ENERGY WORKFORCE SECTOR STRATEGY

Commercial Energy Efficiency Sector Strategy

2013 Summary Report

December 2013

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Introduction

The Energy Workforce Sector Strategy (EWSS) defines PG&E's near-term business direction for continuing workforce development in collaboration with the California Public Utilities Commission (CPUC) and the other Investor Owned Utilities (IOUs). Focusing on the full workforce spectrum, this sector strategy is designed to meet the goals established by AB 32 and associated mandates for efficiency in commercial buildings in California. It is aligned with the CPUC's Energy Efficiency Strategic Plan and recent Project Implementation Plans, linking workforce development to priorities of industry stakeholders and leveraging the assets of California's Community College system and California State Universities.

How to Use This Report

EWSS is a data-driven approach to developing a high-quality workforce for the Commercial Energy Efficiency Sector. It presents a comprehensive profile of workforce requirements for this market, intended to inform industry, education, and policy stakeholders within the PG&E service territory for creating education and training programs that address critical occupations and skill sets.

Recommendations in the report leverage the state's educational assets in response to market drivers and workforce demand. Accordingly, the report sets goals and defines specific programs for 2014 as the foundation for PG&E's ongoing work with the CPUC.

Complementing the CPUC Workforce Education and Training Needs Assessment and other research, this report explores workforce dimensions that can be useful in developing specific training programs that accelerate market adoption of commercial energy efficiency solutions. It creates an overarching strategy that acknowledges best practices from the California Advanced Lighting Controls Training Program (CALCTP) and can inform other associated initiatives like the statewide HVAC Sector Strategy. The focus of this report is on Community Colleges and California State Universities to augment the work already done and ongoing by labor unions and their Labor Management Cooperation Committees.

Further work continues to make a tangible difference in workforce development that helps drive progress to meet the AB 32 mandates in PG&E's service territory. Three training programs were launched in the fall of 2013, in direct response to EWSS research and employer inputs. Additionally, the EWSS initiative is being regionalized to meet the unique requirements of employers in the Bay Area, Central Valley, and Sacrament/North energy efficiency markets. These efforts ultimately will align programs among education providers with the needs of employers in the target regions.

Executive Summary

Synopsis

Approximately 2,200 new jobs in the Commercial Energy Efficiency Sector are projected annually for PG&E's service territory during the years 2012 through 2016. Equal numbers of new professional and skilled trades jobs are expected during this period. According to employer surveys and real-time market data from 2012 and 2013, professional workers – architects, engineers, commercial energy auditors, and business development specialists – will lead market growth and job creation. Significant market adoption barriers have been identified that require a more sophisticated professional workforce in order to achieve the mandates of AB 32, the California Global Warming Solutions Act.

The PG&E Energy Workforce Sector Strategy (EWSS) is a comprehensive approach to workforce development that addresses the full spectrum of commercial energy efficiency occupations. Programs are grouped into three major categories:

> *Demand Creation:* Developing new knowledge and skills within the professional workforce to increase market adoption rates and assure compliant energy efficiency designs.
>
> *Capacity:* Assuring that education and training programs across the occupational spectrum are capable of producing the number of workers required for growth of this sector.
>
> *Compliance:* Infusing new industry expertise into education and training programs that elevate workforce abilities to comply with energy efficiency codes and standards.

EWSS augments prior research into the workforce needs of this sector, such as the 2011 Workforce Education and Training Needs Assessment by the Don Vial Center on Employment in the Green Economy and initiatives by various Labor Management Cooperation Committees. Important dimensions are added by EWSS, more fully leveraging assets of the California State University and Community College Systems.

Specific outcomes for 2013 EWSS workforce advancement are identified for each of the three program categories listed above. Additionally, EWSS drives significant outcomes in stakeholder engagement, regionalization of key programs, and closer coupling of common interests among employers, educators, and students.

Background

EWSS defines PG&E's business direction for workforce education and training in the Commercial Energy Efficiency Sector. Aligned with the CPUC's Energy Efficiency Strategic Plan, Workforce Education and Training Needs Assessment (WE&T), and recent Project Implementation Plans, the report provides the workforce foundation for accelerating progress in PG&E's service territory to achieve the mandates of AB 32, The California Global Warming Solutions Act.

The Commercial Energy Efficiency Sector includes technologies for heating, cooling, ventilation, lighting, refrigeration, building envelope, industrial processes, and plug loads. Approximately 18% of US energy consumption falls within this sector - from hospitals and institutional buildings to commercial offices and retail.

More than 200 stakeholders have joined the conversation to help guide EWSS programs.

Widely divergent interests are influencing the state's implementation of commercial energy efficiency programs. As a result, EWSS establishes a basic prioritization scheme in making sure that appropriate trajectories are achieved in response to this combination of interests: (1) achieving the AB 32 mandates, (2) meeting the requirements of the CPUC's Long Term Strategic Plan, (3) executing the Program Implementation Plan, (4) meeting the market need, (5) driving compliance with codes and standards, and (6) assuring capacity to meet market growth requirements.

Another important dimension in the EWSS perspective is the massive influx of new funding – Prop 39 and PACE – and programs like Cap and Trade and 2013 Title 24 Code to help accelerate growth of the commercial energy efficiency market. EWSS has not considered the potential impact of these investments on workforce beyond the current ratepayer-based funding. An important factor in the 2014 plan will be making an assessment of workforce based on investment levels experienced in 2013.

Key Findings

Following is a high-level summary of two levels of information derived by EWSS research and stakeholder engagement. Level 1 is the Program Narrative section of this report which provides detailed information on the following topics. Level 2 is a group of eight appendices that document research methodology and findings, reflecting raw data and analyses that support EWSS conclusions.

Employment Demand

EWSS projects larger numbers of new jobs than WE&T. EWSS, based on research by Economic Modeling Solutions Inc. (EMSI), estimates creation of 2,200 new jobs annually between 2012 and 2016; the WE&T Needs Analysis reflects 1,649 to 2,411 new person-years will be created in its 2015 medium and high investment scenarios, respectively. However, EWSS projections are only for the PG&E service territory. Other differences in these two projections undoubtedly arise from the uniqueness of each entity's proprietary models, scope of the studies, and underlying definitions. Most notably, the distribution of new jobs among occupations is considerably different between the two studies.

WE&T projects that by 2020, approximately two-thirds of California's energy efficiency jobs will be in the construction trades. In a mature market, the majority of energy efficiency jobs may be skilled workers in the construction trades. More analysis is needed, however, to develop near-term targeting of specific occupational categories for education and training.

Of the thirteen industries included in EWSS 2012-2106 labor market window, engineering services is by far the strongest. It is the region's largest source of jobs in the Commercial Energy Efficiency Sector, contributing 36% of the 135,779 jobs in these industries. It will also create almost half of the sector's projected job growth.

Within the emerging market context, the priority for professional skills and knowledge can easily be seen in the Figure 1 Project Life Cycle diagram. Systems integrators, third party implementers, and contractors typically do not have a dedicated sales force. Rather, senior level managers, engineers, and project managers engage potential commercial and industrial customers to develop opportunities for energy efficiency projects. As illustrated in Figure 1, jobs for design, commissioning, installation, operations, and maintenance get created only when these professionals are successful in contracting for projects. Hence the EWSS priority on this segment of the workforce.

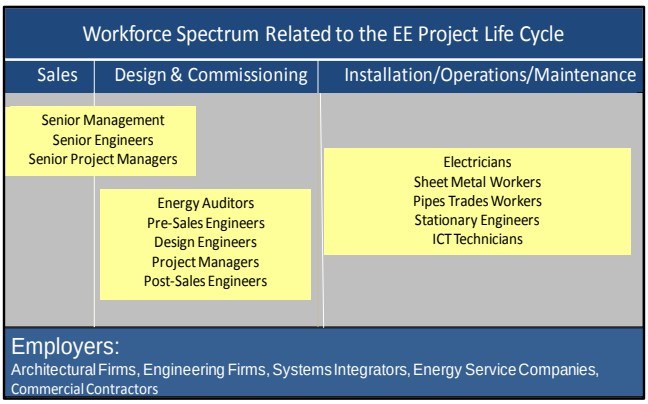

Figure 1. Workforce Spectrum Overlaid on Energy Efficiency Project Life Cycle

Overall, approximately 80% of the energy efficiency job openings are projected to be in 18 of the study's 67 occupational categories, as illustrated in Table 2. Among the conclusions that can be drawn from Table 1 are (1) certain occupations, such as Architects, are expected to see growth that is a large percentage of their current participation in the Energy Efficiency Sector, and (2) forty percent of the job openings are projected for engineering and design occupations versus 35% for construction and technical trades and 25% for operations, business, and finance.

Professional Categories	
Civil Engineers	318
Architects	225
General and Operations Managers	80
Construction Managers	79
Mechanical Engineers	64
Engineers, all other	62
Accountants & Auditors	31
Management Analysts	26
Environmental Engineers	25

CTE Categories	
Electricians	309
Plumbers, Pipefitters, & Steamfitters	179
Carpenters	161
First Line Supervisors	129
Managers, all other	107
Cost Estimators	69
HVAC/R Mechanics & Installers	60
Construction & Building Inspectors	55
Sheet Metal Workers	45

Economic Modeling Specialists Inc., 2012

Table 1. Top 18 Energy Efficiency Occupations

Numbers of new jobs industries tend to be larger in the counties bordering the San Francisco Bay. The four counties of San Francisco, Alameda, Contra Costa, and Santa Clara comprise 51% of all the jobs in these industries in the PG&E service area.

Employer Priorities

Interviews were conducted with a sample population representing stakeholders who are engaged in business or research in meeting the AB 32 goals for energy efficiency in commercial buildings. Those

interviewed were typically very senior, with long experience in engineering, architecture, construction or research in the nonresidential building environment. About two-thirds of the participants were electrical contractors, combined with systems integrators comprised of a mix of PG&E's third-party implementers (3Ps), Senior Energy Professionals (SEPs), and university researchers engaged in energy efficiency.

The most revealing finding in these interviews was the consistency with which employers described the greatest obstacles in developing their energy efficiency business. Seventy-one percent of the contractor responses clustered around financial obstacles in the areas of payback and lack of access to capital. 3Ps and Systems Integrators reported a broader range of obstacles, with 40% clustering around financial issues. Figure 2 summarizes the responses of both groups.

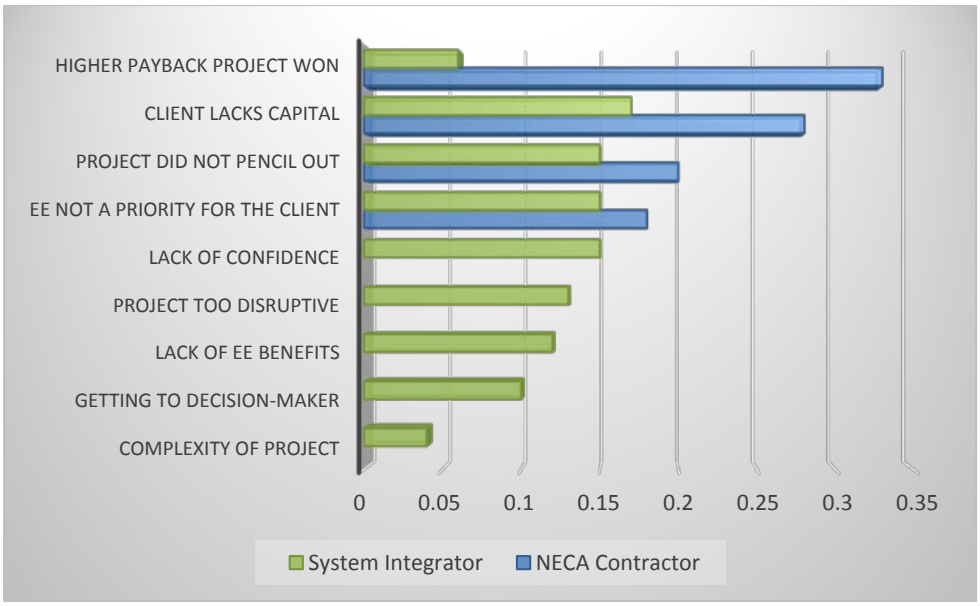

Figure 2. Distribution of Obstacles to Energy Efficiency Market Adoption

This information, along with in-depth inputs from employers, drove specifications for new education and training for these Senior Energy Professionals.

Profile of Senior Energy Professionals

Senior Energy Professionals comprise an important group of "Market Makers" made up of architects, engineers, analysts, project managers, and other professionals. This group represents the top of the energy efficiency career ladder, a segment of the workforce that provides the critical functions of creating demand and assuring quality of design and compliance with codes and standards.

Understanding this tier of the workforce, responsible for much of the demand creation work in this sector, is fundamental to near-term market adoption and career pathway development for future Market Makers. This group is highly focused on the energy efficiency business. More than 80% of the SEPs interviewed or surveyed were employed by companies whose primary line of business is in energy

efficiency - design, engineering, technical support or utility program implementation. All others were employed by companies with energy efficiency as their secondary business.

Educationally, SEPs come from diverse backgrounds involving high educational attainment, with 98% of SEPs holding at least a Bachelor's degree. Seventy percent have a Master's Degree or higher. Although the nature of the SEP's work is highly technical in most cases, their educational background often includes liberal arts fields. SEPs are characterized by long tenure and deep experience in energy efficiency, with 61% having more than fifteen years in the industry and 90% with more than five years.

Interestingly, this is the same basic population that employers targeted for professional development in overcoming barriers to energy efficiency market adoption.

Inventory of Educational Assets

Energy efficiency programs were inventoried at 112 community colleges and 23 CSU campuses. This analysis was based on programs that addressed the top 20 in-demand occupations identified in the EMSI labor market research, accounting for approximately 80% of projected job openings in 2012-16. Labor union programs, while numerous and highly significant, were beyond the scope of EWSS and therefore not researched.

Colleges and universities with the highest concentration of programs related to nonresidential energy efficiency are geographically mapped to demand for the top 18 occupations.

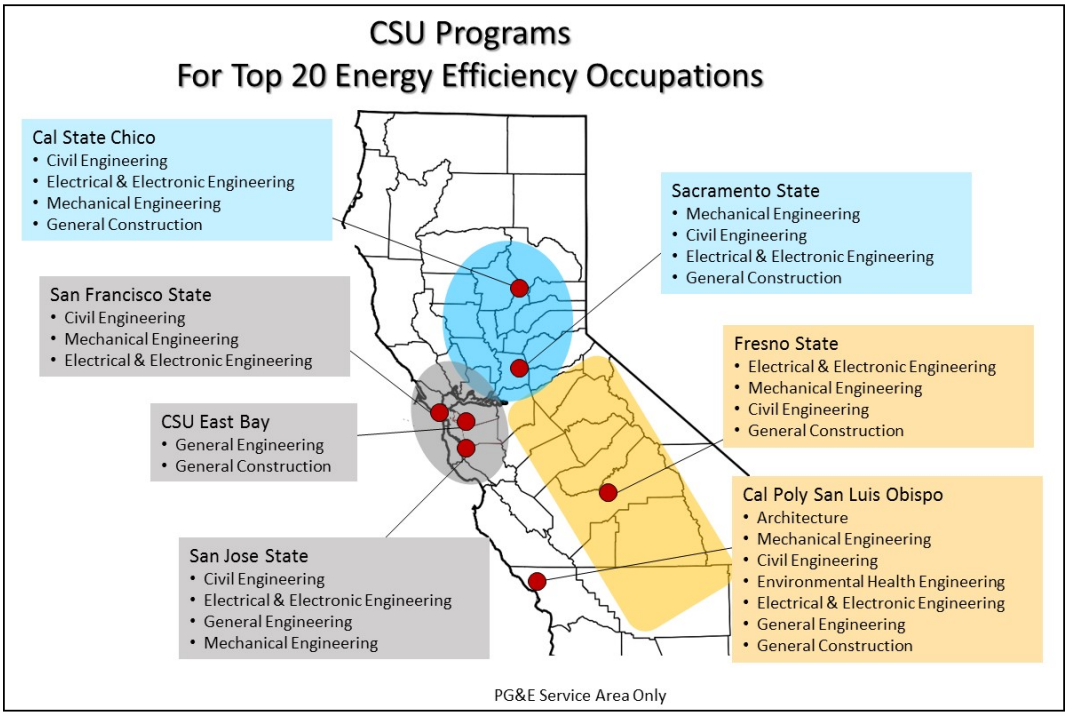

Figure 3. CSU Campuses with Strongest Programs Addressing Top 18 In-Demand Occupations

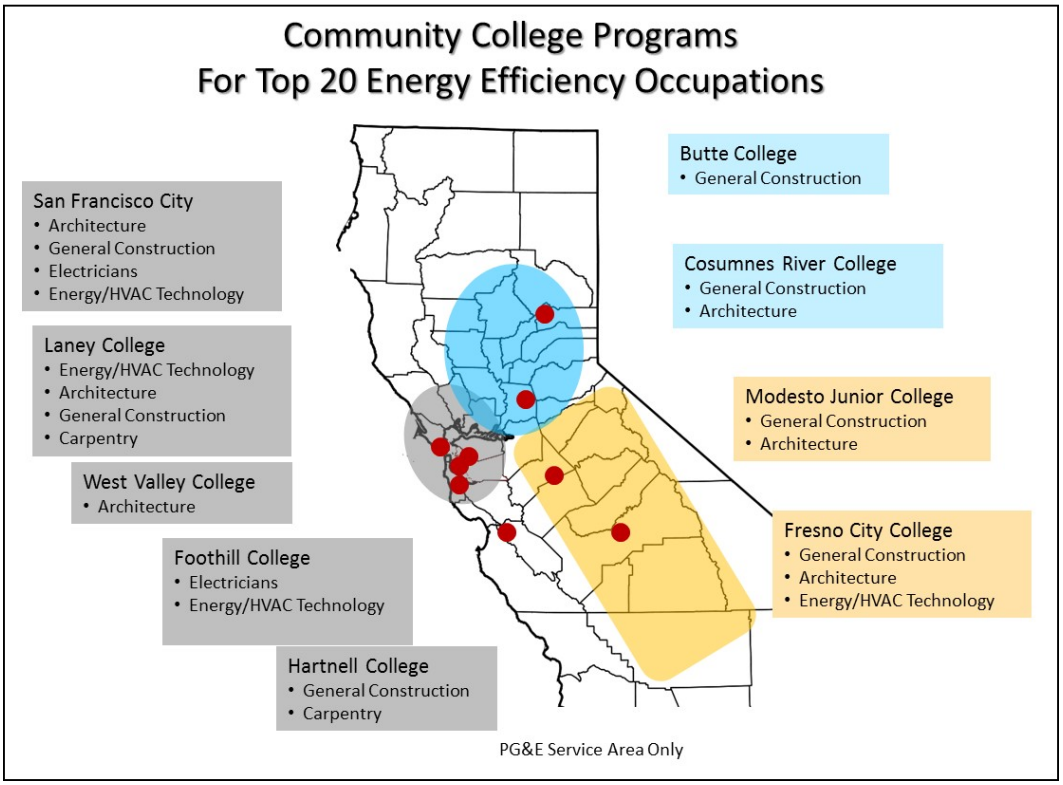

Figure 4. Community Colleges with Strongest Programs Addressing Top 18 In-Demand Occupations

There are of course many other relevant programs at the 23 CSU campuses and 112 community colleges, but these 16 have the greatest concentrations in the geographic areas where the top 18 occupations are in highest demand. EWSS has therefore given priority to these colleges and universities for ongoing curriculum development and connections to employers.

Curriculum Development

A broad array of curriculum currently exists in the public postsecondary system that can be leveraged to meet the needs of the energy efficiency workforce. However, interviews with employers and Senior Energy Professionals clearly indicated the need for more focused programs in this sector. Career Technical Education (CTE) is typically focused on preparing students for specific occupations, whereas academic fields of study provide broad knowledge with certificate programs for opportunities for greater specialization. EWSS characterizes the current energy efficiency CTE landscape as shown in Figure 5.

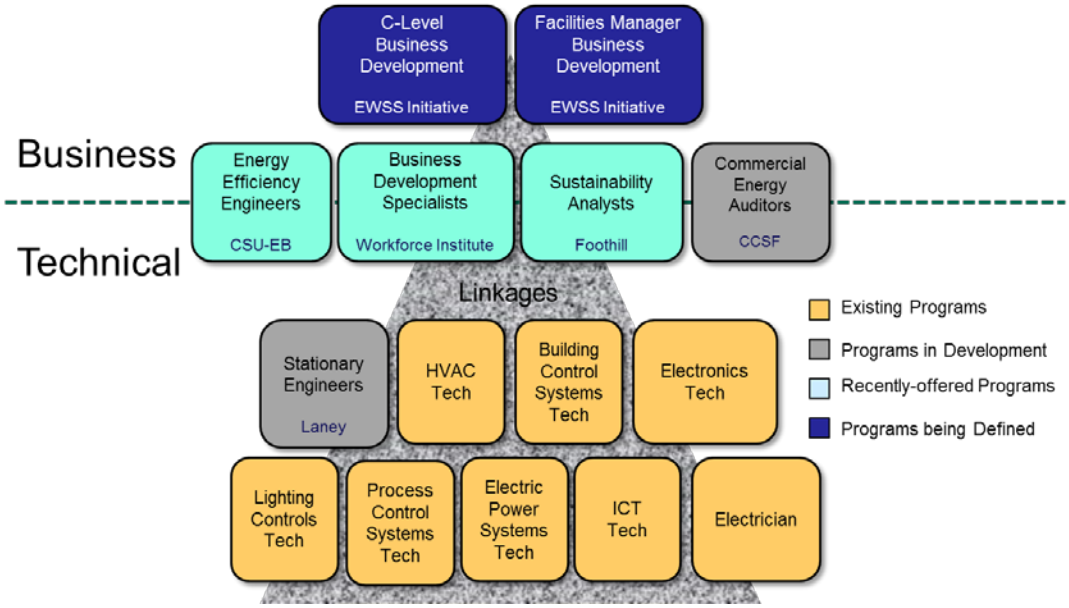

Figure 5. Energy Efficiency CTE Portfolio

As shown in Figures 3 and 4, these curricula are scattered among many colleges and universities, resulting in a fragmented system for developing the workforce. Opportunities abound for sharper focus on demand creation, compliance with codes and standards, and additional capacity. The top two layers of the above graphic illustrate the EWSS approach to student learning outcomes that are a direct reflection of employer needs. Infusing new industry-driven content into other programs in the portfolio is also an important aspect of EWSS. Ideally, limiting EWSS priority engagement to the 16 institutions with the strongest foundational programs will lead to standards for student learning outcomes and employers' adoption of industry-recognized credentials. As progress is made in the state's leading programs, EWSS can address infusion of new content into programs at other colleges and universities. At the high school level, academies and co-enrollment strategies (for lower-division courses) can be developed to build the pipeline of students entering energy efficiency career fields.

Foundation for 2014 and Beyond

Building out workforce programs goes well beyond education and training. Factoring the timing and geographic distribution of labor market demand by occupation into specific programs, EWSS aligns educational assets with market adoption strategies that contribute directly to attainment of AB 32 mandates. Incumbent workers are a key focus, providing the most immediate impact on market adoption rates and compliance with evolving codes and standards. Connections among students, educators, and employers are critical components of the EWSS approach to creating an efficient pipeline that adds capacity on a timely and strategic basis. Education and training programs are designed to overcome the barriers and close the gaps identified by employers, leveraging the assets of California's public postsecondary system. A continuous improvement approach is built into EWSS, fostering dialog among stakeholders that can sustain programs at the regional level – Bay Area, Central Valley, and Sacramento/North – which respond as workforce needs evolve over time.

EWSS identifies gaps and deliverables for 2014 and beyond, combining them into a master implementation plan with metrics and milestones. This plan is summarized as follows:

Outcome	Metrics
1	Continually align the Sector Strategy with the 2013-14 Project Implementation Plan
2	Create and implement a communications plan that keeps stakeholders engaged in EWSS activities via meetings, webinars, and emails
3	Align regional stakeholders with the EWSS initiative
4	Create workforce education and training programs to drive Demand Creation
5	Add capacity to existing workforce programs for priority occupations
6	Develop or expand programs to better assure compliance with codes and standards
7	Cultivate Communities of Practice to build sustainable programs that connect students to employers and build shared resources among educators and industry stakeholders
8	Create a platform for strategy development and implementation across all PG&E WE&T programs
9	Provide measurements to indicate the effectiveness of the 2013 Sector Strategy

Table 2. EWSS 2013 High-Level Plan and Metrics

Included in this plan are the following deliverables:

- Expand stakeholder relationships to form three Regional Collaboratives
    - Bay Area
    - Central Valley
    - Sacramento/North
- Deliver new education and training programs and define career pathways
    - Define pathways for enhanced development of Senior Energy Professionals
    - Link demand creation concepts into programs for emerging professionals
    - Train the first cohort of Senior Energy Professionals in demand creation strategies
    - Launch an Integrated Energy Solutions certificate program (3-course CSU sequence)
    - Complete a series of workshops focused on Energy Auditing (community college)
    - Create Senior Energy Professional linkages with community college pathways
- Add capacity to existing programs as required in the following areas
    - Engineering
    - Commercial Energy Auditors
    - Skilled Technical Workers
    - ICT curriculum as it applies to nonresidential energy efficiency
- Develop or expand programs as appropriate to improve compliance with codes and standards
    - CALCTP
    - Title 24
    - HVAC
- Cultivate Communities of Practice to build sustainable programs and share resources
    - Career Pathway Mapping
    - Employment Sourcing, Internships, and Job Connections

- Education Announcements
- Regionalization

Conclusions

EWSS identified a clear need for workforce development among professional workers – engineers, architects, project managers, energy auditors, etc. – to improve progress toward AB 32 mandates for commercial energy efficiency. Significant assets exist at the university and community college levels to build competencies in this workforce as well as among workers in the skilled trades.

Career pathways and training programs map fairly well to the geographical areas where job creation is expected, although gaps and inconsistencies need to be addressed. Relevant and rigorous new education and training content created with ARRA funding should be infused into existing pathway programs. Regional development of integrated career pathways, mapped to labor demand projections and employer priorities, is a major focus of EWSS for 2014.

Better linkages between PG&E's Energy Centers programs and the public postsecondary systems can offer significant career lattice opportunities. For example, City College of San Francisco enhanced the Pacific Energy Center's (PEC) Commercial Energy Auditor program by offering a fundamentals seminar as a precursor to the program and an advanced seminar for students completing the PEC program. Beginning in 2014, this concept can be expanded to create synergies between other Energy Center programs and certificate and degree programs at community colleges and universities.

The EWSS web portal www.eesectorstrategy.com is being built out to accommodate Communities of Practice that that offers all stakeholders the ability to share information on multiple levels and link to relevant websites. Through this portal, a sustainable ecosystem can be cultivated to drive continuous improvement in education and training programs and linkages to the industry's workforce needs.

EWSS creates the foundation for the Commercial Energy Efficiency Sector for 2015-17. Deliverables in 2013-14 build on stakeholder relationships and begin integration with other programs such as CALCTP, HVAC Sector Strategy, 2013 Title 24 Code updates, and others as appropriate.

Related Documents

EWSS Commercial Sector Strategy – 2013 Accomplishments
2013 Accomplishments – Workforce Incubator Metrics
Energy Workforce Sector Strategy – 2014 Scope of Work

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emsi

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We also acknowledge the contributions of more than 200 stakeholders from government, industry, education, labor, and the state workforce investment system. They are recognized within the sections of this report to which they contributed.

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This report is a product of the Energy Training Centers organization within the PG&E Energy Services and Solutions Group. Additional information on EWSS is available at www.eesectorstrategy.com.

Program Narrative

What is the Commercial Energy Efficiency Sector?

Commercial energy efficiency addresses energy consumption on the customer side of the power meter, specifically in commercial, institutional, and hospital buildings. Also referred to as "Demand Side Energy Efficiency", energy systems in these buildings represent 18% of total energy consumption as illustrated below. Building types vary widely from commercial office buildings to hotels, hospitals, shopping malls, restaurants, government, and educational buildings.

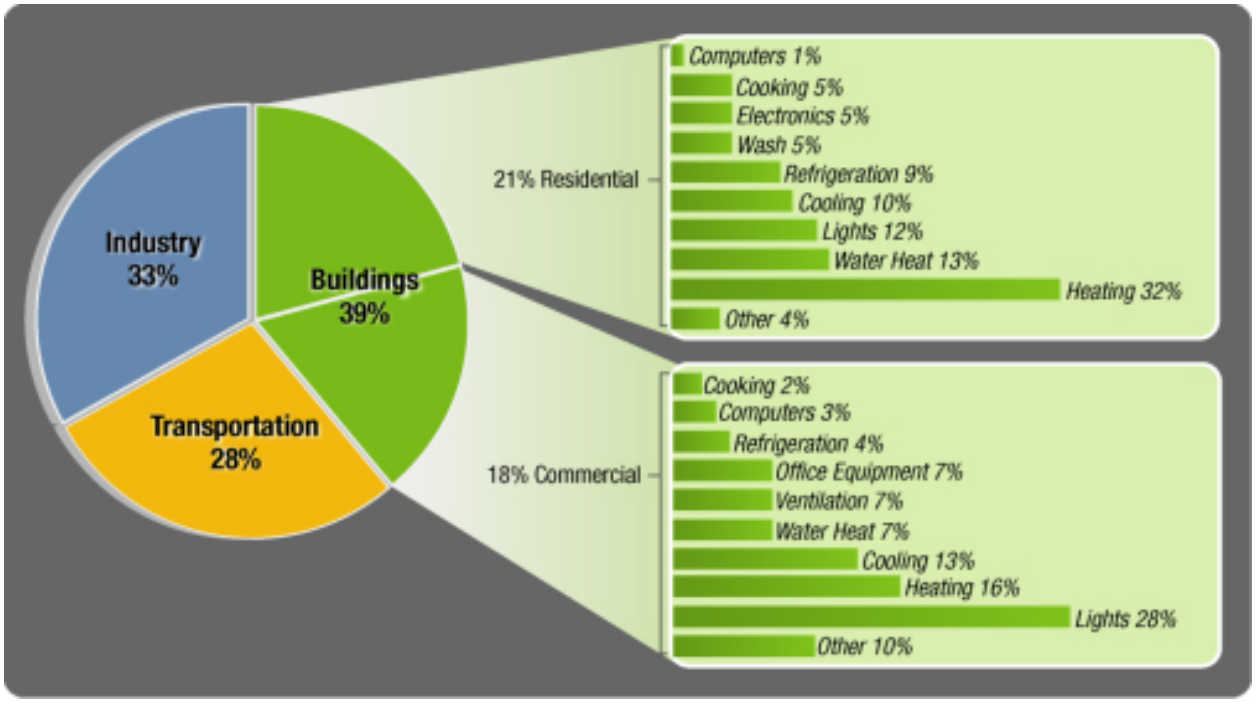


Figure 6. Distribution of US Energy Consumption[1]

What is a Sector Strategy?

