# 2010-2012 WE&T PROCESS EVALUATION

# VOLUME I: CENTERGIES

## REPORT ID# PGE0317.01

Final

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# 1. EXECUTIVE SUMMARY

The WE&T Centergies Program is a $75.8 million dollar program that consists of eight energy Energy Centers (across PG&E, SCE, SCG and SDG&E service territories) and the statewide Builder Operator Certification program[1]. The Centergies program offers training and education to workers that serve commercial and residential customers with the goal of achieving energy savings and demand reduction in the state. Training and education is provided through displays, equipment testing, technical consultations, technology demonstrations, tool lending, and courses. Courses include classes, workshops, educational seminars, and interactive training exhibits. This evaluation primarily focused on the courses and workshops offered at the Energy Centers and set out to answer the following questions:

- **Strategic Alignment**: How is the WE&T program aligned with California's Strategic Plan and the WE&T Needs Assessment? And what should the utilities do now to ensure that they can meet the Strategic Plan's goals of this effort over the next 10 years?
- **Program Effectiveness**: Is the WE&T Centergies Program effective in terms of following learning principles and/or best-practice educational methods; meeting the needs of the target market; and covering the energy efficiency related topics desired?

This evaluation explored these research questions through multiple data collection and analytical approaches, including program staff interviews, secondary research, stakeholder interviews, sector representative interviews, a survey of over 500 course participants, and an instructional design assessment of course materials and course delivery methods.

Over the past three years, between 600-11,000 unique workers attended courses at each Energy Center. In addition, the Energy Centers offered between 30 and 300 unique courses depending on the center, as shown in the table below.

[1] Notably, only seven of the eight Energy Centers were covered in this process evaluation. San Diego's CCSE was excluded from this evaluation as they have moved their energy efficiency focused services to the San Diego Energy Innovation Center.

Table 1. Summary of Energy Center Attendance and Courses 2009-2011

| | PG&E | | | SCE | | SDG&E and SCG | |
|---|---|---|---|---|---|---|---|
| | PEC | ETC | FSTC | CTAC | AgTAC | ERC | SDEIC |
| Number of unique participants | 8,912 | 8,871 | 645 | 11,818 | 2,896 | 9,408 | 6,203 |
| Number of non-unique participants | 24,532 | 18,872 | 1,180 | 33,408 | 9,820 | 33,829 | 21,994 |
| Number of unique courses/seminars | 260 | 205 | 33 | 206 | 202 | 271 | 256 |

Based on participant survey results, the Energy Centers are primarily reaching professional white-collar workers, employed workers (83%), and those in high-level positions (55%) such as management and company owners. Almost half of participants hold a professional (architect/engineer/designer) or green worker/consultant position, while only 13% of respondents represent the trades sector.

## 1.1. Strategic Alignment

California's Long Term Energy Efficiency Strategic Plan was publicly released in 2008, and updated in January 2011, to "create a framework to make energy efficiency a way of life in California by refocusing ratepayer-funded energy efficiency programs on achieving long-term savings through structural changes in the way Californians use energy".[2] The Strategic Plan outlined a plan specifically for WE&T with a vision that "by 2020, California's workforce is training and fully engaged to provide the human capital necessary to achieve California's economic energy efficiency and demand-side management potential."[3] The Centergies Program should contribute to the WE&T vision by striving to achieve the two goals set for this sector:

1. Establish energy efficiency education and training at all levels of California's educational systems

[2] *California Long Term Energy Efficiency Strategic Plan,* January 2011 Update, Section 1, Page 1.

[3] *California Long Term Energy Efficiency Strategic Plan,* January 2011 Update, Section 9, Page 70.

2. Ensure that minority, low-income, and disadvantaged communities fully participate in training and education programs at all levels of the DSM and energy efficiency industry[4]

Following the initial Strategic Plan publication in 2008, the CPUC directed a Needs Assessment study published in 2010 to examine the energy education needs and gaps in the marketplace and how the Energy Centers might improve to address those needs. Notably, many of the Energy Centers have been offering courses and services to the workforce for a long time, some beginning in the 1980s. As such, the Energy Centers have focused on providing energy efficiency education to the market in a general sense with the goal of increasing knowledge of energy efficiency technologies and practices and contributing to energy savings for quite some time prior to the release of the Strategic Plan. The Strategic Plan and Needs Assessment presented some relatively new goals for the Energy Centers in 2011 such as contributing to workforce outcomes and partnering and developing sector strategies. As such, this is a case of long-established programs that are now asked to add a new focus to their ongoing efforts.

After interviewing key center staff, we found that:

- The Energy Centers see themselves as an educational resource that can fill energy efficiency education gaps in the marketplace
- The Energy Centers feel they are a trusted third-party that can advise the marketplace on emerging technologies and core technologies supported by IOU programs
- The Energy Centers are very familiar with the Strategic Plan and Needs Assessment and feel they are in a strategic position to help support it
    - The Energy Centers think that the Strategic Plan is a useful document that is helping them put more structure around their activities and, as a result, they are re-focusing their activities. For example, non-course and non-seminar services, such as partnerships and consultations, are now becoming a key part in their support of the Strategic Plan.

While the Energy Centers believe most Needs Assessment recommendations to better serve the market's training needs are appropriate, they cannot fulfill the suggestions entirely alone due to limited resources; they must partner and collaborate to take action, and these partnerships will take time to mature. In addition, the Energy Centers commonly expressed the need for clearer definitions of terms in the Needs Assessment recommendations to make them actionable. Details regarding the Energy Centers' response to each Needs Assessment recommendation are provided below.

Table 2. Needs Assessment Recommendation Response Summary

| | |
|---|---|
| *Support Sector-Strategies*: Initiate, help fund, and partner with other organizations to develop robust sector strategies in key energy efficiency | Many Energy Centers already have long-standing partnerships with sector-specific associations and organizations, which can be leveraged in developing sector strategies. The Energy Centers are currently developing sector strategies and have identified two large |

[4] Ibid

| | |
|---|---|
| sectors such as HVAC, building operations and maintenance, benchmarking, and other emerging areas (as well as LIEE or other programs undergoing review or redesign). | sectors, Trade and Professional, and 14 sub-sectors within these two sectors categories. The Energy Centers' progress toward sector strategies was outlined in the IOUs' joint supplemental filing with the CPUC[5]. |
| *Collaborations*: Expand collaborations between the Energy Training Energy Centers and building and construction trades associations. The emphasis should be on collaborations with high-road associations demonstrating commitment to investments in ongoing workforce training, such as participating in apprenticeship programs. | The Energy Centers see their collaborations with associations as one method to address many of the other Needs Assessment recommendations given their limited resources. Evaluation results indicate that Energy Centers already have partnerships with most high-road associations and they align with the associations of which most participants are members. How the Energy Centers expand these existing relationships will be considered in their forthcoming sector strategies. |
| *Curriculum Development or Updating:* Actively participate in the content development, review, and updating of curricula, and support instructor professional development for the main "home institutions" that train building and construction professionals and trades people, such as apprenticeship programs, community colleges, and four-year institutions. Energy Training Center staff should be encouraged to share their expertise as appropriate to ensure that curricula incorporate up-to-date information on new technologies and practices. | Energy Centers have been sharing expertise internally and externally on curricula for many years, such as: serving on the Laney College advisory board to advise on curricula; working with community colleges on weatherization and training courses and to complement their existing curriculum and increase exposure to energy efficiency; and working with hospitality degree programs at UC Davis, San Jose State, and San Francisco State. Energy Centers continue to look for opportunities to lend their expertise to more organizations and educational institutions. They are currently working with several schools to collaborate on curricula development, such as with Kendal College to start developing energy efficient and sustainability curriculum for culinary students. The SDEIC is also working with University of California San Diego (UCSD) by offering its students a nine-course sustainability certification. |
| *Inclusion of Disadvantaged Users:* Adopt as a goal for the Energy Training Energy Centers the inclusion of low-income, minority, and disadvantaged workers and job seekers. Develop and implement specific programs in collaboration with organizations that have a track record in this arena, emphasizing sector strategies that can lead to placement in good jobs with career ladders. | The Energy Centers continue to be challenged with how to respond to this recommendation. When discussed with the Energy Centers' staff, they emphasized that they do not exclude anyone from participating in their courses and instead focus on equality of access rather than recruiting disadvantaged or low-income participants. Energy Centers indicated that typically the only limiting factor to course participation, which has become more pronounced in the current economy with high unemployment, are course fees for some courses; however, most of the Energy Centers' courses are offered free of charge.<br><br>Energy Centers indicate that they are looking for more opportunities to collaborate and partner with organizations but that it is a challenge to identify partners to market to and target the low-income or disadvantaged population.<br><br>In addition, Energy Centers also indicated that there is a need for |

[5] SDGE Advice 2260-E-B/2041-G-B; SCG ADVICE 4249-B; SCE ADVICE 2588-E-B; PGE ADVICE 3212-G-B/3852-E-B; October 24, 2011; Additional Supplemental Joint Filing: 2010-2012 Statewide Workforce Education and Training (WE&T) Program Modifications based on Findings of WE&T Needs Assessment.

| | |
|---|---|
| | more commonly accepted definitions of low-income, minority, and disadvantaged in order to better serve these segments of the population and track goal achievement. |
| ***Evaluation of Workforce Outcomes:*** Assess and determine what additional information is required to evaluate workforce outcomes for the Energy Training Energy Centers. At a minimum, the Energy Training Energy Centers should begin to collect information from participants on occupation, prior education, and work experience and demographic characteristics. | The Energy Centers are challenged with collecting this information given participant reluctance and a lack of resources to collect and track this information. This evaluation helped to collect this information for past participants and is presented in this report. Currently, the Energy Centers are capturing participant names, contact information, company names and titles. While it may be challenging to collect this information in sign-up/sign-in sheets, the Energy Centers should consider adding a few questions to their exit surveys so they can start capturing this information. |
| ***Training Center Classes:*** Modify the structure of classes offered by the Energy Training Energy Centers to increase the number of course series that are longer in length than current typical classes, focus on a specific occupation, have a workplace-based hands-on component, and offer clear learning objectives that lead to certification. | Energy Centers currently offer some courses that align with this recommendation in that they are part of a series or directly lead to a certification or accreditation. The following table is a baseline of the proportion of courses currently offered by each center (or IOU) that are part of a series (12%-31% of courses offered) or lead to a certification (1%-23%).<br><br>Courses currently offered by Energy Centers that are part of a series and longer in length include three to five day basic and advanced building performance courses and three- and four-part workshops and modules on specific equipment and techniques. A variety of current course offerings at the Energy Centers also have workplace-based hands-on options such as one-on-one trainings at the participant's facility or training houses or units that provide students with the ability to see and touch installations and exhibits. Some current courses also have objectives that lead to certification or accreditation (such as LEED and NATE) or qualify for continuing education credits with sector-specific trade organizations.<br><br>Based on findings from the participant survey, it is clear that some of the courses currently incorporate workplace based hands-on components; however, the Energy Centers still have some room to improve in this area. Currently, most of the courses offer general energy efficiency information but do not necessarily have hands-on components that are useful in helping participants to develop workplace relevant skills. This topic is discussed more in the section below. |

## 1.2. PROGRAM EFFECTIVENESS

This evaluation found that the Energy Centers are effective in many levels. The Energy Centers are meeting participant and sector expectations well; filling a gap and need in the marketplace for energy efficiency education among existing workers, providing relevant information on new energy efficiency technologies, and contributing to some career advancement outcomes.

This evaluation found that there are some competing goals for the Energy Centers. Given the need of the individuals currently attending the Energy Centers, providing information on new technologies is the most important role that they serve. Most workers have been coming to the Energy Centers to primarily learn about new energy efficient technologies. Almost 80% of survey respondents indicated it was one of their reasons or goals for attending, while 34% of respondents indicated it was their main reason or goal. Overwhelmingly, participants felt the courses successfully met their expectations. Overall, 92% of respondents indicated that the course met their expectations or goals. Satisfaction with the courses offered at each center was relatively high overall. Instructor knowledge received some of the highest satisfaction ratings at each center.

While providing training that will produce workforce outcomes such as career advancement is part of the Strategic Plan's goals, it is only an explicit top priority for some participants coming to the Energy Centers (26% said they came to the center to advance their career within their current company, and 16% said they came to advance their career into a new company or industry). More than half of survey respondents indicated that the Energy Centers are the only place they go for energy efficiency classes, trainings, or other ongoing career education, an indication that the Energy Centers are filling a need in the marketplace and playing a valuable role by providing courses that disseminate information about new technologies. Sector Representatives interviewed also mentioned that the Energy Centers provide relevant and up-to-date energy efficiency education for their sectors and would not know where else to obtain higher-level energy efficiency education in CA. In addition, the large proportion of repeat students (74%) demonstrates value in what the center is providing and the use of the Energy Centers for ongoing education. Therefore, it is important that the Energy Centers continue to provide courses that offer broad-based information to the market as well as courses that focus on skill-development relevant to career advancement.

This evaluation found evidence that the courses are contributing to workforce outcomes such as career advancement for some participants. The majority of course participants (81%) perceive the Energy Centers as a resource that helps them to "do their current job better" or "advance their careers." When asked what specific career benefits participants experienced after taking courses, 83% of participants said they experienced some type of career benefit. The most common career benefits that participants experienced were (1) staying competitive in the marketplace (64%) and (2) delivering a higher level of service to customers (60%). Smaller proportions of participants experienced other desirable career benefits:

- 33% gained new customers
- 27% advanced careers within current companies; 19% advanced into a new industry

- 14% found a job or changed jobs
- 6% received a pay increase and 5% received a job promotion

Further, there is evidence that certifications obtained through the Energy Centers contributed to career advancement for some participants as well. One-quarter of survey respondents took a course at the center that was part of a certification track, of which 33% obtained certification (another 35% were still in the process of completing certification courses or taking the test at the time of the survey). Therefore, a total of 8% of overall survey respondents got certified with the help of the Energy Centers (and another 8% are in the process). Among those who obtained certification following course attendance, 45% have noticed an improvement in their career standing, such as more job opportunities available, increased credibility with customers being more confident in the services and recommendations they provide, and the ability to participate in and qualify for programs.

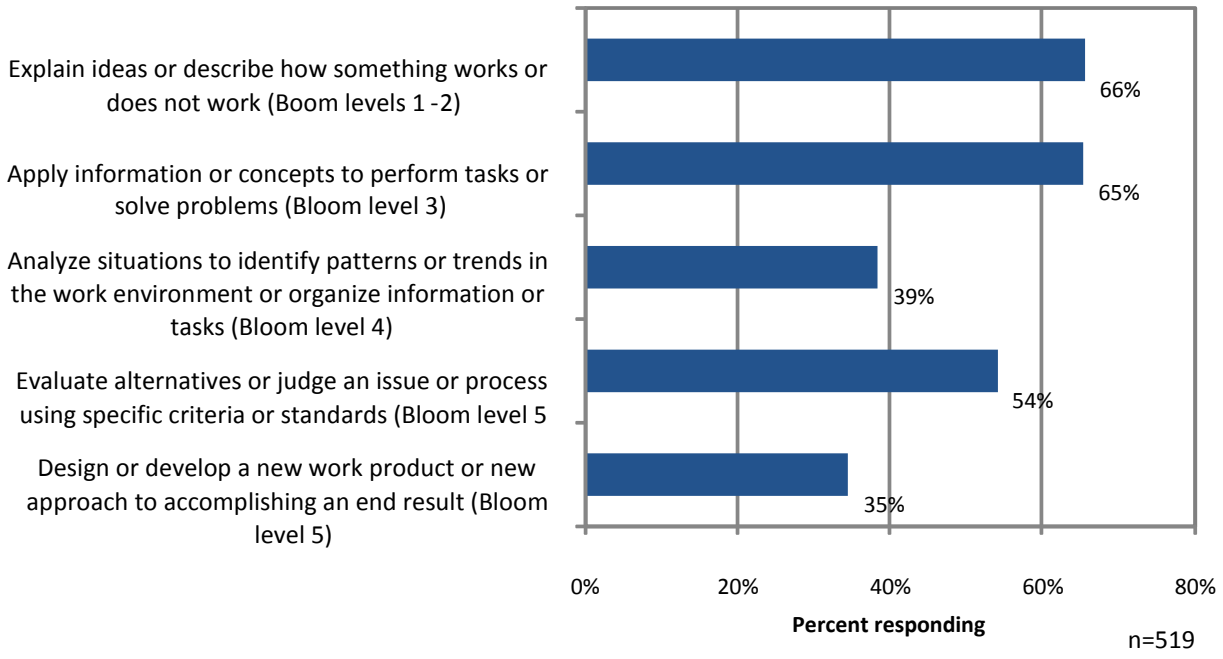
While the Energy Centers are strong in these areas, we found that there are still some areas of improvement as the Energy Centers continue to become a market resource for training workers on needed skills that will translate into desired behavior change in the workplace. Among the sample of courses included in the instructional design assessment, we found that the courses performed relatively poorly on dimensions of behavior change, with the PG&E courses doing somewhat better than the others.

- Per the directive of the CPUC-ED, we also analyzed whether the courses covered "soft skills" such as ways to sell energy efficiency. The courses we reviewed did not include this type of training; however, this is expected, since soft skills have been considered as part of the Energy Centers' charter. However, carefully targeted soft skills may be an appropriate addition to some of the courses offered at the Energy Centers. For example, training targeted to building operations personnel might appropriately include "how to sell your recommendations for energy efficient equipment to the decision makers."Notably, this evaluation covered a sample of courses. The Energy Centers claim that they do offer courses that include soft skill training but these courses were not included in our analysis.
- The area of integrated demand-side management (IDSM) is important in light of the California Strategic Plan. Sector Representatives also widely agreed that their sector needs more IDSM-focused training and that they would like to see the Energy Centers offer more courses that cover this topic. Ensuring that Energy Centers incorporate IDSM into their course offerings is a new directive for the Energy Centers. Therefore, it is unsurprising that our evaluation found that few courses cover this topic and that the Energy Centers should continue efforts to improve in this area.
- We explored whether courses were targeted to job/role responsibilities, supported relevant certification, and helped develop skills that are useful on the job. We found that most courses were well targeted to specific job/role responsibilities and clearly related the content and concepts addressed in the course to those responsibilities. Most of the courses also provided examples that reflected how the information addressed could be used on the job. In addition, the vast majority of the courses had a clear relationship to certification and several directly supported certification by coaching students on the specific content areas and types of questions that they would encounter on the relevant certification exam. One key criterion under Workforce Enablement where many courses did not perform well is that of skill development — having students apply the information presented to situations that parallel the types of things they need to do on the job.

We asked participants in an open-ended fashion, about how the course information helped them in their job, career, or business. Most respondents mentioned outcomes that were information oriented such as "offer more services and products," "better explain options to clients," or the courses "increased knowledge of new and emerging technologies," while few participants mentioned skill-related outcomes. Further, courses are helping train the workforce supporting energy efficiency programs in CA. More than 60% of participants indicated that the course(s) they took helped them understand a program or technology better so they could participate in an energy-related program and over half of participants indicated that their participation or attendance in the course(s) resulted in them, their employer, or their clients participating in an energy-related utility program. However, attendance at the trainings may have qualified workers to participate in programs but it does not guarantee that participants will have obtained the skills needed to provide customers with high-quality work that will pass the programs' quality control expectations.

The lack of skill-related outcomes can largely be attributed to the course delivery style of many courses. Currently, many courses offer general energy efficiency information but do not necessarily have hands-on components that are useful in helping participants to develop workplace relevant skills. Participants were asked about the type of learning experience they were given in the courses. While many participants indicated there was a high level of group feedback and interaction, half of them said they experienced hands-on in-class practice. The survey also explored whether participants believed they were able to accomplish different types of outcomes as a result of attending the courses. The five types of outcomes we asked about correspond to the six levels of Bloom's Taxonomy for the cognitive domain, grouping together the first two levels. In general, the lowest levels ("Explain ideas or describe how something does or does not work" are associated with increasing knowledge and awareness, which builds a foundation for higher-level outcomes. The higher levels are associated with using knowledge in a meaningful way, and correspond with the types of behaviors required on the job. Figure 1 shows that most respondents experienced the lower level of Bloom's taxonomy but fewer participants experienced the higher levels, which are more desirable outcomes for trainings that are geared toward helping workers develop job skills.

**Figure 1. What kinds of things are you able to do as a result of the course(s) you completed? (multiple response)**

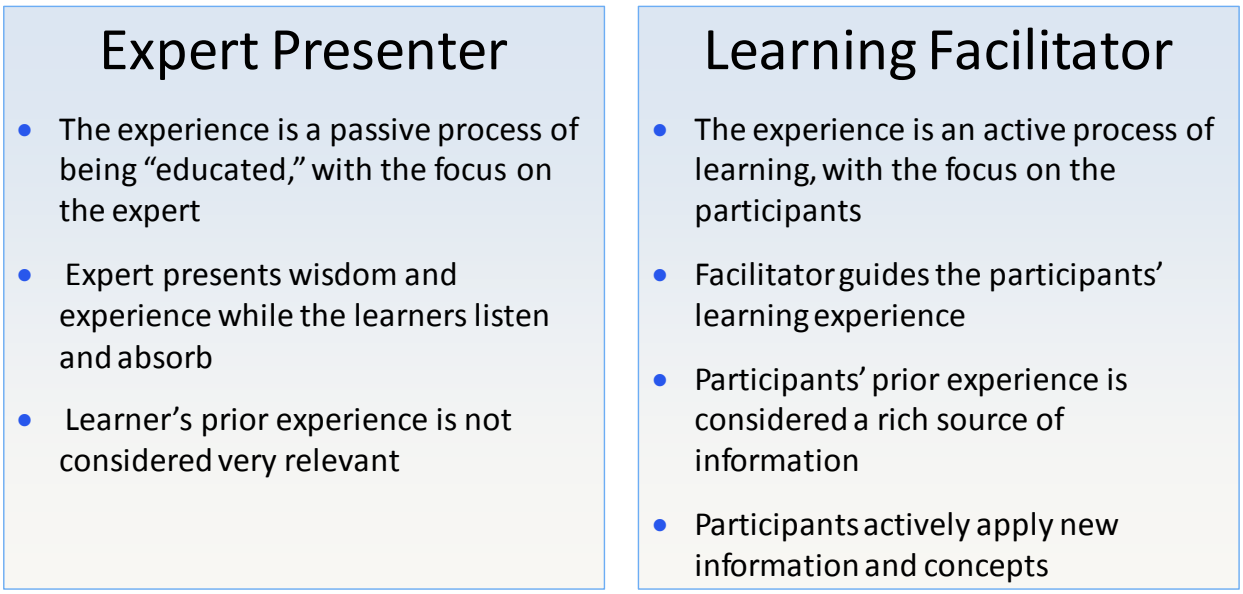



One way in which the Energy Centers can work toward delivering courses that contribute to skill development is to incorporate Adult Learning Principles (ALPs) into the teaching methods. The instructional design assessment explored the extent to which the Energy Centers are already incorporating ALPs. We found that the Energy Centers are all incorporating ALPs to some degree; however, there is room for improvement that will help the Energy Centers provide more meaningful and actionable training. While there is variability, in general, the courses that we reviewed scored lowest in:

- Establishing learning objectives that reflect what participants need to know and do on the job
- Relating course content to participants' roles and responsibilities
- Providing opportunities to apply information to perform tasks that parallel participants' on-the-job requirements

These low scores were often a result of the educational delivery method used for many courses. Many of the courses are delivered following the Expert-Presenter method instead of the Learning Facilitator method. The Expert-Presenter method tends to be good for creating awareness while the Learning-Facilitator method is more effective for facilitating behavior change. Figure 2 summarizes these two methods.

Figure 2. Educational Delivery Method Summary




The participant survey and the Sector Representative explored areas of improvement from their perspective. Most participants and Sector Representatives said that the Energy Centers were offering good trainings already and did not have many suggestions for improvement. However, some did offer suggestions for improvements that were consistent with the Needs Assessment and past center evaluation findings. Suggestions for improvement included:

- Offering more hands-on training and in some cases on-location training (training at a project or customer site). On-location training was specifically important to the HVAC and Building Maintenance/Management sectors. For example, HVAC Sector Representatives mentioned they want more hands-on training, particularly in regards to installation and maintenance techniques and other details that workers can only learn from on-location training, not from reading a book or in-classroom training.
- Offering more flexible course delivery options to reduce geographic and time barriers to participation such as offering more evening and weekend classes and more online courses.
- Incorporating more IDSM content into course content.

There was also significant interest in new course offerings. Many participants were interested in courses in building science, an integrated approach to building systems and sustainable building. There was also significant interest in new course offerings related specifically to the food service sector such as codes and standards, sub-metering, and solar (see Table 25. Interest in New Class Concepts by Center). Interestingly, when we asked Sector Representatives for suggestions on additional training topics that would be useful for their sectors, many of them mentioned training topics that the Energy Centers already offer (see Table 24. Suggestions for Additional Training Support). Therefore, their suggestions may indicate that they need better communication from the Energy Centers to increase their awareness of the training topics offered.

## 1.3. RECOMMENDATIONS

Based on the evaluation findings presented in this report, we recommend the following to increase strategic plan alignment and program implementation effectiveness:

- **Make course information easily transferable to others to extend reach**: Most supervisors and people in a position to share information said courses provided information that was easy to share with their employees/clients. However, some additional materials or improvements to existing materials to help ensure this sharing of information is encouraged. The Energy Centers should consider making course materials available online/electronically (i.e., PowerPoint files), developing more actionable handouts such as step-by-step guides that can be referenced on the job, providing more visual materials (i.e., photos, diagrams), and/or providing additional references/links/resources to supplement coursework. Notably, many of the courses offered at the Energy Centers are design and delivered by industry experts or third-parties, therefore the Energy Centers may only be able to act upon this recommendation for some of the courses.

- **Consider additional course topics and continue to increase IDSM content in all courses where possible**: We suggest that the Energy Centers review the participant and Sector Representatives' suggestions for additional training support (see Table 24 and Table 25) against current offerings and determine whether new courses are needed. If the Energy Centers already offer courses that cover these topics, they should focus on increasing the awareness of these courses in the marketplace. In addition, Sector Representatives indicated that they need more IDSM training and the Energy Centers should continue efforts to increase IDSM content as they continue to develop sector strategies and improve course content. Notably, the recommendations from sector representatives support the sector strategy approach that the IOUs are currently implementing. In the next program cycle, training and certification activities associated with other IOU-funded programs are being further incorporated into Energy Center offerings to support workforce development in these sectors

- **Consider alternate delivery methods for courses mostly focused on information dissemination**: The Internet can be a very effective tool for courses primarily focused on sharing knowledge and not necessarily training on specific job-related skills. An upfront investment in Internet courses (i.e., podcasts, webinars, expert videos, and simple web-based self-studies) could save money and resources in the future while also extending the reach of the Energy Centers by addressing geographic and time barriers to participation.

- **Consider incorporating more Adult Learning Principles and following the Learner-Facilitator method for course delivery**: Incorporating more ALPs and following the Learner-Facilitator model will help the Energy Centers facilitate more skill development, increase the likelihood of behavior change on the job, and help address the need for more hands-on training. Specifically, the Energy Centers should focus limited resources on developing a few courses that target the main skill training needed for specific sectors or job roles. These courses should be geared to developing the skills needed on the job. These courses should:

  - Build from performance objectives based on roles and responsibilities
  - Emphasize "hands-on" practice of skills and application of knowledge
  - Include ample examples based on "real world" scenarios
  - Provide job aids to support performance after class (summary guidance to help analyze options, troubleshoot, assess status, perform a procedure, evaluate quality, etc.)

- **Readdress the Centergies Logic Model and Program Theory**: Since the Strategic Plan and Needs Assessment have asked the Energy Centers to re-focus their activities and goals, the Energy Centers should revisit the program objectives and theory by showing how their efforts lead to "a better trained workforce" or "advancement in the workplace." The theory should also capture the new sector strategies component in terms of activities and outcomes and possibly the re-focus of activities outside of courses that provide support to external educational and disadvantaged-focused organizations.

# 2. PURPOSE OF THE STUDY

Over the 2010-2012 program cycle, the California Investor-Owned Utilities (PG&E, SCE, SCG, and SDG&E) are implementing the Workforce Education & Training (WE&T) Centergies Program. The focus of this process evaluation was to assess the alignment of the program with California's Energy Efficiency Strategic Plan and the implementation effectiveness of the Program.[6] While the Energy Centers offered many services, this evaluation was mostly limited to select courses and workshops offered at the Energy Centers.

The state of California has determined that there is a need to educate California's existing and incumbent workforce to meet the state's long-term energy savings goals. Two key documents guide the alignment of the utilities' WE&T program with the state's need:

- **California's Energy Efficiency Strategic Plan** (Strategic Plan): Established that there was a need for workforce education and training to meet the long-term goals of the plan
- **California's Workforce Education and Training Needs Assessment Report** (Needs Assessment): Provided an inventory of workforce education and training programs across the state, identified collaborative opportunities, and laid out recommendations for the utility workforce education and training efforts

Our evaluation therefore set out to answer the following questions:

- **Strategic Alignment**: How is the WE&T program aligned with California's Strategic Plan and the WE&T Needs Assessment? And what should the utilities do now to ensure that they can meet the Strategic Plan's goals of this effort over the next 10 years?
- **Program Effectiveness**: Is the WE&T Centergies Program effective in terms of following learning principles and/or best-practice educational methods, meeting the needs of the target market, and covering the energy efficiency related topics desired?

The evaluation team was tasked with providing recommendations and support to complement the foundational efforts that have been laid by the utilities. The team enhanced the utilities' response to the Strategic Plan by documenting how the Centergies course offerings align with the Strategic Plan, where the gaps lie, and what changes should be made to the WE&T program to help reach the long-term goals.

[6] California Public Utilities Commission. (2011). *California Long Term Energy Efficiency Strategic Plan.* San Francisco.

# 3. Study Methods

## 3.1. Materials and Database Review

The first step of the Centergies process evaluation was to build the foundation that guided our evaluation efforts. To best understand the market and market needs as well as the Energy Centers' role in the market, we reviewed the following:

- The Strategic Plan
- The Needs Assessment
- Center-specific utility Advice Letters (May 2011 and October 2011)
- Program implementation plans, program theory/logic models
- Past evaluation reports

## 3.2. CPUC-ED, Center Directors and Key Utility Staff, and Stakeholder Interviews

We completed interviews with key individuals from the Energy Division, the IOUs, and stakeholders to develop a picture of how the individual Energy Centers and the BOC are addressing the goals of the Strategic Plan, and fulfilling the needs identified by the Needs Assessment.

Table 3. Program and Stakeholder Interviews

| Interviews | Respondents |
|---|---|
| 20 in-depth interviews with program and CPUC staff | ➢ Centergies program staff<br>➢ Key Utility Staff |
| 5 in-depth interviews with stakeholders/task force members | ➢ Lawrence Berkeley<br>➢ Merritt College<br>➢ UC Davis<br>➢ Infrastructure Academy<br>➢ South Bay Workforce Investment Board |

Throughout these interviews, we:

- Discussed what changes are necessary to meet the needs identified in the Needs Assessment (i.e., exploring both what changes have been made and what is planned)
- Explored the effectiveness of various program components
- Discussed partnerships and the tracking of partnerships

- Explored how adult learning principles are used/applied at each center
- Determined whether past recommendations were addressed and how they were addressed (mainly for the BOC program)

### 3.2.1 Centergies Participant Surveys

As part of the evaluation effort, we conducted an online survey of program participants. The survey covered topics such as:

- Who the Energy Centers are currently serving
- Are Energy Centers training and educating the workforce (not just individuals; i.e., did attendees share information, did the center provide information that is easily transferable)
- Career benefits or advancement participants gained following center attendance
- Course design and delivery
- Attendee skill development
- Whether center offerings meet expectations and needs of participants
- Perception of the Energy Centers as places to go to help with career advancement
- What the Energy Centers can do to better support the workforce

We fielded the web survey by email notification from February 7 through February 27, 2012, screening participants to ensure that they had attended at least one course at one of the seven Energy Centers between 2009 and 2011. The final number of survey respondents was 519, with a response rate of 4.3%[7].

We created the survey sample from individual participant lists provided by each of the Energy Centers in January 2012 (total of 143,635 records in the seven lists combined). Opinion Dynamics consolidated any duplicate names (participants who attended more than one course or center) into a single record, creating a flag for each center attended in order to account for the 25% of participants who attended more than one center between 2009 and 2011, resulting in a population of 48,753 participants. Of these participants, Opinion Dynamics removed 18,063 participants who did not provide email addresses or did not attend a WE&T course or event[8], and IOU and CPUC government attendees (based on their email domain name), resulting in a population of 30,690 participants.

We divided participants into seven quota groups based on which center or Energy Centers they attended, to ensure that the final group of respondents would sufficiently represent each of the Energy Centers. Of the total participants, we sent 13,956 email survey invitations to a random sample of participants at each of the Energy Centers, with the

[7] American Association for Public Opinion Research (AAPOR) Response Rate 4.

[8] Removed participants of courses that are residential or simply educational in nature and not considered WE&T-specific courses.

exception of the Food Service Training Center and AgTAC, where we sent emails to all participants due to the small number of participants available.

A total of 1,725 emails sent bounced back due to incorrect or inactive email accounts.

Table 4 shows the overall populations, survey samples, and final survey respondents.

**Table 4. Summary of Center Population and Sample Frame**

| Center | Population from Center Databases* | Final Population** | Survey Sample | Final Survey Responses | Precision at 90% Confidence Interval |
|---|---|---|---|---|---|
| PEC | 8,912 | 7,897 | 1,500 | 156 | 6.5% |
| ETC | 8,871 | 7,265 | 1,500 | 111 | 7.8% |
| FSTC | 645 | 574 | 574 | 50 | 11.2% |
| CTAC | 11,818 | 6,123 | 1,500 | 113 | 7.7% |
| AgTAC | 2,896 | 1,587 | 1,582 | 71 | 9.6% |
| ERC | 9,408 | 6,554 | 3,000*** | 91 | 8.6% |
| SDEIC | 6,203 | 4,766 | 4,300*** | 87 | 8.8% |
| Total | 48,753 | 30,690 | 13,956 | 519 | 3.6% |

* Duplicate attendees were removed from the population.
**IOU and CPUC employees were removed from the final population.
*** Energy Resource Center and Energy Innovation Center participants were oversampled due to low response rates (additional email invitations were sent to these two Energy Centers on February 24).

We also applied weights to the resulting survey data to match the composition of the population by IOU(s) and center(s) attended. To calculate the overall weight for statewide analysis, we calculated an IOU weight and center weight based on the IOU(s) and center(s) attendance among the original population.

The center weights were generated based on a post-stratification scheme that divided respondents and the population into exhaustive and mutually exclusive groups. In other words, when a participant attended both PEC and FSTC, they were assigned to a group that attended both of those Energy Centers. For PG&E, there were seven attendance groups, and there were three each for SCE and both SDG&E and SCG. These mutually exclusive groups were the basis of calculating expansion weights. Specifically, we divided the proportion of the population in a group by the sample in the same group. We followed a similar procedure for creating the IOU weights.

Overall weights were calculated, and these were the product of the center and IOU weights. All statewide results presented throughout this report are weighted by the overall weight, IOU-specific results are weighted by center weights, while any results presented by individual center are not weighted.

Center Weight = sum (PG&E Weight, SCE Weight, SDG&E and SCG Weight)

Overall Weight = IOU Weight * Center Weight

**Table 5. Survey Data IOU Weight Factors**

| Participant Type by IOU | Participant Population | Un-weighted Survey | Weight |
|---|---|---|---|
| PG&E Only | 41% | 36% | 1.14 |
| PG&E and SCE | 2% | 2% | 0.88 |
| PG&E, SDG&E, and SCG | <1% | --* | -- |
| SCE Only | 20% | 30% | 0.68 |
| SCE, SDG&E, and SCG | 3% | 2% | 1.21 |
| SDG&E and SCG Only | 34% | 29% | 1.15 |
| PG&E, SCE, SDG&E, and SCG | <1% | <1% | 0.51 |

*There were no "PG&E and SDG&E/ SCG" survey respondents

**Table 6. Survey Data Center Weight Factors**

| | Participant Type by Center | Participant Population | Un-weighted Survey | Weight |
|---|---|---|---|---|
| PG&E Weight | FSTC Only | 3% | 12% | 0.24 |
| | FSTC and PEC | <1% | 5% | 0.12 |
| | FSTC and ETC | <1% | --* | -- |
| | ETC Only | 38% | 19% | 1.97 |
| | PEC Only | 42% | 34% | 1.24 |
| | PEC and ETC | 16% | 25% | 0.64 |
| | FSTC, PEC, and ETC | <1% | 5% | 0.13 |
| SCE Weight | AgTAC Only | 20% | 38% | 0.53 |
| | CTAC Only | 80% | 61% | 1.31 |
| | AgTAC and CTAC | <1% | 1% | 0.22 |
| SDG&E and SCG Weight | ERC Only | 40% | 45% | 0.88 |
| | SDEIC Only | 58% | 47% | 1.22 |
| | ERC and SDEIC | 2% | 7% | 0.29 |

*There were no "FSTC and ETC" survey respondents

### 3.2.2 Sector Interviews

The evaluation team identified and focused on five key sectors to help in obtaining valuable and detailed information in each of the sectors, provide a picture of the market, and enhance the analysis of the Strategic Plan and the Needs Assessment. The key sectors identified are:

1. HVAC
2. Lighting/Day-Lighting and electrical
3. Building Management and Maintenance
4. Codes and Standards enforcement agencies
5. Architecture, Engineering and Design

Within each sector, we conducted in-depth interviews with sector-specific association leaders that are familiar with the Energy Centers and the training needs within that sector. The interviews focused on perceptions of a "green market" and potential green specializations within the five sectors, perceptions of the training offered, potential needs of the sectors, other sources for similar training, preferred channels for communication regarding training opportunities, and preferred course formats. The interviews further investigate the energy needs of each sector and identify gaps in terms of market needs versus program offering/training opportunities that could be met by the energy Energy Centers.[9]

The Energy Centers' program staff provided the evaluation team with the names of individuals and organizations that have partnered/collaborated with the Energy Centers, are familiar with the Energy Centers, and have interacted with the program staff for training purposes. This helped formulate the sampling frame for the interviews. We began with these initial contacts and screened for whether the individuals were familiar with the training needs of their organization's members and the center's course offerings. We then implemented a snowball sampling approach to help identify other potential people to interview for this task. The table below shows the number of individuals interviewed and the organization represented within the five sectors.

