evaluation is based on surveys with BOC participants, supervisors of participants, MEEA staff feedback, and analysis of program data and documentation.

As the BOC Program has now been evaluated for multiple consecutive years, the evaluators conducted a limited process evaluation focused on identifying any significant changes to program design, course curriculum, and delivery, and on tracking the status of evaluation conclusions and recommendations that were identified in previous evaluation years.

This chapter begins with a summary and discussion of the results from the EPY7/GPY4 BOC participant survey. This is followed by a discussion of the outcomes of the MEEA staff interview. The chapter concludes by highlighting key findings and program recommendations resulting from the process evaluation.

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 participation and satisfaction levels.

This process evaluation was designed to document the operations and delivery of the Building Operator Certification Program during electric program year seven and natural gas program year four (EPY7/GPY4). Figure 4-1 provides an overview of the evaluation process, including the research activities performed.

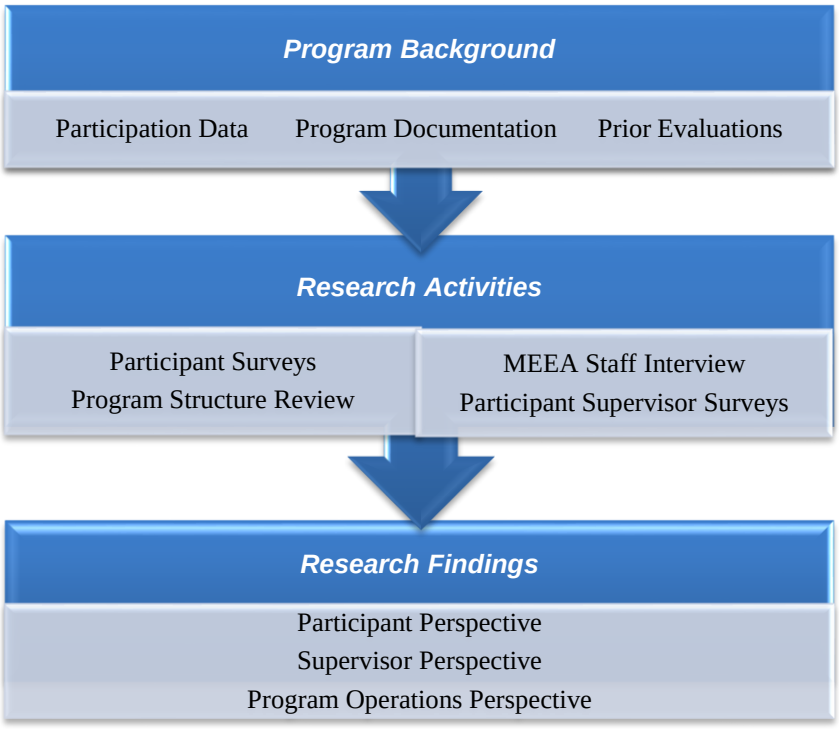

Figure 4-1 Process Evaluation Overview

Key research questions to be addressed by this evaluation of EPY7/GPY4 activity include:

- Is the Building Operator Certification Program using its available resources in a way that sufficiently supports program operation, growth, and performance?
- Is the Building Operator Certification Program effectively engaging participants and meeting their energy efficiency and educational needs?
- Did the Building Operator Certification Program reduce barriers to increased energy efficiency project implementation?
- Did the Building Operator Certification Program respond to previous recommendations obtained through prior evaluation efforts?

During the evaluation, data and information from several sources were analyzed to achieve the stated research objectives. Participant perspectives on the BOC training program were collected using a survey tool conducted over the phone and online. Participants' supervisors were surveyed in order to gain the supervisors' perspectives on program benefits and how their employees have applied the knowledge they gained in the BOC Program to their workplace. Staff perspectives on the internal organization and operational efficiency of program delivery were examined through an interview with MEEA program management staff, and review of program documentation (e.g. promotional literature, participant tracking data, certification maintenance data, and internal course assessments).

4.2 Summary of Primary Data Collection

- Participant surveys: Participant surveys serve as the foundation for understanding the participant perspective. The participant surveys provide participant feedback and insight regarding participant experiences with the Building Operator Certification 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. For EPY7/GPY4 of the Building Operator Certification Program evaluation, 40 program participants responded to the participant survey.

- Supervisor surveys: ADM administered an online survey to supervisors of employees who attended the BOC training during EPY7/GPY4. The purpose of the survey was to assess the value of the training to the organization, identify any impacts on employees' job behaviors and performance that the supervisor may have observed, barriers to completing efficiency improvements, and barriers to participation in the program. ADM received the contact information for 13 supervisors, of whom 5 responded to the survey.

- Interviews and discussions with MEEA staff: In-depth interviews and ongoing discussions with MEEA staff throughout the evaluation provided insight into various aspects of the program and its organization. MEEA staff also provided information about recent organizational and procedural improvements that have been implemented in order to enhance program efficiency and effectiveness.

4.3 Participant Outcomes

A telephone survey was conducted to collect data about participant decision-making, preferences, and opinions of the Building Operator Certification (BOC) Program. In electric program year seven and natural gas program year four (EPY7/GPY4), 122 course participants successfully completed the training and received the associated certification. In total, 40 participants fully responded to the process evaluation components of the telephone survey.

The EPY7/GPY4 survey instrument was nearly identical to the instrument used for EPY6/GPY3 in terms of program areas discussed and types of information gathered. This section presents comparisons between participant responses in EPY7/GPY4 and prior years when appropriate.

4.3.1 Participant Characteristics

When asked to categorize their facility types, the majority of respondents provided a response of *Other* and explained that they are responsible for multiple types of buildings. These respondents primarily represented counties, cities, and other groups of public sector buildings that included libraries, police stations, offices, and community centers. The results are displayed in Table 4-1. These results vary from those of EPY6/GPY3, where the majority of survey respondents indicated a single facility type and appeared to be responsible for one building rather than a group of buildings.

Table 4-1 Respondent Facility Types

	Response	*Percent of Respondents (N = 40)*
What type of facility is it? (Do not read list)	Other (please specify)	53%
	Office - Low Rise	10%
	Hospital	8%
	College/University	5%
	Heavy Industry	5%
	Office - High Rise	5%
	Elementary	3%
	Manufacturing Facility	3%
	Office - Mid Rise	3%
	Retail - Department Store	3%
	School (K-12)	3%
	Don't know	3%

Survey respondents were asked a series of questions related to employment including job titles, and length of employment in their current role. As shown in *Figure 4-2*, 25% of respondents reported holding managerial, team leader, or supervisory job titles while 22% of respondents indicated that they are engineers. These results vary somewhat from prior years in that a higher percentage of respondents are in managerial or supervisory roles rather than individual contributor roles.

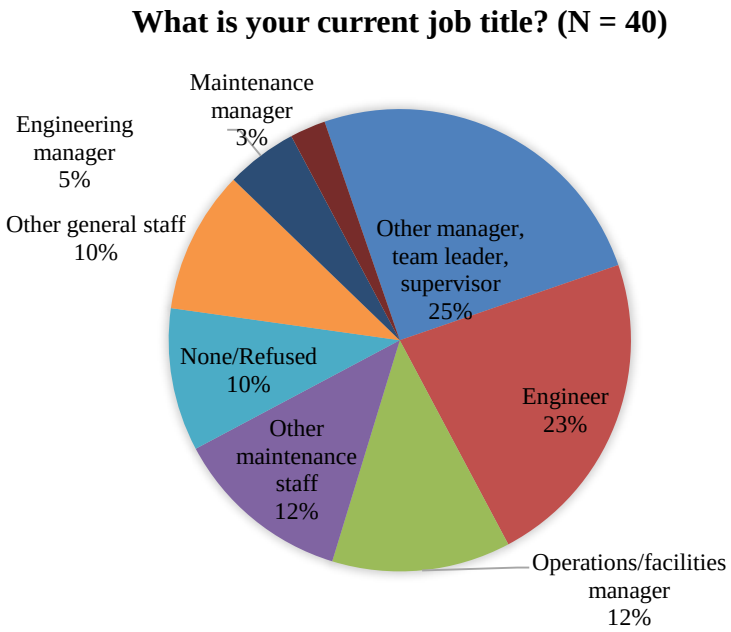

Figure 4-2 Participant Reported Current Job Titles

When asked how long they had worked in their current role, employed respondents provided a wide range of responses, ranging from one to 40 years. The average was approximately 10.5

years. As with prior evaluations, this suggests that participants are highly experienced in their fields, and are likely very familiar with their facilities' equipment and processes.

Respondents were also asked about the number of building operator staff in their facilities. On average, respondents reported that their facilities had 9.8 such staff members, an increase from the average 7.6 reported in EPY6/GPY3. The increase in number of building operator staff at respondents' facilities may be due to a larger percentage EPY7/GPY4 respondents representing multiple facilities or groups of public sector buildings rather than a single facility. When asked how many of these staff members had completed either Level 1 or both Level 1 and Level 2 of BOC training, respondents reported that an average of only 1.8 staff members had accomplished this. As with the prior evaluation, this result suggests that there are likely remaining BOC Program candidates in many of the currently participating facilities.

4.3.2 Existing Energy Efficiency Policies or Procedures

In order to gauge participants' prior and current organizational structures with regard to energy efficiency, survey respondents were asked about energy efficiency policies or procedures that may be in place at their facilities. As shown in

Table *4-2*, approximately two-thirds of respondents reported having a staff member responsible for energy efficiency and nearly half of the respondents indicated that they have an energy management plan. Compared to EPY6/GPY3, a similar portion of respondents reported having active training of staff, but a higher portion of EPY6/GPY3 respondents reported having an energy management plan and policies that incorporate energy efficiency. It is unclear whether the presence of these policies and procedures directly affect the energy saving behaviors at participant facilities, but facilities with fewer resources dedicated to energy efficiency may have a greater potential to gain insight into energy saving projects and opportunities as a result of Building Operator Certification training.

Table 4-2 Existing Energy Efficiency Policies and Procedures

	Response	*Percent of Respondents (n=40)*
Which of the following policies or procedures does your organization have in place regarding energy efficiency improvements?	An energy management plan	48%
	Policies that incorporate energy efficiency in operations and procurement	35%
	A staff member responsible for energy and energy efficiency	68%
	Active training of staff	45%
	Don't know	8%
	Other	3%

Thirteen respondents provided information about their facilities' energy management plan goals. The majority of these respondents did not have specific energy usage targets in mind but provided general information about their organization's approach to energy efficiency when considering specific projects or end uses. Specific commentary related to energy management plans includes:

We are targeting that we want to reduce overall energy use by 30% by 2030.

It's referred to as "20/20 vision" --- to achieve a 20% reduction by 2020.

Depending on the scope of the project we always look to how to decrease our energy consumption – usually it's a percentage of decrease of energy consumption from the previous year.

4.3.3 Program Awareness and Information Channels

As with prior years, BOC participants were asked a series of questions designed to offer insight into general program and rebate awareness and to gauge participant interaction with various marketing and information channels.

Figure 4-3 displays participant responses regarding how they learned about the BOC tuition rebate. The percentages shown are the percentages of respondents, and respondents were able to select multiple responses. The most commonly cited channel for learning about the tuition rebate

was through friends or colleagues; this has remained consistent throughout the past several program years.

Respondents also learned of the tuition rebate from a utility representative, from contractors, during conferences, through SEDAC, and through BOC or Department of Commerce representatives.

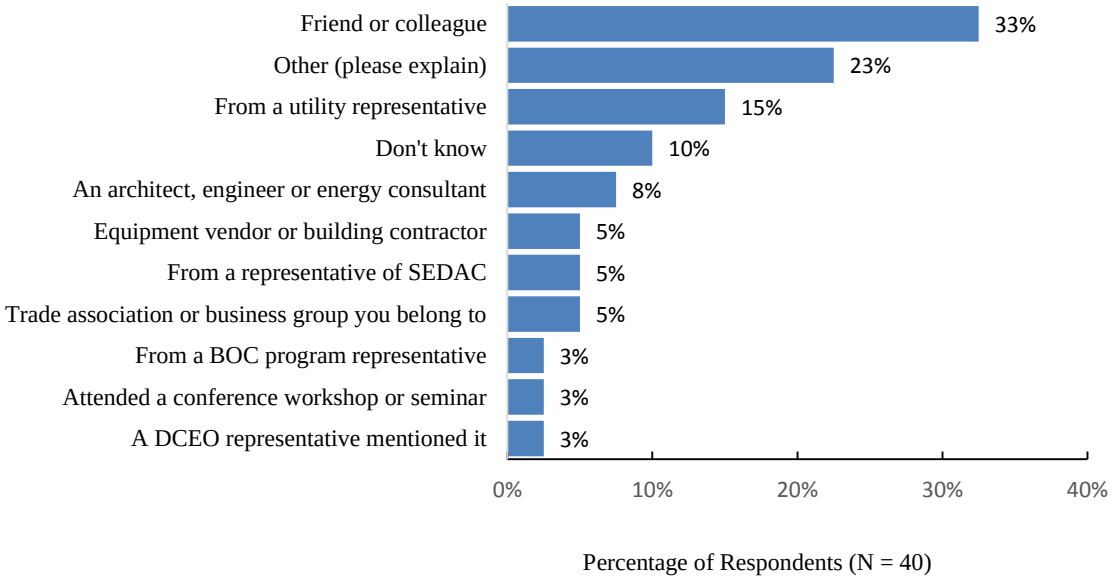

Figure 4-3 How Participants Learned about the BOC Tuition Rebate

Several additional response options were provided for this survey question, although some options were not chosen by any respondents. The methods of learning about the BOC tuition rebate that were not cited by any respondents include:

- A Midwestern Energy Efficiency Alliance (MEEA) representative
- The Department of Commerce website;
- Brochures or advertisements;
- Trade journals or magazines;
- Past experience with the program;
- An energy service company; and
- An Energy Resource Center (ERC) representative.

Participants were asked to name sources their organizations typically rely on for information regarding energy efficiency (including energy efficient practices, equipment, materials, and design features). The following figure displays the distribution of results, where respondents were able to provide multiple responses.

The most commonly cited source of information was equipment vendors or building contractors, followed by utility representatives. These two responses were also the two most commonly cited information sources during the EPY6/GPY3 evaluation. Overall, respondents reported relying on a wide range of sources for energy usage and energy efficiency information. In addition to the listed information sources, respondents selecting the *Other* response cited sources such as Chicago sustainability websites, the U.S. Department of Energy, ENERGY STAR® literature, and broad internet searches.

None of the respondents reported relying on brochures or advertisements or the Energy Resource Center (ERC) for information about energy efficiency, both of which were listed as options.

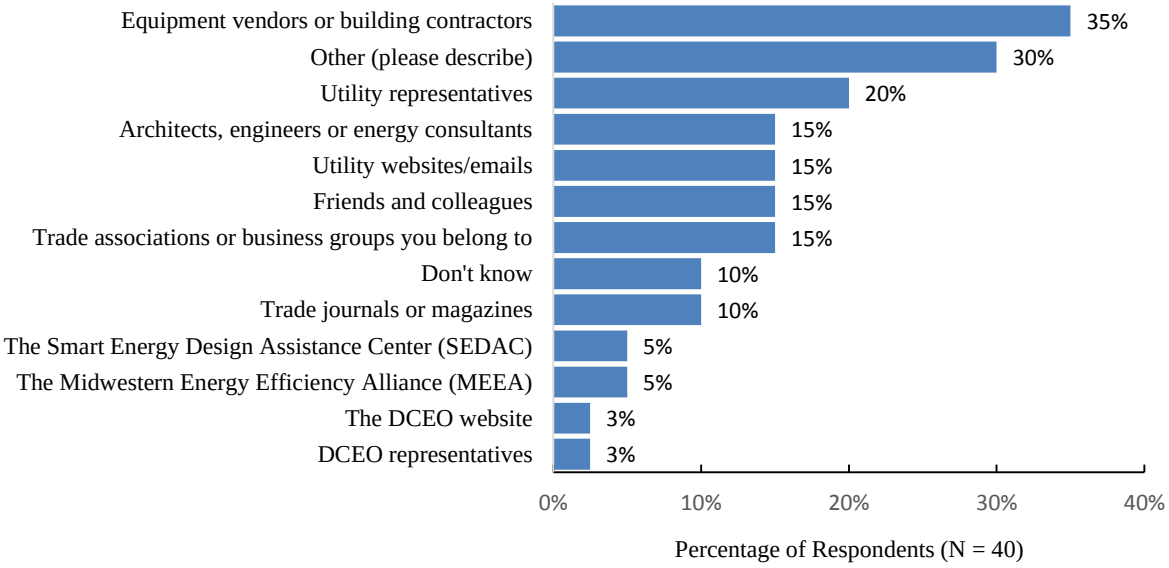

Figure 4-4 Information Sources Typically Used by Participants

4.3.4 Factors Affecting Participation

Participants cited several main factors when asked why they participated in the courses, as shown in

Percentage of Respondents (N = 40)

Figure 4-5. Respondents were able to select more than one reason for participating in the program, and the majority of respondents provided at least two responses.

As with EPY6/GPY3, the two most common reasons participants cited for participating in the training course were to learn about energy efficiency or to learn new skills. A fairly high percentage of respondents cited reasons related to career opportunities, including advancing in their current job or improving their chances of obtaining a new job. Additionally, 28% of respondents stated that participating in the program was required by their company or

organization. Only 13% of respondents cited the tuition rebate as a reason for participating in the program, although this may have been a motivating factor that was considered by participants' supervisors rather than by the participants.

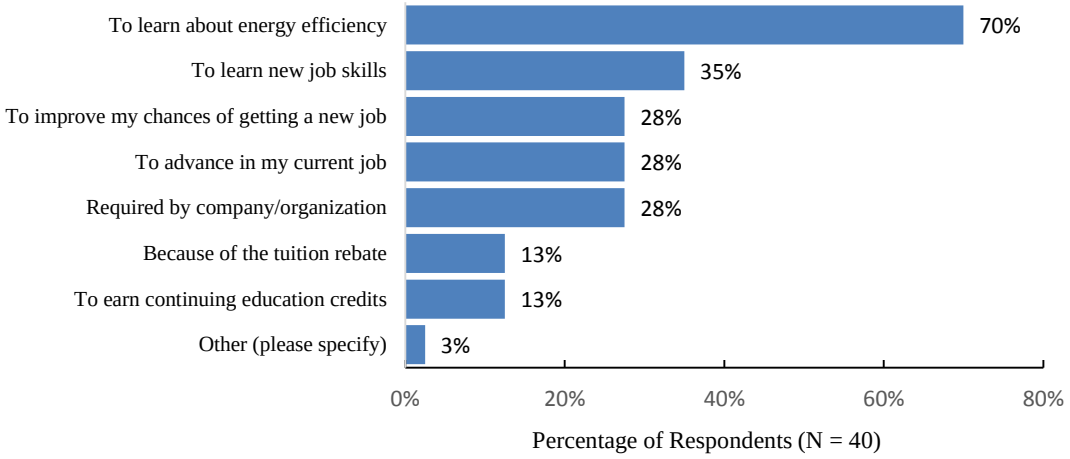

Figure 4-5 Participant Motivations to Enroll in BOC Course

4.3.5 Participant Actions Following BOC Training

As with prior evaluation years, the respondents were asked if any energy efficiency improvements had been made to their facilities since they attended the BOC course. These responses were used to inform the savings impact analysis. This individual question relates only to the timing of projects, and does not yet take into account free ridership levels or whether the participant received a separate incentive for the energy efficiency improvements. Thus, respondents provided information about any energy efficiency improvement since the program, even if the BOC Program did not influence the implementation.