Sector strategies support workforce development initiatives, which are defined as *regional, industry-specific approaches to workforce needs, implemented by an employer-driven partnership of relevant systems and stakeholders*. They are part of a growing movement by states and local areas to adopt industry-focused strategies that are rooted in the economic, human capital and community strengths of a region. They rely on strong partnerships of employers and stakeholders to make data-informed decisions about workforce needs and solutions that will keep regional industry strong and provide quality jobs and advancement opportunities for workers, particularly low-income and at risk workers.

More information is at www.sectorstrategies.org.

Sector Strategy Objectives

PG&E is committed to an Energy Workforce Sector Strategy (EWSS) that will accelerate progress toward AB 32 carbon reduction mandates. Specifically, EWSS will develop a workforce to:

- Increase adoption of more energy efficient solutions by owners and managers of commercial and industrial buildings
- Remove potential barriers associated with inadequate workforce capacity and capabilities
- Provide opportunities for underserved populations

This strategy aligns with the California Public Utilities Commission (CPUC) mandates established in the California Energy Efficiency Strategic Plan (CEESP) and the Statewide Workforce Education and Training Plan (WE&T). Implementation is compliant with the CPUC's Decision Approving 2013-2014 Energy Efficiency Programs and Budgets, filed on October 9, 2012.

EWSS builds upon lessons learned and best practices of other Sector Strategy models such as those adopted by the California Advanced Lighting Controls Training Program (CALTCP), Builder Operator Certification (BOC), PowerPathway™, California Workforce Investment Board (CWIB), and other implementers in California. It provides new research and stakeholder engagement to inform PG&E's business plans, setting specific targets for higher market adoption rates via programs that upgrade and leverage new workforce knowledge, skills, and abilities.

EWSS is a multi-year program that will achieve specific energy efficiency workforce development goals by the end of 2013 and inform PG&E's strategy for 2014.

Frame of Reference for this Report

It became clear during the 2012 planning period that widely divergent interests are influencing the state's implementation of nonresidential energy efficiency programs. As a result, EWSS established a basic "loading order" to prioritize initiatives in making sure that appropriate trajectories are achieved for a response to this combination of interests. PG&E's EWSS loading order is structured as follows:

1. AB 32 Mandates[2]. PG&E, like the other Investor Owned Utilities (IOUs), is funded by ratepayer dollars and chartered to meet these mandates.
2. CPUC Long Range Plan[3]. This is the defining document through which the IOUs are to achieve the AB 32 mandates.
3. Program Implementation Plan[4]. This plan, with its periodic updates, allocates funding for specific IOU activities including workforce education and training.
4. Market Need. As an emerging market, nonresidential energy efficiency requires a workforce development focus that matches evolving industry needs over time and is responsive to the career aspirations of underserved populations.
5. Compliance. The full workforce spectrum – architects, engineers, auditors, installers, operators, maintenance personnel, owners and managers – needs to comply with specific codes and standards.

6. Capacity. Existing education and training is to be leveraged, with program enhancements and expansion to optimize use of in-place capacity. Development of new programs shall be undertaken to create additional capacity as required.

Element 1 of the framework, achieving the AB 32 mandates, is the overarching driver for EWSS workforce development. The goal of Zero Net Energy in 50% of existing commercial buildings by 2030[5] creates a daunting challenge as illustrated in Figure 7. Called "unrealistically aggressive" in the California Energy Commission (CEC) AB 758 Scoping Report, this goal nonetheless drives a very specific approach to workforce development – one that accelerates demand creation and market adoption.

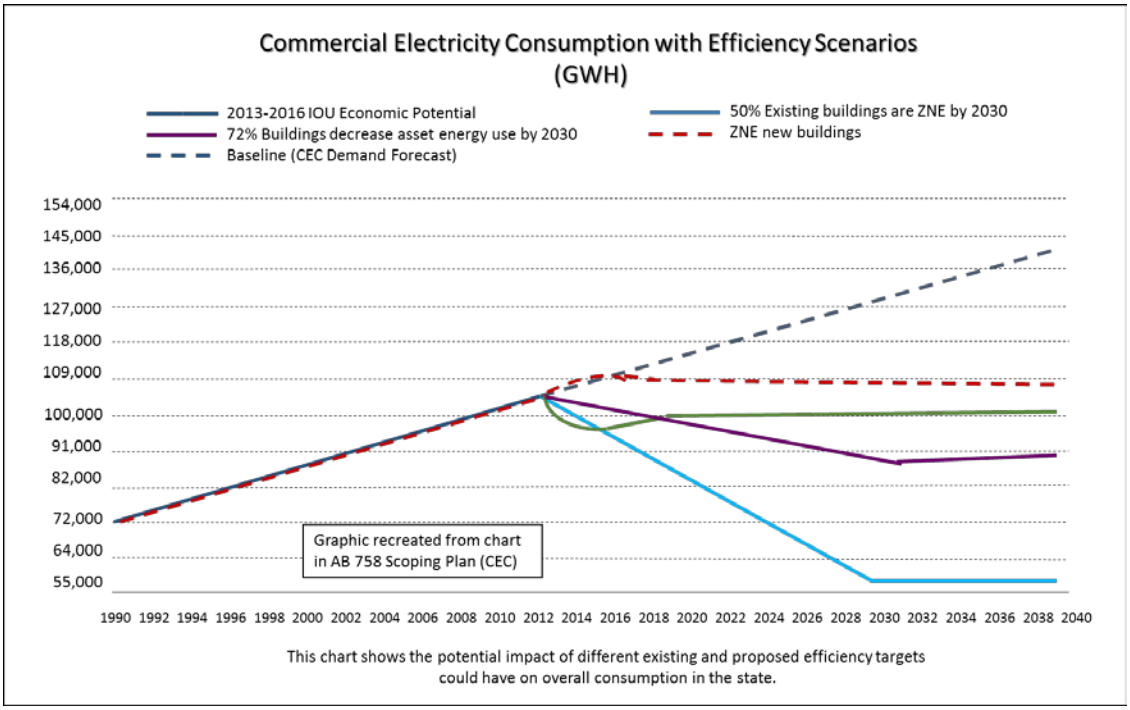


Figure 7. Commercial Energy Consumption Trajectories

Element 2, the CPUC Long Range Plan, specifies workforce goals, strategies, and plans that support the AB 32 mandates while providing opportunities for career development and advancement of low income, minority, and underserved populations. The intended results are:

- Students develop careers and existing workers develop skills and knowledge that advance DSM businesses, policy, research and development, and education.
- Individuals from the targeted communities take advantage of programs that specialize in energy disciplines at all levels of the educational system and successfully advance themselves into rewarding careers in the energy services fields.

EWSS is designed to help accomplish the mid-range 2012-14 Education and Training Implementation Plan: updating workforce needs assessment, maintaining and updating a web portal, maintaining active stakeholder engagement, and developing/expanding energy efficiency education and training programs

in PG&E's service territory. EWSS also supports other PG&E initiatives to advance the careers of low income, minority, and underserved populations.

Element 3, the CPUC Program Implementation Plan, directs PG&E and the other IOUs to hire a Workforce Expert to address concerns cited in the 2013-14 Budget Approval: "Given the amount of funding devoted to energy efficiency programs in this state, and the level of unemployment in the economy in general, this is an area in dire need of more focused attention". Building on research conducted in 2011-12, EWSS focuses on energy efficiency job creation as its primary goal for developing the energy efficiency workforce. This approach supports the Workforce Expert by driving progress in market adoption to achieve the AB 32 mandates while adding capacity, ensuring compliance to codes and standards, and developing opportunities for low income, minority, and underserved populations.

Within this framework, EWSS applies first priority to element 4, synchronizing workforce development with the market need. Because nonresidential energy efficiency is an emerging market, EWSS focuses heavily on near-term and real-time labor market information rather than longer term projections. For example, labor market demand is characterized by EWSS through 2016 rather than looking out to 2020. Additionally, real-time labor market data from *Help Wanted Online* provides an analysis of job postings for the previous six months, and EWSS employer interviews articulate current and near-term market challenges that can be solved through workforce programs. This focus on near-term market needs offers a significant augmentation to the CPUC Workforce Education and Training Needs Assessment.

Addressing an emerging market logically suggests that "Market Makers" are a significant population to understand and develop. Selected barriers to market growth can be overcome through improving competencies of this population in areas such as marketing, business development, sales, auditing, financial analysis, design, and commissioning. These Market Makers also are job creators, whose success in growing the market will drive new employment opportunities. As these opportunities are created, underserved populations can gain entry into the workforce at a significant rate.

Element 5, Compliance, addresses development of workforce competencies in meeting the AB 32 mandates. California's energy efficiency goals can be achieved only if solutions are properly designed, installed, maintained, and operated. In some circles, energy efficiency work is perceived as limited to installation by the skilled trades, whereas the workforce need actually extends to competencies across many occupations – design, installation, commissioning, operations, and maintenance. Within this spectrum, important new occupational categories are beginning to grow, such as commercial energy auditors and sustainability analysts.

Related to element 6, Capacity, EWSS is based on leveraging existing education and training assets to maximize return on ratepayer investment in energy efficiency. Consistent with the Market Maker focus and the need to upgrade compliance competencies across a broad occupational spectrum, EWSS gives priority to California's public postsecondary system – community colleges and CSU campuses – where the majority of the state's workforce is trained. EWSS funding for 2012-13 allowed a limited engagement with The Northern California chapter of the National Electrical Contractors Association (NorCal NECA) and the IBEW-NECA Labor Management Coordinating Committee (LMCC) to incorporate

the needs of union-based electrical contractors into employer research. Expansion of this relationship and inclusion of other labor unions and trade organizations will be important to fully address energy efficiency capacity in PG&E's service territory.

Another important dimension in the EWSS perspective is the massive influx of funding to help accelerate growth of the nonresidential energy efficiency market. A preliminary overview is shown in Table 3.

Program	Annual Investment	Description
Energy Efficiency Funding to the IOUs (CPUC)	$800M	Develops and implements a portfolio of Integrated Demand Side Management energy efficiency programs
Energy Program Investment Charge (EPIC - CPUC & CEC)	$162M	Allocates funding for research, demonstration projects, and market facilitation
Proposition 39	$550M	Upgrades public school buildings and community college campuses for energy efficiency (through 2018)
PACE Financing (Private)	TBD	Property Accessed Clean Energy (PACE) financing for commercial buildings helps make energy efficiency an attractive investment
Smart Grid (CPUC)	TBD	Proceedings are in progress for authorizing ~50 demonstration projects
Cap and Trade (CARB)	-	Establishes a market for carbon reduction credits to commercial and industrial building owners

Table 3. Current Financial Drivers for Nonresidential Energy Efficiency (Preliminary)

EWSS has not considered the potential impact of these investments on workforce beyond the current ratepayer-based funding. An important factor in the 2014 plan will be making an assessment of 2013 and projected ongoing investment levels as potentially impacting workforce development.

Foundational Activities

Launched on February 29th, 2012, EWSS has engaged approximately 200 stakeholders from industry, education, the state workforce system, community-based organizations, the CPUC, and the California Energy Commission (CEC). In order to more precisely frame the Sector Strategy and build stakeholder engagement, EWSS augmented WE&T research with the following:

Employment Demand: Analysis by Economic Modeling Specialists, Inc. (EMSI) provided estimates of workforce supply versus demand. The result was projections through 2016 for PG&E's service territory across 60 different occupations in 13 industries engaged in commercial/industrial energy efficiency products and services.

Scoping: Focus groups with more than 100 stakeholders identified priority occupations, skill requirements, barriers to workforce development, and collaboration models that would accelerate market adoption. These focus groups included representatives from industry, education, Labor and the workforce investment system

Profiles of Energy Professionals: Surveys of 22 top-performing energy efficiency professionals characterized their functions in driving market adoption. These surveys identified the education and work experience needed to define the top end of career ladders (or lattices) through which energy efficiency workers can progress.

Employer Priorities: Interviews with 67 energy efficiency employers built a broad basis for workforce development priorities.

Inventory of Education Assets: Top tier energy efficiency programs were identified in the California Community Colleges and California State Universities. This research characterized the most relevant educational and training resources that can be aligned with and leveraged by EWSS.

Education Map: A "program intensity" analysis identified nine community colleges and seven CSU campuses that offer the strongest foundation for energy efficiency education and training across PG&E's service territory.

Advisory Council Formation: More than 50 stakeholders comprise the EWSS Advisory Council, led by an Executive Committee, to guide strategic activities.

2013 Sector Strategy Program: A blend of the above elements, with inputs from the Advisory Council, have been merged into the 2013 EWSS Program.

Communications Plan: A structured approach to keeping stakeholders informed and engaged throughout 2013.

Each of these foundational activities is outlined in the following sections.

Employment Demand

A projection of energy efficiency job openings was made by Economic Modeling Specialists, Inc. (EMSI) for 19 counties in PG&E service territory, based on the taxonomy shown in Figure 8.

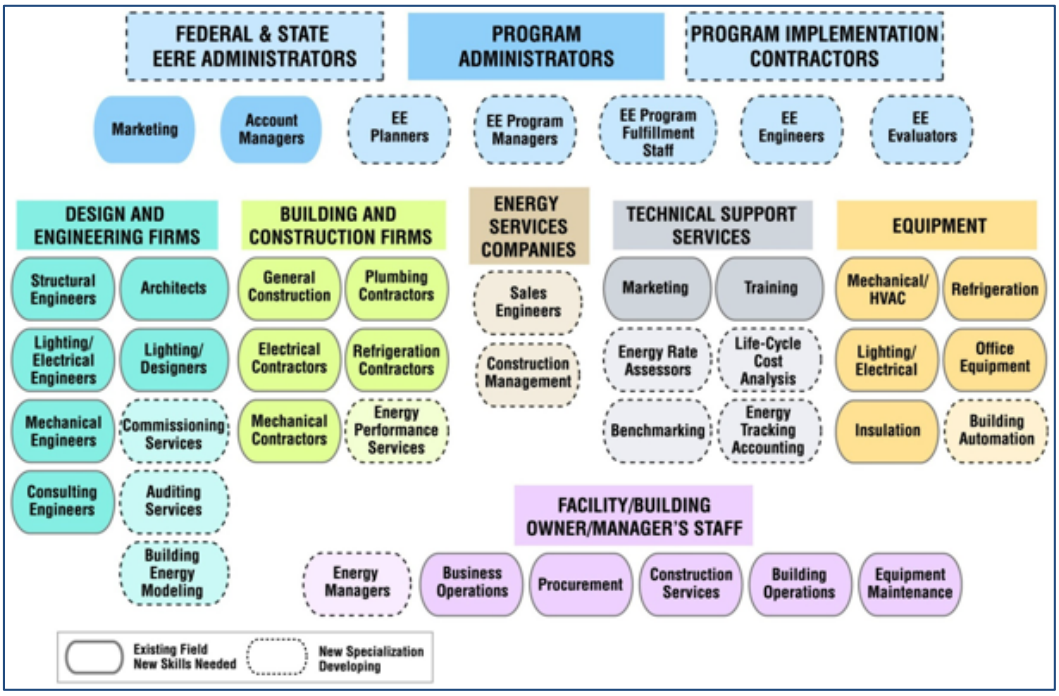


Figure 8. The Commercial-Institutional Energy Efficiency Services Sector[6]

The scope of EWSS is currently limited to providers of energy efficiency solutions and services. Since these providers must compete for talent across a broad range of industries, the EMSI research included manufacturers of energy efficiency products and systems in its labor demand analysis. Excluded from the analysis were utility companies. Although utility firms do employ nonresidential energy efficiency workers, data for this occupational group are not granular enough for inclusion in this analysis.

Given this perspective, EMSI, PG&E, ICF International, Workforce Incubator, and Jim Cassio & Associates collaborated to define sixty-seven occupational titles in the thirteen industries listed below. All have some activity within the Energy Efficiency Sector, with most of the heavy concentrations in the manufacturing segments.

Commercial and Industrial Building Construction
Nonresidential Electrical Contractors
Nonresidential Plumbing and HVAC Contractors
Industrial Building Construction
Air Purification Equipment Manufacturing
Industrial and Commercial Fan & Blower Manufacturing
Heating Equipment Manufacturing
Air Conditioning and Warm Air Heating Equipment Manufacturing
Commercial and Industrial Refrigeration Equipment Manufacturing
Relay and Industrial Control Manufacturing
Architectural Services
Engineering Services
Building Inspection Services

Within these 13 industries, approximately half of the demand is in skilled trades occupations – construction, technician and installation – as shown in Figure 9. It is notable that for the 2012-16 period, demand in professional areas – engineering, building design, and energy assessment – is approximately forty percent. This distribution of demand reinforces the need to assure development across the entire workforce spectrum.

Of the group of key industries, engineering services is by far the strongest. It is the region's largest source of jobs in the Energy Efficiency Sector, contributing 36% of the 135,779 jobs in these industries. It will also create almost half of the sector's projected job growth. In addition, engineering services dominates the other industries in the group with over $5 billion in exports in 2011. This is almost four times the amount of exports as the nearest industry and 65% of the overall total exports for the entire group of industries.

The key industries in this analysis generally require a skilled workforce. The three industries with the highest percentage of skilled workers in their workforce were architectural services, nonresidential electrical contractors, and nonresidential plumbing and HVAC contractors. Engineering services also requires a large number of skilled workers.

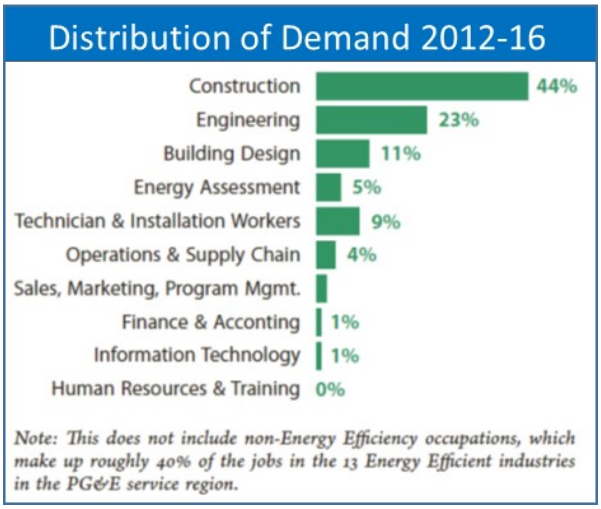


Figure 9. Distribution of Occupational Demand by Major Category

Overall, the characteristics of the 13 industries in the PG&E service area mirror the trend found in the 13 industries statewide. Numbers of new jobs industries tend to be larger in the counties bordering the San Francisco Bay. The four counties of San Francisco, Alameda, Contra Costa, and Santa Clara comprise 51% of all the jobs in these industries in the PG&E service area.

EWSS projects larger numbers of new jobs than the WE&T Needs Assessment. EWSS, based on research by Economic Modeling Solutions Inc. (EMSI), estimates creation of 2,200 new jobs annually between 2012 and 2016; the WE&T Needs Analysis reflects 1,649 to 2,411 new person-years will be created in its 2015 medium and high investment scenarios, respectively. However, EWSS projections are only for the PG&E service territory. Other differences in these two projections undoubtedly arise from the uniqueness of each entity's proprietary models, scope of the studies, and underlying definitions. Most notably, the distribution of new jobs among occupations is considerably different between the two studies.

Top 20 Occupations 2012-2016		
DESCRIPTION	2011 INDUSTRY JOBS	ANNUAL OPENINGS IN INDUSTRY
Civil engineers	9,289	316
Electricians	10,601	294
Architects, except landscape and naval	7,162	215
Plumbers, pipefitters, and steamfitters	5,985	132
Managers, all other	2,375	109
First-line supervisors/managers of construction trades and extraction workers	4,920	94
Carpenters	6,800	82
General and operations managers	2,521	81
Construction managers	4,067	73
Engineers, all other	2,297	64
Mechanical engineers	1,881	60
Heating, air conditioning, and refrigeration mechanics & installers	1,982	59
Engineering managers	2,277	59
Construction and building inspectors	1,581	46
Sheet metal workers	1,721	45
Cost estimators	1,785	42
Electrical engineers	1,489	42
Construction managers	4,067	41
Accountants and auditors	893	32
Business operation specialists, all other	853	29

Table 4. Top 18 In-Demand Occupations

Approximately 80% of the energy efficiency job openings are projected to be in 18 of the study's 67 occupational categories, as illustrated in Table 4. Among the conclusions that can be drawn from Table 1 are (1) certain occupations, such as Architects, are expected to see growth that is a large percentage of their current participation in the Energy Efficiency Sector, and (2) forty percent of the job openings are projected for engineering and design occupations versus 35% for construction and technical trades and 25% for operations, business, and finance.

It should be emphasized that these are categories - each of which encompasses multiple occupations - not individual job titles. So, further work is needed to identify specific positions within these categories for which education and training is required. It should also be noted that emerging positions such as Commercial Energy Auditors and Sustainability Analysts are expected to be priority occupations based on early input from employers.

Priority demand for specific job titles is being developed through ongoing research and regional analysis with employers.

Given these analyses, it would appear that priority should be given to addressing demand for skilled trades categories. The WE&T Needs Assessment projects that by 2020, approximately two-thirds of California's energy efficiency jobs will be in the construction trades[7]. In a mature market, the majority of energy efficiency jobs could be skilled workers in the construction trades.

More analysis is needed, however, before targeting specific occupational categories for education and training. The EMSI projections were presented to focus groups that led to further analysis of priorities for education and training. One conclusion about workforce development priorities was consistently reinforced in the Focus Group, Scoping, and Employer Priorities phases of EWSS:

Barriers to market growth are substantial, and
the professional workforce needs significant development to overcome them.

Market adoption rates for commercial and industrial energy efficiency solutions are perceived by industry stakeholders to be below the trajectory needed to achieve the AB 32 mandates. As will be discussed in the *Scoping* and *Employer Priorities* sections of this Narrative, the priority is for new capabilities in energy efficiency business development and sales. Ongoing research into knowledge and

skills requirements for professionals in design, engineering, and project management will augment findings that predate EWSS. Industry demand for initial training programs in these categories has been strong.

Confirming an emerging market context, the priority for professional skills and knowledge can easily be seen in the Figure 4 Project Life Cycle diagram. Systems integrators, third party implementers, and contractors typically do not have a dedicated sales force. Rather, senior level managers, engineers, and project managers engage potential commercial and industrial customers to develop opportunities for energy efficiency projects. As illustrated in Figure 10, jobs for design, commissioning, installation, operations, and maintenance get created only when these professionals are successful in contracting for projects. Hence the EWSS priority on this segment of the workforce.

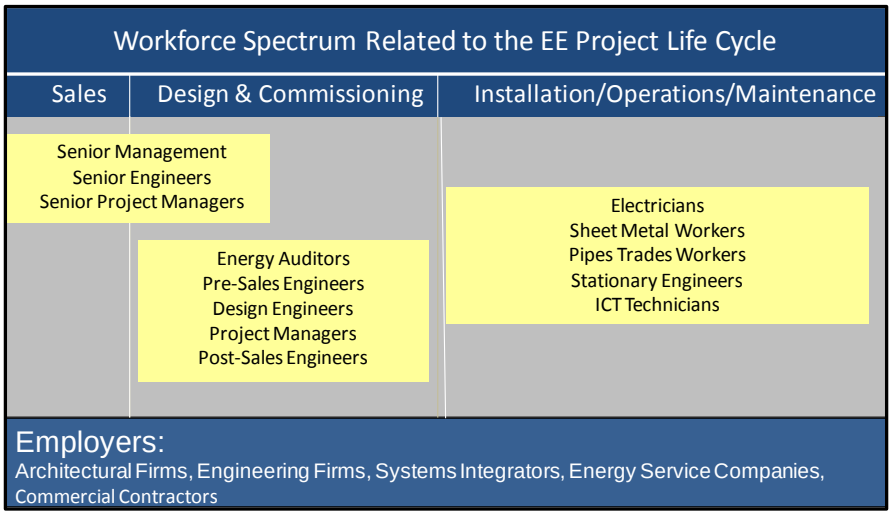


Figure 10. Workforce Spectrum Overlaid on the Energy Efficiency Project Life Cycle

Reinforcement of the need for a priority on developing the professional workforce is reflected in real-time job postings for the Bay Area in Figure 11. Engineers represent almost half of the job postings during the period November 2012 to February 2013.

It should be noted that this pattern is not truly reflective of job openings in the construction trades, which are either advertised through the union hiring halls or are filled by contractors employing workers who previously worked for them. Nonetheless, this pattern is typical of an emerging market.

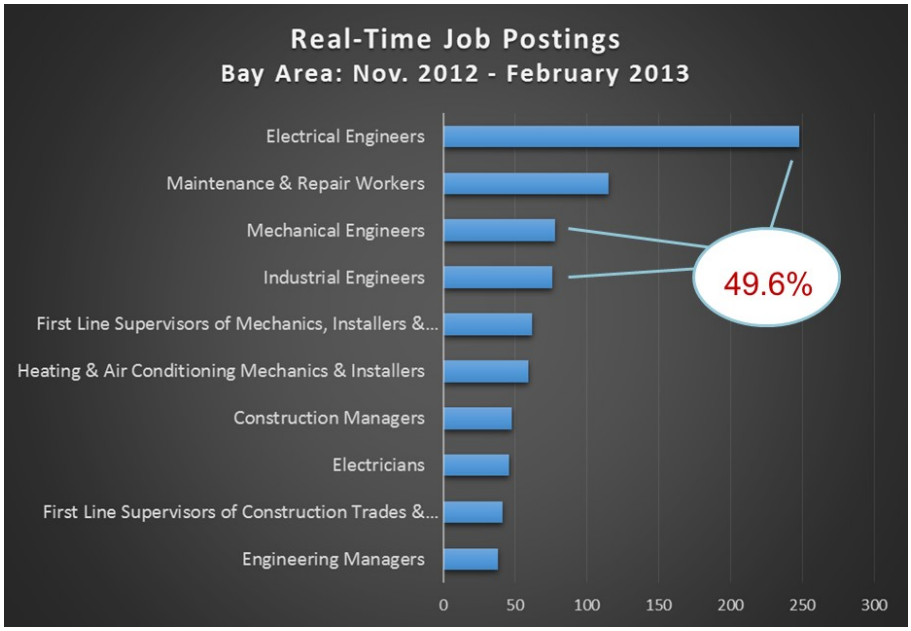


Figure 11. Real-Time Job Postings in the Bay Area, November 2012 – February 2013[8]

From the EMSI and Centers of Excellence research, one can also infer competition for workers across a broad group of industries, all of which have demand for skills needed in the Energy Efficiency Sector. Referring back to the list of thirteen industries included in the EMSI research, similar occupations exist across the entire energy efficiency value chain, including contractors, systems integrators, third party implementers, manufacturers, and supply chain companies. Thus, employers like PG&E's third party implementers[ix], must recruit from a talent pool that is being tapped by hundreds of other companies.

Because engineers are a much smaller percentage of the workforce, yet a high-demand occupation within energy efficiency, specific strategies are needed to assure that the sector can effectively compete for engineers.

As is clear in the data, this focus on professional workers must be balanced with strategies to increase the supply of workers for other high-demand occupations over the 2013-2016 period. These strategies are discussed in the *2013 Program Design* section of this Narrative.

The WE&T and EMSI studies projected gaps between supply and demand for energy efficiency workers, with WE&T pointing out the additional need for up-skilling incumbent workers. EWSS stakeholders confirmed the need for a dual track to: (1) train incumbent workers and (2) build a pipeline of new entrants into energy efficiency career fields.

The supply side of workforce development is addressed in the *Inventory of Education Assets* and *Education Map* sections of this report. Although workforce supply is addressed in the EMSI and WE&T Needs Assessment research, EWSS probed much more deeply with employers and educators about availability of workers with specific energy efficiency skills. EWSS determined the gap to be larger than projected by prior studies.

Scoping Activities

In the fall of 2011, the PG&E Energy Training Centers developed the frame of reference for EWSS as described earlier in this report, and committed to its implementation. The "Market Maker" perspective emerged in parallel with developing the 2013-14 Project Implementation Plan.

Figure 6 is a high-level illustration of the early framework developed by the Energy Training Center and a consulting team led by ICF International. This framework was filled in with more detail over the next 18 months, but remains as the top-level definition of EWSS. A series of research activities, detailed in other sections of this report, was initiated in preparation for engaging stakeholders from industry, education, government, and the workforce system at a Convening in early 2012.

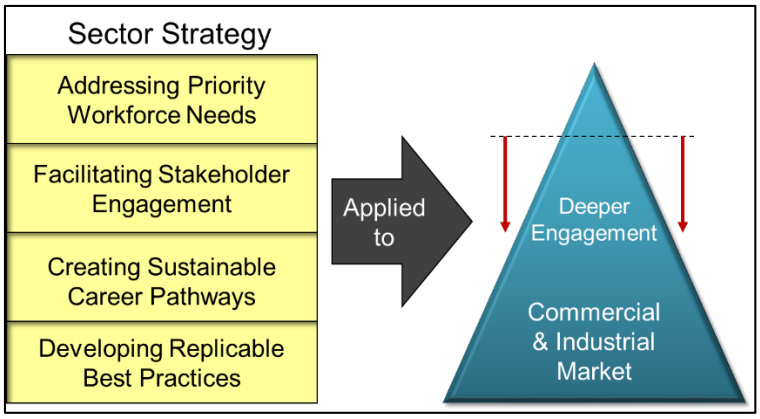


Figure 12. Sector Strategy Platform for Deeper Engagement

At this Convening, 120 representatives from industry, education, labor, workforce agencies, and government participated in focus groups, assigned by the EWSS team to achieve a similar organizational mix in each group. A very tight correlation among the five groups' outcomes, shown in Table 5, provided a strong foundation for organizing activities within the 2012 EWSS initiative.

Focus Group Topics	Top Priority Responses			
Hot Jobs	Facility Managers	Engineers	Sales	Energy Auditors
New Skills	Energy Efficiency Principles	Commercial PV Design	Energy Engineering	
In Our Way	Funding	Time (Bandwidth)	Instructor Skills	
Response Color Code	5 of 5 Focus Groups	4 of 5 Focus Groups		

Table 5. Summary of Focus Group Priority Responses, EWSS Convening[x]

A follow up meeting with a smaller group of employers provided further scoping that targeted selected outcomes for EWSS in 2012. The primary outcome was a focus on training people for jobs that create new demand for energy efficiency. As these training programs begin to produce results – new energy efficiency projects – the design, installation, operations, and maintenance workforce needs to be prepared to address new technologies and meet new standards.

"Market Adoption" is the key variable in creating new demand for non-residential energy efficiency solutions and meeting the goals of the CPUC's Long Term Strategic Plan. This variable is dependent on engagement of C-Level Executives and Facilities managers in a dialog that causes them to change from "business as usual" to higher energy efficiency adoption rates. In order to be effective, demand creation

needs to occur between energy efficiency systems/services providers and the decision-makers who own and/or operate non-residential buildings. These decision-makers are typically C-Level Executives – CEO, COO, CFO, etc. In many cases, these C-Level Executives rely on recommendations from their Facilities Managers before committing to new energy efficiency solutions.

