EVALUATION OF THE 2003 STATEWIDE BUILDING OPERATOR CERTIFICATION AND TRAINING PROGRAM

CALMAC ID: PGE0207.01

March 1, 2005

Prepared for California's Investor-Owned Utilities:

Pacific Gas and Electric Company
San Diego Gas and Electric Company
Southern California Edison Company
Southern California Gas Company

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Measurement and Evaluation
Customer Energy Efficiency
Policy, Evaluation & Regulatory Requirements Section
Pacific Gas and Electric Company
San Francisco, California

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As part of its Customer Energy Efficiency Programs, Pacific Gas and Electric Company (PG&E) has engaged consultants to conduct a series of studies designed to increase the certainty of and confidence in the energy savings delivered by the programs. This report describes one of those studies. It represents the findings and views of the consultant employed to conduct the study and not of PG&E itself.

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All inquiries should be directed to:

James Turnure
Revenue Requirements
Pacific Gas and Electric Company
P. O. Box 770000, Mail Code B9A
San Francisco, CA 94177

research/into/action inc

Final Report

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CALMAC ID: PGE0207.01

Prepared For:

Pacific Gas and Electric Company

Submitted To:

Beatrice Mayo
Pacific Gas and Electric Company

Prepared By:

research/into/action

Marjorie R. McRae, Ph.D.
Robert A. Scholl
Research Into Action, Inc.
P.O. Box 12312
Portland, OR 97212
503.287.9136

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TABLE OF CONTENTS

APPENDICES

EXECUTIVE SUMMARY

This report provides a process evaluation of the 2003 Statewide Building Operators Certification and Training (BOC) Program, focusing on Level II training activities. The Statewide BOC is one of many energy efficiency programs managed by the four California investor-owned utilities (IOUs): PG&E, San Diego Gas & Electric Company, Southern California Edison, and Southern California Gas Company. These efficiency programs are funded by California ratepayers under the auspices of the California Public Utilities Commission (CPUC). Research into Action, Inc. conducted the evaluation under contract with Pacific Gas and Electric Company (PG&E) on behalf of the four IOUs.

The BOC curriculum was developed by the Northwest Energy Efficiency Council (NEEC), which implements the program for the IOUs. The Level II BOC training is an advanced educational course for commercial and industrial building operators and facility managers. It consists of four core courses and two electives on topics such as preventive maintenance advanced electrical diagnostics, HVAC troubleshooting, HVAC controls, motors, and an introduction to building commissioning. All courses promote energy-efficient equipment and operation and maintenance (O&M) activities. The six Level II courses were offered in two locations in 2003: San Francisco and Irwindale.

The evaluation method for this report included surveys and interviews with: 20 of the 37 Level II BOC students; six supervisors of these students; 62 building operations and maintenance staff who had received program marketing materials, but had not sent staff to the BOC training (nonparticipants); two utility BOC program managers; and five NEEC staff (BOC instructors and managers). The findings from these surveys and interviews are detailed in the body of this report and summarized in the concluding chapter. The evaluation's conclusions and recommendations arise from the findings and are summarized here.

CONCLUSIONS

1. Are participants satisfied with the Level II BOC training?

Students and their supervisors expressed high levels of satisfaction. All students have recommended or would recommend the training to others and three-quarters say they would be willing to pay for the training themselves.

2. Does Level II build appropriately and adequately upon Level I?

The Level II course material is an appropriate training step for graduates of the Level I series. Large majorities of the students indicated both the difficulty level and pace of the course materials were appropriate and were more advanced in Level II than the corresponding subject matter in Level I.

3. Does the training affect operators' energy efficiency behaviors?

Changes in operations and maintenance energy efficiency behaviors can be attributed to the BOC. Most students and their supervisors credit the training with increasing students' energy efficiency behaviors and having a positive influence on energy efficiency decisions at their facilities. More than half of the students have trained other staff in BOC concepts.

4. Are students interested in additional training?

Students indicated a desire for more training. Students specifically requested additional training in troubleshooting, HVAC engineering design, indoor air quality, and management of managed systems. Some students went so far as to say, "So when can I take Level III?"

5. Is certification a valued aspect of building operator training?

Students, their supervisors, and nonparticipants value certification for building operator training. Students believe the certificate is good for job advancement and think employers should come to require it. All of the students believe the BOC program should be ongoing in California; without this, certification loses its value.

6. How does the training affect students' estimation of their utilities and how does utility sponsorship of the program affect nonparticipants' estimation of the training?

Utility involvement in the training reflects well upon the utility and enhances the credibility of the program. Satisfaction with their utility increased for some students and supervisors because of the utility's sponsorship of the BOC program. For nonparticipants, utility sponsorship enhances the credibility of the series.

7. To what extent would a training location closer to the customer increase participation, or create a willingness to pay higher tuition?

Some students, supervisors, and nonparticipants would pay more for a class located closer to their facility and a closer class location would somewhat increase enrollment in the series. However, most students, supervisors, and nonparticipants would neither pay more for a class located closer to their facility, nor send more students.

8. Is the cost of tuition for the series more important, especially to institutional customers, than the training location or time away from the job?

The greatest barrier to outside training for the nonparticipants is time away from the job. This barrier was the one most often mentioned by both private sector and institutional operations and maintenance staff. (Even so, most interviewed O&M staff prefer the current one-day monthly classes to shorter, more frequent sessions.) Time away from the job was mentioned as a barrier most frequently by government employees and staff from K-12 schools. Among institutional nonparticipants, a lack of awareness of the BOC program was also a barrier to participation in the training.

9. What are the views of the utility program managers regarding the course series?

The utility program managers are supportive of the Level II training. They believe the program is working well and will continue in California. The Level II training is seen as being good for the students' careers, and for attracting and retaining business in California.

10. Are nonparticipants interested in training for building operators?

A majority of nonparticipants consider certification in building operations and maintenance to be important. Most nonparticipants' facilities had some O&M staff that had attended at least some kind of outside training or certification program during the last three years, and virtually every organization had money budgeted for outside training in 2005.

RECOMMENDATIONS

1. Offer additional advanced training.

Many Level II students expressed an interest in additional training. Development of additional Level II electives should be continued. As more California operators have completed Level II training, consider offering the remaining electives—either singularly or packaged as a group—to those students who have had the Level II core courses.

2. Increase utility presence at BOC trainings.

Although students expressed satisfaction with the level of utility involvement, an opportunity is being missed. Consider sending a utility program manager or customer representative to at least a portion of a single course in each series (e.g., 30 minutes, near the break time, coordinated in advance with NEEC). Further, at sites other than the utilities' energy resource centers, ensure utility program brochures are available, perhaps through a portable tradeshow booth. Participants said their experiences with the BOC reflected positively on their utilities and inclined them to participate in utility efficiency programs and undertake efficiency projects. Utilities could better capitalize on these positive BOC outcomes.

3. Increase utility marketing of the program.

NEEC and the utilities can best promote the program to different markets, and by using different means. NEEC cannot perform the relationship marketing that the utilities can conduct with their own customers. Utilities should comprehensively include the BOC with the marketing efforts for all of their other training programs, effectively presenting the BOC as one of their own programs offered through their energy resource centers.

4. Target institutional customers in marketing efforts.

Institutional customers have larger operations and maintenance staffs than most private-sector employers have, yet a barrier to attendance for nonparticipant institutional customers was a lack of awareness of the existence of the BOC program. This was especially true for government agencies and K-12 schools.

5. Continue to seek opportunities to hold trainings at the site of large employers, perhaps at the site of one of several large employers in related industries, working in proximity.

Although traveling to the training site was an issue for less than half of the interviewed O&M staff, nonetheless the burden of travel remains a barrier for some. Because most of the trainings are a bit less than a full day, on-site training may enable some staff to work before or after the sessions. Consider offering a course series for one type of institutional customer (e.g., government offices, hospitals, K-12 schools) at the facility of the customer most central to the organizations of a similar type in a given geographical area. This approach offers the additional advantage of bringing together students who face similar equipment challenges.

6. Address site-related issues.

Prior to selecting a training location off-site from utility facilities, visit the location to ensure it will meet the needs of instructors and students. Provide clear directions to the students for finding the training locations and offer suggestions for parking.

1. INTRODUCTION

This report provides a process evaluation of the 2003 Statewide Building Operators Certification and Training Program, focusing on Level II training activities. Research into Action, Inc. conducted the evaluation under contract with Pacific Gas and Electric Company (PG&E) on behalf of the four California investor-owned utilities (IOUs): PG&E, San Diego Gas & Electric Company, Southern California Edison, and Southern California Gas Company.

The Statewide BOC is one of many energy efficiency programs managed by the four IOUs and funded by California ratepayers under the auspices of the California Public Utilities Commission (CPUC).

The utilities began offering the Statewide BOC Program in 2002. Research Into Action conducted a first-year process evaluation of the 2002 program last year.

This chapter is organized into five sections as follows:

- Program Background and Structure
- 2003-2005 Statewide BOC Activities and Plans
- Evaluation Objectives
- Related Research
- Organization of the Report

PROGRAM BACKGROUND AND STRUCTURE

Program Background

The Building Operators Certification and Training Program (BOC) is an educational course for commercial and industrial building operators and facility managers. It teaches personnel how to operate and maintain building systems for optimal performance, energy-efficiency and occupant comfort.

Facility operations and maintenance (O&M) activities have long been identified as critical components for the efficient operation of commercial and industrial buildings. Yet, building O&M personnel are often among the least educated about

energy issues and among the least valued of staff in a company. These conditions led professionals interested in increasing energy efficiency to wonder how operations and maintenance staff could receive training and education that would increase their capabilities, improve their estimation of the importance of their work and raise their valuation by the market.

The Northwest Energy Efficiency Council (NEEC), extending efforts initiated by the Washington State Energy Office and the Idaho Building Operators Association, developed the Building Operators Certification Program for the Northwest Energy Efficiency Alliance (the Alliance) in 1997.

The California utilities licensed the course from NEEC and have contracted with them for its delivery. San Diego Gas & Electric Company (SDG&E) ran the BOC program as a pilot in 2001; it was first offered in California as a statewide program in 2002. That year, PG&E initiated two Level I series, Southern California Edison (SCE) initiated three series, SDG&E initiated two series, and Southern California Gas Company (SoCalGas) initiated one series.

The Statewide BOC first offered Level II courses, for graduates of the Level I series and other qualified individuals, in 2003.

The NEEC BOC course is now offered in seventeen states. Detailed participant satisfaction studies and impact evaluations have been conducted in two regions where the course has been offered for multiple years: the Pacific Northwest (for the Northwest Energy Efficiency Alliance) and the Northeast (for the Northeast Energy Efficiency Partnership—NEEP). These studies are in addition to the evaluation of the 2002 California statewide program completed last year.

Structure of the Building Operators Certification Training

As offered in California, per the directive of the CPUC (Decision D.01-11-066), the BOC program educates operators of commercial buildings on "short- and long-term peak demand and energy savings strategies."

The first of the training and certification series is Level I training, which comprises eight days over a seven-month period. Its seven courses (one of the courses spans two days) are:

- Building Systems Overview (BOC 101)
- Energy Conservation Techniques (BOC 102)

- HVAC Systems and Controls (BOC 103, two days)
- Efficient Lighting Fundamentals (BOC 104)
- Maintenance and Related Codes (BOC 105)
- Indoor Air Quality (BOC 106)
- Facility Electrical Systems (BOC 107)

Level II course series and certification are available for students wishing to further their training. Students completing the Level I training are eligible to enroll in the Level II courses, as are building operators who can demonstrate that they are prepared to take the Level II series. In 2003, PG&E and SCE offered the Level II series in San Francisco and Irwindale, respectively. Both series began in September 2003 and concluded the following February.

The Level II courses offered in the 2003 series include:

- Preventive Maintenance and Operations (BOC 201)
- Advanced Electrical Diagnostics (BOC 202)
- HVAC Troubleshooting and Maintenance (BOC 203)
- HVAC Controls and Optimization (BOC 204)
- Motors in Facilities (BOC 211)
- Introduction to Building Commissioning (BOC 214)

The Level II courses numbered 201 through 204 are core courses. Those numbered 210 and higher are electives. The California utilities selected the electives to offer in 2003. In addition to those taught in the 2003 statewide program, NEEC has developed curricula for Advanced Indoor Air Quality (BOC 210), Water Efficiency for Building Operators (BOC 212), Mastering Electric Control Circuits (BOC 213) and Electric Motor Management (BOC 215).

Both trainings cost $1,095 for the first participant from a given facility and $795 for subsequent participants sent to a single training session.

2003-2005 STATEWIDE BOC ACTIVITIES AND PLANS

2003 Statewide BOC Activities

The second round of BOC courses began June 24, 2003. As shown in Table 1.1, the utilities offered eleven BOC Level I course series and two BOC Level II series in 2003.

Table 1.1

BOC SERIES INITIATED IN 2003

UTILITY	START DATE	END DATE	CITY	FACILITY
LEVEL I TRAINING				
PG&E	6/24/03	12/9/03	San Francisco	Pacific Energy Center
PG&E	6/25/03	12/3/03	Stockton	Energy Training Center
PG&E	10/15/03	4/21/04	San Jose	Equity Office Properties
PG&E	10/16/03	4/22/04	San Francisco	Pacific Energy Center
SCE	7/8/03	1/13/04	Irvine	Hyatt Regency
SCE	7/22/03	1/27/04	Irwindale	Customer Technology Application Center
SCE	9/17/03	3/17/04	Ontario	Marriott Hotel
SCE	9/16/03	3/16/04	Santa Monica	Radisson Harley Hotel
SCE	10/8/03	4/14/04	Long Beach	Hyatt Long Beach Hotel
SDG&E	7/9/03	1/4/04	San Diego	National University
SoCalGas*	7/23/03	1/28/04	Downey	Energy Resource Center
LEVEL II TRAINING				
PG&E	9/3/03	2/3/04	San Francisco	Pacific Energy Center
SCE	9/4/03	2/5/04	Irwindale	Customer Technology Application Center

* *SoCalGas customers can also attend at SCE training locations.*

A total of 257 students enrolled in the Level I series and 41 students enrolled in the Level II series that year. As of February 2004, 185 of the 2003 Level I students had been certified, and two of the Level II students had been certified. Since the program's initiation in 2002, 502 students have enrolled in the Level I series, of which 371 have been certified by the program.

California State University, San Marcos offers continuing education units to BOC students nationally.

2004 and 2005 Statewide BOC Activities and Plans

The utilities are offering ten Level I BOC series under the statewide program in 2004, and have plans to offer ten more course series in 2005, as shown in Table 1.2. Two Level II series are being held in Stockton at PG&E's Energy Training Center, and by SCE at a hotel in Anaheim. The utilities plan for four more Level II series to be held in 2005.

Table 1.2

BOC SERIES INITIATED IN 2004 AND PLANNED FOR 2005

UTILITY	START DATE	END DATE	CITY	FACILITY
LEVEL I				
PG&E	5/3/04	11/9/04	Stockton	Energy Training Center
PG&E	5/4/04	11/10/04	Oakland	City of Oakland
PG&E	6/23/04	12/15/04	San Francisco	Pacific Energy Center
PG&E	6/24/04	12/16/04	San Jose	Doubletree San Jose
PG&E	3/05	9/05	Eureka	TBA
PG&E	3/05	9/05	Fresno	TBA
PG&E	4/05	10/05	San Jose	TBA
PG&E	9/05	3/06	San Francisco	TBA
SCE	5/25/04	11/2/04	Anaheim	Marriott Suites
SCE	5/18/04	11/9/04	Ontario	Airport Marriott

Continued

UTILITY	START DATE	END DATE	CITY	FACILITY
LEVEL I				
SCE	6/28/04	12/15/04	Irvine	Irvine Marriott
SCE	9/29/04	3/24/05	Torrance	TBA
SCE	2/05	8/05	Bakersfield	TBA
SCE	2/05	8/05	Irwindale	TBA
SCE	3/05	9/05	San Bernardino or Riverside	TBA
SCE	3/05	9/05	Ventura	TBA
SCE	4/05	10/05	Temecula	TBA
SDG&E	5/19/04	11/10/04	San Diego	National University
SDG&E	9/05	3/06	San Diego	TBA
SoCalGas*	5/26/04	11/3/04	Downey	Energy Resource Center
Level II				
PG&E	10/14/04	3/15/05	Stockton	Energy Training Center
PG&E	2/05	7/05	San Jose	TBA
SCE	10/7/04	3/3/05	Anaheim	Marriott Suites
SCE	5/05	10/05	China Lake	TBA
SDG&E	2/05	7/05	San Diego	TBA
SoCalGas*	5/05	10/05	Downey	TBA

* *SoCalGas customers can also attend at SCE training locations.*

The PG&E program manager indicated the utility plans to offer between six and eight BOC course series per year as a "steady-state" implementation level. In order to make classes accessible to more students, PG&E is planning two new locations for 2005: Eureka and Fresno.

BOC certification is valid for two years. As the Statewide program produced its first certified students in April 2003, program staff anticipate these early students will begin their recertification process in 2005.

EVALUATION OBJECTIVES

This evaluation of program processes addresses the BOC's second year of operation in California. It builds upon the findings of the first evaluation, which found high levels of satisfaction among Level I participants and their supervisors and strong indication—through self-reports—that participants' work behaviors, especially toward energy efficiency, changed in response to what they had learned through the BOC. This second program evaluation addresses issues of satisfaction and behavioral change for Level II participants. In addition, it explores characteristics of nonparticipants to whom the program had been marketed through direct mail and follow-up phone calls.

The goals of this second evaluation are to:

- Document satisfaction with the Level II BOC program from the perspectives of participants and their employers;
- Document change in energy efficiency behaviors attributed to the BOC by Level II students and their employers;
- Assess recommendations for Level II process and content improvements from the perspectives of participants and course implementers;
- Assess factors relating to the program's appeal to nonparticipants; and
- Recommend any modifications to the program suggested by the evaluation findings.

This process evaluation provides a qualitative assessment of Level II program impacts by presenting students' evaluations of whether and how their actions on the job have changed in response to what they learned in the Level II training.

RELATED RESEARCH

The current evaluation builds on the experiences and lessons learned from the first-year (2002) evaluation of the Statewide BOC program and from evaluations of the BOC course in the Pacific Northwest and in the Northeast.

PG&E and the three other investor-owned sponsoring utilities received at the end of 2003, the *Evaluation of the 2002 Statewide Building Operators Certification and Training Program*, prepared by Research Into Action.

For the Pacific Northwest, evaluation reports can be found on the Alliance's website: *www.nwalliance.org/resources/evalreports.asp*. On that page, the reports are accessible under the category *Building Operator Certification*. There are seven documents, all prepared for the Alliance by Research Into Action:

- *Market Progress Evaluation Report, No. 7 – Executive Summary (9/01) E01-088*
- *Market Progress Evaluation Report, No. 6 – Executive Summary (3/01) E01-077*
- *Market Progress Evaluation Report, No. 5 – Executive Summary (5/00) E00-052*
- *Market Progress Evaluation Report, No. 4 – Volume 2 (7/99) (Appendices are separate) E99-031*
- *Market Progress Evaluation Report, No. 4 – Volume 1 (5/99) E99-027*
- *Market Progress Evaluation Report, No. 3 – Executive Summary (10/98) E98-015*
- *Market Progress Evaluation Report, No. 2 – Executive Summary (5/98) E98-007*

For the Northeast, a September 2002 *Evaluation of the Building Operators Certification (BOC) Program in the Northeast* by Research Into Action can be found on NEEP's website at*: www.neep.org/files/BOCstudy.pdf*.

An article on the BOC program and its energy impacts in the Pacific Northwest and the Northeast ("Education that Changes Behavior: The Impacts of the BOC Program") was published by the *2003 International Energy Program Evaluation Conference*. M. McRae and J. Peters of Research Into Action are the primary authors.

ORGANIZATION OF THE REPORT

This remainder of this report is organized as follows.

- *Chapter 2: Methodology* describes the survey instruments, sampling plan and data collection and analysis methods used in this evaluation.