Respondents were asked about a wide range of measures and maintenance activities that may have generated electric or natural gas savings. The equipment and other measures addressed by this portion of the survey include:

- Lighting;
- Lighting controls;
- Air conditioning;
- Economizer;
- Heating system;
- Cooling system;
- Motors;

- Energy Management System (EMS); and
- Variable Speed Drive (VSD).

The maintenance activities addressed by this portion of the survey include:

- Electric panel maintenance;
- Heating system maintenance;
- Cooling system maintenance;
- Ventilation maintenance;
- Compressed air maintenance; and
- Motor maintenance.

Additionally, respondents were given the opportunity to provide details about any equipment implementations or maintenance activities that do not fall under these listed categories.

4.3.6 Energy Efficient Equipment Implementation

Approximately 78% of respondents (31 of 40) indicated that they had purchased and installed new equipment since participating in the BOC courses. This is a slight increase in reported activity since EPY6/GPY3 where only 65% of respondents reported implementing an equipment or maintenance project since participating in the training. Figure 4-6 displays the types of projects that were cited by these respondents. The distribution of equipment types is very similar to that of the past three program years, with lighting and lighting controls being the most commonly reported measures. The next most common energy efficiency measure was air conditioning improvements, followed by heating system improvements. Few respondents reported implementing compressed air or water heating improvements.

It should be noted that the information presented below presents all measures reported by BOC participant survey respondents, regardless of whether they were influenced by the BOC training or the associated tuition rebate. The savings impact chapter of this report (Chapter 3) presents net savings for the BOC Program, taking into account BOC training influence, tuition rebate influence on attendance, and whether the participant received a separate incentive for implementing their energy efficiency project(s).

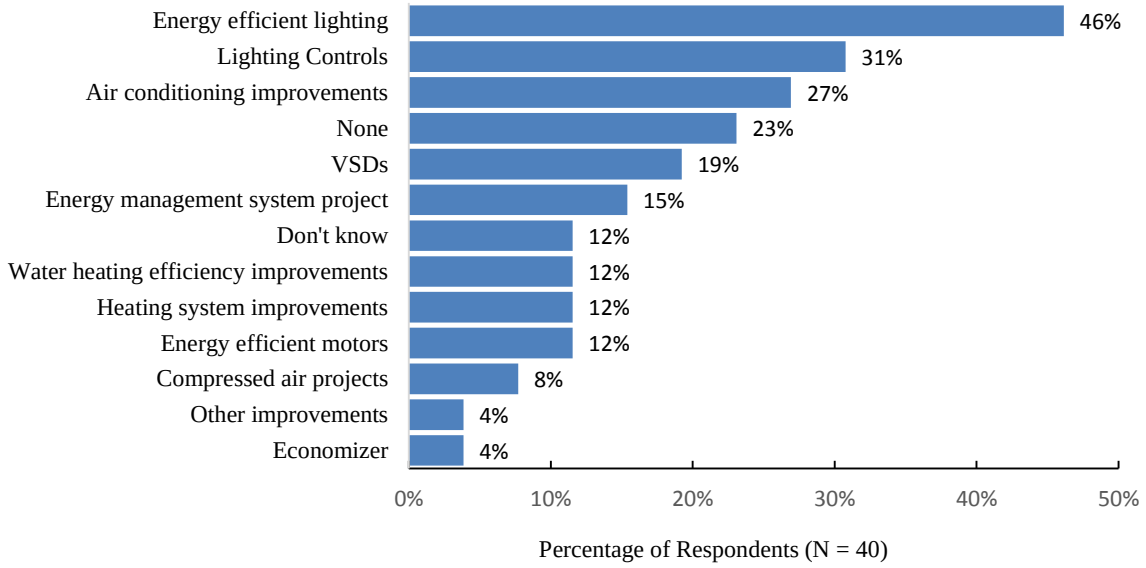

Figure 4-6 Participant Implementations Following BOC Training

4.3.7 Maintenance Improvements and Changes

Respondents were asked if they had implemented one or more maintenance improvements at their facility since participating in the BOC training. For each listed maintenance category, respondents were asked to indicate whether they perform this activity differently (such as adding a new step to the equipment cleaning process) or more frequently (such as maintaining equipment every six months rather than every year) since participating in the BOC training program.

Figure 4-7 displays the distribution of maintenance activities cited by respondents, showing whether they reported a frequency change or a methodology change in their maintenance. The most commonly reported maintenance activity was an increase in heating system maintenance frequency, which was cited by 23% of these respondents. This was followed by increases in ventilation, electric panel, and cooling system maintenance frequency. These results are very similar to those found during the EPY6/GPY3 evaluation, although increased motors maintenance was the most commonly cited change for that program year.

Although few respondents reported making compressed air maintenance changes after attending BOC training, the evaluators found that a single compressed air maintenance project implemented by one of these respondents had achieved more than 300,000 kWh in energy savings. This accounted for a very high portion of the total energy savings that were attributable to the BOC Program during EPY7/GPY4.

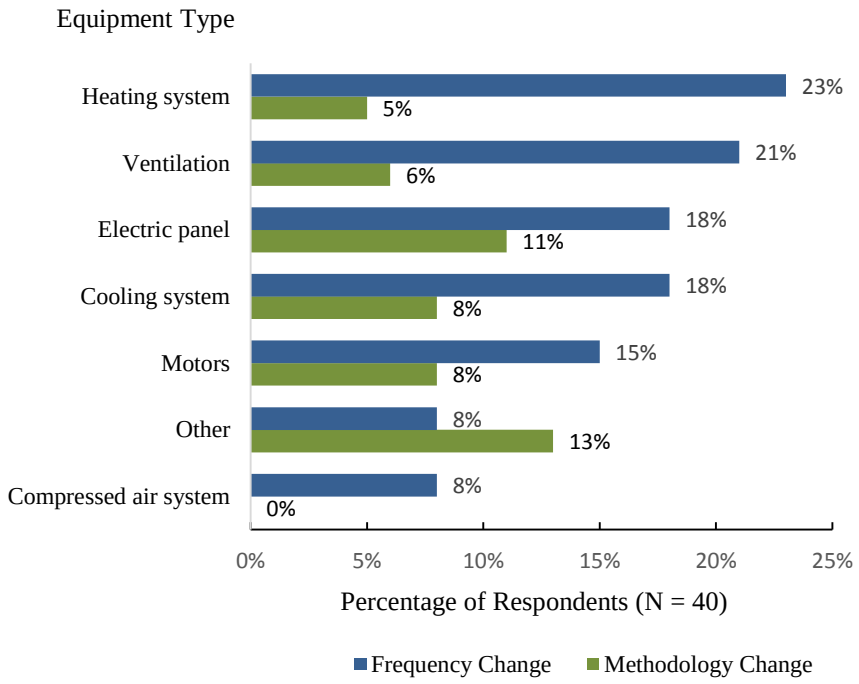

Figure 4-7 Maintenance Changes Following BOC Training

As with prior years, respondents who indicated implementing either a new maintenance activity or energy efficiency equipment project were asked to provide further details about these actions in order to inform the impact evaluation process. These details included specific equipment types, square footage of relevant facility space, and in-depth descriptions of maintenance behaviors.

Additionally, the survey included several subcategories for each maintenance type. For example, if a respondent reported a change in cooling system maintenance, he or she was asked whether this maintenance related to water treatment, cooling towers, condensers, sensor calibration, or other aspects of the cooling system. Additionally, the evaluators prompted participants with these subcategories during the engineering follow-up calls in order to identify any additional maintenance changes that were not captured during the initial survey effort. These subcategories were consistent with the updated list of operations and maintenance changes that was provided to the evaluators by MEEA during EPY7/GPY4.

4.3.8 Plans to Implement Additional Projects

Although the participant survey was administered several months after participants completed their final course and obtained their certification, the time needed to identify, plan, and implement energy efficiency projects can range from several weeks to a year or more. Thus, it is likely that individuals who completed the training during EPY7/GPY4 will implement energy saving projects that cannot be captured during the EPY7/GPY4 evaluation. In order to identify

these projects, survey respondents were asked to identify any projects that are currently planned but have not yet been implemented.

As shown in Table 4-3 52% of respondents reported having at least one of the listed projects planned at the time of the survey. The most commonly identified project was energy efficient lighting, followed by heating system and air conditioning improvements. When asked whether they had initiated the plans for these projects, 12 respondents stated that they had initiated the plans. Additionally, nine of these respondents stated that they initiated the plans for these projects due to information they gained through the Building Operator Certification training.

It should be noted that the likelihood of these projects being implemented and the timing of the implementation is unclear. Additionally, many of these projects may qualify for Department of Commerce grants or EEPS incentives and the level of influence of the BOC on the implementation of these prospective projects has not been fully established. However, the results suggest that participants are actively recommending energy saving projects to their supervisors and that participant organizations are likely to make additional energy efficiency improvements in the near future.

Table 4-3 Planned Implementations of Energy Saving Projects

	Response	*Percent of Respondents (N = 40)*
Does your facility currently have plans to implement any of the following types of energy efficiency projects?	Energy efficient lighting	43%
	Heating system improvements	30%
	Air conditioning improvements	30%
	Lighting controls	28%
	Don't know	28%
	Energy management systems	20%
	None	20%
	Economizer on air handler	18%
	VSDs	15%
	Energy efficient motors	13%
	Water heating efficiency improvements	10%
	Compressed air projects	8%

4.3.9 Other Energy Efficiency Activities

Respondents were also asked about other activities related to energy efficiency that may have occurred at their facilities. These activities included implementing an energy budget, recording energy use, and setting and achieving energy savings goals. Participants provided information about which of these had occurred prior to participating in the BOC course, and which had occurred only after participating in the BOC course. Figure 4-8 displays the results. One-third of

the respondents reported that they had set energy savings goals prior to participating in the BOC training, and one-quarter reported that they had achieved these goals before participating in the program. Twenty percent of respondents reported that they had only set or achieved goals after participating in the training, which is a higher percentage than was found during the EPY6/GPY3 evaluation.12 More than half of the respondents reported that they had already recorded energy use over time prior to participating in the program, and one-third of respondents stated that they had previously implemented an energy budget.

Compared to EPY6/GPY3, a higher percentage of respondents reported implementing each of the listed procedural improvements only after completing the training. Although this question does not establish a causal link between the program and these activities, the results suggests that the BOC Program may be effectively motivating participants to develop their organization's energy saving resources.

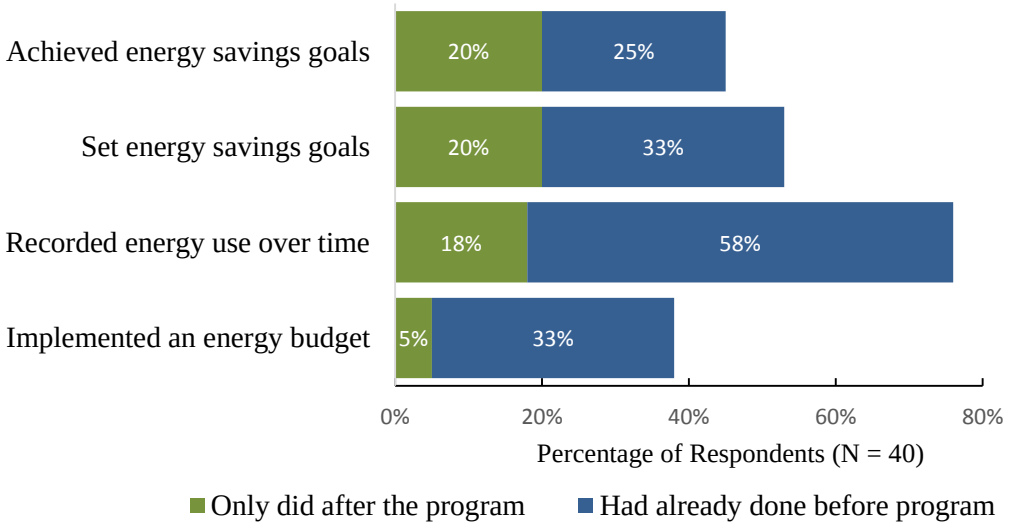

Figure 4-8 Procedural Energy Efficiency Activities Completed by Participants

4.3.10 Barriers to Implementation

In addition to asking participants whether they had implemented equipment or maintenance improvements since attending the BOC training, survey respondents were asked whether they had encountered any barriers to applying their BOC training in their workplace. Similar to EPY6/GPY3, 30% of respondents reported that they have encountered such barriers.

[12] During EPY6/GPY3, 12% of respondents stated that they had only set or achieved energy saving goals after they participated in the program.

When asked to provide further information regarding the barriers they have encountered in the workplace, the 10 respondents who provided this information most commonly cited insufficient budgets as a barrier to energy efficiency.

Only two respondents stated that their organization is not committed to energy efficiency improvements, and the two respondents who selected *Other* both cited lack of time to plan or approve projects as a barrier to energy efficiency. None of the respondents indicated that they have a lack of staff resources or issues with supervisor approval of energy efficiency projects.

Table 4-4 Barriers to Applying BOC Knowledge

	Response	*Percent of Respondents (N = 10)*
What barriers have you encountered? (Do not read list, but use as possible prompts)	Insufficient budget	80%
	Other (please specify)	20%
	Organization/company not committed to energy efficiency improvements	20%
	Not enough staff resources to plan efficiency projects	0%
	Lack of supervisor support	0%
	Don't know	0%

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

These results suggest that while some of the participant organizations may not have the capital to implement high-cost energy saving projects, they may be ideal candidates for utility energy efficiency programs or Department of Commerce grants.

4.3.11 Participant Satisfaction with the Program

Respondents were asked about their levels of satisfaction with selected aspects of the course, aspects of the financial incentive, and their overall program experience. Responses were provided on a scale of *very dissatisfied* to *very satisfied*. Table 4-5 shows participant satisfaction by each selected program element.

Satisfaction ratings were very high for each listed program element, and all respondents reported being *satisfied* or *very satisfied* with their overall BOC Program experience. None of the respondents reported being dissatisfied with the BOC course instructors, course schedule, tuition application process, or time taken to receive the tuition rebate. Only one respondent reported being dissatisfied with the tuition rebate amount, and this respondent explained that they had expected the BOC Program to include a rebate towards an energy efficiency project.

Although participants have reported high satisfaction levels during each evaluation year, the EPY7/GPY4 satisfaction feedback is especially positive. The satisfaction ratings suggest that the

program is very effectively meeting participant expectations, and is highly valued as an educational resource.

Table 4-5 Participant Satisfaction Ratings by Program Element

Element of Program Experience	*Satisfaction Rating (N = 40)*					
	Very Satisfied	*Satisfied*	*Neither Satisfied nor Dissatisfied*	*Dissatisfied*	*Very Dissatisfied*	*Don't know*
Course instructors	70%	25%	5%	-	-	-
Overall experience with BOC Program	82%	18%	-	-	-	-
Tuition rebate amount	54%	20%	3%	3%	-	20%
Tuition rebate application process	57%	18%	3%	-	-	22%
Time elapsed to receive tuition rebate	39%	28%	3%	-	-	30%
Course schedule	62%	35%	3%	-	-	-

4.3.12 Usefulness of Particular BOC Courses

Participants were then asked whether they found any of the courses they attended through the BOC to be particularly useful. Ninety percent of survey respondents reported that they had found at least one of the courses to be very useful. These respondents then provided open-ended commentary discussing the topics and courses that they found particularly useful; the evaluators categorized these comments into topic categories.

Specific courses or subject matter cited as particularly useful by survey respondents include:

- HVAC (13 respondents)
- Lighting (11 respondents)
- Electrical systems (9 respondents)
- Benchmarking (5 respondents)
- Indoor air quality (4 respondents)
- Building automation (4 respondents)
- Low cost operational improvement (3 respondents)
- Commissioning (3 respondents)
- ENERGY STAR® (1 respondent)
- Building envelope (1 respondent)
- Heating systems (1 respondent)
- Motors (1 respondent)
- VSDs (1 respondent)
- Water usage (1 respondent)

Several respondents did not identify specific topics but provided open-ended commentary indicating that they found several or all of the BOC courses very useful:

> *…They were all very relevant and the package was complete, not one [course] more than the other.*
>
> *All of them [were useful], I'd recommend them to anyone interested in energy savings, it was a very well taught course.*
>
> *There were a lot of things that came up that we hadn't looked at from a building operations standpoint. I picked up a lot of information.*
>
> *All of them were extremely useful, and all of the instructors were extremely knowledgeable.*

Respondents were then asked whether they thought that any particular BOC course was not useful. Six of the respondents (15%) reported that they had found at least one course to not be very useful, and were asked to elaborate on these opinions. Two respondents reported that they found the indoor air quality course to be tedious and noted that it did not contain enough information to justify a several hour course. One respondent stated that the Opportunities for Low Cost Improvements course was too basic that other building operators should already know that type of information.

The remaining three respondents explained that some of the course information did not pertain to their facility or their role, so they did not gain useful information from these topics (boiler systems, automated systems, and electrical systems). As participants have a wide array of backgrounds and facility types, it is likely that some course topics will not be relevant to certain individuals. However, the majority of feedback suggests that the course subject matter is appropriately tailored to the interests and needs of participants.

4.3.13 Participant Recommendations and Overall Impressions

The participant survey findings have been fairly consistent throughout the past several program years. The majority of feedback has been consistently positive, and many of the respondents have provided commentary that praises the BOC courses for their relevance, effectiveness, and structure.

As with prior evaluations, the majority of respondents cited specific courses or topics that had been particularly useful to them in their current employment roles, and some respondents explained that they had been able to implement specific energy saving initiatives as a result of new information learned through BOC training. This included both individual energy efficiency projects and organizational changes such as energy management plans and staff training.

BOC participants have continued to rely on a wide range of information sources to learn about energy efficiency, which emphasizes the importance of MEEA's active marketing and outreach

strategy. The survey feedback suggests that equipment vendors and contractors and utility messaging are likely effective methods of communicating with building operators and their organizations.

In terms of barriers to energy efficiency implementation, participants most commonly reported insufficient funding as a barrier. However, the majority of participants stated that they had not encountered any significant barriers in applying the knowledge they had gained through BOC training.