Through this scoping exercise, a priority was determined for up-skilling the energy efficiency systems/services providers' incumbent workforce to more effectively drive market intervention strategies with potential clients (C-Level executives and Facilities Managers). High-level definition of up-skilling requirements includes:

Marketing – analytics, segmentation, messaging tailored by segment
Sales – messaging by segment and C-Level/ Facilities Manager contact, consultative selling

Curricula will integrate knowledge, skills, and abilities in technical, business, financial, interpersonal and analytical domains within the energy efficiency space. Over time, incumbent workers in the energy efficiency systems/services providers need to develop a more finely-tuned set of the capabilities shown in Figure 13, guided by an Advisory Council made up of industry and education stakeholders.

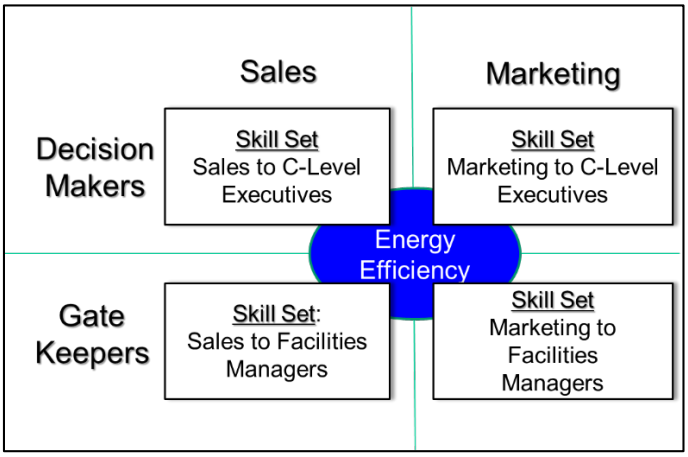


Figure 6. Skills needed by Incumbent Workers to Increase Market Adoption

Follow-on programs are needed to build the pipeline of professionals to assume demand creation responsibilities after further real-world seasoning. Linkages to the trades and skilled craft training are essential to assure a comprehensive workforce solution for installation, operations, and maintenance. Further definition of skills requirements and input for incumbent worker training in demand creation were identified through employer interviews.

Employer Priorities

Objective:

Acquire input from industry executives and senior professionals for workforce development that improves success in developing the market for energy efficiency projects.

Profile of Population Surveyed:

Participants in these interviews were selected as a sample population representing stakeholders who are engaged in business or research in meeting the AB 32 goals for energy efficiency in commercial, industrial, and agricultural buildings. Those interviewed were typically very senior, with long experience in engineering, architecture, construction or research in the nonresidential building environment.

Population Surveyed	Number Surveyed	Source
Electrical Contractors	40	NECA Contractors CALCTP Listed Contractors
Third party Implementers (3P) & Systems Integrators	27	PG&E Implementation Partners Senior Energy Professionals University Energy Research Center

Table 6. Population Surveyed to Determine Employer Priorities for Workforce Development

Telephone interviews were conducted to gain a business perspective on workforce needs. Sixty-three percent were in higher management positions – CEO, President, Director, and Principal – while 24% were mid-level managers and 13% were university researchers engaged in energy efficiency market and technical areas. Most electrical contractors addressed a broad cross-section of commercial building types, while 3Ps and Systems Integrators tended to specialize in particular types of buildings. More research would be useful in analyzing success for each building type to inform a deeper approach to workforce development.

A significant difference in business focus was identified: only 40% of electrical contractors give energy efficiency a high priority whereas virtually all 3Ps and Systems Integrators indicated high priority. This is an important factor in targeting workforce programs to increase demand creation and market adoption.

The most revealing finding in these interviews was the consistency with which employers described the greatest obstacles in developing their energy efficiency business. Seventy-one percent of the contractor responses clustered around financial obstacles in the areas of payback and lack of access to capital. 3Ps and Systems Integrators reported a broader range of obstacles, with 40% clustering around financial issues. Figure 14 summarizes the responses of both groups.

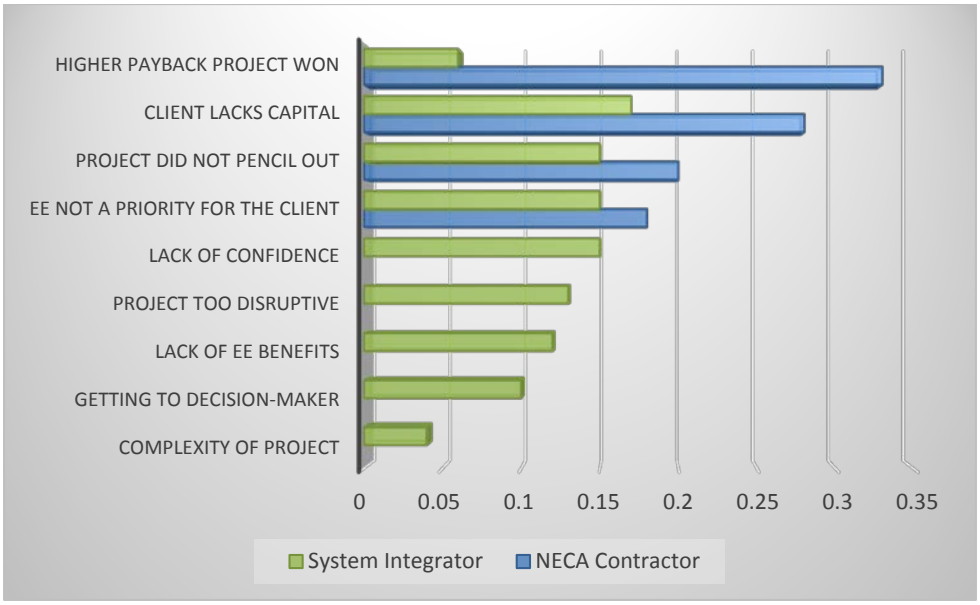


Figure 14. Distribution of Obstacles to Energy Efficiency Market Adoption

Sixty-three percent of contractors and 78% of 3Ps and Systems Integrators indicated that a solid impact could be made on removing these obstacles if they had better tools and were better educated on selling energy efficiency projects. Consistent with the distribution of obstacles identified above, both groups indicated needs for financial training, which is considerably stronger for contractors participating in the survey. Figure 8 highlights the areas in which training and tools are needed.

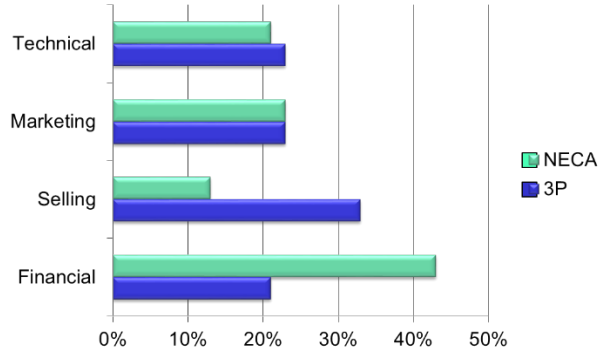


Figure 15. Priorities for Tools and Training

Responses tended to cluster more evenly across all categories for 3P and Systems Integrators, although greater emphasis is needed in developing selling skills. Further dialog during the interviews indicated a need for more professional business case development and presentation, which was more of a consideration for 3Ps and Systems Integrators than for contractors.

The target audience is the senior management Market Maker population among contractors and those who are involved in design and management of projects within the 3P and Systems Implementer group. Considerable time was spent during the interviews defining specific training outcomes desired by these two groups, which are documented separately. A significant amount of information on best practices and suggestions for a stronger engagement with PG&E has been compiled for training purposes.

Based on analysis of these interviews, the 2013 EWSS program includes development and delivery of a Professional Business Development Seminar series. Specifications for this series, incorporated into

Appendix 4, provides the basis for curriculum developers and instructors to tightly couple seminar content to employer needs.

Profile of Senior Energy Professionals

Background

As emphasized by the EMSI labor market research, an important group of workers is comprised of architects, engineers, analysts, project managers, and other professionals. This group represents the top of the energy efficiency career ladder, a segment of the workforce that provides the critical functions of creating demand and assuring quality of design and compliance with codes and standards.

Understanding this tier of the workforce, responsible for much of the demand creation work in this sector, is fundamental to immediate market impact and building career pathways for future Market Makers.

Characteristics of this group were identified through a survey of fifty-one Senior Energy Professionals (SEPs), followed by interviews with fifteen of these workers. This research targeted SEPs that were identified by PG&E, the California Energy Efficiency Industry Council, and their peers as top performers in their respective positions. Figure 16 is a profile of the positions held by SEPs that participated in the research.

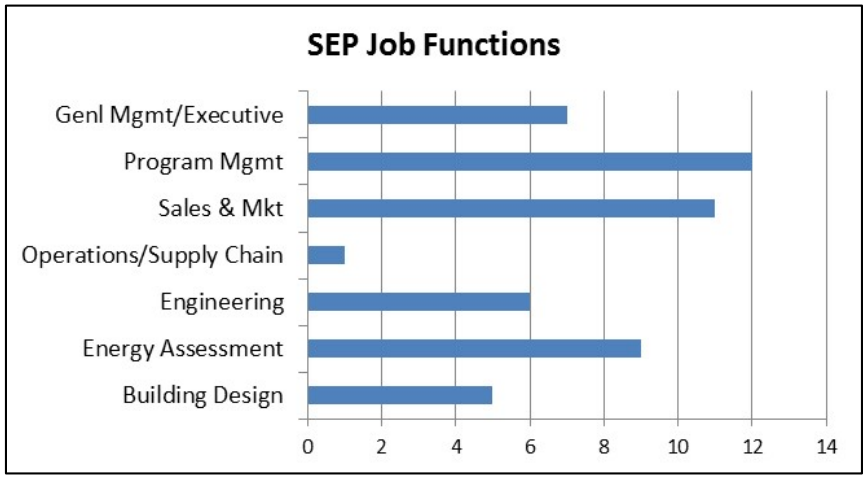


Figure 16. Profile of Research Participants by Energy Efficiency Role

This group was highly focused on the energy efficiency business. More than 80% of the SEPs interviewed or surveyed were employed by companies whose primary line of business is in energy efficiency - design, engineering, technical support or utility program implementation. All others were employed by companies with energy efficiency as their secondary business.

Objective

Characterize the education, experience, and typical duties of the highest performing energy efficiency professionals to inform curricula and career pathways that help build this pool of workers.

Characteristics of Senior Energy Professionals

Educationally, SEPs come from diverse backgrounds involving high educational attainment, with 98% of SEPs holding at least a Bachelor's degree. Although the nature of the SEP's work is highly technical in most cases, their educational background often includes liberal arts fields.

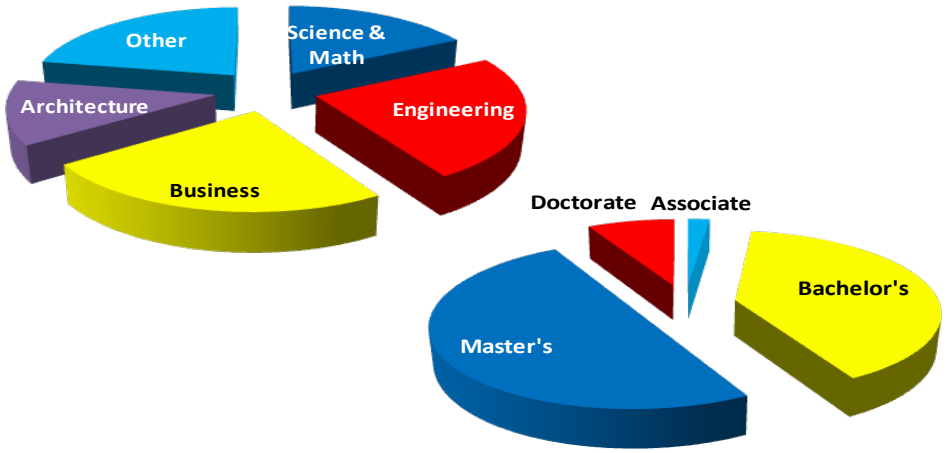


Figure 17. Education and Background of Senior Energy Professionals

SEPs are characterized by long tenure and deep experience in energy efficiency. Most invest more than 50% of their work into the energy efficiency business, and 100% spend more than 25% of their time in energy efficiency.

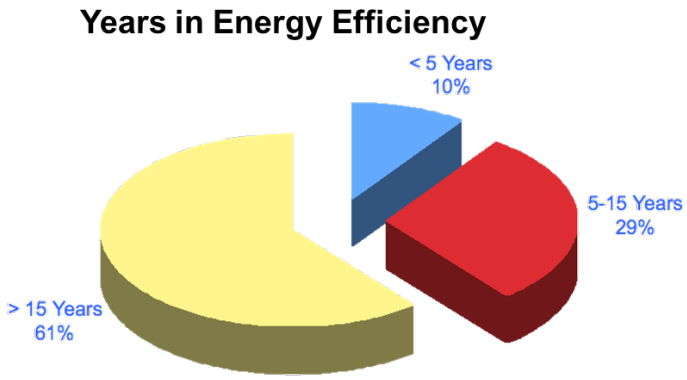


Figure 18. Experience Profile of Senior Energy Professionals

Participants in the research were active across the spectrum of technologies and business functions – from HVAC and lighting to building envelope and weatherization.

The research provided a detailed analysis - by job function - of responsibilities, knowledge, tasks performed, success factors, technical skills, business skills, an interpersonal skills. It also identified skills that the participants thought they needed but were missing, and a projection of the skills they would need as the sector evolves. Prerequisites for achieving their position plus leading colleges and universities that offered degrees or certificates in their field were listed by the participants. And finally, a collective outlook for the Energy Efficiency Sector was captured from participants' inputs. While the information captured in the SEP research is comprehensive, it is also far too specific to summarize in a meaningful way, and is documented separately. As an example, Table 7 is a summary of the characteristics of Program Managers identified in the research. Appendix 3 documents these findings and other in detail.

Program Manager Characterization		
Responsibility Profile		
Responsibility Area 1	Responsibility Area 2	Responsibility Area 3
Program Management Personnel Management Customer Relationship Management Communication	Energy Efficiency Engineering Teaching Financial/Budget Management Task Coordination	Energy Efficiency Policy Community Planning Contracts and Documentation
Priority Knowledge Areas		
Knowledge Area 1	Knowledge Area 2	Knowledge Area 3
Urban & Regional Planning Architecture Management & Operation of Energy Efficiency Programs Psychology Mechanical Engineering	Broad Familiarity with Energy Efficiency Building Science Financial Management Energy Efficiency Lighting, HVAC, Building Envelope Personal Skills	Public Policy Personnel Management
Priority Task Areas		
Priority 1	Priority 2	Priority 3
Designing Course Curricula Meetings Responding to Customer Issues Communications	Customer Relationship Management Administrative Tasks Technology Reviews Documentation	Program Administration Research & Consulting on Design Practices Staff Management Supply Chain Management
Primary Success Factors		
Priority 1	Priority 2	Priority 3
Customer Relationship Management Skills Architecture Knowledge Problem Solving Skills Team Building Skills Establishing Trust Relationships Tactical & Strategic Problem Solving	Technical & Financial Skills Advanced Business Education Operations Management Attention to Detail	"Big Picture" Perspective Design Aspects of Building Systems Quality Protocols

Primary Technical Skills		
Priority 1	Priority 2	Priority 3
Science Background Enclosure Design Computer Skills Mechanical System Performance	Working Knowledge of Energy Efficiency Psychometrics Project Management Writing	Waste Water Lighting General Engineering
Primary Business Skills		
Business Skill 1	Business Skill 2	Business Skill 3
Financial Analysis Project Management Writing Task Scheduling & Performance Assessment	Cost/Benefit Analysis	Policy Management CRM Tools Use Adaptability
Primary Interpersonal Skills		
Priority 1	Priority 2	Priority 3
Client Relationship Management People Management Presentation Skills Communications Problem Solving	Diplomacy	Knowing Markers of Success Public Speaking Motivational Skills Leadership Empathy While Remaining Professional
"Missing" Skills		
Priority 1	Priority 2	Priority 3
Policy Analysis Architecture General Understanding of Energy Efficiency Industry Financial Analysis	On The Job Experience Critical Path Prioritization Technical Aspects of Energy Efficiency Lighting	Knowing "What Not to Do" Sales Skills ROI Analysis
"Future" Skills		
Priority 1	Priority 2	Priority 3
Project Management Sales Cycle Energy Efficiency Technology System Performance	Business Writing Contract Management Computer Skills; Modeling	Financial Analysis Negotiation Knowledge of Energy Efficiency Options
Entry-Level Career Positions		
Priority 1	Priority 2	Priority 3
Energy Study Researcher Project Assistant Energy Efficiency Specialist Energy Conservation Engineer	Teaching Assistant Field Technician Sr. Energy Efficiency Specialist Entry-Level Building Operations Engineer	Sales Manager Apprentice Controls Engineer

Table 7. Example: Program Manager Characterization

In summary, SEPs represent a highly experienced and competent segment of the energy efficiency workforce, one which is vital to market adoption.

Inventory of Education Assets

EWSS focused on a broad cross-section of public postsecondary educational programs to identify existing assets that could be employed in developing all levels of the energy efficiency workforce.

With the help of the California Community Colleges Centers of Excellence and the Chancellor's Office of the California State University System, energy efficiency programs were inventoried at 112 community colleges and 23 CSU campuses. The parameters of this inventory were defined by the 67 occupational titles researched by EMSI in the labor market demand study. Labor union programs, while numerous and highly significant, were beyond the scope of EWSS and therefore not researched.

Colleges and universities with combinations of strategic degree and certificate programs, based on units of academic credit, were identified at the community colleges and CSU campuses designated in Figures 19 and 20. This analysis addressed the top 20 in-demand occupations identified in the EMSI labor market research, accounting for approximately 80% of projected job openings in 2012-16. Very few programs or courses are labelled "energy efficiency", so education and training for the 67 occupational titles were identified through data tags related to the target jobs for which they prepared students.

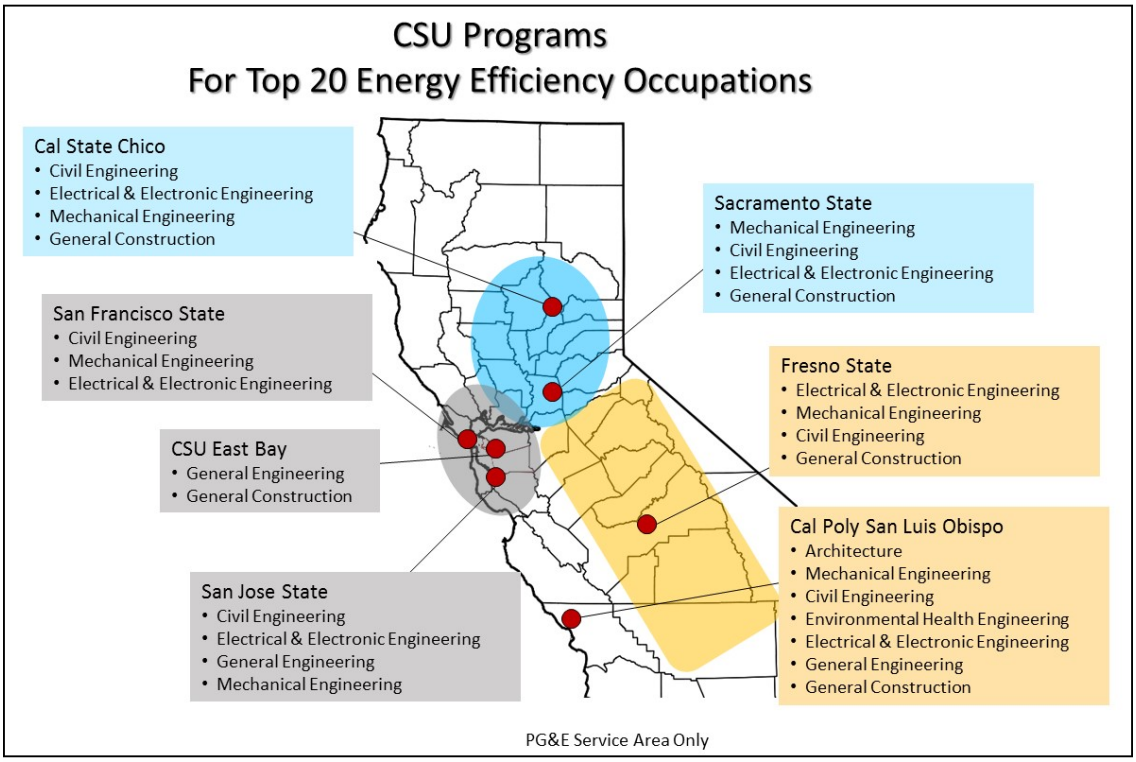


Figure 19. CSU Campuses with Strongest Programs Addressing Top 20 In-Demand Occupations

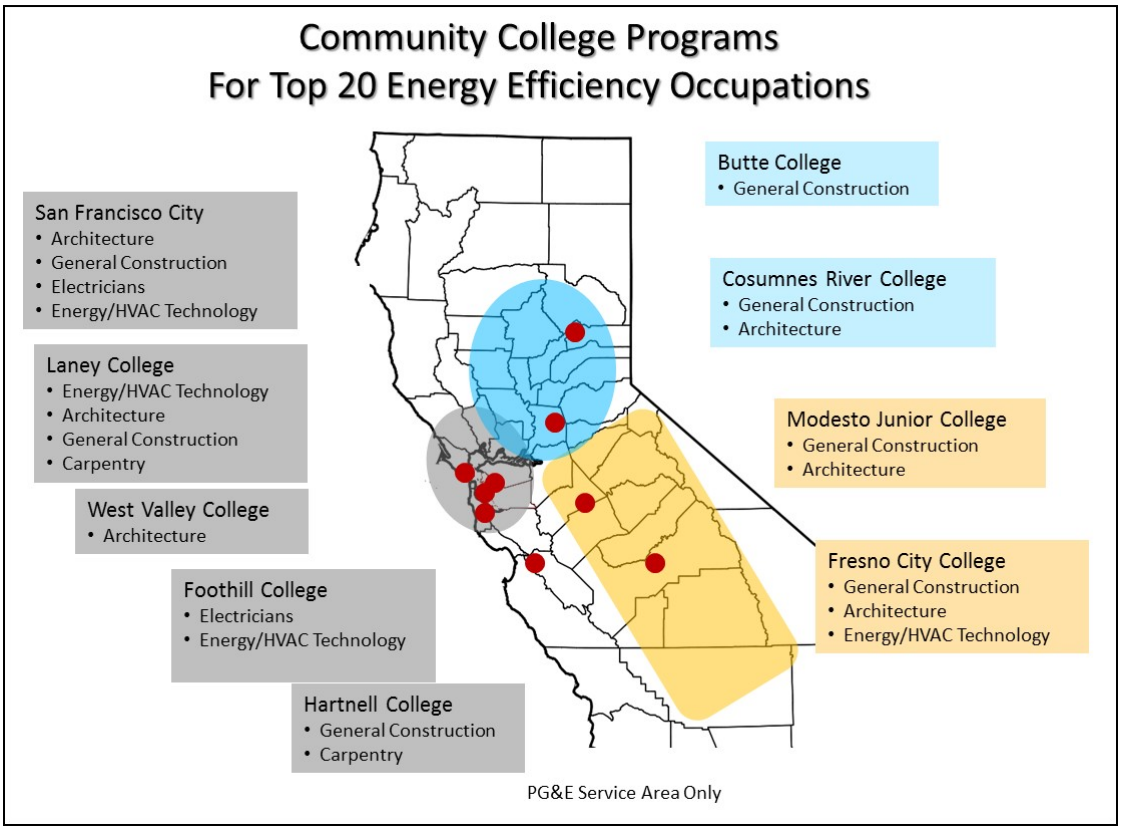


Figure 20. Community Colleges with Strongest Programs Addressing Top 20 In-Demand Occupations

High concentrations of courses relevant to energy efficiency in these colleges and universities, along with course offerings in multiple disciplines, offer the greatest critical mass for building programs that address multiple occupations For example, see the depth and diversity of programs at Cal Poly SLO and Laney College. There are of course many other relevant programs at CSU campuses and community colleges, but these 16 have the greatest concentrations in the geographic areas where the top 20 occupations are in highest demand. EWSS has therefore given priority to these colleges and universities for ongoing curriculum development and connections to employers. The top 20-in-demand occupations are shown in Table 4.

Mapping career pathways has a potentially high impact on building the energy efficiency workforce, especially as EWSS builds these maps and related information into a web-based portal – www.sectorstrategy.com. Employers can identify programs from which to recruit and select courses of study for the professional development of incumbent workers. Students can build individual education plans that lead to employment in their targeted career fields, and identify employers with the types of jobs they want. Faculty can form expert networks, joining other colleges and universities to focus on closing gaps, sharing content, and creating fully articulated career pathways from high school through postsecondary and into the workforce.

Research continues to more specifically relate individual courses, certificates, and programs to these top 20 occupations, with plans to define pathways in a manner similar to Figure 21.

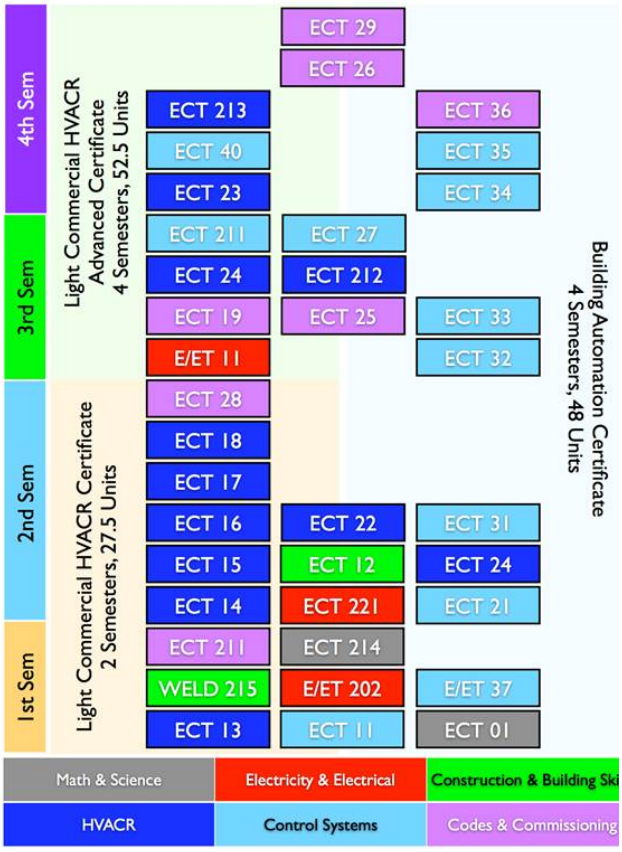


Figure 21. Example Career Pathway Mapping[xi] (Laney College)

Example Career Pathway	
Certificate in Building Automation	
ECT 214	Technical Mathematics for ECT
E/ET 202	Fundamentals of Electricity for ECT
ECT 01	Physics for Building Science
E/ET-ECT 37	Intro to PC H/W & S/W for Building Technicians
ECT 11	Mechanical & Electrical Devices & Controls
ECT 22	Commercial HVACR Systems
ECT 24	Commercial HVACR Systems Troubleshooting
ECT 21	Introduction to Direct Digital Controls
E/ET-ECT 31	Intro to DDC H/W for Building Automation Systems
E/ET 221	Motors & Drives
ECT 27	Advanced Direct Digital Controls
ECT 25	Introduction to Building Commissioning
ECT 12	Blueprint Reading & Interpretation for ECT
ECT 32	Control Systems Design
E/ET-ECT 33	Control Systems Networking Testing, Adjusting, & Balancing
ECT 212	Control Routines for Energy Efficiency
ECT 34	Control Systems Integration
ECT 35	Energy Issues, Policies, & Codes
ECT 36	Data Analysis for Performance Monitoring
ECT 29	Advanced Building Commissioning
ECT 26	

EWSS continues to focus on public postsecondary institutions for research and collaboration. Work is being done to address other educational assets in the state by other organizations such as the UC Berkeley Don Vial Center on Employment in the Green Economy. This Center produced the 2011 Workforce Education and Training Needs Assessment funded by the Investor Owned Utilities.

Curriculum Development

A broad array of curriculum currently exists in the public postsecondary system that can be leveraged to meet the needs of the energy efficiency workforce. However, interviews with employers and Senior Energy Professionals clearly indicated the need for more focused programs in this sector. Career Technical Education (CTE) is typically focused on preparing students for specific occupations, whereas academic fields of study provide broad knowledge with certificate programs for opportunities for greater specialization. EWSS characterizes the current energy efficiency CTE landscape as shown in Figure 22.

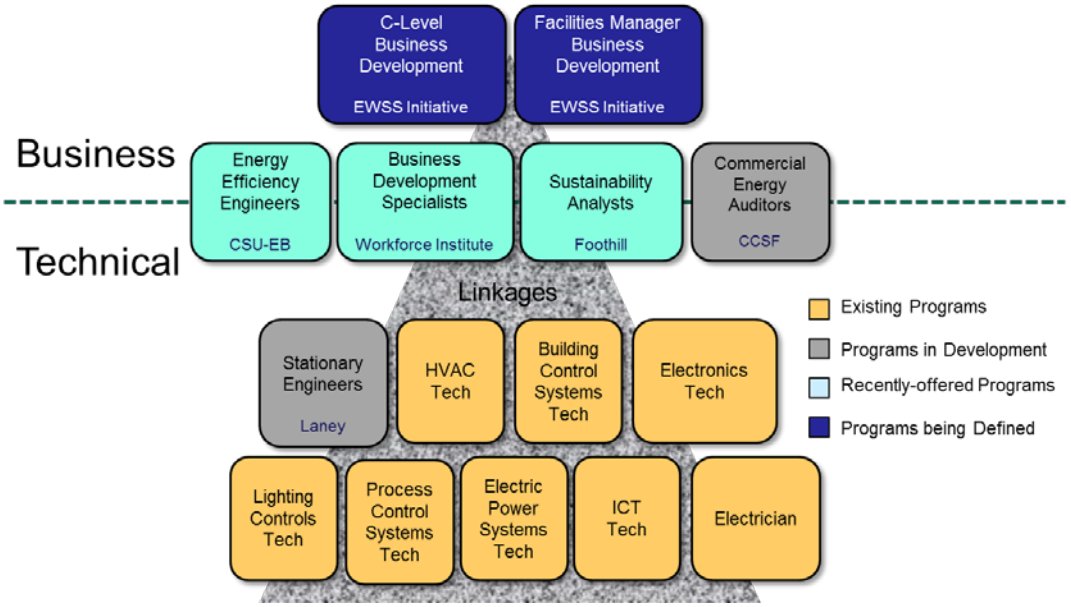


Figure 22. Energy Efficiency CTE Portfolio

As shown in Figures 19 and 20, these curricula are scattered among many colleges and universities, resulting in a fragmented system for developing the energy efficiency workforce. Opportunities abound to create a sharper focus on demand creation, compliance with codes and standards, and additional capacity. The top two layers of the above graphic illustrate the EWSS approach to student learning outcomes that are a direct reflection of employer needs. Infusing new industry-driven content into other programs in the portfolio is also an important aspect of EWSS. Ideally, limiting EWSS priority engagement to the 16 institutions with the strongest foundational programs will lead to standards for student learning outcomes and employers' adoption of industry-recognized credentials. As progress is made in the state's leading programs, EWSS can address infusion of new content into programs at other colleges and universities. At the high school level, academies and co-enrollment strategies (for lower-division courses) can be developed to build the pipeline of students entering energy efficiency career fields.