[9] Please see Appendix A for the in-depth interview guide.

Table 7. Interview Results

| Sector | Sub-Sector | Number of Individuals Interviewed | Organizations Represented |
|---|---|---|---|
| Trade | HVAC | 2 | ➢ Air Conditioning Contractors of America<br>➢ Institute of Heating and Air Conditioning Industries<br>➢ North American Technicians Excellence |
| | Lighting/Day Lighting and electrical | 4 | ➢ California Advanced Lighting Controls Training Program<br>➢ International Brotherhood of Electrical Workers<br>➢ National Electrical Contractors Association<br>➢ National Council on Qualification for the Lighting Professions |
| | Building Management and Maintenance | 4 | ➢ Building Owners and Managers Association<br>➢ California Energy Commission<br>➢ American Society of Heating, Refrigeration and Air Conditioning Engineers |
| Professional | Codes and Standards enforcement agencies | 2 | ➢ California Energy Commission<br>➢ International Code Council |
| | Architecture, Engineering and Design | 6 | ➢ American Institute of Architects<br>➢ Association of Energy Engineers<br>➢ Illuminating Engineering Society<br>➢ US Green Building Council<br>➢ The Lighting Collaborative Inc. |

### 3.2.3 Instructional Design Assessment

The major activities that composed the instructional design assessment were:

- Develop “yardsticks” in collaboration with the IOUs and CPUC-ED
- Identify courses with characteristics associated with workforce enablement
- Conduct in-depth review of materials and in-person audits for a sample of courses

- Synthesize findings

The following provides additional information on each of these steps.

## Develop Yardsticks

The first step in the instructional design assessment was to establish the specific evaluation criteria that the instructional design (ID) team would use to evaluate the courses selected for in-depth review.

During the SCE PY 2006–08 Energy Center Process Evaluation, the evaluation team established two sets of evaluation criteria specific to training offered by the energy Energy Centers: one focused on adult learning principles and practices, the other focused on alignment with program goals and objectives. During the SCE PY 2006–2008 ETO process evaluation, which included an assessment of the BOC program, the evaluation team consolidated the two sets of criteria into a single instrument that we referred to as a course evaluation "yardstick." We used that yardstick as a starting point for three yardsticks used in the WE&T Process evaluation:

- Support of Behavior Change
- Adult Learning Principles and Practices
- Learning Focus

During Phase One of the process evaluation, we augmented and refined the 2006–2008 criteria to reflect the specific needs and focus of the WE&T Centergies program. For example, we added criteria specific to role-based training geared to workforce enablement, criteria specific to helping prepare participants to meet certification requirements, and criteria and data points specific to IDSM. Based on feedback from CPUC ED, we also added data points to the Learning Focus yardstick related to "soft skills" and "remedial" training.

See Appendix E: *Yardsticks Used in ID Assessment* for more information on the yardsticks and the criteria they include.

## Identify Courses with Characteristics Associated with Workforce Enablement

To identify courses appropriate to the instructional design review, we requested databases of center events held in 2010–2011. In general, an "event" is an instance of a course; that is, a course held on a specific date and location is an event.[10] Most courses were represented by multiple events; that is, most courses were held multiple times over the two-year period under consideration.

To obtain the pool of courses from which we drew a random sample, we asked the Energy Centers to rate the courses on several metrics associated with workforce enablement. Table 8 summarizes the metrics and related characteristics used to identify the courses included

[10] There are a few exceptions, such as an "Earth Day" fair and similar event non-course events; these non-course events were eliminated from consideration for the instructional design review.

in the pool. For more information about these metrics and characteristics, see "Appendix F: Course Selection Criteria.

Table 8. Characteristics of Courses Targeted for the Instructional Design Review

| Metric | Characteristic |
|---|---|
| **Core Job Responsibility Focus** | Medium to High |
| **Certification** | Direct Support or Clear Relationship |
| **Adult Learning** | Medium to High |
| **Frequency** | Offered at least once per year |
| **Skill Development** | **Apply level or higher** |

Only courses that met the specified criteria were included in the pool from which the sample was drawn. We also filtered out courses that were identified as part of the BPI or HVAC QI programs, since courses under these programs were addressed in separate process evaluations.

- All courses identified for the review of materials were randomly drawn from the pool of courses marked as aligned with workforce enablement, based on input from the Energy Centers.
- Due to scheduling constraints, some courses included in the in-person audits were not members of the pool of courses marked as aligned with workforce enablement. (Some Energy Centers did not offer courses that were members of the pool during the time in which the in-person audits needed to be conducted.)
- All courses for which we conducted in-person audits also received an in-depth review of materials.

The final sample size was determined by the budget allocations for this evaluation project. Table 9 summarizes the number of events and courses in the database, the number of courses in the pool of courses identified as high in characteristics associated with workforce enablement, and the number of courses included in review of materials and in person audits.

Table 9. Number of Courses in Databases, Pools, and Samples

| Database Elements | PEC | ETC | FSTC | CTAC | AgTAC | ERC | SDEIC | Total |
|---|---|---|---|---|---|---|---|---|
| Number of events in database | 438 | 505 | na | 317 | 314 | 235 | 158 | 1,967 |
| Number of courses in database | 147 | 107 | na | 147 | 164 | 137 | 126 | 828 |
| Number of courses in pool [11] | 63 | 14 | na | 46 | 37 | 39 | 75 | 247 |
| Number of courses in sample for review of materials only | 10 | 9 | na | 9 | 10 | 5 | 4 | 49 |
| Number of courses identified for in-person audits [12] | 2 | 4 | na | 5 | 1 | 1 | 2 | 16 |
| **Total number of courses reviewed** | **12** | **13** | **2** | **14** | **11** | **6** | **6** | **67** |

## Review Materials, Conduct In-person Audits, and Synthesize Findings

For most (49 of 65) of the courses included in the instructional design review, we conducted only a review of the training materials (slides, handouts, lesson plan, instructor notes — whatever course-related materials were available).

For some courses (16 of 65), we also conducted an in-person audit of a session (one of the course "events"), as well as a review of the materials. In-person audits provide information about a course that is unavailable through a review of materials alone. (For example, instructors often add examples and "stories" that help bridge between theory and the "real world," but these examples seldom are documented in course materials. As another example, criteria specific to how an instructor manages the learning environment can be evaluated only when observing the instructor in action.) However, it was cost- and time-prohibitive to conduct in-person audits for more than 16 courses.

All evaluations (materials reviews and in-person audits) were conducted by two senior instructional design professionals who independently rated the courses on the criteria specified in the yardsticks. (See Appendix E: Yardsticks Used in ID Assessment for details.)

Before beginning the material reviews and audits, the raters were oriented to the yardstick criteria and participated in a normalization process. (That is, they rated "sample" material

[11] The number of courses in the pool is smaller than the number of courses that meet the criteria for courses that correlate to workforce enablement [indicated in *Table 16. Population of Courses Geared Toward Workforce Enablement (Center Self-Report)*] because of the filtering for courses that are part of the BPI and HVAC QI programs.

[12] This table reflects the courses for which we actually conducted in-person audits. The original target numbers for PG&E and SCE were evenly divided between the IOUs' Energy Centers. (That is, we targeted 3 in-person audits for PEC, 3 for P-ETC, 3 for Irwindale, and 3 for Tulare.) However, scheduling constraints dictated that we adjust our original plan, resulting in an uneven distribution of audits among the IOU's Energy Centers.

and all raters' results were compared. When different raters had different results for a given criterion, the reasons behind the differences were explored and resolved, serving as a basis for agreeing on how to consistently rate that criterion in the future.)

After the evaluations were conducted, results were synthesized into a single rating for each criterion and an overall rating for each dimension (set of related criteria in a yardstick).

- When there were differences in scoring between raters, the lead instructional design consultant resolved the inconsistency with input from the raters.
- When both a materials review and an in-person audit were conducted for a course, the ratings were recorded separately in the yardstick database, and were averaged to obtain a final "score" for each criterion.
    - Criteria that could not be evaluated based on a review of materials (for example, the criteria under the "Learning Facilitation and Feedback" dimension) were scored as "na" in the "review of materials" section, and scored as indicated by the raters in the in-person audit section.
    - Both methods (material review and in-person audits) resulted in very similar ratings across the relevant dimensions and criteria for courses that were included in the in-person audits.

      This is often not the case: In some evaluations, we have seen exceptionally sound training materials delivered in a manner that was totally inconsistent with the design intent and contrary to effective training. In other evaluations, we have seen materials that rated poorly on the evaluation criteria informally augmented by the instructor, resulting in much higher ratings for the in-person audit than for the review of materials.
    - Because there was marked consistency between the two evaluation methods, we have not distinguished between the findings from the review of materials and in-person audits.
- The ratings reported in this document are the average (mean) of the ratings for all the courses reviewed for both evaluation methods (materials review and in-person audit) for each center.
    - Scores for each criterion for each center's courses were averaged to obtain an overall score on that criterion for all the courses considered for each center.
    - Scores for all criteria under a dimension for all relevant courses were averaged to obtain an overall score on that dimension for all courses considered for each center.
    - Scores for each course individually are maintained in the yardstick database and are available upon request.

# 4. DETAILED FINDINGS

## 4.1. INTRODUCTION TO THE CENTERGIES PROGRAM

The WE&T Centergies Program is a $75.8 million dollar program that consists of eight energy Energy Centers (across PG&E, SCE, SCG and SDG&E service territories) and the statewide Builder Operator Certification program. Notably, while the program consists of eight Energy Centers, only seven were included in this process evaluation. The training and education is targeted primarily to workers that serve commercial and residential customers and is "generally organized around market sectors and cross-cutting segments to facilitate workforce education and training appropriate to achieve the energy savings, demand reduction, and related energy initiatives required of the IOUs"[13]. The Energy Centers offer displays, equipment testing and technical consultations, and technology demonstrations on energy efficient technologies, including lighting and HVAC. The Energy Centers also offer classes, workshops, educational seminars, and interactive training exhibits. In addition, the Energy Centers offer a tool lending library so that customers can do their own analysis of technology alternatives. Table 10 provides a summary of the Energy Centers, the IOUs associated with them, their primary audiences, and some summary statistics for them. Notably, this evaluation covered seven of the eight Energy Centers; SDG&E CCSE was not included.

[13] Southern California Edison 2009-2011 Energy Efficiency Plans, March 2009.

Table 10. Energy Energy Centers Location and Program Information

| Utility | Training Center | Location | Primary Audience | Number of Sessions Offered | 2010-2012 Budget |
|---|---|---|---|---|---|
| Pacific Gas and Electric (PG&E) | Pacific Energy Center (PEC) | San Francisco | Commercial and Industrial Professionals | 164 | $34 Million |
| | Energy Training Center (ETC) | Stockton | Residential Sector Professionals | 90 | |
| | Food Service Technology Center (FSTC) | San Ramon | Commercial and Industrial Professionals | -- | |
| Southern California Edison (SCE) | Customer Technology Application Center (CTAC) | Irwindale | Commercial and Industrial Professionals | 211 | $21 Million |
| | Agricultural Technology Application Center (AgTAC) | Tulare | Agricultural and Industrial Sector Professionals | 146 | |
| Southern California Gas (SCG) | Energy Resource Center (ERC) | Downey | Commercial and Industrial Professionals | 140 | $8.8 Million |
| San Diego Gas and Electric (SDG&E) | Energy Innovation Center (SDEIC) | San Diego | Commercial and Industrial Professionals | 84 | $12 million |
| | California Center for Sustainable Energy (CCSE) | San Diego | Residential Sector Professionals | 195 | |
| **Total** | | | | | **$75.8 million** |

Source: CA Need Assessment
Note: San Diego's CCSE was not included in this evaluation.

This evaluation primarily focused on the courses and workshops offered at the Energy Centers. Over the past 3 years, each Energy Center reached between 600-11,000 unique workers and offered between 30 and 300 unique courses depending on the center. The following table summarizes attendance and the courses offered at each of the seven Energy Centers covered in this evaluation between 2009 and 2011 (based on the participant databases received from each center in January 2012). The number of non-unique participants at each center includes all participants who took multiple courses or seminars at the same center within the 2009-2011 timeframe. San Diego's Energy Innovation Center had the largest proportion of repeat attendees (approximately 50% had attended more than one course) while the Food Service Technology Center had the greatest proportion of one-time attendees (almost 69%).

Table 11. Summary of Energy Center Attendance and Courses 2009-2011

| | PG&E | | | SCE | | SDG&E, and SCG | |
|---|---|---|---|---|---|---|---|
| | PEC | ETC | FSTC | CTAC | AgTAC | ERC | SDEIC |
| Number of unique participants | 8,912 | 8,871 | 645 | 11,818 | 2,896 | 9,408 | 6,203 |
| Number of non-unique participants | 24,532 | 18,872 | 1,180 | 33,408 | 9,820 | 33,829 | 21,994 |
| Number of unique courses/seminars | 260 | 205 | 33 | 206 | 202 | 271 | 256 |
| Percent of participants attending only one event | 55% | 64% | 69% | 55% | 52% | 51% | 50% |

Below we describe the services offered at each of the seven Energy Centers covered in this evaluation and the BOC program.

### PG&E Energy Training Center (ETC)

ETC's primary objective is to eliminate gaps in skills and thus improve the quality of the installation of energy efficiency technologies. ETC identifies critical skill gaps and works with distributors, contractors, builders, designers, and city and county building departments to eliminate these gaps through the following program elements: 1) seminars (courses, etc.); 2) technical consultations; 3) outreach; 4) tool lending library; and 5) educational partnerships. The ultimate goals are to improve the quality of installation of energy efficiency measures; influence the mass market through upstream and midstream market actors; and improve compliance with Title 24 code updates.

The ETC's efforts focus almost exclusively on residential market actors, with some courses targeting small commercial contractors. Program records also include a much smaller number of what may be residential end users. The targets for this center are HVAC contractors, residential builders and general contractors, mechanical engineers, energy consultants, and designers/architects. This center also targets Home Energy Rating System (HERS) Raters, building department inspectors and plan checkers because these market actors have the potential to touch many homes.

### PG&E Energy Center (PEC)

The PEC utilizes courses, consultations, outreach, tool lending, and educational partnerships to target the commercial building operation and new construction design markets including building owners and operators, architects, engineers, and contractors. PEC's stated objective is to break down market barriers that keep customers from taking advantage of energy efficient opportunities in their buildings. PEC employs seminars and workshops (both in-classroom and online), energy efficiency showcases, customer consultations, and resources (Tool Lending Library, Energy Library, etc.) to achieve the desired market effect.

The program serves C&I building owners and operators, architects, engineers, and contractors.

## PG&E Food Service Technology Center (FSTC)

"The Food Service Technology Center (FSTC) program is an EE information only program. The overall objective is to promote the efficient design and operation of food service facilities by providing unbiased performance information to the industry. The FSTC's activities can be divided into two major categories: (1) test method development and equipment testing and (2) energy efficiency information and outreach to the food service industry supported by a comprehensive educational initiative that includes operator seminars, workshops, webinars as well as upstream industry training, facility design and EE consultations, site survey support, web-based tools/resources, and technical publications and reports. The FSTC program provides technical support and resources for Pacific Gas and Electric Company's energy efficiency programs as well as to the other CA IOUs for food service."[14]

Target Participants include food service equipment manufacturers and their customers including hospitals, educational facilities, restaurants, and commercial cooking design consultants.

FSTC is responsible for the course content of a number of courses offered at other Energy Energy Centers (both within PG&E and across the state). As such, FSTC courses include several Joint Energy Center (JEC) courses, or Statewide IOU Food Service Seminars, which are courses that are developed by FSTC but conducted at other Energy Centers. This allows the FSTC to broaden the reach and touch to customers throughout the state. In these cases, FSTC provides the instructor and the course content while the other center provides the facility and marketing support.

Some of the Food Service Seminars are designed for the general commercial food service audience, such as "Ten Energy Saving Tips," while others are targeted at specific customers such as "Starwood Hotel Saving Energy in the Commercial Kitchen." Many of the food service seminars are focused on universities, such as "University of California, Davis, Commercial Food Service Appliance Basics" or the "National Association of College & University Food Service Conference Purchasing Energy Efficient Equipment for Your Sustainable Kitchen." A few of these university-based courses are for students, and so the program effects are expected to be delayed until the students enter the workforce. In addition, several of FSTC's courses were aimed at internal training of sales and service people.

## SCE Agricultural Technology Application Center (AgTAC)

The Agricultural Technology Application Center's (AgTAC) primary objective is to promote industry trends and developments for advancing energy efficiency as a professional discipline. AgTAC accomplishes this by serving as an educational resource center for energy efficiency, providing high-quality programs in line with WE&T curriculum that include training courses, seminars, workshops, clean energy technology demonstrations, equipment efficiency testing, and interactive training exhibits and lectures. AgTAC, established in 1996, has served as SCE's primary delivery channel for mid-stream/upstream workforce education and training, information dissemination, and education coordination. One of SCE's two Energy Education Energy Centers, AgTAC offers specialty energy solutions for the agricultural industry.

[14] PG&E FSTC May 2011 Monthly Report

AgTAC serves agricultural and other business owners and operators, architects and designers, operations and facility managers, contractors, engineers, or anyone wanting to learn about new energy efficiency technology. Although the center would appear to be agriculturally focused, its course offerings apply to a broad audience. It also offers a number of classes for workers in the foodservice industry.

### SCE Customer Technology Application Center (CTAC)

The Customer Technology Application Center's (CTAC) primary objective is to promote industry trends and developments for advancing energy efficiency as a professional discipline. CTAC accomplishes this serving as an educational resource center for energy efficiency, providing high-quality programs in line with WE&T curriculum that include training courses, seminars, workshops, clean energy technology demonstrations, equipment efficiency testing, and interactive training exhibits and lectures. CTAC, established in 1990, has served as SCE's primary delivery channel for mid-stream/upstream workforce education and training, information dissemination, and education coordination.

CTAC serves business owners and operators, architects and designers, operations and facility managers, contractors, engineers, or anyone wanting to learn about new energy efficiency technology. Although the course offerings appeal mostly to commercial workers, there are also courses that apply to a broad audience.

### SoCal Gas Energy Resource Center (ERC)

This resource center for energy and environmental decision-makers opened in the spring of 1995 in Downey, California, the heart of the Greater Los Angeles and Orange County metropolitan areas. The mission of the Energy Resource Center (ERC) is to serve as a one-stop "idea shop," where customers can find the most efficient, cost-effective and environmentally sensitive solutions to their energy needs. The ERC also provides technical assistance, computerized equipment simulations, and air quality and environmental permitting assistance. The educational programs provided by the center include training sessions, tool loans, consultations, and events. Such activities allow potential green workforce candidates to explore energy efficiency, integrated demand-side management technologies, and resource management techniques.

### SDG&E Energy Innovation Center (SDEIC)

SDG&E recently built and opened a new center in 2011; the center previously offered courses in classroom space at the California Center for Sustainable Energy (CCSE) located in San Diego. The center offers educational and technical seminars for businesses in both the residential and non-residential sectors. These workshops are targeted towards specific industries and associations that allow attendees to network and learn alongside others in their industry type. SDG&E also offers technical assistance informally via the SDG&E account managers and workshop coordinators by speaking with participants about further resources provided by CCSE and SDG&E. SDG&E's account representatives often attend the workshops with their customers and shepherd them through the process of learning about resources and methods and ultimately implementing energy efficient practices in their business.

### Builder Operator Certification (BOC)

In addition to the Energy Centers, the evaluation also explored the Builder Operator Certification Program (BOC), a certification program that is offered at the Energy Centers statewide. The BOC program received a process evaluation in the '06-'08 program cycle; therefore, evaluation efforts for BOC in this program cycle were limited documenting how that program responded to the previous evaluation's recommendations (see Appendix A).The program is a nationally recognized energy efficiency training and certification program founded on the principle that trained and motivated operators can reduce energy consumption by 5 to 15%. BOC combines classroom training, exams, and in-facility project assignments to train and certify building engineers and O&M technicians in the practice of energy-efficient building operations and management.

The targeted program participants are commercial and industrial end users who seek certification and who value the importance of efficient building technologies for their ongoing business. Typical program participants would require their employers to make an investment in this education. [SCE/IOUS] program funding does not cover 100% of the cost of certification. The balance of the required funding is contributed by the participant's employer. 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 (NEEA) in 1997.

The NEEC BOC training is now offered in about 20 states, including California, starting in 2002. The California utilities licensed the training from NEEC and have contracted with NEEC for its delivery.

The program serves commercial and industrial end users who seek certification, particularly building engineers and O&M technicians.

Table 12. BOC Participation

| Utility | 2010 | | 2011 | |
|---|---|---|---|---|
| | Participants | Courses | Participants | Courses |
| PG&E | 80 | 14 | 61 | 15 |
| SCE | 104 | 18** | 139 | 18** |
| SCG | 46 | 12 | | 3[a] |
| SDG&E | 57 | 2 | | |

[a] As of Q1 2011.
** assume offer same courses in 2010 and 2011
*** assume have same instructors in 2010 and 2011.

Source: 2010 and 2011 Annual Reports

# 4.2. STRATEGIC ALIGNMENT

## 4.2.1 Strategic Plan and Needs Assessment Overview

The Strategic Plan was publicly released in 2008, and updated in January 2011, to "create a framework to make energy efficiency a way of life in California by refocusing ratepayer-

funded energy efficiency programs on achieving long-term savings through structural changes in the way Californians use energy".[15] The Strategic Plan outlined a plan specifically for WE&T with a vision that "by 2010, California's workforce is training and fully engaged to provide the human capital necessary to achieve California's economic energy efficiency and demand-side management potential".[16] The Centergies Program should contribute to the WE&T vision by striving to achieve the two goals set for this sector:

1. Establish energy efficiency education and training at all levels of California's educational systems

2. Ensure that minority, low-income, and disadvantaged communities fully participate in training and education programs at all levels of the DSM and energy efficiency industry[17]

Following the initial Strategic Plan publication in 2008, the CPUC directed a Needs Assessment study published in 2010. To better align with the Strategic Plan's vision and goals for WE&T, the Needs Assessment study recommended the following to the Centergies Program[18]:

- ***Curriculum Development or Updating:*** Actively participate in the content development, review, and updating of curricula, and support instructor professional development for the main "home institutions" that train building and construction professionals and trades people, such as apprenticeship programs, community colleges, and four-year institutions. Energy Training Center staff should be encouraged to share their expertise as appropriate to ensure that curricula incorporate up-to-date information on new technologies and practices.

- ***Support Sector-Strategies***: Initiate, help fund, and partner with other organizations to develop robust sector strategies in key energy efficiency sectors such as HVAC, building operations and maintenance, benchmarking, and other emerging areas (as well as LIEE or other programs undergoing review or redesign).

- ***Collaborations***: Expand collaborations between the Energy Training Energy Centers and building and construction trades associations. The emphasis should be on collaborations with high-road associations demonstrating commitment to investments in ongoing workforce training, such as participating in apprenticeship programs.

- ***Evaluation of Workforce Outcomes:*** Assess and determine what additional information is required to evaluate workforce outcomes for the Energy Training Energy Centers. At a minimum, the Energy Training Energy Centers should begin to collect information from participants on occupation, prior education, and work experience and demographic characteristics.

[15] *California Long Term Energy Efficiency Strategic Plan,* January 2011 Update, Section 1, Page 1.

[16] *California Long Term Energy Efficiency Strategic Plan,* January 2011 Update, Section 9, Page 70.

[17] Ibid

[18] Note that these are taken directly from the Executive Summary of the Needs Assessment report.

- ***Inclusion of Disadvantaged Users:*** Adopt as a goal for the Energy Training Energy Centers the inclusion of low-income, minority, and disadvantaged workers and job seekers. Develop and implement specific programs in collaboration with organizations that have a track record in this arena, emphasizing sector strategies that can lead to placement in good jobs with career ladders.

- ***Training Center Classes:*** Modify the structure of classes offered by the Energy Training Energy Centers to increase the number of course series that are longer in length than current typical classes, focus on a specific occupation, have a workplace-based hands-on component, and offer clear learning objectives that lead to certification.

### 4.2.2 Center Progress in Addressing Needs Assessment Recommendations

Many of the Energy Centers have been offering courses and services to the workforce for a long time, some beginning in the 1980s. The Energy Centers have always focused on providing energy efficiency education to the market in a general sense with the goal of increasing knowledge of energy efficiency technologies and practices and contributing to energy savings. Strategic Plan and Needs Assessment presented some relatively new goals for the Energy Centers in 2011 such as contributing to workforce outcomes, partnering, and developing sector strategies. As such, this is a case of long-established programs that are now asked to add a new focus to their ongoing efforts.

After interviewing key center staff, we document the following key perspectives from the Energy Centers in terms of how they think they are positioned in the marketplace and how the Strategic Plan's WE&T goals impact them:

- The Energy Centers see themselves as an educational resource that can fill energy efficiency education gaps in the marketplace

- The Energy Centers feel they are a trusted third-party that can advise the marketplace on emerging technologies and core technologies supported by IOU programs

- The Energy Centers are very familiar with the Strategic Plan and Needs Assessment and feel they are in a strategic position to help support it

    - The Energy Centers think that the Strategic Plan is a useful document that is helping the Energy Centers put more structure around their activities and, as a result, they are re-focusing their activities. For example, non-course and non-seminar services, such as partnerships and consultations, are now becoming a key part in their support of the Strategic Plan.

Overall, some concerns exist with the Needs Assessment and Strategic Plan. While the Energy Centers believe all recommendations are appropriate, they cannot fulfill the suggestions entirely alone due to limited resources[19] and they must partner and collaborate to take action; and these partnerships will take time to mature. In addition, the Energy Centers commonly expressed the need for clearer definitions of terms in the Needs

[19] For example, SCE's and both SDG&E and SCG operating budget for the next program cycle will likely be 30% less than the '10-'12 budget.

Assessment recommendations in order to make them actionable. Details regarding the center's response to each Needs Assessment recommendation are provided below.

#### Curriculum Development or Updating

The Needs Assessment recommended that the Energy Centers actively participate in the content development, review, and updating of curricula, and support instructor professional development for the main "home institutions" that train building and construction professionals and trades people, such as apprenticeship programs, community colleges, and four-year institutions. It was recommended that center staff should share their expertise as appropriate to ensure that curricula incorporate up-to-date information on new technologies and practices.

Energy Centers have been sharing expertise internally and externally on curricula for many years, such as:

- Serving on the Laney College advisory board to advise on curricula
- Advising train-the-trainer classes at community colleges
- Working with community colleges on weatherization and training courses and to complement their existing curriculum and increase exposure to energy efficiency
- Working with hospitality degree programs at UC Davis, San Jose State, and San Francisco State
- Supporting CSU East Bay in offering an IDSM Certificate

Energy Centers continue to look for opportunities to lend their expertise to more organizations and educational institutions. They are currently working with several schools to collaborate on curricula development, such as with Kendal College to start developing energy efficient and sustainability curriculum for culinary students. The SCEIC is also working with University of California San Diego (UCSD) by offering its students a nine-course sustainability certification. While the Energy Centers are looking for more opportunities in this area, they stated that they remain challenged with resources available to lend the expertise.

#### Support Sector Strategies

The Needs Assessment recommended that the Energy Centers initiate, help fund, and partner with other organizations to develop robust sector strategies in key energy efficiency sectors. Many Energy Centers already have long-standing partnerships with sector-specific associations and organizations, which can be leveraged in developing sector strategies. The findings from sector representatives support the sector strategy approach that the IOUs are currently implementing. In the next program cycle, training and certification activities associated with other IOU-funded programs are being further incorporated into Energy Center offerings to support workforce development in these sectors. The center's progress

toward sector strategies was outlined in the IOUs' joint supplemental filing with the CPUC[20]. This filing identified two large sectors, Trade and Professional, and 14 sub-sectors within these two sectors categories. We interviewed key representatives of 5 sectors who were familiar with the Energy Centers' courses and their sector's energy efficiency training needs. These findings are presented below for each of the five sectors.

***HVAC Sector Findings***

We interviewed two individuals representing the HVAC industry who provided good insight into the training needs within the industry.[21] Both interviewees agreed that the entire workforce is recognizing the need to move towards energy efficiency and overall technology improvements. As such, they see a continued potential for growth within the "green market"[22] specifically specializing in the continued development and enforcement of energy efficient standards, design, and quality installation for HVAC technologies. Based on this, they thought that the Energy Centers are generally doing a good job of offering training opportunities. One respondent noted that the Energy Centers were vital to the industry and could not imagine where the industry would be without them. We also asked about the potential for pursuing training in IDSM, or the integration of energy efficiency, demand response, or distributed generation technologies. Both interviewees indicated that there is some training already in place, some of which is offered through the Energy Centers, but that there is room for growth.

We asked the interviewees to name some of the other resources, outside of the Energy Centers, available for professions for similar training. While we did get the names of a few organizations (such as vocational and technical schools, community colleges, Refrigeration Service Engineers Society, and Institute of Heating and Air Conditioning Industries), both interviewees agreed that these other organizations offered more entry-level courses while the Energy Centers offered higher-level education and training.

The respondents thought that the courses offered by the Energy Centers were sufficient, but they did offer some suggestions for improving the training opportunities, such as offering:

- Additional training in quality installation and maintenance practices
- Training on new manuals, and
- Training on Title 24 regulations and requirements.

[20] SDGE Advice 2260-E-B/2041-G-B; SCG ADVICE 4249-B; SCE ADVICE 2588-E-B; PGE ADVICE 3212-G-B/3852-E-B; October 24, 2011; Additional Supplemental Joint Filing: 2010-2012 Statewide Workforce Education and Training (WE&T) Program Modifications based on Findings of WE&T Needs Assessment.

[21] One of the professionals interviewed represented and was knowledgeable about the training needs for two organizations.

[22] The interviewees defined the "green market" within the HVAC industry as moving the entire industry towards the use of more energy efficient technologies, and improving quality of installation and maintenance practices overall.

While training on the design side is necessary, one interviewee sees the real gap right now in the HVAC industry in the hands-on area, particularly in regards to installation and maintenance techniques and other details that workers have to be aware of and that are most effectively learned from hands-on training and on-location training. (See 4.3 Program Effectiveness for more discussion of hands-on training at the Energy Centers.)

In line with this, respondents indicated that the preferred formats for this sector included:

- More interactive/hands-on training
- On-the-job training
- Online courses/Webinars, and
- Continuation of offering night courses.

Because California is so geographically large, there is also a continued need to expand the geographic reach of training opportunities in the state. One interviewee indicated that training is a high priority for organization members, but that due to the location of some members (i.e., Riverside and Palm Springs), it is difficult for them to attend current courses.

One of the respondents noted that the professional environment created by the Energy Centers makes the Energy Centers more attractive to potential participants. We also received several suggestions on how to promote the training opportunities available at the Energy Centers. These included 1) partner with organizations such as Institute of Heating and Air Conditioning Industries (IHACI) who have their own members and publications (print training schedules and center information in those publications), 2) target marketing of training opportunities to specific geographic areas and/or specializations within the industry (IHACI mentioned they have a database of industry members that they use to target their marketing), and 3) collaborate with other organizations to use their facilities to serve a wider geographic area (such that people do not have to travel too far to attend the necessary training courses). Notably, the Energy Centers are already partnering with IHACI to offer courses and some Energy Centers do offer courses in other facilities to serve wider geographic areas.

#### *Lighting/Day Lighting and Electrical Sector Findings*

Within the lighting/day lighting and electrical industry, most of the interviewees agreed that there is a potential for growth within the "green market"[23] and some of the specializations within the sector could include new lighting technologies such as lighting controls/sensors/motion detectors, energy auditing/surveying, quality installations, demand response technologies, and inductive lighting projects. Based on this, they thought that the Energy Centers are doing a good job of offering training opportunities for this industry, particularly in reaching specifiers such as architects, engineers, and designers. One respondent noted that the 'light fair' organized by the Energy Centers is a great networking

[23] The interviewees defined the "green market" within the lighting industry as anything that reduces energy waste (through lighting, insulation etc), particularly from an overall perspective (whole house approach rather than just replacing a few light bulbs), as well as new technologies in lighting.

opportunity which gives contractors and people in the industry an opportunity to connect with others. We also asked about the potential for pursuing training in IDSM, or the integration of energy efficiency, demand response, or distributed generation technologies. While there was agreement that the Energy Centers offer courses in distributed generation technologies and energy efficiency, respondents think there is a specific need to offer more training in the area of demand response.

We asked the interviewees to name some of the other resources, outside of the Energy Centers, available for professions for similar training. All interviewees agreed that the industry did have several choices when it came to training opportunities with organizations such as Electrical Industry Training Energy Centers, universities, community colleges, and manufacturer-sponsored trainings. However, most of these are aimed primarily at workers specifically in the lighting industry, and do not necessarily reach those outside the industry who need a knowledge of lighting practices, such as specifiers. One respondent noted that the Energy Centers have an advantage (and offer something different than the other organizations) in that they have great demonstration capabilities, they offer public access, and they offer training to professionals who would not necessarily take classes at the Electrical Industry Training Energy Centers or community colleges.

Some suggestions for improving the training opportunities specifically for this sector included:

- More structured training for specifiers: architects, engineers and designers (use California Advanced Lighting Controls Training Program (CALCTP) as a model to train specifiers such that they are up-to-date on the latest designs and technologies)
- Training for CALCTP certification
- Energy audit training
- Create a database for information on new technologies (people who are interested in learning about energy efficiency and new technologies should be able to go to a center's website for that information rather than having to find it in multiple locations). One respondent indicated that the Energy Centers should be a repository of information – a place where people can easily go for information on new technologies or be directed to the appropriate information sources.
- Have more in-depth classes (offer more follow-up classes and further opportunities to learn beyond "introduction to lighting" courses), and
- Targeted classes for professionals working in the residential market.

In line with this, we asked interviewees about the preferred format for receiving the training. The answers included:

- More interactive/hands-on training (have a lab set-up of different lighting systems)
- On-location training
- Online courses/webinars (or even a combination of online classes with interactive classes), and

- Evening classes.

The more flexible course times and delivery options would help more professionals participate without missing work. We received one specific suggestion on how to better promote the training opportunities available at the Energy Centers. One Representative suggested that the utilities could offer participants an incentive for jobs completed after obtaining training. For example the utilities could offer incentives on jobs completed by CALCTP certified contractors  Sector Representatives thought this would help increase participation because they describe the industry as reactive, in that many contractors will not seek out training just for their own benefit, but will do so in order to get a job/project.

#### *Building Management and Maintenance Sector Findings*

Within the building management and maintenance sector, all of the interviewees agreed that there is a huge potential for growth within the "green market"[24] and some of the specializations within the sector could include energy auditing, commissioning of buildings, and control systems (installation, usage, and verification). Based on this, they thought that the Energy Centers were a great resource for this sector, including professional and new entrants in the sector, to increase their knowledge and gain additional skills. We also asked about the potential for pursuing training in IDSM, or the integration of energy efficiency, demand response, or distributed generation technologies. Based on our interviews, IDSM appears to be less important in this sector. The interviewees agreed that while currently this was not a huge topic for their organizations, they believe there are training opportunities available at the Energy Centers.

We asked the interviewees to name some of the other resources, outside of the Energy Centers, available for professions for similar training. While we did get the names of a few organizations (such as California Building Officials, Building Owners and Managers Association, US Green Building Council, U.C. Berkeley, and Foothill College), the interviewees agreed that the Energy Centers by far offered the most training opportunities. The respondents thought that the courses offered by the Energy Centers covered the topics of interest for professionals within the sector. One respondent noted that the Energy Centers were very proactive in offering new courses based on the changing needs of the sector. Additionally, one respondent noted the advantage of having the tool lending library at the Energy Centers.

Some suggestions for improving the training opportunities included:

- Offering a more structured series of classes for new professionals, with training staff available for follow-up consultation
- Targeted classes for residential consumers/home-owners, and
- An emphasis on building specifications and maintenance.

[24] The interviewees defined green market as the promotion of green energy standards for improving energy efficiency, resource efficiency and sustainability.

In line with this, we asked interviewees about the preferred format for receiving the training. The answers included:

- More interactive/hands-on training using tools and other hardware
- On-location training
- Online courses/webinars/on-demand video courses, and
- Half-day (as opposed to a full day) training.

These, they explained, would help more professionals participate without missing work.

We received several suggestions on how to promote the training opportunities available at the Energy Centers: partner with trade associations and similar organizations to gain participation, have a detailed website that could be promoted through email blasts, and mail printed copies of the calendar of courses offered. Notably, with the exception of the printed calendars, our evaluation found that the Energy Centers are already doing these things for this sector.

#### *Codes and Standards Enforcement Agencies Sector Findings*

We interviewed two individuals within the codes and standards enforcement agencies sector who provided insight into the training needs within the sector. Both interviewees agreed that there is a huge potential for growth within the "green market"[25] and one of the specializations within the sector could be developing higher standards for products to achieve Zero-Net Energy (ZNE) buildings. Based on this, they thought that the Energy Centers have a good curriculum, a nice facility and very knowledgeable instructors. We also asked about the potential for pursuing training in IDSM, or the integration of energy efficiency, demand response, or distributed generation technologies. While the interviewees were unable to provide us with an answer, their interest in ZNE buildings indicates that this is an important area.

We asked the interviewees to name some of the other resources, outside of the Energy Centers, available to professionals for similar training. While we did get the names of a few organizations (such as California Building Officials, Union Energy Centers, community colleges, CalCERTS, and California Building Performance Contractors Association), both interviewees agreed that the Energy Centers were beneficial due to the free courses offered. They also noted that their organizations encourage their employees to regularly attend the training courses offered by the Energy Centers.

The respondents thought that the courses offered by the Energy Centers were sufficient, but they did offer some suggestions for improving the training opportunities:

- Offer courses in building management; specifically addressing how to properly use and operate installed control systems, and

[25] The interviewees defined green market as using energy efficiently, using energy produced through renewable sources and building/maintaining 'Green Buildings'.

- Training on filling out the long and complex forms for green building compliance.

In line with this, we asked interviewees about the preferred format for receiving the training. The answers included:

- On-location training
- Webinars/On-demand web training (with the ability to have a Q&A with instructors) video courses, and
- Full day seminars.