When asked to provide additional open-ended commentary about their experience with BOC, the majority of survey respondents used the opportunity to reiterate their high satisfaction and praise the program's quality and value. Additionally, several respondents provided suggestions for improving the program such as providing a more convenient meeting location (mentioned by one respondent), providing additional employment assistance to veteran participants (mentioned by two of the veteran respondents), and more actively promoting the program to prospective participants (mentioned by four respondents). Program administrators should consider this feedback during future program design and planning activities.

Respondents provided extremely high satisfaction ratings for all listed elements of their BOC Program experience and for the most part respondent commentary did not indicate any systematic or major issues with program structure, management, or operation.

4.4 Internal Course Assessment Review

In order to further assess participant feedback on the EPY7/GPY4 Building Operator Certification Program, the evaluators reviewed the course assessment forms that were filled out by participants upon completing training courses. This review was intended to identify any significant differences between the feedback provided within course assessments and the feedback provided in response to the participant survey. Additionally, the evaluators reviewed the course assessments for thoroughness and detail in order to determine whether any additional information should be gathered during future years.

Course assessments included covered a variety of topics related to the usefulness of individual courses and participant satisfaction with course content and delivery. The course assessments were updated and standardized to include a uniform series of questions across all BOC courses. Specific topics presented in the course assessments included:

- Usefulness of the course (1-10 scale);
- Amount of new information presented in course (1-10 scale);
- Comprehensiveness/complexity of course content (1-10 scale);
- Whether the course provided sufficient preparation and instruction towards on-site project (1-10 scale);

- Satisfaction with course organization, clarity, audio/visuals, handouts, in-class exercises, and opportunity for questions (1-10 scales);
- Whether areas of the curriculum would benefit from additional explanation (Yes/No);
- Whether the course effectively mixed instructor presentation and audience participation (Yes/No);
- Whether instructors allowed time to review the homework that was due next class (Yes/No);
- Extent to which course will increase likelihood of participant organization to purchase energy efficient equipment (1-10 scale);
- Presence of upcoming equipment purchasing decisions within participant organization (range of 6 months to 2+ years);
- Whether the course was worth the time and money spent (Yes/No);
- Whether participant would recommend the course to others (Yes/No);
- Other topics of interest to the participant (List of measure types and end uses); and
- Overall thoughts on potential course improvements.

A review of participant responses to the course assessment showed that participants were overall very satisfied with the course content, structure, and delivery. Additionally, many participants indicated that the course would likely increase their organization's likelihood of investing in energy efficient improvements, and that they would be making such equipment decisions within the next two years. Very few participants indicated dissatisfaction with course instructors, topics discussed, or other aspects of the Building Operator Certification Program experience. There were some suggestions for increasing the level of instructor explanation within specific courses, and some instances of participants indicating that the information presented in the course was either too basic or too complex, but the majority of respondent feedback was complimentary and positive in nature. These results are fairly consistent with those obtained through the evaluators' participant survey effort.

With regard to the content of the course assessment instrument, MEEA and NEEC have made significant improvements to the assessments over time and the current version is fairly comprehensive. It appears that program administrators are interested in gaining insight into participants' perspectives and are committed to making program improvements based on feedback obtained within these course assessments. The evaluators recommend that MEEA continue to administer these course assessments in order to continually assess participant satisfaction and monitor any emerging program issues as promptly as possible.

4.5 Supervisor Outcomes

ADM administered an internet survey to supervisors of employees who attended the BOC training. The purpose of the survey was to assess the value of the training the organization, any impacts on employees' job behaviors and performance that the supervisor may have observed,

barriers to completing efficiency improvements, and barriers to participation in the program. A similar supervisor survey was administered during the EPY5/GPY2 BOC program evaluation. The current survey effort serves to assess participant supervisors' current opinions and perceived program benefits and to identify any program issues or opportunities relevant to the supervisor perspective that may have emerged since the EPY5/GPY2 evaluation.

ADM received the contact information for 13 supervisors, of whom 5 responded to the survey. Each supervisor represented a single EPY7/GPY4 BOC graduate, none of whom responded to the participant survey.

Due to the limited sample frame and low number of respondents, the information presented in this section is not intended to represent the full population of participant supervisors. Supervisor feedback is presented in order to provide general insight into the supervisor perspective for EPY7/GPY4.

4.5.1 Overall Usefulness of the Program

Supervisors of Building Operator Certification Program graduates were asked whether the courses had been useful in increasing their employees' skill level and knowledge in various aspects of their jobs. Specifically, the survey asked how useful the courses had been in helping the employee identify energy efficiency improvements, monitor facility energy use, improve maintenance practices, and identify ways to improve occupant comfort. All of the supervisors reported that the courses had been *very useful* or *somewhat useful* in each of these categories. These results suggest that supervisors have seen improvement in several aspects of employee performance since the BOC courses were completed.

Four of the five supervisors indicated that the BOC Program had also been useful in helping their employees perform more effectively in other areas of their jobs. When asked to elaborate on these other areas of improvement, these supervisors provided the following responses:

> *More awareness for improving energy savings either by his daily actions or for future building budgeting.*
>
> *[The program] did make him look at what we do now and what we could do better.*
>
> *[The program] helped him become more familiar with overall business goals.*
>
> *I think the course helped round off and polish [the participant's] skills.*

When asked whether their employees had used or applied any of the concepts or methods taught in the BOC courses, all of the supervisors confirmed that employees had done this. This feedback suggests that BOC graduates are actively promoting energy efficiency in the workplace and that the program has resulted in observable improvements in their quality of work. This is consistent with the supervisor responses obtained during the EPY5/GPY2 evaluation.

4.5.2 Equipment Changes Implemented or Recommended Since Graduation

Supervisors were then asked to specify the equipment changes that their employees had either implemented or recommended since they completed the BOC training courses. These changes were separated into several categories, including:

- Lighting controls;
- Energy efficient lighting;
- Variable speed drives or variable frequency drives;
- Energy saving improvements to compressed air systems;
- Energy management systems;
- Energy saving improvements to heating systems;
- Energy saving improvements to cooling systems;
- Economizers; and
- Water heating efficiency improvements.

For each of the above categories, supervisors were asked to indicate whether their employees had either implemented a change or recommended the implementation of a change within that specific system or equipment type. All of the supervisors reported that their employee had recommended at least one of the listed projects, and four of the five supervisors reported that their employee had undertaken at least one project. The five supervisors identified a total of 17 projects that their employees had undertaken since participating in the BOC Program, and another 17 projects that their employees had recommended since participating in the program.

The most commonly cited projects were variable speed drives and energy management systems, with three of the supervisors reporting that their employees had undertaken both of these projects. The most recommended but not implemented project was energy saving improvements to cooling systems, which had been recommended by four employees but only undertaken by one employee.

While the participant survey provided information regarding project implementation, the supervisor survey results suggest that participants are actively recommending projects to their supervisors. The level of project activity and recommendations is fairly similar to that found during the EPY5/GPY2 supervisor survey. Although some of these projects have not yet been implemented and may not be approved by the participants' organizations, participants appear to be following BOC guidelines by identifying possible energy efficiency and comfort improvements and notifying their supervisors of these opportunities.

4.5.3 Maintenance Changes Implemented or Recommended Since Graduation

Supervisors were then asked to specify the maintenance changes that their employees had either implemented or recommended since they completed the BOC training courses. Two of the five supervisor respondents reported that their employees had either recommended or implemented a maintenance improvement since completing the BOC Program. When asked to elaborate on these maintenance changes, these supervisors mentioned that their employees had recommended set point adjustments and retro-commissioning activities.

As a follow-up, supervisors were asked whether their employees had performed any maintenance activities more often since completing the BOC Program. One supervisor stated that their employee had performed set point adjustments more often since completing the training. When asked whether their employees had performed any operations or maintenance activities more effectively since completing BOC training, two of the supervisors reported that their employees were more effective in one or more areas. One of these supervisors elaborated by explaining that their employee has become more effective in identifying lighting efficiency opportunities.

Relative to the EPY5/GPY2 supervisor survey effort, supervisors in EPY7/GPY4 provided less information regarding maintenance changes that had been implemented or recommended by recent BOC graduates. This is likely due to the smaller respondent population and does not necessarily reflect any significant changes in participant efforts towards energy efficient maintenance.

4.5.4 Barriers to Energy Efficiency Implementation

In order to gauge the overall ability of organizations to reduce their energy usage, supervisors were asked whether they face any barriers to the implementation of energy efficiency improvements. Two of the five supervisors identified barriers, both of which were related to financial resources to implement energy efficiency projects. None of the supervisors identified a lack of commitment to energy efficiency, lack of knowledge regarding energy efficiency, or limited staffing resources as barriers to energy efficiency implementation in their facility.

As with the participant survey responses, this feedback suggests that financial issues are the primary barrier to energy efficiency in participant facilities and that these organizations would likely benefit from participating in Department of Commerce grant programs or EEPS utility incentive programs.

4.5.5 Organizational Importance of Building Operator Certification

The Building Operator Certification Program is now established as a widely recognized training and education program that encourages best practices and contributes to efficient and mindful facility operation. The effects of the training program are not only limited to the specific projects and maintenance improvements conducted by BOC graduates, and include qualitative benefits to employees and their organizations. The supervisor survey included several questions to address this idea, focusing on the overall value and importance of the certification.

BOC participant supervisors were asked whether their employees had added value to their organization since completing the training, with responses separated into the following categories:

- Saving energy at your facility;
- Saving money;
- Helping to improve occupant comfort;
- Advising in decisions about equipment operation or replacement;
- Having more productive interactions with contractors; and
- Undertaking, recommending, or influencing any energy-efficiency projects.

All five supervisors indicated that their employee had added value in all of the above categories, with the exception of one supervisor who did not know whether their employee had become more productive during interactions with contractors.

In order to gauge to what extent BOC graduates share their training knowledge and educate colleagues about what they have learned, supervisors were asked about their employees' activities since returning from the BOC courses. When asked whether their employees had shared what they had learned with other employees, all five supervisors reported that this had occurred.

Supervisor respondents were then asked how important to the hiring decision it would be for a potential employee of their organization to have the Building Operator Certification. All five of the supervisors reported that it would be either important or very important to the hiring decision. Supervisors were then asked how important having the certification is for current employees to receive promotions or advancements, and all of the supervisors stated that it is an important or very important factor.

Compared to the EPY5/GPY2 supervisor responses, supervisors in EPY7/GPY4 more strongly and uniformly emphasized the value that recent BOC graduates have added to their organization. However in both cases, supervisor feedback highlighted the program's potential value to organizations, and suggested that BOC graduates are likely to represent a wide range of benefits to their employer in addition to energy efficiency improvements.

4.5.6 Considerations for Enrolling Employees in BOC

In order to gauge how supervisors determine who to send to BOC training, respondents were asked what factors they consider when deciding whether to enroll employees in the program. These considerations were divided into a list of categories including time and staff availability, training location and costs, employee professional development, legal requirements, benefits to the organization, and the employee's personal interest.

All of the supervisors indicated that location of the training and employee professional development were considerations when deciding whether to enroll an employee in the training.

Training costs, time/staff availability, and employee personal interest were each cited by three of the supervisors as important considerations.

As a follow-up question, supervisors were then asked whether their employees would have been sent to the Building Operator Certification Program if the tuition rebate had not been available. Four of the five supervisors stated that their employees probably would have attended the training without the rebate, and the remaining supervisor did not know whether their employee would have attended. This suggests that the perceived benefits of Building Operator Certification were numerous or valuable enough to justify spending the full tuition cost.

4.5.7 Future Energy Efficiency Activity

In order to gauge whether the BOC has had a significant effect on organizations' overall decision making and planning, supervisors were asked to speculate about their future involvement in energy efficiency. First, supervisors were asked whether the BOC training has increased the likelihood that their organization will participate in energy efficiency programs such as incentive programs. Two of the supervisors stated that the program has increased this likelihood, and were asked to elaborate on their responses. Specific commentary resulting from this question includes:

> *[The] education has given us ideas on whole building energy reduction measures.*

> *I think it helps us be more aware [of the programs].*

Supervisors reporting that the BOC Program has not increased the likelihood of participating in energy efficiency programs were also asked to elaborate on their responses. Both of these respondents stated that they would have participated in the programs even if their employee had not attended the training.

As a general follow-up question, supervisors were asked whether the employee training for Building Operator Certification has increased the likelihood that the organization will make investments in energy efficiency. None of the supervisors reported that the program has increased the likelihood of these investments (three supervisors respondent *don't know*). Two supervisors elaborated on their response, explaining that they would be likely to invest in energy efficiency regardless of the information gained in the training.

According to these results, some supervisors believe that their organizations are already participating in energy efficiency programs and making energy efficiency investments at a sufficient level. As the supervisors identified several projects that have been recommended but not yet undertaken, it may be useful to provide guidance and further support to supervisors and approval committees within participating organizations, as they will likely be the final decision makers with regard to future project recommendations. These findings are consistent with those obtained during the EPY5/GPY2 supervisor survey effort.

4.5.8 Future Enrollment and Program Referrals

Finally, supervisors were asked about future plans to recommend the BOC Program or to enroll additional employees in the program. All five of the supervisors reported that they would recommend the BOC Program to their colleagues, either within or outside of their organizations. Additionally, three of the supervisors stated that they expect to enroll additional staff in the program during future years.

4.5.9 Overall Supervisor Impressions

The EPY7/GPY4 supervisor survey responses reflect positively on the organizational benefits and broad value of Building Operator Certification, and suggest that graduates have become more effective in several aspects of their roles. None of the supervisors identified any issues with the program, and all five supervisors identified specific benefits that their employees have brought to the organization as a result of the training. The EPY7/GPY4 supervisor responses were very similar to those obtained during the EPY5/GPY2 evaluation, and do not suggest that there have been any significant trends in the supervisor perspective.

4.6 Program Operations Perspective

This section summarizes core Midwest Energy Efficiency Alliance (MEEA) staff interview findings. In order to gather information regarding the operational efficiency and program delivery process for the Building Operator Certification Program, the evaluators conducted interviews and ongoing discussions with MEEA program management staff. Discussion topics were designed to provide insight into any changes to the design, structure, and operation of the BOC Program since EPY6/GPY3, and to identify current program issues and trends.

4.6.1 Summary of Interview Findings

- **Additional Program Outreach Efforts:** When asked about future marketing and promotional efforts for the Building Operator Certification Program, MEEA staff explained that the Northwest Energy Efficiency Council (NEEC), BOC's national partner, is currently developing an in-depth marketing campaign that will be released nationally in the near future. This campaign will consist of magazine and newspaper articles, online promotions, and other advertisements that will be designed to increase regional and national awareness of the BOC. In addition to this new marketing campaign, MEEA is continuing to issue the MEEA Minute newsletter and BOC quarterly regional newsletter, and has continued to work with partners such as community colleges, the Energy Office, and Green Technology Center. These new and continued marketing efforts are intended to increase interest and ultimately boost BOC enrollment levels moving forward as building owners and organizations learn of the benefits of Building Operator Certification.
- **Continued City of Chicago Benchmarking Ordinance Effects:** The advancing tiers of the City of Chicago Benchmarking Ordinance have continued to generate interest in and

augment the value of obtaining Building Operator Certification. As BOC graduates are authorized by the City of Chicago to conduct energy benchmarking and energy data collection for submission to the city on behalf of building owners, the certification now has value that extends beyond making energy efficiency improvements in participants' individual facilities. 2015 marks the second tier of the ordinance, which requires all buildings greater than 50,000 square feet to meet the stated benchmarking requirements. Moving forward in 2016, the ordinance will also apply to residential buildings between 50,000 and 250,000 square feet. This will further increase the appeal of Building Operator Certification and will likely help to generate interest in the program among multi-family building owners.

MEEA staff noted that there has already been increased interest in the program from multi-family facilities and that the city is considering using an existing multi-family outreach grant to pay the tuition costs for building operators in these facilities to complete the training. Staff explained that MEEA and the City of Chicago have developed an effective partnership and that many recent BOC graduates have been able to apply their certification towards helping Chicago facilities meet these benchmarking requirements.

- **Additional Technical and Community College Connections:** Program staff explained that MEEA has continued to work with local technical and community colleges as part of its outreach effort. For example, during EPY7/GPY4 seven students at Wilbur Wright College enrolled in the BOC Program through the Building Energy Technologies (BET) Program that the college offers its students. Although they did not have sufficient work experience to qualify for the official Building Operator Certification, four of these students completed the courses and received a certificate of completion. As with prior program years, this working relationship with technical and community colleges has continued to promote the BOC program as a continuing education tool for both working professionals and full-time students.
- **Interest in Closed Series Course Format:** With regard to course delivery, MEEA noted that some organizations may be interested in arranging Building Operator Certification for their employees in a closed series format. This would consist of a private series of BOC courses for multiple employees of a single facility or organization. The potential benefits of a closed series format would likely depend on whether the employees are all from the same facility, or are from various facilities within the organization. While having multiple BOC graduates within a single facility may increase the likelihood that energy efficiency opportunities will be identified and recommended to upper management, distributing graduates among several facilities likely increases the overall potential energy savings per graduate. This may present an interesting research opportunity during future evaluation years.
- **Continued Curriculum Changes:** MEEA staff noted that course handbooks and curriculum documentation incorporated a new naming convention during EPY7/GPY4 that will be used to identify the degree of changes made to the content or materials of any BOC course. The three degrees of changes designate whether a course handbook experienced an Edition Change, a Version Change, or a Release Change. Using this standardized revision format will likely allow program managers, instructors, and other program staff to more efficiently understand and adapt to changes made from year to year. When asked about possible changes

to the program curriculum, MEEA staff stated that NEEC conducts a review of course content and overall curriculum during the summer months in order to make corrections and keep the courses up-to-date. MEEA noted that NEEC is planning to make several changes to the curriculum. The specific nature of these changes was not yet known during the time of the evaluation, but previous changes have been designed to abide by industry best practices and accommodate requests or suggestions made by past BOC participants and program partners.

- **Continued Military Veteran Outreach and Support:** MEEA continued to offer the military veteran component of the BOC for EPY7/GPY4, and a total of five veterans attended BOC courses during the year. Throughout the past program cycle and into this program year, this component has provided valuable information and career resources to veterans. Although none of the veteran participants who responded to the EPY7/GPY4 participant survey reported being employed at the time of the survey, MEEA has worked with employment partners and building managers to help secure employment for veteran graduates. The veteran component is currently on hold for the upcoming year due to state budgetary delays which affect Department of Commerce funding levels, but MEEA staff expressed interest in continuing to offer the program to veterans in the future if possible.

5. Conclusions and Recommendations

The following section presents a summary of key findings from the process and impact evaluations of the Building Operator Certification Program during electric program year seven and natural gas program year four (EPY7/GPY4). These conclusions and recommendations are based on a combination of research activities including participant surveys, supervisor surveys, interviews with program staff, and reviews of program tracking data, documentation, and prior evaluation reports.