The next page describes new 2013 curriculum initiated by EWSS or reactivated from programs that lost funding when the American Recovery and Reinvestment Act expired.

New Education and Training Programs for 2013

Featured by EWSS

Professional Business Development Seminar
8 hours
@ PG&E Pacific Energy Center

Designed for senior professionals in commercial energy efficiency businesses, this one-day seminar provides new skills in sales and business development. It offers practical application of key financial and sales techniques that improve effectiveness with building owners and managers. The instructor is a former Director of Facilities for a large corporation and a recognized industry expert, currently teaching at San Diego State University. Course content was developed through interviews with 67 senior managers in architectural, engineering, and system integration firms, plus electrical contractors. **Fall 2013**

Integrated Energy Solutions

3 Quarters
@ CSU EAST Bay

This graduate-level certificate program provides a deep foundation in commercial energy efficiency technologies, systems integration, and financial analysis. It enables energy efficiency professionals to expand their knowledge and skills while enabling career-changers to become more employable. Taught in the evening by industry practitioners, this course offers the latest concepts in auditing, designing, and commissioning energy efficiency solutions. Selected topics in financial analysis create a holistic approach to commercial applications. This is the second offering of the program, following a successful pilot sponsored by PG&E. **Fall 2013**

Energy Efficiency Topics Workshops

City College of San Francisco

This convenient series of 3-to-4 hour evening workshops is geared to the needs of those who want an a la carte selection of commercial energy efficiency topics. Busy professionals – currently in energy efficiency jobs or not – can sign up for as many or as few of these workshops as desired. The workshop format includes repackaged and streamlined content from the Integrated Energy Solutions certificate program and the PG&E Commercial Energy Auditing curriculum. Taught by respected industry practitioners, these workshops offer a basic understanding of commercial energy efficiency. **Fall 2013**

The Professional Business Development Seminar is a direct response to employer priorities identified by EWSS.

The EWSS emphasis for curriculum development is on combining technical and business topics into a holistic approach to energy efficiency. The above programs and courses follow this structure. A partial syllabus of an 80-hour course previously offered at Foothill College illustrates typical content. EWSS is chartered to foster proliferation of such curriculum, which is available to other education providers.

Sample Class Schedule

Session	A – First Period	B – Second Period	C – Third Period	D – Fourth Period
1	Class Introduction	Building Energy Use	*Energy Units Exercise and Quiz*	Building Design and Construction
2	Engineering Economics	Costs, Taxes and Incentives	*LCC Exercises and Quiz*	*Energy Programs Careers Roundtable*
3	U-factors and heat transfer	Heat Balance and Bin Analysis	*Envelope Exercises and Quiz*	Environmental Impact of Energy Use
4	Fenestration – Part 1	Fenestration – Part 2	*Fenestration Exercises and Quiz*	IPMVP and Data Driven Models
5	Thermal Comfort and Ventilation	Psychrometrics	*HVAC Comfort/Psychrometric Exercise*	Team Projects Discussion
6	Refrigeration Fundamentals (LW)	Fans and Airflow (LW)	*HVAC Exercise*	*Design Assistance Careers Roundtable*
7	HVAC System Classifications	HVAC Audits and Cx (LW)	*HVAC Audit Exercise*	Team Projects Discussion
8	HVAC Secondary Systems (LW)	HVAC Primary Systems (LW)	Plug and Miscellaneous Loads	HVAC Terminal Systems (LW)
9	HVAC Codes and Standards	Water Heating and Distribution	Team Projects Discussion	Commercial Refrigeration
10	Lamps, Ballasts and Luminaires (SM)	Lighting Design Criteria (SM)	*Lighting Laboratory and Quiz*	Rating and Evaluating Buildings
11	Lighting Controls (SM)	Lighting Audits and Cx (SM)	*Lighting Audit Exercise*	Team Projects Discussion
12	Lighting Codes and Standards	Lighting Analysis Software (SM)	*Lighting Modeling Exercises*	Advanced Lighting Technologies (SM)
13	*Lighting Laboratory*	*HVAC Laboratory*	*Heliodon*	*Daylighting and Fenestration*
14	Energy Standards California – Part 1	Energy Standards Other – Part 2	Commissioning Introduction (Guest)	*Auditing and Cx Careers Roundtable*
15	Advanced Building Envelope Design	Building Automation (MH)	Natural Ventilation and Hybrid	Advanced HVAC Design (CE/MH)
16	Integrated Design Principals	Daylighting – Part 1	Daylighting – Part 2	*ESCO Careers Roundtable*
17	Energy Modeling – Part 1	*Modeling Exercises*	Measurement and Data Collection (RS)	*M&V Laboratory (RS)*
18	Energy Modeling – Part 2	*Modeling Exercises*	Combined Heat and Power	RECs, PPAs and Leases
19	Photovoltaic Fundamentals	Photovoltaic Design	*PV Quiz and Exercises*	*Renewables Careers Rountable*
20	Team Presentations	Team Presentations	Team Presentations	Team Presentations

Legend

- General
- Envelope
- Lighting
- HVAC
- Integrated Design
- Renewables and On-Site Power
- Class Projects
- Interactive Discussion

Table 8. Typical Course Structure Embodying both Technical and Business Topics[xii]

The above course was developed and delivered at Foothill College by industry practitioners, an ideal formula for industry-driven content leading to credentials that employers recognize and for which they recruit. A challenge is to bring these courses into the academic mainstream, which requires significant faculty development.

Direction for 2014 and Beyond

Program Elements

As indicated in prior sections, EWSS focuses on workforce development that accelerates progress toward meeting the AB 32 mandates for nonresidential energy efficiency. Substantial research and stakeholder dialog identified the following elements as priorities for EWSS:

Demand Creation: As its first priority, EWSS invests in developing a workforce that is increasingly effective in creating demand for nonresidential energy efficiency solutions. The EMSI research revealed that professional workers – those typically engaged in business development and design functions – represented about half of the 2012-2016 job openings among the top 20 in-demand occupations. Patterns in real-time labor market surveys consistently reflected that two-thirds of actual job postings are for professional workers. Focus groups, employer surveys, and meetings with industry advisors identified significant barriers faced by professionals – "Market Makers" - in driving higher market adoption rates.

Compliance: California's energy efficiency goals can be achieved only if solutions are properly designed, installed, maintained, and operated. In some circles, energy efficiency work is perceived as limited to installation by the skilled trades, whereas the workforce need actually extends to competencies across many occupations – design, installation, commissioning, operations, and maintenance. Within this spectrum, important new occupational categories are beginning to grow, such as Commercial Energy Auditors and Sustainability Analysts.

Capacity: EWSS is based on leveraging existing education and training assets to maximize return on ratepayer investment in energy efficiency. Consistent with the Market Maker focus and the need to upgrade compliance competencies across a broad occupational spectrum, EWSS gives priority to California's public postsecondary system – community colleges and CSU campuses – where the majority of the state's workforce is trained. EWSS funding for 2012-13, allowed a limited engagement with The Northern California chapter of the National Electrical Contractors Association (NorCal NECA) and the IBEW-NECA Labor Management Coordinating Committee (LMCC) to incorporate the needs of union-based electrical contractors into employer research. Expansion of this relationship and inclusion of other labor unions and LMCCs will be important to fully address energy efficiency capacity in PG&E's service territory.

Combining these three elements into a balanced and cohesive set of programs is required to build the workforce needed to better align market adoption trajectories with the AB 32 mandates in PG&E's service territory.

EWSS Program Design

Building out workforce programs goes well beyond education and training. Factoring the timing and geographic distribution of labor market demand by occupation into specific programs, EWSS aligns educational assets with market adoption strategies that contribute directly to attainment of AB 32 mandates. Incumbent workers are a key focus, providing the most immediate impact on market adoption rates and compliance with evolving codes and standards. Connections among students, educators, and employers are critical components of the EWSS approach to creating an efficient pipeline that adds capacity on a timely and strategic basis. Education and training programs are designed to overcome the barriers and close the gaps identified by employers, leveraging the assets of California's public postsecondary system. A continuous improvement approach is built into EWSS, fostering dialog among stakeholders that can sustain programs at the regional level – Bay Area, Central Valley, and Sacramento/North – which respond as workforce needs evolve over time.

Strategic Alignment at the Program Level

As illustrated in previous sections, EWSS maps educational assets to the top 20 in-demand occupations on a county-by-county basis. Preliminary inventories of degree and certificate programs show relatively good coverage geographically, but most programs need to more directly address the knowledge base and skill sets needed by employers. In addition, little work is yet to be done by EWSS to assess the capacity of these programs in relation to labor market demand.

The alignment process is driven by interaction between PG&E's EWSS team and an Advisory Council comprised of stakeholders from industry, education, and local workforce investment boards. This Council has met periodically since the EWSS launch in February 2012, and will continue through at least 2014. Priority has been given to developing three Regional Collaboratives – Bay Area, Central Valley, and Sacramento/North - which can form stakeholder initiatives that closely couple educational assets with labor market demand within each geography.

Strategic Alignment
Gap 1: Upgrade education and training programs to create a knowledge base and skill sets that better reflect employer needs *Gap 2:* Assess current education and training programs to determine current capacity relative to labor demand
Deliverable: Develop three Regional Collaboratives to bridge these gaps within each targeted geographic area – Bay Area, Central Valley, and Sacramento/North

Table 9. Gaps and Deliverables for Strategic Alignment

In each region, a unique set of strategies will drive education and training to address local market opportunities and barriers and to identify gaps in preparing workers for priority occupations. Programs will be developed, implemented, and promoted in concert with the stakeholders in each Collaborative to bridge gaps, add capacity, and enhance training for codes and standards compliance.

Demand Creation

Industry stakeholder interviews provide evidence that many of the market drivers are not understood well enough to overcome building owner resistance to improving energy efficiency. Thus, sales and business development workers are the top priority among the vast majority of energy efficiency employers that have engaged with EWSS. These employers typically do not have dedicated sales people, but rely on executives and senior engineering and project management personnel for business development activities. These professionals need enhanced skills in gaining commitment by building owners and managers (typically C-level executives or facilities managers) to invest in energy efficiency solutions.

Research on Senior Energy Professionals indicated that these workers typically had advanced degrees and more than 15 years' experience in energy efficiency. As the primary energy efficiency demand creation workforce, these professionals already possess highly sophisticated skills and knowledge to target the best opportunities, identify potential energy efficiency upgrades, and articulate cost-effective solutions. The challenge is to develop new marketing and sales skills, effectively bridging four distinct gaps.

Demand Creation
Gap 1: Marketing Training – analytics, segmentation, messaging tailored by segment *Target Audience: Senior-level industry professionals* *Gap 2*: Sales Training – C-Level/ Facilities Manager relationship skills, consultative selling *Target Audience: Senior-level industry professionals* *Gap 3:* Sales Training - consultative selling coupled with core financial and technical elements *Target Audience: Incumbent energy efficiency professionals seeking senior positions* *Gap 4:* Sales Education - perspectives in energy efficiency financial and technical elements *Target Audience: Students in community college and university programs*
Deliverables: 1. A pilot seminar course in demand creation to be attended by up to 20 senior energy professionals engaged in business development. 2. Recommendation of career pathways for a pipeline of senior energy professionals engaged in business development and engineering.

Table 10. Gaps and Deliverables for Demand Creation

Capacity

As the market develops, the supply of workers in positions needed to support growth will determine the sector's overall market adoption rate. While programs are in place to educate or train these workers, gaps exist in the community college and CSU systems' overall capacity for the knowledge, skills, and abilities required by employers.

As two specific examples, EWSS stakeholder focus groups resulted in a priority for new capacity in engineering and energy auditing positions. WE&T and EMSI research show small gaps or even a surplus of engineers, but an analysis of CSU programs shows that few engineers are being prepared for careers in energy efficiency. Anecdotal reports from industry stakeholders indicate that this is a significant gap, and patterns that support the need for engineers trained in energy efficiency are reflected in analyses of real-time job market postings. Another artifact of the merging nature of this market is that Commercial Energy Auditors don't show up in the research because the occupation is too new to be recognized by O*NET or other classification systems, and only now are a few training programs emerging.

Capacity
Gap 1: Engineers - training capacity in energy efficiency technology, systems, and economics *Target Audience1: Incumbent engineers with up-skilling needs* *Target Audience 2: Dislocated and career-changing engineers* *Gap 2:* Energy Auditors - training capacity in technologies, systems, codes, and standards *Target Audience: Dislocated technical workers and career changers* *Gap 3*: Skilled technical workers - training capacity in specific skills categories *Target Audience 1: Dislocated technical workers and career changers* *Target Audience 2: Students in Career Technical Education or JAT programs* *Gap 4:* Incomplete knowledge of training requirements for ICT integration *Target Audience: To be determined*
Deliverables: 1. Recommendation of enhancements for existing business/technical courses, linking demand creation concepts to training for engineers, business development specialists, sustainability analysts, and energy auditors. 2. Recommendations for capacity additions in training and education programs for (a) engineering, (b) energy auditors, (c) skilled technical workers, and (d) ICT curriculum as it applies to nonresidential energy efficiency.

Table 11. Gaps and Deliverables for Capacity

Compliance

Compliance training is essential to realizing the energy efficiency benefits projected in investment decisions by market adopters. Without new business cases demonstrating actual carbon reduction benefits, cash flow improvement, and return on investment, market adoption likely will continue on its current trajectory or perhaps slow down.

Experience with the CALCTP initiative provides a solid model for developing an EWSS strategy across the commercial and industrial energy efficiency landscape.

Compliance
Gap: Compliance skills training across the spectrum of commercial/industrial energy efficiency, consistent with codes, standards, and best practices. *Target Audience: To be determined*
Deliverables: Recommendations for (1) expansion of CALCTP to engage more contractors in business training, and (2) integrating HVAC and other codes, standards, and best practices into specialized courses and career pathways as project team bandwidth permits.

Table 12. Gaps and Deliverables for Compliance

Compliance is a difficult issue for workforce development in many energy efficiency technologies. While CALCTP has achieved agreement among many disparate parties and enabled a standardized training approach across the state, the problem of compliance standards still needs to be addressed beyond lighting control technologies. EWSS is tracking the progress in other energy efficiency areas such as HVAC to determine the proper timing to begin more fully defining compliance training requirements.

Communities of Practice

In 2012, an EWSS website and member portal was created for centralized access to research, contacts, progress reports, etc. Currently, the website (www.sectorstrategy.com) is limited to periodic updates by the EWSS team as new information is generated. This portal will be expanded into a "Community of Practice" that offers all stakeholders the ability to share information on multiple levels and link to relevant websites. Through this portal, a sustainable ecosystem can be cultivated to drive continuous improvement in education and training programs and linkages to the industry's workforce needs. When fully built out, the Community of Practice will offer unique regional portals in addition to a central site for content that applies to the entire PG&E service territory. Specific capabilities of the Community of Practice include:

Capability	Benefit	Access By / Maintained By
Career Pathway Mapping	Provide students, career-changers, and incumbent workers with information to map their careers through education and training programs into the workforce	Students / Educators
Employment Sourcing	Equip employers with information on programs, pathways, student learning outcomes, and graduation dates to determine hiring priorities by institution and occupation	Employers / Educators
Internship Connections	Enable the posting of internship opportunities to facilitate connections between students and employers	Students / Employers
Job Connections	Link to job postings on employer websites to inform students of new job opportunities	Students / Employers
Education Announcements	Offer students and incumbent workers information on upcoming education and training opportunities	Students & Workers / Educators
Shared Resources	Creates a platform for educators to share resources around curricula, best practices, industry expertise, professional development, etc. to raise educational relevance to industry needs	Educators / Educators
Regionalization	All of the above capabilities will evolve to unique sections of the portal where regional priorities, programs, and resources can be accessed	Regional Stakeholders

Table 13. Elements of the Community of Practice

2013 Program Metrics

Outcome	Metric		Due
1	Align the Sector Strategy with the 2013-14 Project Implementation Plan		January 2013
2	Create and implement a communications plan that keeps stakeholders engaged in EWSS activities via meetings, webinars, and emails		March 2013
3	Align regional stakeholders with the EWSS initiative		
	3.1	Form the Bay Area Collaborative	March 2013
	3.2	Form the Central Valley Collaborative	May 2013
	3.3	Form the Sacramento/North Collaborative	August 2013
4	Create workforce education and training programs to drive Demand Creation		
	4.1	Recommend career pathways for a pipeline of Senior Energy Professionals engaged in business development and engineering.	July 2013
	4.2	Recommend enhancements for existing business/technical courses, linking demand creation concepts to training for engineers, business	October 2013

		development specialists, sustainability analysts, and energy auditors.	
	4.3	Train the first cohort of Senior Energy Professionals in a seminar to increase market adoption of energy efficiency solutions	September 2013
	4.4	Launch the CSU East Bay Integrated Energy Solutions Certificate Program for Energy Professionals (Three course sequence)	September 2013
	4.5	Complete the first series of Energy Professionals workshops at City College of San Francisco (12 sessions)	December 2013
	4.6	Create linkages between existing programs at Tier 1 colleges and universities and content from the Senior Energy Professional training	November 2013
5	Add capacity to existing workforce programs for priority occupations		
	5.1	Engineering	September 2013
	5.2	Commercial Energy Auditors	September 2013
	5.3	Skilled Technical Workers	December 2013
	5.4	ICT curriculum as it applies to nonresidential energy efficiency	December 2013
6	Develop or expand programs to better assure compliance with codes and standards		
	6.1	Expand CALCTP to engage more contractors in business training	December 2013
	6.2	Integrate HVAC and other codes, standards, and best practices into specialized courses and career pathways	December 2013
7	Cultivate Communities of Practice to build sustainable programs that connect students to employers and build shared resources among educators and industry stakeholders		
	7.1	Career Pathway Mapping	August 2013
	7.2	Employment Sourcing	September 2013
	7.3	Internship Connections	September 2013
	7.4	Job Connections	September 2013
	7.5	Education Announcements	September 2013
	7.6	Shared Resources	December 2013
	7.7	Regionalization	December 2013
8	Create a platform for 2014 strategy		November 2013
9	Provide measurements to indicate the effectiveness of the 2013 Sector Strategy		December 2014

Table 14. EWSS Program Metrics for 2013

Communications Plan

Background

As part of the EWSS 2013 Work Plan a proactive communications and industry outreach effort is planned to assure that energy efficiency (EE) industry and education stakeholders are kept apprised of the EWSS project activities, deliverables and outcomes. Additionally, stakeholder input and feedback will be solicited to help guide EWSS direction and facilitate productive interactions among industry, educators and workforce development practitioners.

Communications Strategy

Stakeholder Group	Estimated Frequency of Communications					
	Meeting	Webinar	Email	Phone	Portal Updates	Published Report
Executive Committee	Quarterly	Quarterly	Monthly	Quarterly	As needed	December 2013
Advisory Council	Quarterly	Quarterly	Monthly	Quarterly	As needed	December 2013
Priority 1 Stakeholders	Quarterly	Quarterly	Monthly	Quarterly	As needed	December 2013
All Education Stakeholders	Quarterly	Quarterly	Quarterly	As needed	As needed	December 2013
All Industry Stakeholders	Quarterly	Quarterly	Quarterly	As needed	As needed	December 2013
WE&T Task Force	Statewide Meetings	Statewide Meetings	TBD	As needed	As needed	December 2013
PG&E Management	Quarterly	Quarterly	Monthly	As needed	As needed	December 2013
PG&E Executives	Quarterly	Quarterly	Monthly	As needed	As needed	December 2013
CPUC and CEC	Quarterly	Quarterly	Quarterly	As needed	As needed	December 2013

Table 15. 2013 EWSS Communications Plan

Conclusions

EWSS identified a clear need for workforce development among professional workers – engineers, architects, project managers, energy auditors, etc. – to improve progress toward AB 32 mandates for commercial and industrial energy efficiency. Significant assets exist at the university and community college levels to build competencies in this workforce as well as among workers in the skilled trades.

Career pathways and training programs map fairly well to the geographical areas where job creation is expected, although gaps and inconsistencies need to be addressed. Relevant and rigorous new education and training content created with ARRA funding should be infused into existing pathway programs. Regional development of integrated career pathways, mapped to labor demand projections and employer priorities, is the major focus of EWSS for 2014.

Better linkages between PG&E's Energy Centers programs and the public postsecondary systems can offer significant career lattice opportunities. For example, City College of San Francisco enhanced the Pacific Energy Center's (PEC) Commercial Energy Auditor program by offering a fundamentals seminar as a precursor to the program and an advanced seminar for students completing the PEC program. Beginning in 2014, this concept can be expanded to create synergies between other Energy Center programs and certificate and degree programs at community colleges and universities.

The EWSS web portal www.eesectorstrategy.com is being built out to accommodate Communities of Practice that that offers all stakeholders the ability to share information on multiple levels and link to relevant websites. Through this portal, a sustainable ecosystem can be cultivated to drive continuous improvement in education and training programs and linkages to the industry's workforce needs.

EWSS creates the foundation for the Commercial Energy Efficiency Sector for 2015-17. Deliverables in 2014 build on stakeholder relationships and begin integration with other programs such as CALCTP, HVAC stakeholder agreements, 2013 Title 24 Code updates, and others as appropriate.

Appendices

1. Employment Projections
2. Employer Priorities
3. Survey of Senior Energy Professionals
4. Inputs for Curriculum Development
5. Inventory of Educational Assets
6. 2012 Metrics
7. Communications Plan
8. Notes from Stakeholder Meetings

Appendix 1. Employment Projections

A projection of energy efficiency job openings was made by Economic Modeling Specialists, Inc. (EMSI)[xiii] for 19 counties in PG&E service territory, based on the taxonomy shown in Figure 1.

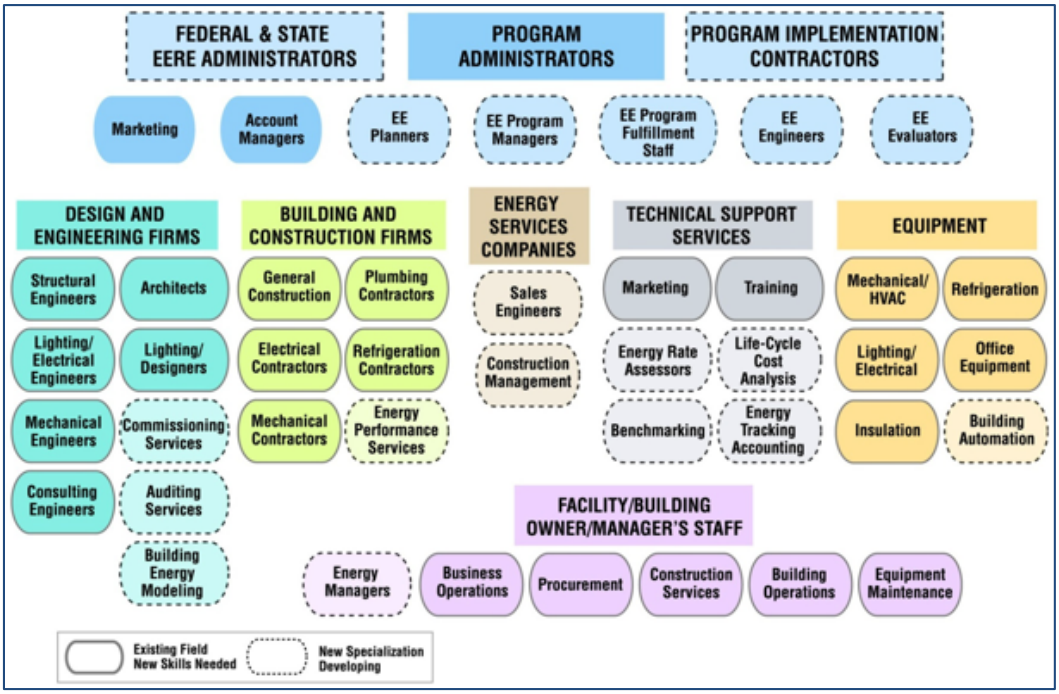


Figure 1. The Commercial-Institutional Energy Efficiency Services Sector[xiv]

The scope of EWSS is currently limited to providers of energy efficiency solutions and services. Since these providers must compete for talent across a broad range of industries, the EMSI research included manufacturers of energy efficiency products and systems in its labor demand analysis. Excluded from the analysis were utility companies. Although utility firms do employ nonresidential energy efficiency workers, data for this occupational group are not granular enough for inclusion in this analysis.

Given this perspective, EMSI, PG&E, ICF International, Workforce Incubator, and Jim Cassio & Associates collaborated to define sixty-seven occupational titles in the thirteen industries listed below. It should be noted that Jim Cassio was one of the original contributors to development of the US Department of Labor O*NET database, the industry standard for occupational definitions, and is a frequent consultant to Workforce Investment Boards in California.

All selected industries have some activity within the energy efficiency sector, with most of the heavy concentrations in the manufacturing segments.

Commercial and Industrial Building Construction
Nonresidential Electrical Contractors
Nonresidential Plumbing and HVAC Contractors

Industrial Building Construction
Air Purification Equipment Manufacturing
Industrial and Commercial Fan & Blower Manufacturing
Heating Equipment Manufacturing
Air Conditioning and Warm Air Heating Equipment Manufacturing
Commercial and Industrial Refrigeration Equipment Manufacturing
Relay and Industrial Control Manufacturing
Architectural Services
Engineering Services
Building Inspection Services

The EMSI research should be used in conjunction with the WE&T Needs Assessment to establish a complete picture of labor market demand through the year 2020.

EMSI projects larger numbers of new jobs than WE&T. EMSI estimates creation of 2,200 new jobs annually between 2012 and 2016; the WE&T Needs Analysis reflects 1,649 to 2,411 new person-years will be created in its 2015 medium and high investment scenarios, respectively. However, EMSI projections are only for the PG&E service territory. Other differences in these two projections undoubtedly arise from the uniqueness of each entity's proprietary models, scope of the studies, and underlying definitions. Most notably, the distribution of new jobs among occupations is considerably different between the two studies.

EWSS does not incorporate the EMSI labor supply analysis into its findings. Rather, EWSS worked directly with the California Community Colleges Centers of Excellence and the California State University Chancellor's Office over an 18-month period to research career pathways relevant to commercial and industrial energy efficiency. While relevant programs were identified at many colleges and universities, EWSS focuses on 16 institutions that have the most complete and robust career pathways. Labor supply is estimated in both the EMSI and WE&T studies, although EWSS stakeholders revealed significant shortages of workers entering the applicant pool with the knowledge, skills, and abilities to become productive in a reasonable period of time. Therefore, EWSS will continue to research education and training capacity to provide fully qualified workers that meet industry requirements.

Appendix 2. Employer Priorities

Employer Survey – Fall, 2012

Objective:

Acquire input from industry executives and senior professionals to improve success in developing the market for energy efficiency projects.

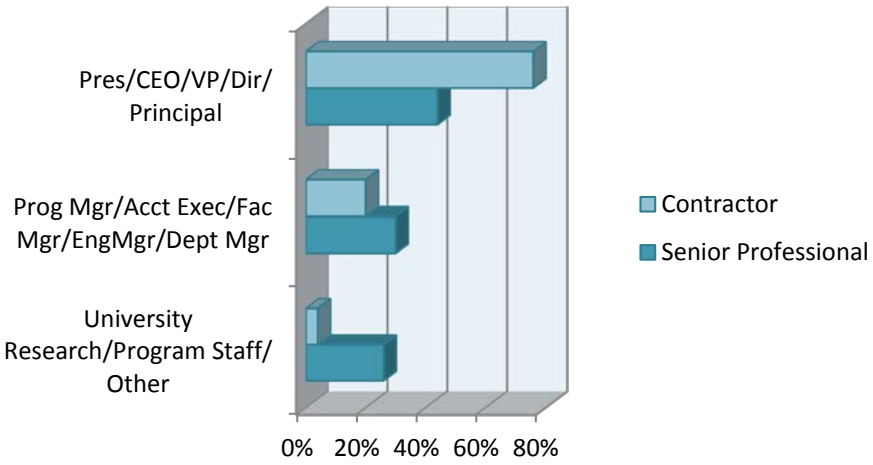
Profile of Population Surveyed:

Participants in these interviews were selected as a sample population representing stakeholders who are engaged in business or research in meeting the AB 32 goals for energy efficiency in commercial, industrial, and agricultural buildings. Those interviewed were typically very senior, with long experience in engineering, architecture, construction or research in the nonresidential building environment.