We received several suggestions on how to promote the training opportunities available at the Energy Centers; partnering with organizations such as California Building Officials and California Building Industry Association, reaching out directly to builders and contractors, preparing and distributing targeted information about training opportunities within the codes and standards sector, and email blasts (which are easy to forward to potential participants within an organization). Notably, with the exception of preparing targeted information, our evaluation found that the Energy Centers are already doing these things for this sector.

#### *Architecture, Engineering and Design Sector Findings*

Within the architecture, engineering, and design sector, all of the interviewees agreed that there is a huge potential for growth within the "green market"[26] and some of the specializations within the sector could include products to achieve ZNE buildings, using specialized software to design buildings on a computer, sensor technologies, LED lighting, commissioning of buildings, and control systems. Based on this, they thought that the Energy Centers were a great resource for this sector, including helping professional and new entrants in the sector to increase their knowledge and gain additional skills. We also asked about the potential for pursuing training in IDSM, or the integration of energy efficiency, demand response, or distributed generation technologies. The interviewees agreed about the need for such training and thought that it was definitely something that should be more widely taught at the Energy Centers.

We asked the interviewees to name some of the other resources, outside of the Energy Centers, available to professionals for similar training. While we did get the names of a few organizations (such as Kelar Pacific, the American Institute of Architects, Green Building Council, Mesa college, and other community colleges), the interviewees agreed that the Energy Centers had an advantage of offering training opportunities at no cost to the participants. One respondent noted that the Energy Centers are well known and well visited because they are well located and offer free courses. The respondents thought that the courses offered by the Energy Centers covered the topics of interest for professionals within the sector. One respondent noted that the Energy Centers had done a tremendous job of offering the appropriate coursework, specifically with their training for CALCTP certification

[26] The interviewees defined "green market" as the demand for green buildings, having a triple bottom line, increasing green jobs and technologies, and generally being more responsible. However, a couple of interviewees did note that "green" is often used as a motivational word or as a marketing tool rather than trying to improve overall system efficiencies.

for contractors. Another respondent noted that the Energy Centers are well informed about the needs of their members and are able to offer courses on new topics fairly quickly. However, a few interviewees noted that while the Energy Centers offer excellent classes they have not marketed themselves fully; many people do not know the Energy Centers exist.

Some suggestions for improving the training opportunities included:

- Revit (architectural design software) skills (The respondent noted that Revit skills add real value to the skill set of a professional and helps them greatly in securing jobs.)
- Certification training for LEED and CASP
- Technology marketing strategies
- Training on understanding how buildings use energy
- Health impacts of the technologies being used
- Statewide course for specialized and advanced lighting, and
- Courses on new legislation that is passed.

In line with this, we asked interviewees about the preferred format for receiving the training. The answers included:

- More interactive/hands-on/project-based training
- Using adult-education principles for teaching classes
- Have tiered teaching; different classes based on levels of knowledge, and different classes depending on the sector (residential sector, commercial/industrial sector, or professionals)
- Speaker series from professionals in the field
- Offer continuing education unit (CEU) credits
- Online courses/webinars/on-demand web training, and
- Breakfast, evening, or after work-hour classes (as opposed to daytime classes).

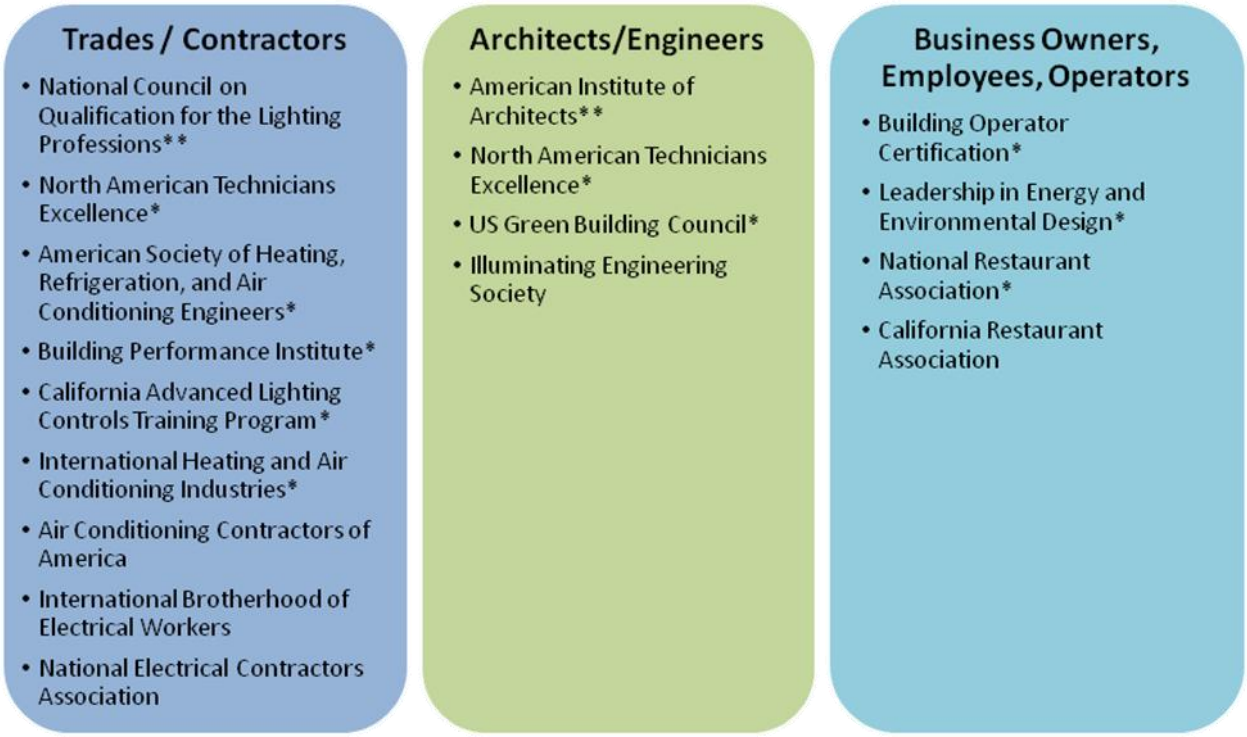
These, they explained, would help more professionals participate without missing work.

We received several suggestions on how to promote the training opportunities available at the Energy Centers. These included: 1) partner and host events with organizations such as American Institute of Architects (the respondent explained that this will, however, require the Energy Centers to be open beyond 5pm), 2) have a presence at trade shows, 3) mail printed materials directly to customers, 4) have a detailed website which could be promoted through email blasts, and 5) reach out to the residential sector through bill inserts (one respondent noted that the Energy Centers should use their 'Smart Home Exhibit' more strategically to engage homeowners and ratepayers).

**Expand Collaborations**

The Needs Assessment recommended that the Energy Centers expand collaborations between the Energy Training Energy Centers and building and construction trades associations. It was recommended that the emphasis should be on collaborations with high-road associations demonstrating commitment to investments in ongoing workforce training, such as participating in apprenticeship programs. Energy Centers already collaborate and partner with many building and construction trade associations in a variety of sectors (shown in Figure 3). The Energy Centers see their collaborations with these organizations as one method to address many of the other Needs Assessment recommendations given their limited resources.

Figure 3. Current Center Partners & Collaborators




* Center Certification Support
** Center Continuing Education Credit

Participant survey results indicate that Energy Centers are building partnerships with most associations of which respondents indicated they were members. Table 13 shows the top 20 associations and organizations named by survey respondents, most of which were mentioned as partners by at least one of the Energy Centers.

Table 13. Top 20 Associations and Organizations of Which Respondents Are Currently Members

| |
|---|
| U.S. Green Building Council (USGBC) |
| American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) |
| Leadership in Energy and Environmental Design (LEED) |
| Building Performance Institute (BPI) |
| American Institute of Architects (AIA) |
| Build It Green (BIG) |
| Home Energy Rating System (HERS) |
| Institute of Heating and Air Conditioning Industries (IHACI) |
| North American Technician Excellence (NATE) |
| Building Operator Certification (BOC) |
| California Building Performance Contractors Association (CBPCA) |
| Air Conditioning Contractors of America (ACCA) |
| American Council for Energy Efficiency Economy (ACEEE) |
| Association of Energy Engineers (AEE) |
| Building Owners and Managers Association International (BOMA) |
| Affordable Comfort, Inc. (ACI) |
| California Home Energy Efficiency Rating System (CHEERS) |
| International Brotherhood of Electrical Workers (IBEW) |
| International Code Council (ICC) |
| Community Services and Educational Training (CSET) |

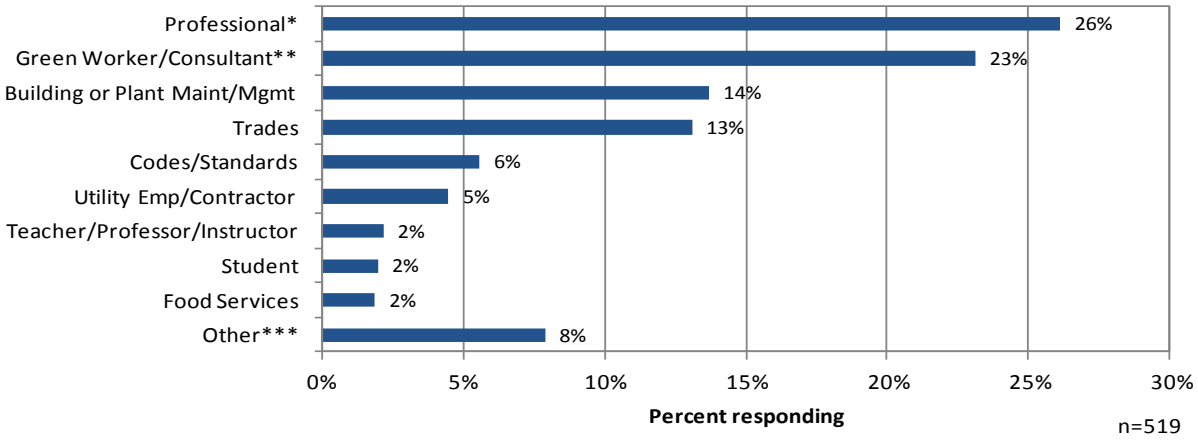
Source: Self-report from participant survey

**Evaluate Workforce Outcomes**

The Needs Assessment recommended that the Energy Centers assess and determine what additional information is required to evaluate workforce outcomes. It was recommended that at a minimum, the Energy Centers should begin to collect information from participants on occupation, prior education, work experience, and demographic characteristics. The Energy Centers are challenged with collecting this information given participant reluctance and a lack of resources to collect and track this information. This evaluation helped to collect this information and is presented below. Currently, the Energy Centers are capturing participant names, contact information, company names, and titles. While it may be challenging to collect this information in sign-up/sign-in sheets, the Energy Centers should consider adding a few questions to their exit surveys so they can start capturing this information.

Based on participant survey results, the Energy Centers are primarily reaching professional white-collar workers, employed workers, and those in management, supervisory, or owner positions. Almost half of respondents hold a professional (architect/engineer/designer) or green worker / consultant position, while only 13% of respondents represent the trades sector.

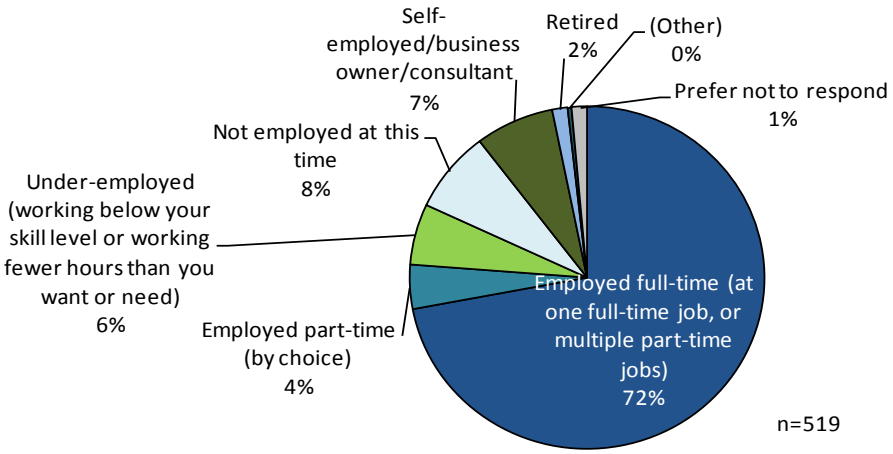
**Figure 4. Position or Job as it Relates to Energy Issues**




*"Professional" category includes architects, engineers, and designers
**"Green Worker/Consultant" category includes energy auditor (for commercial or food industry), energy efficiency consultant or manager, energy manager, environmental preservation, HERS Rater/inspector, Home Performance auditor, low-income weatherization contractor, solar consultant or technician, sustainability consultant, and commissioning agent.
***"Other" category includes Gas or electric utility employee or contractor; Teacher, professor, instructor, trainer; student; real estate; research; manufacturing or automation worker; water utility employee, consultant, technician; and business, management, marketing consultant.

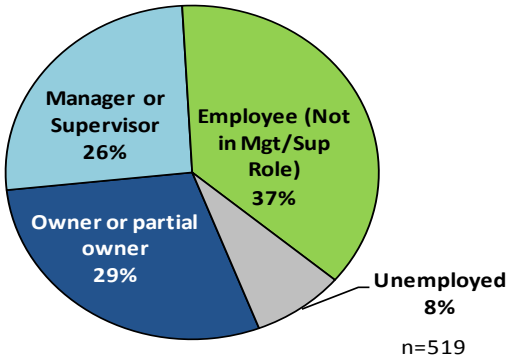
The Energy Centers are primarily reaching people currently in the workforce, while touching some unemployed and underemployed workers. As shown in Figure 5, 83% of survey respondents are employed, either full- or part-time or self-employed, while 14% are unemployed or underemployed.

**Figure 5. Employment Status**




The Energy Centers are also reaching more high-level and influential positions within companies, with 55% of respondents being an owner or partial owner of their company, or in a management or supervisory position (see Figure 6).

Figure 6. Participants' Role in Company




Looking at the kinds of certifications that participants hold, 43% of respondents currently have an energy-related certification or accreditation, with the top ones being LEED Accreditation (19%), BPI Certification (8%), EPA Certifications (6%), NATE Certification (5%), BOC Certification (4%), HERS I / HERS II (3%), and Build It Green / GreenPoint Rater (3%). Additional demographic information is presented in the next section.

#### Inclusion of Disadvantaged Users

The Needs Assessment recommended that the Energy Centers adopt as a goal the inclusion of low-income, minority, and disadvantaged workers and job seekers. It was recommended that Energy Centers develop and implement specific programs in collaboration with organizations that have a track record in this arena, emphasizing sector strategies that can lead to placement in good jobs with career ladders.

The Energy Centers continue to be challenged with how to respond to this recommendation. When discussed with the Energy Centers' staff, they emphasized that they do not exclude anyone from participating in their courses and instead focus on equality of access rather than recruiting disadvantaged or low-income participants. Energy Centers indicated that typically the only limiting factor to course participation, which has become more pronounced in the current economy with high unemployment, are course fees for some courses; however, most courses offered at the Energy Centers are free.

One way in which the Energy Centers may respond to this recommendation is by collaborating with organizations that serve disadvantaged workers. All Energy Centers indicate they are already working with partners that provide assistance to low income customers, such as Workforce Investment Boards (WIBs) and other community based organizations. One center collaborates with low-income communities by offering contractor training in low-income areas and partnering with technical schools. The Energy Centers have helped an initiative in California to create a segment of the Builder Operator Certification (BOC) program that would serve unemployed building operators while leveraging some of the center's resources. BOC and the PEC are partnering with the Alameda County Workforce Investment Board with the goal of offering the BOC course to unemployed workers.

Energy Centers indicate that they are looking for more opportunities to collaborate and partner with organizations but that it is a challenge to identify partners to market to and target the low-income or disadvantaged population.

In addition, Energy Centers also indicated that there is a need for more commonly accepted definitions of low-income, minority, and disadvantaged in order to better serve these segments of the population and track goal achievement. After polling participants in our survey efforts, we collected some demographic information to see how many disadvantaged workers are coming to the Energy Centers (see

Table 14). Notably 70% of participants have at least some college education while only 5% identify with a trade or technical school.

Table 14.Center Participant Demographics

| **Highest Level of Education Completed (n=519)** | |
|---|---|
| No schooling | <1% |
| Less than high school | <1% |
| High school graduate or equivalent (e.g., GED) | 2% |
| Trade or technical school | 5% |
| Some college | 21% |
| College degree | 35% |
| Some graduate school | 9% |
| Graduate degree | 26% |
| Prefer not to respond | 2% |
| **2011 Annual Household Income before Taxes (n=519)** | |
| Less than $20,000 per year | 5% |
| $20,000-49,999 | 10% |
| $50,000-74,999 | 14% |
| $75,000-99,999 | 16% |
| $100,000-149,999 | 19% |
| $150,000-199,999 | 8% |
| $200,000 or more | 4% |
| Prefer not to respond | 22% |
| **Ethnicity (n=519)** | |
| White | 58% |
| Hispanic/Latina(o) | 11% |
| Filipino | 4% |
| Chinese | 3% |
| Black, African American | 3% |

| | |
|---|---|
| American Indian or Alaska Native | 2% |
| Other | 5% |
| Prefer not to respond | 14% |

**Training Center Classes**

The Needs Assessment recommended that the Energy Centers modify the structure of classes offered to increase the number of course series that are longer in length than current typical classes, focus on a specific occupation, have a workplace-based hands-on component, and offer clear learning objectives that lead to certification.

Energy Centers currently offer some courses that align with this recommendation in that they are part of a series or directly lead to a certification or accreditation. The following table is a baseline of the proportion of courses currently offered by each center (or IOU) that are part of a series (12%-31% of courses offered) or lead to a certification (1%-23%). The FSTC is not included in this table because they mostly offer food service technology related seminars that are not currently tied to a specific certification.

Table 15. Baseline Proportion of Course Series and Certification

| | PEC | ETC | SCE AgTac & CTAC | ERC | SDEIC |
|---|---|---|---|---|---|
| % of Courses in a series | 12% | 16% | 30% | 31% | 26% |
| % of Courses that directly lead to certification | 1% | 4% | 13% | 23% | 5% |

Courses currently offered by Energy Centers that are part of a series and longer in length include three to five day basic and advanced building performance courses and three- and four-part workshops and modules on specific equipment and techniques. A variety of current course offerings at the Energy Centers also have workplace-based hands-on options such as one-on-one trainings at the participant's facility or training houses or units that provide students with the ability to see and touch installations and exhibits. Some current courses also have objectives that lead to certification or accreditation (such as LEED and NATE) or qualify for continuing education credits with sector-specific trade organizations.

To help determine how well the WE&T program is aligned with this recommendation, we asked the Energy Centers to identify how they would rate their course offerings on several metrics associated with training designed to help:

- Support certification for trades and professions
- Develop skills and knowledge related with "green jobs" and workforce enablement
    - Focus on core job responsibilities
    - Develop higher-level skills as they are used on the job
    - Adherence to adult learning principles

- Foster understanding and application of IDSM

These metrics, along with the percentage of courses that the Energy Centers identified as having the characteristics associated with each metric, are listed in Table 16. The characteristics in bold are those we identified as highly correlated with workforce enablement. Note that the information below was self-reported by the center staff. Our evaluation found some discrepancies between our assessment of a sample of course and the Energy Centers' assessment for those same classes. For example they may have identified a course as rating high in IDSM or Adult Learning principles but our assessment scored the course low (see Appendix B: *Course Scoring Differences* for a detailed comparison of the evaluation team's ratings and the IOUs' ratings on these characteristics for the courses in our "in-depth review" sample.)

Table 16. Population of Courses Geared Toward Workforce Enablement (Center Self-Report)

| Metrics | Characteristics | PEC (n=147) | ETC (n = 107) | CTAC (n = 147) | AgTAC (n = 164) | ERC (n=137) | SDEIC (n = 126) | Total (n=828) |
|---|---|---|---|---|---|---|---|---|
| **Certification** | **Direct Support** | **1%** | **4%** | **7%** | **16%** | **12%** | **5%** | **9%** |
| | **Clear Relationship** | **61%** | **40%** | **24%** | **27%** | **23%** | **91%** | **46%** |
| | Not Directly Related | 37% | 48% | 67% | 55% | 16% | 4% | 41% |
| | na | 1% | 8% | 2% | 2% | 7% | 0% | 4% |
| **Core Job Responsibility Focus** | **High** | **46%** | **44%** | **31%** | **43%** | **47%** | **97%** | **56%** |
| | **Medium** | **28%** | **39%** | **60%** | **47%** | **4%** | **3%** | **32%** |
| | Low | 25% | 7% | 7% | 9% | 0% | 0% | 8% |
| | na[27] | 1% | 10% | 2% | 1% | 7% | 0% | 4% |
| **Skill Development** | **Evaluate/Create** | **20%** | **16%** | **6%** | **8%** | **3%** | **17%** | **12%** |
| | **Analyze/Apply** | **46%** | **47%** | **83%** | **80%** | **41%** | **64%** | **66%** |
| | Remember/Understand | 33% | 26% | 9% | 11% | 6% | 19% | 17% |
| | na | 1% | 11% | 2% | 1% | 9% | 0% | 5% |
| **Adult Learning** | **Medium to High** | **42%** | **36%** | **73%** | **73%** | **40%** | **97%** | **65%** |
| | Low to None | 57% | 54% | 25% | 26% | 12% | 3% | 31% |
| | na | 1% | 10% | 2% | 1% | 7% | 0% | 4% |
| **IDSM** | **50 to 100%** | **13%** | **6%** | **18%** | **16%** | **14%** | **34%** | **19%** |
| | 10 to 49 | 20% | 6% | 64% | 69% | 29% | 64% | 47% |
| | Little or none | 67% | 80% | 16% | 13% | 8% | 2% | 30% |
| | na | 1% | 8% | 2% | 1% | 7% | 0% | 4% |
| **Overall** | Meets all criteria, including IDSM | 0% | 0% | 0% | 0% | 6% | 34% | 0% |
| | **Meets all criteria, except IDSM** | **29%** | **17%** | **25%** | **36%** | **23%** | **80%** | **38%** |

[27] The information returned by the Energy Centers did not include all data points for all course. When the information was not available, the course was marked "na" (not applicable) for that metric.

Center staff indicated that in order to further address this recommendation from the Needs Assessment, they are looking at their current courses to clarify what classes or series are available for certain sectors, as well as determining how some stand-alone courses might be structured in a series for specific sectors or technologies. While the Energy Centers are starting to look at their courses in light of this recommendation, it is important to note that the Energy Centers report that they are challenged with modifying or elaborating on their existing course structure due to constrained resources.

Based on findings from the participant survey, it is clear that some of the courses currently incorporate workplace based hands-on components; however, the Energy Centers still have some room to improve in this area. Currently, most of the courses offer general energy efficiency information but do not necessarily have hands-on components that are useful in helping participants to develop workplace relevant skills. Participants were asked about the type of learning experience they were given in the courses. While many participants indicated there was a high level of group feedback and interaction, half of them said they experienced hands-on in-class practice.

Table 17. Self-Reported Types of Course Learning Experiences

| Were you given a chance to do any of the following… (Data Aggregated Across All 7 Energy Centers) | Yes | No | DK | N/A |
|---|---|---|---|---|
| Participate through group feedback to instructor questions and/or by solving problems (n=519) | 68% | 14% | 8% | 9% |
| Participate by sharing experiences from the field relevant to the subject at hand (n=519) | 60% | 15% | 12% | 12% |
| Hands-on, in class practice evaluating problems, processes, issues or alternatives (n=519) | 55% | 21% | 12% | 13% |
| Hands-on, in class practice, explaining new info/concepts (n=519) | 53% | 21% | 13% | 12% |
| Hands-on, in-class practice, identifying patterns, using procedures, or solving problems (n=519) | 52% | 23% | 12% | 13% |
| Hands-on, in-class practice, developing a new approach to accomplishing an end-result/process (n=519) | 43% | 27% | 14% | 15% |

We asked participants in an open-ended fashion, about how the course information helped them in their job, career, or business. Most respondents mentioned outcomes that were information oriented while few participants mentioned skill-related outcomes (see Table 18).

Table 18. Participant Information or Skill Oriented Workforce Outcomes (Open-Ended)

| | | Information or Skill Oriented Outcome | | |
|---|---|---|---|---|
| Self-Reported Outcomes | % of Respondents (n=519) | Information | Skill | Unsure |
| Offer more products and services; better explain options to clients | 32% | Yes | No | No |
| More knowledgeable about energy efficiency in | 30% | Yes | No | No |

| | | Information or Skill Oriented Outcome | | |
|---|---|---|---|---|
| general | | | | |
| Increased knowledge of new/emerging technologies | 24% | Yes | No | No |
| Business is more competitive | 17% | No | No | Yes |
| Learned how to use specific technology/software/tool | 16% | No | Yes | No |
| More marketable | 15% | No | No | Yes |

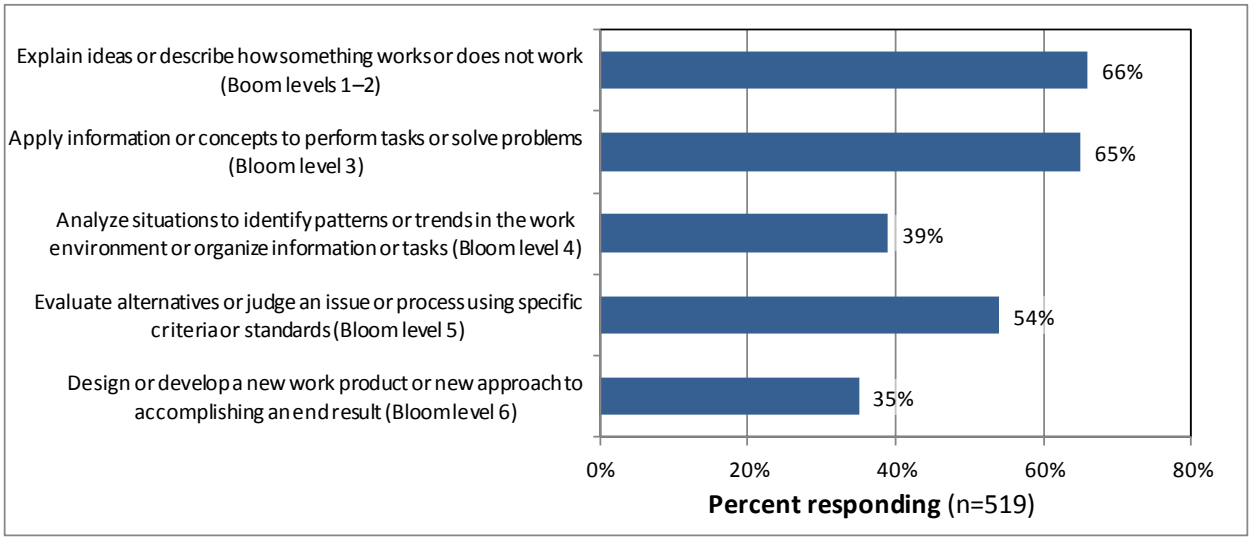
Note: Question was asked open-ended, responses were coded and top "like" categories are shown; respondents' answers may have been coded into multiple outcome categories

The survey also explored whether participants believed they were able to accomplish different types of outcomes as a result of attending the courses. The five types of outcomes we asked about correspond to the six levels of Bloom's Taxonomy for the cognitive domain, grouping together the first two levels. In general, the lowest levels ("Explain ideas or describe how something does or does not work" in Figure 7) are associated with increasing knowledge and awareness, which builds a foundation for higher-level outcomes. **The higher levels are associated with using knowledge in a meaningful way, and correspond with the types of behaviors required on the job.** (See *Appendix H: Learning Outcomes and Training Objectives* for more information on Bloom's Taxonomy and its relationship to appropriate target outcomes for training.)

When looking at what course participants felt they were able to do as a result of the courses, most participants believed they were able to explain or describe a concept (Bloom levels 1 and 2) and were able to apply information to perform a task or solve a problem (Bloom level 3). This indicates that most participants believed that the courses provided them actionable information related to their job.[28]

[28] It is important to note that self-reporting in the area of cognitive ability and performance tends to be more "optimistic" than results from more objective assessment. That is, people tend to rate themselves higher than their actual performance level as measured by a skilled, objective rater or a performance-based exam.

Figure 7. What kinds of things are you able to do as a result of the course(s) you completed? (multiple response)




# 4.3. PROGRAM EFFECTIVENESS

Through this analysis, we determined whether the Energy Centers are effective in terms of:

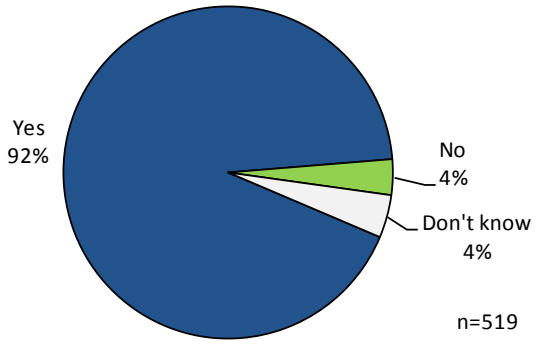
- Meeting the needs of the target market
- Supporting class participants' on-the-job performance
- Following principles and best practices for effective adult education

## 4.3.1 Meeting the Needs of the Target Market

### Meeting Participant Expectations

Overwhelmingly, participants felt the courses successfully met their expectations. Overall, 92% of respondents indicated that the course met their expectations or goals. Of those who did not feel the course was successful in meeting their expectations or goals (17 people), half said the course did not relate to their field or did not address what they needed to learn. Others did not like the course material, did not feel the course helped them find employment, or felt that the breadth of information covered in the class was not enough.

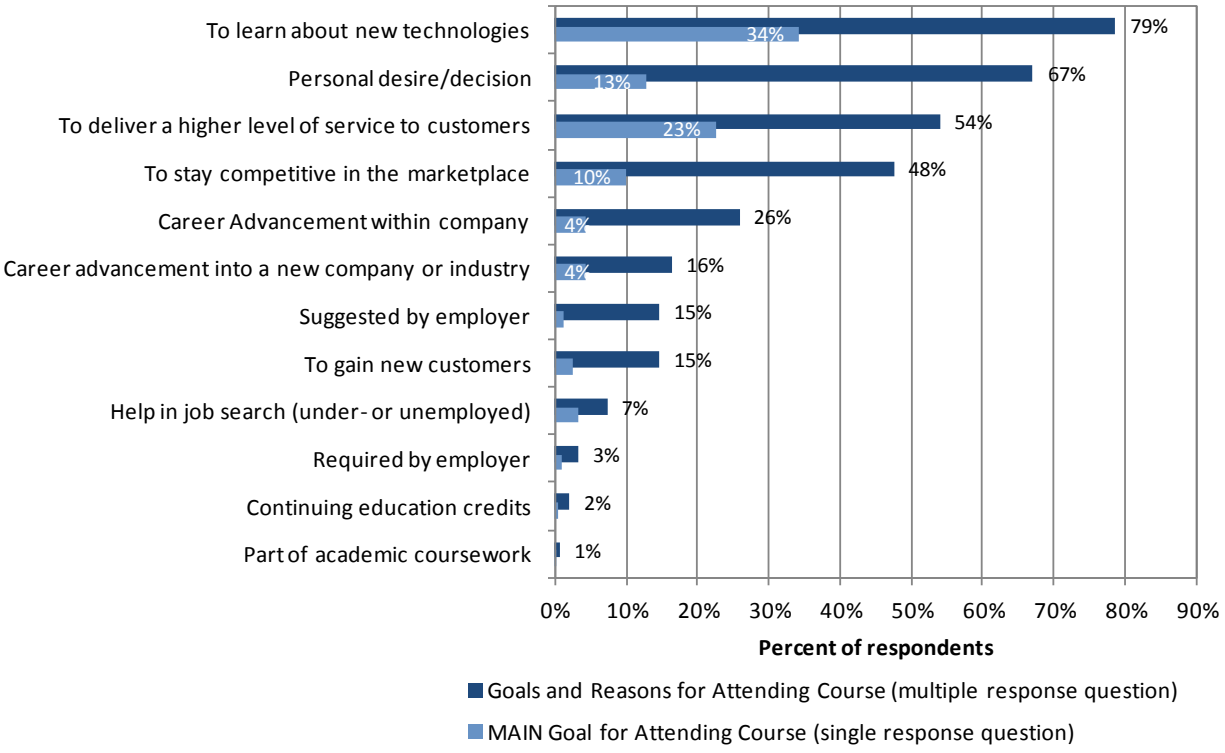
Figure 8. Was the Course Successful in Meeting your Goals?




## Why Individuals Come to the Energy Centers

Learning about new technologies was the primary motivator for attending energy center classes. Almost 80% of respondents indicated it was one of their reasons or goals for attending, while 34% of respondents indicated it was their main reason or goal. Also of high importance to respondents was to deliver a higher level of service to customers (23% indicated it was their main goal or reason for taking the course). While career advancement is part of the Strategic Plan's goals, it is only an explicit top priority for some participants. (While over 25% of participants cited career advancement within their company or into a new company or industry as one reason for attending classes, only 8% cited this as a primary reason.) This information reinforces the Energy Centers' reasoning for wanting to include both broad-based information to the market as well as skill-development information that is relevant to career advancement.

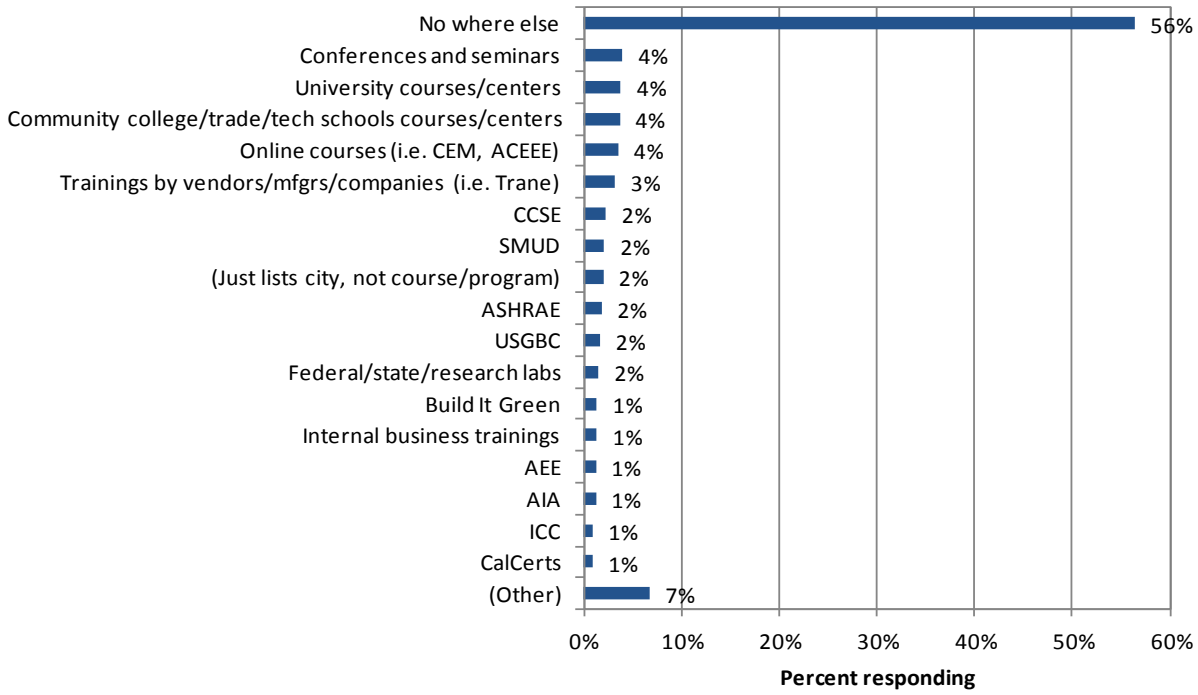
Figure 9. Goals or Reasons for Attending Course




## Filling a Need in the Marketplace

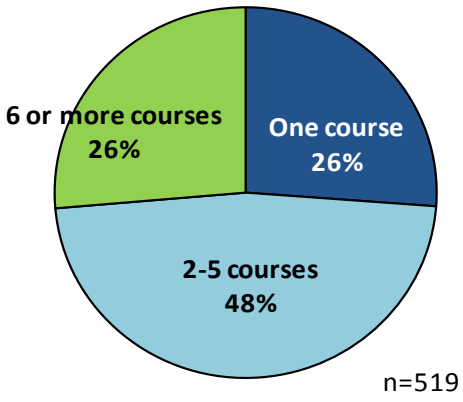
More than half of survey respondents indicated that the Energy Centers are the only place they go for energy efficiency classes, trainings, or other ongoing career education, an indication that the Energy Centers are filling a need in the marketplace and playing a valuable role. As shown in Figure 10, about half (44%) listed a variety of other facilities and organizations, including conferences, universities, community colleges and trade/tech schools, and online courses, but no one source stood out.

**Figure 10. Where else do you go for energy efficiency classes, trainings, or other ongoing career education outside of the Energy Centers?**




In addition, the large proportion of repeat students demonstrates value in what the center is providing and the use of the Energy Centers for ongoing education. Overall, 74% of respondents are repeat attendees, the majority of who took between two and five courses between 2009 and 2011. Respondents who attended six or more courses are likely using the Energy Centers for more of an "education" beyond a single training.