5.1 Impact Conclusions

- **Few of the measure identified in the survey qualified for net savings.** As with prior program years, the savings estimation procedure determined that although participants reported implementing a wide range of projects after their participation in the BOC training, the total net savings impacts resulting from these projects were lower than may be expected based on the number of measures identified. These limitations are likely related to multiple issues:
    - As the participant survey was administered within a few months of training completion, many graduates may not have had enough time to either identify potential energy efficiency improvements in their facilities or have these improvements approved by their organization. Information gathered during the participant survey suggests that 52% of respondents currently have plans to implement at least one additional energy saving project within the near future. As the savings for these prospective projects cannot yet be attributed to the EPY7/GPY4 BOC Program, it is possible that BOC participants from the current program year will ultimately achieve greater energy savings than are reflected in this single-year evaluation. This may be particularly relevant for gas savings, as participants are more likely to identify and implement heating efficiency projects during the later fall and winter months.
    - Of the 103 non-maintenance measures reported by BOC participants in EPY7/GPY4, 56% were associated with other incentive programs according to survey responses. While the BOC training was likely influential for many of these projects, the incentivized savings are claimable by the Department of Commerce and the utilities and cannot also be attributed to the BOC Program. This issue has persisted through each evaluation year and is likely a consequence of one of the BOC Program's objectives: directing participants towards these types of incentive opportunities.
- **Net electricity savings increased dramatically during EPY7/GPY4.** Net kWh savings increased from approximately 88,000 kWh in EPY6/GPY3 to more than 1,700,000 kWh in EPY7/GPY4. This contrasts with the savings trend found during the previous three program years, where net savings steadily decreased over time. Due to the relatively small sample size available for evaluation, the presence of a single project with high savings significantly affects the total program savings. In the case of EPY7/GPY4, the majority of electric savings

resulted from a single compressed air maintenance project. As stated in prior evaluation reports, the range of possible projects implemented by BOC participants is very wide in terms of scope, cost, and end use likely resulting in high savings variability across program years.

5.2 Process Conclusions

- **Participant and supervisor satisfaction is consistently high.** As was found during the prior program cycle, BOC graduates indicated a high level of satisfaction with all elements of their program experience and for the most part did not indicate any systematic or major issues with program structure, management, or operation. The majority of respondents cited specific courses or topics that had been particularly useful to them in their current employment roles, and some respondents explained that they had been able to implement specific energy saving initiatives as a result of new information learned through BOC training. Participant supervisors unanimously indicated that the courses had been useful in adding value to their organization, and that their employees had made specific changes in the workplace as a result of attending the training. Although a few participants mentioned issues for consideration, such as that the class location could have been more convenient or that certain course topics were not relevant to them, the survey did not reveal any significant issues with program structure or delivery that require immediate attention.
- **Program outreach activities are comprehensive and continually updated.** MEEA and NEEC have consistently made improvements to how the BOC Program is promoted in order to increase program awareness and enrollment levels. In addition to traditional marketing media, MEEA has developed partnerships with entities such as community colleges, public sector organizations, and the City of Chicago, and these working relationships have been effective in facilitating participant enrollment and developing program interest. The upcoming marketing campaign being developed my NEEC is expected to further increase program awareness on a regional and national level, and the BOC Program is becoming more appealing in the City of Chicago for building owners who need to meet the requirements of the tiered benchmarking ordinance. Overall, the program has been widely promoted throughout the past several program years and is likely to generate an even higher level of interest among building owners moving forward.
- **MEEA is continually monitoring and improving program components.** MEEA and NEEC made continual changes to course structure and program resources during the prior program cycle and have demonstrated an ongoing commitment to doing so in future program years. This includes developing electronic informational tools, adding credential maintenance opportunities, and refining course content in order to reflect the most up-to-date building operation trends and practices. As the program moves forward, it will be important to have a proactive management structure that is able to modify program design and strategies as needed, and the current program administration staff appears to be well-suited to this role.

5.3 Recommendations

Overall, the evaluators found that the Building Operator Certification Program is well designed and delivered to participants, and is effectively meeting its objectives of educating facility staff on best practices for building operation and encouraging the implementation of energy saving improvements. Although the evaluation identified few significant issues with program structure or operation, the evaluators provide the following recommendations. These recommendations are based on the full range of evaluation activities conducted during EPY7/GPY4 and are intended as considerations for future program years.

- **Consider and plan for external incentive activity (Ongoing):** Throughout the past program cycle and into the current program year, BOC participants have sought and received additional measure incentives from external efficiency programs. As stated in prior evaluation reports, the BOC leads to energy savings through two channels: by directing participants towards utility incentive programs that will claim energy savings, and by causing participants to achieve non-incentivized energy savings. As the incentivized energy savings are not attributed to the BOC program itself, the program savings goals should account for the fact that many BOC graduates will seek additional rebates for their energy efficiency implementations.
- **Consider collecting additional participant characteristics during program enrollment:** As part of the savings impact analysis, the evaluators incorporate participant facility information such as square footage, percentage of facility for which the participant is responsible, and business type. Additionally, although the participant tracking data provides a facility address, this address may represent a mailing address rather than the address of the facility where the graduate may implement energy efficiency measures. Although many respondents provide this information during the survey, instances of missing facility information may cause issues during the savings calculation process. As some respondents appear non-responsive to engineering follow-up calls, it is important to gather as much information as possible from participant enrollment data and survey data. If MEEA is able to collect additional facility characteristics, including the specific address of the facility or facilities where the building operator would likely implement any energy efficiency improvements, this may increase the likelihood that the evaluators will be able to verify and calculate energy savings using only tracking data and survey data.
- **Consider providing additional resources to veteran participants.** The three veteran participants who completed the participant survey during EPY7/GPY4 all indicated that they were not employed at the time of the survey, and two of these respondents mentioned that they would have liked to receive additional employment assistance from the program. Although MEEA currently works with building owners and veteran participants to identify potential employment opportunities, it appears that some veteran participants expected some level of additional support after completing the BOC Program. The evaluators recommend contacting past veteran participants to inquire about this issue and determine whether there are any opportunities to easily provide additional attention to these BOC graduates.

Appendix A: Questionnaire for Participant Survey

Hello may I speak with [participant name]? My name is _____and I am calling on behalf of the Midwestern Energy Efficiency Alliance and the Illinois Department of Commerce and Economic Opportunity (DCEO).

According to our records you completed building operator certificate training and received a tuition rebate.

Is that correct?

( ) Yes
( ) *No (Thank and terminate)*
( ) Don't know *(Thank and terminate)*

I would like to speak with you about your experience with that course. The survey should take about 20 minutes. Is this a good time to talk?

[If no, reschedule]
[If refused, skip to end of survey and hit submit]

1. What are the sources your organization relies on for information about energy efficient practices, equipment, materials and design features? *(Do not read list. Select all that apply.)*
   ( ) DCEO representatives
   ( ) The DCEO website
   ( ) Utility representatives
   ( ) The Midwestern Energy Efficiency Alliance (MEEA)
   ( ) Brochures or advertisements
   ( ) Trade associations or business groups you belong to
   ( ) Trade journals or magazines
   ( ) Friends and colleagues
   ( ) The Smart Energy Design Assistance Center (SEDAC)
   ( ) The Energy Resource Center (ERC)
   ( ) Architects, engineers or energy consultants
   ( ) Equipment vendors or building contractors
   ( ) Other (please describe)
   ( ) Don't know

2. How did you learn about the Department of Commerce tuition rebate for the BOC training? *(Do not read list. Select all that apply.)*
   ( ) From a BOC program representative
   ( ) A Midwestern Energy Efficiency Alliance (MEEA) representative
   ( ) A DCEO representative mentioned it
   ( ) The DCEO website
   ( ) From a utility representative
   ( ) Brochures or advertisements

( ) Trade association or business group you belong to
( ) Trade journal or magazine
( ) Friend or colleague
( ) From a representative of Smart Energy Design Assistance Center (SEDAC)
( ) From a representative of the Energy Resource Center (ERC)
( ) An architect, engineer or energy consultant
( ) Equipment vendor or building contractor
( ) Attended a conference workshop or seminar
( ) Past experience with the program
( ) An energy service company
( ) Other (please describe)
( ) Don't know

3. When you learned about the tuition rebate available for the BOC courses, did you already know about the BOC training?
( ) Yes
( ) No
( ) Don't know

4. Which of the following policies or procedures does your organization have in place regarding energy efficiency improvements at this facility? *(Select all that apply)*
( ) An energy management plan (If checked, go to 4A)
( ) A staff member responsible for energy and energy efficiency
( ) Policies that incorporate energy efficiency in operations and procurement
( ) Active training of staff
( ) Other (please specify)
( ) Don't know

4A. Does your energy management plan include goals for energy savings?
( ) Yes (If checked, go to 4B)
( ) No
( ) Don't know

4B. Could you describe the goals specified in your energy management plan?

5. Were any of the courses you took through the BOC program particularly useful?
( ) Yes *(If marked, go to 5A)*
( ) No
( ) Don't know

5A. Which ones and what made them useful?

6. Were there any courses that you found to not be very useful?
( ) Yes *(If marked, go to 6A*)
( ) No
( ) Don't know

6A. Which ones and what made them not very useful?

7. Why did you attend the BOC training? *(Do not read list. Select all that apply.)* (*Use as prompts if necessary*)
   - ( ) Required by company/organization
   - ( ) To learn new job skills
   - ( ) To advance in my current job
   - ( ) To improve my chances of getting a new job
   - ( ) To earn continuing education credits
   - ( ) To learn about energy efficiency
   - ( ) Because of the tuition rebate
   - ( ) Other
   - ( ) Don't know

8. Have you encountered any barriers to applying what you learned about energy efficiency improvements during the BOC training?
   ( ) Yes (If checked, go to 8A)
   ( ) No
   ( ) Don't know

   8a. What barriers have you encountered? *(Do not read list, but use as possible prompts)*
   - ( ) Lack of supervisor support
   - ( ) Insufficient budget
   - ( ) Organization/company not committed to energy efficiency improvements
   - ( ) Not enough staff resources to plan efficiency projects
   - ( ) Other
   - ( ) Don't know

9. What is the approximate square footage of your building or buildings?

10. What percentage of that space are you responsible for?

11. How many hours per week is your site open for business?

12. What type of facility is it? *(Do not read list)*
   - ( ) College/University
   - ( ) Elementary
   - ( ) Grocery
   - ( ) Healthcare Clinic
   - ( ) Heavy Industry
   - ( ) High School/Middle School
   - ( ) Hospital
   - ( ) Hotel/Motel
   - ( ) Light Industry
   - ( ) Lodging Hotel/Motel
   - ( ) Manufacturing Facility

( ) Medical
( ) Office - High Rise
( ) Office - Low Rise
( ) Office - Mid Rise
( ) Religious Facility
( ) Restaurant
( ) Retail - Department Store
( ) Retail - Strip Mall
( ) Retail/Service
( ) School (K-12)
( ) Warehouse
( ) Other
( ) Don't know

13. Since participating in the BOC program have you implemented any of the following types of energy efficiency projects? *(Ask follow up energy impact assessment questions for any project types indicated)*
( ) Lighting Controls
( ) Energy efficient lighting
( ) NEMA premium energy efficient motors
( ) VSDs
( ) Compressed air projects
( ) Energy management systems
( ) Heating system improvements
( ) Air conditioning improvements
( ) Economizer on an air handler
( ) Water heating efficiency improvements
( ) Other improvements
( ) None-
( ) Don't know

14. Is there somebody we can contact about the measures that may have been installed after attending the BOC course? Please provide a name, phone number, and email address.

15. At how many facilities did you implement any of the previously listed projects?
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 or more
( ) Don't know

16. Is there somebody we can contact about the measures that may have been installed after attending the BOC course? Please provide a name, phone number, and email address.

Energy Impact Follow Up Questions

Lighting Controls
Net-to-Gross

LC1A. The next few questions relate to the lighting controls you implemented. Were lighting controls specifically recommended to you by a BOC course instructor or th~~o~~rough BOC course materials?

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

LC1B. How important was your experience in the Building Operator Certification Program in your decision to implement these lighting controls, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Extremely important

LC1C. Why do you give it this rating? (Please explain)

LC1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented these lighting controls, using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display LC1E if LC1B response = 0,1,2,3 AND LC1D response = 0,1,2,3 OR LC1B response = 8,9,10 AND LC1D response = 8,9,10]

LC1E. You scored the importance of your program experience to your decision to implement the lighting controls with [answer from LC1B] out of 10 possible points. You also scored the likelihood of implementing this measure if you had not participated in the program with [answer from LC1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this measure?

Measure Information

LC2. Had you implemented a similar project prior to attending the BOC training?
( ) Yes
( ) No
( ) Don't know

LC3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?
( ) Yes
( ) No
( ) Don't know

LC4. What type of new lighting controls did you implement?
( ) Occupancy sensors *(if checked, go to LC4A, LC4B, LC4C)*
( ) Day lighting controls *(if checked, go to LC4D, LC4E, LC4F)*
( ) Don't know

LC4A. How many fixtures are controlled by the occupancy sensors, what type of fixture are they, and what is the wattage of those fixtures?

	Type of fixture	Number of fixtures	Wattage of fixtures
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

LC4B. How many hours per day did the lights controlled by the occupancy sensors operate before the controls were installed?

LC4C. Did the hours of operation for the lights change on weekends or holidays? If so, what were the operational hours during weekends or holidays?

LC4D. How many fixtures are controlled by the daylighting sensors, what type of fixture are they, and what is the wattage of those fixtures?

	Type of fixture	Number of fixtures	Wattage of fixtures
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

LC4E. How many hours per day did the lights controlled by the daylighting controls operate before the controls were installed?

LC4F. Did the hours of operation for the lights change on weekends or holidays? If so, what were the operational hours during weekends or holidays?

LC5 . What was the total estimated project cost for the lighting controls you installed? Please be as specific as possible.

Energy efficient lighting

Net-to-Gross

EEL1A. The next few questions relate to the energy efficient lighting you implemented. Was energy efficient lighting specifically recommended to you by a BOC course instructor or thorough BOC course materials?

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

EEL1B. How important was your experience in the Building Operator Certification Program in your decision to implement this energy efficient lighting, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Extremely important

EEL1C. Why do you give it this rating? (Please explain)

EEL1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this energy efficient lighting, using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display EEL1E if EEL1B response = 0,1,2,3 AND EEL1D response = 0,1,2,3 OR EEL1B response = 8,9,10 AND EEL1D response = 8,9,10]

EEL1E. You scored the importance of your program experience to your decision to implement the energy efficient lighting with [answer from EEL1B] out of 10 possible points. You also scored the likelihood of implementing this measure if you had not participated in the program with [answer from EEL1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this measure?

Measure Information

EEL2. How many lighting projects did you complete?

( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 or more
( ) Don’t know

EEL3. Had you implemented a similar project prior to attending the BOC training?

( ) Yes
( ) No
( ) Don’t know

EEL4. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?

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

EEL5. For the fixtures that were replaced in the (number of project) project, please indicate the type of fixture, number of fixtures, and wattage of those fixtures. (Repeat question for each facility which lighting projects were completed.)

	Fixture Type	Fixture Count	Fixture Wattage
Old fixture			
New fixture			

EEL6. How many hours per day are the lights operational?

EEL7. What was the total estimated project cost for the energy efficient lighting you installed?

Energy efficient motors

Net-to-Gross

EEM1A. The next few questions relate to the energy efficient motors you implemented. Were energy efficient motors specifically recommended to you by a BOC course instructor or through BOC course materials?

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

EEM1B. How important was your experience in the Building Operator Certification Program in your decision to implement this energy efficient motors project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Extremely important

EEM1C. Why do you give it this rating? (Please explain)

EEM1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this energy efficient motors project, using a scale of 0 to 10 where 0 means you definitely WOULD NOT have

implemented this measure and 10 means you definitely WOULD have implemented this measure?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display EEM1E if EEM1B response = 0,1,2,3 AND EEM1D response = 0,1,2,3 OR EEM1B response = 8,9,10 AND EEM1D response = 8,9,10]

EEM1E. You scored the importance of your program experience to your decision to implement the energy efficient motors with [answer from EEM1B] out of 10 possible points. You also scored the likelihood of implementing this measure if you had not participated in the program with [answer from EEM1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this measure?

Measure Information

EEM2. Had you implemented a similar project prior to attending the BOC training?

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

EEM3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?

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

EEM4. Were these motors installed for HVAC end-uses or for industrial end-uses? (*Select all that apply*)

( ) HVAC end-use *(if selected, go to EEM4A,)*
( ) Industrial end-use *(if selected, go to EEM4B)*
( ) Don't know

EEM4A. Thinking about one of the motors you installed, please provide the motor application (hot water pump, chilled water pump, supply fan, return fan, or cooling tower fan), efficiency of the motor, horsepower of the motor, and whether or not VSD's control the motor. Additionally, please state how many motors you installed that have these same specifications. (*After respondent provides this information, ask whether they installed any*

additional motors with different specifications. Then, place the additional data in a separate motor group and repeat the data collection procedure until all motors or sets of motors have been described.)

(If the respondent is unable to provide the information on the project specifics, ask if the interview could be rescheduled at a time when the respondent could provide the information, or if there is someone else to speak to who was knowledgeable about the projects.)

	Efficiency of Motors	Motor application	Horsepower of motors	VSD's ("y" for yes / "n" for no)	Number installed
(Motor Group 1)					
(Motor Group 2)					
(Motor Group 3)					
(Motor Group 4)					
(Motor Group 5)					

EEM4B. Thinking about one of the motors you installed for industrial purposes, please provide the motor application (hot water pump, chilled water pump, supply fan, return fan, or cooling tower fan), efficiency of the motor, horsepower of the motor, and whether or not VSD's control the motor. Additionally, please state how many motors you installed that have these same specifications. (*After respondent provides this information, ask whether they installed any additional motors with different specifications. Then, place the additional data in a separate motor group and repeat the data collection procedure until all motors or sets of motors have been described.)*

(If the respondent is unable to provide the information on the project specifics, ask if the interview could be rescheduled at a time when the respondent could provide the information, or if there is someone else to speak to who was knowledgeable about the projects.)

	Efficiency of Motors	Number installed	Motor application	Horsepower of motors	Hours per day of operation	VSD's ("y" for yes / "n" for no)
(Motor Group 1)						
(Motor Group 2)						
(Motor Group 3)						
(Motor Group 4)						
(Motor Group 5)						

EEM5. What was the total estimated project cost for the efficient motors you installed? Please be as specific as possible.

EEM6. Who can we contact about the technical specifics of the energy efficient motors you installed? Please be as specific as possible.

VSDs

Net-to-Gross

VSD1A. The next few questions relate to the VSD project you implemented. Were VSDs specifically recommended to you by a BOC course instructor or through BOC course materials?

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

VSD1B. How important was your experience in the Building Operator Certification Program in your decision to implement this VSD project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Extremely important

VSD1C. Why do you give it this rating? (Please explain)

VSD1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this VSD project, using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display VSD1E if VSD1B response = 0,1,2,3 AND VSD1D response = 0,1,2,3 OR VSD1B response = 8,9,10 AND VSD1D response = 8,9,10]

VSD1E. You scored the importance of your program experience to your decision to implement the VSD project with [answer from VSD1B] out of 10 possible points. You also scored the likelihood of implementing this measure if you had not participated in the program with [answer from VSD1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this measure?