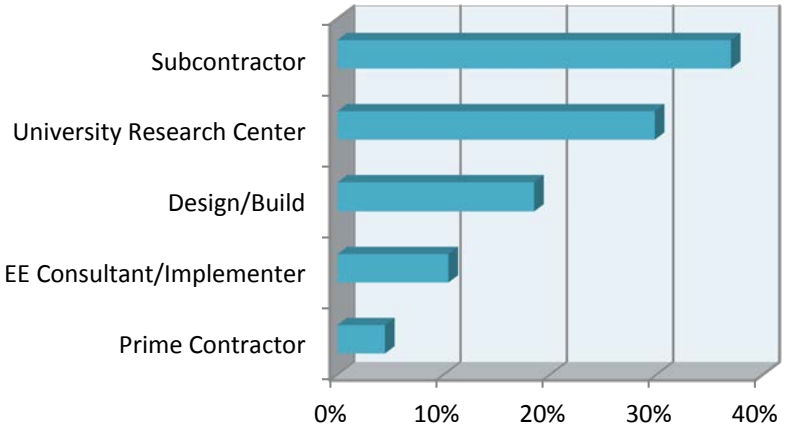
Population Surveyed	Number Surveyed	Source
Contractors	40	NECA Contractors CALCTP Listed Contractors
Senior Energy Professionals	27	PG&E Implementation Partners Senior Energy Professionals University Energy Research Center

Questions

1. What is your job title?



2. Please describe the nature of your business (or work). (Check all that apply)



2. What types of projects are typical for your company (program)? (Check all that apply)

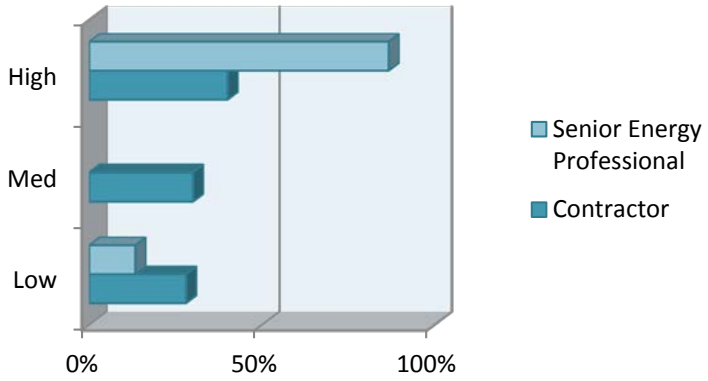
	Contractor	Senior Energy Professional
Government	80%	6%
Colleges	85%	12%
Hospitals	78%	3%
Industrial	83%	9%
Hotel	40%	3%
Restaurant	38%	6%
Retail	48%	3%
Office Bldg.	73%	21%
Strip Commercial	48%	12%
Residential	13%	12%
Utility	58%	15%

3. What energy efficiency services do you currently provide? (Check all that apply)

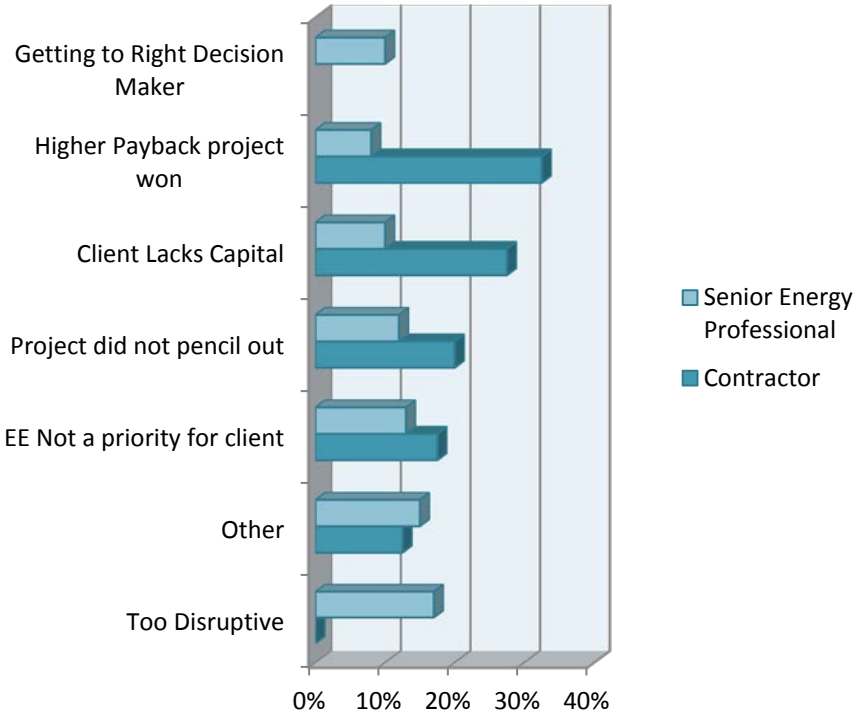
	Contractor	Senior Energy Professional
Lighting	95%	16%
Lighting control systems	93%	16%
HVAC systems and controls		16%
Building envelope measures		6%

Building automation systems	68%	6%
Environmental control systems	40%	3%
All of the above		38%

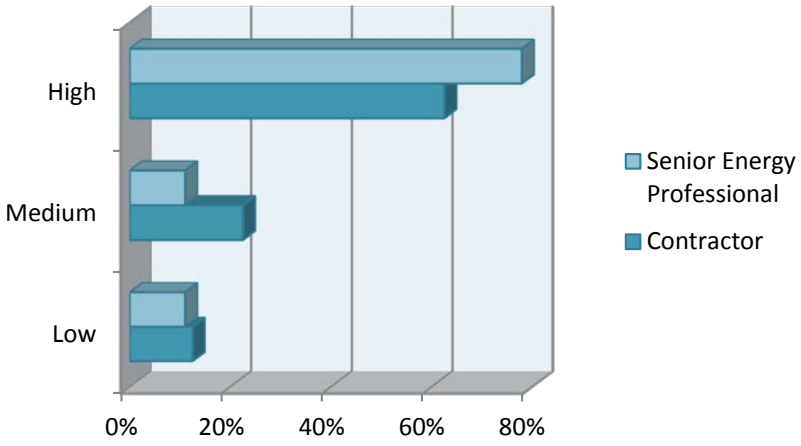
4. What priority do you place on winning energy efficiency projects?



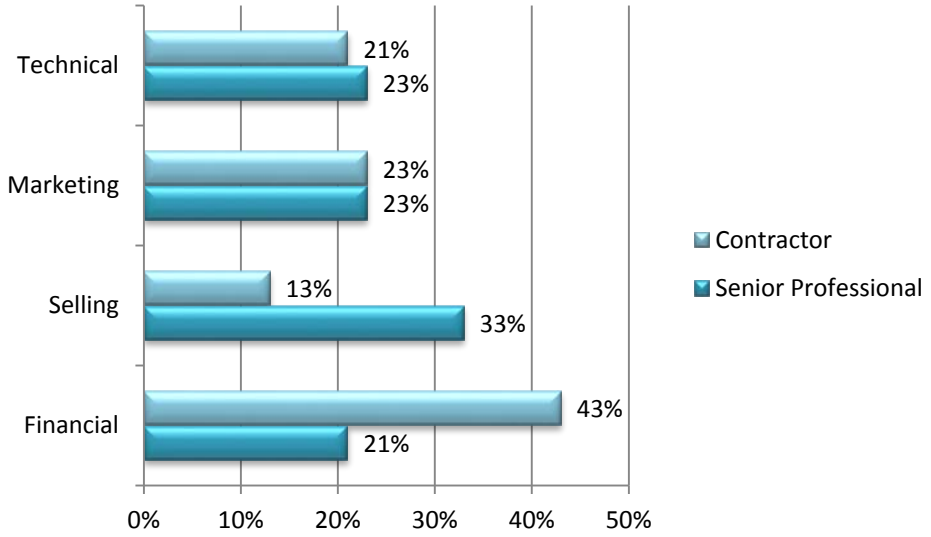
5. What are the most difficult obstacles to winning more energy efficiency projects?



6. What impact could be made on removing these obstacles if you and your team had better tools and were better educated on selling energy efficiency projects?



7. What would you like your employees (colleagues) to be able to do differently as a result of the course in order to overcome client obstacles and win more energy efficiency projects?



Comments from Senior Energy Professionals

Would be good to educate customers on the added benefit of more complex measures. Persistence training, whereby customer does not mess up settings (e.g., refrigerator settings).

I'm a firm believer in learning by doing. One has to do it to really get it. This course could be good introduction to new business development ideas.

We train mechanical and lighting trades (2 half-day sessions) BEFORE they qualify as a trade allies. (On technical tools, succinct financial information, performance information.) We align user value proposition to trade allies. Then we do monthly refreshers, some online and some face-to-face (1/2 day) as well as ride-alongs with trade allies in customer meetings and for in-field training. This has effectively turned trade allies into multiples of our sales force.

Communication skills - Sales 101. Create urgency with qualified data. Address barriers to adoption. How to research before the customer meeting. Cover tools (Finance 101, time value of money), information, research, awareness. Relate technical information to financial situation. Question: How will this course be different than what is already out there?

Understanding customer's base sector, institution, individual facility, their needs, and decision process. Cover sales basics (informal, straightforward approach). Am wary of generic sales practices without tailoring approach to limitations of the sector and institution. Listening skills, consultative selling. Emphasize face-to-face meetings to develop a personal relationship and credibility. No B.S. - Don't fake it with customers to appear more knowledgeable.

Sale approaches and strategies start-to-finish. Project managers will benefit from training. Standardize the sales approach to save time. Human interaction (you and customer) - take their perspective.

Currently see a dual track mentality: Tech savvy or customer relations/business skills. Ideally, having both skill sets is best. Not aware of such a training program.

Whole integrated approach (not piecemeal) would better serve customers. Ability to write easy-to-understand reports. Identify all benefits: savings, maintenance, incentives.

Way to simplify doing ROI Calcs. Provide high-level typical ROI for measures like chillers/lighting for similar operations. Like sample savings examples.

a. Technical - Understand how to use tools and proper assumptions. Takes mastery of science (Our Engineering Grads require about a 5-year break-in period and extensive training). b. The issue is putting forth competent, well-assessed proposals. c. Short course could expose customer decision makers to the EE process.

Understand how certain land uses can maximize EE with a particular package of measures. How to show benefits. Lighting and refrigeration is main issue for grocery stores. Requires standard templates AND specific analysis. Training should include financing options.

Understand customer's business needs first. Then tailor a presentation around that (e.g., Read customer's trade association publications.) Have an industry focus, like key accounts representatives do. Understand what can make the customer successful.

How to identify ALL the customer needs and benefits. Listening skills. How to put together a case that shows a real payoff to the customer. How to sell more extensive projects and to more customers.

Need someone who can do a deep dive from a business perspective and understands how to account for energy savings. How to drive change. Interpersonal skills at the C-level. Understand financials (e.g., balance sheet). Consultative selling. How to do background analysis on company (D&B sheets, trends). General understanding of technical factors.

We need connections and money to grow. Focused on chain retailers because of market advantage. Would be good if seminar helps us meet other companies who might join forces/partner and offers intelligence to help us grow. Recommend marketing opportunities and liaisons. Ultimately, we want to sell the company once we are partnered with a company who can grow it.

Life-cycle-costing should always be the goal. LCC should be the motto for any long-term investment. Facilities people get this. Their bosses often do not. Also, control systems should be included in training. High-level people need front-end education on building EE.

****

1. Financial justification -NPV, simple payback, cost-effectiveness calculators.
2. Sales skills.

3. Deep energy retrofit understanding.

4. Streamlining tools introduction (e.g., software to pre-qualify customers, business enterprise tools to handle data, pass info to contractors, and track project status).

5. How the utility works.

****

1. Understand equipment energy use.

2. Cannot go too far from technical aspects of the sale b/c you don't want to overstate expected savings.

3. Finance - Loans for EE (e.g., on-the-bill financing is a fabulous tool and the process is improving), and NPV.

4. Like Richardson Sales Techniques (i.e., become a trusted advisor with a long-term relationship).

<u>Comments from Contractors</u>

Felt that they "had their pitch down" but allowed that customers who used to be OK with a 4-5 year payback are now "squinting" at a 2-year payback.

Marketing of energy efficiency solutions Financial: How to package the numbers for different types of clients. This includes the constraints that public companies encounter and the differing approaches for private companies.

They see their customer base as savvy regarding existing solutions but in need of awareness regarding how emerging technologies relate to their business.

They seem to have a very thorough staff well skilled on all aspects but would be interested in helping PG&E on addressing these topics

Technical where benefits are made obvious to customer; Financial where a simple model shows benefits with good payback scenarios

Would like to see creative approaches to financing projects. Customers are strapped for cash but may look to leasing type funding.

Marketing - How to overcome Solyndra hype and downturn of Solar City.

Financial - Would like to see easy to understand models integrating technical benefits to financial benefits

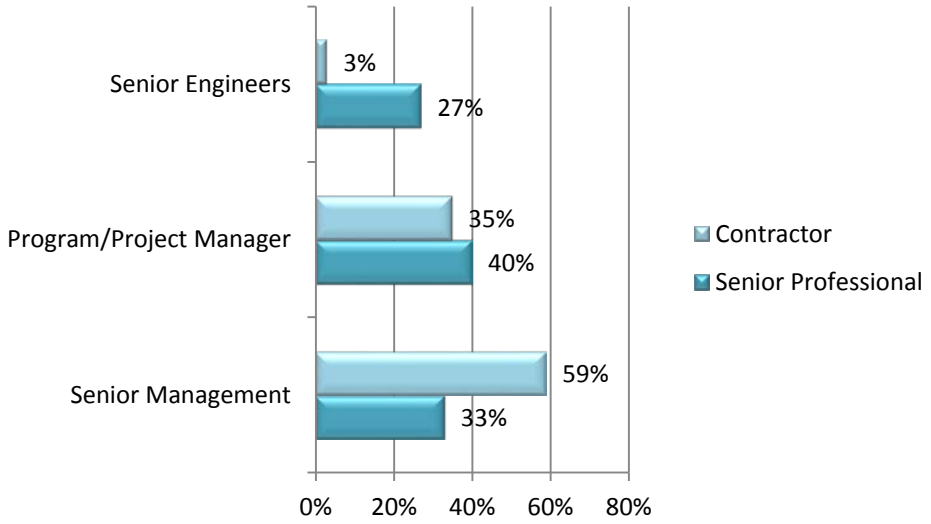
Would like to see the industrial customer base addressed, everybody is claiming solar, would like to see more tie into rebates.

Would like to see what type of partnership approach could be employed to coordinate the efforts of contractors with the PG&E field representatives. Cited cases where his company submitted proposals in support of PG&E's efforts to lower energy that were picked apart by the PG&E field representative resulting in customer confusion and unapproved projects.

Would like to see tools showing paybacks less than 2 years with ease of applications. Cited complexities and too many forms in rebate programs.

Where the technical aspects are addressed from a financial benefit perspective.

8. Who do you think would be the best candidates for the training to deliver results in overcoming obstacles?



9. What would be your advice to PG&E on how to structure the course?

From Senior Energy Professionals

Advice to PG&E NOT on bus. dev./sales training. Rather, "Tell PG&E that if they work closer to us, we can jointly help farmers. "As a national expert with strong ties to National Resource Conservation Services (NRCS), EnSave can audit farms and obtain incentives for EE projects from NRCS.

Students should be field staff (people who sell). Time it for the beginning or end of the week (people tend to travel mid-week). Online webinar would be helpful for field people, but cannot replace face-to-face instruction. Spread sessions out over several weeks. Use case studies (e.g., how on-bill financing has helped customers).

Focus training on business owners, senior managers and marketing people. Workdays in the middle of the week would be best. 3 half-day sessions would allow us some time in the office to get daily work done. Prefer less than 45 minutes driving distance to course.

Focus on a couple populations of 3rd parties involved with utilities. 1. Customer-facing people. 2. Traditional product vendors and installers (HVAC, lighting, envelope retrofits, ME companies). This group is harder to attract b/c they may not perceive the need to sell better. There needs to be a hook to get people to participate. Must convince them it will help their business. Distinguish them (e.g., give them a credential or partnership agreement). A utility partnership can add value, but the utility must add marketing dollars or co-op advertising to qualified vendors. I believe you can get people to attend a couple 1/2 day sessions. More than that and you will lose participation. Follow-up is equally important, whether it is an individual or an accredited company. Keep them engaged over time.

Focus on training field sales people. Many come in with a lack of sales experience and experience talking with customer decision makers. Vendors should be part of the training. Suggest 1/2 time in class and 1/2 in team projects. Recommend 3 months, 1-day every other week with team exercises on case studies in between.

Train installers, program implementers, rank and file program managers (best impact), and vendors (have narrower focus on selling just their product). Divide these into separate group sessions. Suggest 1/2 to a full day max. or 2-3 half-days spread over a month or two. Online segments can save people a lot of time and reach more people.

Prefer in-person training AND online webinar (like PEC does). Half day about right. Train project managers, contractors, utility staff, public agency staff.

Focus on an industry sector (offices, property mgrs.). Then identify "inflection points" with customers. Focus on decision makers (e.g., regional manager at EE firm). Educate folks on customer business needs. We struggle with putting ourselves in the customer's shoes. EE is not the center of their universe. 2 1/2 days max.

Do Sales 101 (i.e., know your product and customer). What's needed to close the sale? Students should be whoever has the customer relationship (management, sales, implementers). All students should be at similar level of experience/knowledge. Content should match time available. Don't drag it out. Some may like web-based course. Cost?

Train in San Ramon for program managers and account representatives, NOT management people. 3-4 hours, not 8 hours. Hard to go away for a day. Keep it concise. Online sounds interesting. Don't do role-play - too drawn out.

Repeat the training for site champions on energy manager skills and for middle management project developers. (Upper management relies on them.)

Target training to EE firms (engineering staff, sustainability department) and facility people and HVAC installers.

5-day training too long. Try 1,2, or 3 days. Hold it at the utility site. Get students offsite to avoid distractions. We've not had much success with online. People don't stay engaged. We do lectures plus teams problem solving. The trainer should be 30% content and 70% showbiz, to keep them engaged.

Hard to get contractors to take a long course. So organize courses for minimum intrusion into the workday (e.g., partly evenings and weekends). Maybe do basics online for a portion of the course combined with some human interaction (e.g., role playing). Consider free to take online lessons, but pay to take the test.

Evenings/weekends best. Would not do online initially - shake out with hands-on course. Not 100% lecture (e.g., class evaluate a balance sheet. Small group interactions - role-playing. Suggest 5-6 one-hour sessions. Follow up with case study with example company. Homework between sessions.

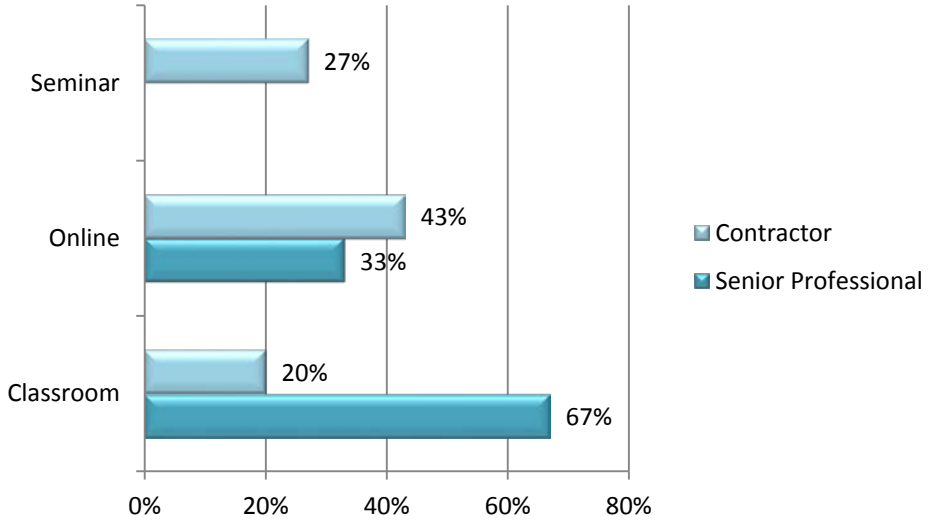
Prefer that key/senior people take the course. They would be more open to possibilities than technical folks (Business savvy connections). Online not as valuable as face-to-face. Like multiple 1/2 day or 1-day sessions separated by about 1 week. Use real case studies. Could be evenings. Whole days are tough. 3 sessions sounds good. Happy to be a case study (i.e., Integrated Comfort Dual Cool). We would welcome and appreciate that.

People are busy. Keep it short and sweet. Meet the students' timelines. Consider short online course modules for high-level people. Use 5-10 minute video segments like Khan Academy model or YouTube. These would be good for top college administrators.

The people to train depends on the firm. All levels of people could use sales training.
Online webinar could be good for some parts. Face-to-face is good for networking. A combination of these might be best. Suggest 1 1/2 hour webinar combined with a 1/2 day classroom session, including case studies.

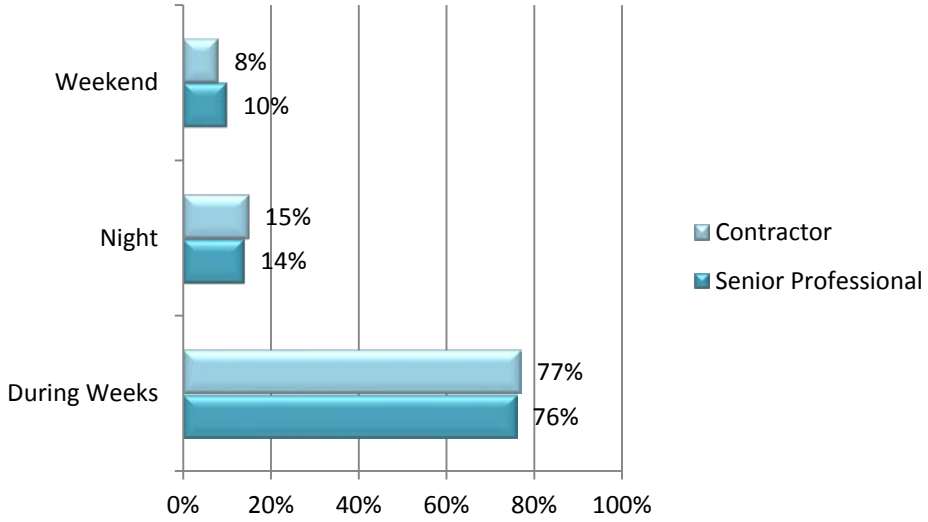
Train vendors, account managers, and people in local government partnerships. Prefer face-to-face training. Suggest two - 1/2-day sessions (about 8-10 Hours).

10. What format do you think would be most effective in delivering the training?

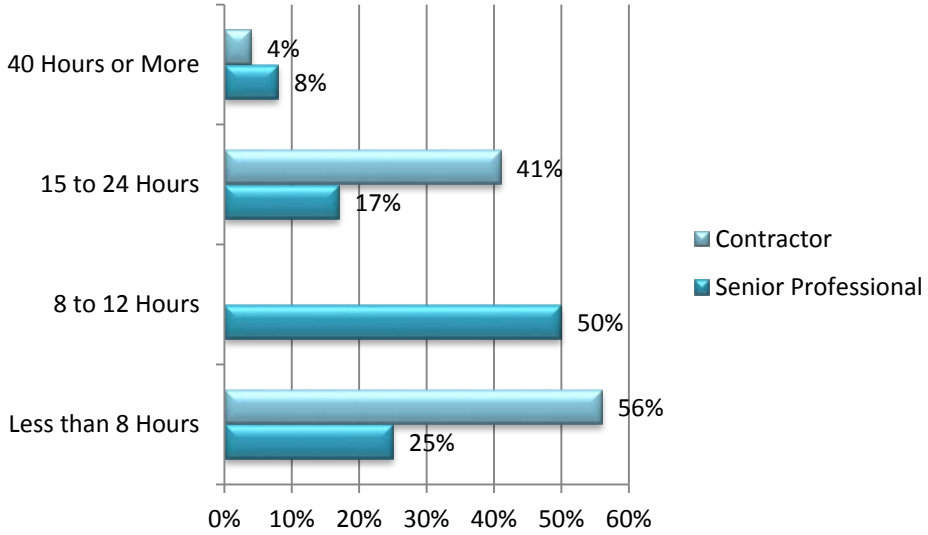


Note: Many "Online" respondents indicated a desire for other feedback

11. When would the training best fit into your business's schedule?



12. How many hours of training do you think would be effective?



13. In summary, what training needs are most important for your employees (colleagues) in order to better to succeed in developing new business with clients? Do these skills differ when dealing with:

i. **High-level decision makers?**
ii. **ii. Facility managers?**
iii. **iii. Building operators?**

From Senior Energy Professionals

National chains often have an energy manager. Independent stores, you deal with a store manager or facility manager (if several locations), or the owner.

Our most critical customer audience is facility managers and business owners.

You can make the most difference in larger commercial and industrial enterprises. For these the sales person needs to be of higher stature and have understanding and language of business (a learned skill).

A lot of sales people work with facility managers (lower level). Not enough effort to reach decision makers (the buyers). Need to learn how to speak the buyer's language.

Deal with people of authority (decision maker). Often have to deal with facility manager. Best if they are in the room together.

New account rep's need to learn common retrofit strategies for chillers, lighting, etc.

Not convinced that sales training can help.

C-level to C-level not necessary. Having rapport, knowledge, and believability carries more credibility than VP to VP. Match the sales person to the audience to establish rapport and comfort with the customer (e.g., pharmaceutical sales often attracted young sales women).

Training should be for EE firm decision makers first (those who make decision to participate in the course). Sell the idea of the course to them first. Then supervisors and field sales people. All should take it. Two selling tasks: to management and to sales people.

Yes, sales differ depending upon whom you are talking to. For a top manager, talk financial/budget information. For facility manager/engineer, talk operations information.

Yes. For chief engineer, talk budget operations, comfort. For director of operations/program managers, savings that can come to them. For CFO, purely financial (NPV, IRR).

From Contractors

Has been addressing the C-Level clients for >20 years so felt comfortable with his skill set. But would send employee for training if he had someone assigned to C-level

Felt that C-Level managers had preconceived notions of energy efficiency as complex solutions at high cost.

Felt that C-Level managers focused only on bottom line. Not sure what would make them look at longer-term benefits.

Need to know the C-Level managers bottom line operationally and balance sheet in order to anticipate what C-level manager's financial focus is.

They are well in tune with their C-Level customers and would like to see PG&E help keep both them and their clients on top of emerging technologies

Employee would need to focus on energy efficiency projects targeted at C-level managers. Would require a dedicated employee but cannot justify the cost at this point

Would be interested in compelling financial based tools that show how to lower energy bills (without) putting cash up front.

Would like to see all avenues of funding available for their customer base. Would like to have a resource to access companies and entities offering financing

Would like something that tackles up-front costs and relevant price points including a thorough analysis of the customer's bills.

Interested in information that could be presented in bullet form that effectively illustrated energy efficiency incentives and "painless" financial scenarios.

Interested in better incentive/rebate scenarios that address ROI and are easier to present without the existing bureaucratic complexities that currently exist

Would like to have compelling statistics demonstrating savings per hours of use.

Would like to see more tools to sell LED lighting. Would be a combination technical and financial.

Would like to see standardized information that the utilities require for lighting retrofits and rebates.

Would like to see something that bridges the gap between building occupants and building owners. They have different criteria for "buying energy efficiency".

Would like to have quick and easy access to client’s energy usage.

Would like to see better tools illustrating what rebates are available

Would like to see a much better coordinated effort with PG&E on addressing retrofits.

Would like to have quick turn solutions with paybacks less than 5 years

Would like a high impact selling partnership where they were equipped with quick formula/model customized to the customer's power profile.

Need an efficient and easy to follow method of stating the bottom line payback based on energy savings. Need real dollar methods.

Sees where his company could benefit from a team approach where PG&E tech reps would function as a technical partner.

Views the need for enough "hard" financial data on what the clients are paying per function. "Usage per device" so that his company can address the bottom line with authority.

Felt that the most critical element was the perception of clients regarding the army of vendors that with the utility not guiding relationships. Felt that the follow through on incentives/rebates needs more thorough approach.

Felt that certification would be the most helpful thing that came out of any effort. Recognition of contractor as a viable resource recognized by PG&E is critical.

Pointed out the need for a PG&E field representative for rebate and technical reference.

Spoke of the need to incorporate PG&E account representatives in the approach to selling energy efficiency. But also cited past issues obtaining the right usage data (Junior College System project) to make a proposal without investing an inordinate amount of resources.

Would like to see end user usage information illustrating the payback form cost savings of the energy efficiency project.

Some sort of a working partnership with PG&E was viewed as the most important element to succeeding.

Billing history in user-friendly format coupled with joint call with PG&E representative.

Would like to see an up to date easy to use and demonstrate audit tool with access to energy history and links to incentives/rebates for calculating cost savings and payback.

Usage statistics showing savings with emphasis on rebate incentives. Case studies per segment (type of application) would per very helpful.

14. What lessons have you learned from the following that can be applied to the PG&E seminar course?

a. Title 24 and other mandated standards (e.g., City of S.F. audits requirement for large buildings)

b. California Advanced Lighting Controls Training Program (CALCTP)

From Senior Energy Professionals

We don't have interaction with Title 24 since we deal with retrofits. Refer T-24 to Savings By Design program. Not familiar with CALCTP. Mostly do refrigeration.

Make sure new marketing staff understands Title 24 requirements.

Title 24: Need accrediting tools to assure compliance. Not familiar with CALCTP.

There is a lack of training on codes and standards and what are the preferred measures. This is a missing piece in the marketplace.

New Title 24 changes are significant. Changes up the ante. Focus on best practices, what's rebateable.

I would NOT make T-24/mandates a focus of the training. We must just adapt to the new standards. Maybe get into subsystems like Demand Response. CALCTP could be a model to replicate, especially with HVAC.

Don't need to know all the technical information. Title 24 changes coming.

Don't need Title 24 overview. Just need bullet points of common retrofits. Qualifying statements to set expectations with customers.

Title 24 pretty involved. Code compliance in EE not well adhered to. Lot of work done without permits. Need to understand the value of T-24. CALCTP, which teaches electricians how to wire lighting controls, goes hand-in-hand with our course on finding and developing business. NECA has a one-week course to teach electrical contractors how to stir up projects. It can show how to find the low hanging fruit. We co-own the course with NECA, which is still teaching it in the western U.S.

Make people aware of standards requirements.

The world is so full of certifications. The program will likely change, so it does not lend itself well to certification. Follow professional learning principles. Biggest T-24 problem is noncompliance (weak on enforcement).

Title 24: Understand potential impact. Vital background piece.

Title 24 is very valuable for the state. Example: Reflective surface in attic now part of T-24. Tipping point in adoption was when it was mandated.

CSU exceeded T-24 standard by 15%. Yes, T-24 has had an impact on adoption rates.

Title 24 mandates do not cause people to run out and adopt measures unless there is a trigger point (e.g., retrofit/upgrade). Let people know what to expect from new standards and codes and how to perform above code. CALCTP concept is great. Train and certify to desired industry performance. Incentivize them. Align incentives to motivate contractors.

From Contractors

Title 24 retrofit requirement as too binding and would impact payback periods adversely if bi-level switching and day lighting were forced. Not aware of any CALCTP impact

Felt that engineers only try to meet bare minimums. Would be interested in training on intent and benefits of title 24 to justify putting it in. Has been waiting to see what happens next with CALCTP. Has been to NECA training at higher level and felt that if it would help if CALCTP were part of title 24.

Title 24 should help but counts on engineers to design in. Not up on benefits thought might be helpful to know more about it.

Viewed title 24 as a background issue that the customer has already dealt with. Not part of the quote. Embraces CALCTP approach, would like more training. Felt that if it were mandated before enough field people were certified it could lead to problems.

Would like to see how emerging technologies would relate to or impact title 24 requirements.

Had a thorough working knowledge on how title 24 benefits his customer base. How to derive tax credits as another aspect. Absolutely sold on having CALCTP elements as part of title 24 to help complete workable solutions get implemented vs. the existing patchwork.

Felt they knew the requirements but typically just followed the spec just as they would the electrical code. Not sold on the business impact of advanced lighting controls. Also felt that troubleshooting could be difficult. They attended a NECA sponsored CALCTP class but are still waiting to see what develops in the industry. Felt that advanced lighting would drive the cost up and was a long process.

Felt they knew the requirements and sold projects while adhering to the requirements. Would send project managers to learn more about CALCTP and had no opinion on the benefit of integrating elements of CALCTP in title 24.

Felt there is a need to address special occupancy cases such as server rooms and bio-medical labs that do not simply drop into title 24. Felt a need for web-based training or information to make their customers aware of the benefits of advanced lighting. Felt that the integration of CALCTP elements into title 24 would spur more business.

Title 24 has not been an issue. Felt that CALCTP is focused on fluorescents and should incorporate LED solutions

Title 24 addressed effectively by their engineers no issues. No experience with CALCTP.

Title 24 addressed effectively by their engineers no issues. Have been engaged with CALCTP and currently have an employee that is a CALCTP instructor. Felt that integrating elements of CALCTP into title 24 would drive more business.

Title 24 is not viewed as an issue. "It's designed in". Has attended the CALCTP applications training conducted by Emerging Technologies Associates and was very happy with the training. Felt that integration of CALCTP elements into title 24 would be of mild benefit.

Title 24 regarded as too much red tape. Would be interested in what could be done to simplify process. Just starting to look into CALCTP.

Filling out Title 24 applications is way too cumbersome and complex. Would like to see PG&E provide aids for understanding and clarifying the process. No exposure to CALCTP.