**Figure 11.Number of Courses Attended Between 2009 and 2011**

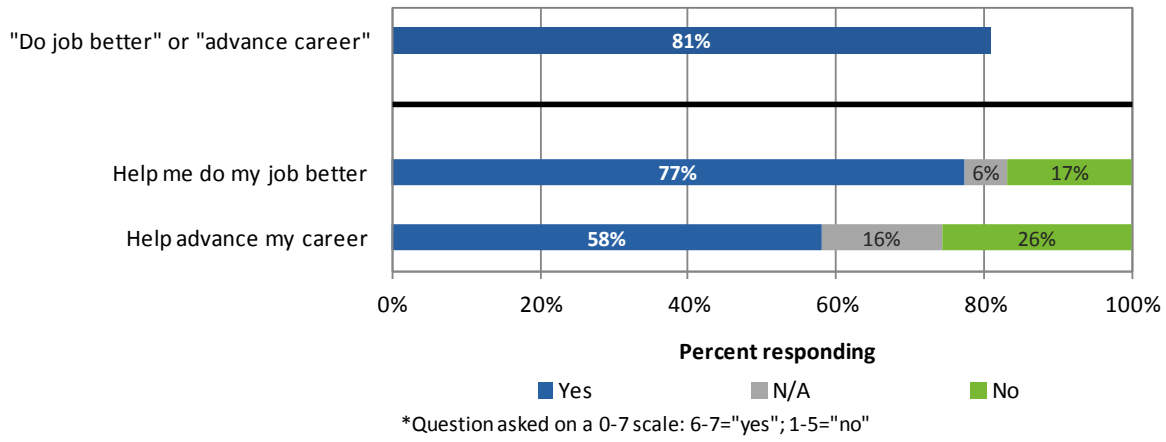



Note: Percentages shown are based on survey responses. Original proportions from participant databases: One course (28%); Two to five courses (41%); Six or more courses (31%)

## Workforce Outcomes

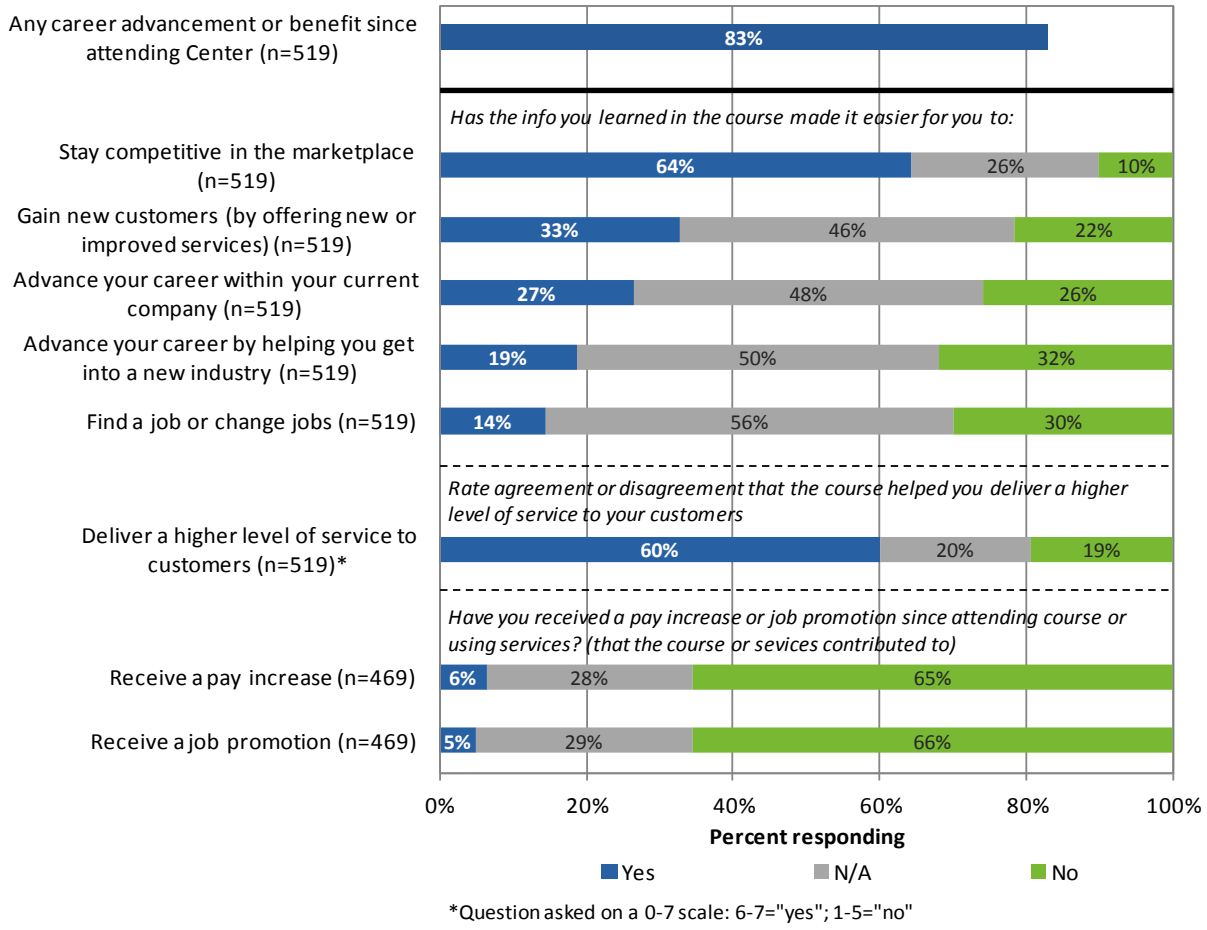
The majority of course participants think the Energy Centers help them to "do their current job better" while about half of participants think the Energy Centers help them to "advance their careers".

Figure 12. Perception of Energy Centers as Career Resources (n=519)




As shown in Figure 13, an overwhelming majority (83%) also realized some kind of career advancement or benefits since attending the course or using services at the center. In particular, many respondents indicated that they were able to stay competitive in the marketplace or deliver a higher level of service to customers.

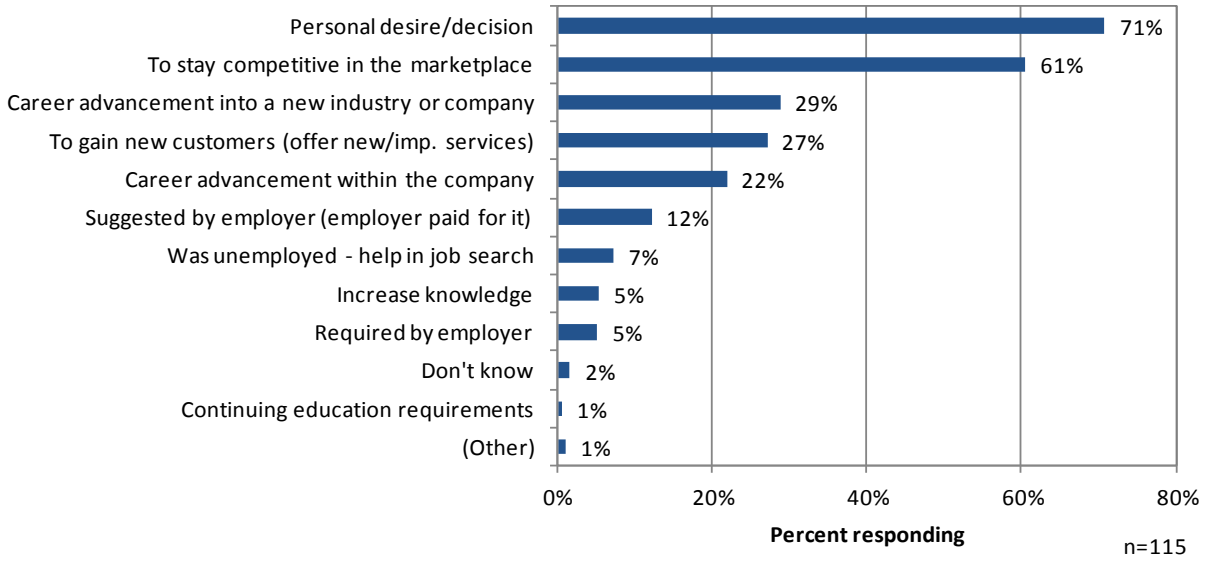
**Figure 13.Career Advancement or Benefits Since Attending the Course or Using Services at the Center**




*Question asked on a 0-7 scale: 6-7="yes"; 1-5="no"

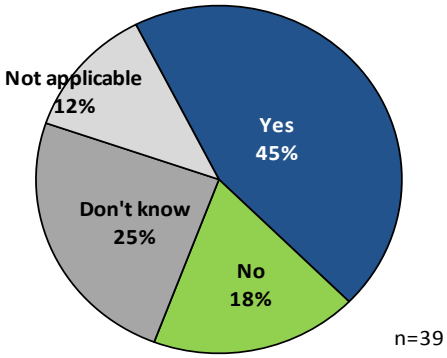
Survey respondents also indicated that obtaining certifications oftentimes helped to advance their careers. Overall, 25% of survey respondents took a course at the center that was part of a certification track, of which 33% obtained certification (another 35% were still in the process of completing certification courses or taking the test at the time of the survey). Therefore, a total of 8% of overall survey respondents got certified with the help of the Energy Centers (and another 8% are in the process). The primary reasons for seeking certification mentioned by respondents were their own personal desire or decision and to stay competitive in the marketplace. The most common certification courses mentioned were NATE, LEED, BOC, and BPI.

Figure 14. Why Participants Originally Sought this Certification




Among those who obtained certification following course attendance, 45% have noticed an improvement in their career standing, such as more job opportunities available, increased credibility with customers being more confident in the services and recommendations they provide, and the ability to participate in and qualify for programs.

Figure 15. Noticed an Improvement in Career Standing after Obtaining Certification




## Participant Satisfaction

Satisfaction with the courses offered at each center was relatively high overall. Instructor knowledge and the course overall received some of the highest ratings at each center, while the technical difficulty of courses was often rated the lowest among participants.

Table 19 through Table 22 show satisfaction scores for each center. In an effort to also determine specific sources of dissatisfaction, the evaluation team analyzed open-ended comments that were provided by respondents who gave ratings below 4 on a scale from 1 to 7.

### *PG&E Energy Centers*

Course satisfaction at the PG&E Energy Centers was generally positive. Overall, PEC courses received slightly lower ratings than ETC, with the exception of instructor knowledge, which received "extremely satisfied" ratings by 88% of respondents at both Energy Centers.

Table 19. PG&E Course Satisfaction

| | Percent of center respondents indicating a "6" or "7" rating<br>Scale: 1 "not at all satisfied"; 7 "extremely satisfied" | | |
|---|---|---|---|
| | ETC (n=111) | PEC (n=156) | PG&E Overall (n=200)* |
| Instructor knowledge | 88% | 88% | 88% |
| Course(s) overall | 85% | 81% | 83% |
| Instructor teaching style | 80% | 78% | 79% |
| Course design (structure and activities) | 77% | 74% | 76% |
| Course materials | 81% | 73% | 77% |
| Times and days courses offered | 80% | 74% | 78% |
| Course duration | 77% | 70% | 73% |
| Technical difficulty of the course | 68% | 65% | 69% |

*Includes ETC and PEC only (not FSTC)

PEC and ETC respondents who gave ratings below 4 (n=14) for any aspects of the course provided the following feedback and suggestions for how the course could be improved (direct quotes from survey respondents are shown in italics).

- Courses could be more detailed or in-depth. Respondents particularly noted that some courses were not technically challenging enough, while others indicated that there was not enough opportunity to get in-depth in the short amount of time available and suggested having longer or multi-day courses.

  *Sometimes specific details and depth of information has been lacking. Buildings are extremely complicated and need very deep analysis. I know this is often difficult to do at short presentations, but I'm ready for longer, more detailed classes.*

  *There is almost too much info covered in one day, could easily be a 2-3 day training class.*

- Courses could be shorter and address the same topics covered.

  *I think the material could have been compressed into a shorter time frame.*

- Courses could be offered more frequently (more dates and times) or offered online.

- Quality of instructors and could be more consistently good.

  *The instructor was not prepared for the class. I took the class again at Laney College and I preferred that class over the one in Stockton.*

- Other students disrupted sessions.

*On multiple occasions, students have derailed the lectures with either their own concerns or with attempts to let people know that they are smart. Instructors should be more firm with these people and push the schedule along.*

Satisfaction with FSTC courses overall is high with five of the eight course aspects being rated a 6 or 7 by 90% or more of survey respondents. However, technical difficulty of courses is rated slightly lower.

Table 20. FSTC Course Satisfaction

| Percent of center respondents indicating a "6" or "7" rating<br>Scale: 1 "not at all satisfied"; 7 "extremely satisfied" | |
|---|---|
| | FSTC (n=50) |
| Instructor knowledge | 98% |
| Course(s) overall | 94% |
| Instructor teaching style | 96% |
| Course design (structure and activities) | 90% |
| Course materials | 82% |
| Times and days courses offered | 88% |
| Course duration | 90% |
| Technical difficulty of the course | 74% |

### *SCE Energy Centers*

Satisfaction with SCE courses is high overall, especially in regards to instructors. Overall, CTAC received slightly higher ratings in each category than did AgTAC.

Table 21. SCE Course Satisfaction

| | Percent of center respondents indicating a "6" or "7" rating<br>Scale: 1 "not at all satisfied"; 7 "extremely satisfied" | | |
|---|---|---|---|
| | AgTAC (n=71) | CTAC (n=113) | SCE Overall (n=182) |
| Instructor knowledge | 87% | 94% | 91% |
| Course(s) overall | 85% | 89% | 87% |
| Instructor teaching style | 83% | 88% | 86% |
| Course design (structure and activities) | 77% | 85% | 82% |
| Course materials | 82% | 84% | 83% |
| Times and days courses offered | 72% | 74% | 74% |
| Course duration | 77% | 83% | 81% |
| Technical difficulty of the course | 66% | 78% | 73% |

CTAC and AgTAC respondents who gave ratings below 4 (n=9) for any aspects of the course provided the following feedback and suggestions for how the course could be improved:

- More hands-on training is needed.
- Some specific classes at AgTAC desired by respondents have been discontinued.
- Courses could provide more detailed or in-depth information.
- Courses were not technically challenging enough.

### *SDG&E and SCG Energy Centers*

Satisfaction with SDG&E and SCG courses also is strong overall, and is noticeably higher among ERC attendees than SDEIC attendees. Again, instructor knowledge is rated the highest, while technical difficulty of the course is rated the lowest.

Table 22. SDG&E and SCG a Course Satisfaction

| | Percent of center respondents indicating a "6" or "7" rating<br>Scale: 1 "not at all satisfied"; 7 "extremely satisfied" | | |
|---|---|---|---|
| | ERC (n=91) | SDEIC (n=87) | SDG&E and SCG Overall (n=166) |
| Instructor knowledge | 89% | 84% | 86% |
| Course(s) overall | 87% | 78% | 83% |
| Instructor teaching style | 82% | 69% | 75% |
| Course design (structure and activities) | 82% | 72% | 77% |
| Course materials | 77% | 71% | 75% |
| Times and days courses offered | 80% | 75% | 77% |
| Course duration | 81% | 77% | 79% |
| Technical difficulty of the course | 74% | 70% | 72% |

ERC and SDEIC respondents who gave ratings below 4 (n=9) for any aspects of the course provided the following feedback and suggestions for how the course could be improved.

- Courses could be more detailed or in-depth.

  *Sometimes the information was too general or some of the underlying principles weren't made clear.*

- Courses could be multi-day sessions when covering a lot of material.
- Courses could be offered more frequently (more dates and times) or offered online.

  *Courses were offered to those somehow able to gain absence from work, for three days, during regular work time hours… Missing three days of work is hard for most of us.*

- Handouts could be improved.

  *The handout should have been a textbook for reference, other than that it is a great course.*

### 4.3.2 Supporting Class Participants' On-the-job Performance

A key aspect of influencing on-the-job performance through education and training is helping participants take appropriate action based on what they learn in a course, as well as ensuring that the content-focus of the training is appropriate to participants' needs.

Adhering to adult learning principles helps ensure participants are able to do what is desired. This issue is addressed in the next section, "Following Principles and Best Practices for Effective Adult Education" beginning on p. 74.

#### Support of Behavior Change — Instructional Design Assessment Results

Three major dimensions, evaluated using the "Support of Behavior Change" yardstick,[29] help ensure that participants are willing and able to take the actions that the training is intended to support.

- Action Motivation addresses issues such as providing students with:
  - Examples of "real world" benefits and implications of recommended actions
  - Guidance on relevant incentive and rebate programs and on "selling" appropriate recommendations to decision makers
- Action Orientation and Support addresses issues such as providing students with:
  - Job aids, worksheets, and checklists to help them assess or analyze their options or help them take a course of action or perform a task.
  - Guidance on where and how to get support for appropriate next steps
- Dissemination Support addresses whether the training is designed to readily enable students to deliver modules of the training to others.

Overall, all Energy Centers' courses performed poorly on all three of these dimensions, with the PG&E courses doing somewhat better than the others. The exception is the two FSTC courses we reviewed, which performed well on the Action Motivation dimension.

[29] As discussed in the "Study Methods" section of this report, the evaluation team developed "yardsticks" we used to conduct the in-depth instructional design assessment. A yardstick is a set of criteria organized into several dimensions reflecting key aspects of what the yardstick is designed to measure. Each dimension has multiple objective criteria we used to rate the training's performance on that dimension. See Appendix E: *Yardsticks Used in ID Assessment* for more information on the yardsticks and the dimensions and criteria they include.

Table 23 summarizes each center's score on the dimensions on the Support of Behavior Change yardstick. The scores reflect the average of all evaluated courses' ratings on all the criteria that compose the dimension. (See "How the Yardsticks Are Used for Rating Learning Materials" in Appendix E: *Yardsticks Used in ID Assessment* for details on how courses were rated and how scoring for a dimension was calculated.)

The best possible score is 100% (all courses meet all the relevant criteria for that dimension); the worst possible score is 0% (none of the courses meet any of the relevant criteria). In general, a score of 72% or higher is considered "good" to "excellent;" a score below 56% is considered "poor" to "very poor." (See Table 32 for details on the rating scheme.)

Table 23. Scores on Support of Behavior Change Yardstick

| Dimensions | PG&E | SCE | FSTC | ERC | SDEIC |
|---|---|---|---|---|---|
| Action Motivation | 49% | 11% | 75% | 10% | 33% |
| Action Orientation | 43% | 21% | 20% | 25% | 13% |
| Dissemination Support | 0% | 0% | 0% | 0% | 0% |

A review of the ratings on the specific criteria that compose these dimensions indicates that the most likely levers to increase direct support of behavior change include:

- Provide relevant job aids (summary guidance to help analyze options, troubleshoot, assess status, perform a procedure, evaluate quality, etc.)
- Include real examples of benefits derived from relevant actions
- Describe relevant incentive and rebate programs

(See Table 43 in Appendix J. *Yardstick Scoring Details* for scores on specific criteria under each of the three dimensions in the Support of Behavior Change Yardstick.)

## Addressing Relevant Content

Addressing content that is relevant to participants' needs and interests also is an important part of supporting class participants' on-the-job performance. Through sector interviews and participant surveys, we learned about how current center offerings meet the content needs of the participants and how effective the courses are in channeling participants to appropriate incentive and rebate programs. In addition, during the instructional design assessment, we looked at how well courses address content relevant to job/role responsibilities and other facets related to the content focus of the training.

### *Sector Interviews*

During the sector interviews, we explored whether the Energy Centers cover the information desired during interviews. While the Sector Representatives agreed that the Energy Centers offer sufficient course topics for their sector, some suggestions for improvement were

offered (shown in Table 24). Notably, many of the Sector Representatives mentioned that they would like to see training topics that the Energy Centers already cover.

Table 24. Suggestions for Additional Training Support

| Sector | Suggestions (Sector self-report) |
|---|---|
| HVAC | ➢ Quality installation and maintenance practices<br>➢ New manuals and Title 24 training |
| Lighting/Day Lighting | ➢ Training for specifiers<br>➢ Energy audit training |
| Architects/Engineers/Design | ➢ Revit (architectural design software) skills<br>➢ Certification training (LEED, CASP)<br>➢ Training on building energy usage and health impacts of technology<br>➢ Training on specialized and advanced lighting<br>➢ Courses on new legislations |
| Codes & Standards | ➢ Builder-specific courses<br>➢ Training for filling out forms for green buildings |
| Building Mgmt and Maintenance | ➢ More structured series of classes<br>➢ Follow-up consultation with instructors<br>➢ Emphasis on building specification and maintenance |

- When asked if the sectors would benefit from more courses related to integrated demand side management (IDSM), all Sectors Representatives agreed that they would like to see more IDSM related courses at the Energy Centers and that there was great need in the marketplace for this type of education. (See "IDSM" under *Learning Focus — Instructional design assessment* on page 71 for a brief discussion on the relevance of IDSM and how it was defined for the purpose of this assessment.)

### *Participant Survey*

We also asked participants about their interest in new courses that the Energy Centers are considering. There is some level of interest in new class concepts among participants, particularly in building science and integrated systems building approaches. The survey asked center participants to rate their level of interest in a list of new class concepts on a scale of 1 (not at all interested) to 7 (extremely interested). While only asked of food service respondents (and consequently results are based on very small sample sizes), courses in codes and standards, greener restaurants, submetering, and solar were of less interest to participants (see Table 25).

Table 25. Interest in New Class Concepts by Center

| | Percent of center respondents indicating a "6" or "7" rating<br>Scale: 1 "not at all interested"; 7 "extremely interested" | | | | | | |
|---|---|---|---|---|---|---|---|
| | ETC (n=111) | PEC (n=156) | FSTC (n=50) | AgTAC (n=71) | CTAC (n=113) | SCG (n=91) | SDGE (n=87) |
| **Building science**[30] | 84% | 76% | 70% | 73% | 83% | 76% | 80% |
| **Integrated systems building approach**[31] | 78% | 74% | 66% | 69% | 77% | 70% | 70% |
| **Fishnick, The Online Toolbox:** How to use the Fishnick website and its resources (FSTC respondents only)* | -- | -- | 62% | -- | -- | -- | -- |
| **Sustainable building** | 67% | 65% | 56% | 54% | 75% | 67% | 68% |
| **Codes and standards:** What are the efficiency codes and standards that apply to food service** | 57% | 52% | 58% | 50% | 55% | 50% | 50% |
| Restaurants Only | | | | | | | |
| **Greener Restaurants workshop:** Hands on seminar on how to apply the National Restaurant Associations Conserve Sustainability Education program to your operation** | 52% | 42% | 60% | 30% | 73% | 50% | 67% |
| **Submetering:** How to measure energy use in restaurants using the metering tools available ** | 48% | 49% | 62% | 30% | 55% | 38% | 33% |
| **Solar:** Solar thermal and photovoltaic technologies and how they might be applied to food service** | 52% | 42% | 54% | 50% | 55% | 31% | 33% |

*Question asked of FSTC respondents only.

**Question asked of food service respondents only. ETC n=23; PEC n=33; AgTAC n=10; CTAC n=11; SCG n=16; SDGE n=6

[30] Definition of Building Science provided in the participant survey: "classes that cover multiple technologies (i.e., mechanical, building envelope, lighting, solar, water, etc.) and their relevance to one another."

[31] Definition of Integrated Systems Building Approaches provided in the participant survey: "how an integrated systems approach optimizes overall demand management, affecting energy efficiency, demand response, and smaller renewable energy systems."

**Program Channeling**

The Energy Centers offer many courses that are relevant to participation in IOU-sponsored energy efficiency programs. We found evidence that the Energy Centers are providing the relevant knowledge in this area. More than 60% of participants indicated that the course(s) they took helped them understand a program or technology better so they could participate in an energy-related program, and over half of participants through each IOU indicated that their participation or attendance in the course(s) resulted in them, their employer, or their clients participating in an energy-related utility program.

As shown in Table 26, participants at ETC, FSTC, CTAC, and SCG were the most likely to indicate that the course(s) they attended helped them to understand a program or technology better so they could participate in a program. However, in regards to actual participation in an energy-related utility program as a result of course attendance, ETC, AgTAC, and SDG&E indicated higher levels of participation.

Table 26. Program Channeling by Center

| | ETC | PEC | FSTC | AgTAC | CTAC | SCG | SDG&E |
|---|---|---|---|---|---|---|---|
| Course helped respondent understand a program or technology better so they could participate in an energy-related program (Percent responding "6" or "7" on 1-7 scale: 1 "Completely disagree" 7 "Completely agree") | 71% (n=111) | 68% (n=156) | 76% (n=50) | 65% (n=71) | 77% (n=113) | 73% (n=91) | 57% (n=87) |
| Participation/attendance in the course(s) resulted in respondent, employer, or clients participating in an energy-related utility program *(valid percents shown, combined yes and partial responses)* | 67% (n=82)) | 60% (n=124) | 56% (n=45) | 63% (n=53) | 49% (n=100) | 48% (n=79) | 66% (n=70) |

## *Learning Focus — Instructional design assessment*

The evaluation team used the "Learning Focus" yardstick to assess how well the courses focused on topics related to the needs of the target audiences.[32] Table 27 shows the overall scores for the sample of courses included in the ID assessment on three dimensions of the Learning Focus Yardstick (workforce enablement, soft skills/remedial skills and IDSM). Following the table are brief discussions about each of these dimensions.

[32] "Yardstick" refers to a set of criteria that the evaluation team used during the instructional design assessment. On each yardstick, related criteria are grouped together to provide ratings of course performance on various dimensions of the training. See **Appendix E**: ***Yardsticks Used in ID Assessment*** for more information on the yardsticks and the dimensions and criteria they include

Table 27. Scores on Learning Focus Yardstick

| Dimensions | PG&E | FSTC | SCE | SCG | SDG&E |
|---|---|---|---|---|---|
| Workforce Enablement | 82% | N/A | 60% | 59% | 61% |
| Soft Skills and Remedial Skills | 4% | 0% | 0% | 0% | 0% |
| IDSM | 12% | N/A | 3% | 10% | 13% |

In general, a score of 72% or higher is considered "good" to "excellent;" a score below 56% is considered "poor" to "very poor." (See Table 32 for details on the rating scheme.)

(See Table 45 in Appendix J: *Yardstick Scoring Details* for scores on specific criteria under each of the three dimensions in the Learning Focus Yardstick.)

**Workforce Enablement**

The Workforce Enablement dimension addresses whether a course:

- Is targeted to job/role responsibilities
- Provides "real world" examples and relates content and concepts to on-the-job responsibilities
- Helps develop skills that are useful on the job
- Supports relevant certification

As shown in Table 27, the courses included in the PG&E sample performed well on the workforce enablement dimension overall. Courses in the SCE, SDG&E, and SCG samples scored significantly lower on this dimension, largely because the courses did not focus on **applying** the information presented to situations that parallel the types of things they need to do on the job.

Most courses reviewed in the instructional design assessment were well targeted to specific job/role responsibilities and clearly related the content and concepts addressed in the course to those responsibilities. Most of the courses also provided examples that reflected how the information addressed could be used on the job. In addition, the vast majority of the courses reviewed had a clear relationship to support of certification, and several directly supported certification by coaching students on the specific content areas and types of questions that they would encounter on the relevant certification exam.

It is important to note that, with the exception of four SCE courses,[33] **all the courses in the sample were randomly selected from a pool of courses that the Energy Centers had identified as high in the criteria associated with workforce enablement**. Therefore, it may be

[33] Four of the 25 courses in the SCE sample were not in the pool of courses identified as high in the criteria associated with workforce enablement. Those four courses (three Irwindale courses and one Tulare course) were included for the purposes of the in-person instructional design review. We had originally scheduled to attend courses that were in the pool of courses identified by the IOUs as high in characteristics associated with workforce enablement. However, several of those courses were cancelled. The resulting scheduling challenges, combined with a request by SCE that we focus on courses that were part of the "mainstream" curriculum and taught by SCE instructors, led us to in-person audits of some courses that were not in the original pool.

assumed that the general population of courses likely would score significantly lower on this dimension than the courses we considered in the instructional design assessment.

See Figure 17 through Figure 19 in Appendix B: *Course Scoring Differences* for a comparison of how the IOUs and the evaluation team rated courses in the sample on the characteristics associated with the Workforce Enablement dimension of the Learning Focus Yardstick.

See "Identify Courses with Characteristics Associated with Workforce Enablement" in the Study Methods section on page 26 for more information on how the courses were selected for the instructional design assessment.

#### Soft and Remedial Skills

The area of "soft skills" and "remedial skills"[34] (data points added to the yardstick at the request of CPUC ED) is one that the courses we included in our instructional design assessment generally do not address. This is to be expected because neither soft nor remedial skills have been considered as part of the Energy Centers' charter. In addition, the selection criteria we used to identify courses to include in the pool may have filtered out some courses that address soft skills or remedial skill. (See Appendix F: *Course Selection Criteria* for more information on how courses were identified for inclusion in the pool from which the sample was selected.)

- However, carefully targeted soft skills may be an appropriate addition to some of the courses offered at the Energy Centers. For example, training targeted to building operations personnel might appropriately include "how to sell your recommendations for energy efficient equipment to the decision makers."

#### IDSM

- The area of integrated demand-side management (IDSM) is important in light of the California Strategic Plan. Ensuring that Energy Centers incorporate IDSM into their course offerings is a new directive for the Energy Centers. We included this metric in our instructional design assessment to provide a baseline measurement that the Energy Centers can compare to over time as they increase this focus in their course offerings.

For the purpose of this evaluation, IDSM content is defined as addressing one of two approaches to integrated demand-side management. These two definitions are the same as the definitions agreed on between the IOUs and the CPUC:

- Building System — Includes information on at least two building systems (i.e., mechanical, building envelope, lighting, solar, water, etc.) and how an integrated systems approach optimizes overall demand management, affecting energy efficiency, demand response, and smaller renewable energy systems

[34] "Soft skills" refers to things such as communications, sales and marketing, negotiation, management and coaching, and other people skills. "Remedial skills" refers to training that is intended to overcome deficiencies in specific areas that the students would typically would be expected to know. For example, helping someone "catch up" on basic math or basic science skills would be an example of remedial skills training.

- **Multiple Technologies** — Technologies addressed can be used to fulfill at least two of the following: energy efficiency, demand response, and distributed generation. (IDSM technology examples would include dimming ballasts, Energy Management Systems, controls, or any technology with a work paper that includes both kW and kWh savings.)

During our instructional design review, we found that the majority of courses that clearly had IDSM content reflected the "Multiple Technologies" approach. Most of these courses addressed energy efficiency and demand response. Very few addressed distributed generation.

- When we compared the evaluation team's assessment of IDSM content to that of the Energy Centers' assessment of IDSM content for the same courses,[35] we found that the evaluation team estimated a significantly lower percentage of IDSM content for most courses.

- Table 28 compares the Energy Centers' assessment of IDSM content to the review team's assessment. The courses reflected in the table are those that were selected for the instructional design review. The percentages for each IOU indicate the percentage of courses that addressed IDSM at a given level. (For example, the evaluation team found that 8% of the PG&E courses in our sample had 10 to 49% IDSM content; center staff, considering the same courses, found that 44% of the courses had 10 to 49% IDSM content.)

For all IOUs, the evaluation team estimates of level of IDSM content was significantly lower than the Energy Centers' estimates. This difference was less pronounced for the PG&E courses than for the SCE, SDG&E, and SCG courses.

**Table 28. Comparison of Evaluation Team's and Energy Centers' Assessment of the Level of IDSM Content in Courses**

| IOU (classes) | Estimated by Evaluation Team | | | Reported by Energy Centers | | |
|---|---|---|---|---|---|---|
| | ≥ 10% IDSM content | 10 – 49% IDSM content | 50 – 100% IDSM content | ≥ 10% IDSM content | 10 – 49% IDSM content | 50 – 100% IDSM content |
| PG&E (n= 25) | 8% | 8% | 0% | 44% | 44% | 0% |
| SCE (n=25) | 4% | 4% | 0% | 96% | 88% | 8% |
| SDG&E and SCE (n=12) | 17% | 0% | 17% | 100% | 50% | 50% |

The evaluation team was concerned about the dramatic difference between our findings and those reported by Energy Centers. To help us understand the discrepancy, we conducted a "normalization spot check" with an individual at PG&E who had been closely involved in developing the relevant definitions with the CPUC. This normalization session confirmed that

[35] When identifying courses that were high in characteristics associated with workforce enablement in order to focus our sample of courses to review, we collected information from the Energy Centers about their assessment of the level of IDSM content each of their courses addressed. We found we were unable to include courses high in IDSM content as a selection criterion because, combined with the other selection criteria, it resulted in a pool that was too small to support our target sample size.

— for some courses — there is a definite disconnect between the IDSM estimates from Energy Centers and estimates that would be given by a "neutral third party" reviewing the relevant materials. In addition, the evaluation team and the PG&E IDSM subject matter expert discussed other issues that may have contributed to the differences in ratings.

Factors that may have caused the difference between the evaluation team's ratings and the Energy Centers' ratings of course IDSM content include:

- Some courses were rated higher by the Energy Centers than the materials actually warrant.

  During the "normalization spot check" with the IDSM subject matter expert, we jointly reviewed materials for three courses that showed a marked difference between the evaluation team's rating and the Energy Centers' rating of IDSM content.

  - For the first course, the evaluation team rated it as having less than 10% IDSM content; the center rated it as having 10 to 49%.
  - For the second course, the evaluation team rated it as having no (0%) IDSM content; the center rated it as having 10 to 49% IDSM content.
  - For the third course, the evaluation team rated it as having no (0%) IDSM content; the center rated it as having 50 to 100% IDSM content.

  In all three cases, the IDSM subject matter expert agreed with the evaluation team's assessment of the level of IDSM content reflected in the course materials.

- The Energy Centers may have interpreted the "Multiple Technologies" component of the IDSM definition more broadly than the evaluation team.

  The evaluation team considered a course to have IDSM content only if the **course materials indicated that technology could fulfill at least two of the three target areas** (energy efficiency, demand response, and distributed generation).

  The Energy Centers may have considered a course to have IDSM content if the technology was addressed — regardless of whether the course made it clear that the technology could meet two or more facets associated with IDSM.

  For example, consider two courses we reviewed:

  - One course mentions dimming ballasts and daylighting controls, and describes how these technologies can increase energy efficiency. The course does not mention how they can be used for demand response.
  - Another course focuses on programmable logic controllers and how they can be used to improve energy efficiency. The course does not address how they can be programmed to reduce demand in response high peak loads.

  In both these cases:

  - The ID team rated the course low in IDSM, since the materials did not note that these technologies can be used to support demand response; rather the information focused solely on the energy efficiency aspects of the technology.
  - The center rated the course relatively high in IDSM. The reason for the higher rating may have been because these technologies **could** be used for demand response, even though the courses did not mention this.

- The Energy Centers may have considered "supplemental information" that was not reflected in the materials that the evaluation team reviewed.

  For example, the center staff estimating the level of IDSM content may know that an instructor often includes a discussion of IDSM in a class, even though the course materials themselves do not address IDSM. For most of the courses that were included in the instructional design review, we based our ratings solely on a review of materials, so could not consider what the instructor might add during delivery.

- The evaluation team members conducting the review of materials may not have recognized some content that would be included in the definition of IDSM.

  The team members who conducted the instructional design review of materials have had many years of experience in the field of energy efficiency, demand response, and distributed generation training. It is unlikely that this team missed common, established technologies in these areas.

  However, the agreed definition of IDSM includes "any technology with a work paper that includes both kW and kWh savings." Some courses may have addressed new or emerging technologies that fit this definition that the evaluation team did not recognize.

### 4.3.3 Following Principles and Best Practices for Effective Adult Education

One goal of this assessment was to explore whether the Energy Centers are using effective learning strategies for the target audience and determine whether improvement can and should be made in this area.

Adult learning principles and best practices reflect a combination of sound course design (and supporting materials) and of instructor technique that is crucial to achieving an effective and meaningful learning experience. Courses that employ adult learning principles and best practices are more likely to achieve the targeted training goals and affect participants' behavior outside the training environment. (See Appendix I: About Adult Learning Principles and Practices for more information on the rationale for and benefits of adhering to adult learning principles.)

Therefore, our evaluation explored whether and how the Energy Centers are following these principles and practices. This was initially explored through staff in-depth interviews and more rigorously explored through an instructional design assessment.

To help ensure a common understanding of what we meant by "adult learning principles" when talking with IOU staff, we summarized the principles and best practices and provided some examples as noted in the second two columns of Table 29. These principles/practices and examples are a streamlined summary of the criteria in the Adult Learning Yardstick[36] we

[36] As discussed earlier in this report, the evaluation team, in conjunction with center and CPUC staff, developed sets of specific criteria, which we refer to as "yardsticks," to facilitate the in-depth instructional design review of courses. Each yardstick is organized into several dimensions that reflect key aspects of what the yardstick designed to measure. Each dimension is composed of several specific, objective criteria. See Appendix E: *Yardsticks Used in ID Assessment* for more information on the yardsticks and the dimensions and criteria they include.

used in the in-depth instructional design review of courses. The yardstick dimensions that correlate to the principles/practices we discussed with center staff are noted in the first column of Table 29.

Table 29. Overview of Adult Learning Principles

| Adult Learning Yardstick Dimension | Adult Learning Principle/Practice | Examples |
|---|---|---|
| Learner orientation, buy-in, engagement | Focus on the learner | ➢ Explain benefits; relate to participants' "real world" needs<br>➢ Reflect participants' roles, experience, and background<br>➢ Engage participants, rather than "spotlight" the instructor |
| Learner success engineering | Engineer for success | ➢ Use examples, stories, analogies that participants can relate to<br>➢ Give "real world" context for new information<br>➢ Focus on essentials; address a reasonable amount of information for timeframe |
| Practice, application, interactivity | Provide practice | ➢ Engage participants solving problems<br>➢ Include individual, small-group, and/or whole-group exercises to check understanding and apply learning<br>➢ Include opportunities to transfer to the "real world" |
| Lesson plan and content decisions | Focus on desired outcomes | ➢ Establish the learning objectives (specific, observable, measurable)<br>➢ Build presentations and activities around the objectives |
| Learning facilitation and feedback | Provide feedback | ➢ Solicit participants' ideas and questions<br>➢ Communicate "how well" participants did in class activities |
| Assessments | Assess progress | ➢ Use "formative" evaluations (for example, "Check Your Understanding" opportunities) throughout the training to ensure participants are meeting the objectives for each segment of the training<br>➢ Use a test, "final project," or other "summative" evaluation method to determine whether participants met the course objectives |

## Staff Interview Findings

Based on center staff interviews, a summary of the center's familiarity with adult learning principles (ALP) is presented in Table 30.