- *Chapter 3: Student and Supervisor Assessment of the BOC Program* provides survey findings on satisfaction with the BOC Level II training, assessment of its usefulness, importance of utility involvement, student and supervisor recommendations for improving the BOC program, and importance of training that leads to certification.

- *Chapter 4: Nonparticipant Attitudes Toward the Program* seeks to provide a sense of the demand for the program by looking at building O&M staff and supervisors' interest in the course topics and their willingness to pay for BOC training. It also addresses the importance placed upon certification, plans for and barriers to training, nonparticipants' awareness of the BOC, and—among aware nonparticipants—the reasons no staff members were sent to the training.

- *Chapter 5: Program Implementation* provides the perspectives of utility BOC program managers, instructors and NEEC staff on the various facets of program implementation.

- *Chapter 6: Summary of Findings, Conclusions and Recommendations* identifies the key findings from the research, draws conclusions based on those findings and makes recommendations for the BOC program and subsequent program evaluations.

- *Appendices A, B, C, D, E and F* provide the survey instruments.

2. METHODOLOGY

In this chapter we describe the survey instruments, sampling plan and data collection and analysis methods used in the evaluation. A plan was prepared to govern the research, which conforms to the *Energy Efficiency Policy Manual* requirements for information-only programs. This chapter is organized into the following sections, which provide a synopsis of the evaluation plan:

- Survey Instruments
- Sampling Plan
- Data Collection and Analysis Approach

SURVEY INSTRUMENTS

This section describes the survey instruments used in the evaluation of the 2003 Statewide Building Operators Certification and Training Program.

Six interview guides were developed to support the evaluation covering the following actors:

- Level II Students (participants)
- Level II Students' Supervisors
- Nonparticipant Building Operations and Maintenance Staff
- Utility Program Staff
- BOC (NEEC) Program Staff
- BOC Instructors

Survey of BOC Level II Students

A telephone survey of BOC students was performed, which took approximately 20 minutes. The survey instrument was developed from the interview guide used in the evaluation of the 2002 Statewide BOC Program. This document has the advantage of being field-tested and demonstrated to support the evaluation of

issues relevant to the current study. Appendix A provides the instrument used to query the Level II students in the 2003 Statewide program. It addressed:

1. Satisfaction with, and assessment of the value of the course series;
2. Assessment of the impact of the program on participants' operations and maintenance activities, especially those promoting energy efficiency;
3. Views on their utilities' role in the training; and
4. Anticipated demand for the program (Level I and II trainings for their colleagues).

Survey of Supervisors of Level II Students

The telephone survey instrument for supervisors of Level II students was comparable to the survey instrument for students, in order to allow for a comparison of the two groups' responses. Appendix B provides the instrument used to query the supervisors of Level II students in the 2003 Statewide program.

Most of the issues addressed by the survey of supervisors were the same as those addressed for students, as described above. However, discussion with the PG&E program manager during the evaluation initiation meeting led to a change in the way the current study approached the issue of what a supervisor is willing to pay for the training. The PG&E program manager wondered, among other things, to what extent a training location closer to the customer might increase participation, or would create a willingness to pay a higher tuition.

Rather than asking the supervisor to respond to alternative tuition levels, as was done for the 2002 program evaluation, for this evaluation we asked supervisors questions that revealed their views on the amount of the series tuition relative to the distance their employees have to travel to a training site. The survey sought to determine the relative value of employee travel time to the supervisors when considering sending staff to the BOC training.

Surveys of Nonparticipating Building Operations and Maintenance Staff

Appendix C contains the nonparticipant survey—for operations and maintenance supervisors who have not attended the BOC training. The survey was directed to O&M supervisors who can authorize outside training or who contribute to training decisions. It addressed the following topics:

1. Types of training attended by the facility's operations and maintenance staff;
2. Certifications and professional memberships received by the facility's operations and maintenance staff;
3. Decision factors considered in sending staff to training;
4. Interest in various types of certification;
5. Interest in BOC courses by subject;
6. Likelihood of sending staff to the BOC, and number of staff that might be sent; and
7. Facility characteristics.

In addition to these issues, the nonparticipant survey, like the participating supervisors' survey, explored views on the costs of tuition, travel time and time staff spent away from the facility, as well as how they make tradeoffs among these.

Surveys of Utility Program Managers, BOC (NEEC) Program Staff and BOC Instructors

Appendices D, E and F contain the three interview guides used for the 2003 program evaluation to obtain the views and experiences of the utility BOC managers, the NEEC BOC managers and the BOC instructors. Guides for the telephone interviews, which were based upon the 2002 program interview guides, addressed the following issues:

1. Process issues concerning delivery and logistics;
2. Working with the other parties involved in program implementation (utilities, NEEC);
3. Course content relative to California building operation needs, including how instructors teach "demand response" energy activities;
4. Assessment of marketing; and
5. Sense of market potential.

SAMPLING PLAN

Table 2.1 provides the evaluation's sampling plan.

Table 2.1

RESEARCH SAMPLE PLANNED AND COMPLETED

TARGET GROUP	POPULATION	TARGET SAMPLE SIZE	COMPLETED SAMPLE SIZE
Utility Program Staff	3	3	2
BOC Staff & Instructors	8	5	5
Level II Students	37	19-24	20
Student's Supervisors	34-37	10-12	6
Nonparticipants	700	62	62

Two of the three program managers from the sponsoring utilities were interviewed. The third utility program manager is employed by the parent company of two of the investor-owned utilities that sponsor the BOC program. Neither of those utilities had yet held any Level II courses. Thus, that program manager had no experience with the Level II training and was not interviewed. BOC staff members who were interviewed included the NEEC director of the BOC program, NEEC's marketing manager for the program and three Level II course instructors.

Student Population and Sample

Research Into Action obtained from the NEEC BOC director lists of Level II BOC students who had taken the course series at the Irwindale (Southern California Edison) and San Francisco (Pacific Gas & Electric) training facilities. Twenty-five students from 19 unique facilities had taken the course series at the Irwindale location, and 12 students from seven unique facilities had taken it at the San Francisco location (Table 2.2). Thirteen of the students had been interviewed last year about their Level I experiences.

We attempted to contact every BOC student. We found seven of the Irwindale students and two of the San Francisco students to be unreachable (i.e., they were no

longer with the same employer). Thus, our available population was 28, with 18 of the students in the sample from the Irwindale training and 10 students from the San Francisco training. We were able to complete interviews with 13 of the Irwindale students, for a completion rate of 72%. The completion rate for the San Francisco students was 80% (8 completed interviews).

Table 2.2

STUDENT POPULATION AND SAMPLE DISPOSITION

POPULATION & CHARACTERISTICS	IRWINDALE	SAN FRANCISCO	TOTAL
Student Population	25	12	37
Unique Facilities	19	7	26
Not Reachable	7	2	9
Available Population	18	10	28
Completed Interviews	13	7	20
Completed Interviews as Percent of Available Population	72%	70%	71%

The sample of 20 of the 37 Level II students provides 80/10 confidence/precision. When the sample is compared to the available population, it has a 90/10 confidence/precision.

Supervisor Population and Sample

We also began with a list of names of 32 supervisors for the students from the Irwindale and San Francisco courses. These supervisor names had been provided by students when they registered for the course and were included in NEEC's participant database. Twenty-four of these supervisors were for Irwindale students, and eight were for the San Francisco students. In addition, we asked the students we interviewed to provide the name of their supervisor, in the event that it had changed since their enrollment. Specifically, we asked students to identify a supervisor who could comment on the benefit of the BOC training from the perspective of their organization. The population and interview sample of students' supervisors by utility is shown in Table 2.3.

Table 2.3

SUPERVISOR POPULATION AND SAMPLE DISPOSITION

POPULATION & CHARACTERISTICS	IRWINDALE	SAN FRANCISCO	TOTAL
Supervisor Population	24	8	32
Not Reachable	15	6	21
Available Population	9	2	11
Completed Interviews	4	2	6
Completed Interviews as Percent of Available Population	44%	100%	56%

Fifteen of the Irwindale supervisors and six of the San Francisco supervisors were not reachable, leaving an available population of eleven, nine from Irwindale and two from San Francisco. We were able to complete interviews with four of the Irwindale supervisors and both of the San Francisco supervisors in the sample (see Table 2.3). The completed sample provides 80/17 confidence/precision when considered in relation to the available population.

Supervisors were judged "unreachable" for a number of reasons. More than one-third (eight) of the students said during their interview that the person to whom they reported was outside of the O&M group and did not supervise (in a technical sense) their actual operations and maintenance activities (see Table 2.4).

Thus, the students (and in some cases the supervisors themselves) indicated that these supervisors were not in a position to comment on the value of the BOC from their organization's perspective. This number of supervisors (eight) might seem high; and yet it was primarily senior O&M staff that took the 2003 Level II series. In an equal number of cases (eight), the students no longer had the same supervisor they had at the time of the training. Other reasons a supervisor was not interviewed were that the supervisor himself had taken the course and had already been interviewed as one of the students (two), the supervisor declined to be interviewed because he or she was too busy (two), or the student had not yet completed the Level II course series (one).

Table 2.4

REASONS SUPERVISORS NOT INTERVIEWED

REASON	PERCENT (N=20)
Student Had No O&M Supervisor	40%
Student No Longer Employed	20%
Supervisor Replaced	20%
Supervisor Interviewed as Student	10%
Too Busy	10%
Total	100%

Nonparticipant Population and Sample

We interviewed building O&M supervisors who had received program marketing materials (letters, brochures and, in some cases, follow-up phone calls), yet who had not sent staff to the BOC program. These contacts had had an opportunity to become aware of the program and to consider sending staff. We received from NEEC a list of 7,647 contacts to whom it sent a direct mail piece. NEEC had followed up with calls to a subset of about 700 of these contacts, although we did not distinguish these contacts from those who had not received calls when we drew our sample. Prior to drawing the sample, we removed those organizations that had participated in the Statewide BOC program at any time. The list of 7,647 names corresponded with far fewer organizations, as it contained multiple contacts for many of them. We pulled a random sample of 500 contacts that had been screened to eliminate duplicate contacts from a single organization. We reached our quota after placing multiple calls to 393 contacts, as shown in Table 2.5. The final sample of 62 completed interviews gives close to a 90/10 precision/confidence.[1]

[1] A total of sixty-two interviews gives a 90% confidence and 10.3% precision. Sixty-five completed interviews would give a 90/10 precision/confidence. The sample size of 62 was determined based on an assumed nonparticipant sample of 700; the sample size was not revisited when the nonparticipant population was expanded from the follow-up call list of 700 to the complete mailing list of over 7,000.

Table 2.5

DISPOSITION OF NONPARTICIPANT SAMPLE

DISPOSITION OF SAMPLE	COUNT	PERCENT
Completed Interview	62	16%
No Answer (e.g., voice mail)	154	39%
Bad Number (e.g., fax)	57	15%
Refused	46	12%
Asked To Be Called At Another Time	41	10%
Not Qualified (not involved in O&M training decisions)	33	8%
Total	393	100%

DATA COLLECTION AND ANALYSIS

The data from utility program staff, BOC program staff and BOC instructors were obtained during telephone interviews. The questions asked in these interviews were primarily open-ended, and varied somewhat among respondents, as the interviewer tailored questions in response to answers already given. The survey instruments for these groups are more accurately viewed as discussion guides. The data from these respondents are handwritten notes in text form.

These data from the utility and program staff were analyzed using qualitative data methods. Themes common to more than one respondent were identified, as well as information that provided context for interpreting the data from students and supervisors.

Data from the BOC Level II students, their supervisors and nonparticipants were collected during telephone interviews using a computerized survey instrument. The participating student and supervisor survey instruments and data sets were created using SPSS's Data Entry Builder module. The nonparticipant survey data were collected by Gilmore Research Group. Separate data sets were created for each population.

The first steps in data analysis were to clean the data and recode selected variables, such as creating categorical variables from open-ended responses, creating "top-two

boxes" responses from scale data, and creating separate variables corresponding to the response elements in questions where multiple answers are permitted.

The middle step in data analysis was to conduct simple frequencies to understand the information in aggregate.

The last data analysis steps involved identifying and executing more complex analyses, such as comparisons of subgroups of nonparticipants (e.g., institutional and noninstitutional respondents) and exploring the characteristics of the respondents who answered a question a particular way. In these steps, Research Into Action considered the implications of the program theory and its field implementation, as well as any concerns raised by interviewed staff, and explored the data in light of these implications and concerns.

This evaluation was written based on the findings from the interviews with course implementers and program staff, and from the simple frequencies and more complex analyses of the participant (student and supervisor) and nonparticipant data.

3. BOC LEVEL II PARTICIPANTS

This chapter provides findings from the surveys of BOC Level II students and their supervisors. The sample and survey design were discussed in the preceding chapter.

This chapter is organized into the following sections:

- Student and Supervisor Characteristics
- Satisfaction with and Usefulness of the Level II Training
- Influence of BOC Training
- Utility Involvement in the BOC
- Value of Building Operator Certification
- Indicators of Demand for BOC Training
- Characteristics of Participants' Facilities

STUDENT AND SUPERVISOR CHARACTERISTICS

The Level II BOC students typically had extensive experience in building operations and maintenance (Table 3.1).

Table 3.1

STUDENTS' YEARS OF EXPERIENCE IN BUILDING OPERATIONS

EXPERIENCE IN BUILDING OPERATIONS	PERCENT (N=20)
Two through Five Years	20%
Six through Ten Years	20%
Eleven through Twenty Years	45%
More than Twenty Years	15%
Total	100%

Only one of them had less than two years experience, and three-fifths of them had worked in building operations and maintenance for more than ten years. The average amount of experience of these students was more than 13 years.

As another indicator of the experience level of the 2003 BOC students who were interviewed, three-quarters of them said they supervise other O&M staff members (Table 3.2). The number of staff supervised by the students ranged from 2 to 350. One-half of the students said they supervise more than three staff members.

Table 3.2

NUMBER OF O&M STAFF SUPERVISED BY STUDENTS

NUMBER OF STAFF SUPERVISED	(N=20)
None	25%
One through Three	25%
Four through Ten	35%
More than Ten	15%
Total	100%

Two-thirds (65%) of the students and all but one of the supervisors said they have the authority to send additional staff from their facilities to the BOC training (Table 3.3).

Table 3.3

AUTHORITY OR INFLUENCE TO SEND STAFF TO OUTSIDE TRAINING

ABILITY TO SEND STAFF TO TRAINING	STUDENTS (N=20)	SUPERVISORS (N=6)
Authority	65%	83%
Influence	25%	0%
No Authority or Influence	10%	17%
Total	100%	100%

All but two of the remaining students said they can influence the decision to send additional staff from their facility to the training.

All but one of the supervisors have operations and maintenance responsibilities in the facilities in which they work (Table 3.4). This one supervisor without O&M responsibilities was not the same supervisor who said he has no authority to send staff to outside training.

Table 3.4

SUPERVISORS WITH BUILDING O&M RESPONSIBILITIES

O&M RESPONSIBILITIES	SUPERVISORS (N=6)
Yes	83%
No	17%
Total	100%

SATISFACTION WITH AND USEFULNESS OF THE LEVEL II SERIES

Appropriateness of Marketing Information

Even before attending the Level II courses, the students had received a good understanding of what to expect from the BOC program from its promotional and publicity materials and information. Almost three-quarters of the students (70%) and all but one of their supervisors said the pre-course information provided a good understanding of the series and its potential (Table 3.5). One student commented, "It lived up to what it said it would be. Hit the nail on the head."

Another student said, "By reading the advertisement, I had a good idea; when I got in there it was even more than I expected. I got more out of it." And in reference to the list of graduates and job titles in an advertisement for the program, a third student said, "We recognize our peers are getting training."

Table 3.5

ADEQUACY OF MARKETING MATERIALS IN DESCRIBING COURSE

INFORMATION GAVE GOOD UNDERSTANDING OF COURSE AND IT POTENTIAL	STUDENTS (N=20)	SUPERVISORS (N=6)
Yes	70%	83%
No	25%	0%
Don't Know	5%	17%
Total	100%	100%

Satisfaction

Ninety-five percent of the students (all but one) said they were satisfied or highly satisfied with the training they received; and all of them said they were satisfied or highly satisfied considering the cost of the training (Table 3.6). The one student who reported dissatisfaction with the series also said it was too basic, and that the courses were not beyond Level I courses. That student was not fluent in English, and was the only student who gave these responses to the training.

Table 3.6

INDICATORS OF SATISFACTION WITH BOC TRAINING*

SATISFACTION WITH COURSE	STUDENTS (N=20)	SUPERVISORS (N=5)
Proportion Satisfied or Very Satisfied with Training	95%	83%
Proportion Satisfied or Very Satisfied with Cost of Training	100%	NA
Willing to Pay for Training on Own	75%	NA

* *Each row reports responses to a single question. Percentages correspond with responses of "4" or "5"—"satisfied" or "very satisfied" on a five-point scale. Not shown are percentages of respondents replying to the questions with a "1", "2", or "3".*

As another indication of the students' strong satisfaction with the training, three-quarters of the students (75%) said they would be willing to pay for the training themselves. All but one of the students' supervisors also said they were satisfied or highly satisfied with the training. That one supervisor was not dissatisfied with the program. Rather, he simply did not express an opinion on the issue of program satisfaction.

Four-fifths of the students (80%) said the level of the course material was "about right" (Table 3.7). The remaining students said the course material was too basic for them.

Table 3.7

OVERALL DIFFICULTY OF THE PROGRAM

OVERALL DIFFICULTY OF COURSE	STUDENTS (N=20)
About Right	80%
Too Basic	20%
Too Advanced	0%
Total	100%

The pace of the information presented during the courses was, for the most part, appropriate according to the students (Table 3.8). Only two of them said some—but not too much—of the material was presented too slowly. A few more (five) said some—but not too much—of the information was presented too quickly. None of the students said too much of the information was presented either too slowly or too quickly.

Table 3.8

STUDENT ASSESSMENT OF THE PACE OF COURSE INFORMATION

PROPORTION OF INFORMATION...	NONE OR VERY LITTLE	SOME, BUT NOT TOO MUCH	TOTAL
...Presented Too Slowly (N=19)	89%	11%	100%
...Presented Too Quickly (N=19)	74%	26%	100%

Between 60% and 75% of the students said the information in each of the Level II courses was beyond the information offered to them in the Level I courses (Table 3.9). The course for which the fewest students said the Level II information was more advanced was *Preventive Maintenance and Operations*, for which 60% of the students still felt the Level II material was more advanced. Only one student said the information was not beyond the information offered in Level I. Again, that student was the one who lacked fluency in English. Two students said they were unable to distinguish clearly the Level I and Level II courses in their memories, and so did not answer this question.

Table 3.9

COMPARISON OF COURSE INFORMATION WITH INFORMATION IN LEVEL I

AREAS	BEYOND LEVEL I	SOMEWHAT BEYOND LEVEL I	NOT BEYOND LEVEL I	UNABLE TO RECALL	TOTAL
Preventive Maintenance & Operations (N=20)	60%	25%	5%	10%	100%
Advanced Electrical Diagnostics (N=19)	63%	21%	5%	11%	100%
HVAC Troubleshooting & Maintenance (N=19)	73%	11%	5%	11%	100%
HVAC Controls & Optimization (N=19)	68%	16%	5%	11%	100%
Motors & Facilities (N=19)	73%	11%	5%	11%	100%

Usefulness and Applicability of Courses

Students said each of the BOC Level II courses were useful and applicable to their jobs (Table 3.10). Three of the courses, *Advanced Electrical Diagnostics*, *Motors in Facilities* and *Introduction to Building Commissioning,* were said by 90% of the students to be useful and applicable to their work. The course said by the fewest number of students to be useful and applicable was *HVAC Controls and Optimization*. Even so, almost three-quarters of the students (70%) found this course to be useful and applicable to their work.