Title 24 addressed effectively by their engineers no issues. Have attended CALCTP management training and currently has 5 certified employees.

Could see a benefit in the commissioning of advanced lighting being part of title 24.

Views Title 24 as a minimum standard and cited ASHRAE/LEEDS as better requirements, addressed as required. Very experienced with CALCTP and thought rebates should support CALCTP projects.

Filling out Title 24 applications is a big mess in that the specifications are not clearly understood and who and what to fill out is confusing. The forms are too complex. Views the current situation as one where people are filling out forms to comply but not really knowing the benefits or rational for the whole thing. No exposure yet to CALCTP. Just staring to review.

Cited a need for clients to be educated on what is really required. Cited crank backs due to too many loopholes, which made it a moving target causing confusion. Feels that some technologies such as LED lighting have been oversold and are not quite mature enough for wide scale use. Also cited past confusion in PG&E rebates where rebates were offered for projects exceeding title 24 by certain percentages. This caused much extra work on their part with no resultant feedback from PG&E. CALCTP - end users lack the staff to effectively use advanced lighting. Commissioning is a huge part that needs to be addressed.

Would be interested in training that addresses changes in title 24 to address potential issues in energy management. This would empower them to address issues head on. Took 8 hour management course in CALCTP and is planning on following up with additional training. Could see how title 24 ties to advanced lighting elements would drive business.

Engineers effectively deal with title 24. Has experience with CALCTP for both managers and field people. Sees how certain elements as part of title 24 could drive more business but cautions that it must be clear to customers otherwise they will take the if it is not broken don't fix it.

Felt that some material on the application of title 24 "How it's applied" would be relevant. Not familiar with CALCTP.

Would like to see rebates/incentives for all aspects of advanced lighting from a component level up.

Has participated in CALCTP and has certified techs, feels that rebates would definitely help.

Has participated in CALCTP and has certified techs. Felt that tying into title 24 would be an additional benefit for deploying energy efficiency solutions.

Would like to see rebates/incentives for advanced lighting to make for a payback period of less than 3 years.

Felt that tying advanced lighting to title 24 would help energy efficiency business and strongly felt that rebates must be available to drive the application.

County planners make the process too complex and costly when applying title 24 to retrofits vs. new builds. Trained on CALCTP and could see title 24 as a potential benefit but concerned if title 24 complexities cited earlier push projects out timewise and dollarwise.

Additional Comments from Interviewees

From Senior Energy Professionals:

The problem in the EE industry is getting contractors to participate. THAT's how you get scale. You need really positive encouragement to contractors. The design and management of utility programs is the biggest obstacle to get contractors to like it.

A lot of workforce training programs use traditional media. The EE industry needs to use more digital media to better engage customers through marketing and sales. Training is needed on a "modern sales toolkit" (e.g., social networking tools). Marketing is changing... Customers are inhabiting digital spaces in ways never before known. This holds for business consumers too.

How will this course be promoted/advertised? How will it be distinguished from other existing courses? We can help with this.

Do homework first. Listen and understand what makes the customer work. Credibility is very important. Meet in person.

Love to have a mini-seminar for customer decision-makers, maybe at a breakfast or lunch. Invite other business people to dispel myths about EE cost-effectiveness and explain other benefits received. Chance for customers to interact with each other. Most utility people have had sales training already

I vote for a certificate for course completion. Otherwise, the course won't have legs. I can help with metrics, case studies (before and after), version control. These are critical factors that can make or break course. "High fidelity robust data" to show impact/results is critical to course success.

Educational track needs to be focused on high-level administrators and architectural leaders. Recommend life-cycle-cost training that is manageable. A good source for research is the National Center for Construction Research (published by Pearson).

Our sales are with customers. Our business development is with utilities. I suggest you use the phrase "sales training", not "business development training". Transform market niches (e.g. Offices, convenience stores) by doing a deep dive on all end uses. I have a lot of ideas on this and would like to work with PG&E on this.

From Contractors

Rebates don't drive projects but contribute to their success. Felt a need for better LED lighting incentives

Recommended that some training be targeted at his C-level customers to expose them to the financial and business environment benefits

Felt strongly that a total energy approach may be too big and therefore harder to sell. Approaches should be phased.

Collins is successful with energy efficiency projects when they provide financing options to the customer. They cite the drop in rebate levels as an area that should be looked at.

They would be very interested in better tools regarding the energy efficiency benefits and payback on electric motors.

Feels strongly that a seminar targeted at his peer group should be focused and at an appropriate level. Not for beginners.

Although he has been frustrated with the inconsistencies his company has experienced in past dealings with PG&E energy efficiency programs, he remains supportive and interested in improving the situation.

Felt strongly that PG&E has focused on large contractors and clients with staffing to be able to address energy efficiency and has not addressed the needs of smaller contractors or energy customers.

Feels that there has been a void in business-to-business approaches to energy efficiency whereas the technical portion seems to have been addressed.

Felt strongly that certification is needed to separate qualified contractors from not qualified people in the field. Also had experience where the PG&E rebate process was administered differently leading to confusion with the customer and loss of profit. Feels very strongly that there has been a lack of coordination in rebate incentives.

Stated that incentives and financing were the 2 main tools that would help win more projects. Equally important was the need to differentiate qualified contractors from fly by night lighting contractors. Needs PG&E to be more proactive in coordination.

Felt that the SMUD Competitive Energy Solutions program was a good format to look at for an approach to energy efficiency.

Felt very strongly that rebates need to be broadened and reviewed for effectiveness. They have "no faith" in the current system due to its many complexities and delays from too many people to deal with. Recommended something tied to bill backs as a practical approach to the lacking capital obstacle.

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Consol
EnSave, Inc.
Portland Energy Conservation, Inc. (PECI)
Matrix Energy Services
Nexant
Resource Solutions Group (RSG)
Quantum Energy Services and Technologies
The Energy Alliance Assn. (TEAA)
SMUD
ASW Engineering
Bevilacqua-Knight, Inc.
Assn. of Energy Service Professionals
Bevilacqua-Knight, Inc.
Energy Commercialization, LLC
Integrated Comfort, Inc.
Cal State University
Ecology Action
PG&E
California Lighting Technology Center
Western Cooling Efficiency Center
UC Davis Energy Efficiency Center
Enlight Energy
Energy Etc Incq
BECI Electric
DAL Technology inc.
BEI Construction
Pacific Data Electric
Brayer Electric
Gill's Electric Co Inc
N2 Electric Inc

Arktos incorporated
Bedard Controls
Contra Costa Electric (Fresno)
Collins Electric (Stockton)
Electric Motor Shop (Fresno)
Albright Electric
Con J Franke Electric
Fresno Electric
PC Electric
Electricraft SLO
Collins Electric (Fresno)
Strategic Mechanical, Inc
Wasatch Electric Division of Dynalectric
Ray Scheidts Electric Inc.
Thoma Electric
Central Electric
Pacific Ridge Electric Inc
Delgado Electric Inc
Collins Electric
Regalado Electric
JM Electric
Commonwealth Electric
Parsons Electric
Mann Electric
Long Electric Co.
Schetter Electric
Metropolitan Electric
Gatejen Electric
L&H Airco
CMSH Electrical
CH Reynolds

Appendix 3. Survey of Senior Energy Professionals

Background

The Energy Efficiency Workforce Sector Strategy (EWSS) focuses on workforce factors that are important to growth of the nonresidential energy efficiency market. One important group of workers is comprised of architects, engineers, analysts, project managers, and other professionals. These professionals represent the top of the energy efficiency career ladder, a segment of the workforce that provides the critical functions of creating demand and assuring quality of design and compliance with codes and standards. Characteristics of this group were identified through a survey of fifty-one Senior Energy Professionals (SEPs), followed by interviews with fifteen of these workers. SEPs were identified by PG&E, the California Energy Efficiency Industry Council, and their peers.

Objective

Characterize the education, experience, and typical duties of the highest performing energy efficiency professionals to inform curricula and career pathways that help build this pool of workers.

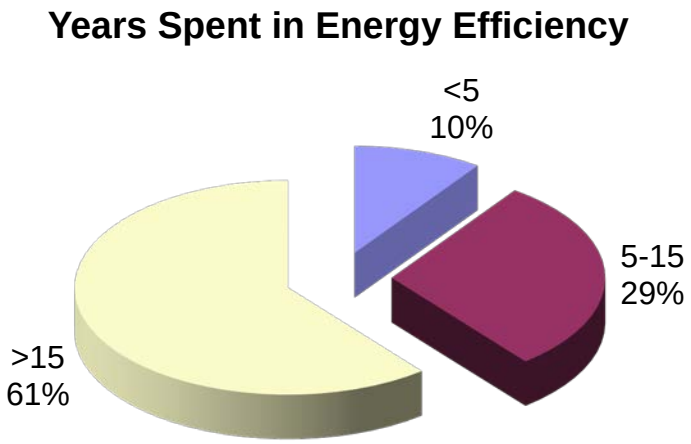
Acknowledgments

The following organizations participated in surveys and/or interviews to provide the basis for this research:

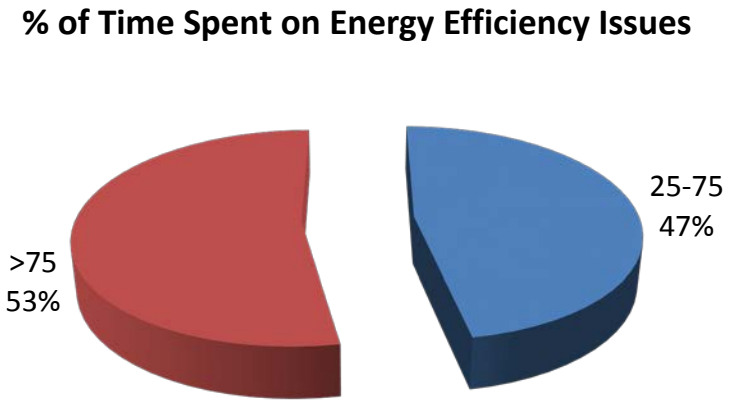
ASW Engineering
Butte College
ConSol Engineering
PG&E (multiple participants)
The Energy Alliance Association
Taylor Engineering
QuEST
Build it Green
Nix Consulting
UC Berkeley
UC Davis
Taylor Engineering
Lawrence Berkeley National Laboratory
EnergySoft
Charles Eley, Architect
Davis Energy
WSP Flack + Kurtz
EHDD
Integral Group
Siegel & Strain, Architects

Survey Results Summary

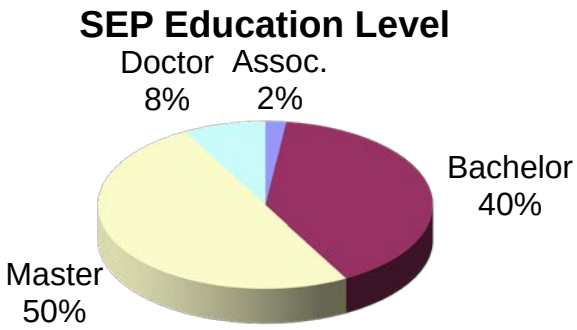
SEPs get to their level of performance through experience. More than 60% of the 53 SEPs surveyed have greater than 15 years of experience in energy efficiency.

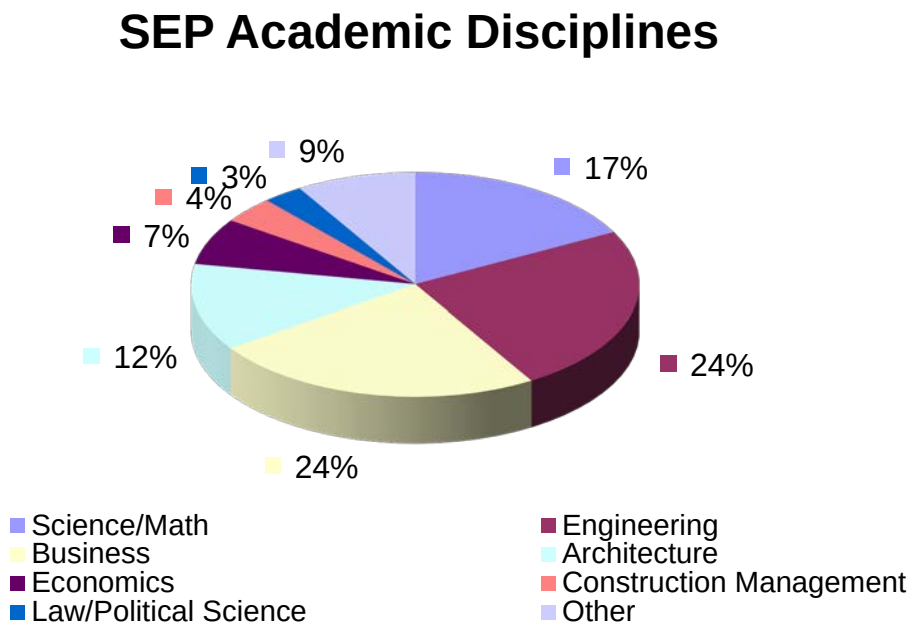


All of the SEPs surveyed spend at least 25% of their time on energy efficiency issues, with more than half spending greater than 75% of their time on energy efficiency.

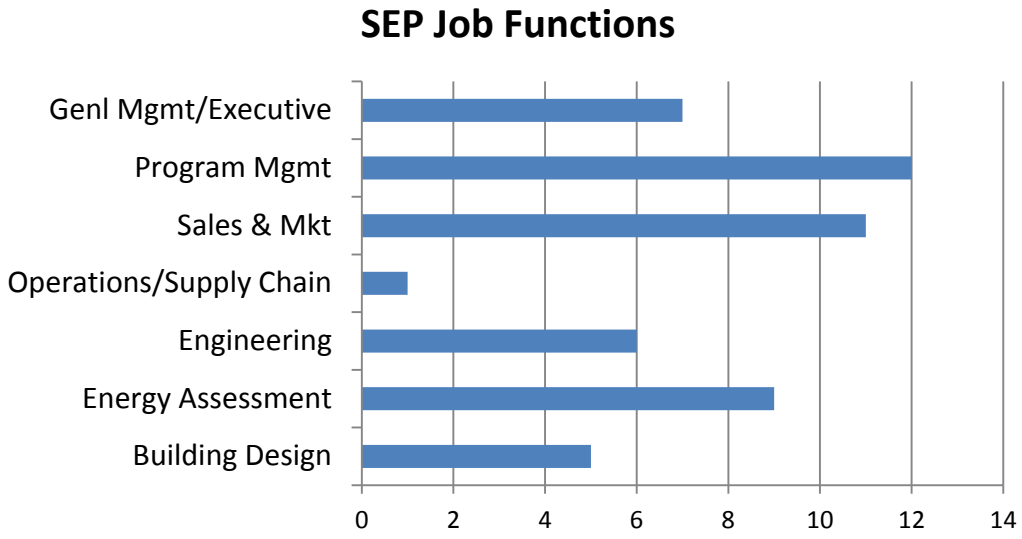


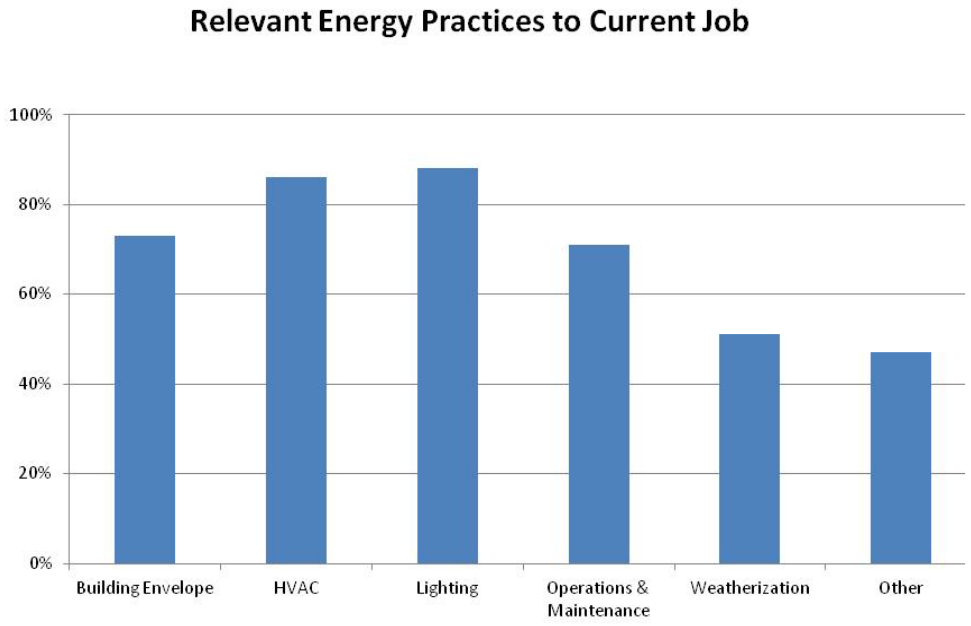
Educationally, SEPs come from diverse but highly educated, backgrounds, with 98% of SEPs holding at least a Bachelor's degree, though evenly spread through scientific and liberal arts fields. As will be noted subsequently, some SEPs reflected in interviews that a liberal arts education provides a good starting point for skilled energy efficiency occupations.





SEPs also deal with a broad array of energy efficiency disciplines from a wide variety of job functions within their firms.





For complete survey results, see the document SEP Survey Summary.pdf. Only questions that reveal names of individuals or companies have been omitted.

Interview Summaries

Workforce Incubator contacted all Survey respondents to request interviews, and achieved a 38% response rate. Interviews were conducted using a script, and were recorded and transcribed for later analysis. The interview script is in Appendix B.

Interview subjects fell into four broad categories of job function: Executive, Program Management, Account Management, and Other (Business Development, Directors of Industry Associations, Academics, etc.). Each was interviewed about how they reached their position, and what knowledge, skills, and abilities they felt were important for a new entrant to reach their position.

Position & Critical Job Responsibilities

Interviewees were asked basic information about their position, their companies, and their critical job responsibilities. Each was asked to give three or more responsibilities, and answer summaries are listed in the order given by the respondents.

Job Function Category	Titles		Critical Responsibility Summaries
Executive	CEO Principal President VP	1	Business Development Proposal Writing/Fundraising Research/Strategic Intelligence Contribute to CPUC/CEC Proceedings
		2	Financial Analysis Partnering/Partner Identification General Management Client/Relationship Management Planning Vision
		3	Monitor & Respond to Regulatory Changes Program Design Personnel & Resource Management
Program Management	Program Manager Sr. Program Manager	1	Program Management Personnel Management Customer Relationship Management Communication
		2	Energy Efficiency Engineering Teaching Financial/Budget Management Task Coordination
		3	Energy Efficiency Policy Community Planning Contracts and Documentation

Job Function Category	Titles		Critical Responsibility Summaries
Account Management	Account Manager Account Manager 2 Sr. Account Manager	1	On-time Projects Customer Satisfaction Customer Relationship Management
		2	Project Planning Providing Accurate Information Administrative Responsibilities Staff Management
		3	Resource Management Billing Availability of Services
Other	Director CRM Manager, Expert Supervisor Professor Architect Director, Bus. Development	1	Client Reporting Selling Energy Efficiency Personnel Management Teaching/Research Design/Structural Issues Program Management
		2	Billing Outage Issues Task Management Business Development
		3	Lead Generation and Management Community Outreach Customer Relationship Management Regulatory Issues Research – Future Programs

Knowledge

Interviewees were asked the top three Knowledge Areas they had mastered in their position. Each answer summary is listed in the order given by the respondents.

Job Function Category	Knowledge Area 1	Knowledge Area 2	Knowledge Area 3
Executive	Engineering; Electrical & Mechanical Research & Data Analysis Business Analysis Thermodynamics Fundamentals Fundamental Business Systems & Structure Theoretical & Practical Aspects of Energy Efficiency	Technical Report Writing Energy Efficiency Industry Landscape Building Science Sales Residential Retrofit	Energy Efficiency Simulations Energy Efficiency Economics Human Factors Leadership Financial Management Vision
Program Management	Urban & Regional Planning Architecture Management & Operation of Energy Efficiency Programs Psychology Mechanical Engineering	Broad Familiarity with Energy Efficiency Building Science Financial Management Energy Efficiency Lighting, HVAC, Building Envelope Personal Skills	Public Policy Personnel Management
Account Management	Negotiation Customer Relations Business Communications Interpersonal Relationship Development	Soft Skills Mathematics	Energy Research Project Management
Other	Lighting Energy Service Delivery Rates & Programs Architectural Design Financial Projections	Energy Efficiency Equipment Usage & Replacement Sales, Customer Needs CAD, Computer How Markets Work	3rd Party Programs Community Knowledge Internal Processes Construction Management, Critical Path Market Psychology

Tasks

Interviewees were asked the top three tasks that take up the greatest amount of their time. Task summaries are listed in the order given by the respondents.

Job Function Category	Task Area 1	Task Area 2	Task Area 3
Executive	Project Management Personnel Management Meetings Time Management Communications Responding to Requests for Information	Task Execution Planning Design Documentation Performance Assessment Improving Energy Efficiency Programs	Business Development Proposal Writing Client Meetings Company Management
Program Management	Time Management Designing Course Curricula Meetings Responding to Customer Issues Communications	Customer Relationship Management Administrative Tasks Technology Reviews Documentation	Program Administration Research & Consulting on Design Practices Staff Management Supply Chain Management
Account Management	Project/Task Follow-up Energy Audits Responding to Customer Issues Regulatory Rate Analysis	Staff Management Root Cause Analysis Researching Projects Customer Relationship Management	Communications Track & Document Tasks 3rd Party Coordination
Other	Report Tracking Root Cause Analysis Case Follow-up Project Design Research	Customer Relationship Management Client Meetings Issue Resolution Writing	Communications Community Involvement Project Coordination Financial Analysis

Success Factors

Interviewees were asked the top three factors contributing to success in their job. Answer summaries are listed in the order given by the respondents.

Job Function Category	Success Factor 1	Success Factor 2	Success Factor 3
Executive	"Fundamental" Undergraduate Degree Thinking "Outside the Box" Risk Management Broad Background – Structural, Mechanical Engineering, Architecture Business & Accounting Education Vision PhD with Practical Experience	HVAC Experience Large Scale Integrator Knowledge Ability to Quickly Ascertain Market Viability Computer Skills Communication Skills Ongoing Industry Education Leadership Training Tenacity Long-term Experience	Ability to Influence People Engineering/Technical Skills Policy Knowledge Sensing What Works - "Connecting the Dots" National Involvement Setting Goals
Program Management	Customer Relationship Management Skills Architecture Knowledge Problem Solving Skills Team Building Skills Establishing Trust Relationships Tactical & Strategic Problem Solving	Technical & Financial Skills Advanced Business Education Operations Management Attention to Detail	"Big Picture" Perspective Design Aspects of Building Systems Quality Protocols
Account Management	Mentors College Education Understanding Customer Needs Basic Business & Economics Skills	Company Sponsors Training Accountability Responsiveness Follow-through	Communications Skills Pragmatism – Needs vs. Expectations
Other	Education Experience Communications Skills Critical Thinking Industry Training	Professional Development Living & Working in Community Served Technical & Business Acumen Problem Solving Skills Connecting "Big Picture" with On the Ground Implementation Strategic Thinking	Multi-tasking Ability Dedication to Sustainability

Technical Skills

Interviewees were asked the top three technical skills they had mastered or acquired in their position. Answer summaries are listed in the order given by the respondents.

Job Function Category	Technical Skill 1	Technical Skill 2	Technical Skill 3
Executive	HVAC Science Data Analysis Engineering Analysis Design Tools Computer Skills Energy Efficiency Technology & Engineering Systems Analysis	Building Science Technical Writing Engineering Modeling Understanding Customer's Business Understanding Contractor Business	Electrical Systems Physics Load Calculations & Equipment Sizing Specialized Software Understanding Regulatory Environment
Program Management	Science Background Enclosure Design Computer Skills Mechanical System Performance	Working Knowledge of Energy Efficiency Psychometrics Project Management Writing	Waste Water Lighting General Engineering
Account Management	Fundamental Engineering Calculations; Mechanical, Electrical Computer Skills Building Systems; Motors, HVAC, Lighting Mathematics	Controls; New Equipment Application of Products to Customer Requests Rates Analysis	Chemistry
Other	Energy Efficiency Gas & Electric Service Details Computer Skills; CAD	Rebate Program Knowledge Engineering Software and Analysis Building Science	Lighting Billing & Program Knowledge Residential Market Knowledge

Business Skills

Interviewees were asked the top three business skills they had mastered or acquired in their position. Answer summaries are listed in the order given by the respondents.

Job Function Category	Business Skill 1	Business Skill 2	Business Skill 3
Executive	Financial Analysis/Cash Flow Technical Writing Personnel Management Communications Accounting Vision	Feasibility Analysis Motivational Skills Industry Trend Knowledge Goal Setting	Proposal Writing Negotiation Teaching Labor Laws Selling Plans & Proposals Maintaining Contacts
Program Management	Financial Analysis Project Management Writing Task Scheduling & Performance Assessment	Cost/Benefit Analysis	Policy Management CRM Tools Use Adaptability
Account Management	Financial Analysis Business Research Rate Analysis	Marketing Cost/Benefit Analysis	Project Management Selling & Closing
Other	Time Management Negotiation Writing Accounting Financial Analysis/Cash Flow	Organizational Skills Communications Supervisory Skills Presentation Skills	Project Management Research Problem Solving Skills

Interpersonal Skills

Interviewees were asked the top three interpersonal skills they had mastered or acquired in their position. Answer summaries are listed in the order given by the respondents.

Job Function Category	Interpersonal Skill 1	Interpersonal Skill 2	Interpersonal Skill 3
Executive	Listening Empathy People Management Communications Sense of Humor Motivational Skills	Documentation Mentoring Crisis Management Being Diplomatic & Constructive	Organizational Skills Leadership Presentation Skills Team Orientation Negotiation Insisting on Performance
Program Management	Client Relationship Management People Management Presentation Skills Communications Problem Solving	Diplomacy	Knowing Markers of Success Public Speaking Motivational Skills Leadership Empathy While Remaining Professional
Account Management	Communications Public Speaking	Reliability Writing Negotiation	Customer Relationship Management Understanding Human Behavior - “Reading the Room”
Other	People Management Customer Relationship Management Supervisory Skills Motivational Skills Listening Public Speaking	Sales Skills Corporate Politics Leadership Conflict Resolution Communications Writing	Personal Confidence Presentation Skills Empathy Viewing People as Assets

"Missing" Skills

Interviewees were asked the top three skills they would like to develop further in pursuing their career. Answer summaries are listed in the order given by the respondents.

Job Function Category	Missing Skill 1	Missing Skill 2	Missing Skill 3
Executive	Leadership Applied Engineering Skills Energy Efficiency Industry Basics Building System Problems & Solutions Financial Diagnostics Keeping Up With Technology Coalition Building	Presentation Skills Energy Efficiency Measures Decision Making Learning How to Learn Patience	Communications Listening How to Grow Business Understanding Capitalization & Markets Diplomacy
Program Management	Policy Analysis Architecture General Understanding of Energy Efficiency Industry Financial Analysis	On The Job Experience Critical Path Prioritization Technical Aspects of Energy Efficiency Lighting	Knowing "What Not to Do" Sales Skills ROI Analysis
Account Management	Presentation Skills Soft Skills Financial Analysis Technical Skills: HVAC, Electrical	Computer Skills	Distributed Generation Technology
Other	Time Management Mathematics Supervisory Skills MBA	New Energy Efficiency Technology Science Leadership Solar Design & Construction Economics	Program Management Computer Skills Emerging Construction Systems Energy Efficiency Training

"Future" Skills

Interviewees were asked the top three skills they felt would be more important in the Energy Efficiency future. Answer summaries are listed in the order given by the respondents.

Job Function Category	Future Skill 1	Future Skill 2	Future Skill 3
Executive	Data Communications Financial Assessment Engineering Modeling Policy Management	Database Mechanical Engineering Computer Tools Leadership International Market Understanding	Smart Grid Integration & Implementation Quality Improvement
Program Management	Project Management Sales Cycle Energy Efficiency Technology System Performance	Business Writing Contract Management Computer Skills; Modeling	Financial Analysis Negotiation Knowledge of Energy Efficiency Options
Account Management	Controls Social Networking Public Speaking	Distributed Generation Smart Grid Technology	Regulatory Environment Computer Skills
Other	Contract Negotiation MBA Corporate Cross-Functional Knowledge New Construction Systems Multi-Family Projects	Value Engineering – New Technology Strategies Leadership Concrete Forms Financing & Financial Industry	New Design Principles Real Estate Industry – Insert Energy Efficiency Parameters

Schools and Training Options

Interviewees were asked to indicate their preferred training methods, and to identify any particular schools or training institutions that they trust for the quality of their graduates. Training options were ranked "3" for important, "2" for somewhat important, and "1" for not important.

Job Function Category	Highly Regarded Schools	Internship	Apprenticeship	Specialized Degree	Certification	Alternative Learning (e.g., Online)
Executive	All UCs & CSUs UC Berkeley UC Davis UC San Diego Sonoma State Stanford Colorado Boulder MIT BYU Texas A&M USC Indian Institute of Technology UCLA	3 (3) 2 (4) Avg 2.43	3 (5) 2 (1) 1 (1) Avg 2.57	3 (5) 2 (2) 1 (1) Avg 2.5	3 (3) 2 (3) 1 (2) Avg 2.13 Negative comments from some subjects on the value of certifications Specific certifications called out by others: NATE, BPI, HERS	3 (1) 2 (7) 1 (1) Avg 2 Comments that alternative learning methods less valuable when used exclusively; proof of proficiency needed
Program Management	Santa Rosa Sonoma State Arcadia PG&E In-House Training UC Berkeley Stanford NOT Online Colleges	3 (4) 2 (2) Avg 2.67	3 (3) 2 (2) Avg 2.6	3 (4) 2 (1) Avg 2.8	3 (2) 2 (3) Avg 2.4	3 (1) 2 (2) 1 (2) Avg 1.8
Account Management		3 (2) 2 (2) Avg 2.5	3 (2) 1 (2) Avg 2	3 (3) 2 (2) Avg 2.6	2 (2) 1 (2) Avg 1.5	3 (1) 2 (3) Avg 2.25
Other	Sonoma State PG&E In-House Training UC Berkeley Presidio School of Management	3 (3) 2 (2) Avg 2.6	3 (1) 2 (2) 1 (2) Avg 1.8	3 (5) Avg 3	3 (3) 2 (2) Avg 2.6	2 (4) 1 (1) Avg 1.8

Career Prerequisites

Interviewees were asked to identify certifications and entry- and mid-level positions they would consider prerequisite to attaining their current position. For entry- and mid-level positions, answer summaries are listed in the order given by the respondents.