Table 30. Center Familiarity with Adult Learning Principles

| IOU | Adult Learning Principle Status from Center Staff Interviews |
|---|---|
| PG&E Energy Centers | ➢ Commercial and Residential Energy Centers are familiar and taking steps:<br>• Some staff trained on (ALP) and incorporating changes into their courses<br>• Working with an ID consultant to assess a sample of their current courses<br>• FSTC unfamiliar with ALP, most of their courses/training are done through hands-on and interactive lessons and activities (often using the customer's own equipment in a restaurant setting) |
| SCE Energy Centers | ➢ Energy Centers have embraced ALP by committing to continuous internal training All but newest instructors are well-versed in ALP:<br>• Have good understanding of how to apply ALP to courses<br>• Use impact evaluations and exit surveys to evaluate effectiveness<br>• Credit change in customer satisfaction and behavior to ALP |
| SDG&E and SCG Energy Centers | ➢ SCG has not done any formal ALP training but tries to share ALP information with instructors on an as-needed basis<br>➢ SDG&E has not done any formal ALP training but reviews courses and tries to incorporate hands-on approaches when applicable<br>➢ SDG&E and SCG Energy Centers also benefit from SCE's formalized ALP training provided to instructors, since a significant number of instructors teach at both SCE and SDG&E and SCG Energy Centers. |

## Instructional Design Assessment Findings

For the Instructional Design Assessment, we evaluated 67 courses that were randomly sampled from the pool of courses that the Energy Centers identified as having the characteristics associated with workforce enablement, as described in Table 31.

It is important to note that the pool of courses from which we drew the sample of courses evaluated in the instructional design assessment is based on the **Energy Centers' assessment** of a course's characteristics. Comparing the Energy Centers' ratings and the evaluation team's ratings of the courses included in the sample, Energy Centers' ratings are generally higher than the evaluation team's ratings, particularly in the areas of skill development and general adherence to adult learning principles. (See Appendix B: *Course Scoring Differences* for more information.)

Table 31. Characteristics of Courses in Sample for Instructional Design Assessment

| Attribute | Characteristic |
|---|---|
| Core Job Responsibility Focus | Medium to High |
| Certification | Direct Support or Clear Relationship |
| Adult Learning | Medium to High |
| Frequency | Offered at least once/year |

| Attribute | Characteristic |
|---|---|
| Skill Development | Apply level or higher |

During the assessment, a team of two independent raters evaluated the course materials using the Adult Learning Yardstick. Their ratings were normalized and the resulting ratings on specific criteria for all courses were averaged to obtain overall scores for each dimension on the yardstick. (See "Instructional Design Assessment" on page 25 in the Study Methods section of this report for more information.)

A course that meets all the criteria for a dimension scores 100%; a course that meets none of the criteria scores 0% on that dimension. Table 32 summarizes the rating scheme that can be used to interpret the results for Adult Learning Principles Yardstick.

**Table 32. Rating Scheme for Performance on Dimensions for Adult Learning Principles**

| Score Range | Interpretation |
|---|---|
| 86% to 100% | Very Good to Excellent |
| 71% to 85% | Good |
| 56% to 70% | Fair |
| 36% to 55% | Poor |
| 0% to 35% | Very Poor |

As shown in Figure 16, considering the courses from all Energy Centers collectively, the review of course materials and the observations of in-class deliveries, resulted in relatively poor scores across all dimensions except Learning Facilitation and Feedback (which focuses on how well instructors perform in the classroom).

**Figure 16. Overall Cross-Center Course Performance on Key Dimensions for Adult Learning Principles**

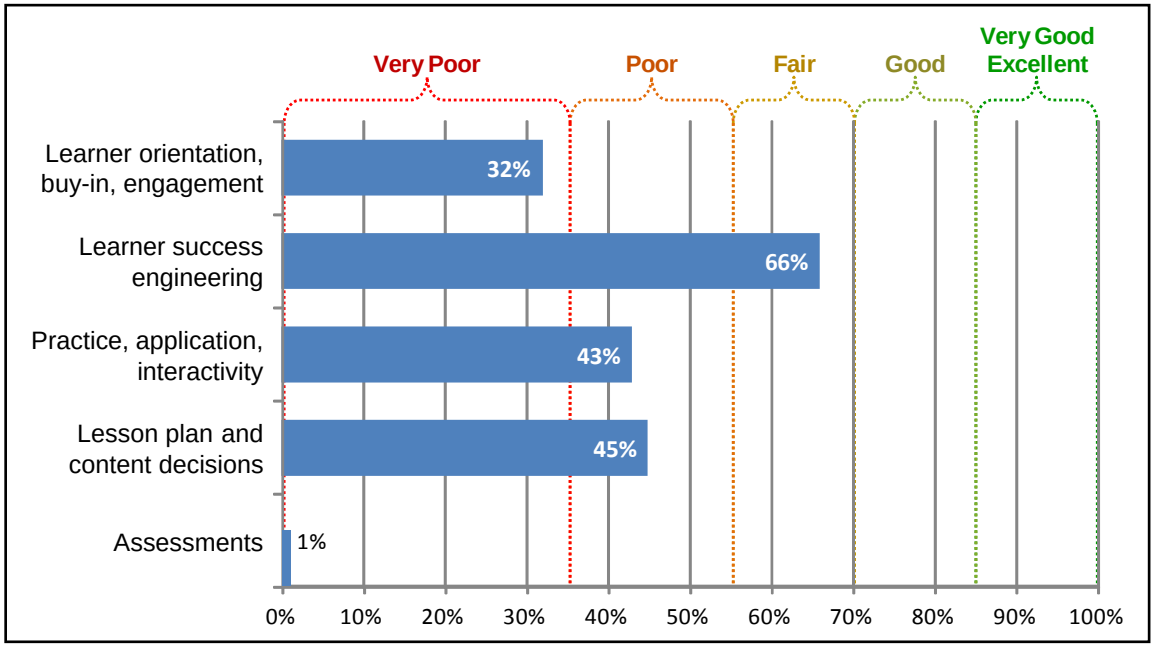


Table 33 presents IOU-specific scores on the main dimensions of the Adult Learning Yardstick. Details by center and for each criterion under these dimensions are found in Appendix J: *Yardstick Scoring Details*.

- Courses included in the in-person instructional design evaluation generally did very well in the criteria associated with Learning Facilitation and Feedback.

  The criteria under this dimension focus on the instructor's ability to manage the classroom environment, build rapport, explain information, and demonstrate respect for the participants.

  (Courses for which we performed only a review of materials were scored "na" on the criteria associated with this dimension. SCE's score on this dimension is low because only six SCE courses were audited in person, and two of the instructors did poorly on several criteria. The other four SCE instructors generally scored well in all criteria for this dimension.)

- Most courses scored "fair to very poor" in the other dimensions, with the exception of many PG&E courses, which did well on the "Lesson plan and content decisions" and "Learner success engineering" dimensions as well as the "Learning Facilitation and Feedback" dimension.

**Table 33. Scores on Adult Learning Yardstick**

| Dimensions of the Adult Learning Yardstick | PG&E | FSTC[37] | SCE | ERC | SDEIC |
|---|---|---|---|---|---|
| Learner orientation, buy-in, engagement | 54% | 56% | 27% | 13% | 36% |
| Learner success engineering | 82% | 90% | 59% | 66% | 64% |
| Practice, application, interactivity | 60% | 39% | 25% | 10% | 32% |
| Lesson plan and content decisions | 89% | 67% | 51% | 44% | 63% |
| Learning facilitation and feedback | 92% | na | 61% | 100% | 100% |
| Assessments | 13% | 0% | 6% | 20% | 0% |

Considering the scores on individual criteria (see Appendix J: *Yardstick Scoring Details*), the most prevalent reasons for courses scoring low on the Adult Learning Yardstick are:

- Very few of the courses have learning objectives that reflected what class participants are expected to be able to **do** as a result of the training.

  - 33% of courses have objectives.

  - Of the courses with objectives, less than half (48%) state what the **student** will accomplish as a result of the training. (Most objectives tended to reflect what the instructor would do during the course — not what the student would do.)

[37] The FSTC courses apparently are not intended to develop skills or even directly affect on-the-job performance. Rather, by design, the intent of FSTC courses is to disseminate information about energy efficiency technologies. In that light, they do well in terms of adult learning principles.

Lack of student-oriented learning objectives leads to a lack of clarity regarding what the course is intended to accomplish in terms of students' capabilities, competencies, and behaviors. This, in turn, leads to a poor focus for the learning experience and makes assessment of whether the course is accomplishing its goals very difficult.

- Most of the courses were very "content laden," with little time for participants to discuss and assimilate the information presented.

  Only 27% of the courses were rated as having an appropriate amount of content for the time period, with many courses averaging less than two minutes per information-rich slide.

- Only about half (52%) of the courses included any type of activity designed to allow participants to check their understanding of information or concepts or practice key skills.

- Very few (1%) of the courses incorporated an assessment that would indicate whether an individual attained the training goals.

### *Predominance of Expert Presenter Approach*

Most of the courses (particularly SCE, SDG&E, and SCG courses) reflected the "Expert Presenter" approach in both the training design and the instructor's technique. This emphasis on the instructor as expert raises concerns about courses' effectiveness in enabling the workforce and effecting the desired change in on-the-job behavior. In general:

- The **Expert Presenter** approach is **effective in creating awareness** of new information, but is **not** as effective in accomplishing the other desired goals of the training (increasing knowledge, changing attitudes, affecting behavior, and improving on-the-job performance).

  In the Expert Presenter approach, the experience is a passive process of being "educated," with the focus on the expert:

  - The expert presents wisdom and experience while the learners passively listen and absorb.
  - The learners' prior experiences are not considered very relevant.
  - Learners typically have little or no opportunity to use in class what they have learned from the expert and receive appropriate feedback and coaching.

  The predominance of the Expert Presenter approach is an underlying cause behind many of the low scores on the Adult Learning Principles Yardstick.

- The Learning Facilitator approach is necessary to accomplish higher-level objectives that develop skills and enable the learner to apply information on the job in meaningful ways.

  In the Learning Facilitator approach:

  - The learning experience is designed around specific performance objectives that describe the desired outcome in terms of what the participants will be able to **do** as a result of the training.
  - Participants engage in activities that allow them to practice the relevant skills and apply the relevant knowledge.

- The facilitator guides the participants' learning experience, tailoring presentations to participants' skills and knowledge and providing appropriate coaching and feedback during activities.

See Appendix I: *About Adult Learning Principles and Practices* for more information on the Expert Presenter and Learning Facilitator approaches as well as the rationale for the dimensions and criteria addressed in the Adult Learning Yardstick.

# 5. RECOMMENDATIONS

Based on the evaluation findings presented in this report, we recommend the following to increase strategic plan alignment and program implementation effectiveness:

- **Make course information easily transferable to others to extend reach**: Most supervisors and people in a position to share information said courses provided information that was easy to share with their employees/clients. However, some additional materials or improvements to existing materials to help ensure this sharing of information are encouraged. The Energy Centers should consider making course materials available online/electronically (i.e., PowerPoint files), developing more actionable handouts such as step-by-step guides that can be referenced on the job, providing more visual materials (i.e., photos, diagrams), and/or providing additional references/links/resources to supplement coursework.

- **Consider additional course topics and continue to increase IDSM content in all courses where possible**: We suggest that the Energy Centers review the participant and Sector Representatives' suggestions for additional training support (see Table 24 and Table 25) against current offerings and determine whether new courses are needed. If the Energy Centers already offer courses that cover these topics, they should focus on increasing the awareness of these courses in the marketplace. In addition, Sector Representatives indicated that they need more IDSM training and the Energy Centers should continue efforts to increase IDSM content as they continue to develop sector strategies and improve course content.

- **Consider alternate delivery methods for courses mostly focused on information dissemination**: The Internet can be a very effective tool for courses primarily focused on sharing knowledge and not necessarily training on specific job-related skills. An upfront investment in Internet courses (i.e., podcasts, webinars, expert videos, and simple web-based self-studies) may save money and resources in the future while also extending the reach of the Energy Centers by addressing geographic and time barriers to participation.

- **Consider incorporating more Adult Learning Principles and following the Learner-Facilitator method for course delivery**: Incorporating more ALPs and following the Learner-Facilitator model will help the Energy Centers facilitate more skill development, increase the likelihood of behavior change on the job, and help address the need for more hands-on training. Specifically, the Energy Centers should focus limited resources on developing a few courses that target the main skill training needed for specific sectors or job roles. These courses should be geared to developing the skills needed on the job. These courses should:

  - Build from performance objectives based on roles and responsibilities
  - Emphasize "hands-on" practice of skills and application of knowledge
  - Include ample examples based on "real world" scenarios
  - Provide job aids to support performance after class (summary guidance to help analyze options, troubleshoot, assess status, perform a procedure, evaluate quality, etc.)

- **Readdress the Centergies Logic Model and Program Theory**: Since the Strategic Plan and Needs Assessment have asked the Energy Centers to re-focus their activities and goals, the Energy Centers should revisit the program objectives and theory by showing how their efforts lead to "a better trained workforce" or "advancement in the workplace." The theory should

also capture the new sector strategies component in terms of activities and outcomes and possibly the re-focus of activities outside of courses that provide support to external educational and disadvantaged-focused organizations.

# Appendix A. BOC Response to Previous Evaluation Recommendations

- For the BOC program, we document changes that have been made to the program in response to the evaluation findings and recommendations from the CA program's 2006-2008 cycle.

Table 34. BOC Response to 06-08 Evaluation Recommendations

| Recommendation | Program Change and Status |
|---|---|
| Consider adding web-based classes (reduce drop out and recruit students from small orgs) | ➢ Added four-part webinar series each year (starting in 2010) so students can make up missed classes, increase flexibility, and decrease drop-out rate. |
| Consider adding evening and weekend classes | ➢ (Same as above) |
| Consider establishing stronger links to IOU programs in the curriculum | ➢ Integrated info on IOU rebate and incentive programs into curriculum<br>• BOC workbook revised to include a new assignment focused on introducing utility energy efficiency<br>• Representatives from each IOU invited to speak during each BOC course series |
| Think about what differences should exist between Level I and II trainees | ➢ New curriculum which should differentiate more between Level I and II being piloted in Fall 2011 (10 new modules - addition made possible through US DOE grant) |
| Consider making some advance class material mailings | ➢ Starting fall 2010, advance prep materials for new students are disseminated (electronically) prior to beginning of course. |
| Quality control processes for updating database | ➢ Meeting with program evaluators to discuss database improvements has not yet been scheduled. |
| Consider maintaining database of exit survey results | ➢ All exit surveys are being entered into a database consistently. |
| Increase efforts to market the program to smaller firms | ➢ Recommendation accepted, no activity yet. |
| Increase efforts to strengthen new marketing channels | ➢ Identified opportunities with IOUs to serve their partnership programs<br>• A minimum of two course series were held in each program year (starting in 2010) to serve local government, BOMA, and Federal sector partnerships |
| Encourage instructors to fulfill in-class activities as they are designed | ➢ Established performance metrics for instructors (incorporated into exit surveys) with intent of increasing and strengthening in-class activities and discussions, and debriefing of homework assignments |
| Implement meaningful discussion of | ➢ (same as above) |

| Recommendation | Program Change and Status |
|---|---|
| homework assignments | |
| Improve the final exam and related process so that passing clearly indicates that a student has met the class objectives | ➢ Revised class exams to align better with learning objectives (completed 2010; piloting 2011) |

# Appendix B. Course Scoring Differences

Based on the self-ratings from the Energy Centers, it appears as if the Energy Centers' portfolios of courses do well in key areas intended to develop and enable a green workforce. However, it is important to note that, for the sample of courses that were included in the in-depth instructional design review, the ID team's ratings of courses on these criteria was generally lower than the Energy Centers' ratings. This gap between the Energy Centers' ratings and the ID team's ratings was particularly noticeable in the areas of:

- Skill Development
- Adult learning

  (PG&E is an exception: the Energy Centers' ratings and the ID team's ratings were relatively close in this area, and the ID team actually had a higher overall rating for PEC courses than the center staff.)
- IDSM content

  (Possible reasons for this gap are discussed in section 0)

Figure 17 through Figure 21 compare the average rating by the Energy Centers and by the ID team. (See Appendix G: Strategic Alignment for details.)

**Figure 17. Support of Certification — Comparison of Center and ID Team Ratings (Courses in the ID Review Sample)**

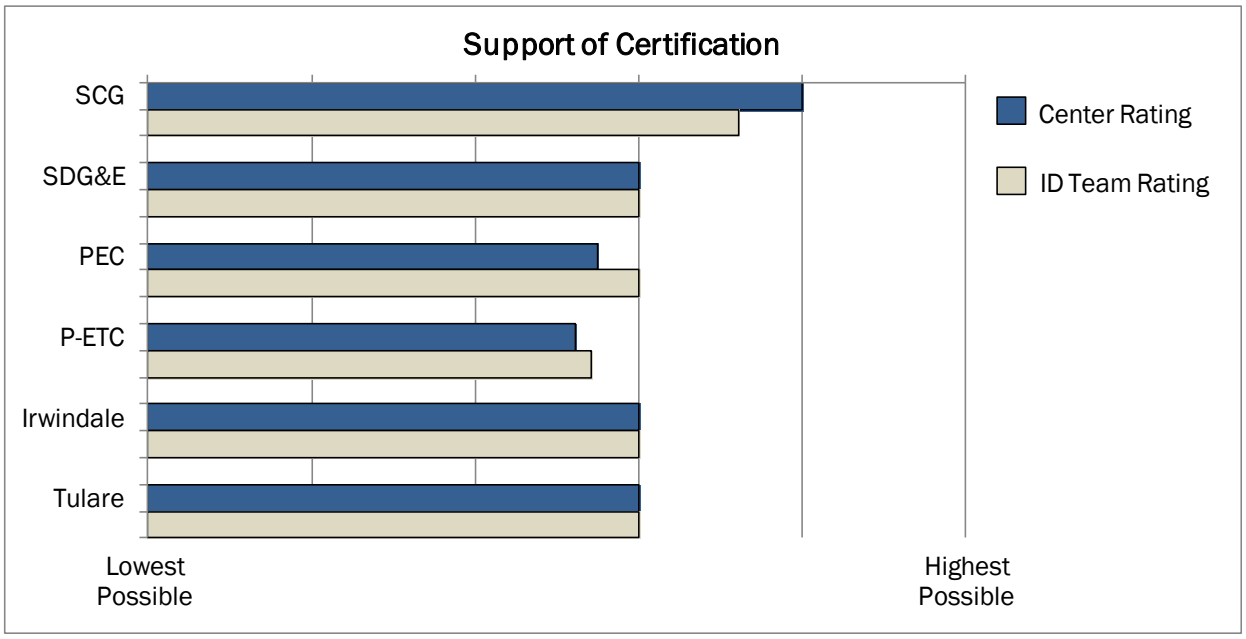


**Figure 18. Focus on Core Job Responsibility — Comparison of Center and ID Team Ratings (Courses in the ID Review Sample)**

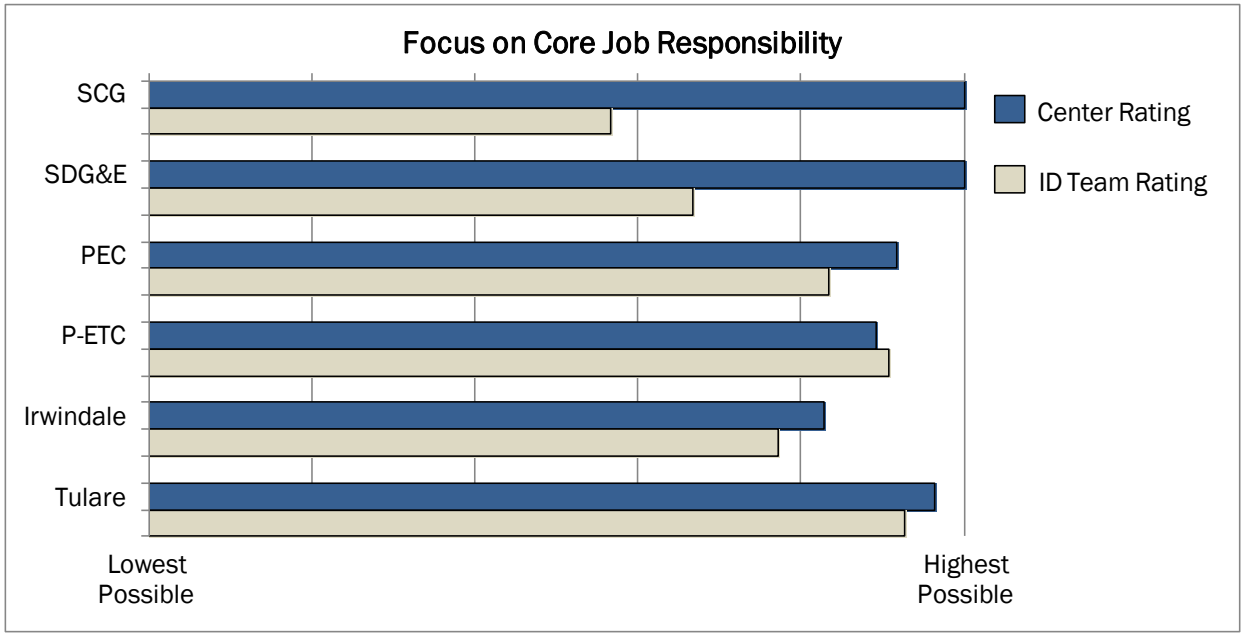



**Figure 19. Skill Development — Comparison of Center and ID Team Ratings (Courses in the ID Review Sample)**

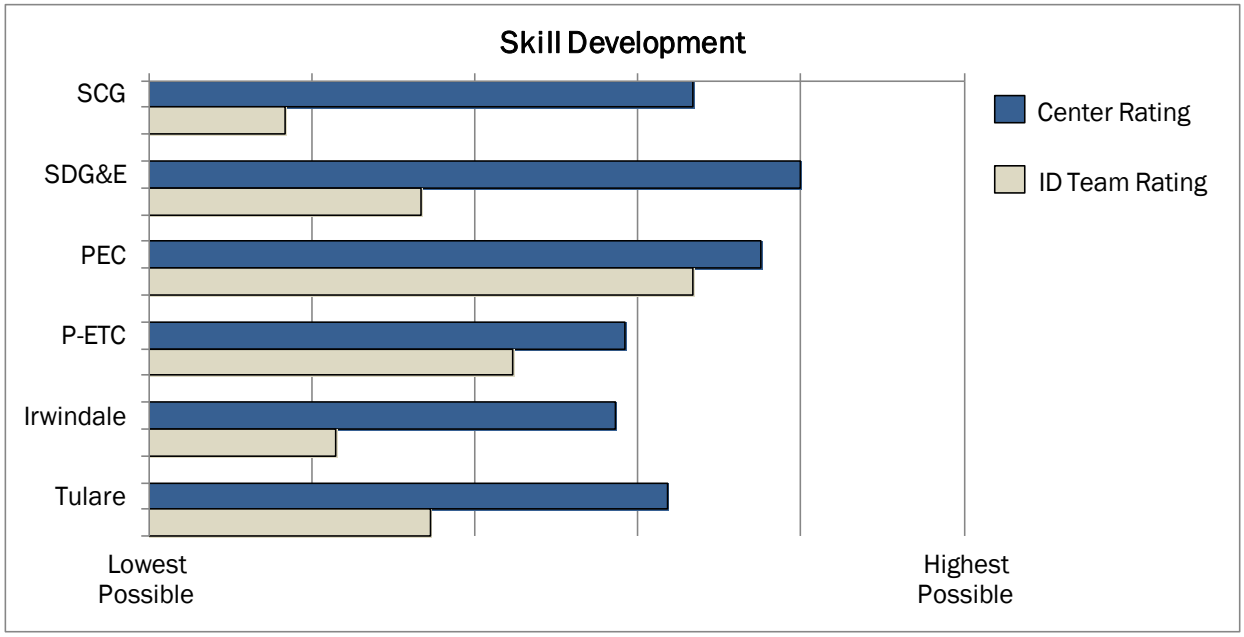
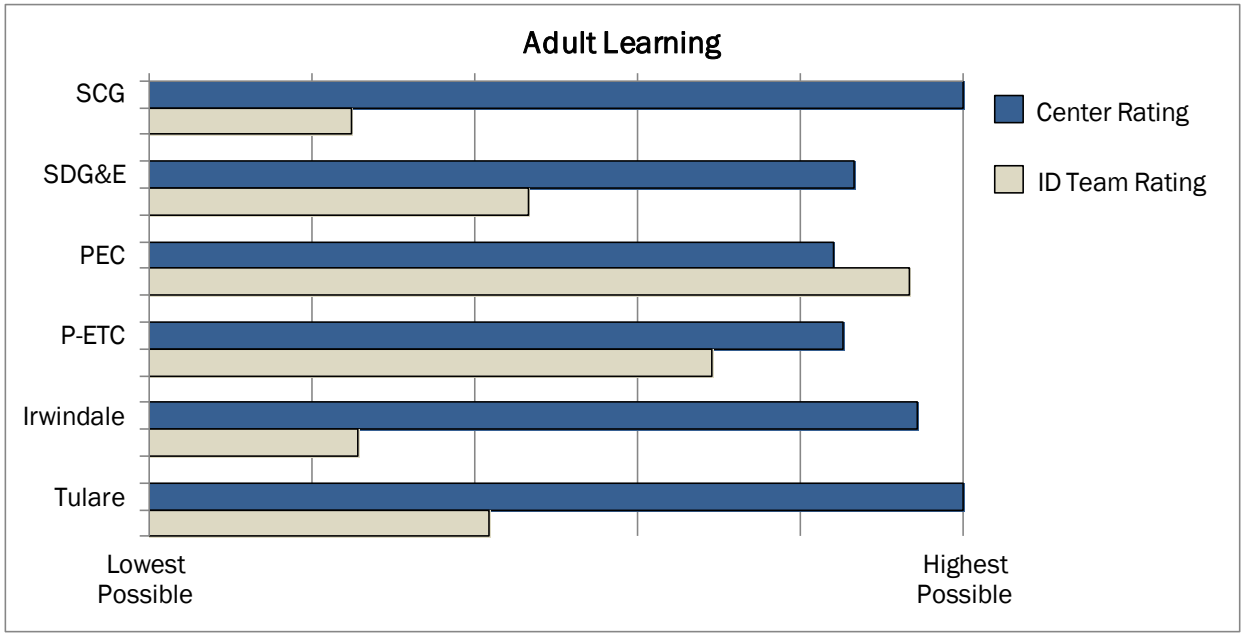
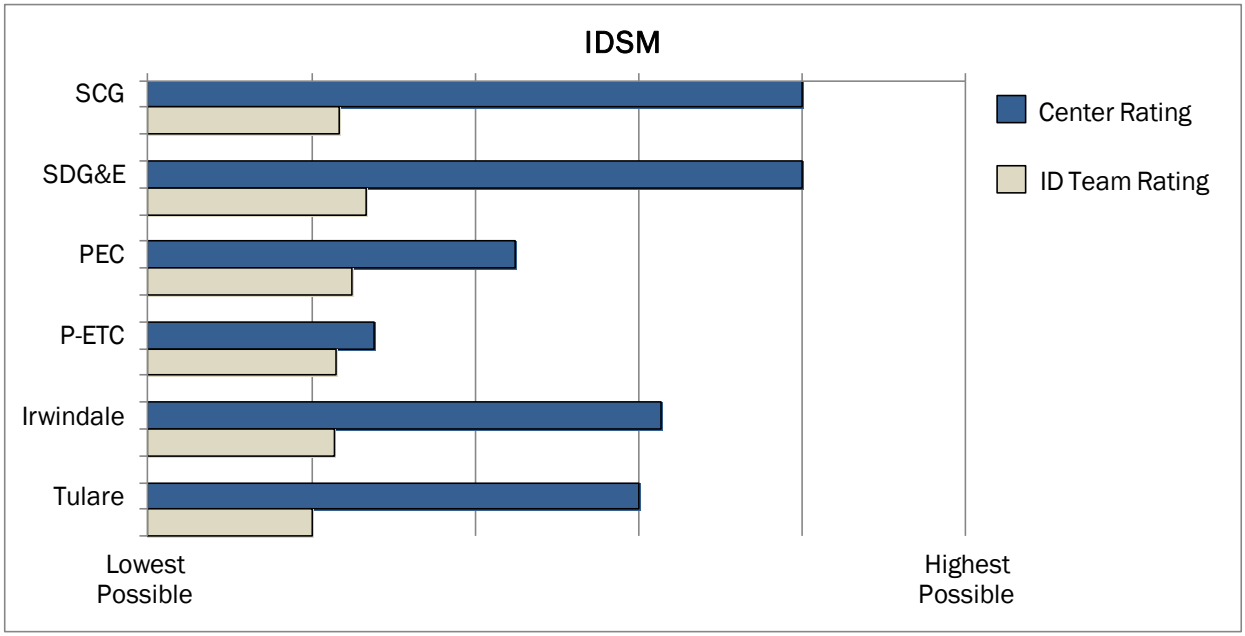


**Figure 20. Adult Learning [38]— Comparison of Center and ID Team Ratings (Courses in the ID Review Sample)**




[38] These ratings re. Adult Learning reflect an overall impression from the Energy Centers and from the ID team. They do not reflect the ratings on specific criteria on the "Adult Learning Yardstick." See "Adult Learning — Instructional Design Assessment Findings" in section ☐ for ratings on detailed yardstick criteria.

**Figure 21. IDSM[39] — Comparison of Center and ID Team Ratings (Courses in the ID Review Sample)**




[39] See "Learning Focus — Instructional Design Assessment" in section 0 for additional information about the IDSM ratings.

# Appendix C. Survey Instruments

## Centergies Partner Interview Guide

### INTRODUCTION

Hello, my name is _____ and I'm calling from Opinion Dynamics.

We are conducting an evaluation of the statewide Workforce, Education, and Training program for the CPUC. As part of this we're trying to talk with people at trade and professional associations that represent the LIGHTING industry in CA, are familiar with the Energy Centers, and have interacted with center staff for training purposes.

[IOU/CENTER] indicated that you are their main contact within [ORGANIZATION].

If you are familiar with the training needs of your organization's members (or within the LIGHTING industry overall) and the center's course offerings, I would like to talk with you for 10-15 minutes. Or if there is someone else within your organization that you would recommend I speak with, that would be great.

Specifically we're interested in:

- How the Energy Centers can better serve the LIGHTING workforce in CA
- Training needs within the LIGHTING industry to help workers incorporate energy efficiency concepts into their jobs.
- Courses
- Course formats

Your feedback will help the Energy Centers decide what types of training it can offer to best support the LIGHTING industry in California.

### Gaps in Needs vs. Program Offerings

1. How would you define the "green market" within the LIGHTING industry?
2. What does a "green market" mean to you?
3. What is the potential for growth of a "green market" within the LIGHTING industry?
4. What do you see as some of the "green specializations" that might happen within the LIGHTING industry in the future?
5. In your point of view, how well are the Energy Centers currently meeting the energy efficiency training needs of the LIGHTING workforce?
6. What else do you think the Energy Centers should offer?
7. What kinds of training do LIGHTING workers in CA need that they aren't getting?

8. Outside of the Energy Centers, are there any ongoing energy efficiency training needs that you are aware of within the industry? (certifications, continuous adult learning)

9. Where does the LIGHTING workforce go for ongoing energy efficiency training needs outside of the Energy Centers?

10. Does the LIGHTING industry in CA have any training in place that is promoting the integration of energy efficiency, demand response, or distributed generation technologies?

11. Is the LIGHTING industry pursuing any training in the area of integrating these different concepts?

12. Is there anything the Energy Centers/courses can do to help support these efforts?

13. What courses should be offered to better address energy efficiency training needs in the LIGHTING industry?

14. What course formats are most attractive to potential participants? (Probe for classroom seminars, webinars, on-demand web training, demonstrations, on-location training)

15. What is the best way for the Energy Centers to inform the LIGHTING workforce about training opportunities (to target the highest-potential audiences)? Probe for channels of communication, forms of advertising/marketing, recruitment methods.

*Thank you for your time.*

Snowball:

Is there anyone else that you would recommend that we talk to about the CA's LIGHTING workers' training needs and how the Energy Centers might best support the LIGHTING industry in the future?

If yes, collect ORG NAME, CONTACT NAME, PHONE NUMBER/EMAIL

**Centergies Participant Survey**
**February 2012**

**Read-ins and Sample Type:**

SAMPLETYPE=1: "Course" (one-time visit only)
SAMPLETYPE=2: "Courses" (2-5 classes)
SAMPLETYPE=3: "Courses" (6 or more classes)

## INTRO

Thank you for your participation in this study! The purpose of these questions is to look at how the following energy and technology Energy Centers are currently meeting the needs of California's workforce and to determine areas where the Energy Centers and their course offerings might be improved.

- SCE's Energy Education Center (CTAC) in Irwindale
- SCE's Energy Education Center (AgTAC) in Tulare
- PG&E's Pacific Energy Center (PEC) in San Francisco
- PG&E's Energy Training Center (ETC) in Stockton
- PG&E's Food Service Technology Center (FSTC) in San Ramon
- SCG's Energy Resource Center (ERC) in Downey
- SDG&E's Energy Innovation Center (EIC) in San Diego

The data we collect will be used ONLY for the evaluation of the Energy Centers and will not reflect individual views of you or your company in ANY way, so please feel free to be candid in your responses. All responses that you provide will be kept strictly confidential.

## Background

B1. Do you recall attending or participating in [IF SAMPLETYPE=1 READ IN "a training course" OR IF SAMPLETYPE=2 OR 3 READ IN "training courses"] at [IF MULTENERGY CENTERS READ IN "multiple energy Energy Centers in California" OR IF SINGLECENTER READ IN "the [CENTER]"] between 2009 and 2011?
1. Yes, recall taking at least one course.
2. No, do not recall taking a course. [TERMINATE]
3. Recall registering for a course, but did not attend/participate. [TERMINATE]

[IF SAMPLETYPE=1]
B2. Is this the only course or training that you have attended at the [CENTER] between 2009 and 2011?
1. Yes
2. No
8. Don't know

[IF B2=2,8 or SAMPLETYPE =2,3]

B3.In total, how many courses did you attend at [IF MULTENERGY CENTERS READ IN "these energy Energy Centers in California" OR IF SINGLECENTER READ IN "the [CENTER]"] between 2009 and 2011?
1. One course
2. Two to five courses
3. Six or more courses
8. Don't know

[GENERATE SAMPLE=1 IF B2=1 OR B3=1 OR (SAMPLETYPE=1 AND B3=8)]
[GENERATE SAMPLE=2 IF B3=2 OR (SAMPLETYPE=2 AND B3=8)]
[GENERATE SAMPLE=3 IF B3=3 OR (SAMPLETYPE=3 AND B3=8)]

[IF B2=YES or B3=1]
B4a. The [CENTER] offers a number of different types of courses, why have you only attended one course at the Center? (Check all that apply)
1. Personal lack of time/too busy
2. Courses are not offered at convenient times or on convenient days
3. Duration of class is too long
4. Courses are too far away (geographically)
5. Unaware of other courses offered
6. Do not need any more education/training at this time
7. Typically attend energy-related courses at a different center
00.. Other, please specify _____

[IF B4a = 2 OR 3]
B4b. What can the Center do to help you overcome these time constraints? [OPEN-END]

[ASK IF CENTER<>FSTC]
B5. Do you work in the food service industry, or specialize in providing a service or product that serves the food service industry?
1. Yes
2. No

[GENERATE FOOD=1 IF B5=1, ELSE FOOD=0]

[ASK IF CENTER<>FSTC OR FOOD=0] (Multiple response)
B6. What energy-related certifications or accreditations do you currently have?
1. NATE Certification
2. BPI Certification
3. BOC Certification
4. LEED Accreditation
00. Other, please specify _____
6.

[ASK IF CENTER<>FSTC AND FOOD=0]
B7. What professional or trade organizations or associations are you currently a member of? (Check all that apply)
1. Affordable Comfort, Inc. (ACI)
2. Air Conditioning Contractors of America (ACCA)
3. American Council for Energy Efficiency Economy (ACEEE)
4. American Institute of Architects (AIA)
5. American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

6. Build It Green (BIG)
7. Building Operator Certification (BOC)
8. Building Owners and Managers Association International (BOMA)
9. Building Performance Institute (BPI)
10. California Advanced Lighting Controls Training Program (CALCTP)
11. California Building Performance Contractors Association (CBPCA)
12. California Home Energy Efficiency Rating System (CHEERS)
13. Community Services and Educational Training (CSET)
14. Foodservice Consultants Society International (FCSI)
15. Home Energy Rating System (HERS)
16. International Brotherhood of Electrical Workers (IBEW)
17. International Facility Management Association (IFMA)
18. Institute of Heating and Air Conditioning Industries (IHACI)
19. Leadership in Energy and Environmental Design (LEED)
20. National Association of the Remodeling Industry (NARI)
21. North American Technician Excellence (NATE)
22. National Restaurant Association (NRA)
23. U.S. Green Building Council (USGBC)
00. Other, specify _____

[ASK IF CENTER=FSTC OR FOOD=1]
B7a. What professional or trade organizations or associations are you currently a member of? (Check all that apply)

1. Foodservice Consultants Society International (FCSI)
2. North American Association of Food Equipment Manufacturers (NAFEM)
3. California Restaurant Association (CRA)
4. Manufacturers' Agents for the Food Service Industry (MAFSI)
5. American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
6. American Culinary Federation (ACF)
7. American Dietetic Association (ADA)
8. American Society for Testing and Materials (ASTM)
9. Commercial Foodservice Equipment Service Association (CFESA)
10. American Institute of Architects (AIA)
11. Foodservice Equipment Dealers Association (FEDA)
12. Certified Professional Manufacturers Representative (CPMR)
13. Certified Food Service Professional (CFSP)
14. American Council for Energy Efficiency Economy (ACEEE)
15. Golden Gate Restaurant Association (GRA)
16. California School Nutrition Association (CSNA)
17. School Nutrition Association (SNA) National Level
18. California Environmental Health Association (CEHA)
19. California Dietetic Association (CDA)
20. American Correctional Foodservice Association (ACFSA)
21. National Association of College and University Foodservice (NACUFS)
22. National Restaurant Association (NRA)
00. Other, specify _____

## Core Job Responsibilities and Motivation for Coming to Center

[ASK IF CENTER<>FSTC AND FOOD=0]
CJ2. What best describes your position or job as it relates to energy issues?

1. General Construction Trade Contractor

2. Lighting Trade Contractor
3. Building Management or Maintenance Role
4. Energy Auditor for the Commercial Sector
5. Manufacturing or Automation Worker
6. Home Performance Auditor
7. Low-Income Weatherization Contractor
8. Codes & Standards Enforcer
9. Architect, Engineer or Designer
10. Lighting Design or Consultant
11. Sustainability Consultant
12. New Construction Builder
13. Food Service Business Owner or Employee
14. Student, please specify degree program: _____
00. Other, please specify _____

[ASK IF CENTER=FSTC OR FOOD=1]
CJ2a. What best describes your position or job as it relates to energy issues?