Table 3.10

USEFULNESS/APPLICABILITY OF BOC COURSE TOPICS*

TOPIC	USEFUL/APPLICABLE		SOMEWHAT USEFUL/APPLICABLE		NOT USEFUL/NOT APPLICABLE	
	STUDENTS (N=20)	SUPERVISORS (N=6)	STUDENTS (N=20)	SUPERVISORS (N=6)	STUDENT (N=20)	SUPERVISORS (N=6)
Preventive Maintenance and Operations	85%	67%	15%	17%	0%	17%
Advanced Electrical Diagnostics	90%	33%	0%	67%	10%	0%
HVAC Trouble-Shooting and Maintenance	80%	67%	15%	17%	5%	17%
HVAC Controls and Optimization	70%	83%	15%	17%	15%	0%
Motors in Facilities	90%	100%	5%	0%	5%	0%
Introduction to Building Commissioning	90%	17%	5%	33%	5%	50%

* *Rows report both students and supervisors. Row percentages total 100% for students; for supervisors, row percentages total 100% and—due to rounding error—101%..*

With the exception of two courses, *Advanced Electrical Diagnostics* and *Introduction to Building Commissioning*, the students' supervisors also generally rated the course topics as useful and applicable to their employees' jobs, and all of the supervisors said *Advanced Electrical Diagnostics* was at least somewhat useful for their employees. *HVAC Controls and Optimization* and *Motors in Facilities* in particular were felt by the supervisors to be useful courses for their employees.

There is a rough correlation between the assessments of the students and the assessments of the supervisors regarding the usefulness or applicability of the Level II BOC course topics to the students' jobs, with two exceptions. Students' ratings of the usefulness or applicability of *Advanced Electrical Diagnostics*, and even more so of *Introduction to Building Commissioning*, were higher than the usefulness/ applicability ratings given by their supervisors. Nine-tenths of the students said *Advanced Electrical Diagnostics* was useful or applicable to their jobs, while only

one-third of the supervisors made this assessment of the course. Nine-tenths of the students also said *Introduction to Building Commissioning* was useful or applicable to their jobs, yet one-half of the supervisors said that course was not at all useful or applicable to the jobs of their employees.

There are several possible explanations for this disparity of opinions between students and supervisors. Students may feel all new knowledge is useful, even though it may not be immediately applicable to their job. In the case of building commissioning specifically, we suspect some supervisors have an incomplete understanding of what building commissioning is. We were unable to determine which, if any, of these explanations accounts for the disparity between the students' and their supervisors' responses. This is an area where further research may be warranted.

Course Improvement Suggestions

One-half of the students had no suggestions for ways in which to improve the course series (Table 3.11). However, in response to this question, nearly one-half of the students (45%) expressed a desire for additional operations and maintenance courses or information. These desires were expressed as "more troubleshooting," "more engineering design, for example, for HVAC," "more on lighting and hazardous materials," "an advanced indoor air quality course," "a third series of classes in management of managed systems," and generalized comments such as "need to go deeper," and "longer in duration and cover a couple more topics," or "more electives." In addition, a student who offered no comment to this question had inquired at an earlier point in the interview, "When is Level III coming?" Thus, he is included among the respondents expressing a desire for more courses or information in Table 3.11.

Table 3.11

COMMENTS OR SUGGESTIONS TO IMPROVE THE LEVEL II SERIES

COMMENTS	STUDENTS (N=20)
No Suggested Course Improvements	50%
Suggested More Courses or Information	45%
Other	5%
Total	100%

One student suggested eliminating a topic, saying, "Building commissioning shouldn't be offered."[2] Another student felt there is a "need to improve the commissioning discussion." On the other hand, one of the students who had no comment on ways to improve the course series, spontaneously added, "The commissioning class was very useful."

INFLUENCE OF BOC TRAINING

The BOC program has had an influence upon the work activities of the students who took the Level II course. All but one of the students reported that since taking the Level II course, they have used one or more of the concepts taught in the program in their work activities (Table 3.12).

In particular, the data suggest that since taking the course, the students may be participating more actively in decisions related to energy use in their facilities. Ninety percent of them reported they have advised in decisions about equipment operation or replacement since taking the course, and 90% also said they have undertaken, recommended or influenced energy efficiency projects at their facilities since taking the course. Large majorities of the students also reported that as a result of the training, they have both saved energy and improved occupant comfort at their facilities (80%), saved money for their facilities (75%), and that they both do some of their work better or faster and do some actions they did not do before (70%).

There appears to be a spillover effect of the training as well. Sixty percent of the students reported training other staff in the concepts learned during the course. This was borne out by their supervisors, five of six of whom reported their employees who had attended the course had since trained other staff. Generally speaking, the supervisors supported their employees' assessments of the effects of the course upon the employees' work.

[2] It should be recalled, however, that 90% of the students judged the building commissioning course to be useful or applicable to their jobs (Table 3.10).

Table 3.12

INFLUENCE OF LEVEL II SERIES ON WORK ACTIVITIES*

EVENTS ATTRIBUTED TO BOC TRAINING	STUDENTS AGREEING (N=20)	SUPERVISORS AGREEING (N=6)
Used or Applied Concepts Taught	95%	67%
Advised in Decisions about Equipment Operation or Replacement	90%	83%
Undertake, Recommended or Influenced Energy-Efficiency Projects	90%	33%
Improved Occupant Comfort	80%	67%
Saved Energy at Facility	80%	50%
Saved Money	75%	50%
Do Some Actions Better or Faster	70%	67%
Do New O&M Actions	70%	50%
Trained Other Staff	60%	83%
Do Some Actions More Often	55%	67%
More Productive Interactions with Contractors	55%	83%

* *Each row reports responses to a single question. Percentages correspond with responses of agreement ("yes"). Not shown are percentages of respondents replying to the questions with a "no" or "don't know."*

Another set of findings also suggests more active participation by the BOC-trained employees in their facilities' decisions related to energy savings. Specifically, the students reported there is now an increased likelihood of their companies making energy-efficient investments and an increased likelihood of their companies participating in utility energy-efficiency programs (Table 3.13). The students also reported having greater confidence in their ability to respond to a call for a demand response. The responses of their supervisors backed up the students in regard to all of these matters.

Table 3.13

INFLUENCE OF LEVEL II SERIES ON FUTURE EFFICIENCY AND DEMAND RESPONSE ACTIONS*

INDICATOR	STUDENTS AGREEING (N=20)	SUPERVISORS AGREEING (N=6)
Increased Likelihood of Company Making Energy-Efficiency Investments	95%	67%
Increased Likelihood of Company's Participation in Utility Energy-Efficiency Programs	90%	83%
Greater Confidence in Ability to Respond to a Call For a Demand Response	90%	100%

* *Each row reports responses to a single question. Percentages correspond with responses of agreement ("yes"). Not shown are percentages of respondents replying to the questions with a "no" or "don't know."*

UTILITY INVOLVEMENT IN BOC

Generally speaking, the students feel the level of involvement of the utilities in the BOC is about right (Table 3.14). Seventy percent of the students gave this response. Three of the students said they would like to see more utility involvement. Two of the six supervisors also said they would like to see more utility involvement. One of these supervisors specified the additional utility involvement he would like to see is a follow-up review course and more information updates.

Table 3.14

UTILITY INVOLVEMENT IN BOC

SATISFACTION WITH LEVEL OF UTILITY INVOLVEMENT	STUDENTS (N=20)	SUPERVISORS (N=6)
About Right	70%	17%
More Involvement Desired	15%	33%
Less Involvement Desired	0%	0%
Don't Know/No Opinion	15%	50%
Total	100%	100%

Between the BOC program being offered by the utilities or by an educational or professional organization, the students indicated a strong preference for the course to be offered by the utilities (Table 3.15). Three of the students said they would like the course to be offered by both. Most of the supervisors (83%) expressed no preference regarding who offers the BOC program.

Table 3.15

PREFERENCE REGARDING WHO OFFERS BOC

PREFERENCE	STUDENTS (N=20)	SUPERVISORS (N=6)
Utility	60%	17%
Educational or Professional Organization	10 %	—
Both	15%	—
No Preference	10%	83%
Don't Know	5%	—
Total	100%	100%

Almost one-half of the students (45%) said their satisfaction with their utility had increased because of the utility's sponsorship of the BOC program (Table 3.16).

Table 3.16

SATISFACTION WITH UTILITY BASED UPON SPONSORSHIP OF BOC PROGRAM

SATISFACTION WITH UTILITY	STUDENTS (N=20)	SUPERVISORS (N=6)
Higher	45%	33%
Unchanged	45%	50%
Don't Know	10%	17%
Total	100%	100%

This was echoed by one-third of the supervisors. None of the students or supervisors said their satisfaction with their utility had decreased as a result of the utility's sponsorship of the BOC program.

VALUE OF BUILDING OPERATOR CERTIFICATION

Ninety percent of the students had received certification for their participation in the training. Both the students and their supervisors placed a high regard upon the value of BOC certification. The student responses are particularly noteworthy in that 90% or more of them said the certificate is good for job advancement, that they have recommended or would recommend the Level II training to others, and that employers should expect operations and maintenance staff to have BOC certification (Table 3.17). All of the students said it is important for the BOC program to be ongoing in California.

Table 3.17

VALUE OF BOC CERTIFICATE*

INDICATORS OF VALUE OF BOC CERTIFICATE	STUDENTS AGREEING (N=20)	SUPERVISORS AGREEING (N=6)
Important or Very Important for BOC Certification Program to Be Ongoing in California	100%	67%
Certificate Good for Advancing Job	95%	NA
Recommend to Others/Sending Others to Training	95%	83%
Would Like to See Employers Expect O&M Staff to Have BOC Certification	90%	67%
Prefer Training Program with Certificate	85%	67%

* *Each row reports responses to a single question. Percentages correspond with responses of agreement ("yes"). Not shown are percentages of respondents replying to the questions with a "no" or "don't know."*

INDICATORS OF DEMAND FOR BOC TRAINING

Plans for Training

Future demand for the BOC program appears strong. Roughly two-thirds both of the students (65%) and of the supervisors (67%) expect their organization to enroll other staff in a BOC series (Table 3.18).

Table 3.18

EXPECT TO SEND ADDITIONAL STAFF TO TRAINING

EXPECT TO SEND ADDITIONAL STAFF TO TRAINING	STUDENTS (N=19)	SUPERVISORS (N=6)
Yes	68%	67%
No	11%	33%
Don't Know	21%	0%
Total	100%	100%

These respondents expect 50 or more additional students will be sent from their facilities to one of the BOC series, or about 2.5 additional students per Level II student interviewed (Table 3.19). More specifically, students said they expect 36 staff members from their facilities will enroll in the Level I series and 14 will enroll in the Level II series. Supervisors said they expect ten staff members from their facilities will enroll in each of the series.

Table 3.19

TOTAL NUMBER OF STAFF EXPECTED TO ENROLL

RESPONDENT TYPE	STAFF EXPECTED TO ATTEND LEVEL I	STAFF EXPECTED TO ATTEND LEVEL II
Students Expecting Other Staff to Enroll (N=13)	36	14
Supervisors Expecting Other Staff to Enroll (N=4)	10	10

Factors Affecting Demand

Roughly one-half of the students (45%) traveled 30 minutes or less to reach the location where they took the Level II course series (Table 3.20). One-quarter of them traveled between 30 minutes and one hour. Roughly one-third of them (30%) traveled more than an hour to reach the training, with one-half of these students traveling three hours or more.

Table 3.20

TIME REQUIRED TO TRAVEL TO COURSE

TIME SPENT TRAVELING TO BOC CLASSES	STUDENTS (N=20)
30 Minutes or Less	45%
30-60 Minutes	25%
1-2 Hours	15%
3 Hours or More	15%
Total	100%

Even though most (55%) of the students believe holding the training nearer to their facilities would have no effect upon enrollment, there is some indication the location of the trainings can have an impact upon the size of enrollments, and even upon the amount an organization is willing to pay for the training (Table 3.21). Roughly one-third of the students (30%), and one-half of the supervisors said they would expect their facility would send more staff to the BOC if the training were offered at a location nearer to them. One student suggested it would be nice to have the training at his facility, as there are more than 300 maintenance people at that site. Two of the supervisors indicated they would be willing to pay $300 more for the training if it were held at location closer to their facility.

Table 3.21

WOULD SEND MORE STAFF IF TRAINING NEARER

WOULD SEND...	STUDENTS (N=20)	SUPERVISORS (N=6)
...More Staff	30%	50%
...About the Same Number	55%	33%
Don't Know	10%	0%
Not Applicable, All Staff Trained	5%	17%
Total	100%	100%

There is a strong preference among both the students and their supervisors for BOC classes to be monthly, full-day events, rather than shorter, more frequent sessions. Ninety percent of the students, and two-thirds of their supervisors expressed this preference (Table 3.22).

Table 3.22

PREFERRED SCHEDULE FOR COURSE

PREFERENCE	STUDENTS (N=20)	SUPERVISORS (N=6)
Full Day Classes Once a Month	90%	67%
Half-Day Classes Twice a Month	0%	0%
Weekly Two-Hour Classes	0%	17%
No Preference	10%	17%
Total	100%	101%

* *Totals 101% due to rounding error.*

PARTICIPANTS' FACILITIES

Most of the students (75%), and interviewed supervisors (67%) were from private commercial or industrial establishments (Table 3.23). One-fifth of the Level II students were from government agencies. Only one of the students was employed by a nonprofit organization.

Table 3.23

PARTICIPANTS' ORGANIZATIONS

FACILITY SECTOR	STUDENTS (N=20)	SUPERVISORS (N=6)
Commercial & Industrial	75%	67%
Government	20%	17%
Nonprofit	5%	17%
Total	100%	101%

* *Totals 101% due to rounding error.*

A broad array of activities occurs at the facilities where the students are employed. The most common use of the facilities was for offices, with the next most common use being hotel or motel lodging[3]. In addition to the specific activities set forth in Table 3.24, the "miscellaneous manufacturing" use was for a research and development firm, and the "other" activities were television broadcasting and a contract maintenance firm with 2,000 employees.

[3] One of the Hotel and Motel Lodging facilities was a casino with 300 employees that would like to have a training session on site for their employees.

Table 3.24

PRINCIPAL ACTIVITY OCCURRING IN PARTICIPANTS' FACILITIES

ACTIVITY	STUDENTS (N=20)	SUPERVISORS (N=6)
Office	20%	17%
Hotel or Motel Lodging	15%	0%
Warehouse	10%	0%
Manufacturing or Industrial: Mining, Metals,	10%	0%
Manufacturing or Industrial: Petroleum, Plastic, Rubber	10%	17%
Retail	5%	0%
Community Service/Religious/Municipal	5%	17%
Healthcare/Hospital	5%	17%
College/University	5%	0%
Miscellaneous Manufacturing or Industrial	5%	0%
Other	10%	33%
Total	100%	101%

* *Totals 101% due to rounding error.*

Students taking the Level II BOC course tended to be from large enterprises. Two-thirds of them were from facilities with more than five buildings (Table 3.25). Only two (10%) of them were from facilities with only one building. One-half of the interviewed supervisors represented facilities with more than ten buildings.

Table 3.25

NUMBER OF BUILDINGS IN PARTICIPANTS' FACILITIES

NUMBER OF BUILDINGS	STUDENTS (N=20)	SUPERVISORS (N=6)
One Building	10%	0%
Two through Five Buildings	35%	17%
Six through Ten Buildings	15%	17%
11-25 Buildings	25%	33%
26-50 Buildings	0%	17%
60-100 Buildings	10%	0%
Don't Know*	5%	17%
Total	100%	101%**

* *This is a facility that contracts for maintenance people, for which the square footage could not be determined.*

** *Totals 101% due to rounding error.*

Consistent with the large number of buildings in participants' facilities, 60% of the students who knew the size of their facilities were from facilities with more than 500,000 square feet of floor space (Table 3.26). One-half of the interviewed supervisors were from facilities with more than one million square feet of floor space.

Table 3.26

ESTIMATED SQUARE FOOTAGE OF PARTICIPANTS' FACILITIES

FACILITY FLOOR SPACE	STUDENTS (N=20)	SUPERVISORS (N=6)
Less than 100.000 Square Feet	20%	17%
100.000 through 500,000 Square Feet	20%	33%
500.000 through One million Square Feet	20%	0%
More than One Million Square Feet	20%	50%
Don't Know	20%	0%
Total	100%	100%

Just under half (45%) of the students worked in facilities with more than ten operations and maintenance staff (Table 3.27). One-half of the interviewed supervisors worked in facilities with staff sizes in this range. The largest operations and maintenance staff at a student's facility was 350, while the largest such staff at a supervisor's facility was 700.

Table 3.27

SIZE OF O&M STAFF IN PARTICIPANTS' FACILITIES

O&M STAFF SIZE	STUDENTS (N=20)	SUPERVISORS (N=6)
One through Ten Employees	55%	50%
11 through 25 Employees	25%	17%
26 through 50 Employees	0%	17%
51 through 100 Employees	10%	0%
More than 100 Employees*	10%	17%
Total	100%	101%**

* *One of these two facilities is a contract maintenance firm with one building and 2,200 operations and maintenance employees.*

* *Totals 101% due to rounding error.*

The number of the supervisory operations and maintenance staff in three-quarters of the students' facilities was three or fewer (Table 3.28). This was true for three-fifths of the interviewed supervisors as well. Two of the students and one of the supervisors worked in facilities with more than ten supervisory operations and maintenance staff.

Table 3.28

NUMBER OF SUPERVISORY O&M STAFF IN PARTICIPANTS' FACILITIES

O&M SUPERVISORY STAFF SIZE	STUDENTS (N=20)	SUPERVISORS (N=5)
One through Three	75%	60%
Four through Ten	15%	20%
More than Ten	10%	20%
Total	100%	100%

4. BOC NONPARTICIPANTS

In this chapter, we seek to provide a sense of the demand for the program among those who have not yet participated in it. To better understand the training decisions made by businesses and individuals who have not attended BOC trainings, we interviewed 62 operations and maintenance supervisors of various types of businesses throughout California. We spoke with staff who have authority to send themselves or their employees to training, or who, if lacking such authority, can influence training decisions (see Chapter 2). We generically refer to these businesses and individuals as nonparticipants.[4]

This chapter looks at the nonparticipants' interest in the BOC course topics and at the nonparticipants' willingness to pay for BOC training. It also addresses the importance placed upon certification, the nonparticipants' plans for training, their barriers to training, the ways in which nonparticipants who were aware of the training had learned about it, and the reasons no staff members were sent to the training from those facilities where there was an awareness of the program.

This chapter is organized into the following sections:

- Nonparticipant Characteristics
- Staff Training and Certification
- Plans For Staff Training
- Interest In Certification and Course Topics
- Awareness of Demand for BOC Program
- Institutional Customers

NONPARTICIPANT CHARACTERISTICS

Ninety percent of the nonparticipant supervisors were male. The nonparticipants were well experienced in building operations and maintenance. About 90% of them had more than five years of operations and maintenance experience, and about two-

[4] See Chapter 2, Methodology, for more details on the sample selection and disposition.

thirds (69%) of them had more than ten years of experience (Table 4.1). The average length of experience of these respondents was 18 years; the median for them was 15 years. In fact, the interviewed nonparticipants were more experienced operations and maintenance personnel than were the Level II students who had a rough average of 13 years of experience.

Table 4.1

YEARS IN BUILDING O&M

YEARS	PERCENT (N=62)
Three through Five	10%
Six through Ten	21%
11 through 20	39%
More Than 20	29%
Don't Know/Refused	1%
Total	100%

All of the interviewed nonparticipants supervise other O&M employees (Table 4.2).

Table 4.2

NUMBER OF O&M STAFF SUPERVISED BY RESPONDENTS

NUMBER OF STAFF SUPERVISED	PERCENT (N=62)
One through Three	52%
Four through Ten	26%
More than Ten	21%
Don't Know/Refused	1%

Total	100%

Roughly one-half of them (52%) supervise three or fewer employees, and roughly another fifth (21%) supervise more than ten employees.

Professional Memberships

The nonparticipants identified a wide array of professional or trade associations in which they held membership. Even so, roughly one-half of them (47%) said they did not belong to any such organizations (Table 4.3). The most commonly named organization by those who did have a professional membership was the International Association of Facility Managers (IFMA). Roughly one-fifth of the nonparticipants (19%) were members of IFMA. The next most commonly named organization, mentioned by three respondents, was the Building Owners and Managers Association (BOMA). Other organizations mentioned (twice each) were the California Association of School Business Officials (CASBO), the Association for Facility Engineering (AFE) and the American Society for Healthcare Engineering (ASHE).