Job Function Category	Certifications		Entry-Level Positions	Mid-Level Positions
Executive	Professional Engineering License Contractor License	1	Engineer Mechanical Design Code Compliance Sales Account Representative Program Management Simulation Modeling	Project Management Senior Designer Division Manager Program Design
		2	Engineering Auditor Commissioning Authority Production Associate Program Manager 1	Program Manager Sr. Engineer Production Manager
		3	Field Engineer Sr. Associate Program Manager	General Management
Program Management		1	Energy Study Researcher Project Assistant Energy Efficiency Specialist Energy Conservation Engineer	Project Management – Architecture Project Coordinator Installation Manager Senior Engineer
		2	Teaching Assistant Field Technician Sr. Energy Efficiency Specialist Entry-Level Building Operations Engineer	Account Manager Supply Chain Manager Chief Engineer
		3	Sales Manager Apprentice Controls Engineer	Sales Manager
Account Management		1	Residential Energy Auditor Small Customer Management Service Planning Small Commercial Auditor	Account Manager
		2	Business Customer Field Representative	
		3	Technology, Customer Segment Analyst	
Other	LEED AP BPI	1	Project Manager Account Representative Construction Coordinator Market Analyst	Service Planning Major Account Representative Sr. Account Representative Degreed Architect Program Design

Job Function Category	Certifications		Entry-Level Positions	Mid-Level Positions
		2	Service Planning Drafting Program Evaluator	Billing Representative Construction Coordinator Research Analyst
		3	Call Center/Meter Reader Program Manager	

Industry Outlook

Interviewees were asked a series of questions about the Energy Efficiency Industry outlook.

Job Function Category	Experience/Education Critical to Personal Development	Occupations Most Changing	New Jobs	Forces Driving Change
Executive	Communication, Presenting, Teaching Knowing politics of writing successful RFPs College Education Mentors Personal Drive	Building Operators Building Controls Architects Engineering Quality Assurance Residential Energy Efficiency Jobs (Construction, Skilled Laborers) Low-Skilled Contractor Jobs Diminish	Title 24 Field Inspectors Commissioning Jobs	Use of Energy Efficiency Data in Decision Making Need for Energy Efficiency Phased Out as it becomes Routine Information Systsems Regulation Environmental Needs Increase in Retrofits BPI Fees Increasing Need for More Training Renewables vs. Efficiency (not equivalent) Smartgrid Financing Mechanisms Informatics Green Building Initiatives Communication Technologies Storage Technologies How Energy is Produced & Sold Climate Change US Economy

Job Function Category	Experience/Education Critical to Personal Development	Occupations Most Changing	New Jobs	Forces Driving Change
Program Management	Mentors Education/Master's Degree Broad Experience	Architects (marginalized) Rebate Processing Lighting & Control Jobs Direct Installers going away Data Acquisition & Analysis	Computer/IT Jobs Controls Jobs Demand Response-related Jobs	Loss of Funding Threat Economics of Energy Efficiency Politics & Policy of Energy Efficiency Regulation; code changes Digitization of Architecture Controls Lighting Smartgrid Climate Change
Account Management	Mentors	Controls-related Jobs Demand Response Program Jobs Thermal Storage Account Manager	Solar & Green Technology Jobs Fuel Cell Jobs Computer/IT Jobs	Regulation Technology Fossil Fuels Financial Payback Energy Storage Technologies Fuel Cells Solar Lighting
Other	Interest in Government Affairs Mentors IT Background Utility Company Experience	Energy & Gas Planning Sustainability & Architecture HVAC Remodeling & Real Estate	Communications Internal & External Marketing & Advertising Specialized Field Representative Computer/IT Jobs Construction Jobs Jobs Working with Financial Industry	Market Penetration Regulation/Code Technology Changes Reliability & Repair Smartgrid Technologies Environmental Concerns Regulation/Safety Artificial Intelligence Modularity Advanced Materials Finance Real Estate Marketing

Final Comments

Interviewees were asked if they had any other thoughts on the interview topics. Here is a sampling of the comments:

- Information systems delivering commodity energy at the right time, commercial customers having more options, energy moving to a commodities market; skill sets needed with customer contact important.
- Continue PG&E in-house training.
- Job candidates have no education in how to interview, present themselves & add value.
- An Energy Management Design Program is needed.
- Want to see a time when sustainability benefits are available to the masses, not just to those who can afford it.

Appendix A: Survey Questions

1. Please tell us who you are – Name:
2. Company:
3. Title:
4. Phone:
5. Please identify your company's primary and secondary lines of business from the list below: - Primary
    - Utility Program Administrator
    - Utility Program Implementation Contractor
    - Design & Engineering Firm
    - Building & Construction Firm
    - Energy Services Company
    - Technical Support Service Company
    - Manufacturer
    - Facility Management Company
    - Other (Specify)
6. Please identify your company's primary and secondary lines of business from the list above.
7. Please choose the job function that most closely relates to your current role from the list below.
    - Building Design
    - Construction
    - Energy Assessment
    - Engineering
    - Finance & Accounting
    - Human Resources & Training
    - Information Technology
    - Operations & Supply Chain
    - Sales, Marketing, Program Management
    - Technician & Installation
8. Select the Job Title that is most closely associated with your position.
9. How many years have you held your current position?
10. How many years have you been working in the field of energy efficiency?
11. What percent of your job is spent on tasks that pertain directly to energy efficiency?
12. Which of the following energy efficiency practices does your job currently apply to: (CHECK ALL THAT APPLY):
    - Building Envelope
    - HVAC
    - Lighting
    - Operations & Maintenance

- Weatherization
- Other (Please Specify)

13. Please identify your highest level of educational attainment from the list below (CHOOSE ONE):

    - High School
    - Associate Degree
    - Bachelor's Degree
    - Master's Degree
    - Doctorate Degree
    - Other (Please Specify)

14. Please identify your discipline of study from the following categories: (CHECK ALL THAT APPLY):

    - Science / Math
    - Engineering
    - Business
    - Architecture
    - Economics
    - Construction Management
    - Law/Political Science
    - Other (Please Specify)

15. Do you have any certifications from AEE that might have contributed to your subject matter expertise in your field? (CHECK ALL THAT APPLY):

    - Certified Building Commissioning Professional (CBCP)
    - Certified Building Energy Simulation Analyst (BESA)
    - Certified Business Energy Professional (BEP)
    - Certified Carbon & GHG Reduction Manager (CRM)
    - Certified Energy Auditor (CEA)
    - Certified Energy Manager (CEM)
    - Certified Energy Procurement Professional (CEP)
    - Certified Geoexchange Designer (CGD)
    - Certified Green Building Engineer (GBE)
    - Certified Lighting Efficiency Professional (CLEP)
    - Certified Measurement & Evaluation Professional (CMUP)
    - Certified Measurement & Verification Professional (CMVP)
    - Certified Power Quality Professional (CPQ)
    - Certified Renewable Energy Professional (REP)
    - Certified Residential Energy Auditor (REA)
    - Certified Sustainable Development Professional (CSDP)
    - Distributed Generation Certified Professional (DGCP)
    - Energy Manager in Training (EMIT)
    - Existing Building Commissioning Professional (EBCP)
    - None
    - Other (Please Specify)

16. Do you have any certifications from ASHRAE that might have contributed to your subject matter

expertise in your field? (CHECK ALL THAT APPLY):

- Building Energy Assessment Professional (BEAP)
- Building Energy Modeling Professional (BEMP)
- Commissioning Process Management Professional (CPMP)
- Healthcare Facility Design Professional (HFDP)
- High-Performance Building Design Professional (HBDP)
- Operations & Performance management Professional (OPMP)
- None
- Other (Please Specify)

17. Do you have any certifications from BOMA that might have contributed to your subject matter expertise in your field? (CHECK ALL THAT APPLY):

    - Building Systems Maintenance Certificate (BSMC)
    - Facilities Management Administrator (FMA)
    - Facilities Management Certificate (FMC)
    - Property Management Financial Proficiency Certificate (PMFPC)
    - Property Administration Certificate (PAC)
    - Real Property Administrator (RPA)
    - Systems Maintenance Administrator (SMA)
    - Systems Maintenance Technician (SMT)
    - None
    - Other (Please Specify)

18. Do you have any certifications from US GREEN BUILDING COUNCIL that might have contributed to your subject matter expertise in your field? (CHECK ALL THAT APPLY):

    - Green Associate - US Green Council (LEED GREEN ASSOCIATE)
    - LEED AP - US Green Building Council (LEED AP)
    - LEED AP Building Design + Construction - US Green Building Council (LEED AP BD+C)
    - LEED AP Interior Design + Construction - US Green Building Council (LEED AP ID+C)
    - LEED AP Neighborhood Development - US Green Building Council (LEED AP ND)
    - LEED AP Operations + Maintenance - US Green Building Council (LEED AP O+M)
    - None
    - Other (Please Specify)

19. Do you have any certifications from OTHER CERTIFYING ORGANIZATIONS that might have contributed to your subject matter expertise in your field? (CHECK ALL THAT APPLY):

    - Certified Facility Manager (CMP) - International Facility Management Association (IFMA)
    - Facility Management Professional (FMP) - International Facility Management Association
    - Building Operator Certificate (NWEEI & Univ of Oregon)
    - Energy Management Certification (NWEEI & Univ of Oregon)
    - Residential Auditor & Inspector (NWEEI & Univ of Oregon)
    - Sustainable Building Advisor (NWEEI & Univ of Oregon)
    - Energy Resource Management Certificate (UC-DAVIS)
    - None
    - Other (Please Specify)

Appendix B: Interview Script

Workforce Incubator SEP Study – Interview Subject No. 01

Name: _____ Organization: _____

Title: _____

Phone: _____email: _____ Date: _____

INTRODUCTION

Hello, my name is _____ with Workforce Incubator, an independent consulting firm in Livermore, CA. We are conducting a confidential PG&E-sponsored survey with individuals in the utility and clean energy industries who are promoting or developing energy efficiency programs and solutions.

Distributed generation and demand response are included within the scope of energy efficiency for the purposes of this survey.

1. I was directed to contact you through a source within PG&E because you were identified as someone whose work pertains to the promotion or development of energy efficiency programs or solutions.

Is now a good time to conduct the interview?

Yes ……. 1 (*continue*)

No ……. 2 *

* IF NO, ATTEMPT TO MAKE APPOINTMENT TO CALL BACK AT A MORE CONVENIENT TIME.

DATE: _____ TIME: _____

JOB RESPONSIBILITIES – (*What are key foundation aspects of the SEP's day-to-day duties*)

We want to better understand your job – what you do and how you spend your time.

2. What are your most critical job responsibilities? Please list them in order of importance.

Responsibility 1:_____

Responsibility 2:_____

Responsibility 3:_____

Responsibility 4:_____

Responsibility 5:_____

3. What are the top knowledge areas that one needs to have mastered in order to be in this position?

Knowledge Area 1:_____

Knowledge Area 2:_____

Knowledge Area 3:_____

4. What tasks would you say take up the greatest amount of your time on an average day?

Task 1:_____

Task 2:_____

Task 3:_____

5. In thinking about what differentiates you from your peers, can you highlight the major success factors that you believe are key to your effectiveness?

Success Factor 1:_____

Success Factor 2:_____

Success Factor 3:_____

SKILLS – *(Defines key competencies of the position)*

Our primary objective with this study is to understand the skills that you believe are most important for your job. We categorize skills into three groups: technical, business, and interpersonal.

Let's begin with the technical skills. These include competencies used to perform a particular task. They generally are acquired through experience (e.g. design, engineering, planning, equipment maintenance, testing, or installation, etc).

6. Please list the technical skills, in order of importance which you believe are most critical to your job performance. (LIST SKILLS ACCORDING TO RANK ORDER)

Technical Skill 1:_____

Technical Skill 2:_____

Technical Skill 3:_____

Next are the business skills. These include such things as critical analysis and thinking, problem solving, idea generation, and industry knowledge.

7. What would you say are the most important business skills that you apply in your work?

Business Skill 1:_____

Business Skill 2:_____

Business Skill 3:_____

8. Which interpersonal skills do you use every day?

Interpersonal Skill 1:_____

Interpersonal Skill 2:_____

Interpersonal Skill 3:_____

9. Are there any skills that you would like to develop in order to be even more effective?

Missing Skill 1:_____

Missing Skill 2:_____

In this next section I'd like to get your input about the trends you think will impact the way people do this work in the future.

10. In your view, which skills will be most important in the future?

Future Skill 1:_____

Future Skill 2:_____

Future Skill 3:_____

EDUCATION – (*Drivers for education pathways)*

11. In thinking about the schools that prepares people for a career in your field in energy efficiency, which ones do you think provide the best training / education on a regional level?

What advice would you offer education and training organizations to help them prepare candidates for your type of job?

12. Specifically, how important would you say the following options are on a scale from 1-3 where 3 = "Very Important"; 2 = "Somewhat Important"; 1 = "Not Important"? (READ EACH OPTION AND CHECK ALL THAT APPLY, THEN RATE)

13. Can you explain how each of these adds value? (PROBE)

Training Options		**25 –** Rating	**26 -** Comments / Specific Advice
[ ]	Internships		
[ ]	Apprenticeships		"
[ ]	Specialized degree programs		"
[ ]	New industry certifications		"
[ ]	Alternative modes of learning [online, etc.]		"
[ ]	Other		"

CAREER PATHWAY – *(Basis for knowledge map)*

In this next section we would like to get a better understanding of your career path to determine how best to advise job candidates just starting out.

14. Please briefly outline your career path by telling me the positions, and the approximate number of years you spent in each one, that lead to where you are today?

Position 1:_____Number of years_____

Position 2:_____Number of years_____

Position 3:_____Number of years_____

Position 4:_____Number of years_____

Position 4:_____Number of years_____

15. What would you say are the entry-level requirements for someone who wishes to work their way towards a job like yours? (PROBE)

16. Are any certifications required to secure employment in your field?

Certification 1: _____

Certification 2: _____

Certification 3: _____

We also want to understand your career path at a more granular level, particularly how various entry, mid- and senior-level positions have helped you be successful.

17. Let's start with the entry level positions. Please list the types of entry-level jobs that could prepare someone to reach your current level.

Entry level Job 1:_____

Entry level Job 2:_____

Entry level Job 3:_____

18. Which mid-level positions are most important to develop leadership ability in this sector?

Mid level Job 1:_____

Mid level Job 2:_____

Mid level Job 3:_____

19. Finally, looking back over the course of your entire career, which factors were instrumental in getting you where you are today? Please discuss any specific professional experiences you have had, or describe a mentor who had an impact. (PROBE)

INDUSTRY OUTLOOK – (*Future drivers & opportunity for education investment)*

Before we wrap up, I wanted to get your input on the outlook for employment in your field.

20. Which occupations do you believe will undergo the most change?

21. Can you think of any potential new jobs that will arise in the energy efficiency industry? Which jobs do you believe will go away? (PROBE)

22. What are the major forces that will drive change in your industry in the next 10 years?

Industry Trend 1:_____

Industry Trend 1:_____

Industry Trend 1:_____

WRAP UP

Thank you for your time. Your perspective has been incredibly valuable!

23. I want to make sure I capture all of your thoughts. Is there anything you would like to add?

24. Would you like to receive a copy of our summary report? Where would you like that sent?

25. May we contact you with any follow-up questions?

Appendix 4. Inputs for Curriculum Development

Professional Business Development Seminar for Energy Efficiency Curriculum Development and Delivery Specifications

Introduction

This document presents the basic criteria and actions required to develop curriculum for a Business Development Seminar that is specifically tailored to energy efficiency industry practitioners who regularly interact with commercial, industrial, and agricultural customers of PG&E. A course will be developed and delivered to provide students with the skills and knowledge necessary to increase their effectiveness in increasing customer adoption rates of energy efficiency projects. This curriculum will be developed and delivered based upon findings drawn by PG&E's Energy Workforce Sector Strategy (EWSS) project team from dozens of interviews with energy efficiency professionals and academics.

Background

PG&E is engaged in an Energy Workforce Sector Strategy (EWSS) that will accelerate progress toward AB 32 carbon reduction mandates. Specifically, EWSS will develop a workforce to (1) increase market adoption of more energy efficient solutions in commercial and industrial buildings and (2) remove potential barriers associated with inadequate workforce capacity and capabilities. This strategy aligns with the California Public Utilities Commission (CPUC) mandates established in the *California Energy Efficiency Strategic Plan* [xv] (CEESP) and the *Statewide Workforce Education and Training Plan*[xvi] (WE&T). Implementation is compliant with the CPUC's *Decision Providing Guidance on 2013-2014 Energy Efficiency Portfolios and 2012 Marketing, Education, and Outreach*[xvii], released in March 2012.

Scope

This document describes findings from stakeholder interviews in Phase 2 of PG&E's research project for developing the nonresidential energy efficiency workforce. These findings are drawn from dozens of interviews of energy efficiency industry professionals. Stakeholders interviewed included executives with PG&E Third Party Program partner firms, highly experienced senior energy professionals, energy efficiency contractors, representatives of NECA, IBEW, BOMA, and Association of Energy Service Professionals (AESP), and research and program staff of several UC Davis energy centers. Their collective input confirmed the need for sales and business development training for energy efficiency practitioners in order to increase the adoption rate of energy efficiency projects by commercial, industrial, and agricultural customers.

These findings along with seminar course topics derived from them are presented as suggested specifications for use in curriculum development and delivery by the selected course instructor(s).

Summary of Findings

The primary obstacles identified to increasing adoption of energy efficiency projects included:

- Lack of access to capital
- Perceived insufficient project return on investment
- Lack of confidence in the project design or technology
- Project too disruptive to the business
- Customer not fully understanding the benefits of energy efficiency
- Difficulty getting to the ultimate decision maker
- Energy efficiency not a priority for the business
- Client chooses to invest capital in other projects
- Complexity of the project

The overwhelming consensus of those interviewed was that concise sales and business development training, if tailored to the needs of energy efficiency practitioners, would provide them a valuable and welcomed enhancement of skills.

Desired training and skills fell into four categories:

1. Financial
2. Sales
3. Marketing
4. Technical

Suggested groups for training included:

- Senior management with energy efficiency and contracting firms
- Program managers and project managers
- Senior engineers
- Field sales people
- Account executives
- Vendors

Preferred training format was heavily weighted to face-to-face training in a seminar class with possible online exercises or case studies.

The strong preference of most people interviewed was to conduct the training mid-week during normal business hours. The suggested course length varied from less than eight hours to over 40 hours. The

EWSS team believes that a 16-hour course would balance this varied input and likely allow for substantive engagement and learning while also respecting students' demanding work schedules.

Curriculum Development and Delivery

Prerequisites: Students in a particular class cohort will ideally go through some sort of "leveling process" in order to assure that they have a similar base of experience and knowledge as other students. For instance, one class may consist of executives with energy efficiency firms whereas another class may consist of unionized electrical contractors. Yet other classes may be targeted to field sales people, account executives, and vendors. The EWSS project team suggests that one "leveling process" might be via a particular class's promotional materials tailored to attract the desired cohesive audience for the seminar.

Key Tasks and Deliverables:

1. **Develop course curriculum that familiarizes students with effective sales techniques and tools from which they can increase customer adoption rates for energy efficiency projects.**

This work shall include instructor recommendations regarding how to schedule seminar sessions (i.e., ½ day versus full-day sessions and consecutive days versus separation of sessions by a week or so). It should also include recommendations regarding venues for conducting the initial training session(s) (e.g., PG&E's Pacific Energy Center, San Ramon Training Center, or Stockton Training Center). Also, identify any additional instructional resources desired (e.g., co-instructor, guest presenters, etc.).

The trainer is encouraged to recommend to the EWSS project team ways to differentiate this course from other sales training seminars as well as ways to incentivize student participation and completion.

Course Content:

The following topics are suggestions of the EWSS project team for consideration as course content. They are drawn from industry stakeholder interview findings. Of course, the length of the course may necessitate a shorter list of topics that can be adequately covered in the limited time available. If so, the trainer is asked to emphasize the financial and selling topics, which address many of the needs articulated by the stakeholders interviewed.

Financial:

- Language of the CFO. Change the conversation depending on whom you are talking with at the customer premises.
- Comparison of cost-effectiveness calculation methodologies (e.g., Life-Cycle-Costing, Net Present Value, Simple Payback). Perhaps this topic could be called, "Which ROI tool to use and when". (The top barrier identified in interviews was perceived payback of customer investment.)
- How loans and incentives change the equation, as well as PG&E On-The-Bill Financing Program.

Selling:

- Identifying the customer decision-making process and key decision-maker
- Consultative selling = Listening skills
- Proposal development
- Anticipating and overcoming objections and concerns
- Identifying non-energy efficiency benefits
- Creating a sense or urgency

Marketing:

- How to articulate the full value proposition to the customer (e.g., life-cycle-costing, non-energy benefits like increased worker productivity from better lighting)

C-Level Skills and Tools Needed:

- Financial
- PG&E Partnership (or designation as a partner or trade ally)
- Rebates/Enhancements

Case Studies:

Industry stakeholders indicated a desire to have some case study work included in the class, time permitting, to help students actively engage in addressing a sales challenge pertinent to the particular cohort. A number of industry professionals interviewed offered to provide real-life practical examples for possible use in the class. EWSS team members can assist in obtaining such cases.

2. Present curriculum for review and approval by the PG&E's EWSS team and management.

Complete draft course curriculum by November 30, 2012 for review by PG&E staff and management. Fine tune course content as necessary by January 15, 2013 based upon feedback received. Finalize course materials and lecture presentations in preparation for delivery to the first cohort of students.

3. Deliver the seminar course in early 2013 to the initial cohort of students. Upon completion of the training prepare evaluation results to PG&E on what worked well and areas needing change or enhancement.

The EWSS project team suggests that the initial cohort focus on senior management and/or project managers with energy efficiency firms. Later, the seminar can be offered to cohorts of field sales people, contractors (union and non-union), account executives, and vendors. Scheduling of the first class will be done in collaboration with PG&E staff as budgetary considerations must be addressed.

Appendix 5. Inventory of Educational Assets

Background

Over a period of 18 months, EWSS researched education and training programs with the California Community Colleges Centers of Excellence and the California State University Chancellor's Office. The objective of this process was threefold: (1) enabling employers to prioritize colleges and universities from which to recruit, (2) informing students of education and training programs most relevant to job opportunities in specific geographic areas, and (3) enabling educators to better define programs that map to in-demand energy efficiency occupations within their region.

Taxonomy

Just as with the EMSI labor market demand analysis, this research followed the taxonomy developed by Lawrence Berkeley National Laboratory, and included 67 occupational codes in 13 major industry classifications. Creating this framework enabled direct mapping of the labor market demand to the California public postsecondary system's offerings at state colleges and universities in PG&E's service territory.

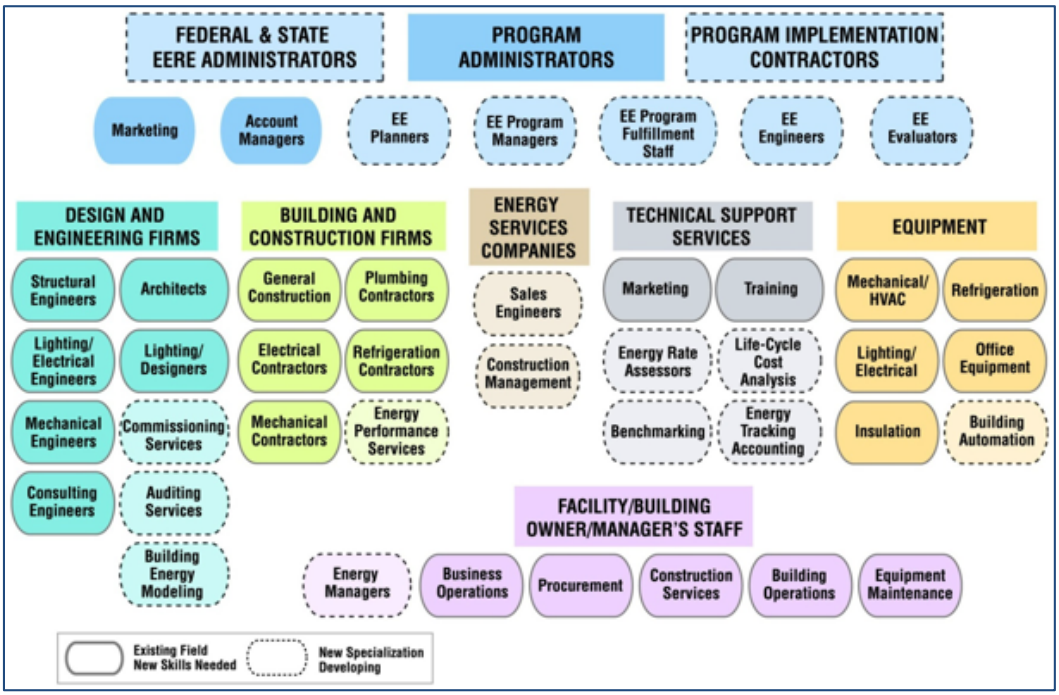


Figure 1. The Commercial-Institutional Energy Efficiency Services Sector[xviii]

The scope of EWSS is currently limited to providers of energy efficiency solutions and services. Since these providers must compete for talent across a broad range of industries, the EMSI research included manufacturers of energy efficiency products and systems in its labor demand analysis. Excluded from

the analysis were utility companies. Although utility firms do employ nonresidential energy efficiency workers, data for this occupational group are not granular enough for inclusion in this analysis.

Given this perspective, EMSI, PG&E, ICF International, Workforce Incubator, and Jim Cassio & Associates collaborated to define sixty-seven occupational titles in the thirteen industries listed below. It should be noted that Jim Cassio was one of the original contributors to development of the US Department of Labor O*NET database, the industry standard for occupational definitions, and is a frequent consultant to Workforce Investment Boards in California. All industries have some activity within the energy efficiency sector, with most of the heavy concentrations in the manufacturing segments.

Commercial and Industrial Building Construction
Nonresidential Electrical Contractors
Nonresidential Plumbing and HVAC Contractors
Industrial Building Construction
Air Purification Equipment Manufacturing
Industrial and Commercial Fan & Blower Manufacturing
Heating Equipment Manufacturing
Air Conditioning and Warm Air Heating Equipment Manufacturing
Commercial and Industrial Refrigeration Equipment Manufacturing
Relay and Industrial Control Manufacturing
Architectural Services
Engineering Services
Building Inspection Services

EWSS mapped the twenty highest in-demand occupations (Table 1) in these segments to relevant programs in the public post-secondary system.

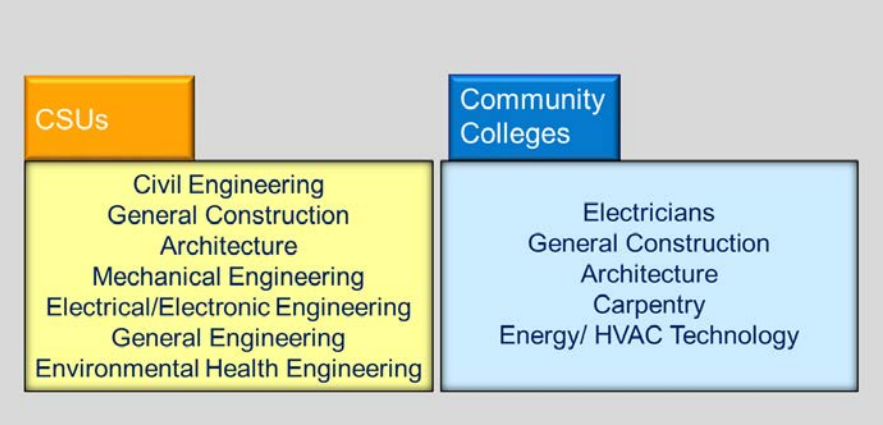


Table 1. Top 20 Highest Demand Occupations

Strategic Colleges and Universities

Colleges and universities with combinations of strategic degree and certificate programs, based on units of academic credit, were identified in relation to the top 20 in-demand occupations in Table 1,

accounting for approximately 80% of projected job openings in 2012-16. Very few programs or courses are labelled “energy efficiency”, so education and training for the 67 occupational titles were identified through data tags related to the target jobs for which they prepared students.

Mapping career pathways at colleges and universities to county-level EMSI data, EWSS identified 16 institutions with the most robust programs serving employment demand for the top 20 in-demand occupations in various regions throughout PG&E’s service territory. The outcomes of this mapping process are shown in Figures 2 and 3.

High concentrations of courses relevant to energy efficiency in these 16 strategic colleges and universities, along with course offerings in multiple disciplines, offer the greatest critical mass for building programs that address multiple occupations. There are of course many other relevant programs at CSU campuses and community colleges, but these 16 have the greatest concentrations in the geographic areas where the top 20 occupations are in highest demand. EWSS has therefore given priority to these colleges and universities for ongoing curriculum development and connections to employers.