Measure Information

VSD2. Had you implemented a similar project prior to attending the BOC training?

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

VSD3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?

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

VSD4. Were the VSDs installed on existing motors part of an HVAC system?

( ) Yes *(if selected, go to VSD4A)*
( ) No *(if selected, go to VSD4B)*
( ) Some were part of an HVAC system, some were not *(if selected, go to VSD4A and VSD4B)*
( ) Don't know

VSD4A. For each of the VSDs used in a HVAC system, please provide the number of VSDs installed and the horsepower of the motors controlled.

Motor Application	Number of VSDs Installed	Horsepower of Motors Controlled by VSDs
Hot Water Pump		
Chilled Water Pump		
Supply Fan: Constant Volume		
Supply Fan: Air Foil/inlet Guide Vanes		
Supply Fan: Forward Curved Fan, with discharge dampers		
Supply Fan: Forward Curved Inlet Guide Vanes		
Cooling Tower Fan		
Custom Process		

VSD4B. For the existing motors not used in a HVAC system, what is the total number of motors and total motor horsepower controlled by the VSDs?

Number of motors:	
Individual motor horsepower:	

Operation hours:	
Motor efficiency:	

VSD5. What was the total estimated project cost for the VSD's you installed? Please be as specific as possible.

VSD6. Who can we contact about the technical specifics of the VSD installation if needed? Please provide a name, phone number, and email address.

Compressed air projects

Net-to-Gross

CA1A. The next few questions relate to the compressed air project you implemented. Were compressed air projects specifically recommended to you by a BOC course instructor or through BOC course materials?

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

CA1B. How important was your experience in the Building Operator Certification Program in your decision to implement this compressed air project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Extremely important

CA1C. Why do you give it this rating? (Please explain)

CA1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this compressed air project, using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7

( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display CA1E if CA1B response = 0,1,2,3 AND CA1D response = 0,1,2,3 OR CA1B response = 8,9,10 AND CA1D response = 8,9,10]

CA1E. You scored the importance of your program experience to your decision to implement the compressed air project with [answer from CA1B] out of 10 possible points. You also scored the likelihood of implementing this measure if you had not participated in the program with [answer from CA1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this measure?

Measure Information

CA2. Had you implemented a similar project prior to attending the BOC training?
( ) Yes
( ) No
( ) Don't know

CA3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?
( ) Yes
( ) No
( ) Don't know

CA4. What is the horsepower of each air compressor in the system?

	Horsepower	VSD? (yes or no)
Compressor 1		
Compressor 2		
Compressor 3		
Compressor 4		
Compressor 5		

CA5. What kind of compressed air project did you implement? *(Do not read list.) (Select all that apply.) (For each response selected, follow up with CA6.)*
( ) New high efficiency single-speed compressor
( ) New high efficiency variable-speed compressor
( ) New efficient refrigerated air dryer
( ) New efficient desiccant air dryer
( ) Improved staging controls
( ) Other (Please specify type of compressed air equipment and quantity of units)
( ) Don't know

CA6. For the new high efficiency (type of air compressor) compressor, what is the total number of compressors and horsepower of each new compressor? (Repeated for each compressed

air project selected in CA5.)

Number of new compressors:	
Horsepower for each new compressor:	

CA7. What type of other air compressor project did you implement? Please describe the equipment and quantity of units.

CA8. Who can we contact about the technical specifics of the compressed air project(s)? Please provide name, phone number, and email address. Not in survey

Energy management systems

Net to Gross

EMS1A. The next few questions relate to the energy management system project you implemented. Were energy management system projects specifically recommended to you by a BOC course instructor or through BOC course materials?

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

EMS1B. How important was your experience in the Building Operator Certification Program in your decision to implement this energy management system project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Extremely important

EMS1C. Why do you give it this rating? (Please explain)

EMS1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this energy management system project, using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4

( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display EMS1E if EMS1B response = 0,1,2,3 AND EMS1D response = 0,1,2,3 OR EMS1B response = 8,9,10 AND EMS1D response = 8,9,10]

EMS1E. You scored the importance of your program experience to your decision to implement the energy management system project with [answer from EMS1B] out of 10 possible points. You also scored the likelihood of implementing this measure if you had not participated in the program with [answer from EMS1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this measure?

Measure Information

EMS2. Had you implemented a similar project prior to attending the BOC training?
( ) Yes
( ) No
( ) Don't know

EMS3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?
( ) Yes
( ) No
( ) Don't know

EMS4. What is the square footage of the area that the Energy Management System controls?

EMS5. Did you install a new energy management system after the BOC training?
( ) Yes
( ) No
( ) Don't know

EMS6. Did you make changes to an existing energy management system after the BOC training?
( ) Yes
( ) No
( ) Don't know

EMS7. Please describe the function of the Energy Management System? *(Do not read list. Select all that apply.)*
( ) On and off schedule
( ) Does everything
( ) Cooling plant optimization
( ) Cooling distribution optimization

( ) Outdoor air ventilation (economizer)
( ) Outdoor air ventilation (demand controlled ventilation with CO sensor)
( ) Air distribution optimization
( ) Heating plant and distribution optimization
( ) Other *(Please specify all other)*
( ) Don't know

EMS8. What was the total estimated project cost for the energy management system you installed? Please be as specific as possible.

EMS9. Who can we contact about the technical specifics of the energy management system project(s)? Please provide name, phone number, and email address.

Heating system improvements
Net to Gross

HS1A. The next few questions relate to the heating system project you implemented. Were heating system projects specifically recommended to you by a BOC course instructor or through BOC course materials?
( ) Yes
( ) No
( ) Don't know

HS1B. How important was your experience in the Building Operator Certification Program in your decision to implement this heating system project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?
( ) 0 – Not at all important
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Extremely important

HS1C. Why do you give it this rating? (Please explain)

HS1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this heating system project, using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?
( ) 0 – Definitely would not have implemented
( ) 1
( ) 2

( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display HS1E if HS1B response = 0,1,2,3 AND HS1D response = 0,1,2,3 OR HS1B response = 8,9,10 AND HS1D response = 8,9,10]

HS1E. You scored the importance of your program experience to your decision to implement the heating system project with [answer from HS1B] out of 10 possible points. You also scored the likelihood of implementing this measure if you had not participated in the program with [answer from HS1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this measure?

Measure Information

HS2. Had you implemented a similar project prior to attending the BOC training?
( ) Yes
( ) No
( ) Don't know

HS3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?
( ) Yes
( ) No
( ) Don't know

HS4. What is the primary heating system type for the system you made improvements to? *(Do not read list) (Select all that apply)*
( ) Hot air furnace
( ) Wall or floorboard radiator (steam, hot water or electric resistance)
( ) Steam, hot water or electric resistance coils in ventilation system
( ) Space heaters
( ) Heat pump (air source)
( ) Heat pump (ground source)
( ) Heat pump (water loop)
( ) Electric boiler
( ) Gas boiler
( ) Other *(Please specify)*
( ) Don't know

HS5. What type of heating system improvements that produce energy savings did you implement? *(Do not read list) (Select all that apply) (For each response selected, follow up with HS8.)*

( ) Installed a heat recovery system
( ) Installed a furnace
( ) Installed a high efficiency boiler
( ) Installed a high efficiency low turn-down burner
( ) Installed oxygen trim control
( ) Other *(Please describe the type and quantity of equipment installed)*
( ) Don't know

HS6. What is the primary fuel source for heating? *(Do not read list)*

( ) Electric
( ) Gas
( ) Oil
( ) Purchased steam
( ) Other (*Please specify)*
( ) Don't know

HS7. What kind of heating system efficiency improvements did you make? Please include as many details about capacity, efficiency, and quantity as possible.

HS8. What is the capacity and efficiency of the (improvement type) installed? *(Repeated for each project selected in HS5.)*

Capacity (BTU):	
Efficiency level (AFUE):	

HS9. What was the total estimated project cost for the energy efficient heating system you installed? Please be as specific as possible.

HS10. Who can we contact about the technical specifics of the heating system project(s)? Please provide name, phone number, and email address.

Air conditioning improvements

Net to Gross

AC1A. The next few questions relate to the air conditioning project you implemented. Were air conditioning projects specifically recommended to you by a BOC course instructor or through BOC course materials?

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

AC1B. How important was your experience in the Building Operator Certification Program in your decision to implement this air conditioning project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important

( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Extremely important

AC1C. Why do you give it this rating? (Please explain)

AC1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this air conditioning project, using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display AC1E if AC1B response = 0,1,2,3 AND AC1D response = 0,1,2,3 OR AC1B response = 8,9,10 AND AC1D response = 8,9,10]

AC1E. You scored the importance of your program experience to your decision to implement the air conditioning project with [answer from AC1B] out of 10 possible points. You also scored the likelihood of implementing this measure if you had not participated in the program with [answer from AC1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this measure?

Measure Information

AC2. Had you implemented a similar project prior to attending the BOC training?

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

AC3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?

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

AC4. What is the primary cooling system type for the system you made improvements to? (Do not read list) (Select all that apply)
( ) Chiller – air-cooled
( ) Chiller – water or evaporatively cooled
( ) Evaporative cooler
( ) Fans
( ) Direct expansion – air-cooled packaged or split system cooling or heat pump
( ) Geothermal heat pump
( ) Window or thermal units (PTAC/PTHP)
( ) Other *(Please specify)*
( ) Don't know

AC5. What type of air conditioning improvements that produced energy savings did you implement? *(Do not read list.) (Select all that apply)*
( ) Installed new high-efficiency chiller(s) *(Go to AC7)*
( ) Installed new terminal unit(s) *(Go to AC8)*
( ) Installed heat pump(s) *(Go to AC9)*
( ) Installed package unit(s) *(Go to AC10)*
( ) Installed split system(s) *(Go to AC11)*
( ) Other *(Please describe the type and quantity of equipment installed)*
( ) Don't know

AC6. What kind of air conditioning improvements did you make that were not listed above?

AC7. What is the capacity and efficiency level of the chiller(s) you installed?

	Capacity	**Efficiency level**
Improvement type 1		
Improvement type 2		
Improvement type 3		

AC8. What is the capacity and efficiency level of the terminal unit(s) you installed?

	Number of units	**Capacity (tons)**	**Efficiency level (EER)**	**Efficiency level (SEER)**
Unit(s)				

AC9. What type of heat pump did you install? *(Do not read list) (Use as possible prompts)*
( ) Air cooled heat pump
( ) Water source heat pump
( ) Ground source heat pump
( ) Water cooled heat pump
( ) Don't know

AC9A. What is the capacity and efficiency level of the chiller(s) you installed?

	Number of heat pumps	**Efficiency level (EER or SEER or HSPF or COP)**
Capacity of: Less than 1 1/2 tons		
Capacity of: 1 1/2 tons to 2 1/2 tons		
Capacity of: More than 2 1/2 tons to 5 tons		
Capacity of: More than 5 tons to 11 tons		
Capacity of: More than 11 tons to less than 20 tons		
Capacity of: More than 20 tons		

AC10. What is the capacity and efficiency level of the package unit(s) you installed?

	Number of units	**Efficiency level (EER or SEER)**
Capacity of: Less than 1 1/2 tons		
Capacity of: 1 1/2 tons to 2 1/2 tons		
Capacity of: More than 2 1/2 tons to 5 tons		
Capacity of: More than 5 tons to 11 tons		
Capacity of: More than 11 tons to less than 20 tons		
Capacity of: More than 20 tons		

AC11. What is the capacity and efficiency level of the split system you installed?

	Number of units	Efficiency level (EER or SEER)
Capacity of: Less than 1 1/2 tons		
Capacity of: 1 1/2 tons to 2 1/2 tons		
Capacity of: More than 2 1/2 tons to 5 tons		
Capacity of: More than 5 tons to 11 tons		
Capacity of: More than 11 tons to less than 20 tons		
Capacity of: More than 20 tons		

AC12. What was the total estimated project cost for the air conditioning improvements you installed? Please be as specific as possible.

AC13. Who can we contact about the technical specifics of the air-conditioning system project(s)? Please provide name, phone number, and email address

Economizers on Air Handlers
Net to Gross

E1A. The next few questions relate to the economizer project you implemented. Were economizer projects specifically recommended to you by a BOC course instructor or through BOC course materials?

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

E1B. How important was your experience in the Building Operator Certification Program in your decision to implement this economizer project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Extremely important

E1C. Why do you give it this rating? (Please explain)

E1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this economizer project, using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display E1E if E1B response = 0,1,2,3 AND E1D response = 0,1,2,3 OR E1B response = 8,9,10 AND E1D response = 8,9,10]

E1E. You scored the importance of your program experience to your decision to implement the economizer project with [answer from E1B] out of 10 possible points. You also scored the likelihood of implementing this measure if you had not participated in the program

with [answer from E1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this measure?

Measure Information

E2. Had you implemented a similar project prior to attending the BOC training?
- ( ) Yes
- ( ) No
- ( ) Don't know

E3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?
- ( ) Yes
- ( ) No
- ( ) Don't know

E4. For the installed economizer, what is the capacity of the cooling system (in tons)?

E5. What is the total estimated project cost for the economizer you installed?

E6. Who can we contact about the technical specifics of the economizer project(s)? Please provide name, phone number, and email address

Water heating efficiency improvements
Net to Gross

WH1A. The next few questions relate to the water heating project you implemented. Were water heating projects specifically recommended to you by a BOC course instructor or through BOC course materials?

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

WH1B. How important was your experience in the Building Operator Certification Program in your decision to implement this water heating project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Extremely important

WH1C. Why do you give it this rating? (Please explain)

WH1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this water heating project, using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display WH1E if WH1B response = 0,1,2,3 AND WH1D response = 0,1,2,3 OR WH1B response = 8,9,10 AND WH1D response = 8,9,10]

WH1E. You scored the importance of your program experience to your decision to implement the water heating project with [answer from WH1B] out of 10 possible points. You also scored the likelihood of implementing this measure if you had not participated in the program with [answer from WH1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this measure?

Measure Information

WH2. Had you implemented a similar project prior to attending the BOC training?
- ( ) Yes
- ( ) No
- ( ) Don't know

WH3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?
- ( ) Yes
- ( ) No
- ( ) Don't know

WH4. What type of water heating improvements that produced energy savings did you implement? *(Do not read list. Select all that apply)*
- ( ) Installed timeclock to turn off circulation pump after hours *(Go to WH5 and WH6)*
- ( ) Installed heat recovery system *(Go to WH8)*
- ( ) Installed a more efficient hot water heater *(Go to WH7)*
- ( ) Insulated pipes(s) *(How thick was the insulation and how many linear feet were installed?)*
- ( ) Installed low-flow faucets, pre-rinse spray valves, or low-flow showerheads *(Go to WH10)*
- ( ) Other *(Go to WH8)*
- ( ) Don't know

WH5. What kind of water heating system is controlled by the timeclock?
- ( ) Boiler
- ( ) Hot water heater
- ( ) Don't know

WH6. What is the capacity and efficiency level of the boiler that the timeclock is installed on?

	Capacity (BTU)	**Efficiency level (AFUE %)**
Boiler		

WH7. What is the capacity, number, and efficiency level of the more efficient hot water heater or boiler?

	Capacity	Type	New efficiency	Old efficiency	Quantity
Heater/Boiler					
Heater/Boiler					
Heater/Boiler					
Heater/Boiler					
Heater/Boiler					

WH8. Please describe the water heating improvements that produced energy savings including the type of equipment and quantity.

WH9. What was the total estimated project cost for the water heating improvements you installed? Please be as specific as possible.

WH10. Please indicate the quantity of low-flow faucets, pre-rinse spray valves, and low-flow showerheads you installed:

Measure Type	Quantity Installed
Low-flow faucets	
Low-flow showerheads	
Pre-rinse spray valves	

Other improvements

O1. You mentioned that you implemented some other energy efficiency projects. Can you describe what these projects were?

Net to Gross

O2A. The next few questions relate to the other project you implemented. Was this other project specifically recommended to you by a BOC course instructor or through BOC course materials?

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

O2B. How important was your experience in the Building Operator Certification Program in your decision to implement this other project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7

( ) 8
( ) 9
( ) 10 – Extremely important

O2C. Why do you give it this rating? (Please explain)

O2D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this other project, using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display O2E if O2B response = 0,1,2,3 AND O2D response = 0,1,2,3 OR O2B response = 8,9,10 AND O2D response = 8,9,10]

O2E. You scored the importance of your program experience to your decision to implement the other project with [answer from O2B] out of 10 possible points. You also scored the likelihood of implementing this measure if you had not participated in the program with [answer from O2D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this measure?

Measure Information

O3. Had you implemented a similar project(s) prior to attending the BOC training?

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

O4. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?

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

O5. Did these projects produce electricity, or natural gas savings or both?

( ) Electricity
( ) Natural gas

( ) Both
( ) Don't know

O6. What was the total estimated project cost for the other energy efficiency improvements you installed? Please be as specific as possible.

O7. Who can we contact about the technical specifics of these other project(s)? Please provide name, phone number, and email address

Maintenance Energy Impacts Assessment

17. Now I'd like to ask you about changes in maintenance activities you may have implemented at your facility since completing the BOC training. For each of the following activities, please indicate if you have performed them differently or more frequently or both since participating in the BOC training.

	Differently	More Frequently	Both	No Chance	Don't Know
Maintenance on the cooling system equipment?	( )	( )	( )	( )	( )
Maintenance on the heating equipment?	( )	( )	( )	( )	( )
Motor maintenance, including belt alignment and tension?	( )	( )	( )	( )	( )
Maintenance on compressed air system?	( )	( )	( )	( )	( )
Electrical panel maintenance?	( )	( )	( )	( )	( )
Ventilation maintenance?	( )	( )	( )	( )	( )
Other energy savings maintenance?	( )	( )	( )	( )	( )

[*If maintenance is performed differently, more frequently, or both, for any category go to M1 and ask selected Maintenance Improvement Questions*]

18. At how many facilities did you make these changes to your maintenance practices?
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7

( ) 8
( ) 9
( ) 10 or more
( ) Don't know

Follow Questions for Maintenance Improvements

Cooling system

Net to Gross

CSM1A. The next few questions relate to the cooling system maintenance you implemented. Was cooling system maintenance specifically recommended to you by a BOC course instructor or through BOC course materials?

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

CSM1B. How important was your experience in the Building Operator Certification Program in your decision to implement this cooling system maintenance, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Extremely important

CSM1C. Why do you give it this rating? (Please explain)

CSM1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this cooling system maintenance using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this maintenance and 10 means you definitely WOULD have implemented this maintenance?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8

( ) 9
( ) 10 – Definitely would have implemented

[Display CSM1E if CSM1B response = 0,1,2,3 AND CSM1D response = 0,1,2,3 OR CSM1B response = 8,9,10 AND CSM1D response = 8,9,10]

CSM1E. You scored the importance of your program experience to your decision to implement the cooling system maintenance with [answer from CSM1B] out of 10 possible points. You also scored the likelihood of implementing this maintenance if you had not participated in the program with [answer from CSM1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this maintenance?