Table 4.3

PROFESSIONAL OR TRADE ASSOCIATION MEMBERSHIPS (MULTIPLE RESPONSES ALLOWED)

ORGANIZATION	PERCENT* (N=62)
None	47%
International Association of Facility Managers (IFMA)	19%
Building Owners and Managers Association (BOMA)	5%
Association for Facility Engineering (AFE)	3%
American Society for Healthcare Engineering (ASHE)	3%
California Association of School Business Officials (CASBO)	3%
Other	34%

* *Totals over 100% because multiple responses were allowed.*

Other organizations named once each by these respondents were, in alphabetical order: American Society of Testing Materials, American Sociological Association, American Water Works Association, Association of California School Administrators, Association of Equipment Managers, Association of Physical Plant Administrators, Building Industry Association, California Society for Hospital Engineers, California Water Environment Association, Coalition for Adequate School Housing, International Code Council, National Air Duct Cleaners Association, National Association of Purchasing Managers, National Fire Prevention Association, National Tooling and Machining Association, Plasterers Association, Professional Retail Store Maintenance Association, Refrigeration Engineer Technicians Association, Society for Human Resource Management, and Society of Manufacturing Engineers.

Nonparticipants' Facilities

Roughly one-third of the nonparticipants worked in facilities with three or fewer operations and maintenance staff members (Table 4.4). Roughly two-thirds of them (64%) worked with fewer than ten other O&M staff. These respondents, representing almost two-thirds of the nonparticipants' facilities, represent less than 6% of the operations and maintenance staff members employed by all of the nonparticipants' facilities.

Table 4.4

SIZE OF O&M STAFF IN NONPARTICIPANTS' FACILITIES

O&M STAFF SIZE	PERCENT (N=62)
One through Three Employees	32%
Four through Ten Employees	32%
11 through 25 Employees	13%
26 through 50 Employees	6%
51 through 100 Employees	6%
More than 100 Employees	8%
Don't Know/Refused	3%
Total	100%

Five of the nonparticipants worked in facilities where the operations and maintenance staff exceeds 100 employees. Two of these facilities each had roughly 700 employees on their O&M staff. These five nonparticipants (8% of the total) represent almost three-quarters of all of the operations and maintenance employees at the nonparticipants' facilities (74%).

The number of supervisors at the facilities where the nonparticipants worked ranged from one to fifty. Almost one-half of the operations and maintenance staffs (45%) where the nonparticipants worked had only one supervisor for the staff (Table 4.5). Ten percent of the nonparticipants reported there were more than ten supervisors for the staffs at their facilities, corresponding roughly to the 8% of nonparticipants, above, who were part of a staff of more than 100.

Table 4.5

NUMBER OF O&M STAFF WHO ARE SUPERVISORS

NUMBER OF SUPERVISORS	PERCENT (N=62)
One	45%
Two or Three	27%
Four through Ten	16%
More than Ten	10%
Don't Know/Refused	2%
Total	100%

The size of the facilities at which these respondents worked ranged from 4,000 square feet to 25,000,000 square feet of conditioned space. However, one-half of the nonparticipants were from facilities with less than 100,000 square feet of conditioned space (Table 4.6).

Table 4.6

ESTIMATED SQUARE FOOTAGE OF RESPONDENTS' FACILITIES

FACILITY FLOOR SPACE	PERCENT (N=62)
Less than 50,000 Square Feet	29%
50,000 to 100,000 Square Feet	21%
100,000 to 500,000 Square Feet	13%
500,000 to One Million Square Feet	18%
One Million Square Feet Or More	11%
Don't Know/Refused	8%
Total	100%

About two-thirds of the interviewed nonparticipants (68%) were from the private sector (Table 4.7). The remaining nonparticipants were from public sector facilities.

Table 4.7

NONPARTICIPANT FROM PRIVATE SECTOR OR PUBLIC SECTOR ENTITY

PRIVATE OR PUBLIC SECTOR	PERCENT (N=62)
Private	68%
Public	32%
Total	100%

Various types of manufacturing or industrial activities were most frequently mentioned as the type of activity occurring in the facilities where the nonparticipants worked, mentioned by one-third (33%) of respondents (Table 4.8). These included multifamily housing construction, airplane repair, a contract maintenance facility, a

pharmaceutical research and development laboratory, and a metallurgical testing laboratory.

Table 4.8

PRINCIPAL ACTIVITY OCCURRING IN RESPONDENTS' FACILITIES

ACTIVITY	PERCENT* (N=62)
Other Manufacturing/Industrial	16%
Commercial Office	16%
School	13%
Government (Federal, State, Local)	8%
Manufacturing/Industrial: Electronics and Equipment	6%
Healthcare/Hospital	6%
College/University	6%
Manufacturing/Industrial: Chemicals, Petroleum, Plastic, Rubber	6%
Restaurant	5%
Warehouse	3%
Manufacturing/Industrial: Food and Beverages	3%
Manufacturing/Industrial - Metals, Stone, Glass, Concrete, Mining	2%
Other	10%
Total	100%

Commercial office buildings were the next most commonly mentioned use of these respondents' facilities (ten mentions). Public schools were the third most frequently mentioned use, with eight mentions, followed by some kind of governmental activity (five mentions). Four of the nonparticipants were from colleges or universities, and four were from hospital or healthcare facilities. Other facilities in which these respondents worked were restaurants (three mentions), and warehouses (two mentions). Finally, mentioned once each were: an airline terminal, hanger, and

cargo facility; a recreational facility; an automobile and automobile parts distribution center; a gated retirement community; a retail store; and a hotel.

Comparing 2004 to a year or two earlier, more than one-half of the nonparticipants (52%) said the priority for considering energy efficiency in operations and maintenance at their facility has become more important (Table 4.9). Only two (3%) of these respondents said energy efficiency in operations and maintenance at their facility has become less important.

Table 4.9

CHANGE IN PRIORITY FOR CONSIDERING ENERGY EFFICIENCY IN O&M

CHANGE IN PRIORITY	PERCENT (N=62)
More Important	52%
No Change	45%
Less Important	3%
Total	100%

STAFF TRAINING AND CERTIFICATION EXPERIENCE

A large majority of the nonparticipants (84%) had heard of training in how to operate and maintain facilities to minimize energy use (Table 4.10).

Table 4.10

HEARD OF ENERGY EFFICIENCY O&M TRAINING

HEARD OF TRAINING	PERCENT (N=62)
Yes	84%
No	16%

Total	100%

An even larger majority (89%) reported either they or someone from the operations and maintenance staff where they worked had attended some kind of outside training or education program during the last three years (Table 4.11). The nonparticipants who said no one from their staff had attended such training in the last three years (seven) were from facilities with a small O&M staff. The largest staff among these had six employees. Five of theses seven nonparticipants worked at facilities with an operations and maintenance staff of only one or two persons.

Table 4.11

RESPONDENT OR STAFF ATTENDED OUTSIDE TRAINING PROGRAMS IN THE LAST THREE YEARS

ATTENDED OUTSIDE TRAINING	PERCENT (N= 62)
Yes	89%
No	11%
Total	100%

Of those nonparticipants who said someone from their staff had attended an outside training session during the past three years, more than one-half (56%) said they or another staff member had received certification from a training program in some area of building operations and maintenance (Table 4.12).

Table 4.12

RESPONDENT OR STAFF RECEIVED PRIOR CERTIFICATION

RECEIVED CERTIFICATION	PERCENT (N= 55)
Yes	56%

No	42%
Don't Know/Refused	2%
Total	100%

The certifications received by these nonparticipants and their co-workers reflect mastery of a diverse array of skills and knowledge. The most commonly received certifications were for building or facilities management. Roughly one-third of those receiving a certificate (29%) received this type (Table 4.13). Electrical certifications and HVAC certifications were the next most common types received. Between 10% and 15% of the nonparticipants received OSHA certification, or certification for refrigeration or for fire safety training. Other certifications were for training in asbestos, indoor air quality, energy efficiency, operating engineering, the ADA, playground safety, aquatic facilities operation, water treatment, underground storage tanks, domestic water systems, hoists, elevators, specialized welding, and other knowledge and skills.

Table 4.13

TYPES OF CERTIFICATION NONPARTICIPANTS RECEIVED (MULTIPLE RESPONSES ALLOWED)

TYPE OF CERTIFICATION	PERCENT* (N=31)
Building/Facilities Management	29%
Electrical Certification/Electrician	26%
HVAC	23%
OSHA	13%
Refrigeration	13%
Fire Safety/Alarm/Response	10%
Asbestos	6%
Certified Indoor Air Quality Technician	3%
Energy Efficiency	3%

Operating Engineering Certification	3%
Other	68%

* *Totals over 100% because multiple responses were allowed.*

PLANS FOR STAFF TRAINING

Training Budgets

Two-thirds of the nonparticipants said their company will have a budget for sending operations and maintenance staff to outside training in 2005 (Table 4.14). Of those who said their company would not have a training budget in 2005, or were uncertain whether their company would have such a budget, more than one-half (53%) said they believe their company will have a training budget for operations and maintenance staff "in the next few years." One respondent who did not have a training budget for 2005 and did not know if in the future there would be money available worked for a contract maintenance firm.

Table 4.14

WILL HAVE BUDGET TO SEND STAFF TO OUTSIDE TRAINING

BUDGET	IN 2005 (N=60)	IN NEXT FEW YEARS (N=19)
Yes	67%	53%
No	17%	5%
Don't Know/Refused	17%	42%
Total	101%	100%

* *Totals 101% due to rounding error.*

Barriers to Training

Budget constraints (as shown in Table 4.14) will constrain 32% of respondents in 2005 and about half that many in 2006. They are, of course, only one of the factors that can limit staff training. A barrier to training mentioned more frequently than budget limitations was the time employees must spend away from their facilities in order to attend training programs. Of the nonparticipants who expect to have a budget for training within the next few years, three-fifths (60%) reported the time staff would be away from the facility to attend a training program was a barrier that would preclude sending some of their staff to such programs (Table 4.15).

Table 4.15

NON-BUDGETARY BARRIERS TO SENDING STAFF TO TRAINING (MULTIPLE RESPONSES ALLOWED)

BARRIER	PERCENT* (N=50)
Time Away from Facility	60%
Staff Turnover/Staff Not Expected to Stay	16%
Location of Training	10%
Problems Convincing Mgmt Course is Valuable	6%
Language (English Is a Second Language)	2%
Employees in Diverse Locations	2%
No Other Barriers	24%
Don't Know/Refused	2%

* *Totals over 100% because multiple responses were allowed.*

The expectation of staff turnover, resulting in no lasting training benefit to the company, was the next most commonly mentioned barrier to sending staff to training programs. Other barriers mentioned by the nonparticipants were the location of the training, problems convincing management of the value of the training, limited understanding of English, and the diverse locations of the employees. In spite of these concerns, roughly one-quarter of those expecting to

have a budget for staff training (24%) said there are no barriers other than budgetary concerns to sending staff from their facilities to such training.

Plans for Training

Nine-tenths of the nonparticipants who have or expect to have a budget for training within the next few years said they expect staff from their facility will go to training programs during the next calendar year (Table 4.16). Four nonparticipants said they expect no staff training before the end of 2005. Reasons given included they have fewer staff and cannot spare them for training and that limits have been imposed upon staff training. Three of these four respondents were from facilities with fewer than seven employees in operations and maintenance. The other respondent was from a contract maintenance firm. This was also the respondent from the company with no training budget for 2005.

Table 4.16

PLAN TO SEND SELF OR STAFF TO TRAINING BEFORE END OF 2005

PLAN TO SEND	PERCENT (N=50)
Yes	90%
No	8%
Don't Know/Refused	2%
Total	100%

Roughly two-thirds of the nonparticipants (64%) who expect someone from their staff to attend a training before the end of 2005 said operations and maintenance staff training in the coming year will be about the same as it has been in prior years (Table 4.17).

Table 4.17

STAFF TRAINING IN THE COMING YEAR COMPARED TO PRIOR YEARS

COMPARISON	PERCENT (N=45)
More Training Next Year Than in the Past	31%
About the Same	64%
Less Training Next Year Than in the Past	2%
Don't Know/Refused	2%
Total	99%*

* *Totals 99% due to rounding error.*

Roughly one-third of the nonparticipants (31%) said they expect more training in the coming year than in the past. One of the nonparticipants said he expects less training for his staff in the coming year. Like most of the respondents who said they expect none of their staff to attend training programs in 2005, this one respondent was also from a facility with six or fewer operations and maintenance employees.

Those nonparticipants who said they expect more training for their operations and maintenance staff in the coming year gave several reasons for the increase in training. Roughly one-third of them (36%) said the factor in their company that has changed to encourage more training was increased interest in efficient, money-saving operations and concern for energy use (Table 4.18).

Table 4.18

WHY PLANNING MORE TRAINING THAN PREVIOUSLY (MULTIPLE RESPONSES ALLOWED)

REASON	PERCENT* (N=14)
More Interest in Efficient Operations/Saving Money through Better Operations	36%
Policy Encouraging Training	29%

Doing Better Financially	21%
More Staff/More New Hires/More Need for Training	21%
New Equipment, Systems/Expanded Facility	14%

* *Totals over 100% because multiple responses were allowed.*

Roughly one-third (29%) anticipating they would have more training in 2005 than previously said there are new company policies encouraging training. Other reasons given for the anticipated increases in training were the company is doing better financially (three mentions), and the related reasons that there are more new hires in need of training (three mentions) and there is new equipment or an expanded facility (two mentions). The one nonparticipant who said he expects less training for his staff than in previous years said the reason for this is tighter money.

INTEREST IN CERTIFICATION AND COURSE TOPICS

Importance of Certification

Even though these respondents had not participated in the BOC program, more than three-fifths of them (62%) consider certification in building operations and maintenance for their staff to be important (Table 4.19). Most of these consider such certification to be "very important." Less than one-fifth (16%) said they consider such certification to be unimportant. All of these respondents were from facilities with eight or fewer employees working in building operations and maintenance.

Table 4.19

IMPORTANCE OF CERTIFICATION

IMPORTANCE	PERCENT (N=50)
Very Important	36%
Important	26%
Neither Important Nor Unimportant	20%
Unimportant	12%

Very Unimportant	4%
Don't Know/Refused	2%
Total	100%

Interest in Course Topics

To gauge the areas of training that are of interest to the nonparticipants, we asked them to tell us their interest in six BOC Level I course topics: *Energy Conservation Techniques*, *HVAC Systems and Controls, Regulatory Codes for Maintenance and Operations, Indoor Air Quality, Facility Electrical Systems,* and *Efficient Lighting* (Table 4.20).

Table 4.20

INTEREST IN COURSES

COURSE	INTERESTED	NEUTRAL	DISINTERESTED	TOTAL
Energy Conservation Techniques (N=50)	64%	18%	18%	100%
HVAC Systems and Controls (N=50)	64%	22%	14%	100%
Regulatory Codes for Maintenance and Operations (N=49)	69%	18%	12%	99%*
Indoor Air Quality (N=50)	64%	26%	10%	100%
Facility Electrical Systems (N=50)	62%	22%	16%	100%
Efficient Lighting (N=50)	52%	34%	14%	100%

* *Totals 99% due to rounding error.*

Roughly two-thirds of the nonparticipants expressed interest in each of the topics except *Efficient Lighting*. Even though that topic was of the least interest to these respondents, more than one-half of them (52%) said they were interested in it. As another indication of the relative unpopularity of the *Efficient Lighting* topic, it was

the only one to which two respondents from facilities with 100 or more operations and maintenance staff said they were disinterested.

AWARENESS OF AND DEMAND FOR BOC PROGRAM

Awareness

Roughly two-thirds (63%) of the nonparticipants said they were unaware of the BOC program offered by NEEC and the California investor-owned utilities (Table 4.21).

Table 4.21

AWARE OF THE BOC

AWARE	PERCENT (N=62)
Yes	37%
No	63%
Total	100%

The most common way in which those who were aware of the BOC program had heard about it was from a utility information source. Roughly one-third of those who were aware of the program (35%) said they had heard about it this way (Table 4.22). An equal number of these respondents said they had heard of the program from another mailing, emailing, advertisement or flyer. Other ways in which they had learned of the BOC program were from a boss or other co-worker, a trade association or publication, a school or college, and the Internet.

Table 4.22

HOW HEARD ABOUT BOC
(MULTIPLE RESPONSES ALLOWED)

HOW HEARD ABOUT BOC	PERCENT* (N=23)
Other Mailing, Emailing, Advertisement, or Flyer	35%

Utility (Representative, Seminar, Personal Contact)	22%
Utility (Email, Mailing)	13%
Boss or Co-worker	13%
Professional or Trade Association/Publication	4%
School/College	4%
Internet	4%
Don't Know/Refused	9%

** Totals over 100% because multiple responses were allowed.*

Reasons for Not Sending Staff to BOC Training

Of the 23 nonparticipants who were aware of the BOC training, 12 (52%) said they had considered sending themselves or their staff to the training. The most common reason given by these respondents for not sending anyone to the training was lack of time or staff availability. One-half of the twelve gave this reason (Table 4.23). One-quarter of the twelve cited money or budget problems as a reason for sending no staff to the BOC training.

Table 4.23

REASONS FOR NOT SENDING STAFF TO BOC (MULTIPLE RESPONSES ALLOWED)

REASON	PERCENT* (N=12)
Lack of Time/Staff Availability	50%
No Money/Budget	25%
No Need for Training	17%
Other	67%

* Totals over 100% because multiple responses were allowed.

Other reasons given by these twelve respondents who had considered sending staff to the training were the training takes too much time, difficulty in getting approval to attend, staff would have to attend training on their own time and were unwilling to do so, their journeyman level technicians provide training to the rest of their staff, and the use of third-parties to do work of a technically demanding nature.

Several other reasons given by these respondents suggest an incomplete understanding of the BOC program. These were reasons such as no need for the training, no relevant subject matter in the training, the quality of the training was unknown or poor, and straightforwardly, inadequate information about the program to make the decision to attend.

Five of the 23 nonparticipants who had heard of the BOC program said they had not considered sending themselves or their staff to the training, and the remaining 6 of the 23 did not recall. Those who had not considered the training each gave a different reason: 1) no need for training; 2) no money or budget; 3) taking other training; 4) staff is mostly sub-contracted; and 5) simply it was not a priority.

Demand for BOC Training

To obtain a more informed indication of the nonparticipants' interest in the BOC program, the nonparticipants were given more information about the series. Specifically, they were told the BOC is a competency-based training and certification for building operators, offering improved job skills and more comfortable, efficient facilities. The nonparticipants were also told building operators earn certification by attending training and completing project assignments in their facilities, and that the training topics include facility electrical, HVAC and lighting systems, indoor air quality, environmental health and safety, and energy conservation.

With this information in mind, the nonparticipants were asked whether they would then consider sending themselves or their staff to the training. More than one-half of the nonparticipants (57%) then said they would consider the training for themselves or their staff (Table 4.24).

Table 4.24

AFTER LEARNING MORE, WOULD CONSIDER SENDING SELF OR STAFF TO BOC

WOULD CONSIDER SENDING SELF/STAFF	PERCENT (N=56)
Yes	57%
Depends	21%
No	20%
Don't Know/Refused	2%
Total	100%

Further, three-quarters of the nonparticipants who would consider the training for their staff after learning more about it said they might send more than one staff member to participate (Table 4.25). More than one-third of these respondents (34%) said they might send three or more staff to the training.

Table 4.25

NUMBER OF STAFF MIGHT SEND TO BOC AFTER LEARNING MORE

NUMBER OF STAFF MIGHT SEND	PERCENT (N=32)
One	19%
Two	41%
Three through Five	28%
Six through Ten	6%
Don't Know/Refused	6%
Total	100%

The nonparticipants who were asked about the number of O&M staff who might be sent to the BOC training were also asked about their preference for its scheduling. A preference for a day-long class once per month was expressed by a large majority (69%) of these respondents (Table 4.26). Other scheduling options that they were asked about, and which were preferred by some, were two half-day classes per month and four two-hour classes per month.