1. General Contractor
2. Lighting Contractor
3. Plant Manager
4. Energy Auditor for Food Service Sector
5. Manufacturer or Manufacturers' Rep
6. Kitchen Equipment Dealer/Distributor
7. Building Inspector, Plan Checker, Health Department
8. Architect, Engineer
9. Lighting Design or Consultant
10. Sustainability Consultant
11. Restaurant/Facility Designer
12. New Construction Builder
13. Equipment Installers (fitters, plumbers, sheet metal workers)
14. Restaurant Business Owner/Manager
15. Chef/Sous Chef/Line Cook
16. Food and Beverage Manager
17. Energy Manager
18. Student, please specify degree program: _____
00. Other, please specify _____

CJ3. Are you an owner or partial owner of your company?

1. Yes
2. No
9. Not applicable

[IF CJ3=2]
CJ3a. Are you in a management or supervisory position in your company?

1. Yes
2. No
9. Not applicable

[ASK IF CENTER<>FSTC]
CJ4. Did you receive a grant or scholarship to attend [IF SAMPLE 1 READ IN "this course"; IF SAMPLE 2, 3 READ IN "these courses"] at [IF MULTENERGY CENTERS READ IN "the multiple energy

Energy Centers in California that you indicated earlier" OR IF SINGLECENTER READ IN "the [CENTER]"]?
1. Yes
2. No
8. Don't know
9. Not applicable

[ASK IF CJ4=1]
CJ4a. What was the source of the grant or scholarship? [OPEN-END]

CJ5. What were your goals or reasons for attending the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] at [IF MULTENERGY CENTERS READ IN "the multiple energy Energy Centers in California" OR IF SINGLECENTER READ IN "the [CENTER]"]? (Check all that apply)
1. Career advancement within the company
2. Career advancement into a new company or industry
3. Required by employer
4. Suggested by employer
5. To gain new customers
6. To deliver a higher level of service to customers
7. To stay competitive in the marketplace
8. To learn about new technologies
9. Personal desire/decision
10. Was unemployed or underemployed and thought it would help in job search
00. Other, please specify _____
96. I did not have any reasons or goals

[ASK IF CJ5 HAS MULTIPLE RESPONSES. SKIP IF CJ5 = 96]
CJ5a. What was your MAIN goal for attending the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"]?
1. Career advancement within the company
2. Career advancement into a new company or industry
3. Required by employer
4. Suggested by employer
5. To gain new customers
6. To deliver a higher level of service to customers
7. To stay competitive in the marketplace
8. To learn about new technologies
9. Personal desire/decision
10. Was unemployed or underemployed and thought it would help in job search
00. Other, please specify _____

CJ6. Do you think the [IF SAMPLE 1 READ IN "course was"; IF SAMPLE 2, 3 READ IN "courses were"] successful in meeting this goal?
1. Yes
2. No
8. Don't know

CJ6a. Please explain why you feel like the [IF SAMPLE 1 READ IN "course was"; IF SAMPLE 2, 3 READ IN "courses were"] successful or not in meeting your goal, or why you are unsure. [OPEN-END]

[ASK IF CENTER<>FSTC]

CJ7. Have you received a pay increase since attending the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] or using the services at [IF MULTENERGY CENTERS READ IN "the multiple energy Energy Centers in California" OR IF SINGLECENTER READ IN "the [CENTER]"]?
1. Yes
2. No
8. Don't know
9. Not applicable

[ASK IF CENTER<>FSTC]
CJ8. Have you received a job promotion since attending the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] or using the services at [IF MULTENERGY CENTERS READ IN "the multiple energy Energy Centers in California" OR IF SINGLECENTER READ IN "the [CENTER]"]?
1. Yes
2. No
8. Don't know
9. Not applicable

[ASK IF CJ7=1 OR CJ8=1 AND CENTER<>FSTC]
CJ9. Did the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"], or using the services at [IF MULTENERGY CENTERS READ IN "the energy Energy Centers in California" OR IF SINGLECENTER READ IN "the [CENTER]"], contribute to your pay increase or job promotion?
1. Yes
2. No
8. Don't know
9. Not applicable

## Training & Educating the Workforce

### *Individually*

H1. Has the information you learned from the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] made it easier for you to do any of the following? If a statement is not relevant to your situation, please indicate "Not applicable." [For each option, 1=YES, 2=NO, 3=NOT APPLICABLE, ] [ROTATE a-e]
a. Advance your career within your current company?
b. Advance your career by helping you get into a new industry?
c. Gain new customers (by offering new or improved services)?
d. Stay competitive in the marketplace?
e. Find a job or change jobs?

H2. Rate your agreement or disagreement with each of the following statements on a 1-7 scale, where 1 is "completely disagree" and 7 is "completely agree." If a statement is not relevant to your situation, please indicate "Not applicable." [1-7, xx=NOT APPLICABLE,; ROTATE a-i]
a. Overall, the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] provided useful knowledge of energy efficiency
b. Overall, the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] provided useful knowledge of distributed generation
c. Overall, the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] provided useful knowledge of demand response

d. The [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] provided me with a better understanding of how to apply energy efficiency best practices in my job
e. The [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] included training that applied to my everyday job responsibilities
f. The [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] helped me understand a program or technology better so that I could participate in an energy-related program
g. The [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] helped me deliver a higher level of service to my customers
h. [IF MULTENERGY CENTERS READ IN "The energy Energy Centers in California offer" OR IF SINGLECENTER READ IN "The [CENTER] offers"]resources, seminars, and courses that will help me do my job better
i. [IF MULTENERGY CENTERS READ IN "The energy Energy Centers in California offer" OR IF SINGLECENTER READ IN "The [CENTER] offers"]resources, seminars, and courses that will help me advance my career

H3. Please describe how the information you learned from the [IF SAMPLE 1 READ IN "course has"; IF SAMPLE 2, 3 READ IN "courses have"] helped your job, career, or business, if at all? [OPEN END]

*Sharing information / training the "workforce"*

S1. Have you shared the skills, information, or resources you learned from the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] with others in your company?
1. Yes
2. No
9. Not applicable, I am unemployed or do not have other employees at my company [SKIP TO NEXT SECTION]

[ASK IF S1=1]
S2. How did you share the skills, information, or resources with others in your company? (Check all that apply)
1. Conducted formal training
2. Sent a company email or contributed to a newsletter describing what you learned
3. Discussed informally with other employees
4. Have helped a fellow employee do at least one task better
00. Other, specify _____

S3. Did the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] provide materials that you could share with other employees or that you could use to train others? (Such as a workbook with information that helps you share key information, step-by-step directions on how to do something, factsheets, presentation materials, web resources and tools, etc.)
1. Yes
2. No
8. Don't know / don't remember
9. Not applicable

[IF S3 =NO]
S3a. What materials could be offered that would be helpful in passing your knowledge on to fellow employees? [OPEN-END 96 Nothing]

[IF S3=YES]
S3b. What improvements could be made to these materials or what other materials could be offered that would be helpful in passing your knowledge on to other employees? [OPEN-END 96 None]

S4. Using a 1-7 scale, where 1 is "Not at all important" and 7 is "Extremely important", how important is it to your company that you or your staff be trained on energy-related best practices and technologies? [1-7, xx=NOT APPLICABLE, 98=DON'T KNOW]

S5. Has your participation/attendance in the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] resulted in you, your employer, or your clients participating in any energy-related utility programs? (1=YES, 2=PARTIALLY, 3=NO, 4=NOT APPLICABLE, 98=DON'T KNOW)

[ASK IF S5=1,2]
S6. How did the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] encourage you to participate in energy-related utility programs? [OPEN-END]

S7. Has your participation/attendance in the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] resulted in you, your employer, or your clients taking energy efficiency actions that did not include an incentive? (1=YES, 2=PARTIALLY, 3=NO, 4=NOT APPLICABLE, 98=DON'T KNOW)

[ASK IF S7=1,2]
S8. What actions did you, your employer, or your clients take? [OPEN-END]

## Certification Training and Education

[ASK SECTION IF CENTER<>FSTC OR FOOD=0]
C1. Did you attend or participate in [IF SAMPLE 1 READ IN "a course offered by the center that was"; IF SAMPLE 2, 3 READ IN "courses offered by the center that were"] part of a certification track?
1. Yes
2. No [SKIP TO NEXT SECTION]
8. Don't know [SKIP TO NEXT SECTION]
9. Not applicable [SKIP TO NEXT SECTION]

[IF C1=1]
C2. What certification was it? [If you attended courses for multiple certifications, please select the most recent certification]
1. Building Operator Certification (BOC)
2. Building Performance Institute (BPI) Certification
3. HERS-2 Certification
4. LEED Accreditation
6. NATE Certification
00. Other, please specific _____
89. Don't know / don't remember

[IF C1=1]
C4. Have you completed all the courses required for this certification?
1. Yes
2. No
8. Don't know

9. Not applicable

[IF C4=2]
C5. Do you plan to continue with the certification track?
1. Yes
2. No
8. Don't know

[ASK IF C5=2]
C5a. Can you explain why you do not plan to continue with obtaining the certification? [OPEN END]

[IF C4 =1]
C6. Did you take the certification test?
1. Yes
2. No
8. Don't know
9. Not applicable

[IF C6=2]
C6a. Can you explain why you did not take the certification test? [OPEN END]

[IF C6=1]
C7. Did you pass the certification test?
1. Yes
2. No
8. Don't know

[IF C7=1]
C8. Did you notice an improvement in your career standing after obtaining certification?
1. Yes
2. No
8. Don't know
9. Not applicable

[IF C8=1]
C9. Can you describe how your career standing improved after obtaining the certification? [OPEN-END]

C10. Why did you originally seek this certification? (Please check all that apply)
01. Career advancement within the company
02. Career advancement into a new industry or company
03. Required by employer
04. Suggested by employer (employer paid for it)
05. To gain new customers (by offering new or improved services)
06. To stay competitive in the marketplace
07. Personal desire/decision
08. Was unemployed and thought it would help in job search
00. Other, please specify _____
98. Don't know

## Course Design, and Delivery

A2. Rate your satisfaction with each of the following items on a 1-7 scale, where 1 is "Not at all satisfied" and 7 is "Extremely satisfied." If any item is not relevant to the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] you took, please indicate "Not applicable." [1-7, xx=NOT APPLICABLE,]
   a. The [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] overall
   b. The course materials
   c. The instructor knowledge
   d. The instructor teaching style
   e. The course design (including the course structure and activities)
   f. The times and days that courses are offered
   g. The course duration
   h. The technical difficulty of the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"]
   i. The fees were reasonable (if there were no fees charged for the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] you took, indicate "Not applicable")

[ASK IF ANY A2 a-i ARE RATED <4]
A3. Why did you give a low rating for some aspects of the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"]? [OPEN END]

[ASK IF CENTER=FSTC]
FS2. [IF SAMPLE 1 READ IN "Was the length of the seminar"; IF SAMPLE 2, 3 READ IN "Were the length of the seminars"] you attended appropriate, or was the three hour time-period too long?
   1. Length of seminar was too short
   2. Length of seminar was just right
   3. Length of seminar was too long
   9. Not applicable

A4. Please indicate your level of interest in each of the following class concepts on a 1-7 scale, where 1 is "Not at all interested" and 7 is "Extremely interested". [1-7, xx=NOT APPLICABLE,]
   a. Building science: Classes that cover multiple technologies (i.e., mechanical, building envelope, lighting, solar, water, etc.) and their relevance to one another
   b. Integrated Systems Building Approach: how an integrated systems approach optimizes overall demand management, affecting energy efficiency, demand response, and smaller renewable energy systems
   c. Sustainable building
   d. [ASK IF CENTER=FSTC OR FOOD=1] Submetering: How to measure energy use in restaurants using the metering tools available for energy and water.
   e. [ASK IF CENTER=FSTC OR FOOD=1] Solar: Solar thermal and photovoltaic technologies and how they might be applied to food service.
   f. [ASK IF CENTER=FSTC] Fishnick, The Online Toolbox: How to use the Fishnick website and its resources to meet your operations and design needs.
   g. [ASK IF CENTER=FSTC OR FOOD=1] Codes and Standards: what are the efficiency codes and standards that apply to food service.
   h. [ASK IF CENTER=FSTC OR FOOD=1] Greener Restaurants workshop: A hands on seminar on how to apply the National Restaurant Associations Conserve Sustainability Education program to your operation.

A6a. Where else do you go for energy efficiency classes, trainings, or other ongoing career education outside of the following Energy Centers? [OPEN END 96 Nowhere else]

a. SCE's Energy Education Center (CTAC) in Irwindale
b. SCE's Energy Education Center (AgTAC) in Tulare
c. PG&E's Pacific Energy Center (PEC) in San Francisco
d. PG&E's Energy Training Center (ETC) in Stockton
e. PG&E's Food Service Technology Center (FSTC) in San Ramon
f. SCG's Energy Resource Center (ERC) in Downey
g. SDG&E's Energy Innovation Center (EIC) in San Diego

A7. If given the opportunity to take courses online, rather than at a physical location, would you be interested in online classes that are available for you to take at your convenience (such as a pre-recorded presentation that you could view at any time on your own)?
1. Yes
2. No
8. Don't know
9. Not applicable

[IF A7 =YES]
A7a. What type of classes would you like to take in this manner? [OPEN END]

A8. Would you be interested in an online class that is cast "live" (such as a class that is given in real-time by a person at a specific time)?
1. Yes
2. No
8. Don't know
9. Not applicable

[IF A8 =YES]
A8a. What type of classes would you like to take in this manner? [OPEN END]

## Skill Development

SD1. What kinds of things are you able to do as a result of the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"] you completed? [CHECK ALL THAT APPLY]
1. Design or develop a new work product or new approach to accomplishing an end result
2. Evaluate alternatives or judge an issue or process using specific criteria or standards
3. Analyze situations to identify patterns or trends in the work environment or organize information or tasks
4. Apply information or concepts to perform tasks or solve problems
5. Explain ideas or describe how something works or does not work
6. 00. Other, please specify _____

OR
7. 96. Cannot do anything new or different as a result of the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"]

[IF SD1=7]
SD2. What, if anything, did you **expect** to be able to do as a result of the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"]? [OPEN END]

[IF SD1=1]

SD4a. Please provide an example of what you have created using what you learned in the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"]. [OPEN END]

[IF SD1=2]
SD4b. Please provide an example of what you have evaluated using what you learned in the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"]? [OPEN END]

[IF SD1=3]
SD4c. Please provide an example of what you have analyzed using what you learned in the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"]? [OPEN END]

[IF SD1=4]
SD4d. Please provide an example of tasks you have performed or problems you have solved using what you learned in the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"]? [OPEN END]

[IF SD1=5]
SD4e. Please provide an example of what you have explained or described to others using what you learned in the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"]? [OPEN END]

[IF SD1=6]
SD4f. Please provide an example of what other kinds of things you have done using what you learned in the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"]? [OPEN END]

SD3. In the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"], were you given a chance to do any of the following: [1=YES, 2=NO, 3=DON'T KNOW/DON'T REMEMBER, xx=NOT APPLICABLE]

a. Participate by sharing experiences from the field relevant to the seminar subject at hand
b. Participate through group feedback to instructor questions and/or by solving problems

[In the following, "hands-on" refers to all "learning by doing" activities. It is not restricted to working with equipment. For example, a role play or a case-study based "pencil and paper" activity would be considered "hands-on."]

c. "Hands-on," in-class practice developing a new approach to accomplishing an end result or process
d. "Hands-on," in-class practice evaluating problems, processes, issues, or alternatives
e. "Hands-on," in-class practice identifying patterns, using procedures, or solving problems
f. "Hands-on," in-class practice explaining new information or concepts

SD5. Did [IF SAMPLE 1 READ IN "the course"; IF SAMPLE 2, 3 READ IN "any of the courses"] you attended include "soft skills" development? (By "soft skills" we mean things such as questioning and listening skills, people interaction skills, sales and marketing skills, negotiation skills, management skills.) [1=YES, 2=NO, 3=DON'T KNOW/DON'T REMEMBER, xx=NOT APPLICABLE]

[IF SD5=1]
SD6. Please provide an example of the kind of soft skills that were addressed in the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"]. [OPEN END]

SD7. Did [IF SAMPLE 1 READ IN "the course"; IF SAMPLE 2, 3 READ IN "any of the courses"] you attended include related "remedial skills" development? (By "remedial skills" we mean things such as basic math, basic science, and basic writing skills.) [1=YES, 2=NO, 3=DON'T KNOW/DON'T REMEMBER, xx=NOT APPLICABLE]

[IF SD7=1]
SD8. Please provide an example of the kind of remedial skills that were addressed in the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"]. [OPEN END]

A9. Is there anything else you would like the evaluation team to know in general about your course experience at the [IF SAMPLE 1 READ IN "course"; IF SAMPLE 2, 3 READ IN "courses"]? [OPEN END 96 No]

## Demographic

The following questions are for analytical purposes only and will greatly help us determine how well the Energy Centers are addressing California's training and educational needs. If you would prefer not to share this information with the evaluation, please click on the "prefer not to respond" option.

D1. Which of the following best describes your age?
- 1 Less than 18 years old
- 2 18-24 years old
- 3 25-34 years old
- 4 35-44 years old
- 5 45-54 years old
- 6 55-64 years old
- 7 65 or older
- 9 Prefer not to respond

D2. What is the highest level of education you have completed?
- 1 no schooling
- 2 less than high school
- 3 some high school
- 4 high school graduate or equivalent (e.g., GED)
- 5 trade or technical school
- 6 some college
- 7 college degree
- 8 some graduate school
- 9 graduate degree
- 00 other (SPECIFY)
- 99 Prefer not to respond

D3. What is your current employment status?
1. Employed full-time (at one full-time job, or multiple part-time jobs)
2. Employed part-time (by choice)
3. Under-employed (working below your skill level or working fewer hours than you want or need)
4. Not employed at this time
00. Other, specify _____
99. Prefer not to respond

[SKIP IF UNEMPLOYED]
B8. Approximately, how many people are employed at your company? If your company has locations outside of California, please limit your answer to just the number of people employed in the State of California. ? [OPEN END NUMERIC, DON'T KNOW]

D4. Which of the following best represents your annual household income from all sources in 2011, before taxes? Was it . . . .?

1 Less than $20,000 per year
2 $20,000-49,999
3 $50,000-74,999
4 $75,000-99,999
5 $100,000-149,999
6 $150,000-199,999
7 $200,000 or more
9 Prefer not to respond

D5. What is your ethnicity?

1 White
2 Black, African American
3 American Indian or Alaska Native
4 Chinese
5 Japanese
6 Korean
7 Vietnamese
8 Filipino
9 Native Hawaiian
10 Guamanian or Chamorro
11 Samoan
12 Hispanic/Latina(o)
00 Other (SPECIFY)
99 Prefer not to respond

# Appendix D. Center SnapShot Findings

| CTAC<br>SCE | 21 years<br>est. 1990 | Target Audience: Continuing Education for Individuals already working in Residential and Non-Residential Trade and Professional Sectors |
|---|---|---|

## Reach of Program (2009 - 2011)

| | |
|---|---|
| **Number of unique participants:** | 11,818 |
| **Number of non-unique participants:** | 33,408 |
| **Number of sessions offered:** | 206 |

## PPM Tracking Status

Familiarity with PPMs, but challenges exist in progressing towards PPMs due to funding issues, difficulty defining requirements and tracking/quantifying data (partnerships and individual participant data).

Challenges:

- IDSM goal seems within scope, but they have difficulty defining it.
- Need additional guidance in reporting and establishing baselines and benchmarks
- Need to come to an agreement with the utilities that they are tracking relevant and meaningful metrics

## Course Series that lead to certification

- Introduction to LEED certification process
- Host classes for USGBC for LEED certification
- Support NATE training through IHACI
- BOC
- BPI

## Description of Courses

| | |
|---|---|
| **Workforce Enablement (% of courses)** | |
| Low | 7% |
| Medium | 60% |
| High | 31% |
| N/A | 2% |
| **Certification Related (% of courses)** | |
| Direct Support | 7% |
| Clear Relationship | 24% |
| Not Directly Related | 67% |
| N/A | 2% |
| **Adult Learning (% of courses)** | |
| Low to None | 25% |
| Medium to High | 73% |
| N/A | 2% |
| **IDSM Content (% of courses)** | |
| Little or None | 16% |
| 10 to 49% | 64% |
| 50 to 100% | 18% |
| N/A | 2% |
| **Frequency (% of courses)** | |
| Less than one | 0% |
| One to two | 51% |
| Three to four | 29% |
| Five or more | 18% |
| **Skill Development (% of courses)** | |
| Remember/Understand | 9% |
| Analyze/Apply | 83% |
| Evaluate/Create | 6% |
| N/A | 2% |

## Adult Learning Principles

- Embracing ALP by committing to continuous internal training. All but newest instructors are well-versed in ALP.
- Have good understanding of how to apply ALP to courses.
- Use impact evaluations and exit surveys to evaluate effectiveness, then try to implement improvements based on results.
- Credit change in customer satisfaction and behavior to ALP
- Lesson plans are part of course materials in most classes.
- Course content is based on their interaction with the customers, not on a certain percentage of basic, intermediate, and advanced courses.

## Participant Tracking

| | |
|---|---|
| Class name | Address |
| Event date | City |
| First name | State |
| Last name | ZIP Code |
| Company | |

| CTAC<br>SCE | 21 years<br>est. 1990 | Target Audience: Continuing Education for Individuals already working in Residential and Non-Residential Trade and Professional Sectors |
|---|---|---|

### Support Sector Strategies

- Currently define sector by technology
- Lighting Academy

### Partnerships & Sectors

- LEED
- USGBC
- CBPCA
- BPI
- NATE
- IHACI
- CALC

### Sectors Reached

- Architects, designers, engineers, contractors
- Operations and facility managers
- Foodservice industry
- Water industry

### Modify Structure of Courses

Currently offers:

- Introduction to LEED certification process.
- Three- and Four-part workshops and modules on refrigeration, programmable logic controllers, and air distribution
- Occupation-specific training for energy consultants (nonresidential standards essentials), Cook, Chill & Retherm Technologies for the Foodservice Industry, CSI Contractor Solar Class, Lighting for Architecture and Interiors, Energy Tools Workshop for the Water Industry
- Hands-on training of basic programmable logic controllers, commercial lighting, electricity and energy efficiency fundamentals, outdoor lighting, and Energy Tools Workshop for the Water Industry

### Consulting on External EE Curricula

Not being done yet, but could fulfill some of the requirements with certificate programs of the needs assessment if they shared their Lighting Academy statewide. And other certification programs IOUs do that they could participate in as well.

### Description of WE&T/Low Income / Disadvantaged / Minority Emphasis

Currently focus on equality of access rather than disadvantaged or low income participants

# AgTAC

SCE

**15 years**
est. 1996

Target Audience: Mid-stream/upstream workforce education and training, offering specialty energy solutions for the agricultural industry.

## Reach of Program (2009 - 2011)

| | |
|---|---|
| **Number of unique participants:** | 2,896 |
| **Number of non-unique participants:** | 9,820 |
| **Number of sessions offered:** | 202 |

## PPM Tracking Status

Familiarity with PPMs, but challenges exist in progressing towards PPMs due to funding issues, difficulty defining requirements and tracking/quantifying data (partnerships and individual participant data).

- Approximately 90% of their classes have greater than 50% IDSM content

Challenges:

- IDSM goal seems within scope, but they have difficulty defining it.
- Need additional guidance in reporting and establishing baselines and benchmarks
- Need to come to an agreement with the utilities that they are tracking relevant and meaningful metrics

## Course Series that lead to certification

- BOC classes
- NATE certification classes
- IHACI certification classes
- BPI certification training on site (partner with CBPCA)
- AIA credits available for certain classes
- LEED courses (partner with USGBC)
- HERS certification

## Description of Courses

| | |
|---|---|
| **Workforce Enablement (% of courses)** | |
| Low | 9% |
| Medium | 47% |
| High | 43% |
| N/A | 1% |
| **Certification Related (% of courses)** | |
| Direct Support | 16% |
| Clear Relationship | 27% |
| Not Directly Related | 55% |
| N/A | 2% |
| **Adult Learning (% of courses)** | |
| Low to None | 26% |
| Medium to High | 73% |
| N/A | 1% |
| **IDSM Content (% of courses)** | |
| Little or None | 13% |
| 10 to 49% | 69% |
| 50 to 100% | 16% |
| N/A | 1% |
| **Frequency (% of courses)** | |
| Less than one | 0% |
| One to two | 54% |
| Three to four | 24% |
| Five or more | 20% |
| **Skill Development (% of courses)** | |
| Remember/Understand | 11% |
| Analyze/Apply | 80% |
| Evaluate/Create | 8% |
| N/A | 1% |

## Adult Learning Principles

- Embracing ALP by committing to continuous internal training. All but newest instructors are well-versed in ALP.
- Have good understanding of how to apply ALP to courses.
- Use impact evaluations and exit surveys to evaluate effectiveness, then try to implement improvements based on results.
- Credit change in customer satisfaction and behavior to ALP
- Lesson plans are part of course materials in most classes.
- Course content is based on their interaction with the customers, not on a certain percentage of basic, intermediate, and advanced courses.

## Participant Tracking

| | |
|---|---|
| Class name | Address |
| Event date | City |
| First name | State |
| Last name | ZIP Code |
| Company | |

# AgTAC

SCE

**15 years**
est. 1996

Target Audience: Mid-stream/upstream workforce education and training, offering specialty energy solutions for the agricultural industry.

## Support Sector Strategies

- Currently define sector by technology
- Courses most offered to trade sector.
- Currently work with HVAC technicians, engineers, architects, general contractors, building contractors, building operators, city and county employees, food manufacturing workers, lighting technicians, water purveyors, HERS raters, building performance contractors, and restaurant owners.
- AIA and Automation Academy are unique offerings, so do not overlap.

## Partnerships & Sectors

- LEED
- AIA
- HERS
- USGBC
- BPI
- IHACI
- CBPCA
- NATE
- BOC
- WIBs
- CSET

## Sectors Reached

- Agriculture
- Architects, designers, engineers, contractors, HERS raters, building performance contractors
- Operations and facility managers
- HVAC and lighting technicians
- Municipal employees
- Manufacturing
- Water purveyors
- Food service

## Modify Structure of Courses

Currently offers:

- NATE and BOC certification classes. Partnered with BPI to offer precursor to certification classes. Partner with USGBC to offer LEED courses, and offer AIA credits for certain classes.
- Four-part workshop on AC/HP Refrigeration and four-part module on IHACI Air Distribution
- Occupation-specific training for energy consultants (nonresidential standards essentials)
- Hands-on training of electrical and energy efficiency fundamentals and lighting software for non-CAD users, along with the Automation Academy, which teaches use of programmable logic controllers in a factory-type environment

Currently trying to make some classes more series-oriented

Challenges to modifying or elaborating on existing course structure include funding, offering series courses without introductory components, balancing customers needs with direct linkages to DSM with adding skills to the workforce.

## Consulting on External EE Curricula

Was close to having an agreement to participate in the sustainability curriculum with the College of the Sequoias, but lost funding.

## Description of WE&T/Low Income / Disadvantaged / Minority Emphasis

- Currently collaborate with WIB and CSET (promoting seminars and workshops, increasing awareness).
- Perception that they are serving outlying areas and disadvantaged and unemployed workers, but do not currently have data to show this.
- Support minority organization events and hold cultural events to attract different ethnic groups. Ex. event for Black History Month.
- Hold seminars in economically disadvantaged and ethnically diverse communities.

# Pacific Energy Center (PEC)

PG&E

**20 years**
est. 1991

Target Audience: Commercial building operation and new construction design markets to break down barriers that keep customers from taking advantage of energy efficient opportunities in their buildings.

## Reach of Program (2009 - 2011)

| | |
|---|---|
| **Number of unique participants:** | 8,912 |
| **Number of non-unique participants:** | 24,532 |
| **Number of sessions offered:** | 260 |

## PPM Tracking Status

Perception that they are appropriate and achievable, but need to be better defined (need definitions for "increases in collaboration," "disadvantaged").

Currently:

- Supports CALCTP through curriculum development and trainings;
- Has audit classes for green- and white-collar attendees;
- Trains Power Pathways instructors within an IDSM certificate program

## Course Series that lead to certification

- BOC
- AIA credits available for certain classes
- NCQLP credits available for certain classes
- IDSM Certificate program – Working with CSU Eastbay and Power Pathways

## Description of Courses

| | |
|---|---|
| **Workforce Enablement (% of courses)** | |
| Low | 25% |
| Medium | 28% |
| High | 46% |
| N/A | 1% |
| **Certification Related (% of courses)** | |
| Direct Support | 1% |
| Clear Relationship | 61% |
| Not Directly Related | 37% |
| N/A | 1% |
| **Adult Learning (% of courses)** | |
| Low to None | 57% |
| Medium to High | 42% |
| N/A | 1% |
| **IDSM Content (% of courses)** | |
| Little or None | 67% |
| 10 to 49% | 20% |
| 50 to 100% | 13% |
| N/A | 1% |
| **Frequency (% of courses)** | |
| Less than one | 39% |
| One to two | 41% |
| Three to four | 12% |
| Five or more | 7% |
| **Skill Development (% of courses)** | |
| Remember/Understand | 33% |
| Analyze/Apply | 46% |
| Evaluate/Create | 20% |
| N/A | 1% |

## Adult Learning Principles

- Some training staff have been trained on Adult Learning Principles (ALP) and will integrate them with the goal of promoting energy efficient behavior and participating in available EE programs.
- PEC and ETC are working with an adult learning consultant to assess current courses and where modifications can be made.

## Participant Tracking

| | |
|---|---|
| Patron ID | Event ID and name |
| First and last name | Event date |
| Phone number | Event duration |
| Email address | Event location |
| Address | Enroll date |

## Pacific Energy Center (PEC)

PG&E

**20 years**
est. 1991

Target Audience: Commercial building operation and new construction design markets to break down barriers that keep customers from taking advantage of energy efficient opportunities in their buildings.

### Support Sector Strategies

- Lighting – Some of their lighting classes qualify for NCQLP credit, currently collaborate with IES (provide venue), and support CALCTP through curriculum development and trainings
- HVAC – Collaborating with ASHRAE on annual seminars
- Auditors – Offering benchmarking classes as there is currently no certification for auditors

### Partnerships & Sectors

- AIA
- ASHRAE
- BOMA
- USGBC
- CHEERS
- CALCerts
- CBPCA
- PG&E ZNE Group
- PG&E ETP

### Sectors Reached

- Architects, engineers, contractors , designers (primarily commercial)
- Building owners and operators (primarily commercial)
- Lighting, mechanical, HVAC engineers and technicians (primarily commercial)

### Modify Structure of Courses

Currently offers:

- Lighting Classroom – experience poor and good quality lighting
- Energy Audits Class – Utilize Tool Lending Library and PEC to learn ways of measuring building performance
- Overcast Sky Simulator and Heliodon – test physical models of buildings for daylighting and shading performance
- Interactive energy modeling software classes

Is currently working to organize their curriculum better to clarify what classes or series' are available for participants

### Consulting on External EE Curricula

- Coordinate and collaborate with the Emerging Technologies (ET) program to develop demonstration and testing facilities, develop curricula, organize product showcases, introduce new equipment, installation practices, and whole building concepts to key market actors, coordinate training programs for training the trainer and training programs with information about technologies on the horizon for introduction to the marketplace.
- PEC staff are on the Laney College advisory board to advise on curricula. Also advise the train-the-trainer classes at community colleges.
- PEC staff advise AIA continuing education curricula
- PEC supports CALCTP through curriculum development and trainings
- PEC trains Power Pathways instructors within an IDSM certificate program

### Description of WE&T/Low Income / Disadvantaged / Minority Emphasis

Currently working with Alameda County WIB to identify unemployed people who would benefit from certification.

# Energy Training Center (ETC)

PG&E

**33 years**
est. 1978

Target Audience: Upstream and midstream market actors (primarily residential) with the intent of improving the quality of installation of energy efficient measures.

## Reach of Program (2009 - 2011)

| | |
|---|---|
| **Number of unique participants:** | 8,871 |
| **Number of non-unique participants:** | 18,872 |
| **Number of sessions offered:** | 205 |

## PPM Tracking Status

Perception that they are achievable and clearly defined.

Currently:

- Has 14 sessions that qualify as having greater than 50% IDSM content since the start of 2011
- Collaborating with Power Pathway, working with six community colleges on weatherization curriculum and training materials
- Providing tools (no longer in use in their tool lending library) to colleges for hands-on training
- Partnering with BPI to provide training

## Course Series that lead to certification

- NATE (certification classes and continuing education credits)
- NARI (continuing education credits)
- AIA (continuing education credits)
- BIG (continuing education credits)
- ACCA courses
- BPI (one course)

## Description of Courses

| | |
|---|---|
| **Workforce Enablement (% of courses)** | |
| Low | 7% |
| Medium | 39% |
| High | 44% |
| N/A | 10% |
| **Certification Related (% of courses)** | |
| Direct Support | 4% |
| Clear Relationship | 40% |
| Not Directly Related | 48% |
| N/A | 8% |
| **Adult Learning (% of courses)** | |
| Low to None | 54% |
| Medium to High | 36% |
| N/A | 10% |
| **IDSM Content (% of courses)** | |
| Little or None | 80% |
| 10 to 49% | 6% |
| 50 to 100% | 6% |
| N/A | 8% |
| **Frequency (% of courses)** | |
| Less than one | 3% |
| One to two | 32% |
| Three to four | 31% |
| Five or more | 25% |
| **Skill Development (% of courses)** | |
| Remember/Understand | 26% |
| Analyze/Apply | 47% |
| Evaluate/Create | 16% |
| N/A | 11% |

## Adult Learning Principles

- Some training staff have been trained on Adult Learning Principles (ALP) and will integrate them with the goal of promoting energy efficient behavior and participating in available EE programs.
- PEC and ETC are working with an adult learning consultant to assess current courses and where modifications can be made.

## Participant Tracking

| | |
|---|---|
| First and last names | Event/class location |
| Company | Event/class date |
| Address | Date registered |
| Phone number | Instructor |
| Email | Accounting |
| Event/class name | ID |

# Energy Training Center (ETC)

PG&E

**33 years**
est. 1978

Target Audience: Upstream and midstream market actors (primarily residential) with the intent of improving the quality of installation of energy efficient measures.

## Support Sector Strategies

- HVAC – Working with ACCA to offer the ACCA Quality Installation Training Series
- Residential construction – classes targeting residential builders
- Agriculture – Class offered on energy management for dairy, winery, and other agricultural facilities.

## Partnerships & Sectors

- NATE
- ACI
- BPI
- NARI
- AIA
- BIG
- HERS
- CBPCA
- USGBC
- ASHRAE
- CHEERS

## Sectors Reached

- Architects, designers, engineers, contractors (primarily residential)
- Municipal employees
- HVAC contractors
- Building owners and operators (primarily residential)
- Real estate and development
- Agriculture

## Modify Structure of Courses

Currently offers:

- HVAC Training unit – "best practice" implemented in 2005, provides students with hands-on experience of property charging, duct sealing, etc.
- Training House - provides students with the ability to see and touch quality insulation installation, high efficiency lighting exhibits, weatherization techniques, etc.

## Consulting on External EE Curricula

Working with Power Pathways and community colleges to develop and deliver weatherization curricula.

## Description of WE&T/Low Income / Disadvantaged / Minority Emphasis

- Worked with San Francisco City College on an articulated curriculum model (in partnership with San Francisco OEWD). Many participants were disadvantaged or looking for employment.
- Coordinated with WIBs to provide training in Bakersfield and Merced to job-seekers.

## Food Service Training Center (FSTC)

PG&E

**24 years**
est. 1987

Target Audience: Commercial food industry

### Reach of Program (2009 - 2011)

| | |
|---|---|
| **Number of unique participants:** | 645 |
| **Number of non-unique participants:** | 1,180 |
| **Number of sessions offered:** | 33 |

### PPM Tracking Status

Not specifically familiar with PPMs, but collaborate with other organizations and centers a lot already, so feel they would be able to work towards most of the goals (they don't currently track these collaborations, but could start).

### Course Series that lead to certification

- Courses offered which contribute to LEED certification
- SCSI (continuing education credits)

### Description of Courses

Due to the significantly different nature of the FSTC, the breakdown of courses, as done for other centers, was not compiled.

### Adult Learning Principles

- Not specifically aware of ALP, but most of their courses/training are done through hands-on and interactive lessons and activities (often using the participant's own equipment).

### Participant Tracking

| | |
|---|---|
| First and last name | State |
| Company | ZIP code |
| Title | Phone |
| Address | Email address |
| City | Industry sector |

| Food Service Training Center (FSTC)<br>PG&E | 24 years<br>est. 1987 | Target Audience: Commercial food industry |
|---|---|---|

### Support Sector Strategies

- Work with architects, engineers, and designers (SCSI)
- Partnering with hospitality sector (working with NRA, and University hospitality programs)

### Partnerships & Sectors

- SCSI
- NRA
- LEED
- Local restaurant associations
- Ethnic associations (i.e. Chinese Consortium of San Francisco)
- Kendall College
- UC Davis
- San Jose State
- San Francisco State

### Sectors Reached

- Architects, engineers, and designers
- Hospitality and food service
- Manufacturing

### Modify Structure of Courses

Currently offers:

- Workplace-based hands-on – one-on-one trainings at the participant's facility, working with kitchen and restaurant staff
- Offer continuing education credits and LEED courses
- Using data derived from their energy efficient equipment testing in order to design courses and seminars

### Consulting on External EE Curricula

- Currently share instructors with the other centers
- Working with Kendall College to start developing energy efficient and sustainability curriculum – increasing awareness of energy efficiency and sustainability in restaurants among culinary students, so that when they join the workforce it will be more of a focus.

### Description of WE&T/Low Income / Disadvantaged / Minority Emphasis

- Most restaurant workers are low income or disadvantaged, so through on-site trainings and site audits at their restaurants, they are working with this segment of the population (hard to get these workers in the classroom/centers, so they often go to them).
- FSTC also has one staff member who is fluent in Mandarin so as to better communicate with this population of restaurant workers and owners.
- Working with ethnic associations (i.e. Chinese Consortium of San Francisco)

# Energy Resource Center (ERC)

SCG

**16 years**
est. 1995

Target Audience: Commercial and industrial market actors, vendors, and contractors

## Reach of Program (2009 - 2011)

| | |
|---|---|
| **Number of unique participants:** | 9,408 |
| **Number of non-unique participants:** | 33,829 |
| **Number of sessions offered:** | 271 |

## PPM Tracking Status

Feel the PPMs are achievable, but do need more clear definitions. Currently have a few classes that fall into the more than 50% IDSM category.