Maintenance Information

CSM2. Please tell me which of the following changes you've made to your cooling system maintenance practices?

( ) Changes to cooling tower service *(please include total tons)*
( ) Changes to chiller bundle cleaning *(please include chiller tons)*
( ) Changes to condenser cleaning *(please include cooling tons)*
( ) Changes to refrigerant charge adjustment *(please include system tons)*
( ) Other changes
( ) Don't know

CSM3. Who can we contact about the technical specifics of the cooling system maintenance practices if needed? Please provide a name, phone number, and email address.

Heating equipment

Net to Gross

HE1A. The next few questions relate to the heating system maintenance you implemented. Was heating equipment maintenance specifically recommended to you by a BOC course instructor or through BOC course materials?

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

HE1B. How important was your experience in the Building Operator Certification Program in your decision to implement this heating system maintenance, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7

( ) 8
( ) 9
( ) 10 – Extremely important

HE1C. Why do you give it this rating? (Please explain)

HE1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this heating system maintenance using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this maintenance and 10 means you definitely WOULD have implemented this maintenance?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display HE1E if HE1B response = 0,1,2,3 AND HE1D response = 0,1,2,3 OR HE1B response = 8,9,10 AND HE1D response = 8,9,10]

HE1E. You scored the importance of your program experience to your decision to implement the heating system maintenance with [answer from HE1B] out of 10 possible points. You also scored the likelihood of implementing this maintenance if you had not participated in the program with [answer from HE1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this maintenance?

Maintenance Information

HE2. Please tell me which of the following changes you've made to your heating equipment maintenance practices. *(Select all that apply)*

( ) Heat exchanger cleaning *(Please provide capacity in BTU's)* no box to provide info*
( ) Blowdown frequency *(Please provide boiler capacity in BTU's and number of traps))* no box to provide info*

( ) Steam trap *(Please provide number of traps and whether they were cleaned, repaired, or replaced))*
( ) Other
( ) Don't know

HE3. Please ask for additional information for each change indicated above, such as how frequently the maintenance was performed before and after the course. Not in online survey

HE4. Who can we contact about the technical specifics of the heating system maintenance practices if needed? Please provide a name, phone number, and email address.

Air Compressor Maintenance
Net to Gross

AC1A. The next few questions relate to the air compressor maintenance you implemented. Was air compressor maintenance specifically recommended to you by a BOC course instructor or through BOC course materials?

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

AC1B. How important was your experience in the Building Operator Certification Program in your decision to implement this air compressor maintenance, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Extremely important

AC1C. Why do you give it this rating? (Please explain)

AC1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this air compressor maintenance using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this maintenance and 10 means you definitely WOULD have implemented this maintenance?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7

( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display AC1E if AC1B response = 0,1,2,3 AND AC1D response = 0,1,2,3 OR AC1B response = 8,9,10 AND AC1D response = 8,9,10]

AC1E. You scored the importance of your program experience to your decision to implement the air compressor maintenance with [answer from AC1B] out of 10 possible points. You also scored the likelihood of implementing this maintenance if you had not participated in the program with [answer from AC1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this maintenance?

Maintenance Information

AC2. Please tell me all the changes you have made to your air compressor equipment maintenance.

( ) Audible leak detection
( ) Ultra-sonic leak detection
( ) Pressure optimization
( ) End-use isolation
( ) Filter changes
( ) System diagnostics
( ) Other
( ) Don't know

AC3. What is the total horsepower of the air compressor(s)?

AC4. What is the average CFM (Cubic Feet Per Minute) of the air compressor(s)?

AC5. Who can we contact about the technical specifics of the air compressor maintenance changes if needed? Please provide a name, phone number, and email address.

Ventilation Maintenance

Net to Gross

VM1A. The next few questions relate to the ventilation maintenance you implemented. Was ventilation maintenance specifically recommended to you by a BOC course instructor or through BOC course materials?

( ) Yes
( ) No
( ) Don’t know

VM1B. How important was your experience in the Building Operator Certification Program in your decision to implement this ventilation maintenance, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important
( ) 1

( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Extremely important

VM1C. Why do you give it this rating? (Please explain)

VM1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this ventilation maintenance using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this maintenance and 10 means you definitely WOULD have implemented this maintenance?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display VM1E if VM1B response = 0,1,2,3 AND VM1D response = 0,1,2,3 OR VM1B response = 8,9,10 AND VM1D response = 8,9,10]

VM1E. You scored the importance of your program experience to your decision to implement the ventilation maintenance with [answer from VM1B] out of 10 possible points. You also scored the likelihood of implementing this maintenance if you had not participated in the program with [answer from VM1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this maintenance?

Maintenance Information

VM2. Please tell me all the changes you have made to your ventilation maintenance. (For each change mentioned, ask how frequently they do this).

( ) Economizer optimization/repair
( ) Sensor Calibration
( ) Setpoint optimization
( ) Balancing
( ) Filter changes
( ) System diagnostics

( ) Sealed leaks / replaced door gaskets
( ) Other
( ) Don't know

VM3. What is the total horsepower of the serviced fans?

VM4. Who can we contact about the technical specifics of the ventilation maintenance practices if needed? Please provide a name, phone number, and email address.

Other Maintenance

OM1A. The next few questions relate to the other maintenance you implemented. Was this other maintenance specifically recommended to you by a BOC course instructor or through BOC course materials?

( ) Yes
( ) No
( ) Don’t know

OM1B. How important was your experience in the Building Operator Certification Program in your decision to implement this other maintenance, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?

( ) 0 – Not at all important
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10 – Extremely important

OM1C. Why do you give it this rating? (Please explain)

OM1D. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this other maintenance using a scale of 0 to 10 where 0 means you definitely WOULD NOT have implemented this maintenance and 10 means you definitely WOULD have implemented this maintenance?

( ) 0 – Definitely would not have implemented
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6

( ) 7
( ) 8
( ) 9
( ) 10 – Definitely would have implemented

[Display OM1E if OM1B response = 0,1,2,3 AND OM1D response = 0,1,2,3 OR OM1B response = 8,9,10 AND OM1D response = 8,9,10]

OM1E. You scored the importance of your program experience to your decision to implement the other maintenance with [answer from OM1B] out of 10 possible points. You also scored the likelihood of implementing this maintenance if you had not participated in the program with [answer from OM1D] out of 10 possible points. Can you please explain the role the program had in your decision to implement this maintenance?

Maintenance Information

OM2. Please describe the other maintenance changes that you have made since attending the BOC training. [*If needed, prompt with please describe the change in practice and how frequently it is performed*]

OM3. Who can we contact about the technical specifics of the other maintenance practices if needed? Please provide a name, phone number, and email address.

Now I would like to ask a few general questions about your experience with the program.

19. Do you think that there are certain barriers that may make it difficult for potential program participants to attend or complete the BOC training? What are they? *(Don't read list. Select all that apply.)*
    ( ) Time
    ( ) Cost
    ( ) Not aware of it
    ( ) Supervisor approval
    ( ) No barriers
    ( ) Don't know

20. Please indicate your level of satisfaction with the following elements of the BOC training.

Element of Experience	Very Dissatisfied	Dissatisfied	Neither Satisfied nor Dissatisfied	Satisfied	Very Satisfied	Don't know
Course schedule	( )	( )	( )	( )	( )	( )
Course instructors	( )	( )	( )	( )	( )	( )
Tuition rebate application process	( )	( )	( )	( )	( )	( )
Tuition rebate amount	( )	( )	( )	( )	( )	( )
Time elapsed to receive tuition rebate	( )	( )	( )	( )	( )	( )

Overall experience with the BOC Program	( )	( )	( )	( )	( )	( )

20A. Please describe the ways in which you were not satisfied with the BOC training or the tuition rebate.

21. For each of the following activities, please indicate if you had already completed them prior to completing BOC training, before and after the training, only completed them after attending BOC training, or have not yet completed them:

Activity	Completed Prior to Training	Completed Before and After Training	Only Completed After Training	Not Yet Completed Them	Don't know
Implemented an energy budget	( )	( )	( )	( )	( )
Recorded energy use over time	( )	( )	( )	( )	( )
Set energy savings goals	( )	( )	( )	( )	( )
Achieved energy savings goals	( )	( )	( )	( )	( )

22. Have you participated in any other DCEO energy efficiency programs?
( ) Yes *(if checked, go to 22A)*
( ) No
( ) Don't know

22A. What other DCEO energy efficiency programs did you participate in?

23B. How important was the BOC course in your decision to participate in these other DCEO programs? *(Read list)*
( ) Very important
( ) Somewhat important
( ) Neutral
( ) Somewhat unimportant
( ) Not important at all
( ) Don't know/Not applicable

23. What is your current job title? *(Do not read list)*
( ) Operations/Facilities operations manager
( ) Maintenance manager
( ) HVAC supervisor or technician
( ) Engineering manager
( ) Facilities manager
( ) Engineer
( ) Maintenance manager
( ) General contractor
( ) Building management specialist

( ) Other engineering position
( ) Other manager, team leader, supervisor

24. How many years have you worked in this role?

25. How many building operator staff is there at your current location?

26. How many of these staff has completed the BOC training *(either Level 1 or Level 1&2)*?

27. Does your facility currently have plans to implement any of the following types of energy efficiency projects? *(Select all that apply)*
    ( ) Lighting Controls
    ( ) Energy efficient lighting
    ( ) NEMA premium energy efficient motors
    ( ) VSDs
    ( ) Compressed air projects
    ( ) Energy management systems
    ( ) Heating system improvements
    ( ) Air conditioning improvements
    ( ) Economizer on an air handler
    ( ) Water heating efficiency improvements
    ( ) Other improvements
    ( ) None
    ( ) Don't know

[Ask Q28 if any projects indicated in Q28]
28. In what month and year do you expect the aforementioned projects to be implemented?

29. Did you initiate the plans for these upcoming projects, or did someone else in your organization?
    ( ) I initiated the plans [If selected, ask Q30]
    ( ) Someone else initiated the plans
    ( ) Don't know

30. Did you initiate the plans for these upcoming projects due to information you gained through Building Operator Certification training?
    ( ) Yes
    ( ) No
    ( ) Don't know

31. Do you have any other comments or feedback that you would like to provide regarding the Building Operator Certification Program? (Please explain)

Thank you for taking this survey of participants in the building operator certification program. Your response is very important to us.

Appendix B: Participant Survey Responses

As part of the evaluation effort, a telephone survey was administered to Building Operator Certification training participants who completed the MEEA program. This survey provided the information used in Chapter 3 to estimate free ridership and potential savings for projects in the BOC Program. Additionally the survey gathered information pertaining to the program process evaluation.

Each participant was interviewed using the survey instrument provided in Appendix A. During the interview, a participant was asked questions about (1) his or her general decision making regarding purchasing and installing energy efficient equipment, (2) his or her knowledge of and satisfaction with the BOC Program, and (3) the influence that the BOC Program had on his or her decision to install energy efficiency measures (e.g., lighting measures, HVAC measures, maintenance and operation improvements).

The following tabulations summarize participant survey responses. Three columns of data are presented. The first column presents the number of survey respondents (n) associated with each response. The second column presents the percentage of survey respondents associated with each response.

	Response	*(n=40)*	*Percent of Respondents**
What are the sources your organization relies on for information about energy efficient practices, equipment, materials and design features? (Do not read list. Select all that apply.)	DCEO representatives	1	3%
	The DCEO website	1	3%
	Utility representatives	8	20%
	The Midwestern Energy Efficiency Alliance (MEEA)	2	5%
	Brochures or advertisements	0	0%
	Trade associations or business groups you belong to	6	15%
	Trade journals or magazines	4	10%
	Friends and colleagues	6	15%
	The Smart Energy Design Assistance Center (SEDAC)	2	5%
	The Energy Resource Center (ERC)	0	0%
	Architects, engineers or energy consultants	6	15%
	Equipment vendors or building contractors	14	35%
	Other (please describe)	18	45%
	Don't know	4	10%

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

	Response	*(n=40)*	*Percent of Respondents**
How did you learn about the Department of Commerce tuition rebate for the BOC training?	From a BOC program representative	1	3%
	A Midwestern Energy Efficiency Alliance (MEEA) representative	0	0%
	A DCEO representative mentioned it	1	3%
	The DCEO website	0	0%
	From a utility representative	6	15%
	Brochures or advertisements	0	0%
	Trade association or business group you belong to	2	5%
	Trade journal or magazine	0	0%
	Friend or colleague	13	33%
	From a representative of Smart Energy Design Assistance Center (SEDAC)	2	5%
	From a representative of the Energy Resource Center (ERC)	0	0%
	An architect, engineer or energy consultant	3	8%
	Equipment vendor or building contractor	2	5%
	Attended a conference workshop or seminar	1	3%
	Past experience with the program	0	0%
	An energy service company	0	0%
	Other (please explain)	9	23%
	Don't know	4	10%

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

When you learned about the tuition rebate available for the BOC courses, did you already know about the BOC training?	*Response*	*(n=36)*	*Percent of Respondents*
	Yes	13	36%
	No	22	61%
	Don't know	1	3%

Which of the following policies or procedures does your organization have in place regarding energy efficiency improvements?	*Response*	*(n=40)*	*Percent of Respondents**
	An energy management plan	19	48%
	A staff member responsible for energy and energy efficiency	27	68%
	Policies that incorporate energy efficiency in operations and procurement	14	35%
	Active training of staff	18	45%
	Other (please specify)	3	8%
	Don't know	1	3%

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

Does your energy management plan include goals for energy savings?	*Response*	*(n=19)*	*Percent of Respondents*
	Yes	16	84%
	No	1	5%
	Don't know	2	11%

What motivated you to participate in the BOC course? (Do not read list. Select all that apply.) (Use as prompts if necessary)	*Response*	*(n=40)*	*Percent of Respondents**
	Career Opportunity	15	38%
	Learn new skills	21	53%
	Personal interest	20	50%
	Learn about energy efficiency	24	60%
	Other (please specify)	3	8%
	Don't know	0	0%

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

Were any of the courses you took through the BOC program particularly useful?	*Response*	*(n=40)*	*Percent of Respondents*
	Yes	36	90%
	No	2	5%
	Don't know	2	5%

Were there any courses that you found to not be very useful?	*Response*	*(n=40)*	*Percent of Respondents*
	Yes	6	15%
	No	33	83%
	Don't know	1	3%

	Response	*(n=40)*	*Percent of Respondents**
Why did you attend the BOC training? (Do not read list. Select all that apply.) (Use as prompts if necessary)	Required by company/organization	11	28%
	To learn new job skills	14	35%
	To advance in my current job	11	28%
	To improve my chances of getting a new job	11	28%
	To earn continuing education credits	5	13%
	To learn about energy efficiency	28	70%
	Because of the tuition rebate	5	13%
	Other (please specify)	1	3%
	Don't know	0	0%

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

	Response	*(n=40)*	*Percent of Respondents*
Have you encountered any barriers to applying what you learned about energy efficiency improvements during the BOC training?	Yes	12	30%
	No	28	70%
	Don't know	0	0%

	Response	*(n=12)*	*Percent of Respondents*
What barriers have you encountered? (Do not read list, but use as possible prompts)	Lack of supervisor support	0	0%
	Insufficient budget	8	67%
	Organization/company not committed to energy efficiency improvements	2	17%
	Not enough staff resources to plan efficiency projects	0	0%
	Other (please specify)	4	33%
	Don't know	0	0%

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

	Response	*(n=29)*	*Average square footage*
What is the approximate square footage of your building or buildings?	Average square footage		1,943,534

	Response	*(n=35)*	*Percent responsible*
What percentage of that space are you responsible for?	Percent responsible		92.3

	Response	*(n=31)*	*Hours per week*
How many hours per week is your site open for business?	Hours per week		116.4

	Response	*(n=40)*	*Percent of Respondents*
What type of facility is it? (Do not read list)	College/University	2	5%
	Elementary	1	3%
	Grocery	0	0%
	Healthcare Clinic	0	0%
	Heavy Industry	2	5%
	High School/Middle School	0	0%
	Hospital	3	8%
	Hotel/Motel	0	0%
	Light Industry	0	0%
	Lodging Hotel/Motel	0	0%
	Manufacturing Facility	1	3%
	Medical	0	0%
	Office - High Rise	2	5%
	Office - Low Rise	4	10%
	Office - Mid Rise	1	3%
	Religious Facility	0	0%
	Restaurant	0	0%
	Retail - Department Store	1	3%
	Retail - Strip Mall	0	0%
	Retail/Service	0	0%
	School (K-12)	1	3%
	Warehouse	0	0%
	Other (please specify)	21	53%
	Don't know	1	3%

	Response	*(n=33)*	*Percent of Respondents**
Since participating in the BOC program have you implemented any of the following types of energy efficiency projects? (Read list)	Lighting Controls	17	43%
	Energy efficient lighting	20	50%
	Energy efficient motors	5	13%
	VSDs	6	15%
	Compressed air projects	3	8%
	Energy management system project	10	25%
	Heating system improvements	14	35%
	Air conditioning improvements	14	35%
	Economizer	8	20%
	Water heating efficiency improvements	2	5%
	Other improvements	4	10%
	None	8	20%
	Don't know	1	3%

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

	Response	*(n=31)*	*Percent of Respondents*
At how many facilities did you implement any of the previously listed projects?	1	14	45%
	2	5	16%
	3	2	6%
	4	2	6%
	5	3	10%
	6	0	0%
	7	0	0%
	8	1	3%
	9	0	0%
	10 or more	4	13%
	Don't know	0	0%

LC1A. The next few questions relate to the lighting controls you implemented. Were lighting controls specifically recommended to you by a BOC course instructor or through BOC course materials?	*Response*	*(n=17)*	*Percent of Respondents*
	Yes	9	53%
	No	8	47%
	Don't know	0	0%

LC1B. How important was your experience in the Building Operator Certification Program in your decision to implement these lighting controls, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	*Response*	*(n=17)*	*Percent of Respondents*
	0	0	0%
	1	0	0%
	2	0	0%
	3	0	0%
	4	0	0%
	5	3	18%
	6	3	18%
	7	1	6%
	8	6	35%
	9	1	6%
	10	3	18%
	Don't know	0	0%

	Response	*(n=17)*	*Percent of Respondents*
LC1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented these lighting controls, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	0	1	6%
	1	0	0%
	2	0	0%
	3	1	6%
	4	1	6%
	5	6	35%
	6	3	18%
	7	2	12%
	8	1	6%
	9	0	0%
	10	2	12%
	Don't know	0	0%

	Response	*(n=17)*	*Percent of Respondents*
LC2. Had you implemented a similar project prior to attending the BOC training?	Yes	10	59%
	No	7	41%
	Don't know	0	0%

	Response	*(n=17)*	*Percent of Respondents*
LC3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?	Yes	11	65%
	No	4	24%
	Don't know	2	12%