Table 4.26

PREFERRED CLASS SCHEDULES

PREFERENCE	PERCENT (N=32)
Full-Day Classes Once a Month	69%
Half-Day Classes Twice a Month	16%
Two-Hour Classes Once a Week	13%
Don't Know/Refused	3%
Total	101%*

* *Totals 101% due to rounding error.*

Factors Affecting Demand for BOC Training

Utility Involvement

Utility involvement in the BOC program has a positive impact upon the value of the program in the eyes of most of the nonparticipants. More than one-half of them (54%) said the utilities' involvement in the program increases their confidence in the BOC (Table 4.27). None of the nonparticipants said the utilities' involvement in the program decreased their confidence in the program.

Table 4.27

EFFECT OF UTILITY INVOLVEMENT UPON VALUE OF PROGRAM

EFFECT	PERCENT (N=56)
Increased Confidence in Program	54%
No Effect	46%
Total	100%

Price and Driving Time

While one-half of the nonparticipants said they believe the price for the Level II BOC training (about $1,100) is reasonable, about one-third of them (31%) said they thought the price was not reasonable (Table 4.28). The others said the price may be reasonable or did not express an opinion regarding the reasonableness of the price.

Table 4.28

PRICE SEEMS REASONABLE

PRICE SEEMS REASONABLE	PERCENT (N=48)
Yes	50%
No	31%
Maybe/Depends	15%
Don't Know/Refused	4%
Total	100%

Nearly one-half (46%) of the nonparticipants said a driving time of up to one hour is a reasonable amount of time to commute to attend a training program; 7% indicated willingness to drive up to two hours (Table 4.29). However, roughly three out of ten

of the nonparticipants (29%) said the maximum driving time they consider to be reasonable to attend a training program is 30 minutes.

Table 4.29

MAXIMUM REASONABLE DRIVING TIME TO ATTEND TRAINING

DRIVING TIME	PERCENT (N=56)
30 Minutes or Less	29%
Between 30 and 60 Minutes	46%
Between 60 and 90 Minutes	14%
Between 90 minutes and Two Hours	7%
Over Two Hours	0%
Don't Know/Refused	4%
Total	100%

Almost two-thirds of the nonparticipants said they would not be willing to pay more for a training program, even if the driving time to reach it were only one-half of their stated maximum reasonable driving time (Table 4.30).

Table 4.30

WILLING TO PAY HIGHER PRICE FOR HALF AS MUCH TRAVEL TIME

WOULD CONSIDER SENDING SELF/STAFF	PERCENT (N=56)
Yes	29%
No	63%
Don't Know/Refused	9%
Total	101%*

* Totals 101% due to rounding error.

However, as one might expect, the greater the driving time a given nonparticipant said was reasonable, the more likely they also were to say they would be willing to pay more, if by doing so the driving time would be halved (Table 4.31).

Table 4.31

WILLINGNESS TO PAY MORE FOR SHORTER DRIVING TIME COMPARED TO MAXIMUM REASONABLE DRIVING TIME

MAXIMUM REASONABLE DRIVING TIME	WOULD PAY MORE TO HALVE TIME			
	YES	NO	DON'T KNOW	TOTAL
30 minutes or Less (N=16)	0%	88%	12%	100%
Between 30 and 60 Minutes (N=26)	35%	58%	8%	101%*
Between 60 and 90 Minutes (N=8)	50%	38%	12%	100%
Between 90 Minutes and Two Hours (N=4)	50%	50%	0%	100%

* Totals 101% due to rounding error.

None of these respondents who considered 30 minutes to be the maximum reasonable time for driving to a training program said they would pay more to shorten the driving time. However, one-half or more of the respondents who said 60 minutes or more is a reasonable driving time also said they would pay more to halve the driving time.

One-half of those who were willing to pay more to halve the driving time to the BOC program said the largest additional amount they were willing to pay for a nearer location was $200 (Table 4.32); 40% expressed a willingness to pay between $300 and $500 for a nearer location.

Table 4.32

ADDITIONAL AMOUNT WILLING TO PAY FOR NEARER LOCATION

AMOUNT	PERCENT (N=10)
$500	20%
$400	10%
$300	10%
$200	50%
Don't Know/Refused	10%
Total	100%

INSTITUTIONAL CUSTOMERS

BOC program staff observed that participation of institutional customers in the BOC training has been less than expected. By the term "institutional customers" we mean public or public-purpose entities, including government and quasi-government agencies, public schools, colleges and universities (including private colleges), and hospitals and healthcare facilities (including private hospitals).

To determine whether there are differences in the way outside training for operations and maintenance staff is viewed between private business and industry, and public or public-purpose entities, we looked at each of the survey variables relative to these two organizational types. We found statistically significant differences ($p < 0.10$) between the two organizational types only for three of the variables: 1) the number of operations and maintenance employees at the facilities; 2) awareness of the BOC program; and 3) the amount of time staff is willing to drive to attend trainings.

Private-sector facilities are more likely than institutional customers to have smaller operations and maintenance staffs ($p = 0.07$). One-half of the nonparticipants from private business or industry work in a facility with fewer than five operations and maintenance employees (Table 4.33).

Table 4.33

COMPARISON OF PUBLIC & PRIVATE SECTOR O&M STAFF SIZES

STAFF SIZE	PRIVATE BUSINESS OR INDUSTRY (N=42)	INSTITUTIONAL CUSTOMERS (N=20)
One through Four	50%	15%
Five through Nine	21%	35%
Ten through Nineteen	5%	10%
20 through 49	10%	15%
50 through 99	5%	10%
100 or More	7%	15%
Refused to Answer	2%	0%
Total	100%	100%

By comparison, only 15% of the nonparticipants from institutional facilities represented a staff of fewer than five employees. The average number of O&M employees at the private facilities is 41. For the institutional facilities, the average number is 62 employees. The median number of operations and maintenance staff at the private facilities is four, while the corresponding number for the institutional facilities is 11 staff members.

The second statistically significant relationship by entity type is in regard to awareness of the BOC program. Institutional customers were relatively unaware of the BOC program compared to their private sector counterparts ($p = 0.05$). Nearly one-half of the nonparticipants (45%) from private business or industry had heard of the BOC program at the time of the interviews, whereas only one-fifth of the institutional nonparticipants had heard of the program at that time (Table 4.34).

Table 4.34

COMPARISON OF PUBLIC & PRIVATE SECTOR AWARENESS OF BOC

AWARE OF BOC	PRIVATE BUSINESS OR INDUSTRY (N=42)	INSTITUTIONAL CUSTOMERS (N=20)
Yes	45%	20%
No	55%	80%
Total	100%	100%

The third distinction found between the private sector and institutional customers concerns the amount of driving time they view as reasonable to attend a training program ($p = 0.01$). One-half of the private sector nonparticipants view a drive of more than 30 minutes as unreasonable (Table 4.35). By contrast, roughly two-thirds (65%) of the institutional nonparticipants consider a driving time of up to one hour to be reasonable, and 15% of them see up to a two-hour drive as reasonable.

Some BOC staff and utility managers mentioned limited budgets as a barrier to participation for certain types of institutional customers. While budget constraints were mentioned as a barrier by some of the nonparticipants, all of but one of the interviewed nonparticipants from federal, state or local government agencies, from colleges and universities, and from K-12 schools reported having training budget in 2005.[5] The one respondent without training money this year expected to have a budget for training in the next few years.

5 Two of the respondents said they did not know if they had a training budget for 2005, but thought they would have training money in the next few years.

Table 4.35

COMPARISON OF PUBLIC & PRIVATE SECTOR VIEWS OF DRIVING TIME

REASONABLE DRIVING TIME	PRIVATE BUSINESS OR INDUSTRY (N=42)	INSTITUTIONAL CUSTOMERS (N=20)
30 Minutes or Less	36%	5%
Between 30 & 60 Minutes	31%	65%
Between 60 & 90 Minutes	17%	5%
Between 90 Minutes and Two Hours	2%	15%
Don't Know/No Response	14%	10%
Total	100%	100%

In contrast to the issue of budget, institutional nonparticipants were more likely than noninstitutional customers to mention that employee time away from their facility while attending a training program was a barrier to attending such trainings. Roughly one-third of the nonparticipants from the manufacturing/ industrial sector (38%) and from commercial office buildings (30%) said time away from the job is a barrier to their operations and maintenance staff's training (Table 4.36). This compares to one-half of the K-12 school nonparticipants and 80% of the government nonparticipants who also said this.

Thus, if institutional customers have been less likely to attend the BOC training program than their private sector counterparts, that result is more likely to have been caused by a relative lack of awareness of the BOC program (especially among K-12 schools and government agencies), and a relatively greater difficulty in taking time away from the job than to have been caused merely by funding or budgetary limitations.

Table 4.36

BARRIERS TO NONPARTICIPANTS' TRAINING*

NONPARTICIPANT'S FACILITY	BUDGET	TIME AWAY
PRIVATE BUSINESS & INDUSTRY		
Manufacturing/Industrial (N=21)	14%	38%
Commercial Office (N=10)	10%	30%
Restaurant (N=3)	0%	33%
Warehouse (N=2)	0%	50%
Other Private (N=5)	0%	20%
INSTITUTIONAL CUSTOMERS		
School (N=8)	0%	50%
Government (Federal, State, Local) (N=5)	0%	80%
College/University (N=4)	0%	25%
Healthcare/Hospital (N=3)	0%	33%

* *This table explores the two most frequently mentioned barriers to training—budget and time away (as shown in Table 4.14 and 4.15). Other barriers to training were reported with insufficient frequency to support an analysis by business type.*

COMPARISON OF PARTICIPANTS AND NONPARTICIPANTS

Most questions asked of BOC students and their supervisors addressed their experience with and response to the training, whereas most questions asked of nonparticipants were intended to gauge their potential interest in the BOC and barriers to participation. Thus, most of information obtained from each group does not have a counterpart in the information obtained from the other group. In this concluding section, we discuss the few points of comparison that can be made.

The nonparticipants were screened at the outset of the interview to include only people who supervised operations and maintenance staff; all of them did. Of the BOC Level II students supervised, 75% supervised operations and maintenance staff. Yet roughly half of both groups supervised more than four employees.

The nonparticipants had more operations and maintenance job experience than did the BOC students: an average of 18 years for the nonparticipants, compared with 13 years for the students.

The nonparticipants were more likely to work in public or public purpose establishments (referred to in the preceding section as institutional customers) than were the BOC students, 32% compared with 15%.

The nonparticipants had smaller facilities overall than the BOC students. Fifty percent of nonparticipants, compared with 20% of students, worked in facilities under 100,000 square feet; and 11% of nonparticipants, compared with 20% of students, worked in facilities greater than one million square feet.

About two-thirds of students thought their organizations might enroll additional staff in the BOC; about 57% of nonparticipants thought their organizations might send staff to the training.

Both groups of respondents were asked questions to gauge the value of the utilities' involvement in the BOC. Students were asked what type of organization, from a list identifying several candidates, they preferred to see sponsor the BOC: 75% preferred their utility, working alone or in tandem with an educational or professional organization (the BOC's current arrangement). Nonparticipants were asked whether knowing their utility made the BOC available to them increased their confidence in the quality of the training: 54% replied that it did.

Both groups of respondents were asked how they prefer the BOC be offered—as a series of all-day, once a month courses (the BOC's current arrangement), or as half-day, twice a month courses, or as two-hour, weekly courses. Ninety percent of students and 69% of nonparticipants preferred the all-day, once a month option.

Students were asked how long they drove to the BOC and nonparticipants were asked the maximum driving time they considered to be reasonable for attending training. Thirty percent of students reported having commuted for more than one hour to attend the BOC training; 21% of nonparticipants indicated they would be willing to travel for more than one hour to attend training. About one-third of both groups thought their establishments would send more students to closer trainings (e.g., within one hour, as compared with within two hours commute time) and would be willing to pay a higher tuition for closer trainings.

5. PROGRAM IMPLEMENTATION

This chapter provides the perspectives of utility BOC program managers, BOC instructors and NEEC staff on various facets of program implementation. It is organized into the following sections:

- Aspects of Program Delivery
- Coordination with the Utilities
- Curriculum and Course Feedback
- Marketing
- The Market
- Issues Affecting Program Future

ASPECTS OF PROGRAM DELIVERY

In addition to development of the BOC course curricula, NEEC's management of the course series in California includes training-site management, provision of course instructors and program marketing. To oversee the training sites, NEEC employs two site managers, one for northern California locations, and the other for locations in southern California. According to the instructors, the site managers "have been very helpful" and are doing an "excellent job" of handling the on-site administrative aspects of the trainings.

To provide course instructors, NEEC has created and maintains a pool of highly qualified, college-level teachers and other experts in the various course topics. Each of the instructors we interviewed had many years of both practical and teaching experience in their respective fields. For the first year of the program, NEEC relied heavily upon its existing instructors from the Pacific Northwest in order to meet the program's start-up deadline. The instructor pool now includes teachers from California, but instructors from the Pacific Northwest still predominate.

NEEC is responsible for filling the seats in the classes, that is, for marketing. To accomplish this, NEEC employs a marketing manager, who works closely with other NEEC staff and who is responsible for the overall program marketing strategy and tactics. The marketing manager's activities include mass mailings,

program information meeting scheduling, and follow-up telephone calls to certain prospective program participants and supervisors. Information at the meetings held to promote the courses is presented by one of NEEC's higher-level staff members working in tandem with the site manager for that area.

Each year, the utilities commit to offering the courses and determine the number of classes they will offer. The locations for the trainings are determined collaboratively between NEEC and the utilities. However, with the exception of the Irwindale Energy Resource Center (ERC), each year the sites include each utility's ERC for one or more of the course series.[6]

Based upon student feedback, NEEC staff believes all of the sites for the trainings, save one, have been highly satisfactory. The one exception was an on-site training for which the classroom facility was provided by the employer/owner of the site.

The instructors concurred with NEEC's assessment of the quality of the training locations. However, two of the instructors expressed reservations about the geographic locations of some of the trainings. Traffic and parking were thought to be a problem for the San Francisco ERC. Traffic is a problem for training locations throughout the Bay Area according to the region's utility program manager. The Downey location was hard to find according to one instructor. And because of traffic, class days throughout California were one-half-an-hour shorter than they have been in other states.

NEEC staff expressed the belief that financial incentives and technical assistance opportunities from the utilities help move the students to action in using the knowledge and skills gained through the BOC offerings. However, because there are neither utility staff nor non-staff energy resources on-site at the course locations away from the ERCs, such linkage has not occurred extensively at the non-ERC sites.

Even at the utilities' training centers, participation in the classes by utility personnel has typically been minimal according to the instructors. They said utility staff involvement has been limited to occasional introductions and perhaps saying a few words at the beginning of a class. One instructor said he was surprised by the lack of utility involvement. However, another instructor said greater utility involvement in the classes is not necessary because he tells the students the purpose of the courses is to conserve energy. And the third instructor said the

6 The various utility training centers have been given different names by the utilities. For simplicity, all of the utility training centers are referred to as ERCs in this report.

curriculum is so full, there is no time for greater participation in the classes by utility staff. Neither of the interviewed utility program managers had attended any of the training sessions.

Almost the only information the students receive about the utilities and their programs during the courses is the utility information available in the form of brochures and lobby displays at the ERC training locations. One instructor said he provides such information as appropriate and in response to specific questions from students. Another instructor said the utilities "don't really show much overt interest" in the BOC program.

COORDINATION WITH THE UTILITIES

It is believed the utilities' association with the program benefits the BOC program in California by lending it credibility.

Although there has been turnover among all of the utility program managers since the BOC program's inception, the transitions to successive managers have been smooth and have not caused any problems for the program.

A NEEC staff member said initially some of the utilities were skeptical about their customers' acceptance of the BOC program, because the utilities offered free educational programs, while the BOC program required payment of a fee. However, the skepticism was overcome when the classes filled and the utilities realized there is a demand for the credential offered by the course.

A more significant change in the utilities' approach to the program has occurred at one utility in particular. That change has been the inclusion of the BOC – in the words of program staff, "where it belongs" – with that utility's programs under the umbrella of its ERC.

The relationship between the program and the utilities is continuing to evolve in other ways as well. For example, the utilities have been interested and helpful in expanding the locations of the trainings, particularly to locations outside of the principal urban areas. Thus, course locations for 2005 will include Eureka, Ventura, San Bernardino/Riverside, Temecula and Fresno.

CURRICULUM AND COURSE FEEDBACK

At the suggestion of two of the California utilities, the BOC Level II curriculum has been adapted for their markets. A course on gas absorption chillers and a class on

ENERGY STAR® benchmarking information have been added. The utilities have also requested a course on demand response, a topic that is "not really" addressed in the courses according to NEEC staff.[7] Instructors said demand response is "addressed sparingly," by looking at demand charges on bills, in reference to gas cooling as an alternative to electric cooling, or during "sidebar discussions" on the causes of brownouts or rolling blackouts. One instructor said he talks about load shedding of non-critical loads.

Superficially, there appears to be an inconsistency between the instructors' statements about the limited class discussions of demand response and the students' and supervisors' statements, reported in Chapter 3, that the classes have given the students greater confidence in their ability to respond to a call for a demand response. However, we believe these statements are not, in fact, inconsistent. We believe the students' overall enhanced understanding of their equipment, gained from the courses, increased their confidence and their ability to operate the equipment appropriately under diverse conditions and circumstances, including at times when a demand response is called for.

NEEC has plans to develop a course on demand response to be offered as an elective. NEEC also plans to develop supplemental material on optimization of packaged rooftop equipment, and plans generally to update the Level II course information. Such general updating and renewal occurs routinely every 18 to 24 months. NEEC has no plans at this time for a Level III BOC course.

One of the instructors mentioned an additional modification that has been made to the curriculum for California students. He said the discussion of control systems has been expanded to include enhanced automation. He also mentioned there are more solar issues in California than in other markets, and less need for boiler discussions there. He said he has had California classes in which none of the students worked with boilers.[8]

In addition to receiving feedback from the utilities regarding course content, NEEC staff receives and summarizes all of the students' evaluations for each class. If these evaluations reveal issues concerning instructors, NEEC staff addresses them. The evaluation summaries are given to the utilities each year. As yet another way in

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7 It was found the term "demand response" is not immediately, universally recognized by BOC instructors and students. Other terms used in talking about demand response were "uninterrupted power supply (UPS)," "demand charges," "time-of-use rates" and "load shedding."

8 In the *Evaluation of the 2002 Statewide Building Operators Certification and Training Program*, cited in the Related Research section of Chapter 2, above, it was found that 73% of Level I students in California work with boilers.

which NEEC stays informed about the quality of the program, the site coordinators provide brief site evaluations to NEEC staff at the end of each class.

The instructors see the in-class evaluations and receive evaluation summaries and test scores from NEEC staff.

MARKETING

NEEC's Marketing Manager provided additional information about NEEC's efforts to promote the program in California.

The principal marketing activities for the BOC courses have included the integrated and sequential use of direct mail, information meetings held at various California locations and follow-up telephone calls. NEEC's mailing list includes alumni of previous BOC trainings and their supervisors, names of those who have requested information about the program, and federal-sector building operators who have participated in the U.S. Department of Energy's Federal Energy Management Program (FEMP). NEEC has augmented its mailing list by joining and obtaining mailing lists from industry and trade groups in California. These groups include the California Association of School Business Officials, the California Society of Healthcare Engineers, the International Facility Management Association (IFMA), and the Building Owners and Managers Association (BOMA).

Membership in these organizations provides additional marketing opportunities as well. These memberships allow NEEC to place notices of the trainings in the organizations' newsletters and websites, to speak at their regular meetings, to have information booths at their annual meetings, and sometimes to be part of annual meeting programs.

NEEC's marketing manager makes follow-up telephone calls to those who have shown interest in the program by contacting NEEC or attending one of the information sessions. Supervisors of BOC training alumni are also called. These follow-ups include leaving voice messages and faxing packets with more information than was contained in the original mailings.