## Course Series that lead to certification

- BOC
- NATE

## Description of Courses

| | |
|---|---|
| **Workforce Enablement (% of courses)** | |
| Low | 0% |
| Medium | 4% |
| High | 47% |
| N/A | 7% |
| **Certification Related (% of courses)** | |
| Direct Support | 12% |
| Clear Relationship | 23% |
| Not Directly Related | 16% |
| N/A | 7% |
| **Adult Learning (% of courses)** | |
| Low to None | 12% |
| Medium to High | 40% |
| N/A | 7% |
| **IDSM Content (% of courses)** | |
| Little or None | 8% |
| 10 to 49% | 29% |
| 50 to 100% | 14% |
| N/A | 7% |
| **Frequency (% of courses)** | |
| Less than one | 11% |
| One to two | 40% |
| Three to four | 0% |
| Five or more | 1% |
| **Skill Development (% of courses)** | |
| Remember/Understand | 6% |
| Analyze/Apply | 41% |
| Evaluate/Create | 3% |
| N/A | 9% |

## Adult Learning Principles

- No formal training on ALP, but try to share info with instructors on an as-needed basis.

## Participant Tracking

| | |
|---|---|
| First and last name | Phone number |
| Address | Email address |
| City | Class |
| State | |
| ZIP Code | |

## Energy Resource Center (ERC)

SCG

**16 years**
est. 1995

Target Audience: Commercial and industrial market actors, vendors, and contractors

### Support Sector Strategies

- Currently define sector by technology, but is currently looking to how they can go beyond that and support industries.

### Partnerships & Sectors

•BOC
•Trade Technical Community College
•Emerging Technology Program
•Urban League
•Workforce Investment Boards
•STEM Education Coalition
•ERC has a goal to expand collaborations with trade associations.

### Sectors Reached

- Architects, engineers, designers, contractors
- Commercial and industrial business owners and facility managers
- Manufacturers
- Hospitality and food service

### Modify Structure of Courses

Currently offers:

- Early in 2011, ERC was working to identify ways to expand course offerings for the industrial segment, modifying course content and titles in the residential segment and increasing commercial courses in the area of sustainable green building.

### Consulting on External EE Curricula

None mentioned

### Description of WE&T/Low Income / Disadvantaged / Minority Emphasis

ERC is currently looking to partner with other organizations (such as Workforce Investment Board and Urban League) to make classes more available to low-income and minority workers/job seekers.

# Energy Innovation Center (EIC)

SDG&E

**1 year**
est.2011

Target Audience: Market actors and end-users, both in the residential and non-residential sector.

## Reach of Program (2009 - 2011)

| | |
|---|---|
| **Number of unique participants:** | 6,203 |
| **Number of non-unique participants:** | 21,994 |
| **Number of sessions offered:** | 256 |

## PPM Tracking Status

- Feels the metrics are appropriate, and that they will need to change some of what they are doing to meet them.
- Concerned about expectations of increasing numbers, when it is more important to tailor the program to needs.

## Course Series that lead to certification

- BOC
- NATE
- LEED (partner with USGBC)

## Description of Courses

| | |
|---|---|
| **Workforce Enablement (% of courses)** | |
| Low | 0% |
| Medium | 3% |
| High | 97% |
| N/A | 0% |
| **Certification Related (% of courses)** | |
| Direct Support | 5% |
| Clear Relationship | 91% |
| Not Directly Related | 4% |
| N/A | 0% |
| **Adult Learning (% of courses)** | |
| Low to None | 3% |
| Medium to High | 97% |
| N/A | 0% |
| **IDSM Content (% of courses)** | |
| Little or None | 2% |
| 10 to 49% | 64% |
| 50 to 100% | 34% |
| N/A | 0% |
| **Frequency (% of courses)** | |
| Less than one | 2% |
| One to two | 95% |
| Three to four | 2% |
| Five or more | 2% |
| **Skill Development (% of courses)** | |
| Remember/Understand | 19% |
| Analyze/Apply | 64% |
| Evaluate/Create | 17% |
| N/A | 0% |

## Adult Learning Principles

- Does not have in-house staff or instructors, but instead uses local speakers and subject matter experts.

## Participant Tracking

| | |
|---|---|
| First name | Phone |
| Last name | Email |
| Company | Class |
| Address | Enrollment date |

## Energy Innovation Center (EIC)

SDG&E

**1 year**
est.2011

Target Audience: Market actors and end-users, both in the residential and non-residential sector.

### Support Sector Strategies

- Offer energy efficiency training for food service staff

### Partnerships & Sectors

- NATE
- BOC
- USGBC
- ASHRAE
- BOMA
- IBEW
- IFMA
- California Restaurant Association
- UCSD
- San Diego City College

### Sectors Reached

- Architects, designers, engineers, contractors
- Commercial and residential building operations and maintenance
- Food service

### Modify Structure of Courses

Currently offers:

- 3-5 Day Basic and Advanced Building Performance Courses – BPI Certification Ready
- Reduce your Bottom Line Four-part Series
- Four courses offered that provide continuing education credits

Following Needs Assessment, trying to change how they package and market their courses. Identified a need for a series for property managers.

### Consulting on External EE Curricula

- Strengthened and expanded collaborations with career associations, occupational programs, and community colleges.
- Collaborating with UCSD to hold a 9-course certification "Intro to Sustainability"

### Description of WE&T/Low Income / Disadvantaged / Minority Emphasis

- Collaborate with low-income communities by offering contractor training in low-income areas.
- Working with agencies that provide assistance to low income customers and partnering with technical schools.

# Appendix E. Yardsticks Used in ID Assessment

We used three yardsticks (sets of evaluation criteria) for the Centergies review of materials:

- A: Support of Behavior Change yardstick
- B: Adult Learning Principles and Practices yardstick
- C: Learning Focus yardstick

The first-level numbered items (A.1, A.2, A.3…) under each of these yardsticks on the following pages are the dimensions on which we will evaluate the courses. The lower-level items (A.1.1, A.1.2, A.1.3…) under each dimension are the specific evaluation criteria.

The yardsticks are consistent with the evaluation criteria employed in the SCE PY 2006-08 Energy Energy Centers Process Evaluation and the SCE PY 2006–08 ETO Process Evaluation.

## How the Yardsticks Are Used for Rating Learning Materials

For most criteria, a course may score 1 (yes), 0 (no), or "na" (not applicable).[40] If a criterion is not applicable to a given course, that criterion is not considered in the scoring. A course's overall score in a dimension is determined by actual score divided by the total possible score.

For example, let's consider the "Action Orientation and Support" dimension of the Support of Behavior Change yardstick. This dimension is composed of five criteria, as shown in table the below. Let's say a particular course review results in:

- "Yes" on four of these criteria
- "No" on one criterion

That course scores 4 (four "yes" answers) out of 5 total possible points on this dimension.

[40] A few criteria, such as those related to skill development or learning levels, are rated on a scale. When a criterion is rated other than using "1=yes" and "0=no," the scoring conventions are noted in the yardstick details in Table 38 through Table 40.

Table 35. Example Course Scoring for "Action Orientation and Support" Dimension on the Support Behavior Change Yardstick

| Criteria for Action Orientation and Support | Score |
|---|---|
| Includes specific calls to action / specific next steps | YES |
| Supports development of individualized action plan | YES |
| Includes job aids / worksheets to assist in assessing / analyzing options | NO |
| Includes job aids / checklists to assist in taking action | YES |
| Includes info on where/how to get assistance in taking action | YES |
| **Total Points Scored / Total Possible Points** | **4/5** |
| **Score** | **80%** |

As another example, let's say we're applying the Support of Behavior Change yardstick to a different course. In this situation, the course material does not include job aids or worksheets to assist assessing and analyzing options. However, the focus of this course does not relate to issues where the learner's action includes evaluating options before determining a course of action. Therefore this criterion is not applicable.

- The course gets a "yes" on four of the criteria.
- It gets a "na" on one criterion.

That course scores 4 (four "yes" answers) out of 4 total possible points because "not applicable" items are not considered in the scoring. Therefore, the course scores 100% on this dimension.

Table 36. Another Course Scoring for "Action Orientation and Support" Dimension on the Support Behavior Change Yardstick

| Criteria for Action Orientation and Support | Score |
|---|---|
| Includes specific calls to action / specific next steps | YES |
| Supports development of individualized action plan | YES |
| Includes job aids / worksheets to assist in assessing / analyzing options | na |
| Includes job aids / checklists to assist in taking action | YES |
| Includes info on where/how to get assistance in taking action | YES |
| **Total Points Scored / Total Possible Points** | **4/4** |
| **Score** | **100%** |

In the body of this report, we present summary scores for each dimension. These scores are the average of individual course-specific scores on all the criteria under the dimension as shown in Table 37.

Table 37. Example Aggregate Scoring for "Action Orientation and Support" Dimension on the Support Behavior Change Yardstick

| Support of Behavior Change | Course 1 | Course 2 | Course 3 | Overall Score |
|---|---|---|---|---|
| **Action orientation and support** | **80%** | **100%** | **40%** | **73%** |
| Includes specific calls to action / specific next steps | 1 | 1 | 0 | **67%** |
| Supports development of individualized action plan | 0 | 1 | 0 | **33%** |
| Includes job aids / worksheets to assist in assessing / analyzing options | 1 | 1 | 0 | **67%** |
| Includes job aids / checklists to assist in taking action | 1 | 1 | 1 | **100%** |
| Includes information on where/how to get assistance in taking action | 1 | 1 | 1 | **100%** |

## The Actual Yardsticks

The following detail the yardsticks (sets of evaluation criteria) that the ID team used in the review of materials and in-person audits of courses:

- Table 38. Yardstick for Evaluating Support of Behavior Change
- Table 39. Yardstick for Evaluating Adult Learning Principles and Practices
- Table 40. Yardstick for Evaluating Learning Focus

Table 38. Yardstick for Evaluating Support of Behavior Change

| A. Support of Behavior Change |
|---|
| **A.1. Action orientation and support** |
| A.1.1. Includes specific calls to action / specific next steps |
| A.1.2. Supports development of individualized action plan |
| *A.1.2.1. Action planning is incorporated into the course in a meaningful and useful manner* |
| A.1.3. Includes job aids / worksheets to assist in assessing / analyzing options |
| A.1.4. Includes job aids / checklists to assist in taking action |
| A.1.5. Includes information on where/how to get assistance in taking action |
| **A.2. Action motivation** |
| A.2.1. Includes examples of "typical" benefits realized through actions or measures addressed by course |
| A.2.2. Includes detailed case study of actual implementations and benefits derived |
| A.2.3. Provides guidance on "selling" recommendations to decision makers in the organization, when appropriate |
| A.2.4. Includes references to relevant incentive and rebate programs |
| **A.3. Dissemination support** |

A.3.1. Includes units of instruction appropriate to in-house training by supervisors or others to support development of their organization's workforce

A.3.2. Provides preparation guidelines and delivery suggestions for the in-house units of instruction

A.3.3. Supports a variety of delivery formats such as one-to-one, short (e.g., one- to two-hour) small group "brown bag" sessions, and longer, more formal, "in service" sessions)

A.3.4. Specifies one or more learning objective for each in-house unit of instruction

A.3.5. Provides materials to support in-house delivery of specific teaching points that directly support the targeted objective(s)

A.3.6. Includes in-house "go do" activities that directly support the targeted objective(s)

*("Go do" activities are structured learning opportunities that the in house trainer can assign to trainees to provide practice and application of the skills or knowledge addressed in the unit of instruction.)*

A.3.7. Provides appropriate evaluation, coaching, and feedback guidelines for each "go do" activity associated with an in-house unit of instruction

Table 39. Yardstick for Evaluating Adult Learning Principles and Practices

| B. Adult Learning Principles and Practices |
|---|
| **B.1. Learner orientation, buy-in, engagement** |
| B.1.1. There is an initial activity that helps participants see the value of the training |
| B.1.2. The usefulness of the learning in the participants' lives is emphasized and demonstrated |
| B.1.3. The instructor creates a safe and respectful learning environment |
| B.1.4. There is an activity that enables participants to indicate their learning goals, and/or participants are given choices to select activities or content that is relevant to their interests and needs |
| B.1.5. There are activities that enable the learners to discover important information on their own |
| B.1.6. There are activities that enable the participants to contribute ideas |
| B.1.7. An in-class mini needs assessment conducted |
| B.1.8. The focus is on learner rather than presenter |
| B.1.9. The class builds on learner's prior learning or experience |
| B.1.10. The class meets needs of different learning styles |
| **B.2. Learner success engineering** |
| B.2.0. There are participant activities |
| B.2.1. There are activities that enable the participants to indicate and/or demonstrate their level of experience and expertise |
| B.2.2. Good examples and stories are provided that connect new learning to the participants' prior learning and experience |
| B.2.3. A maximum of 5 familiar and meaningful concepts and a maximum of 3 unfamiliar concepts are taught at one time |
| B.2.4. Rules are taught first; exceptions are not introduced until it is clear that the rules are understood |
| B.2.5. Transitional statements are made that show how different sections of the training relate to each other |
| B.2.6. A variety of instructional methods are used to ensure that visual, aural, and kinesthetic learners' needs are addressed |
| **B.3. Practice, application, interactivity** |
| B.3.1. There are problem-solving activities that actively engage the learners |
| B.3.2. There are opportunities for participants to immediately apply their new learning in the classroom |
| B.3.3. Materials include a participant workbook for hands on activities to check learning and comprehension |
| B.3.4. Learners are actively engaged in discovering answers |
| B.3.5. The design includes checks for comprehension before leaving a key topic area |
| B.3.6. There are opportunities for learners to practice what they've learned as they learn it |
| B.3.7. The activities reflect the learning objectives, including an appropriate mix of terminal performance and enabling objectives |
| B.3.8. Activities are included after each new concept or skill area is addressed |

B.3.9. Activities are parallel to — but different from — assessment items focusing on the same objectives

B.3.10. Activities employ a variety of approaches appropriate to relevant objectives and participants' "real world" requirements

**B.4. Lesson plan and content decisions**

B.4.1. There are learning objectives

B.4.2. The learning objectives are specific, observable, and measurable

B.4.3. The materials indicate the desired learning levels

B.4.3.1. Level stated by materials (objectives or other)

- *Evaluate = 3.00*

  *The most advanced level:*
  - *Making judgments based on criteria and standards through checking and critiquing*
  - *For example: Appraise based on specific criteria; decide or critique based on standards*
- *Create = 2.50*

  *Formerly the advanced level, now second to highest level:*
  - *Putting elements together into a coherent whole; reorganize elements into a new structure by generating, planning, or producing*
  - *For example: Design or develop a new work product; formulate a new plan or point of view "*
- *Analyze = 2.00*

  *The high middle level:*
  - *Determining how parts relate to one another and to an overall structure or purpose by differentiating, organizing, etc.*
  - *For example: Compare elements; distinguish relationships; identify patterns*
- *Apply = 1.50*

  *The low middle level:*
  - *Carrying out or using a procedure through executing, or implementing*
  - *For example: Use information in a new way; use concepts to solve problems*
- *Understand = 1.00*

  *Understand — The second most basic level:*
  - *Constructing meaningful messages by interpreting, exemplifying, classifying, summarizing, explaining, etc.*
  - *For example: Explain ideas or concepts; describe how something works*
- *Remember = 0.50*

  *The most basic level:*
  - *Retrieving, recognizing, and recalling relevant knowledge from long-term memory*
  - *For example: Recall or remember information; recognize or list steps*

B.4.3.2. Level inferred based on class activities

*(Level definitions and values same as for B.4.3.1.)*

B.4.4. There design reflects a variety of training methods

B.4.5. There is a clear focus on key content; interesting but unimportant content kept to a minimum

B.4.6. There is an organizing principle

B.4.7. There is an appropriate amount of content for the time period

**B.5. Learning facilitation and feedback**

B.5.1. Instructor validates learners' involvement and responses

B.5.2. Instructor makes transitional statements between sections

B.5.3. Instructor ensures that all learners can see and hear

B.5.4. Instructor provides breaks every 50 minutes or so

B.5.5. Instructor provides guidance and feedback when participants are asked to practice or demonstrate skills and knowledge

B.5.6. Instructor's feedback encompasses both positive and corrective feedback as appropriate

B.5.7. Instructor provides corrective guidance as appropriate (e.g., not just "incorrect" or "poor" but why, and where to find the correct information or how to perform better)

**B.6. Assessments**

B.6.0. There are assessments

B.6.1. Assessments measure successful completion based on "curriculum teaching" rather than "item teaching"

B.6.2. Assessments include items that sample the full range of learning objectives, including terminal performance and enabling objectives

B.6.3. Assessments reflect the learning level inherent in the objective(s) addressed by the items

B.6.4. Assessments distinguish between those who can meet the course objectives and those who do not

**B.7. General impression of Adult Learning**

B.7.1. ID team overall impression of "Adult Learning" (not score based)

*NOT based on scores for other criteria; used to compare ID team's overall impression with Energy Centers' overall impressions, as indicated in database.*

- *Medium to High — Many adult learning principles and practices are currently reflected in the course; for example, the course was originally designed to reflect adult learning principles and best practices, or has undergone major revisions within the past three years, in order to incorporate adult learning principles*
- *Low to None — Although some adult learning principles and best practices may be incorporated in the course, the overall course generally is not guided by these principles and practices*

B.7.2. [IOU DATA] IOU overall impression of "Adult Learning"

*Data provided by center staff in response to data request re. selection criteria used to identify courses to include in the pool for in-depth review.*

*Levels and descriptions same as those in B.7.1 above.*

**B.8. Additional Data Point**

B.8.1. Includes agenda for the session

Table 40. Yardstick for Evaluating Learning Focus

## C. Learning Focus

### C.1. Workforce enablement

C.1.1. The course is targeted to specific job/role responsibilities

#### C.1.1.1. Core job responsibility focus from ID team

*To what degree does the course clearly and directly support performance of job-specific tasks and decisions?*

- *High = 1.0*

  *Most of the course is specifically focused on how to perform tasks or make decisions that are typically associated with on-the-job responsibilities of a given role(s)*

- *Medium = 0.5*

  *About half of the course is specifically focused on how to perform tasks or make decisions that are typically associated with on-the-job responsibilities of a given role(s)*

- *Low = 0.0*

  *Little or none of the course is focused on how to perform tasks or make decisions associated with on-the-job responsibilities; however the content is directly relevant (a "good student" could see how to apply the information to the job)*

#### C.1.1.2. [IOU DATA] Core job responsibility focus from Center staff

*Data provided by center staff in response to data request re. selection criteria used to identify courses to include in the pool for in-depth review.*

*Levels and descriptions same as those in C.1.1. 1 above.*

C.1.2. The course clearly relates content and concepts to on-the-job responsibilities

C.1.3. The course includes examples that reflect "real-world" on-the-job requirements

*[Definition originally included both examples and activities. Deleted "and activities" because that was forcing a 0 for almost all classes — some of which had examples.]*

C.1.4. The course provides direct support for certification or has a clear relationship to certification

#### C.1.4.1. Certification support level from ID team

- *Direct Support = 1.0*

  *Is a requirement for a certification program or is recommended by the certifying agency or its designates as preparation for certification*

- *Clear Relationship = 0.5*

  *Clearly and specifically addresses knowledge or skills required to obtain certification, but is not specifically required or recommended by the certifying agency; also includes courses that provide continuing education credits*

- *Not Directly Related = 0.0*

  *Does not directly address knowledge or skills that an individual must demonstrate in order to become certified; may or may not address knowledge or skills typically held by individuals with certification*

### C.1.4.2. [IOU DATA] Certification support level from Center staff

*Data provided by center staff in response to data request re. selection criteria used to identify courses to include in the pool for in-depth review.*

*Levels and descriptions same as those in C.1.4. 1 above.*

C.1.5. Addresses the Apply (level 3) skill development (learning) level or higher

*Similar data to learning levels addressed under B.4.3.*

*The difference is that this item is directly parallel to data request of IOUs, for purpose of comparison.*

C.1.5.1. Skill Development level from ID team

- *Evaluate / Create = 3.0*

  *The most advanced level, includes:*

  - *Putting elements together into a coherent whole; reorganize elements into a new structure by generating, planning, or producing*
  - *Making judgments based on criteria and standards through checking and critiquing*

  *For example:*

  - *Design or develop a new work product; formulate a new plan or point of view*
  - *Appraise based on specific criteria; decide or critique based on standards"*

- *Analyze / Apply = 2.0*

  *The middle level, includes:*

  - *Determining how parts relate to one another and to an overall structure or purpose by differentiating, organizing, etc.*
  - *Carrying out or using a procedure through executing, or implementing*

  *For example:*

  - *Compare elements; distinguish relationships; identify patterns*
  - *Use information in a new way; use concepts to solve problems"*

- *Remember / Understand*

  *The most basic level, includes:*

  - *Constructing meaningful messages by interpreting, exemplifying, classifying, summarizing, explaining, etc.*
  - *Retrieving, recognizing, and recalling relevant knowledge from long-term memory*

  *For example:*

  - *Explain ideas or concepts; describe how something works*
  - *Recall or remember information; recognize or list steps"*

C.1.5.2. [IOU DATA] Skill Development level from Center teams

*Data provided by center staff in response to data request re. selection criteria used to identify courses to include in the pool for in-depth review.*

*Levels and descriptions same as those in C.1.5.2 above.*

## C.2. IDSM

C.2.1. The course includes content that either addresses integration through a balance of building systems OR integration through technology

C.2.1.1. IDSM Type

- *Building System*

  *Includes information on at least two building systems (i.e., mechanical, building envelope, lighting, solar, water, etc.) and*

  *How an integrated systems approach optimizes overall demand management, affecting energy efficiency, demand response, and smaller renewable energy systems"*

- *Multiple Technologies*

  *Technologies addressed fulfill at least two of the following: energy efficiency, demand response, and distributed generation*

  *IDSM technology examples would include dimming ballasts, Energy Management Systems, controls, or any technology with a work paper that includes both kW and kWh savings.*

- *Both Bldg Sys and Tech*
- *Neither Bldg Sys or Tech*

C.2.1.2. IF BALANCE OF BLDG SYS Includes information on how an integrated systems approach optimizes overall demand management, affecting energy efficiency, demand response, and smaller renewable energy systems

C.2.1.3. IF VIA TECHNOLOGY Technologies addressed fulfill at least two of the following: energy efficiency, demand response, and distributed generation

*IDSM technology examples would include dimming ballasts, Energy Management Systems, controls, or any technology with a work paper that includes both kW and kWh savings.*

C.2.1.3.1. [Tech Type 1] Energy Efficiency

C.2.1.3.2. [Tech Type 2] Demand Response

C.2.1.3.3. [Tech Type 3] Distributed Generation

C.2.2. The course specifically addresses the goals and benefits of IDSM

C.2.3. Percentage of IDSM content

C.2.3.1. IDSM Percent from ID team

- *50 to 100% = 1.0*

  *Half or more of the course addresses IDSM*

- *10 to 49%= 0.50*

  *A significant portion of the course but less than half, addresses [IDSM]*

- *Little or None = 0.0*

  *Although the course may address issues related to [IDSM], little or none of the class addresses IDSM*

C.2.3.2. [IOU DATA] IDSM Percent from Center team

### C.3. Additional Data Points

C.3.1. The course addresses technologies that achieve permanent load shift to off-peak periods (e.g., thermal energy storage, off-peak ice making)

C.3.1.1. Load Shift Type

- *TES*
- *Off-peak process*
- *Other (specify)*
- *Multiple*

C.3.2. The course addresses "soft skills" (communications, sales and marketing, negotiation, management and coaching, other "people skills")

- *Communication*
- *Sales/Marketing*
- *Negotiation*
- *Management and coaching*
- *Other "people skills"*

C.3.3. The course provides opportunities for remedial instruction in "soft skills"

C.3.4. The course provides opportunities for remedial instruction in technical skills (e.g., basic math, basic science

# Appendix F. Course Selection Criteria

To identify courses appropriate to the instructional design review, we requested databases of center events held in 2010–2011. In general, an "event" is an instance of a course; that is, a course held on a specific date and location is an event.[41] Most courses were represented by multiple events; that is, most courses were held multiple times over the two year period under consideration.

To obtain the pool of courses from which we drew a random sample, we asked the Energy Centers to rate the courses in several areas associated with workforce enablement.

The following notes the criteria — and associated descriptions — that were provided to the Energy Centers to help the evaluation team identify the courses to be considered as candidates for the in-depth instructional design review.

**Core Job Responsibility Focus**

To what degree does the course clearly and directly support performance of job-specific tasks and decisions?

- High — Most of the course is specifically focused on how to perform tasks or make decisions that are typically associated with on-the-job responsibilities of a given role(s)
- Medium — About half of the course is specifically focused on how to perform tasks or make decisions that are typically associated with on-the-job responsibilities of a given role(s)
- Low — Little or none of the course is focused on how to perform tasks or make decisions associated with on-the-job responsibilities; however the content is directly relevant (a "good student" could see how to apply the information to the job)

Courses included in the pool were identified by the Energy Centers as "High" or "Medium" in this area.

**Certification**

Is the course intended to help the participant achieve certification — and if so, to what degree?

- Direct Support — Is a requirement for a certification program or is recommended by the certifying agency or its designates as preparation for certification
- Clear Relationship — Clearly and specifically addresses knowledge or skills required to obtain certification, but is not specifically required or recommended by the certifying agency; also includes courses that provide continuing education credits
- Not Directly Related — Does not directly address knowledge or skills that an individual must demonstrate in order to become certified; may or may not address knowledge or skills typically held by individuals with certification

[41] There are a few exceptions, such as an "Earth Day" fair and similar event non-course events; these non-course events were eliminated from consideration for the instructional design review.

Courses included in the pool were identified by the Energy Centers as "Direct Support" or "Clear Relationship" in this area.

**Skill Development**

Which of the following "learning levels" does the course target? At the end of the course, what should the student be able to do as a result of the class? Please choose the "highest" level applicable.

- Evaluate / Create — The most advanced level, includes:
  - Putting elements together into a coherent whole; reorganize elements into a new structure by generating, planning, or producing
  - Making judgments based on criteria and standards through checking and critiquing
  - For example:
    - Design or develop a new work product; formulate a new plan or point of view
    - Appraise based on specific criteria; decide or critique based on standards
- Analyze / Apply — The middle level, includes:
  - Determining how parts relate to one another and to an overall structure or purpose by differentiating, organizing, etc.
  - Carrying out or using a procedure through executing, or implementing
  - For example:
    - Compare elements; distinguish relationships; identify patterns
    - Use information in a new way; use concepts to solve problems
- Remember / Understand — The most basic level, includes:
  - Constructing meaningful messages by interpreting, exemplifying, classifying, summarizing, explaining, etc.
  - Retrieving, recognizing, and recalling relevant knowledge from long-term memory
  - For example:
    - Explain ideas or concepts; describe how something works
    - Recall or remember information; recognize or list steps

Courses included in the pool were identified by the Energy Centers as "Evaluate/Create" or "Analyze/Apply" in this area.

**Adult Learning**

To what degree does the course incorporate adult learning principles?

- Medium to High — Many adult learning principles and practices are currently reflected in the course; for example, the course was originally designed to reflect adult learning principles

and best practices, or has undergone major revisions within the past three years, in order to incorporate adult learning principles

- **Low to None** — Although some adult learning principles and best practices may be incorporated in the course, the overall course generally is not guided by these principles and practices

Courses included in the pool were identified by the Energy Centers as "Medium to High" in this area.

See "More about Adult Learning" on p. 132 for a description of the key principles and best practices.

**IDSM** [42]

To what degree does the course support integrated demand-side management?

- **50 – 100%** — Half or more of the course addresses technologies or measures that achieve a ***combination of two or more*** of the following: kWh savings, kW reduction, distributed generation
- **10 – 49%** — A significant portion of the class, but less than half, addresses technologies or measures that achieve a ***combination of two or more*** of the following: kWh savings, kW reduction, distributed generation
- **Little or None** — Although the class may address technologies or measures that achieve kWh savings or kW reduction, or distributed generation, it generally does not address technologies or measures that achieve a ***combination*** of these

Support of IDSM was not considered when determining the pool of courses from which the sample was selected. (Filtering for relatively high IDSM support resulted in a pool that was too small to support the agreed sample size.)

**Frequency**

How often is the class held each year (on average)?

- **5 or more** times per year
- **3 to 4** times per year
- **1 to 2** time per year
- **Less than once** a year (offered some years, but not others)

Courses included in the pool were identified by the Energy Centers as offered at least once per year.

[42] While we collected information about courses' IDSM with the intention of using it as a course selection criterion, there were too few courses that were identified as having 50 – 100% that it was not feasible to limit our pool to courses that were high in IDSM content as well as met the other criteria. Therefore, IDSM was eliminated as a course selection criterion.

**More about Adult Learning**

Adult Learning Principles include:

- **Obtain learner buy-in** — for example, explains "what's in it for me" and relates course content to the participants' "real world" needs
- **Build on what learners know** — for example, uses examples, stories, or analogies that relate new content or concepts to information or ideas that the typical participant would already be familiar with
- **Engage the learners** — for example, includes activities that allow participants to explore new ideas, discover information, or contribute their ideas
- **Set up learners for success** — for example, shows a logical structure and context for new ideas and information, avoid overwhelming participants with too many details or exceptions (especially before the "rules" are learned)
- **Let learners apply what they have learned** — for example, in-class activities call for participants solve problems using the information and concepts presented in the class.

Adult Learning Best Practices include:

- **Lesson plan** — course materials include a listing of learning objectives (specific, observable, and measurable), summarizing class topics and agenda, and noting the various learning methods employed
- **Content decisions** — the course focuses on key content (minimizing "nice to know" information), is organized in an evident and logical manner, and addresses a reasonable amount of information for the timeframe
- **Interactive activities** — the course includes individual, small-group, and/or whole-group exercises that actively engage the participants in solving problems, discovering answers, and checking their understanding of information and concepts presented in the class.
- **Learner centricity** — the instructor tailors the course to the background, experience, needs, and interests of the participants; learning opportunities include a variety of media and methods; the focus is on the participants rather than the "expert" instructor
- **Learning facilitation** — the instructor actively solicits participants' ideas and questions, ensures participants can see and hear, and provides frequent breaks (e.g., every 90 or so)
- **Practice opportunities** — exercises after each main lesson give participants a chance to meet course objectives within the classroom environment; exercises employ a variety different techniques appropriate to the objectives addressed; exercises help tie class content and concepts to "real world" situations and requirements
- **Feedback** — participants are told "how well" they did in class activities and practice opportunities, including both positive feedback ("right") and corrective guidance ("it would be more effective if…")
- **Assessments** — a test, a "final project," or similar evaluation method is used at the end of the course measure whether participants successfully meet the course objectives

# Appendix G. Strategic Alignment Details

To help determine how well the WE&T program is aligned with these goals, we asked the Energy Centers to identify how they would rate their course offerings on several metrics associated with training designed to help:

- Support certification for trades and professions
- Develop skills and knowledge related with "green jobs" and workforce enablement
  - Focus on core job responsibilities
  - Develop higher-level skills as they are used on the job
  - Adherence to adult learning principles
- Foster understanding and application of IDSM

The Energy Centers' self-reporting on these metrics for all courses in the 2010–2011 database is summarized in the body of this report. This appendix provides the details on how the Energy Centers and the evaluation team assessed courses on these metrics. Specifically, Table 41 shows the percentages of courses that were identified by the Energy Centers and by the ID team having a given characteristic for each metric.

Characteristics highlighted in bold are identified as supporting the goals of the California Strategic Plan and the WE&T Needs Assessment.

**Table 41. Energy Centers' and ID Team's Assessment of Courses' Characteristics re. Workforce Enablement and IDSM Characteristics**

| Metric | Characteristic | SCG (n=6) | | SDG&E (n=6) | | PEC (n=12) | | P-ETC (n=13) | | Irwindale (n=14) | | Tulare (n=11) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Center | ID | Center | ID | Center | ID | Center | ID | Center | ID | Center | ID |
| **Certification** | **Direct Support** | **50%** | **33%** | **0%** | **0%** | **0%** | **0%** | **0%** | **0%** | **29%** | **29%** | **9%** | **9%** |
| | **Clear Relationship** | **50%** | **17%** | **100%** | **33%** | **92%** | **25%** | **85%** | **46%** | **43%** | **36%** | **82%** | **73%** |
| | Not Directly Related | 0% | 0% | 0% | 0% | 0% | 0% | 8% | 8% | 29% | 29% | 9% | 9% |
| | na[43] | 0% | 50% | 0% | 67% | 8% | 75% | 8% | 46% | 0% | 7% | 0% | 9% |
| **Core Job Responsibility** | **High** | **100%** | **50%** | **100%** | **33%** | **92%** | **75%** | **85%** | **85%** | **57%** | **71%** | **91%** | **91%** |
| | **Medium** | **0%** | **0%** | **0%** | **50%** | **0%** | **8%** | **8%** | **8%** | **43%** | **0%** | **9%** | **0%** |
| | Low | 0% | 33% | 0% | 17% | 0% | 17% | 0% | 8% | 0% | 29% | 0% | 9% |
| | na[43] | 0% | 17% | 0% | 0% | 8% | 0% | 8% | 0% | 0% | 0% | 0% | 0% |
| **Skill Development[44]** | **Evaluate / Create** | **17%** | **0%** | **50%** | **0%** | **50%** | **33%** | **8%** | **0%** | **0%** | **0%** | **9%** | **0%** |
| | **Analyze / Apply** | **83%** | **0%** | **50%** | **33%** | **42%** | **50%** | **85%** | **62%** | **93%** | **7%** | **91%** | **36%** |
| | Remember / Understand | 0% | 83% | 0% | 67% | 0% | 17% | 0% | 38% | 7% | 93% | 0% | 64% |
| | na[43] | 0% | 17% | 0% | 0% | 8% | 0% | 8% | 0% | 0% | 0% | 0% | 0% |
| **Adult Learning** | **Medium to High** | **100%** | **17%** | **83%** | **33%** | **92%** | **92%** | **92%** | **62%** | **93%** | **7%** | **100%** | **27%** |
| | Low to None | 0% | 67% | 17% | 67% | 0% | 8% | 0% | 38% | 7% | 93% | 0% | 73% |
| | na[43] | 0% | 17% | 0% | 0% | 8% | 0% | 8% | 0% | 0% | 0% | 0% | 0% |
| **IDSM** | **50 to 100%** | **50%** | **0%** | **50%** | **0%** | **0%** | **0%** | **0%** | **0%** | **14%** | **0%** | **0%** | **0%** |
| | 10 to 49% | 50% | 17% | 50% | 17% | 67% | 8% | 23% | 8% | 79% | 7% | 100% | 0% |
| | Little or None | 0% | 67% | 0% | 83% | 25% | 58% | 69% | 92% | 7% | 93% | 0% | 100% |
| | na[43] | 0% | 17% | 0% | 0% | 8% | 33% | 8% | 0% | 0% | 0% | 0% | 0% |

[43] When the Energy Centers did not provide rating information about a course for a specific metric, the course was marked "na" for the center's data on that metric. When the course materials provided for the instructional design review were inadequate for the ID team to provide an assessment relative to a specific metric, the course was marked "na" for the ID team's data on that metric.

[44] See Appendix H: *Learning Outcomes and Training Objectives* for more information on what these skill levels mean.

# Appendix H. Learning Outcomes and Training Objectives

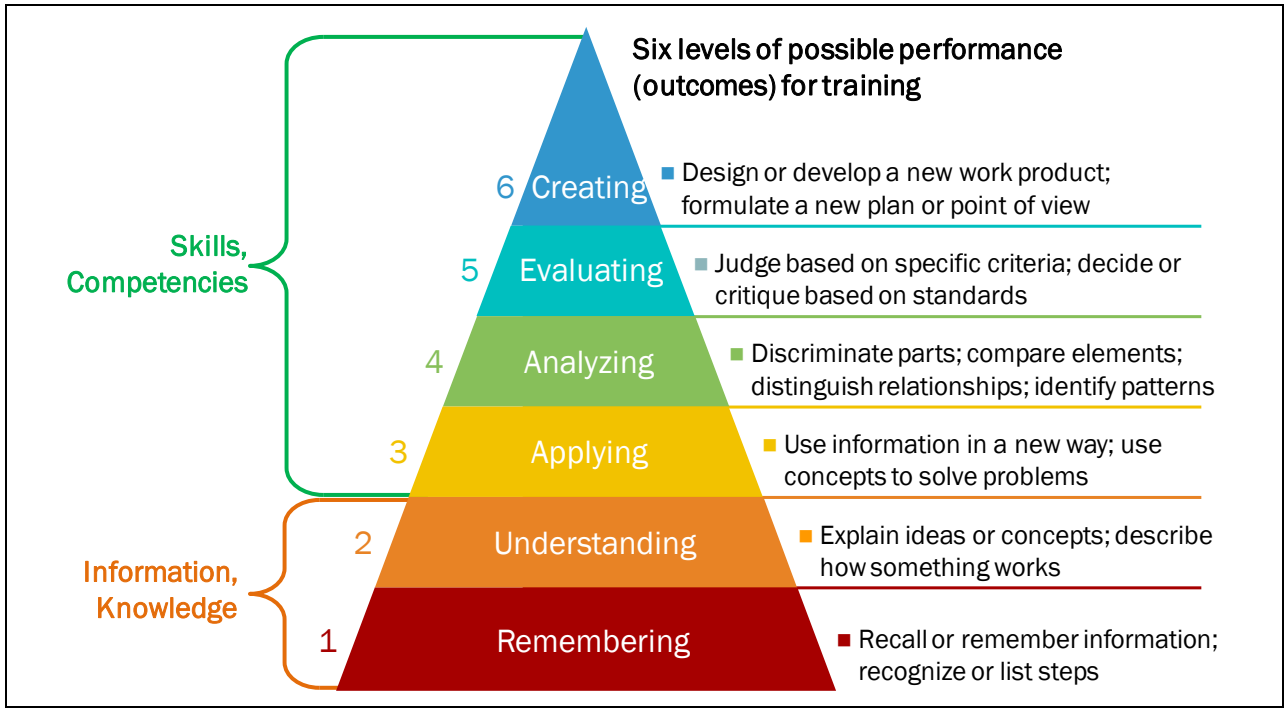
Decisions regarding the design of the training should be informed by the desired outcomes of the training. That is, the first questions a course developer needs to ask are, "What are we trying to accomplish?" and "What is the desired end result of the training experience?"