	Response	*(n=17)*	*Percent of Respondents**
LC4. What type of new lighting controls did you implement? (Do not read list)	Occupancy sensors	14	82%
	Daylighting	7	41%
	Don't know	2	12%

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

	Response	*(n=20)*	*Percent of Respondents*
EEL1A. The next few questions relate to the energy efficient lighting you implemented. Was energy efficient lighting specifically recommended to you by a BOC course instructor or through BOC course materials?	Yes	8	40%
	No	12	60%
	Don't know	0	0%

	Response	*(n=20)*	*Percent of Respondents*
EEL1B. How important was your experience in the Building Operator Certification Program in your decision to implement this energy efficient lighting, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	0	1	5%
	1	0	0%
	2	0	0%
	3	1	5%
	4	3	15%
	5	3	15%
	6	1	5%
	7	1	5%
	8	4	20%
	9	2	10%
	10	4	20%
	Don't know	0	0%

	Response	*(n=20)*	*Percent of Respondents*
EEL1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this energy efficient lighting, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	0	0	0%
	1	0	0%
	2	0	0%
	3	1	5%
	4	2	10%
	5	5	25%
	6	2	10%
	7	1	5%
	8	3	15%
	9	0	0%
	10	6	30%
	Don't know	0	0%

	Response	*(n=20)*	*Percent of Respondents*
EEL2. How many lighting projects did you complete?	1	7	35%
	2	2	10%
	3	5	25%
	4	1	5%
	5	0	0%
	6	0	0%
	7	0	0%
	8	0	0%
	9	0	0%
	10 or more	1	5%
	Don't know	4	20%

EEL3. Had you implemented a similar project prior to attending the BOC training?	*Response*	*(n=20)*	*Percent of Respondents*
	Yes	15	75%
	No	5	25%
	Don't know	0	0%

EEL4. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?	*Response*	*(n=20)*	*Percent of Respondents*
	Yes	15	75%
	No	4	20%
	Don't know	1	5%

EEM1A. The next few questions relate to the energy efficient motors projects you implemented. Were energy efficient motors specifically recommended to you by a BOC course instructor or through BOC course materials?	*Response*	*(n=5)*	*Percent of Respondents*
	Yes	2	40%
	No	3	60%
	Don't know	0	0%

EEM1B. How important was your experience in the Building Operator Certification Program in your decision to implement these energy efficient motors, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	*Response*	*(n=5)*	*Percent of Respondents*
	0	0	0%
	1	0	0%
	2	0	0%
	3	1	20%
	4	0	0%
	5	0	0%
	6	1	20%
	7	0	0%
	8	2	40%
	9	0	0%
	10	1	20%
	Don't know	0	0%

EEM1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented these energy efficient motors, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	*Response*	*(n=5)*	*Percent of Respondents*
	0	0	0%
	1	0	0%
	2	1	20%
	3	0	0%
	4	1	20%
	5	0	0%
	6	0	0%
	7	0	0%
	8	2	40%
	9	0	0%
	10	1	20%
	Don't know	0	0%

EEM2. Had you implemented a similar project prior to attending the BOC training?	*Response*	*(n=5)*	*Percent of Respondents*
	Yes	0	0%
	No	5	100%
	Don't know	0	0%

EEM3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?	*Response*	*(n=5)*	*Percent of Respondents*
	Yes	2	40%
	No	2	40%
	Don't know	1	20%

EEM4. Were these motors installed for HVAC end-uses or for industrial end-uses? (select all that apply)	*Response*	*(n=5)*	*Percent of Respondents**
	HVAC end-use	3	60%
	Industrial end-use	3	60%
	Don't know	0	0%

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

VSD1A. The next few questions relate to the VSDs you implemented. Were VSDs specifically recommended to you by a BOC course instructor or through BOC course materials?	*Response*	*(n=6)*	*Percent of Respondents*
	Yes	2	33%
	No	4	67%
	Don't know	0	0%

	Response	*(n=6)*	*Percent of Respondents*
VSD1B. How important was your experience in the Building Operator Certification Program in your decision to implement these VSDs, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	0	1	17%
	1	0	0%
	2	0	0%
	3	0	0%
	4	0	0%
	5	2	33%
	6	1	17%
	7	0	0%
	8	1	17%
	9	0	0%
	10	1	17%
	Don't know	0	0%

	Response	*(n=6)*	*Percent of Respondents*
VSD1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented these VSDs, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	0	0	0%
	1	0	0%
	2	1	17%
	3	0	0%
	4	1	17%
	5	1	17%
	6	0	0%
	7	0	0%
	8	2	33%
	9	0	0%
	10	1	17%
	Don't know	0	0%

	Response	*(n=6)*	*Percent of Respondents*
VSD2. Had you implemented a similar project prior to attending the BOC training?	Yes	1	17%
	No	5	83%
	Don't know	0	0%

	Response	*(n=6)*	*Percent of Respondents*
VSD3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?	Yes	5	83%
	No	0	0%
	Don't know	1	17%

	Response	*(n=5)*	*Percent of Respondents*
VSD4. Were the VSDs installed on existing motors part of an HVAC system?	Yes	4	80%
	No	1	20%
	Don't know	0	0%

CA1A. The next few questions relate to the compressed air project you implemented. Was this measure specifically recommended to you by a BOC course instructor or through BOC course materials?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	1	33%
	No	2	67%
	Don't know	0	0%

CA1B. How important was your experience in the Building Operator Certification Program in your decision to implement this compressed air project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	*Response*	*(n=3)*	*Percent of Respondents*
	0	1	33%
	1	0	0%
	2	0	0%
	3	1	33%
	4	0	0%
	5	1	33%
	6	0	0%
	7	0	0%
	8	0	0%
	9	0	0%
	10	0	0%
	Don't know	0	0%

CA1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this compressed air project, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	*Response*	*(n=3)*	*Percent of Respondents*
	0	0	0%
	1	0	0%
	2	0	0%
	3	0	0%
	4	0	0%
	5	0	0%
	6	0	0%
	7	0	0%
	8	1	33%
	9	1	33%
	10	1	33%
	Don't know	0	0%

CA2. Had you implemented a similar project prior to attending the BOC training?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	1	33%
	No	2	67%
	Don't know	0	0%

CA3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	1	33%
	No	2	67%
	Don't know	0	0%

EMS1A. The next few questions relate to the EMS you implemented. Were EMSs specifically recommended to you by a BOC course instructor or through BOC course materials?	*Response*	*(n=10)*	*Percent of Respondents*
	Yes	2	20%
	No	8	80%
	Don't know	0	0%

EMS1B. How important was your experience in the Building Operator Certification Program in your decision to implement the EMS, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	*Response*	*(n=10)*	*Percent of Respondents*
	0	1	10%
	1	0	0%
	2	0	0%
	3	0	0%
	4	1	10%
	5	0	0%
	6	3	30%
	7	1	10%
	8	1	10%
	9	0	0%
	10	3	30%
	Don't know	0	0%

EMS1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented the EMS, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	*Response*	*(n=10)*	*Percent of Respondents*
	0	2	20%
	1	0	0%
	2	0	0%
	3	0	0%
	4	0	0%
	5	2	20%
	6	1	10%
	7	1	10%
	8	3	30%
	9	0	0%
	10	1	10%
	Don't know	0	0%

EMS2. Had you implemented a similar project prior to attending the BOC training?	*Response*	*(n=10)*	*Percent of Respondents*
	Yes	3	30%
	No	7	70%
	Don't know	0	0%

EMS3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?	*Response*	*(n=10)*	*Percent of Respondents*
	Yes	5	50%
	No	5	50%
	Don't know	0	0%

EMS5. Did you install a new energy management system after the BOC training?	*Response*	*(n=10)*	*Percent of Respondents*
	Yes	4	40%
	No	6	60%
	Don't know	0	0%

EMS6. Did you make changes to an existing energy management system after the BOC training?	*Response*	*(n=10)*	*Percent of Respondents*
	Yes	6	60%
	No	4	40%
	Don't know	0	0%

HS1A. The next few questions relate to the heating system project you implemented. Were heating system projects specifically recommended to you by a BOC course instructor or through BOC course materials?	*Response*	*(n=14)*	*Percent of Respondents*
	Yes	2	14%
	No	12	86%
	Don't know	0	0%

HS1B. How important was your experience in the Building Operator Certification Program in your decision to implement the heating system project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	*Response*	*(n=14)*	*Percent of Respondents*
	0	2	14%
	1	0	0%
	2	1	7%
	3	0	0%
	4	0	0%
	5	4	29%
	6	2	14%
	7	2	14%
	8	3	21%
	9	0	0%
	10	0	0%
	Don't know	0	0%

	Response	*(n=14)*	*Percent of Respondents*
HS1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented the heating system project, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	0	0	0%
	1	0	0%
	2	0	0%
	3	0	0%
	4	1	7%
	5	2	14%
	6	1	7%
	7	2	14%
	8	1	7%
	9	1	7%
	10	6	43%
	Don't know	0	0%

	Response	*(n=14)*	*Percent of Respondents*
HS2. Had you implemented a similar project prior to attending the BOC training?	Yes	8	57%
	No	6	43%
	Don't know	0	0%

	Response	*(n=14)*	*Percent of Respondents*
HS3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?	Yes	6	43%
	No	6	43%
	Don't know	2	14%

	Response	*(n=14)*	*Percent of Respondents**
HS4. What is the primary heating system type for the system you made improvements to? (Do not read list) (Select all that apply)	Hot air furnace	2	14%
	Wall or floorboard radiator (steam, Hot Water or electric resistance)	5	36%
	Steam, hot water or electric resistance coils in ventilation system.	3	21%
	Space heaters	1	7%
	Heat pump, air source	1	7%
	Heat pump, ground source	1	7%
	Heat pump, water loop	2	14%
	Electric boiler	0	0%
	Gas boiler	8	57%
	Other (please specify)	4	29%
	Don't know	0	0%

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

AC1A. The next few questions relate to the air conditioning project you implemented. Was this air conditioning improvement specifically recommended to you by a BOC course instructor or through BOC course materials?	*Response*	*(n=14)*	*Percent of Respondents*
	Yes	3	21%
	No	11	79%
	Don't know	0	0%

AC1B. How important was your experience in the Building Operator Certification Program in your decision to implement this air conditioning project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	*Response*	*(n=14)*	*Percent of Respondents*
	0	5	36%
	1	0	0%
	2	1	7%
	3	0	0%
	4	0	0%
	5	5	36%
	6	0	0%
	7	0	0%
	8	2	14%
	9	1	7%
	10	0	0%
	Don't know	0	0%

AC1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this air conditioning system project, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	*Response*	*(n=14)*	*Percent of Respondents*
	0	0	0%
	1	0	0%
	2	0	0%
	3	0	0%
	4	1	7%
	5	2	14%
	6	0	0%
	7	0	0%
	8	2	14%
	9	1	7%
	10	8	57%
	Don't know	0	0%

AC2. Had you implemented a similar project prior to attending the BOC training?	*Response*	*(n=14)*	*Percent of Respondents*
	Yes	5	36%
	No	9	64%
	Don't know	0	0%

AC3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?	*Response*	*(n=14)*	*Percent of Respondents*
	Yes	7	50%
	No	6	43%
	Don't know	1	7%

AC4. What is the primary cooling system type for the system you made improvements to?	*Response*	*(n=14)*	*Percent of Respondents**
	Chiller - air-cooled	5	36%
	Chiller - water or evaporatively cooled	5	36%
	Evaporative cooler	2	14%
	Fans	2	14%
	Direct Expansion - air-cooled packaged or split system cooling or heat pump	8	57%
	Geothermal heat pump	2	14%
	Window or thermal units (PTAC/PTHP)	1	7%
	Other (please specify)	3	21%
	Don't know	0	0%

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

E1A. The next few questions relate to the economizer project you implemented. Was this economizer project specifically recommended to you by a BOC course instructor or through BOC course materials?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	4	50%
	No	4	50%
	Don't know	0	0%

E1B. How important was your experience in the Building Operator Certification Program in your decision to implement this economizer project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	*Response*	*(n=8)*	*Percent of Respondents*
	0	0	0%
	1	0	0%
	2	0	0%
	3	1	13%
	4	0	0%
	5	2	25%
	6	1	13%
	7	1	13%
	8	1	13%
	9	1	13%
	10	1	13%
	Don't know	0	0%

E1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this economizer project, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	*Response*	*(n=8)*	*Percent of Respondents*
	0	0	0%
	1	0	0%
	2	2	25%
	3	0	0%
	4	1	13%
	5	0	0%
	6	0	0%
	7	1	13%
	8	2	25%
	9	0	0%
	10	2	25%
	Don't know	0	0%

E2. Had you implemented a similar project prior to attending the BOC training?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	1	13%
	No	7	88%
	Don't know	0	0%

E3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	4	50%
	No	3	38%
	Don't know	1	13%

WH1A. The next few questions relate to the water heating project you implemented.Was this water heating project specifically recommended to you by a BOC course instructor or through BOC course materials?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	1	50%
	No	1	50%
	Don't know	0	0%

	Response	*(n=2)*	*Percent of Respondents*
WH1B. How important was your experience in the Building Operator Certification Program in your decision to implement this water heating project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	0	0	0%
	1	0	0%
	2	0	0%
	3	1	50%
	4	0	0%
	5	0	0%
	6	1	50%
	7	0	0%
	8	0	0%
	9	0	0%
	10	0	0%
	Don't know	0	0%

	Response	*(n=2)*	*Percent of Respondents*
WH1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this water heating project, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	0	0	0%
	1	0	0%
	2	0	0%
	3	0	0%
	4	1	50%
	5	0	0%
	6	0	0%
	7	0	0%
	8	1	50%
	9	0	0%
	10	0	0%
	Don't know	0	0%

	Response	*(n=2)*	*Percent of Respondents*
WH2. Had you implemented a similar project prior to attending the BOC training?	Yes	0	0%
	No	2	100%
	Don't know	0	0%

	Response	*(n=2)*	*Percent of Respondents*
WH3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?	Yes	0	0%
	No	2	100%
	Don't know	0	0%

	Response	*(n=2)*	*Percent of Respondents**
WH4. What type of water heating improvements that produced energy savings did you implement? (Do not read list. Select all that apply)	Installed timeclock to turn off circulation pump after hours	0	0%
	Installed heat recovery system	1	50%
	Installed a more efficient hot water heater or boiler?	1	50%
	Insulated pipes(s) (How thick was the insulation and how many linear feet were installed?)	0	0%
	Other	0	0%
	Don't know	0	0%

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

O1A. The next few questions relate to the other project you implemented. Was this measure specifically recommended to you by a BOC course instructor or through BOC course materials?	*Response*	*(n=4)*	*Percent of Respondents*
	Yes	2	50%
	No	2	50%
	Don't know	0	0%

O1B. How important was your experience in the Building Operator Certification Program in your decision to implement this other project, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	*Response*	*(n=4)*	*Percent of Respondents*
	0	0	0%
	1	0	0%
	2	0	0%
	3	0	0%
	4	0	0%
	5	0	0%
	6	1	25%
	7	0	0%
	8	2	50%
	9	0	0%
	10	1	25%
	Don't know	0	0%

	Response	*(n=4)*	*Percent of Respondents*
O1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this other project, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	0	2	50%
	1	0	0%
	2	1	25%
	3	0	0%
	4	1	25%
	5	0	0%
	6	0	0%
	7	0	0%
	8	0	0%
	9	0	0%
	10	0	0%
	Don't know	0	0%

	Response	*(n=4)*	*Percent of Respondents*
O2. Had you implemented a similar project prior to attending the BOC training?	Yes	0	0%
	No	4	100%
	Don't know	0	0%

	Response	*(n=4)*	*Percent of Respondents*
O3. Have you received or applied for a financial incentive from a utility or the Illinois DCEO for this project?	Yes	2	50%
	No	2	50%
	Don't know	0	0%

	Response	*(n=40)*	*Percent of Respondents*
Please indicate if you have performed maintanence on the cooling system equipment differently or more frequently or both since participating in the BOC training. Maintenance on the cooling system.	Differently	1	3%
	More Frequently	5	13%
	Both	2	5%
	No Change	26	65%
	Don't know	6	15%

	Response	*(n=40)*	*Percent of Respondents*
Please indicate if you have performed maintenance on the heating equipment differently or more frequently or both since participating in the BOC training. Maintenance on the heating equipment.	Differently	0	0%
	More Frequently	7	18%
	Both	2	5%
	No Change	24	60%
	Don't know	7	18%

Please indicate if you have performed maintenance on motors (including belt alignment and tension) differently or more frequently or both since participating in the BOC training. Motor maintenance, including belt alignment and tension.	*Response*	*(n=40)*	*Percent of Respondents*
	Differently	1	3%
	More Frequently	4	10%
	Both	2	5%
	No Change	28	70%
	Don't know	5	13%

Please indicate if you have performed maintenance on compressed air systems differently or more frequently or both since participating in the BOC training. Maintenance on compressed air system.	*Response*	*(n=40)*	*Percent of Respondents*
	Differently	0	0%
	More Frequently	3	8%
	Both	0	0%
	No Change	25	63%
	Don't know	12	30%

Please indicate if you have performed electrical panel maintenance differently or more frequently or both since participating in the BOC training. Electrical panel maintenance.	*Response*	*(n=40)*	*Percent of Respondents*
	Differently	3	8%
	More Frequently	6	15%
	Both	1	3%
	No Change	22	55%
	Don't know	8	20%

Please indicate if you have performed ventilation maintenance differently or more frequently or both since participating in the BOC training. Ventilation maintenance.	*Response*	*(n=40)*	*Percent of Respondents*
	Differently	1	3%
	More Frequently	7	18%
	Both	1	3%
	No Change	24	60%
	Don't know	7	18%

Please indicate if you have performed other energy savings maintenance differently or more frequently or both since participating in the BOC training. Other maintenance.	*Response*	*(n=40)*	*Percent of Respondents*
	Differently	5	13%
	More Frequently	3	8%
	Both	0	0%
	No Change	27	68%
	Don't know	5	13%

	Response	*(n=19)*	*Percent of Respondents*
At how many facilities did you make these changes to your maintenance practices?	1	5	26%
	2	2	11%
	3	1	5%
	4	2	11%
	5	0	0%
	6	1	5%
	7	1	5%
	8	0	0%
	9	0	0%
	10 or more	6	32%
	Don't know	1	5%

CS1A. The next few questions relate to the cooling system maintenance. Was this measure specifically recommended to you by a BOC course instructor or through BOC course materials?	*Response*	*(n=8)*	*Percent of Respondents*
	Yes	4	50%
	No	4	50%
	Don't know	0	0%

CS1B. How important was your experience in the Building Operator Certification Program in your decision to implement this cooling system maintenance, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	*Response*	*(n=8)*	*Percent of Respondents*
	0	1	13%
	1	0	0%
	2	0	0%
	3	0	0%
	4	0	0%
	5	1	13%
	6	1	13%
	7	1	13%
	8	1	13%
	9	1	13%
	10	2	25%
	Don't know	0	0%