NEEC tries to maximize its marketing efforts by coordinating with, and taking advantage of, the utilities' participation in the program. For example, informational program brochures have been printed for each utility with their name and logo appearing on the front cover. Another brochure with the names of all four utilities on the cover has also been printed. On the infrequent occasions when NEEC has had difficulty filling classes, it has asked the utility program managers to help recruit students, which the program managers have done.

Some of the utilities have also augmented the program's marketing efforts by including information about it at their ERCs and in booths at professional events. One of the program managers gives printed "slicks" and testimonials to his utility's account executives to give to their customers.

Other integration efforts of BOC marketing with the marketing activities for the utilities' training programs have been uneven. Two of the utilities have posted the schedule of BOC classes on their websites. A third utility website contains both a schedule of BOC courses and an online registration form. However, we were unable reach either of these through the website's menu options. Using that website's menus we were able only to find a link to the BOC website. We were unable to find either a schedule of BOC classes or a link to the BOC website on the website of the fourth utility.

The utilities have also emailed notices of upcoming course offerings to past BOC students. However, this method of announcing courses has not been undertaken consistently by the utilities. Furthermore, the utilities have not consistently included the BOC schedule in the printed calendars or quarterly catalogs of training events they mail to their customers. Only one utility has included the BOC program with its own programs at its ERC. One of the utility program managers believes rolling the BOC into the utilities' ERCs may need to happen for the program to become fully integrated into the utilities' marketing efforts.

There are two related issues affecting acceptance by the marketplace of the BOC program in California. One issue is an apparent trend toward outsourcing operations and maintenance work. Building owners such as the General Services Administration (GSA) no longer have their own operations and maintenance staff. Instead they rely upon private contractors to provide these services for their buildings.

Beyond the mere marketing challenge of reaching these contractors with information about the BOC program, there is the related issue that these contractors "seem not to be so interested in spending money on training." One reason for this may be the absence of a direct financial benefit from work that enhances the energy efficiency of someone else's building.

THE MARKET

According to NEEC staff, response to the Level II BOC program has been strong, both from local governments, and, with the exception of GSA managed facilities, from federal agencies, including military facilities, as well. The private sector has also responded well. In the private sector, industrial manufacturing has been a

particularly strong market segment (especially in southern California) according to the instructors, with office buildings, healthcare facilities and higher education also represented. NEEC staff reported state government agencies and K-12 schools have been the least responsive in sending operations and maintenance employees to the trainings.

Only one of the interviewed instructors said he had received sufficient student feedback to form an opinion about the long-term prospects for the BOC training in California. He believes there is a "gigantic target market." As examples of market potential, he cited the hitherto minimal participation of K-12 schools in the program, and the fact that some large industrial customers have made the certification a prerequisite for advancement of their operations and maintenance employees. Even in the absence of student feedback regarding program market potential, another instructor likened the market to "a full bottle of pop with only a sip taken out of it." But he added it is "tough" to reach this market.

Although the students are typically operations and maintenance line staff, according to the instructors, they have widely varying levels of experience. The instructors say the students are about equally likely to know as much as the instructor knows as they are to have almost no knowledge or experience at all, with most of the students falling somewhere in between these extremes.

ISSUES AFFECTING PROGRAM FUTURE

In spite of the size of the market for the series reported by the instructors, NEEC staff report it has been difficult to fill classes in locations where trainings have already occurred.

Program staff discussed issues that have the potential to affect the market for the BOC program in California. They mentioned funding levels of state agencies as an issue regarding the participation of state government facilities and K-12 schools. One of the utility program managers added the opinion that employees' time away from the job is more of a concern for these organizations than is the cost of tuition.

The interviews with the nonparticipants described in the Institutional Customers section of Chapter 4, above, support the utility program manager's observation that time away from the job is a greater barrier to participation in outside training programs than are funding limitations. Another factor, uncovered by those interviews, that may have resulted in lower BOC training participation rates for institutional customers was their relative lack of awareness of the existence of the program.

Program staff also mentioned the absence of a sponsor for the program in California. Although the California investor-owned utilities pay for the BOC to be offered, they have stopped short of licensing the curriculum and fully sponsoring it as organizations in other states have done.

Some staff speculated the absence in the program marketing materials of information on energy savings resulting from the training may be limiting demand for it. Finally, an issue mentioned as specifically affecting the market and future of the Level II series is the need to have certified Level I students in order to have a Level II population.

Otherwise, neither NEEC staff, the instructors, nor the utility program managers have seen problems with the program, and universally believe the program is working well.

6. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY OF FINDINGS

Level II BOC Students and Supervisors

Assessment of Level II Training

- Most of the students (95%) and supervisors (83%) said they were satisfied or highly satisfied with the training. All of the students said they were satisfied or highly satisfied, considering its cost.
- Three-quarters of the students (75%) said they would be willing to pay for the training themselves.
- Most of the students reported the difficulty level and pace of the courses were about right.
- Most of the students (70%) say the level of utility involvement in the training is about right, and most (75%) prefer the program be offered by their utility (acting alone or in tandem with an educational or professional organization) over other possible organizational sponsors. Few of the supervisors expressed a preference regarding who offers the BOC program.
- Nearly one-half of the students (45%) and one-third of the supervisors say their satisfaction with their utility is higher since the training.

Influence of the Level II Training on Job Activities

- Most of the Level II students (95%) say they use or apply concepts taught in the course, including doing new and ongoing activities more efficiently or effectively.
- Most of the students (90%) say they have advised in decisions about equipment operation or replacement, and undertaken, recommended or influenced energy-efficiency decisions as a result of their training.
- Most of the students (over 90%) report there is an increased likelihood their companies will make energy-efficient investments and participate in

utility energy-efficiency programs. Most of the students (90%) also report having greater confidence in their ability to respond to a call for a demand response since taking the training.

- The responses of the supervisors backed up the students in regard to all of these matters.
- Three-quarters or more of the students report they have saved energy at their facility, saved money for their facility, and improved occupant comfort in their facility since taking the courses.
- Most of the students (60%) say they have trained other staff in concepts they learned from the Level II courses.
- Most of the suggestions for improving the courses were expressions of desire for additional course topics or information. Several of the students were interested in taking additional BOC courses.

Potential Demand for BOC Training

- Both students and supervisors placed a high regard on the value of BOC certification. Ninety percent or more of the students say the certificate is good for job advancement, they have recommended or would recommend the Level II training to others, and employers should expect operations and maintenance staff to have BOC certification.
- All of the students say it is important for the BOC program to be ongoing in California.
- Students and supervisors expect a total of 50 or more additional operations and maintenance staff will be sent to Level I and Level II BOC training from their facilities. This corresponds to an average of 2.5 additional BOC students per Level II student interviewed.

Factors Affecting Demand

- Almost one-half of the students (45%) traveled 30 minutes or less to reach the Level II training location. Roughly one-third of them (30%) traveled more than one hour to reach the training, with one-half of these students traveling three hours or more.

- Most of the students (55%) believe holding the training nearer to their facilities would have no effect upon enrollment. Nonetheless, about one-third (30%) of the students and one-half of the supervisors said they would expect their facility would send more staff to the BOC if the training were offered at a location nearer to them.

- Two of six interviewed supervisors indicated they would be willing to pay $300 more for the training if it were held at location closer to their facility.

Nonparticipants

Characteristics

- The interviewed nonparticipants, selected from among supervisors of operations and maintenance staff who had been sent BOC marketing materials, were more experienced operations and maintenance personnel than were the Level II students. The nonparticipants had an average of eighteen years of experience.

- About one-third of the nonparticipants (32%) work in facilities with three or fewer operations and maintenance staff. About another third of them (32%) work in facilities with from four through ten staff members.

- A large majority of the nonparticipants (89%) report they or someone from their operations and maintenance staff had attended an outside training or education program during the last three years. Of these, more than one-half (56%) say they or another staff member has received certification from a training program in some area of building operations and maintenance.

Factors Affecting Nonparticipants' Demand for BOC Training

- Most of the nonparticipants (83%) have or expect to have a budget for outside training within the next few years.

- Nine-tenths of the nonparticipants who say they will have a budget for training say they expect staff from their facility will go to training programs during 2005.

- According to the nonparticipants, the greatest barrier to staff training is time away from the job, not budget limitations. The most common reason

of the nonparticipants who had heard of the BOC training for not sending anyone to it was lack of time or staff availability.

- More than three-fifths of the nonparticipants (62%) consider certification in building operations and maintenance for their staff to be important.
- Roughly two-thirds of the nonparticipants (62% to 69% per course topic) said they were interested in each of the Level I course topics except "Efficient Lighting," in which 52% expressed interest.
- Only about one-third of the nonparticipants (37%) had heard of the BOC program. About one-third (35%) of these had heard of the program from a utility. Institutional nonparticipants had a significantly lower level of awareness (20%) than did nonparticipants from private-sector facilities (45%).
- Utility involvement in the BOC program has a positive impact upon the value of the program in the eyes of most of the nonparticipants (54%).
- Nearly one-half (46%) of the nonparticipants said a driving time of up to one hour is a reasonable amount of time to travel to attend a training program, with 7% willing to drive up to two hours.

Program Implementation

Program Administration

- Each year, the utilities determine the number of classes they will offer. The locations for the trainings are determined collaboratively between NEEC and the utilities.
- The utilities have been interested and helpful in expanding the locations of the trainings, particularly to locations outside of the principal urban areas.
- All but one of the sites for the trainings have been highly satisfactory. The one problematic site was at the location of a large organization that held a training for its staff.
- The site managers are doing an "excellent job" of handling the on-site administrative aspects of the trainings according to instructors.

- Traffic and parking are problems for training locations throughout California. As a result, California class days are one-half hour shorter than they are in other locations.

- Because there are neither utility staff nor non-staff energy resources on-site at the course locations away from the Energy Resource Centers (ERCs), information about financial incentives and technical assistance opportunities from the utilities has not been extensively provided at non-ERC sites.

- Almost the only information students receive during the courses about the utilities and their programs is that available in the form of utility brochures and lobby displays at the ERC training locations.

Marketing and Market Response

- The principal marketing activities for the BOC courses are direct mail, information meetings, and follow-up telephone calls. These activities are augmented by notices in the publications of industry trade associations, and by appearances at trade association meetings.

- Some of the utilities have augmented the program's marketing efforts by including information at their ERCs, in booths at professional events, and by giving information to their account executives to give to their customers.

- Integration of the BOC program by the utilities with the marketing activities for their own training programs has been uneven.

- The private sector and federal agencies have been the most responsive in sending employees to the BOC training. State agencies and K-12 schools have been the least responsive.

- The potential market for the Level II training is mostly untapped, but difficult to reach.

Curriculum

- At the suggestion of two of the California utilities, the BOC Level II curriculum has been adapted for their markets. Nonetheless, further

adaptations for the California market could be made according to instructors.

- The topic of demand response is only addressed sparingly during the courses according to instructors. NEEC has plans to develop a course on demand response to be offered as an elective.
- Although NEEC has plans to add electives in addition to a course on demand response, there are no plans for a Level III BOC course.

CONCLUSIONS

This process evaluation explored a number of issues about the quality, direction, and progress of the BOC Level II training.

1. Are participants satisfied with the Level II BOC training?

Students and their supervisors expressed high levels of satisfaction. All students have recommended or would recommend the training to others and three-quarters say they would be willing to pay for the training themselves.

Most students indicated all of the course topics are useful and applicable to their jobs. Most of their supervisors concurred, except in regard to two courses: Advanced Electrical Diagnostics and Introduction to Building Commissioning. In contrast, of the six course topics, these two courses were indicated by the largest majorities of students to be useful and applicable to their jobs. This disparity in views may warrant further research.

2. Does Level II build appropriately and adequately upon Level I?

The Level II course material is an appropriate training step for graduates of the Level I series. Large majorities of the students indicated both the difficulty level and pace of the course material were appropriate and that the Level II course material was more advanced than the corresponding subject matter in Level I.

3. Does the training affect operators' energy efficiency behaviors?

Changes in operations and maintenance energy efficiency behaviors can be attributed to the BOC. Most students and their supervisors credit the Level II training with positive changes in the students' job activities and with a positive

influence on their facilities' energy efficiency decisions. As a result of the courses, most students are: advising in decisions about equipment operation or replacement; undertaking, recommending or influencing energy efficiency projects at their facilities; saving energy and improving occupant comfort at their facilities; saving money for their facilities; and training other staff in the concepts learned during the course.

4. Are students interested in additional training?

Students indicated a desire for more training. Students specifically requested additional training in troubleshooting, HVAC engineering design, indoor air quality and management of managed systems. Some students went so far as to say, "So when can I take Level III?"

5. Is certification a valued aspect of building operator training?

Students, their supervisors, and nonparticipants value certification for building operator training. The students believe the certificate is good for job advancement and believe employers should come to expect O&M staff to have BOC certification. Further, all of the students believe it is important for the BOC program to be ongoing in California; without an ongoing presence, certification loses its value.

6. How does the training affect students' estimation of their utilities and how does utility sponsorship of the program affect nonparticipants' estimation of the training?

Utility involvement reflects well upon the utility and enhances the credibility of the program. Satisfaction with their utility increased for some students and supervisors because of the utility's sponsorship of the BOC program. Utility sponsorship of the course did not diminish the standing of the utility in anyone's eyes. For nonparticipants, utility sponsorship enhances the credibility of the series.

7. To what extent would a training location closer to the customer increase participation, or create a willingness to pay higher tuition?

Some students, supervisors and nonparticipants would pay more for a class located closer to their facility, and a closer class location would

somewhat increase enrollment in the series. However, most students, supervisors and nonparticipants would neither pay more for a class located closer to their facility nor send more students.

8. Is the cost of tuition for the series more important, especially to institutional customers, than training location or time away from the job?

The greatest barrier to outside training for the nonparticipants is time away from the job. This barrier was the one most often mentioned by both private-sector and institutional operations and maintenance staff. (Even so, most interviewed O&M staff prefer the current one-day monthly classes to shorter, more frequent sessions.) Time away from the job was particularly mentioned frequently by government employees and staff from K-12 schools. Lack of funding was far less frequently mentioned than time away from their job by private sector employees, and not mentioned at all by staff of institutional customers. Among institutional nonparticipants in particular, a lack of awareness of the BOC program was also a barrier to participation in the training.

9. What are the views of the utility program managers regarding the course series?

The utility program managers are supportive of the Level II training. They believe the program is working well and will continue in California. The Level II training is seen as being good for the students' careers, and for attracting and retaining business in California.

10. Are nonparticipants interested in training for building operators?

A majority of nonparticipants consider certification in building operations and maintenance for their staff to be important. At least some O&M staff from most nonparticipants' facilities had attended an outside training or education program during the last three years, and virtually every organization had money budgeted for outside training in 2005. Certifications already received by the nonparticipant respondents and their co-workers included training in building or facilities management, electrical, HVAC, OSHA, refrigeration, fire safety, asbestos, indoor air quality, energy efficiency, operating engineering, the ADA, playground safety, aquatic facilities operation, water treatment, underground storage tanks, domestic water systems, hoists, elevators and specialized welding.

RECOMMENDATIONS

1. Offer additional advanced training.

Many Level II students expressed an interest in additional training. Development of additional Level II electives should be continued. As more California operators have completed Level II training, consider offering the remaining electives—either singularly or packaged as a group—to those students who have had the Level II core courses.

2. Increase utility presence at BOC trainings.

Although students expressed satisfaction with the level of utility involvement, an opportunity is being missed. Consider sending a utility program manager or customer representative to at least a portion of a single course in each series (e.g., 30 minutes, near the break time, coordinated in advance with NEEC). Further, at sites other than the utilities' energy resource centers, ensure utility program brochures are available, perhaps through a portable tradeshow booth. Participants said their experiences with the BOC reflected positively on their utilities and inclined them to participate in utility efficiency programs and undertake efficiency projects. Utilities could better capitalize on these positive BOC outcomes.

3. Increase utility marketing of the program.

NEEC and the utilities can best promote the program to different markets, and by using different means. NEEC cannot perform the relationship marketing that the utilities can conduct with their own customers. Utilities should comprehensively include the BOC with the marketing efforts for all of their other training programs, effectively presenting the BOC as one of their own programs offered through their energy resource centers.

4. Target institutional customers in marketing efforts.

Institutional customers have larger operations and maintenance staffs than most private-sector employers have, yet a barrier to attendance for nonparticipant institutional customers was a lack of awareness of the existence of the BOC program. This was especially true for government agencies and K-12 schools.

5. Continue to seek opportunities to hold trainings at the site of large employers, perhaps at the site of one of several large employers in related industries, working in proximity.

Although traveling to the training site was an issue for less than half of the interviewed O&M staff, nonetheless the burden of travel remains a barrier for some. Because most of the trainings are a bit less than a full day, on-site training may enable some staff to work before or after the sessions. Consider offering a course series for one type of institutional customer (e.g., government offices, hospitals, K-12 schools) at the facility of the customer most central to the organizations of a similar type in a given geographical area. This approach offers the additional advantage of bringing together students who face similar equipment challenges.

6. Address site-related issues.

Prior to selecting a training location off-site from utility facilities, visit the location to ensure it will meet the needs of instructors and students. Provide clear directions to the students for finding the training locations and offer suggestions for parking.

APPENDICES

APPENDIX A:

INTERVIEW GUIDE FOR BOC LEVEL II STUDENTS – 2003-2004 OCTOBER 13, 2004

1. Student Name: _____
2. Location: _____
3. ID Number: _____

Introduction: I am _____. __(Utility)___ gave me your name as a person who has completed the Level II training of the Building Operator Certification Program. We are conducting an evaluation of the program and are following up with students to obtain their views of it. Do you have time to talk for about 15 minutes?

4. Do you conduct or direct operations and maintenance activities at your facility?

   N Y DK

   [If Y, skip to Q8. If N or DK, ask Q5 – Q7, then thank and terminate]

5. Why did you take the Level II training? (open) _____

6. Were you satisfied with the Level II training, given your purpose in taking it?

   N Y DK

7. Why/ Why not? (open) _____

Thank and terminate

Assessment of Training

8. How would you rate your overall satisfaction with the training you received? Please use a scale of "1" to "5," where "1" means not at all satisfied and "5" means very satisfied.

   [not at all] 1 2 3 4 5 [very]

Intro to Q9

Please rate how useful to your work you found the course material relating to the systems and equipment you work with, indicating whether the course was useful, somewhat useful, or not useful.

9. Preventive maintenance and operations

   a. __useful __somewhat useful __not useful

10. Advanced electrical diagnostics

    a. __useful __somewhat useful __not useful

11. HVAC trouble shooting and maintenance

    a. __useful __somewhat useful __not useful

12. HVAC controls and optimization

    a. __useful __somewhat useful __not useful

13. Motors in facilities

    a. __useful __somewhat useful __not useful

14. Introduction to building commissioning

    a. __useful __somewhat useful __not useful

Intro to Q15 {Ask only of students who took Level I}

Please indicate the extent to which the course advanced your understanding beyond that of the Level I training, indicating whether it went beyond Level I, somewhat beyond Level I, or not beyond Level I.

15. Preventive maintenance and operations

    b. __beyond Level I __somewhat beyond Level I __not beyond Level I

16. Advanced electrical diagnostics

    b. __beyond Level I __somewhat beyond Level I __not beyond Level I

17. HVAC trouble shooting and maintenance

    b. __beyond Level I __somewhat beyond Level I __not beyond Level I

18. HVAC controls and optimization

    b. __beyond Level I __somewhat beyond Level I __not beyond Level I

19. Motors in facilities

    b. __beyond Level I __somewhat beyond Level I __not beyond Level I

20. How would you rate the level of difficulty of the course series. Would you say that overall it was about right, too basic, or too advanced?

__About right

__Too basic

__Too advanced

21. What proportion of the course information did you feel was covered too quickly, if any?

__none or very little

__some, but not too much from my perspective

__too much from my perspective

a. {If not "none or very little":} What topics in particular were covered too fast? _____

22. What proportion of the course information did you feel was covered too slowly, if any?

__none or very little

__some, but not too much from my perspective

__too much from my perspective

a. {If not "none or very little":} What topics in particular were covered too fast? _____

23. Please add any comments or suggestions to improve the course series.

[open] _____

Influence of BOC on Work Activities

24. Have you used or applied any of the concepts and methods taught in the Level II series?

N Y DK

25. Do you do new O&M actions that you did not do before taking the course?

N Y DK

26. Do you do some actions more often than you did before taking the course?

N Y DK

27. And do you feel you do some actions better or faster than you did before?

N Y DK

28. Have you trained other staff with information you received during the Level II series?

N Y DK

29. [If no:] Do you plan to?