## Learning Levels

Learning outcomes often are categorized into six levels — referred to as Bloom's taxonomy for the Cognitive Domain — from the most "basic" to the most "advanced."[45]

An updated version of the levels in Bloom's Taxonomy[46] are shown in Figure 22.

Figure 22. Skill Development or Learning Levels




[45] Bloom's Taxonomy is considered to be a core element within the education and training community. It addresses three domains: Cognitive (thinking), Affective (feeling), and Psychomotor (physical movement). For examples of the essential position of Bloom's taxonomy, see *Significant Writings that Have Influenced the Curriculum: 1906-1981*, by H.G. Shane (http://www.eric.ed.gov/ERICWebPortal/search/detailmini.jsp?_nfpb=true&_&ERICExtSearch_SearchValue_0=EJ238619&ERICExtSearch_SearchType_0=no&accno=EJ238619) and "Bloom's Taxonomy: A Forty-Year Retrospective" the 1994 yearbook of the National Society for the Study of Education (http://nsse-chicago.org/Yearbooks.asp).

[46] The original taxonomy, established by Bloom in 1956, defined the levels as Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation. This was refined in the 1990s to reflect the levels shown above. [Source: http://www.odu.edu/educ/roverbau/Bloom/blooms_taxonomy.htm]

Which learning outcomes are most appropriate depend upon the overarching goal of the training. For example:

- The **Remembering** level is appropriate if the end goal is to raise participants' awareness — or to establish the "background knowledge" necessary to achieve the higher levels of outcomes.
- The **Understanding** level is appropriate if the end goal is to change participants' attitudes.
- The **Applying** level is appropriate if the end goal is to change participants' behavior in relatively discrete and structured ways.
- The **Analyzing**, **Evaluating**, and **Creating** levels are appropriate if the end goal is to help participants make relatively complex decisions or enhance their behavior.

## Objectives

After identifying the desired learning outcomes for a course, it is possible to develop the specific training objectives that serve as the touchstone for the presentations and activities that compose the course — as well as form the basis for evaluating the success of the training and participants' performance relative to the training.

Training objectives are typically stated in terms of a hierarchy:

- Terminal performance objectives (TPOs) are the "main things" you want participants to do as a result of the training.

  The TPOs of a course should directly reflect the desired outcomes. They tell you what "putting it together" activities should address, and they define the parameters for what would be in a "final exam." If participants meet the TPOs (and the TPOs are appropriate to the overarching goals for the training), you will have accomplished what you set out to accomplish.

- Enabling objectives (EOs) are the subsidiary things that participants must know or do in order to accomplish the TPOs. They are the building blocks of the TPOs.

  The EOs set the parameters for teaching points and interim practice opportunities.

Both kinds of objectives should be written in terms of measurable, observable behaviors. For example, instead of saying the participant will "appreciate" something, it is more useful to say the participant will "describe the benefits" of something or "select the option that reflects the value" of something.

- You can't directly tell by listening or watching whether someone appreciates — and two different observers may interpret the same behavior as appreciating or not.
- You can, however, tell whether someone describes the benefits of something or selects the alternative that reflects the characteristics of what you want them to appreciate.

A practical way to consider objectives is to ask "What will success look like? How will we know if participants meet expectations? What will they be able to do at the end of the class to prove they've learned 'the right stuff'?" The answers to these questions form the TPOs for a course. EOs address the subordinate questions: "What goes into doing what the TPO describes? How will we know if someone knows that or can do that?"

# Appendix I. About Adult Learning Principles and Practices

The following discusses some of the concepts and supporting research behind the adult learning principles and practices that were central to portions of the instructional design assessment of courses.

## Comparing Two Approaches: Expert Presenter and Learning Facilitator

There are two models of adult education. The first model is the formal instructional approach that is found on most college campuses: an educational expert imparts his or her wisdom and experience. The learners come to be educated by the expert, so they expect to listen while the expert talks. The focus is on the expert. We refer to this model as the Expert Presenter.

The other model, which typically is employed in organizations that want to affect change in their target audiences' performance and behavior, focuses on the learners and actively engages them throughout the learning experience. We refer to this model as the Learning Facilitator.

The following compares these two approaches and addresses the question as to which approach is "better."

Table 42. Characteristics of the "Expert Presenter" Approach

| Expert Presenter | |
|---|---|
| **Approach** | Expert presents wisdom and experience |
| **Role of learner** | Listen and absorb |
| **Learner's prior experience** | Limited source of information |
| **Learning** | A passive process of being educated |
| **Focus** | **The expert** |

Table 43. Characteristics of the "Learning Facilitator" Approach to Adult Education

| Learning Facilitator | |
|---|---|
| **Approach** | Learners discover and practice new skills |
| **Role of learner** | Offer information and demonstrate learning |
| **Learner's prior experience** | Source of information and meaning |
| **Learning** | An active process of involvement |
| **Focus** | **The learner** |

In general, the instructors of the courses we audited were very good **Expert Presenters**. They:

- Were highly competent and credible, extremely knowledgeable, and clearly committed to their subject areas
- Established a positive rapport with their audiences through their credentials, personalities, humorous anecdotes, and responses to questions
- Provided examples that were effective and useful

There also were two courses we audited in PG&E territory (one at the PEC and one at the P-ETC), where the Learning Facilitator approach predominated. These instructors:

- Also were highly competent and credible, effectively established rapport, and provided effective, useful examples
- Focused on key concepts and skills, ensuring that these concepts were understood and skills practiced before moving on to the next topic area.
- Employed a variety of learning activities that to accommodate aural, visual, and kinesthetic learners

  (Kinesthetic learners benefit from moving physically as part of the learning experience.)
- Maintained control of the learning environment by using presentations, managing group discussions and handling questions to keep the session on track, and by assigning and appropriately debriefing activities

#### Which Model is Better?

Both the Expert Presenter and the Learning Facilitator approaches have an appropriate role in adult learning. In general:

- The Expert Presenter approach can be effective when the overarching goal of the training is to impart information, such as updates on new technologies.

  This corresponds to Levels 1 and 2 in Bloom's taxonomy.[47]
- The Learning Facilitator approach is essential when the goal of the training is to develop skills and help participants apply new information and concepts to their "real world."

  This corresponds to Levels 3 through 6 in Bloom's taxonomy.[47]

  It is important to note that even when the Expert Presenter model is appropriate, it is still important to provide students with an opportunity to discuss and practice the new information. For example, in a course intended to impart information about energy efficiency technologies, the emphasis can be delivering information (expert presentation), but students would benefit significantly from opportunities to:
- Discuss how this information relates to their experience and environment

[47] See Appendix H: Learning Outcomes and Training Objectives for a discussion of Bloom's taxonomy and the learning/skill levels it describes.

- Practice their grasp of the new information through "check your understanding" opportunities (answering questions about the content).

Figure 23 and Figure 24 clearly show the positive impact that providing opportunities to practice and apply has on the long-term effect of the training.

**Figure 23. Teaching Styles and Average Retention Rates [48]**

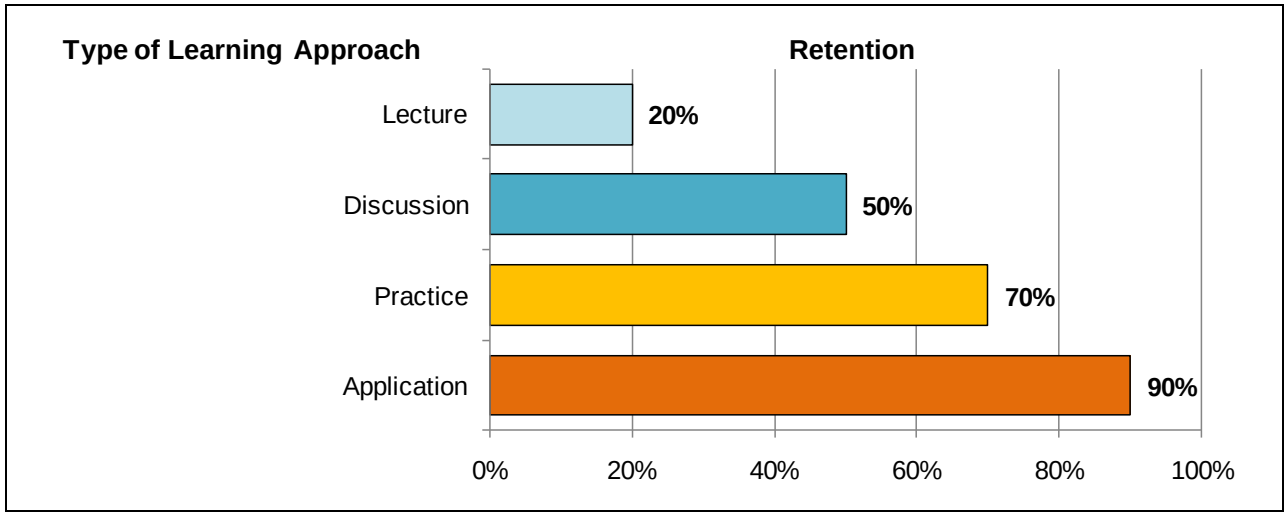
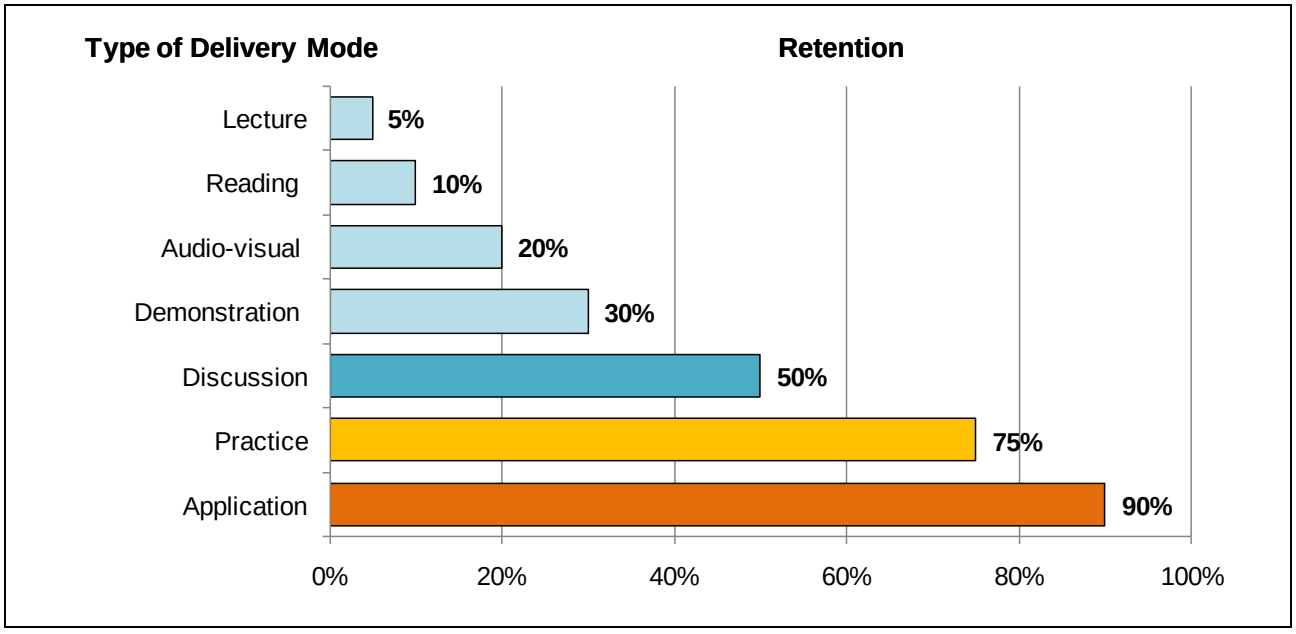



**Figure 24. Delivery Mode and Average Retention Rates [49]**




[48] Source: ftp://ftp-fc.sc.egov.usda.gov/NEDC/isd/choosing_instructional_strategies.pdf

[49] Source: ftp://ftp-fc.sc.egov.usda.gov/NEDC/isd/methods_media.pdf

**Other Aspects of Adult Learning that Apply to Both Models**

Other aspects of adult learning principles and best practices also are backed by research. For example:

- Focus on key information

  Studies on cognition (the ability to acquire knowledge) have revealed that adults can learn approximately five new things within a training segment if those things are familiar and meaningful. (The training segment may be 10 minutes, 30 minutes, an hour, or more. It depends upon the complexity of the items to be learned.)

  If the new items to be learned are unfamiliar, adults can learn only 2-3 of them at a time.

  - This is why it is so important to limit the amount of information taught at one time, as well as to ensure that it is as meaningful as possible. Teach only what is essential to achieving the training objectives.

  - A task analysis will identify the essential learning that must occur during a training session. The task analysis is used to create the specific, observable and measurable training objectives. These objectives identify what the learners will do to learn and to demonstrate their learning.

    (See Appendix H: Learning Outcomes and Training Objectives for further discussion of objectives.)

- Give regular breaks

  Other research indicates that adult brains become saturated after approximately 50 minutes. Adults need at least 10 minutes to relax and absorb what they have learned before they begin the next training segment.

  In addition, studies indicate that the prime time for learning occurs at the very beginning and ending of every training segment. Every "break" increases the amount of prime learning time.

  This is why it is so important to take regularly scheduled "breaks" every 50 minutes. Otherwise, participants minds can become fatigued and overloaded, limiting learning and retention.

  It is important to note that these breaks do not need to be a formal "recess" from the training environment.

  An effective break can be accomplished through a change of pace and type of activity. For example, a game to "check your understanding," a role play to practice communication skills, a table group activity in which participants work together to solve a problem, or an activity in which participants work hands-on with equipment all can serve as the "recommended break every 50 minutes to an hour." (Of course participants still need formal "recess" breaks in addition to "change of pace" breaks. Typically these are best scheduled once or twice per half day of training.)

- Meet the needs of different learning styles

  Cognitive research also shows that people learn differently. One of the simplest models identifies three different learning styles: aural, visual, and kinesthetic.

  - The aural learner learns best by listening.

- The visual learner learns best by seeing.
- The kinesthetic learner learns best by moving.

That is why a training program benefits from a variety of learning activities that are rich enough to simultaneously meet the needs of all three learning styles.

A workbook in which the learners can write, audiovisuals that highlight or exemplify key points, active discussions in which the learners move to work with one another or write on a flipchart or pop out of their chairs to answer a question, or hands-on activities that provide application practice all help ensure the different learning style needs are met.

- Teach the rule and its exceptions at different times

Learning research also indicates that teaching a rule with its exception at the same time nullifies learning either the rule or the exception.

It is necessary to teach the rule and make sure it has been firmly learned before ever mentioning exceptions.

## Guidelines for Effective Learning Experiences

Table 44 provides a high-level summary of key principles for effective adult learning — and their implications for training design and delivery — as researched and documented in numerous professional instructional design references.

Table 44. Guidelines for Effective Learning Experiences

| Guideline | Implications |
|---|---|
| *Adults learn best when they…* | |
| Are actively involved in the learning process | ➢ Involve participants in the learning process (effective instructors are good facilitators as well as good presenters)<br>➢ Balance lecture with opportunities for participants to share experiences, ask questions, and apply knowledge and practice skills |
| Receive timely and appropriate feedback | ➢ Provide feedback (e.g., "suggested responses" or "class solutions") for exercises<br>➢ Debrief individual and table group activities<br>➢ Incorporate opportunities for instructor and participants to comment on others' ideas and results |
| See how the new knowledge and skills will help them meet their goals | ➢ Solicit participants' goals and expectations for the training; relate course objectives, content, and activities to these goals and expectations<br>➢ Articulate how participants will benefit from the training (answer "what's in it for me?")<br>➢ Show how the course content and activities apply to their work and other responsibilities that are important to them |
| Can use their natural learning style(s) | ➢ Employ a variety of training methods (e.g., group discussion, small-group problem solving, case-studies, games, individual or small-group coaching, demonstration, lecture)<br>➢ Frequently relate "the parts to the whole" and the "whole to the parts"<br>➢ Use a variety of "media" (spoken and written words, graphics, models); incorporate opportunities for physical interactions |
| Can relate new information, concepts, and skills to their current knowledge and skills | ➢ Acknowledge the experiences, perspectives, and expertise that participants bring to the training; solicit participants' opinions and ideas<br>➢ Relate new information to prior experiences and learnings |
| Experience success in comfortable and secure learning environment | Design for success and avoid "information overload" by doing the following:<br>➢ Focus all information and activities on the targeted learning outcomes (objectives) |

| Guideline | Implications |
|---|---|
| | ➢ Organize information into discrete segments (modules or chapters)<br>➢ Provide context for each new topic; use transitional statements (and/or graphics) to show how different sections relate to each other<br>➢ Logically build from the simple to the complex; ensure that participants fully comprehend the "rules" before teaching the "exceptions"<br>➢ Focus on the essentials; save "nice to know" information for optional extended learning opportunities<br>➢ Introduce and summarize consistently ("tell them what you're going to tell them; tell them; tell them what you told them")<br>➢ Provide opportunities to practice, practice, practice and apply, apply, apply<br>➢ Create a safe and engaging learning environment<br>➢ Promote group interaction; solicit participants' input; demonstrate respect for differing opinions and experiences<br>➢ Encourage questions; create opportunities for participants to "experiment and discover"<br>➢ Consider "training games" as a vehicle for discovery learning and practice; consider playful approaches to reinforcing participation and desired performance<br>➢ Schedule frequent breaks and opportunities for participants to work together in small, informal groups<br>➢ Incorporate opportunities for self-directed learning; allow participants to make decisions about the learning areas they pursue and take a leadership role in their learning experience<br>➢ Ensure that the training objectives are appropriate to the desired outcomes and target audience — and that presentations and activities are appropriate to the training objectives |

As mentioned above, a large body of research over the past few decades is distilled into the guidelines for effective adult learning experiences summarized in Table 42. Some of references that provide further discussion of these tenets include:

Stolovitch, Harold D., and Erica J. Keeps. (2011) *Telling Ain't Training: Why Training Fails, What Makes Training Successful, How You and Your Learners Can Achieve Astonishing Results.* 2nd Edition. Alexandria, VA: ASTD. ISBN: 1562867016

Galbraith, Michael W. (2004). *Adult learning methods: A guide for effective instruction.* 3rd edition. Malabar, FL: Krieger Publishing Company. ISBN: 157524232X

Knowles, Malcolm S., Elwood F. Holton, and Richard A. Swanson. (2005) *The adult learner: The definitive classic in adult education and human resource development*. Amsterdam: Elsevier. ISBN: 0750678372

Merriam, S. B., Caffarella, R. S., and Baumgartner, L. M. (2007). *Learning in adulthood: A comprehensive guide*. 3rd edition. San Francisco, CA: Jossey-Bass, Inc. ISBN: 0787975885.

# Appendix J. Yardstick Scoring Details

The following tables provide the criterion-specific scores from the instructional design assessment.

Note that the overall score for a dimension may not be the average of the scores for the criteria under that dimension. This is because:

- Overall dimension scores are the average of individual course-specific scores on all the criteria under the dimension.
- Some courses were scored "na" on some criteria, and were excluded from the average scores.
- This effectively "weights" some criteria; that is, a criterion on which all courses were scored will have a greater affect on the overall score for the dimension that a criterion where several courses were scored "na."

See Appendix E: *Yardsticks Used in ID Assessment* on p. 119 for details on the course scoring conventions.

When a course was included in both a review of materials and an in-person audit, the reported scores are the average of the scores obtained using the two evaluation methods. (We have not reported the scores for review of materials and for in-person audits separately because the ratings were generally consistent for the two methods.)

Table 45. Detailed Results for Support of Behavior Change Yardstick

| Support of Behavior Change<br>Dimensions and Criteria | SCG (n=6) | SDG&E (n=6) | PEC (n=12) | P-ETC (n=13) | Irwindale (n=14) | Tulare (n=11) | FSTC (n=2) |
|---|---|---|---|---|---|---|---|
| **Action orientation and support** | **25%** | **13%** | **52%** | **29%** | **19%** | **24%** | **20%** |
| Includes specific calls to action / specific next steps | 20% | 17% | 38% | 13% | 8% | 18% | 0% |
| Supports development of individualized action plan | 20% | 0% | 38% | 13% | 12% | 0% | 0% |
| Includes job aids / worksheets to assist in assessing / analyzing options | 40% | 17% | 41% | 31% | 31% | 45% | 0% |
| Includes job aids / checklists to assist in taking action | 40% | 0% | 59% | 56% | 31% | 36% | 0% |
| Includes information on where/how to get assistance in taking action | 20% | 33% | 75% | 31% | 19% | 18% | 100% |
| **Action motivation** | **10%** | **33%** | **65%** | **25%** | **13%** | **9%** | **75%** |
| Includes examples of "typical" benefits realized through actions or measures addressed by course | 20% | 50% | 82% | 44% | 15% | 27% | 100% |
| Includes detailed case study of actual implementations and benefits derived | 0% | 67% | 67% | 31% | 8% | 9% | 100% |
| Provides guidance on "selling" recommendations to decision makers in the organization, when appropriate | 20% | 0% | 7% | 0% | 8% | 0% | 0% |
| Includes references to relevant incentive and rebate programs | 0% | 20% | 57% | 25% | 19% | 0% | 100% |
| **Dissemination support** | **0%** | **0%** | **0%** | **0%** | **0%** | **0%** | **0%** |
| Includes units of instruction appropriate to in-house training by supervisors or others to support development of their organization's workforce | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Provides preparation guidelines and delivery suggestions for the in-house units of instruction | na | na | na | na | na | na | na |
| Supports a variety of delivery formats such as one-to-one, short (e.g., one- to two-hour) small group "brown bag" sessions, and longer, more formal, "in service" sessions) | na | na | na | na | na | na | na |
| Specifies one or more learning objective for each in-house unit of instruction | na | na | na | na | na | na | na |
| Provides materials to support in-house delivery of specific teaching points that directly support the targeted objective(s) | na | na | na | na | na | na | na |
| Includes in-house "go do" activities that directly support the targeted objective(s) | na | na | na | na | na | na | na |
| Provides appropriate evaluation, coaching, and feedback guidelines for each "go do" activity associated with an in-house unit of instruction | na | na | na | na | na | na | na |

Table 46. Detailed Results for Adult Learning Principles Yardstick

| Adult Learning Principles<br>Dimensions and Criteria | SCG (n=6) | SDG&E (n=6) | PEC (n=12) | P-ETC (n=13) | Irwindale (n=14) | Tulare (n=11) | FSTC (n=2) |
|---|---|---|---|---|---|---|---|
| **Learner orientation, buy-in, engagement** | **13%** | **36%** | **61%** | **47%** | **27%** | **27%** | **56%** |
| There is an initial activity that helps participants see the value of the training | 0% | 33% | 46% | 4% | 11% | 9% | 100% |
| The usefulness of the learning in the participants' lives is emphasized and demonstrated | 20% | 50% | 75% | 62% | 42% | 73% | 100% |
| The instructor creates a safe and respectful learning environment | 100% | 100% | 100% | 100% | 75% | 100% | na |
| There is an activity that enables participants to indicate their learning goals, and/or participants are given choices to select activities or content that is relevant to their interests and needs | 0% | 0% | 33% | 4% | 25% | 0% | 0% |
| There are activities that enable the learners to discover important information on their own | 0% | 17% | 67% | 54% | 15% | 10% | 0% |
| There are activities that enable the participants to contribute ideas | 20% | 17% | 67% | 65% | 15% | 10% | 100% |
| An in-class mini needs assessment conducted | 0% | 20% | 42% | 4% | 14% | 0% | 50% |
| The focus is on learner rather than presenter | 0% | 33% | 54% | 42% | 14% | 9% | 0% |
| The class builds on learner's prior learning or experience | 60% | 100% | 79% | 88% | 86% | 86% | 100% |
| The class meets needs of different learning styles | 0% | 17% | 71% | 62% | 7% | 18% | 50% |
| **Learner success engineering** | **66%** | **64%** | **80%** | **85%** | **55%** | **63%** | **90%** |
| There are activities that enable the participants to indicate and/or demonstrate their level of experience and expertise | na | 50% | 80% | 95% | 50% | 50% | na |
| Good examples and stories are provided that connect new learning to the participants' prior learning and experience | 90% | 83% | 83% | 96% | 82% | 68% | 100% |
| A maximum of 5 familiar and meaningful concepts and a maximum of 3 unfamiliar concepts are taught at one time | 80% | 67% | 67% | 69% | 68% | 85% | 100% |
| Rules are taught first; exceptions are not introduced until it is clear that the rules are understood | 90% | 75% | 95% | 100% | 75% | 100% | 100% |
| Transitional statements are made that show how different sections of the training relate to each other | 70% | 80% | 85% | 77% | 46% | 60% | 100% |
| A variety of instructional methods are used to ensure that visual, aural, and kinesthetic learners' needs are addressed | 0% | 17% | 68% | 67% | 7% | 18% | 50% |
| **Practice, application, interactivity** | **10%** | **32%** | **69%** | **52%** | **16%** | **36%** | **25%** |
| There are problem-solving activities that actively engage the learners | na | 50% | 90% | 75% | 67% | 41% | na |
| There are opportunities for participants to immediately apply their new learning in the classroom | na | 100% | 100% | 80% | 33% | 55% | na |
| Materials include a participant workbook for hands on activities to check learning and comprehension | na | 50% | 72% | 68% | 33% | 75% | na |
| Learners are actively engaged in discovering answers | na | 100% | 90% | 90% | 67% | 20% | na |
| The design includes checks for comprehension before leaving a key topic area | 20% | 17% | 13% | 4% | 21% | 9% | 50% |

| Adult Learning Principles<br>Dimensions and Criteria | SCG (n=6) | SDG&E (n=6) | PEC (n=12) | P-ETC (n=13) | Irwindale (n=14) | Tulare (n=11) | FSTC (n=2) |
|---|---|---|---|---|---|---|---|
| There are opportunities for learners to practice what they've learned as they learn it | 0% | 33% | 83% | 67% | 11% | 45% | 0% |
| The activities reflect the learning objectives, including an appropriate mix of terminal performance and enabling objectives | na | na | 100% | 100% | 50% | na | na |
| Activities are included after each new concept or skill area is addressed | na | 100% | 65% | 45% | 33% | 40% | na |
| Activities are parallel to — but different from — assessment items focusing on the same objectives | na | na | na | na | 50% | 0% | na |
| Activities employ a variety of approaches appropriate to relevant objectives and participants' "real world" requirements | na | 75% | 83% | 70% | 33% | 18% | na |
| **Lesson plan and content decisions** | **42%** | **63%** | **81%** | **66%** | **41%** | **38%** | **64%** |
| There are learning objectives | 0% | 17% | 79% | 23% | 32% | 9% | 100% |
| The learning objectives are specific, observable, and measurable | na | 100% | 60% | 75% | 20% | 0% | 0% |
| The materials indicate the desired learning levels | 0% | 17% | 73% | 23% | 11% | 0% | 0% |
| Level stated by materials (objectives or other)[50] | na | 1.5 | 2.0 | 1.5 | 3.0 | na | na |
| Level inferred based on class activities | 0.6 | 0.9 | 2.0 | 1.2 | 0.8 | 1.1 | 0.5 |
| There design reflects a variety of training methods | 0% | 17% | 73% | 65% | 11% | 23% | 50% |
| There is a clear focus on key content; interesting but unimportant content kept to a minimum | 80% | 100% | 96% | 92% | 79% | 91% | 100% |
| There is an organizing principle | 100% | 100% | 100% | 96% | 82% | 100% | 100% |
| There is an appropriate amount of content for the time period | 70% | 92% | 88% | 88% | 54% | 44% | 100% |
| **Learning facilitation and feedback** | **100%** | **100%** | **95%** | **90%** | **94%** | **75%** | **na** |
| Instructor validates learners' involvement and responses | 100% | 100% | 100% | 100% | 80% | 100% | na |
| Instructor makes transitional statements between sections | 100% | 100% | 100% | 100% | 80% | 0% | na |
| Instructor ensures that all learners can see and hear | 100% | 100% | 100% | 100% | 100% | 100% | na |
| Instructor provides breaks every 50 minutes or so | 100% | 100% | 67% | 75% | 100% | 100% | na |
| Instructor provides guidance and feedback when participants are asked to practice or demonstrate skills and knowledge | na | 100% | 100% | 67% | 100% | na | na |
| Instructor's feedback encompasses both positive and corrective feedback as appropriate | na | 100% | 100% | 100% | 100% | na | na |
| Instructor provides corrective guidance as appropriate (e.g., not just "incorrect" or "poor" but why, and where to find the correct information or how to perform better) | na | 100% | 100% | 100% | 100% | na | na |
| **Assessments** | **20%** | **0%** | **27%** | **0%** | **11%** | **0%** | **0%** |

[50] Evaluate = 3.0; Create = 2.5; Analyze = 2.0; Apply = 1.5; Understand = 1.0; Remember = 0.5

| **Adult Learning Principles**<br>**Dimensions and Criteria** | **SCG (n=6)** | **SDG&E (n=6)** | **PEC (n=12)** | **P-ETC (n=13)** | **Irwindale (n=14)** | **Tulare (n=11)** | **FSTC (n=2)** |
|---|---|---|---|---|---|---|---|
| There are assessments | 20% | 0% | 27% | 0% | 14% | 0% | 0% |
| Assessments measure successful completion based on "curriculum teaching" rather than "item teaching" | 100% | na | 100% | na | 50% | na | na |
| Assessments include items that sample the full range of learning objectives, including terminal performance and enabling objectives | na | na | 100% | na | 100% | na | na |
| Assessments reflect the learning level inherent in the objective(s) addressed by the items | na | na | 100% | na | 100% | na | na |
| Assessments distinguish between those who can meet the course objectives and those who do not | na | na | 100% | na | 100% | na | na |

**Table 47. Detailed Results for Learning Focus Yardstick**

| Learning Focus<br>Dimensions and Criteria | SCG (n=6) | SDG&E (n=6) | PEC (n=12) | P-ETC (n=13) | Irwindale (n=14) | Tulare (n=11) | FSTC (n=2) |
|---|---|---|---|---|---|---|---|
| **Workforce enablement** | **59%** | **61%** | **89%** | **76%** | **53%** | **68%** | **33%** |
| The course is targeted to specific job/role responsibilities[51] | 0.7 | 0.8% | 0.8 | 0.9 | 0.8 | 0.9 | 0 |
| The course clearly relates content and concepts to on-the-job responsibilities | 50% | 67% | 83% | 92% | 71% | 91% | na |
| The course includes examples that reflect "real-world" on-the-job requirements | 10% | 83% | 79% | 85% | 50% | 82% | 100% |
| The course provides direct support for certification or has a clear relationship to certification | 100% | 100% | 100% | 86% | 69% | 90% | 0% |
| Addresses the Apply (Level 3) skill development (learning) level or higher | 17% | 33% | 83% | 62% | 7% | 36% | 0% |
| **IDSM** | **10%** | **13%** | **15%** | **9%** | **5%** | **0%** | **0%** |
| The course includes content that either addresses integration through a balance of building systems OR integration through technology | 20% | 17% | 25% | 12% | 7% | 0% | 0% |
| The course specifically addresses the goals and benefits of IDSM | na | 100% | 25% | 0% | 0% | na | na |
| **Additional Data Points** | **0%** | **0%** | **2%** | **2%** | **0%** | **0%** | **0%** |
| The course addresses technologies that achieve permanent load shift to off-peak periods (e.g., thermal energy storage, off-peak ice making) | 0% | 0% | 13% | 8% | 0% | 0% | 0% |
| The course addresses "soft skills" (communications, sales and marketing, negotiation, management and coaching, other "people skills") | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| The course provides opportunities for remedial instruction in "soft skills" | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| The course provides opportunities for remedial instruction in technical skills (e.g., basic math, basic science) | 0% | 0% | 8% | 8% | 0% | 0% | 0% |

[51] 1.0 = High; 0.5 = Medium; 0.0 = Low

# Appendix K. List of Courses Reviewed

| Course Title | Center | Type[52] |
|---|---|---|
| **SDG&E and SCG** | | |
| IHACI - NATE 3: Gas Heating Part 1 (Chatsworth) | SCG | M |
| Boiler Water Treatment for Energy Efficiency-Energy Resource Center | SCG | M |
| Certified Green Building Professional (CGBP) | SCG | M |
| EnergyPro 5: Residential New Construction | SCG | M |
| IHACI - NATE 8: Air Distribution Part 2 (ERC) | SCG | M |
| Well and Pump Engineering - Gaining Efficiencies Through Technology | SCG | A |
| Air Distribution Module (Part 3) - Four Part Series | SDGE | M |
| Energy Efficiency for Refrigerated Warehouses | SDGE | M |
| Outdoor Lighting Design & Compliance for the 2008 Title 24 Standards | SDGE | M |
| Take Action on Climate Change - The Cool Planet Project | SDGE | M |
| Benchmarking Hands-on | SDGE | A |
| IHACI - (CAQI/CAQM/CAQS) Electrical Module Part 3 | SDGE | A |
| **SCE** | | |
| IHACI - NATE Gas Heating Part 1 | Irwindale | M |
| Gas Heating Module Part 2 | Irwindale | M |
| AC/HP Refrigeration: CAQM of Air Conditioning & Heat Pump Systems Part III | Irwindale | M |
| AC/HP Refrigeration: CAQS of Air Conditioning & Heat Pump Systems Part IV | Irwindale | M |
| Best Practices Residential Performance Modeling | Irwindale | M |
| IHACI - NATE Core Part 2 | Irwindale | A |
| IHACI HVAC System Diagnostics Part 1 -Fundamentals, Theory, Methodology and Mind | Irwindale | M |
| IHACI NATE Air Conditioners & Heat Pumps: Part 1 | Irwindale | M |
| IHACI System Performance Part 2 - HVAC: A Sub-system of the Building | Irwindale | M |
| LEED for Green Associates | Irwindale | M |
| Introduction to Programmable Logic Controllers: Energy Efficiency Applications | Irwindale | A |
| Introduction to Lighting | Irwindale | A[53] |
| Beyond Efficient Lamps | Irwindale | A[53] |
| Implementing Energy Efficiency Projects | Irwindale | A[53] |

[52] M = review of materials only; A = in-person audit plus review of materials

[53] This course was not in the original pool of courses identified as high in the criteria associated with workforce enablement. Due to cancellations of scheduled courses, challenges scheduling audits to replace the cancelled courses, and a request by SCE that we focus on courses that were part of the "mainstream" curriculum and taught by SCE instructors, we substituted this course, which was not in the original pool of courses that met the selection criteria.

| Course Title | Center | Type[52] |
|---|---|---|
| CAQI/CAQAM/CAQS AC/HP/Refrigeration Module (4 Parts) Part III | Tulare | M |
| CAQI/QM/QS Air Distribution Module - Fundamental Theory and Techniques of Air Side Design and Installation Part III | Tulare | M |
| Gas Heating Module - Gas Heating Part II - California Quality Installation, Maintenance, and Service of Gas Heating Systems | Tulare | M |
| Home Performance with Energy Star HPwES Level III PART II (CBPCA) Added Class NOT ON QTRLY 8 AM - 5 PM | Tulare | M |
| HVAC System Diagnostics Module HVAC System Diagnostics Part III - Evaluating, Analyzing, and Ultimately Identifying the Root Causes(s) of the HVAC /R System | Tulare | M |
| HVAC System Diagnostics Module HVAC System Diagnostics Part IV - Accurate Elimination and Verification of the Root Causes(s) of the HVAC /R System | Tulare | M |
| IHACI Electrical Module Part IV - Electrical Schematics: A Roadmap to Diagnosing and HVAC/R System | Tulare | M |
| System Performance Module System Performance Part II - HVAC: A Sub-system of the Building | Tulare | M |
| Title 24 Proper Procedures for Charging Air Conditioners and Heat Pumps MAX 25 PG&E | Tulare | M |
| Title 24 Requirements for HVAC Contractors | Tulare | M |
| Basic Heating, Ventilation, & Air Conditioning (HVAC) | Tulare | A[53] |
| **PG&E** | | |
| Energy Auditing Techniques for Small & Medium Commercial Facilities | PEC | A |
| Lighting Controls Workshop (PEC) | PEC | M |
| Energy Audit Skills: Tools, Data Collection Techniques, & Calculations | PEC | M |
| Advanced Lighting Controls for Specifiers | PEC | M |
| CHPS (Collaborative for High Performance Schools) School Modernizations Bootcamp | PEC | M |
| CHPS School Modernizations Bootcamp: HVAC and Lighting | PEC | M |
| EBCx Workshop and Project Review I | PEC | M |
| Existing Building Commissioning Workshop Series V Class # 11 | PEC | M |
| Existing Building Commissioning Workshop Series VI Class # 7 | PEC | M |
| Existing Building Commissioning Workshop Series VI Class # 9 | PEC | M |
| Lighting Design & Software for Outdoor Calculations | PEC | M |
| Benchmarking Energy Use In Commercial Buildings | PEC | A |
| Energy Auditing Techniques for Small and Medium Commercial Facilities | PETC | M |
| Lighting Controls Workshop (PETC) | PETC | M |
| Energy Audit Skills: Tools, Data Collection Techniques, and Calculations | PETC | A |
| ACCA Manual J - Equipment Sizing and Selection | PETC | M |
| Advanced ACCA Manual N | PETC | M |
| Photovoltaic (PV) Site Analysis and System Sizing | PETC | M |
| Proper Procedures for Charging Air Conditioners and Heat Pumps | PETC | M |
| Title 24 Duct Installation Standards and Diagnostic Testing | PETC | M |
| Title 24 HVAC System Change-Outs | PETC | M |

| Course Title | Center | Type[52] |
|---|---|---|
| Zoning Design and Beyond | PETC | M |
| Balanced Ventilation for High Performance Homes | PETC | A |
| HVAC System Airflow and Static Pressure Diagnostics | PETC | A |
| Optimizing Residential HVAC System Performance | PETC | A |
| **FSTC** | | |
| Effective and Efficient Food Service Lighting | FSTC | M |
| Greener Restaurant Seminar | FSTC | M |