	Response	*(n=8)*	*Percent of Respondents*
CS1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this cooling system maintenance, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	0	3	38%
	1	1	13%
	2	0	0%
	3	0	0%
	4	1	13%
	5	2	25%
	6	0	0%
	7	0	0%
	8	0	0%
	9	0	0%
	10	1	13%
	Don't know	0	0%

	Response	*(n=8)*	*Percent of Respondents**
CS2. What type of air conditioning improvements that produced energy savings did you implement? (Do not read list. Select all that apply)	Changes to cooling tower service	4	50%
	Changes to chiller bundle cleaning	1	13%
	Changes to condenser cleaning	7	88%
	Changes to refrigerant charge adjustment	3	38%
	Other changes	3	38%
	Don't know	0	0%

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

	Response	*(n=9)*	*Percent of Respondents*
HE1A. The next few questions relate to the heating system maintenance you implemented. Was this measure specifically recommended to you by a BOC course instructor or through BOC course materials?	Yes	4	44%
	No	5	56%
	Don't know	0	0%

	Response	*(n=9)*	*Percent of Respondents*
HE1B. How important was your experience in the Building Operator Certification Program in your decision to implement this heating system maintenance, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	0	2	22%
	1	0	0%
	2	0	0%
	3	0	0%
	4	1	11%
	5	0	0%
	6	1	11%
	7	1	11%
	8	1	11%
	9	2	22%
	10	1	11%
	Don't know	0	0%

	Response	*(n=9)*	*Percent of Respondents*
HE1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this heating system maintenance, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	0	2	22%
	1	0	0%
	2	1	11%
	3	0	0%
	4	1	11%
	5	2	22%
	6	0	0%
	7	0	0%
	8	1	11%
	9	0	0%
	10	2	22%
	Don't know	0	0%

	Response	*(n=9)*	*Percent of Respondents**
HE2. What type of heating system improvements that produced energy savings did you implement? (Do not read list. Select all that apply)	Heat exchanger cleaning (Please provide capacity in BTU's)	5	56%
	Blowdown frequency (Please provide boiler capacity in BTU's and number of traps)	2	22%
	Steam trap	3	33%
	Other	1	11%
	Don't know	2	22%

**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*
ACM1A. The next few questions relate to the air compressor maintenance you implemented. Was this measure specifically recommended to you by a BOC course instructor or through BOC course materials?	Yes	2	67%
	No	1	33%
	Don't know	0	0%

	Response	*(n=3)*	*Percent of Respondents*
ACM1B. How important was your experience in the Building Operator Certification Program in your decision to implement this air compressor maintenance, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	0	0	0%
	1	0	0%
	2	0	0%
	3	0	0%
	4	0	0%
	5	1	33%
	6	1	33%
	7	1	33%
	8	0	0%
	9	0	0%
	10	0	0%
	Don't know	0	0%

	Response	*(n=3)*	*Percent of Respondents*
ACM1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this air compressor maintenance, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	0	0	0%
	1	0	0%
	2	0	0%
	3	0	0%
	4	1	33%
	5	0	0%
	6	0	0%
	7	1	33%
	8	0	0%
	9	0	0%
	10	1	33%
	Don't know	0	0%

	Response	*(n=3)*	*Percent of Respondents**
ACM2. Please tell me all the changes you have made to your air compressor equipment maintenance. (Do not read list. Select all that apply)	Audible leak detection	0	0%
	Ultra-sonic leak detection	1	33%
	Pressure optimization	3	100%
	End-use isolation	1	33%
	Filter changes	1	33%
	System diagnostics	0	0%
	Other (please specify)	0	0%
	Don't know	0	0%

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

VM1A. The next few questions relate to the ventilation maintenance project you implemented. Was this measure specifically recommended to you by a BOC course instructor or through BOC course materials?	*Response*	*(n=9)*	*Percent of Respondents*
	Yes	4	44%
	No	5	56%
	Don't know	0	0%

VM1B. How important was your experience in the Building Operator Certification Program in your decision to implement this ventilation maintenance, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	*Response*	*(n=9)*	*Percent of Respondents*
	0	0	0%
	1	0	0%
	2	0	0%
	3	1	11%
	4	0	0%
	5	0	0%
	6	1	11%
	7	3	33%
	8	1	11%
	9	0	0%
	10	3	33%
	Don't know	0	0%

VM1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this ventilation maintenance, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	*Response*	*(n=9)*	*Percent of Respondents*
	0	3	33%
	1	0	0%
	2	0	0%
	3	1	11%
	4	2	22%
	5	2	22%
	6	0	0%
	7	0	0%
	8	0	0%
	9	0	0%
	10	1	11%
	Don't know	0	0%

	Response	*(n=10)*	*Percent of Respondents**
VM2. What type of ventilation improvements that produced energy savings did you implement? (Do not read list. Select all that apply)	Economizer optimization/repair	4	40%
	Sensor Calibration	6	60%
	Setpoint optimization	5	50%
	Balancing	4	40%
	Filter changes	6	60%
	System diagnostics	5	50%
	Sealed leaks / replaced door gaskets	2	20%
	Other (please specify)	0	0%
	Don't know	2	20%

**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*
OM1A. The next few questions relate to the other maintenance you implemented. Was this measure specifically recommended to you by a BOC course instructor or through BOC course materials?	Yes	6	75%
	No	2	25%
	Don't know	0	0%

	Response	*(n=8)*	*Percent of Respondents*
OM1B. How important was your experience in the Building Operator Certification Program in your decision to implement this other maintenance, using a scale of 0 to 10 where 0 is not at all important and 10 is extremely important?	0	0	0%
	1	0	0%
	2	0	0%
	3	1	13%
	4	0	0%
	5	0	0%
	6	1	13%
	7	1	13%
	8	1	13%
	9	3	38%
	10	1	13%
	Don't know	0	0%

	Response	*(n=8)*	*Percent of Respondents*
OM1C. If you had not participated in the Building Operator Certification Program, how likely is it that your organization would still have implemented this other maintenance, using a 0 to 10 scale where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?	0	1	13%
	1	0	0%
	2	0	0%
	3	2	25%
	4	1	13%
	5	3	38%
	6	0	0%
	7	1	13%
	8	0	0%
	9	0	0%
	10	0	0%
	Don't know	0	0%

	Response	*(n=40)*	*Percent of Respondents**
Do you think that there are certain barriers that may make it difficult for potential program participants to attend or complete the BOC training? What are they? (Don't read list. Select all that apply.)	Time	18	45%
	Cost	10	25%
	Not aware of it	19	48%
	Supervisor approval	9	23%
	No barriers	4	10%
	Don't know	2	5%

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

	Response	*(n=40)*	*Percent of Respondents*
Please indicate your level of satisfaction with the following elements of the BOC training. Course schedule.	Very Dissatisfied	0	0%
	Dissatisfied	0	0%
	Neither Satisfied nor Dissatisfied	1	3%
	Satisfied	14	35%
	Very Satisfied	25	63%
	Don't know	0	0%

	Response	*(n=40)*	*Percent of Respondents*
Please indicate your level of satisfaction with the following elements of the BOC training. Course instructors.	Very Dissatisfied	0	0%
	Dissatisfied	0	0%
	Neither Satisfied nor Dissatisfied	2	5%
	Satisfied	10	25%
	Very Satisfied	28	70%
	Don't know	0	0%

	Response	*(n=40)*	*Percent of Respondents*
Please indicate your level of satisfaction with the following elements of the BOC training. Tuition rebate application process.	Very Dissatisfied	0	0%
	Dissatisfied	0	0%
	Neither Satisfied nor Dissatisfied	1	3%
	Satisfied	7	18%
	Very Satisfied	23	58%
	Don't know	9	23%

	Response	*(n=40)*	*Percent of Respondents*
Please indicate your level of satisfaction with the following elements of the BOC training. Tuition rebate amount.	Very Dissatisfied	0	0%
	Dissatisfied	1	3%
	Neither Satisfied nor Dissatisfied	1	3%
	Satisfied	8	20%
	Very Satisfied	22	55%
	Don't know	8	20%

	Response	*(n=40)*	*Percent of Respondents*
Please indicate your level of satisfaction with the following elements of the BOC training. Time elapsed to receive tuition rebate.	Very Dissatisfied	0	0%
	Dissatisfied	0	0%
	Neither Satisfied nor Dissatisfied	1	3%
	Satisfied	11	28%
	Very Satisfied	16	40%
	Don't know	12	30%

	Response	*(n=40)*	*Percent of Respondents*
Please indicate your level of satisfaction with the following elements of the BOC training. Overall experience with the BOC Program.	Very Dissatisfied	0	0%
	Dissatisfied	0	0%
	Neither Satisfied nor Dissatisfied	0	0%
	Satisfied	7	18%
	Very Satisfied	33	83%
	Don't know	0	0%

	Response	*(n=40)*	*Percent of Respondents*
Please indicate if you had already completed energy budget implementation prior to completing BOC training, before and after the training, only completed them after attending BOC training, or have not yet completed.	Completed Prior to Training	10	25%
	Completed Before and After Training	3	8%
	Only Completed After Training	2	5%
	Not Yet Completed	19	48%
	Don't know	6	15%

Please indicate if you had already recorded energy use over time prior to completing BOC training, before and after the training, only completed them after attending BOC training, or have not yet completed.	*Response*	*(n=40)*	*Percent of Respondents*
	Completed Prior to Training	14	35%
	Completed Before and After Training	9	23%
	Only Completed After Training	7	18%
	Not Yet Completed	7	18%
	Don't know	3	8%

Please indicate if you had already set energy savings goals prior to completing BOC training, before and after the training, only completed them after attending BOC training, or have not yet completed.	*Response*	*(n=40)*	*Percent of Respondents*
	Completed Prior to Training	6	15%
	Completed Before and After Training	7	18%
	Only Completed After Training	8	20%
	Not Yet Completed	15	38%
	Don't know	4	10%

Please indicate if you had already achieved energy savings goals prior to completing BOC training, before and after the training, only completed them after attending BOC training, or have not yet completed.	*Response*	*(n=40)*	*Percent of Respondents*
	Completed Prior to Training	4	10%
	Completed Before and After Training	6	15%
	Only Completed After Training	8	20%
	Not Yet Completed	17	43%
	Don't know	5	13%

Have you participated in any other DCEO energy efficiency programs?	*Response*	*(n=40)*	*Percent of Respondents*
	Yes	6	15%
	No	33	83%
	Don't know	1	3%

How important was the BOC course in your decision to participate in these other DCEO programs? (Read list)	*Response*	*(n=6)*	*Percent of Respondents*
	Very important	4	67%
	Somewhat important	1	17%
	Neutral	0	0%
	Somewhat unimportant	0	0%
	Not important at all	1	17%
	Don’t know/Not applicable	0	0%

	Response	*(n=40)*	*Percent of Respondents*
What is your current job title? (Do not read list)	Operations/Facilities operations manager	4	10%
	Maintenance manager	0	0%
	HVAC supervisor or technician	0	0%
	Engineering manager	0	0%
	Facilities manager	1	3%
	Engineer	5	13%
	Maintenance manager	1	3%
	General contractor	0	0%
	Building management specialist	0	0%
	Other engineering position	0	0%
	Other manager, team leader, supervisor	0	0%
	Other	29	73%

How many years have you worked in this role?	*(n=38)*	
	Average Years	10.4

How many building operator staff is there at your current location?	*(n=34)*	
	Average Staff	9.8

How many of these staff have completed the BOC training (either Level 1 or Level 1&2)?	*(n=35)*	
	Average BOC Completion	1.8

	Response	*(n=40)*	*Percent of Respondents*
Does your facility currently have plans to implement any of the following types of energy efficiency projects?	Lighting controls	11	28%
	Energy efficient lighting	17	43%
	Energy efficient motors	5	13%
	VSDs	6	15%
	Compressed air projects	3	8%
	Energy management systems	8	20%
	Heating system improvements	12	30%
	Air conditioning improvements	12	30%
	Economizer on air handler	7	18%
	Water heating efficiency improvements	4	10%
	Other (please explain)	0	0%
	None	3	20%
	Don't know	3	28%

	Response	*(n=40)*	*Percent of Respondents*
Did you initiate the plans for these upcoming projects, or did someone else in your organization?	I initiated the plans	12	30%
	Someone else initiated the plans	10	25%
	Don't know	18	45%

	Response	*(n=12)*	*Percent of Respondents*
Did you initiate the plans for the upcoming project(s) due to information you gained through the Building Operator Certification training?	Yes	9	75%
	No	3	25%
	Don't know	0	0%

Appendix C: Supervisor Survey Instrument

1. According to our records [number] of your employees completed the Building Operator Certification Course. Specifically, our records indicate that [employee name] attended the course. Is this correct?
( ) Yes
( ) No (If selected, go to follow up)
( ) Don't know (If selected, go to follow up)

1A. Did you have one or more employees attend the building operator certification course between June 1 2014 and May 31 2015?
( ) Yes (If selected, go to 1A.1)
( ) No (If selected, go to 1A.2)
( ) Don't know (If selected, go to 1A.2)

1A.1. What are their name(s)?

1A.2. We do not have any further questions for you.

Please scroll to the end of the survey and click submit.

1. How useful would you say the Building Operator Certification course was for helping your employees perform better in the following areas?

	Very Useful	**Somewhat Useful**	**Not Useful**	**Don't know / Not Applicable**
Identifying energy efficiency improvements				
Monitoring facility energy use				
Improving maintenance practices				
Identifying ways to improve occupant comfort				

1A. Was the course useful for helping your [employee/employees] perform better at other aspects of their job?

1B. (if any marked not at all useful) Could you explain more about why you think the course was not useful in improving certain areas of your employee's(s') job performance?

2. From what you have observed, [has your employee / have your employees] used or applied any of the concepts and/or methods taught in the Building Operator Certification courses?
( ) Yes
( ) No
( ) Don't know

3. Since completing the Building Operator Certification, [has your employee / have your employees] undertaken or recommended any of the following energy efficiency projects?

	Undertaken	Recommended	Don't Know
Installation of lighting controls			
Installation of energy efficient lighting			
Installation of variable speed drives or variable frequency drives			
Energy saving improvements to compressed air systems			
Energy management system projects			
Energy saving improvements to heating system			
Energy saving improvements to cooling system			
Energy saving economizer project			
Water heating efficiency improvements			

4. Since completing the Building Operator Certification, [has your employee/have your employees] undertaken or recommended any other energy saving improvements not mentioned above?
( ) Yes
( ) No
( ) Don't know

4A. What other energy projects [has your employee / have your employees] undertaken or recommended since attending the Building Operator Certification courses? Please specify whether these projects were undertaken or recommended?

5. [Has your employee / Have your employees] performed any new operation and maintenance actions since completing the Building Operator Certification?
( ) Yes
( ) No
( ) Don't know

5B. What new operations and maintenance activities [has your employee / have your employees] performed since completing the Certification?

6. Would you say that your [employee performs / employees perform] performs some past operation and maintenance more often since completing the Building Operator Certification?
( ) Yes
( ) No
( ) Don't know

6B. What activities [has your employee / have your employees] performed more often since completing the Certification?

7. Would you say that your [employee performs / employees perform] some past operation and maintenance activities better since attending the course?
( ) Yes
( ) No
( ) Don't know

7A. What activities [has your employee / have your employees] performed better since completing the Certification?

8. Does your organization face any of the following barriers to making energy efficiency improvements? (Select all that apply)
( ) Organization/company not committed to energy efficiency improvements
( ) Lack of knowledge about ways to save energy
( ) Not enough staff resources to plan efficiency projects
( ) Other (Please specify)
( ) Don't know

9. Since attending the Building Operator Certification courses [Has your employee / Have your employees] shared what was learned with other employees?
( ) Yes (If selected, go to 9A)
( ) No
( ) Don't know

9A. How [has your employee / have your employees] shared the information learned in the course with other employees? (Select all that apply)
( ) On the job demonstration of concepts or methods
( ) Verbal explanation of concepts or methods
( ) Written explanation of concepts or methods
( ) Shared course materials
( ) Don't know
( ) Other _____

10. Based on your observations, has the Building Operator Certification training course led to your [employee / employees] having increased value to your organization in terms of the following?

	Yes	**No**	**Don't Know**
Saving energy at your facility?	( )	( )	( )
Saving money?	( )	( )	( )
Helping to improve occupant comfort?	( )	( )	( )
Advising in decisions about equipment operation or replacement?	( )	( )	( )
Having more productive interactions with contractors?	( )	( )	( )

Undertaking, recommending, or influencing any energy-efficiency projects?			

11. If you were hiring a new employee, how important would the candidates having a building operator certificate be to your hiring decision?
( ) Very important
( ) Important
( ) Not important
( ) Not at all important
( ) Don't know

12. For current employees, how important is having a building operator certificate for promotion and/or advancement?
( ) Very important
( ) Important
( ) Not important
( ) Not at all important
( ) Don't know

13. What do you consider in deciding whether or not to send your employees to the Building Operator Certification Program training course? (Select all that apply)
( ) Time/staff availability
( ) Training costs
( ) Location of the training
( ) Instructor/sponsor for the training
( ) Length of training
( ) Your organization's approval process for sending employees to training
( ) Employee professional development
( ) Legal requirements
( ) Gain/benefits for company of certification
( ) The employee's personal interest
( ) Other
( ) Don't know

14. How important was the rebate to the decision to send your [employee / employees] to the Building Operator Certification courses?
( ) Very important
( ) Important
( ) Not important
( ) Not at all important
( ) Don't know

15. Would your [employee / employees] have been sent to the Building Operator Certification course if the rebate was not available?
( ) Definitely would have
( ) Probably would have

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

16. Do you think your [employee's/employees'] training in the Building Operator Certification Program training course has increased the likelihood that your organization will participate in energy efficiency programs, such as equipment incentive programs?
( ) Yes (If selected, go to 16A)
( ) No (If selected, go to 16B)
( ) Don't know

16 A. Why has it increased the likelihood of participating in the energy efficiency programs?

16B. Why has it not increased the likelihood of participating in energy efficiency programs?

17. Do you think your (employee's / employees') training in the Building Operator Certification Program training course has increased the likelihood that your organization will make investments in energy efficiency?
( ) Yes (If selected, go to 17A)
( ) No (If selected, go to 17B)
( ) Don't know

17A. Why has it increased the likelihood that your organization will make investments in energy efficiency?

17B. Why has it not increased the likelihood that your organization will make investments in energy efficiency?

18. Would you recommend the Building Operator Certificate Program to any of your colleagues in your organization or in other organizations?
( ) Yes
( ) No (If selected, go to 18A)
( ) Don't know

18A. Why would you not recommend the Building Operator Certification Program to your colleagues?

19. Do you expect your organization to enroll any other staff at your facility in the Building Operator Certificate Program?
( ) Yes
( ) No (If selected, go to 19A)
( ) Don't know

19A. Why do you not expect your organization to enroll any more staff in the Building Operator Certification Program to your colleagues?