N Y DK

Has the Level II training led to your having:

30. ...saved energy at your facility?

N Y DK

31. ...saved money?

N Y DK

32. ...improved occupant comfort?

N Y DK

33. ...advised in decisions about equipment operation or replacement?

N Y DK

34. ...more productive interactions with contractors?

N Y DK

35. ...undertaken, recommended, or influenced any energy-efficiency projects (e.g., selecting or recommending energy-efficient new equipment, participating in a utility program)?

N Y DK

36. [If Y:] What? (check all that apply)

__lighting project

__HVAC project

__system automation project

__variable speed drives/ variable frequency drives

__cogeneration project

__other (describe: _____)

Do you think your training in BOC Level II has...

37. ...increased the likelihood that you would encourage your organization to participate in utility energy efficiency programs?

N Y already participating DK

38. ...increased the likelihood that you would encourage your organization to make investments in energy efficiency?

N Y already participating DK

39. ...made you more confident about what actions your facility might take to reduce load, should the state or your utility call for a "demand response"?

N Y already participating DK

40. Before taking the training, would you say you had a fairly good understanding of the Level II course and its potential value to you?

N Y already participating DK

41. [If N or DK:] What do program staff and marketing materials need to convey to prospective students a better sense of the purpose and value of the course?

[open] _____

Professional Value of Training and Certification

42. Have you received or will you be receiving your Level II Certificate?

N Y DK

43. [If N or DK] Why not?

[open] _____

44. Do you think having a Building Operator Level II Certificate will be good for advancing at your current job, or getting a new job if needed?

N Y DK

45. Have you recommended or would you recommend the Level II Building Operator Certificate program to others—those doing the same type of work you do, or for any staff you or they might supervise?

N Y DK

46. [If = N or DK:] Why do you say that?

[open] _____

In the following questions, I'd like your thoughts on a few things about how the BOC is offered in California.

47. Would you say that your utility's level of involvement in the BOC appears to be about right, or do you think the program would be improved with more utility involvement, or less utility involvement?

__about right

__more involvement

__less involvement

__dk

48. [If "more involvement":] What involvement would you like to see?

[open] _____

49. Do you prefer that your utility offer the BOC, or would you prefer to see an educational or professional organization offer the BOC, or do you have no preference?

__utility

__educational or professional organization

__no preference

__dk

50. Is your satisfaction with your utility higher, lower, or unchanged based on its sponsorship of the BOC program?

__higher

__lower

__unchanged

__dk

51. Do you prefer a training program for building operators that is training only, or one that leads to certification, or do you have no preference?

__training only

__certification

__no preference

52. How important is it to you to have the BOC certification program have an ongoing presence in California? Would you say it is...

__very important

__important

__not important

__or do you have no opinion

53. Would you like to see employers come to expect their O&M staff to have BOC certification?

N Y DK

Future Demand for BOC

54. Do any operations and maintenance staff report to you?

N Y DK

55. [If Y:] How many?

[open] _____

56. Do you have the authority to send staff to outside training, or is that decision made by others?

N Y DK

57. [If N:] Do you have influence in training decisions?

N Y DK

58. Were you involved in your facility's decision to have you attend the Level II training?

N Y DK

59. [If Y:] In deciding whether to attend, were you aware the Level II training cost about $1,100 per participant, and about $800 for a second registrant or more from the same organization?

N Y DK

60. [If Y:] Would you describe yourself as highly satisfied with the training you received for that expenditure, satisfied, not satisfied, or unsure?

__highly satisfied

__satisfied

__not satisfied

__unsure/ dk

61. If your employer were not willing to pay for the course, is this something you might be willing to pay for yourself?

N Y DK

62. Do you expect any other staff at your facility will enroll in either the Level I or Level II course series? (The two series cost the same.)

N Y DK

63. [If Y:] About how many in Level I?

[open] _____

64. [If Y:] About how many in Level II?

[open] _____

65. [If N or DK:] Why do you say that?

[open] _____

66. How long did you travel to attend the BOC?

___ hours driving distance

67. Would you expect your facility would send more staff to the BOC if the training was offered a location nearer to you?

__more staff

__about the same

68. {If more staff:} Within what distance from your facility would the training need to be to attract more staff than would come to the location you where you trained?

__hours in driving time from your facility

69. Assuming the BOC was offered nearby, which of the following class schedules would you prefer:

___weekly two-hour classes

___half-day classes twice a month

___full-day classes once a month (the current schedule)

___no preference

Who would be the best person at your organization, such as your supervisor, to ask for opinions about whether the Level II BOC training is a good investment for the organization?

70. Name: _____

71. Title: _____

72. What's the best phone number to reach him/her at? _____

Operator Responsibilities

73. How many years have you been in building operations?

[open] _____

74. How many building operations and maintenance staff are at your facility:

____total O&M staff (including line and supervisory staff)

____supervisors

75. Does your facility have more than one building?

N Y DK

76. [If Y:] How many buildings are there?

[open] _____

77. Do you know or could you estimate the size of your facility (all buildings) in square feet?

_____ (enter 99 if don't know)

78. Is your establishment a commercial enterprise or is it in the government or quasi-governmental sector?

Commercial Government Other DK

79. [If "other" or "DK", describe:] _____

80. What is the main business or activity performed at this location? (probe to code)

Office.....01
Retail (non-food).....02
College/University.....03
School.....04
Grocery Store.....05
Convenience Store.....06
Restaurant.....07
Health Care/Hospital.....08

Hotel/Motel/Lodging 09
Warehouse 10
Personal Service 11
Community Service/Church/Temple/Municipality 12
Agricultural 13
Condo Association/ Apartment Management 14
Manufacturing/ Industrial:
Manufacturing/ Industrial Electronic & Machinery 15
Manufacturing/ Industrial Mining, Metals, Stone, Glass, Concrete 16
Manufacturing/ Industrial Petroleum, Plastic, Rubber and Chemicals 17
Other Manufacturing/ Industrial (describe below) 18
.....
Other (describe below) 98
Don't know/Refused 99

81. [If other, specify:] _____

82. If we are conducting additional research on the BOC program, say next year, may we contact you again?

N Y DK

Thank you for your time..

APPENDIX B:

INTERVIEW GUIDE FOR BOC LEVEL II STUDENTS' SUPERVISORS – 2003-2004 OCTOBER 12, 2004

1. Supervisor's Name: _____

2. ID# of Student Supervised: _____

3. **Introduction:** I am_____. Your employee,_(Student)___, attended the Level II training of Building Operator Certification Program and gave me your name as his/her supervisor. We are conducting an evaluation of the certification program and are following up with students and their supervisors to obtain their views of the program. Do you have time to talk for about 15 minutes?

4 -7: Intentionally omitted

Assessment of Training

8. Based on what you have observed, has your employee's participation in the Level II BOC program been useful on the job? Please answer using a "1" to "5" scale, where "1" means not at all useful and "5" means very useful.

   [not at all] 1 2 3 4 5 [very] dk

Please rate each course area on applicability to your employee's work.

9. Preventive maintenance and operations

   a. __applicable __somewhat applicable __not applicable

10. Advanced electrical diagnostics

    a. __applicable __somewhat applicable __not applicable

11. HVAC trouble shooting and maintenance

    a. __applicable __somewhat applicable __not applicable

12. HVAC controls and optimization

    a. __applicable __somewhat applicable __not applicable

13. Motors in facilities

    a. __applicable __somewhat applicable __not applicable

14. Introduction to building commissioning

    a. __applicable __somewhat applicable __not applicable

15. Do you have any comments to offer to improve the course series?

    [open] _____

Influence on Work Activities

16. From what you have observed has your employee used or applied any of the concepts and methods taught in the Level II course?

    N Y already proficient too soon to tell DK

17. Does your employee do new O&M actions he did not do before taking the course?

    N Y already proficient too soon to tell DK

18. Would you say he does some actions more often now than he did before?

    N Y already proficient too soon to tell DK

19. Would you say he does some activities better or faster now than he did before?

N Y already proficient too soon to tell DK

20. Has your employee attempted to pass on to other employees some of the things he learned?

N Y Not his job DK

Based on your observations, has the Level II training led to his having:

21. ...saved energy at your facility?

N Y too soon to tell DK

22. ...saved money?

N Y too soon to tell DK

23. ...improved occupant comfort?

N Y too soon to tell DK

24. ...advised in decisions about equipment operation or replacement?

N Y already advising too soon to tell DK

25. ...more productive interactions with contractors?

N Y already proficient too soon to tell DK

26. ...undertaken, recommended, or influenced any energy-efficiency projects (e.g., selecting or recommending energy-efficient new equipment, participating in a utility program)?

N Y already doing too soon to tell DK

27. [If Y:] What? (check all that apply)

__lighting project

__HVAC project

__system automation project

__variable speed drives/ variable frequency drives

__cogeneration project

__other (describe: _____)

Do you think your employee's training in BOC Level II has...

28. ...increased the likelihood that your organization will participate in utility energy efficiency programs?

N Y already participating too soon to tell DK

29. ...increased the likelihood that your organization will make investments in energy efficiency?

N Y already investing too soon to tell DK

30. Do you think your employee's Level II training has made your organization better prepared to reduce its electrical load should the state or your utility call for it?

N Y DK

Assessment of Marketing

31. How did you learn about the Level II BOC program? [check all that apply]

__Supervisor or co-worker 0
__Employee.....1
__Utility mailing or advertisement 2
__Utility representative.....3
__Utility seminar 4
__Colleague or friend 5
__Conference or trade-show.....6
__Professional or trade association / publication.....7
__Internet 8
__Mailing/Flyer/Advertisement.....9
__Other 10
__Don't know 98

32. [If Other:] Describe:

[open] _____

33. Did the information you saw informing you of the Level II course give you a good understanding of the course and its potential value to your employee?

N Y DK NA (not seen any materials)

34. [If N or DK:] How could the materials be changed to better convey the purpose and value of the course?

[open] _____

Professional Value of Training and Certification

35. Have you recommended or would you recommend the Building Operator Certificate program to any of your colleagues in your organization or in other organizations?

N Y DK

In the following questions, I'd like your thoughts on a few things about how the BOC is offered in California.

36. Would you say that your utility's level of involvement in the BOC appears to be about right, or do you think the program would be improved with more utility involvement, or less utility involvement?

__about right

__more involvement

__less involvement

__dk

37. [If "more involvement":] What involvement would you like to see?

[open] _____

38. Do you prefer that your utility offer the BOC, or would you prefer to see an educational or professional organization offer the BOC, or do you have no preference?

__utility

__educational or professional organization

__no preference

__dk

39. Is your satisfaction with your utility higher, lower, or unchanged based on its sponsorship of the BOC program?

__higher

__lower

__unchanged

__dk

40. Do you prefer a training program for building operators that is training only, or one that leads to certification, or do you have no preference?

__training only

__certification

__no preference

41. How important is it to you that the BOC certification program have an ongoing presence in California. Would you say it is...

__very important

__important

__not very important

__no opinion/ dk

42. Would you like to see employers come to expect their O&M staff to have BOC certification?

Y N DK

Future Demand for BOC

43. Do you have the authority to send staff to outside training or is that decision made by others?

N Y DK

a. [If N:] Do you have influence in training decisions?

N Y DK

44. Do you expect your organization to enroll any other staff at your facility in either the Level I or Level II course series

N Y DK

45. [If Y:] About how many in Level I?

[open] _____

46. [If Y:] About how many in Level II?

[open] _____

47. [If N or DK:] Why do you say that?

[open] _____

48. How long did your employee to travel to attend the BOC?

___ hours driving distance

49. Would you expect your facility would send more staff to the BOC if the training was offered a location nearer to you?

__more staff

__about the same

50. {If more staff:} Within what distance from your facility would the training need to be to attract more staff than would come to the location you where your employee trained?

__hours in driving time from your facility

51. If training were held within that distance from your facility, how many staff might attend the BOC?

_____ staff (for Level I and Level II in total)

52. Would you be willing to pay more for BOC training held close to your facility?

N Y DK

a. {If yes:} As you may recall, the cost of the six-course training is $1,095 per participant, and $795 for a second registrant or more from the same organization. What premium would you be willing to pay for a nearby course? (read down; stop when obtain a "yes"; check all subsequent amounts "yes")

__ $500

__ $400

__ $300

__ $200

__ $100

53. Assuming the BOC was offered nearby, which of the following class schedules would you prefer:

___weekly two-hour classes

___half-day classes twice a month

___full-day classes once a month (the current schedule)

___no preference

Responsibilities

54. Do you have building operations and maintenance responsibilities in addition to your supervisory responsibilities?

N Y dk

55. How many building operators do you supervise?

[open] _____

56. How many building operations and maintenance staff are at your facility:

____total O&M staff (including line and supervisory staff)

____supervisors

57. Does your facility have more than one building?

N Y DK

58. [If Y:] How many buildings are there?

[open] _____

59. Do you know, or could you estimate, the size of your facility (all buildings) in square feet?

60. _____square feet (use 99 for don't know)

61. Is your establishment a commercial enterprise or is it in the government or quasi-governmental sector?

Company Government Other DK

62. [If "other" or "DK", describe:] _____

63. What is the main business or activity performed at this location? (probe to code)

Office.....01
Retail (non-food).....02
College/University.....03
School.....04
Grocery Store.....05
Convenience Store.....06
Restaurant.....07
Health Care/Hospital.....08
Hotel/Motel/Lodging 09
Warehouse 10
Personal Service.....11
Community Service/Church/Temple/Municipality 12
Agricultural 17
Condo Association/ Apartment Management 18
Manufacturing/ Industrial:
Manufacturing/ Industrial Electronic & Machinery 13
Mfg/ Industrial Mining, Metals, Stone, Glass, Concrete.....14
Mfg/ Industrial Petroleum, Plastic, Rubber and Chemicals 15
Other Industrial (describe below) 16
.....
Other (describe below) 98
Don't know/Refused 99

64. [If other, specify:] _____

65. If we are conducting additional research on the BOC program next year, may we contact you again?

N Y DK

Thank you for your time

APPENDIX C:

INTERVIEW GUIDE FOR NONPARTICIPATING SUPERVISORS October 29, 2004

INT01

```
COMPANY <COMP                                                    >
Hello, This is _______________ with Gilmore Research Group.
May I speak with the manager or supervisor of your building operations and
maintenance staff?
I have the name <cont><TITLE>. If he/she is the supervisor or manager of building
operations and maintenance staff, I could talk with him/her?
                                          >
ONCE ON LINE: Hello, my name is__________ calling on behalf of PG&E, Edison, SDG&E,
and SoCal Gas. We are talking to managers of building operations and maintenance about
education and training for staff. This study is strictly for research purposes, we are
not trying to sell anything.
```

N=.....
Continue .....
{convenient times to call back}.....

Q1

About how many building operations and maintenance staff work at your facility in total, including both line and supervisory staff? (Definition of building operations and maintenance: staff responsible for the maintenance and operation of mechanical and electrical systems, such as air conditioning and lighting. If needed: Not staff primarily involved in janitorial, cleaning, landscaping, and grounds.)

N=.....
Don't know / Not sure / Refused 9999

If "none" or "one", thank and terminate

Q2

About how many of these staff are supervisors (including yourself)?
N=.....
Don't know / Not sure / Refused..... 999

Skip to Q4 if Q2=1 (respondent is the only supervisor), else ask Q3

Q3

How many building operations and maintenance staff are you directly responsible for?
N=.....
ZERO / NONE 0000
ONE..... 0001
etc .....
DON'T KNOW / REFUSED..... 9999

Verify talking with the right person. If no one (other than self), seek appropriate contact; if no one, thank and terminate.

Q4

Have you or any of your staff attended any outside training or education programs in the last three years?
N=.....
Yes..... 1
No 2
Dk/refused 9

Ask if Q4=1 (yes attended); else, skip to Q8

Q5

Have you or any of your staff received certification from training in any area of building operations and maintenance? (Do not read:)
N=.....
Yes..... 1
No 2
Don't know / Refused 9

Ask if Q5=1 (yes, got certification); else skip to Q8

Q6

What types of certification have you received? (do not read; open-ended; up to 5 responses; pre-codes follow; probe: anything else?)
N=.....
Building Operators Certification (BOC) 01
Operating Engineering certification 02
Certified Energy Manager 03
Certified Energy Procurement Professional 04
Certified Indoor Air Quality Professional 05
Certified Indoor Air Quality Technician 06
Certified Testing, Adjusting, Balancing Professional 07
Asbestos..... 08
Boilers 09
Building Owners and Managers Association (BOMA)..... 10
Building/Facilities Management..... 11
Electrical Certification/Electrician 12
Energy Audit 13
Energy Conservation 14
Energy Efficiency..... 15
Energy Maintenance/Management 16
EPA/Environment..... 17
Emergency response/CPR/First Aid..... 18
Equipment Operation (Crane/Forklift) 19
Fire Safety/Alarm/Response..... 20
Hazardous Waste/HAZMAT..... 21
HVAC..... 22
OSHA 23
Refrigeration..... 24
Other (specify)..... 97
Don't know / Refused 99

Ask if Q6=1 (Building Operators Certification), otherwise skip to Q8

Q7

Is your Building Operators Certification from your utility, who is offering the certification through the Northwest Energy Efficiency Council (NEEC), or is it from some other group?
N=.....
Utility / NEEC 1
OTHER / SPECIFY..... 8
Don't know / Refused..... 9

If Q7=1 (certification from utility/NEEC course), thank and terminate. Quota based on nonparticipants.

Q8

Have you heard of training in how to operate and maintain facilities to minimize energy use?
N=.....
Yes..... 1
No..... 2
Don't know / Refused..... 9

Q9

Do you have the authority to send staff to outside training?
Yes..... 1
No..... 2
Don't know..... 8
Refused..... 9

Ask if Q9=2 or 8 (no or don't know); else go to Q15

Q10

Do you have influence in training decisions?
N=.....
Yes..... 1
No..... 2
Maybe / Depends / Don't know..... 8
Refused..... 9

Ask if Q9 or 10=1 (yes, either make or influence); else go to Instructions for Q12

Q11

Will you have budget in 2005 to send staff for outside training?
N=.....
Yes..... 1
No..... 2
Don't know / Refused..... 9

Instructions for Q12: Ask if Q10=2 (no money for outside training); else skip to Q15

Q12

Do you think there will be money for outside training in the next few years?
N=.....
Yes..... 1
No 2
Don't know / Refused 9

If Q12=2 (no), dk, or ref go to Q27 (are you aware of BOC); else continue.

Q13-14 intentionally omitted

Q15

Beside money, what other barriers preclude sending some people in your group to training? (open; pre-codes given; don't limit responses to pre-codes; up to 6 responses; probe: anything else?)
N=.....
No other barriers..... 0
Language (English is a second language)..... 1
Reading/ literacy..... 2
Staff turnover/ staff not expected to stay..... 3
Time away from facility 4
Don't know / Refused 9

Q16

Between now and the end of 2005, do you plan to send yourself or any staff to any outside training or continuing education activities?
N=.....
Yes 1
No 2
Don't know /Refused 9

Ask if Q16=1 (yes plan on training); else skip to Q19B

Q17

Do you expect to provide your staff with more outside training in the coming year than in years past, about the same amount as before, or less training this year?
N=.....
More training this year than in the past 1
About the same 2
Less training this year than in the past 3
Don't know / Refused 9

Ask if Q17=1 (more this year); else skip to Q20

Q18

What's changed about your organization that it is planning for more outside training than previously? (open; check all that apply; pre-codes given; don't limit responses to pre-codes)
N=.....
Doing better financially 1
More staff/ more new hires/ more need for training 2
Policy encouraging training 3
New equipment, systems/ expanded facility 4
More interest in efficient operations/ saving money thru better operations 5
More concerned with energy use 6
More problems with facility, equipment 7
Don't know / Refused 9

Ask if Q17= 3 (less this year); else skip to Q20

Q19A

What's changed about your organization that you are planning for less outside training than previously? (open; check all that apply; pre-codes given; don't limit responses to pre-codes)
N=.....
Money is tighter/ spending caps or reduction 1
Limits on training 2
Fewer staff/ can't spare the staff 3
Staff more experienced now 4
Don't know / Refused 9

Ask if Q16=2,8,9 (not planning to train in 2005) AND Q4=1 (yes, have trained in past 3 years); else Q20

Q19B

What's changed about your organization that you are not planning for training in the coming year yet, according to your previous response, you've sent staff to training in the past three years?

N=.....
Money is tighter/ spending caps or reduction 1
Limits on training 2
Fewer staff/ can't spare the staff 3
Staff more experienced now 4
Don't know / Refused 9

Q20

How important do you consider certification in building operations and maintenance for your staff? Please rate importance using a scale of minus 2 to plus 2, where minus 2 means 'not at all important your staff', plus 2 means 'very important for your staff', or any number in-between.

N=.....
MINUS 2 - not at all important 1
MINUS 1 2
ZERO - Neutral 3
PLUS 1 4
PLUS 2 - very important 5
DON'T KNOW / REFUSED 9

Intro to Q21

```
Now I am going to read you a list of courses that might be offered for
building operations and maintenance staff. Please use the same scale to rate how
interested you might be in each of the following courses.
```

.....
CONTINUE..... 1

Q21

(How interested would you be in a course about...)
Energy Conservation Techniques
IF NEEDED: Would you rate your interest in this type of course for you or your operations or maintenance staff a minus 2, not at all interested, plus 2, very interested, or some number in between?
N=.....
MINUS 2 - not at all interested 1
MINUS 1 2
ZERO - Neutral 3
PLUS 1 4
PLUS 2 very interested in this 5
DON'T KNOW / REFUSED 9

Q22

(How interested would you be in a course about...)
HVAC Systems and Controls
IF NEEDED: Would you rate your interest in this type of course for you or your operations or maintenance staff a minus 2, not at all interested, plus 2, very interested, or some number in between?
N=.....
MINUS 2 - not at all interested 1
MINUS 1 2
ZERO - Neutral 3
PLUS 1 4
PLUS 2 very interested in this 5
DON'T KNOW / REFUSED 9

Q23

(How interested would you be in a course about...)
Regulatory Codes for Maintenance and Operations
IF NEEDED: Would you rate your interest in this type of course for you or your operations or maintenance staff a minus 2, not at all interested, plus 2, very interested, or some number in between?
N=.....
MINUS 2 - not at all interested 1
MINUS 1 2
ZERO - Neutral 3
PLUS 1 4
PLUS 2 very interested in this 5
DON'T KNOW / REFUSED 9

Q24

(How interested would you be in a course about...)
Indoor Air Quality
IF NEEDED: Would you rate your interest in this type of course for you or your operations or maintenance staff a minus 2, not at all interested, plus 2, very interested, or some number in between?
N=.....
MINUS 2 - not at all interested 1
MINUS 1 2
ZERO - Neutral 3
PLUS 1 4
PLUS 2 very interested in this 5
DON'T KNOW / REFUSED 9

Q25

(How interested would you be in a course about...)
Facility Electrical Systems
IF NEEDED: Would you rate your interest in this type of course for you or your operations or maintenance staff a minus 2, not at all interested, plus 2, very interested, or some number in between?
N=.....
MINUS 2 - not at all interested 1
MINUS 1 2
ZERO - Neutral 3
PLUS 1 4
PLUS 2 very interested in this 5
DON'T KNOW / REFUSED 9

Q26

(How interested would you be in a course about...)
Efficient Lighting
IF NEEDED: Would you rate your interest in this type of course for you or your operations or maintenance staff a minus 2, not at all interested, plus 2, very interested, or some number in between?
N=.....
MINUS 2 - not at all interested 1
MINUS 1 2
ZERO - Neutral 3
PLUS 1 4
PLUS 2 very interested in this 5
DON'T KNOW / REFUSED 9

Q27

Are you aware of the Building Operators Certification offered by your utility (if necessary: conducted by the Northwest Energy Efficiency Council (NEEC))?

N=.....
Yes..... 1
No..... 2
Don't know / Refused..... 3

Ask if Q27=1 (yes, aware); else, skip to Instructions for Q32

Q28

How did you hear about the Building Operators Certification?
(open-ended; do not read; record all that apply; prompt: Anything else?)

N=.....
Phone call from NEEC/ course sponsor..... 01
Mailing or emailing from NEEC/ course sponsor..... 02
Seminar by NEEC/ course sponsor..... 03
Utility (representative, seminar, personal contact)..... 04
Utility (email, mailing)..... 05
Other mailing, emailing, advertisement, or flyer..... 06
Boss or co-worker..... 07
Professional or trade association / publication..... 08
Conference or trade show..... 09
Friend or colleague..... 10
Internet..... 11
School/college..... 12
Other..... 97
Don't know / Refused..... 99

Instructions for Q29: If Q11 or 12 or 14 = 2 (no) or dk or ref, Go to Q39 (importance of energy efficiency); else continue.

Q29

Have you considered going yourself or sending any of your staff to earn building operators certification?

N=.....
Yes..... 1
No..... 2
Don't know / Refused..... 9

Ask if Q29=1 (yes, considered), else skip to Q31

Q30

Can you tell me some of the reasons you have not sent any staff to earn building operators certification?
(open-ended; do not read; up to 5 responses; pre-codes follow, but don't limit responses to pre-codes; probe: anything else?)
N=.....
No need for training 00
No money/budget 01
Subject matter not relevant 02
No gain/benefit to the company 03
Lack of time/staff availability 04
Bad location 05
Quality unknown or poor 06
Length of training (too long) 07
Didn't know enough about it to decide 08
Difficult to get approval 09
Don't know/ not sure / refused 99

Ask if Q29=2,8 (no, don't know), else skip to Intro to Q32

Q31

Why haven't you considered sending any staff to earn a building operators certification?
(open-ended; do not read; up to 5 responses; pre-codes follow, but don't limit responses to pre-codes; probe: anything else?)
N=.....
No need for training 00
No money/budget 01
Subject matter not relevant 02
No gain/benefit to the company 03
Lack of time/staff availability 04
Bad location 05
Quality unknown or poor 06
Length of training (too long) 07
Didn't know enough about it to decide 08
Difficult to get approval 09
.....
Don't know/ not sure / refused 99

Intro to Q32

Let me tell you a little more about the Building Operators Certification and Training program your utility is offering. Building Operator Certification (BOC) is a competency-based training and certification for building operators—offering improved job skills and more comfortable, efficient facilities. Operators earn certification by attending training and completing project assignments in their facilities. Training topics include facility electrical, HVAC and lighting systems, indoor air quality, environmental health and safety, and energy conservation.

PRESS ENTER TO CONTINUE @X20

N=.....
CONTINUE..... 1

Q32

Now that you've heard a little a little more about the training, would you consider going yourself or sending any of your staff to earn building operators certification?
N=.....
Yes 1
Maybe/depends..... 2
No 3
Don't know / Refused 9

Ask if Q32=yes, else skip to Q34

Q33

Including yourself, how many staff members do you think you might send?
N=.....
DON'T KNOW / REFUSED..... 999

Q34

How does the fact that YOUR UTILITY IS THE ONE offering the training affect your confidence in the value of the program? Does it{read}...
N=.....
Increase your confidence..... 1
Not change your confidence 2
Or decrease your confidence in the value of the program..... 3
Don't know / Refused 9

Ask if Q32=1 (yes, would send staff); else skip to Q36

Q35

Assuming an eight-hour building operator and certification training were offered nearby, which of the following three class schedules would you prefer:
N=.....
Four two-hour classes..... 1
Two half-day classes twice a month..... 2
Or one full-day classes once a month..... 3
No preference (do not read)..... 4
DON'T KNOW / REFUSED (do not read) 9

Q36

What is the maximum driving time (one-way) you consider reasonable for attending training? (open; pre-codes)
N=.....
30 minutes (half hour) or less..... 1
Between 30 and 60 minutes (half-hour and hour) 2
Between 60 and 90 minutes (hour and one-and-one-half hours)..... 3
Between 90 minutes and two hours..... 4
Over two hours 5
DON'T KNOW / REFUSED..... 9

Q37

Consider that a course you want your staff to attend were offered in two locations, one of which is at the maximum driving time you consider reasonable and the other is about half that distance. Would you be willing to pay a higher price for the closer course?
N=.....
Yes..... 1
No 2
DON'T KNOW / REFUSED..... 9

Q37A

The training program your utility currently offers consists of 6 full-day courses. The cost is $1,100, which is less than $200 per day. Does this price seem reasonable to you?
N=.....
Yes..... 1
No 2
Maybe/Depends..... 3
DON'T KNOW / REFUSED..... 9

Ask if Q37=1 and 37A=1

Q38

You said you might be willing to pay a premium for a nearby course. Would you be willing to pay an additional...

Q38A $500?
Yes 1
No 2
DON'T KNOW / REFUSED 9

If Q38A=1 (yes), skip to Q39; else continue
Q38B $400?
Yes 1
No 2
DON'T KNOW / REFUSED 9

If Q38B=1 (yes), skip to Q39; else continue
Q38C $300?
Yes 1
No 2
DON'T KNOW / REFUSED 9

If Q38C=1 (yes), skip to Q39; else continue
Q38D $200?
Yes 1
No 2
DON'T KNOW / REFUSED 9

Q39

Finally, I'd like to ask you a few questions about you and your organization only to group your answers with others. How long have you been in building operations and maintenance?

ENTER WHOLE YEARS
N= .....
Don't know/ REFUSED 99

.....

Q41

Are you a member of any other professional or trade associations that I have not mentioned?
CLARIFY FOR NAME IF INITIALS

Yes - Such as? (open-ended; pre-coded responses below; don't limit to precodes)
No, not a member to any others 00
AEE (Assoc. of Energy Engineers) 01
AFE (Assoc. for Facilities Engineering) 02
APPA (Assoc. of Physical Plant Administrators) 03
ASHE (American Society for Healthcare Engineering) 04
ASHRAE (American of Society of Heating, Refrig., and A/C Engineers) 05
IEE (Inspectors of Electrical Engineering) 06
IEEE (Inst of Electrical and Electronic Engineers) 07
IFHE (International Federation of Hospital Engineering) 08
IREM (Inst of Real Estate Management) 09
NFPA (National Fire Prevention Assoc.) 10
RSES (Refrigeration Service Engineer Society) 11
IFMA (International Assoc. of Facility Managers) 12
BOMA (Building Owners and Managers Assoc.) 13
CASBO (Calif Assoc of School Business Officials) 14
CSHE (Calif Society for Healthcare Engineering) 15
Other ..... 16 .....
Don't know / Not sure / Refused 98

Q41 A Other, specify: _____

Q42

Is your organization a private sector or public sector entity?
N= .....
Private 1
Public 2
Don't Know/ Refused 9

Q43

Comparing this year to a year or two earlier, has the priority for considering energy efficiency in operation and maintenance at your facility stayed the same, become more important, or become less important?
N= .....
Stayed the same 1
More important 2
Less important 3
Don't know/ Refused 9

Q44

What is the approximate square footage of the total CONDITIONED space of the facility where you work? {open. If necessary, probe: "Is it over 1 million SF?"}
N=.....
.....

Q45

What is the main business activity at this facility—for example non-food retail or commercial office use? (open-ended. Probe to code as specifically as possible; read if necessary)
N=.....
Commercial office 01
Government (federal, state, local, municipal) 02
Community Service/Church/Temple 03
Retail (non-food) 04
Health Care/Hospital 05
College/University 06
School 07
Warehouse 08
Grocery Store 09
Hotel/Motel/Lodging 10
Convenience Store 11
Restaurant 12
Personal Service 13
Agricultural 14
Condo Association/ Apartment Management 15
Manufacturing/Industrial (Codes follow) .....
Manufacturing/Industrial - Electronics & Equipment 16
Manufacturing/Industrial - Metals, Stone, Glass, Concrete, Mining 17
Manufacturing/Industrial – Chemicals, Petroleum, Plastic, Rubber 18
Other Industrial (describe) 19
Other (describe) 98
Don't know/Refused 99

GENDR

RECORD GENDER
N=.....
Male 1
Female 2

INT01

That's all my questions. If you would like a copy of the results of this survey they will be available in next spring on the website of the California Measurement Advisory Council (CALMAC.org). You would go to their "searchable database" and search on building operators certification. Thank you for your time and cooperation.
Completed Interview 1

APPENDIX D:

INTERVIEW GUIDE FOR BOC UTILITY MANAGERS – 2004

2004 Evaluation of the BOC

1. What are you most interested in learning from this evaluation?

Role of Utility Staff in Program

1. What is your role in the BOC? How long have you had this responsibility?

2. Did you take over responsibility from someone else who got the program started? {If yes:} Did that person pass on to you any concerns or questions about how the program was faring or the future of the program?

3. Have you attended any of the classes? [If yes:] How many? What has been your reaction to the instructor? To the course content?

4. Who from your utility interacts with the students? What are their roles? Are any of them there throughout the course, or just at the beginning of each class?

Delivery/Logistics

1. Do the students receive any information about other utility programs? [If yes:] Who presents the information? What type of information? Brochures and verbal presentation? When is the information given? Each class in the series or selected classes? When during the class? Is information about utility programs integrated into the course material in any way?

2. How are the sites working out? Do you have any plans for changing or adding sites?

3. How often do you plan to offer the Level I series? The Level II?

4. Do you have any plans to offer a Level III—i.e., the additional electives that NEEC has to offer?

Course Content/ Instructors/ Students

1. Have any modifications been made to the curriculum to meet your needs?

2. Are there any aspects of the curriculum that you are concerned about, or that you think may not be sufficiently tailored to your needs?

3. How do you think the students are responding to the Level I series? The Level II series?

4. Have the students provided any written feedback about the course? [If yes:] Has anyone at your utility had a chance to look over the feedback?

Marketing/ Strategy/ Demand

1. What does your utility do to inform potential students about the class? Who is involved in marketing? Do you promote the BOC using the same methods your utility uses for all of its training activities?

2. How well does BOC fit with your portfolio of commercial programs and training activities? In what ways do you think the BOC program complements your utility's activities? In what ways do you think the BOC program in California benefits from your utility's involvement?

3. How prominently does the marketing material present your utility as the one making the course available? Is there any controversy at your utility or expressed concerns about how closely the program should be linked to your utility? Do you think your utility should be more involved with the BOC program? If so, How?

4. How satisfied are you with the current marketing activities conducted by NEEC? Do you think any additional methods or approaches are needed?

5. What's your sense of how well the BOC program meets the needs of California commercial energy users? Of California building operators?

6. Do you have a sense of what types of business/industry students tend to come from? Public or private?

7. What do you think are the long-term prospects for the course in your service territory? [sense of market potential]

8. Do you have a long-term vision for the program?

Conclusion

1. Thus far, what has worked best about the program?

2. Have any problems surfaced? Do you have any concerns about the BOC program?

3. May I call you back if I have additional questions?

APPENDIX E:

INTERVIEW GUIDE FOR BOC STAFF (NEEC) – 2004

Background

1. What would you like to learn from this evaluation?

2. How many people from each utility have you worked with on the program since its launch? [continuity of program managers] In what ways have turnover in utility staff affected the program implementation?

3. Do you think the utilities' views on the program have changed since it was launched? Do you know of any current concerns the utilities have about offering the BOC?

Delivery/Logistics

1. Can you briefly describe the NEEC staff involved in offering the program in California and their roles?

2. How are the sites working out? Do you have any plans for changing or adding sites?

3. How do you decide when to offer a class? Does your contract specify how many series you will offer each year at each location, or does that vary with the market response? {If it varies:} Do you or the utilities decide how many to offer?

4. Do the students receive any information about other utility programs? [If yes:] Who presents the information? What type of information? (Brochures and verbal presentation?) When is the information given? (Each class in the series or selected classes? When during the class?) Is information about utility programs integrated into the course material in any way?

Marketing/ Strategy/ Demand

1. How do potential students learn about the class? Any other ways? Does the BOC marketing take advantage of or coordinate with the marketing the utilities do for their other training or efficiency activities?

2. Who is responsible for ensuring the class is filled?

3. How prominently does the marketing material present each utility as the one making the course available? Is there any controversy at any of the utilities or expressed concerns about how closely the program should be linked to them?

4. How satisfied are you with the current marketing activities? Do you think any additional methods are needed? Have the utilities expressed any concerns about marketing?

5. What issues do you see are affecting the market acceptance of the Level II BOC program in California? How about the Level I program?

6. Do you anticipate offering any Level III series (additional electives)?

Course Content/ Instructors/ Students

1. Who are the Level II instructors? What training have they had in BOC? Have any issues come up relating to the instructors?

2. Have any modifications been made to the Level II curriculum for California? Have the instructors offered any feedback on the curriculum? How is the topic of "demand response" being handled? Are there any aspects of the curriculum that you think (or the utilities have suggested) need to be changed?

3. Have you received any feedback on how the students are responding? Have the students provided any written feedback about the course? [If yes:] Has anyone at the utilities asked to look over the feedback?

4. What business/ industry types do the Level II students tend to come from? Public or private?

5. Have you seen any change in response to the BOC Level I since the program's inception? To what do you attribute the changes?

Conclusion

1. Thus far, what has worked best about the program?

2. Have any problems surfaced?

3. What is your vision for the program in California?

4. Do you have any concerns about offering and implementing the BOC program in California?

5. May I call you back if I have additional questions?

APPENDIX F:

INTERVIEW GUIDE FOR BOC LEVEL II INSTRUCTORS (NEEC) – 2004

Background

1. Which BOC courses do you teach? How many course series have you taught (distinguish between in California and in other locations)?

2. What background do you bring to teaching BOC?

Delivery/Logistics

1. How are the course sites working out? Are there any changes you would like to see?

2. Does anyone from the utilities interact with the students? What are their roles? Are any of them there throughout the course, or just at the beginning of each class? How does that work for you? Would you like greater or less involvement from the utilities, or is the current involvement about right? [If change desired:] What changes would you like to see?

3. Who are the site coordinators? What is their role? Is anyone else present during classes? How does that work for you? Are there any changes you would like to see?

4. Do the students receive any information about other utility programs? [If yes:] Who presents the information? What type of information? (Brochures and verbal presentation?) When is the information given? (Each class in the series or selected classes? When during the class?) Is information about utility programs integrated into the course material in any way?

Marketing/ Strategy/ Demand

1. Have you received any feedback from students that has led you to form an opinion about the long-term prospects for the course in California? [sense of market potential]

2. Do you see any issues affecting the future of the Level II BOC program in California?

3. How about the Level I program?

4. Do you anticipate offering any Level III series (additional electives)?

Course Content/ Students

1. Have any modifications been made to the curriculum for California? Do any need to be made? What feedback have the students given on the suitability of the curriculum to the buildings they work on?

2. How is the topic of "demand response" being handled? What is your sense of how well students understand the issue? What types of techniques do you teach that will help them to maximize their facilities' demand responsiveness? How well do they understand these techniques? How likely do you think it is that they will seek to increase their facilities' demand responsiveness?

3. Are there any aspects of the curriculum that you think (or the utilities have suggested) need to be changed? Have you given NEEC any feedback on the curriculum? [If yes:] What?

4. Have you received any feedback on how the students are responding? Have the students provided any written feedback about the course? [If yes:] Have you had a chance to look over the feedback?

5. What is your sense of how well students are suited to the class in terms of their prior experience/ knowledge? What is the background of the students taking the class? Are they typically line staff or supervisors? What business/ industry types do they tend to come from? Public or private?

Conclusion

1. Thus far, what has worked best about the program? Have any problems surfaced? Do you have any concerns about offering and implementing the BOC program in California?

2. What are you hoping to learn from the evaluation?

3. May I call you back if I have additional questions?

research/into/action inc

P.O. Box 12312, Portland, Oregon 97212

503 / 287-9136