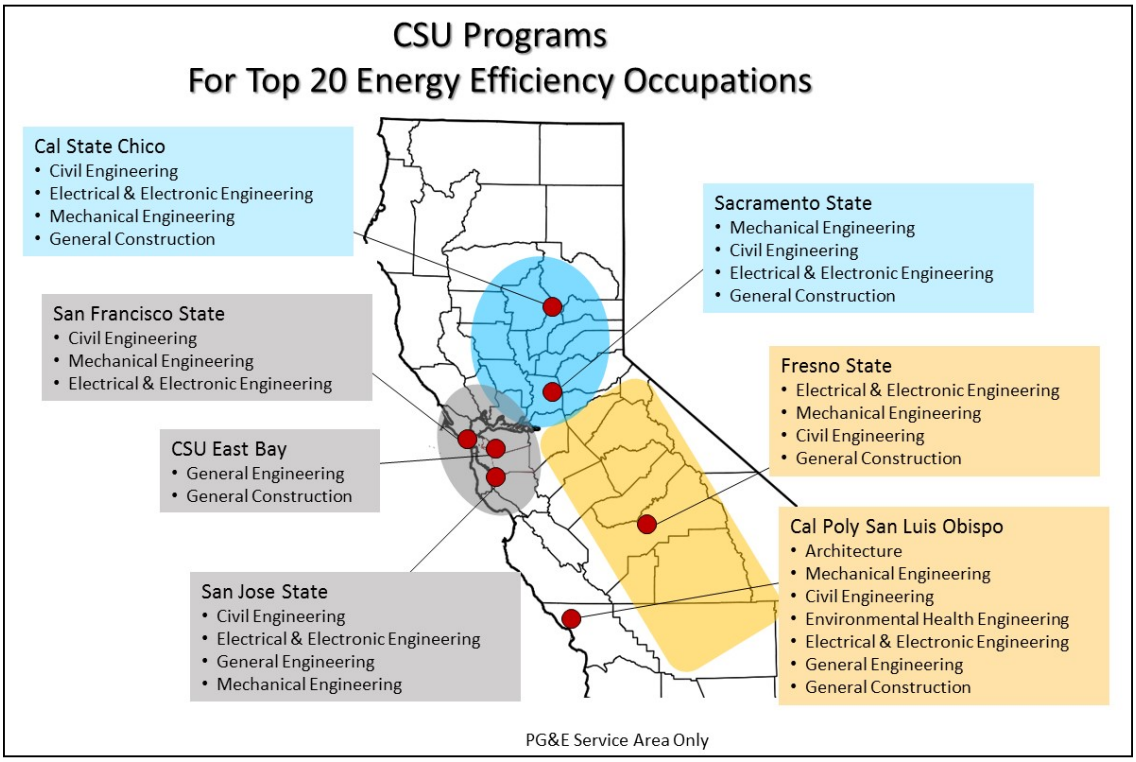


Figure 2. CSU Campuses with Strongest Programs Addressing Top 20 In-Demand Occupations

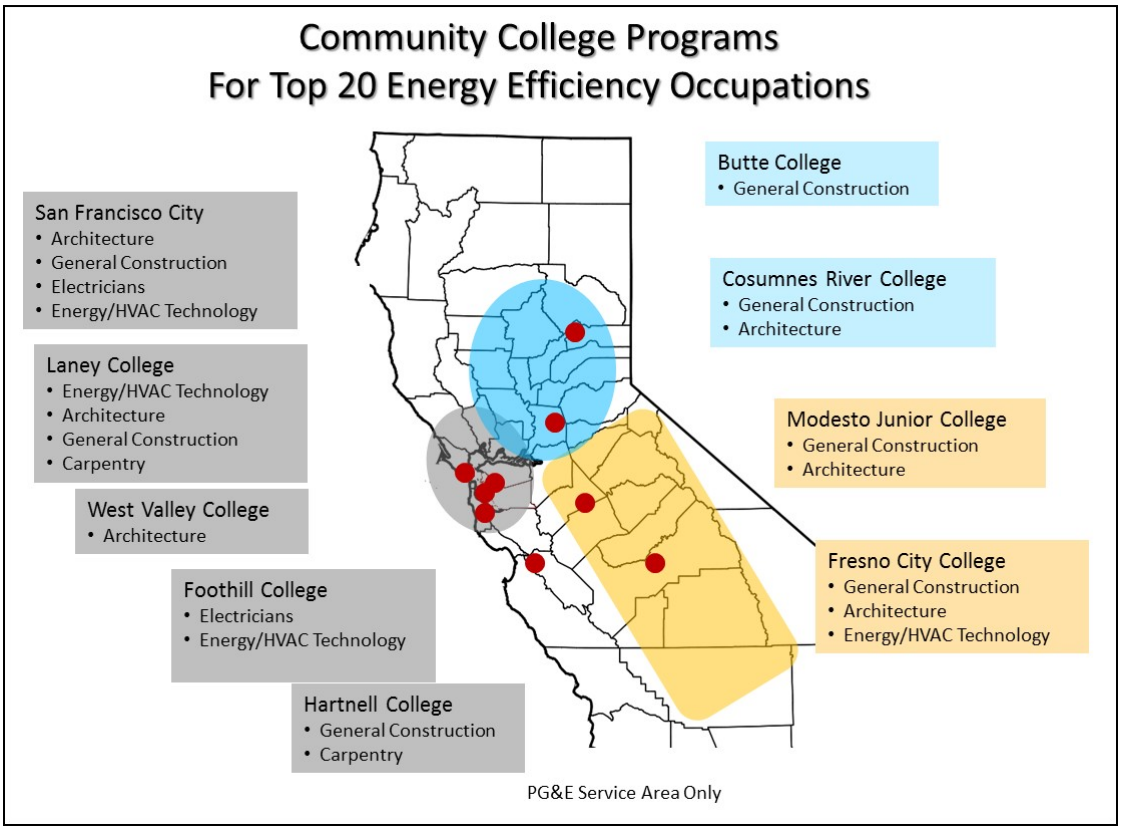


Figure 3. Community Colleges with Strongest Programs Addressing Top 20 In-Demand Occupations

Program Intensity Analysis

EWSS developed a "Program Intensity Analysis" for emphasizing career pathways that serve multiple occupations as the primary means for identifying strategic colleges and universities. This type of analysis places greatest value on combinations of courses that (1) can be arranged into degree and certificate programs serving today's top 20 in-demand occupations, (2) provide a robust foundation for adding relevance and rigor to meet evolving industry needs, (3) are in geographic proximity to the areas where relevant job growth is expected to occur, and (4) offered a spectrum of programs from which multi-discipline degrees and certificates can be developed.

For the California State University System, geographic proximity was less important than the other three factors because experience by recruiters tends to show greater mobility of new graduates than in the community college system. Geographic proximity does become important, however when considering programs for up-skilling existing workers or helping dislocated workers re-purpose their careers.

The maps in Figures 2 and 3 are based on Program Intensity Analysis outcomes. Figure 4 illustrates the Program Intensity Analysis Process.

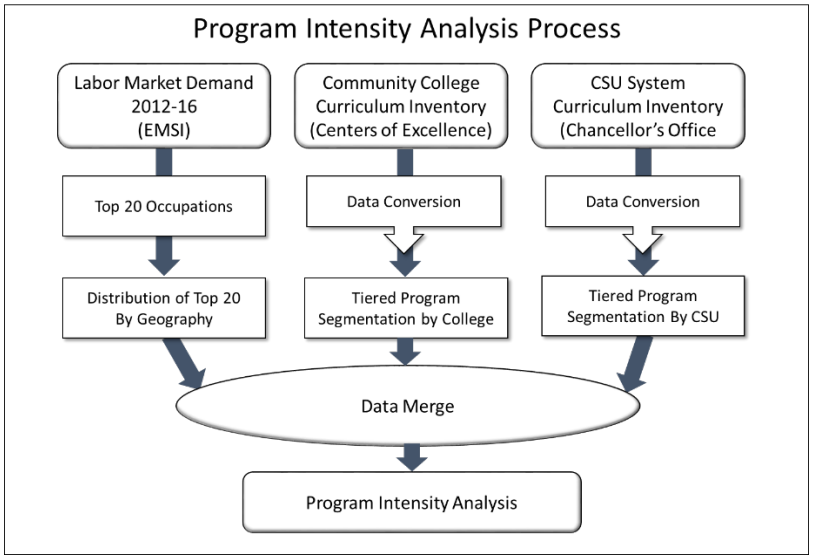


Figure 4. Program Intensity Analysis Process

This process was broken into sequences as follows:

Labor Market Demand: See Appendix 1 for the full EMSI labor market demand report and derivation of the top 20 occupations.

Curriculum Inventory: The complete databases of the community college and California State University systems were analyzed, encompassing all approved courses at 112 community colleges and 23 CSU campuses.

Data Conversion: Multiple translations were required to build a common set of curriculum data. More information is provided in a separate Data Conversion description.

Tiered Program Segmentation: Colleges and universities in PG&E's service territory were stratified into tiers based on the numbers of courses offered for the top 20 occupations.

Data Merge: EMSI data for the top 20 occupations at the county level was merged with the college and university curriculum inventory.

Program Intensity Analysis: Weighting factors were applied at each of the colleges in order to arrive at the 16 strategic institutions. How these weighting factors were applied is described separately.

Data Conversion

The CSU System uses the US Department of Education Classification of Instructional Programs[xix] (CIP codes), whereas the California Community College System has instituted its unique Taxonomy of Programs[xx] coding system (TOP codes) to classify their respective courses and programs. O*NET is based on the US Bureau of Labor Statistics Standard Occupational Classification[xxi] (SOC codes). The combined expertise of EMSI, Jim Cassio & Associates, and Workforce Incubator was applied to

conversion of all curriculum data to SOC codes and correlated to the EMSI classifications, but an unquantified margin of error can be expected in the conversion process, as a single CIP or TOP code can encompass several SOC codes.

Program Intensity Weighting

Job growth is the key to Program Intensity at each of the colleges. Using the EMSI data for the top 20 in-demand occupations, each college or university is allocated the number of new jobs projected annually for the county in which it is located. The jobs data is then correlated to relevant programs at the college or university through the following formula to arrive at a Program Intensity Score:

Program Intensity = ((C/P) *J/ 1000)

Where:

C = Curriculum units for each major occupational class for top 20 in-demand occupations
P = Number of Programs offered by the institution related to top 20 in-demand occupations
J = Total new jobs in the county annually for top 20 occupations

1000 is used to simply format the result into 2 digits before the decimal

Using Laney College in Alameda County as an example, the data and application of the formula are as follows:

C = 381 Total Curriculum Units
- 103 units in General Construction
- 104 units in Architecture
- 69 units in Carpentry
- 105 units in Energy / HVAC

P = 4 Programs:
- General Construction
- Architecture
- Carpentry
- Energy / HVAC

J = 750 new jobs annually in Alameda County

Program Intensity for Laney College = (381/4) times (750/1000) = 71.4375

Please see supporting analyses in Table 2 and subsequent detail pages.

Program Intensity											
			Units in Program Areas with Top 20 SOCs								
Community Colleges w/Tiered Programs	Region	Convening?	1. Electricians	3. General Construction	5. Architecture	6. Carpentry	10. Energy/HVAC Technology	Total Units	Count	Total Jobs	Score
SOCs			47-2111	47-1011, 11-9021, 47-4011, 47-2211	17-1011	47-2031	49-9021				Units/Count *Jobs/1000
Annual Openings			331	261	225	201	63				
Laney	Bay	Yes		103	104	69	105	381	4	750	71.4375
San Francisco City	Bay	Yes	4	74	82		3	163	4	880	35.86
West Valley	Bay	Yes			100			100	1	225	22.5
Foothill	Bay		68				45	113	2	394	22.261
Cabrillo	Bay			124			6	130	2	324	21.06
San Mateo	Bay			60	26			86	2	486	20.898
Santa Rosa	Bay			93	6		3	102	3	549	18.666
Diablo Valley	Bay	Yes		70				70	1	261	18.27
Chabot	Bay				36		10	46	2	288	6.624
Marin	Bay				43		3	46	2	288	6.624
Evergreen Valley	Bay			24				24	1	261	6.264
San Jose City	Bay						90	90	1	63	5.67
Merritt	Bay						58	58	1	63	3.654
De Anza	Bay						55	55	1	63	3.465
Skyline	Bay	Yes					25	25	1	63	1.575
Los Medanos	Bay						15	15	1	63	0.945
Ohlone	Bay	Yes					12	12	1	63	0.756
Gavilan	Bay							0	0	0	0
Las Positas	Bay							0	0	0	0
Mission	Bay							0	0	0	0
Solano	Bay							0	0	0	0
Cosumnes River	North			130	74			204	2	486	49.572
Butte	North			104				104	1	261	27.144
American River	North			38				38	1	261	9.918
Sacramento	North						78	78	1	63	4.914
Napa Valley	North							0	0	0	0
Redwoods	North							0	0	0	0
Shasta	North							0	0	0	0
Siskiyous	North							0	0	0	0
Yuba	North							0	0	0	0
Cuesta	South		108					108	1	331	35.748
Hartnell	South			83		26		109	2	462	25.179
Bakersfield	South				49			49	1	225	11.025
Monterey Peninsula	South				44		3	47	2	288	6.768
Allan Hancock	South							0	0	0	0
Cerro Coso	South							0	0	0	0
Santa Barbara	South							0	0	0	0
Fresno City	Valley	Yes		118	108		114	340	3	549	62.22
Modesto Junior	Valley			90	60			150	2	486	36.45
Sequoias	Valley			42	88		64	194	3	549	35.502
San Joaquin Delta	Valley			33		47	86	166	3	525	29.05
Merced	Valley		60				69	129	2	394	25.413
Sierra	Valley					26		26	1	201	5.226

Score Explanation:
Units per job → Higher is better
* Number of jobs (potential for that many credits being earned)
/ 1000 → manageable figure

Table 2. Raw Data – Community College Program Intensity Analysis

Community College Program Intensity

EWSS Advisory Council Colleges		Units in Program Areas with Top 20 SOCs								
SOCs		47-2111	47-1011, 11-9021, 47-4011, 47-2211	17-1011	47-2031	49-9021	Total Units	Unique Job Count	Total Jobs	Units/Count *Jobs/1000
Annual Openings		331	261	225	201	63				
Community Colleges w/Tiered Programs	Region	1. Electricians	3. General Construction	5. Architecture	6. Carpentry	10. Energy/HVAC Technology				Score
Laney	Bay		103	104	69	105	381	4	750	71.44
Fresno City	Valley		118	108		114	340	3	549	62.22
Cosumnes River	North		130	74			204	2	486	49.57
Modesto Junior	Valley		90	60			150	2	486	36.45
San Francisco City	Bay	4	74	82		3	163	4	880	35.86
Butte	North		104				104	1	261	27.14
Hartnell	South		83		26		109	2	462	25.18
West Valley	Bay			100			100	1	225	22.5
Foothill	Bay	68				45	113	2	394	22.26

CSU Program Intensity

EWSS Advisory Council Colleges		Units in Program Areas with Top 20 SOCs										
SOCs		17-2051	47-1011, 11-9021, 47-4011, 47-2211	17-1011	13-1051, 17-2141	17-2071	17-2199	17-2081	Total Units	Unique Job Count	Total Jobs	Units/Count*Jobs/1000
Annual Openings		330	261	225	152	85	62	27				
CSUs w/Tiered Programs	Region	2. Civil Engr	3. General Constr	5. Architecture	8. Mech Engr	9. Electrical & Electronic Engineering	11. General Engr	13. Environmental Health Engineering				Score
San Luis Obispo	South	156	142	173	158	154	151	156	1090	7	1142	177.83
Sacramento	North	106	99		129	101			435	4	828	90.05
Chico	North	109	93		102	105			409	4	828	84.66
Fresno	Valley	67	53		129	130			379	4	828	78.45
San Jose	Bay	103			92	103	98		396	4	629	62.27
San Francisco	Bay	99			99	99			297	3	567	56.13
East Bay	Bay		120				143		263	2	323	42.47

Community College Pathway Candidates

College	Related SOCs	Rank		Contacts	
Laney	47-2031	5	Carpenters	Nick Kyriakopedi	Department Chair
	11-9199	6	Managers, all other	Peter Waring	Building Performance Instructor
	11-1021	7	General and operations managers	Barbara Widhalm	NSF Project Manager
	47-1011	10	Heating, air conditioning, and refrigeration mechanics and installers	Peter Crabtree	Dean of Instruction
	49-9021	13	First-line supervisors/managers of constr. trades and extraction workers	Larry Chang	
	47-4011	14	Construction and building inspectors		
	13-2011	18	Accountants and auditors		
Fresno City	47-2111	2	Electricians	Natalie Culver-Dockins	
	47-2152	4	Plumbers, pipefitters, and steamfitters	Christopher Whiteside	CTE Dean
	47-2031	5	Carpenters		
	11-9199	6	Managers, all other		
	11-1021	7	General and operations managers		
	47-1011	10	First-line supervisors/managers of constr. trades and extraction workers		
	49-9021	13	Heating, air conditioning, and refrigeration mechanics and installers		
	47-4011	14	Construction and building inspectors		
	13-2011	18	Accountants and auditors		
Cosumnes River	17-1011	3	Architects, except landscape and naval	Ryan Connally	Professor, Construction Management
	11-9199	6	Managers, all other	Bob Johnson	Dean, Careers and Technology
	47-1011	10	First-line supervisors/managers of constr. trades and extraction workers		
	13-2011	18	Accountants and auditors		

Community College Pathway Candidates

College	Related SOCs	Rank		Contacts	
Modesto	47-2152	4	Plumbers, pipefitters, and steamfitters	Pedro Mendez	CTE Dean
	47-2031	5	Carpenters		
	47-1011	10	First-line supervisors/managers of constr. trades and extraction workers		
	47-2211	15	Sheet metal workers		
	13-2011	18	Accountants and auditors		
San Francisco	47-2111	2	Electricians	Gerald Bernstein	Director, ATTE
	47-2152	4	Plumbers, pipefitters, and steamfitters	Wendy Miller	Program Coordinator
	47-2031	5	Carpenters		
	11-9199	6	Managers, all other		
	11-1021	7	General and operations managers		
	47-1011	10	First-line supervisors/managers of constr. trades and extraction workers		
	49-9021	13	Heating, air conditioning, and refrigeration mechanics and installers		
	13-2011	18	Accountants and auditors		
Butte	11-9199	6	Managers, all other	Denise Adams	Dean, Student Learning
	47-1011	10	First-line supervisors/managers of constr. trades and extraction workers		
	47-4011	14	Construction and building inspectors		
	13-2011	18	Accountants and auditors		

Community College Pathway Candidates

College	Related SOCs	Rank		Contacts	
Hartnell	47-2111	2	Electricians	Michael Thomas	CTE Dean
	47-2152	4	Plumbers, pipefitters, and steamfitters	Atallah Zahi	EWD/Adv Tech Dean
	47-2031	5	Carpenters	John Anderson	Faculty
	47-1011	10	First-line supervisors/managers of constr. trades and extraction workers		
	47-4011	14	Construction and building inspectors		
	47-2211	15	Sheet metal workers		
	13-2011	18	Accountants and auditors		
West Valley	17-1011	3	Architects, except landscape and naval	David Esmaili	CTE Dean
	11-9199	6	Managers, all other		
	13-2011	18	Accountants and auditors		
Foothill	47-2111	2	Electricians	Catherine Ayers	Project Manager
	47-2152	4	Plumbers, pipefitters, and steamfitters	Robert Cormia	Instructor
	11-1021	7	General and operations managers	Reg Duhe	Dir, Bus & Ed Partnerships
	47-1011	10	First-line supervisors/managers of constr. trades and extraction workers	John Mummert	CTE Dean
	49-9021	13	Heating, air conditioning, and refrigeration mechanics and installers	Peter Murray	EWD/Adv Tech Dean
	13-2011	18	Accountants and auditors		

CSU Pathway Candidates

CSU	SOC	Program Areas	Annual Openings	Credential		Contacts	
SLO	17-2051,17-2141,17-2071,17-2199,17-2081	Civil, Mech, Elec, and Gen'l Engineering	629	BS	MS	Debra Larson	Dean of Engineering
	11-9021,11-1021	General Construction, Business Mgmt	496		MS	Art MacCarley	Professor
	11-9021,11-9199,11-1021	General Construction, Business Mgmt	496	BS	MBA	Brian Tietje	Vice Provost
	11-9021,11-9199,11-1021	General Construction, Business Mgmt	496	Option		Rakesh Goel	Associate Dean of Engineering
	17-2051	Civil Engineering	330	BS			
	17-2051	Civil Engineering	330		Option		
	17-2051	Civil Engineering	330		MS		
	11-1021	Business Management	235	Option			
	11-9199,11-1021	Business Management	235		MPP		
	11-9199,11-1021	Business Management	235	Option			
	17-1011	Architecture	225		MS		
	17-1011	Architecture	225		MS		
	17-2141	Mechanical Engineering	152	BS	MS		
	17-2071	Electrical Engineering	85	BS	MS		
	17-2199	General Engineering	62		Option		
	13-2011	Accounting & Finance	32	Option			
	13-2011	Accounting & Finance	32	Option			
	17-2081	Environmental Engineering	27	BS			

CSU Pathway Candidates

CSU	SOC	Program Areas	Annual Openings	Credential		Contacts	
Sacramento	11-9021,11-9199,11-1021	General Construction, Business Mgmt	496	BS	MBA	Guido Krickx	Dean of Extended Education
	17-2051	Civil Engineering	330	BS	MS	Emir Macari	Dean of Engineering
	11-1021	Business Management	235	Option		Jenni Murphy	Sr. Dir. Strategic Comm & Emerging Markets
	11-9199,11-1021	Business Management	235		MPPA		
	11-9199,11-1021	Business Management	235	Option			
	17-2141	Mechanical Engineering	152	BS	MS		
	13-2011	Accounting & Finance	32	Option			
	13-2011	Accounting & Finance	32	Option	MS		
	13-2011	Accounting & Finance	32	Option	Option		
Chico	11-9021,11-9199,11-1021	General Construction, Business Mgmt	496	BS	MBA	Debra Berger	Dean of Extended Education
	11-9021,11-9199,11-1021	General Construction, Business Mgmt	496	Option		Mike Ward	Dean of Engineering
	17-2051	Civil Engineering	330	BS			
	11-9199	Business Management	235	Option			
	11-9199	Business Management	235	Option			
	11-9199,11-1021	Business Management	235	BA	MPA		
	17-2141	Mechanical Engineering	152	BS			
	13-2011	Accounting & Finance	32	Option			
	13-2011	Accounting & Finance	32	Option			
	13-2011	Accounting & Finance	32	Option			

CSU Pathway Candidates

CSU	SOC	Program Areas	Annual Openings	Credential		Contacts	
Sacramento	11-9021,11-9199,11-1021	General Construction, Business Mgmt	496	BS	MBA	Guido Krickx	Dean of Extended Education
	17-2051	Civil Engineering	330	BS	MS	Emir Macari	Dean of Engineering
	11-1021	Business Management	235	Option		Jenni Murphy	Sr. Dir. Strategic Comm & Emerging Markets
	11-9199,11-1021	Business Management	235		MPPA		
	11-9199,11-1021	Business Management	235	Option			
	17-2141	Mechanical Engineering	152	BS	MS		
	13-2011	Accounting & Finance	32	Option			
	13-2011	Accounting & Finance	32	Option	MS		
	13-2011	Accounting & Finance	32	Option	Option		
Chico	11-9021,11-9199,11-1021	General Construction, Business Mgmt	496	BS	MBA	Debra Barger	Dean of Extended Education
	11-9021,11-9199,11-1021	General Construction, Business Mgmt	496	Option		Mike Ward	Dean of Engineering
	17-2051	Civil Engineering	330	BS			
	11-9199	Business Management	235	Option			
	11-9199	Business Management	235	Option			
	11-9199,11-1021	Business Management	235	BA	MPA		
	17-2141	Mechanical Engineering	152	BS			
	13-2011	Accounting & Finance	32	Option			
	13-2011	Accounting & Finance	32	Option			
	13-2011	Accounting & Finance	32	Option			

CSU Pathway Candidates

CSU	SOC	Program Areas	Annual Openings	Credential		Contacts	
Fresno	17-2051,17-2141,17-2071,17-2199,17-2061	Civil, Mech, Elec, and Genl Engineering	629		MS	Walter Mizuno	Co-Director UCAM
	11-9021,11-9199,11-1021	General Construction, Business Mgmt	496	BS	MBA	Ram Nunna	Dean of Engineering
	11-9021,11-9199,11-1021	General Construction, Business Mgmt	496	Option		Lynnette Zelezny	Dean of Extended Education
	17-2061	Civil Engineering	330	BS	MS		
	11-1021	Business Management	235	Option			
	11-9199,11-1021	Business Management	235	BA	MPA		
	11-9199,11-1021	Business Management	235	Option			
	17-2141	Mechanical Engineering	152	BS	Option		
	17-2071	Electrical Engineering	86	BS	Option		
	13-2011	Accounting & Finance	32	Option	MS		
	13-2011	Accounting & Finance	32	Option			
San Jose	17-2051,17-2141,17-2071,17-2199,17-2061	Civil, Mech, Elec, and Genl Engineering	629	BS	MS	Ping Hsu	Dean of Engineering
	11-9021,11-9199,11-1021	General Construction, Business Mgmt	496	BS	MBA	Mark Novak	Dean of Extended Education
	11-9021,11-9199,11-1021	General Construction, Business Mgmt	496	Option			
	17-2051	Civil Engineering	330	BS	MS		
	17-2051	Civil Engineering	330		MS		
	11-1021	Business Management	235	Option			
	11-9199,11-1021	Business Management	235		MPA		
	11-9199,11-1021	Business Management	235	Option			
	17-2141	Mechanical Engineering	152	BS	MS		
	17-2071	Electrical Engineering	86	BS	MS		
	13-2011	Accounting & Finance	32	Option			
	13-2011	Accounting & Finance	32	Option	MS		
	13-2011	Accounting & Finance	32	Option			
	13-2011	Accounting & Finance	32	Option			
	13-2011	Accounting & Finance	32		MST		

CSU Pathway Candidates

CSU	SOC	Program Areas	Annual Openings	Credential		Contacts	
San Francisco	17-2051,17-2141,17-2071,17-2199,17-3051	Civil, Mech, Elec, and Genl Engr	629		MS	Susan Propst	
	11-9021,11-9199,11-1021	General Constr, Business Mgmt	496	BS	MBA	Wenshen Pong	Dir, School of Engineering
	11-9021,11-9199,11-1021	General Constr, Business Mgmt	496	Option		Sheldon Axler	Dean of Engineering
	17-2051	Civil Engineering	338	BS	Option	Jose Galvan	Dean of Extended Education
	17-2051	Civil Engineering	338		Option		
	11-9199	Business Management	235	BS			
	11-9199,11-1021	Business Management	235		MPA		
	17-2141	Mechanical Engineering	152	BS			
	17-2071	Electrical Engineering	86	BS			
	17-2199	General Engineering	62		Option		
	13-2011	Accounting & Finance	32	Option	MS		
	13-2011	Accounting & Finance	32	Option			
East Bay	17-2051,17-2141,17-2071,17-2199,17-3051	Civil, Mech, Elec, and Genl Engr	629	BS		Michael Leung	Dean, College of Science
	11-9021,11-9199,11-1021	General Constr, Business Mgmt	496	BS	MS, MBA	Saied Motavalli	Chair, Engineering
	11-9199,11-1021	Business Management	235	Option	MPA	Brian Cook	Dean of Extended Education
	11-9199,11-1021	Business Management	235	Option	Option		
	13-2011	Accounting & Finance	32	Option			
	13-2011	Accounting & Finance	32	Option	Option		
	13-2011	Accounting & Finance	32		MS		

Appendix 6. 2014 EWSS Scope of Work

Energy Workforce Sector Strategy

2014 Scope of Work

1.0 BACKGROUND/ PROJECT SUMMARY

The Energy Workforce Sector Strategy (EWSS) defines PG&E's near-term business direction for continuing workforce development in collaboration with the California Public Utilities Commission (CPUC) and the other Investor Owned Utilities (IOUs). Focusing on the full workforce spectrum, this sector strategy is designed to meet the goals established by AB 32 and associated mandates for energy efficiency in the Commercial Sector. It is aligned with the CPUC's Energy Efficiency Strategic Plan and recent Project Implementation Plans, linking workforce development to priorities of industry stakeholders and leveraging the assets of California's Community College system and California State Universities.

2.0 DEFINITIONS

Energy Workforce Sector Strategy (EWSS) – This PG&E initiative is described in Section 1.0, Background/Project Summary.

Sector Strategy - Sector strategies support workforce development initiatives, which are defined as *regional, industry-specific approaches to workforce needs, implemented by an employer-driven partnership of relevant systems and stakeholders*. They are part of a growing movement by states and local areas to adopt industry-focused strategies that are rooted in the economic, human capital and community strengths of a region. They rely on strong partnerships of employers and stakeholders to make data-informed decisions about workforce needs and solutions that will keep regional industry strong and provide quality jobs and advancement opportunities for workers, particularly low-income and at risk workers. More information is at www.sectorstrategies.org.

AB 32 – This is The California Global Warming Solutions Act of 2008 which mandates performance to be achieved within the state for reduction of carbon emissions.

Demand Creation – This is comprised of sales, marketing, and business development activities to increase market adoption of energy efficiency solutions in commercial, industrial, and agricultural buildings to meet the mandates of AB 32.

Non-government Organization (NGO) – This refers to community-based organizations (CBOs) or nonprofits engaged in workforce education and development.

Senior Energy Professional (SEP) – This is a professional energy efficiency worker who has at least 5 years in energy efficiency as an architect, engineer, project manager, program manager, auditor, analyst, or business development specialist.

Information and Communications Technology (ICT) – This technology domain includes computer hardware, software, metering, telecommunications and networking systems that control energy efficiency in buildings and interface with the utility's electric and gas infrastructure.

California Advanced Lighting Control Training Program (CALCTP) – This training program prepares electricians and electrical contractors to sell, design, and install lighting control systems that are in compliance with current codes and standards

HVAC – This acronym refers to heating, ventilation, and air conditioning systems that control the air quality and temperature in buildings.

Communities of Practice – This term refers to a set of shared resources, typically made available through an online portal, that enables specific groups of stakeholders to advance best practices, develop common curriculum, create career pathways, support relationships between educators and industry stakeholders, and connect employers and students.

Career Pathways – An array of education and training programs that result in certificates and/or degrees that make graduates more employable in targeted occupations.

3.0 PROJECT SCOPE –

This Project Scope encompasses activities and outcomes through December 31, 2014. It employs the EWSS framework developed in 2012 and 2013, expanding programs that began in those years and driving regional strategies around the PG&E service territory in collaboration with key industry, education, NGO, and government stakeholders.

3.1 Task 1: Facilitate Course Linkages to Public Postsecondary Pathways; Infuse Curricula.

Task 1 continues to build out public postsecondary programs that link to the PEC for priority occupational groups and other Workforce Education and Training initiatives. Also included in this task are PG&E programs to support statewide strategies for Title 24 and CALCTP.

Consultant will expand the infusion of curricula into priority colleges and universities to increase the capacity of these programs to produce graduates that are qualified for employment in energy efficiency jobs. These programs, to the extent practical, will be linked to PEC offerings in combinations of career pathways to serve students, incumbent workers, and career-changers.

Deliverable (s) | Due Date (s):

- Project plans completed for applicable programs: February 15, 2014
- Community college and CSU agreements to update pathways: June 1, 2014

- Pathway alignment and construction complete: December 31, 2014

3.2 Task 2: Develop and Implement Regional Programs in Response to Key Stakeholders

Task 2 assures that programs developed through Task 1 are responsive to regional stakeholder needs which can vary across the PG&E service territory. Analysis and application of regional labor market data are major elements of this task, along with regional career pathway mapping and building out the www.eesectorstrategy.com portal to support regional needs.

Consultant will facilitate the infusion of energy expertise into existing education and training programs at community colleges and California State University campuses in response to regional workforce requirements identified by key stakeholders.

Deliverable (s) | Due Date (s):

- Updated Labor Market Information to all regional stakeholders: February 1, 2014
- Periodic Labor Market Information as requested by stakeholders: Ongoing
- Update career pathway maps for all priority colleges and universities: June 1, 2014
- Migrate the eesectorstrategy.com portal to support regional needs: July 15, 2014
- Update the eesectorstrategy.com portal to reflect regional stakeholder needs: Ongoing
- Develop and implement regional stakeholders' priority pathways: November 15, 2014

3.3 Task 3: Cultivate Broad Stakeholder Engagement and Visibility by PG&E Leadership

Task 3 continues to build on stakeholder engagement through convenings of the Executive Committee, the Advisory Council, and other individuals/organizations that contribute to or benefit from EWSS implementation. Additionally, PG&E leadership maintains visibility into EWSS via quarterly and year-end metrics reports plus a comprehensive year-end 2014 report on outcomes, findings, and recommendations.

Consultant will expand engagement of stakeholders in industry, education, workforce investment board, and labor to develop regional stakeholder groups in the Bay Area, Central Valley, and Sacramento/North, for the purpose of implementing regional EWSS programs within each of these regions.

Deliverable (s) | Due Date (s):

- Develop the 2014 Communications Plan and begin Implementation: February 1, 2014
- Convene quarterly Executive Committee and Advisory Council meetings: Each Quarter
- Publish quarterly EWSS performance metrics: Each Quarter
- Publish a year-end report on metrics and accomplishments: December 31, 2014
- Publish a comprehensive year-end report on EWSS outcomes, findings, and recommendations: December 31, 2014

Appendix 7. 2012 Metrics

EWSS engaged approximately 120 stakeholders from industry, education, the state workforce system, community-based organizations, the CPUC, and the California Energy Commission (CEC). In order to more precisely frame stakeholder engagement, EWSS augmented WE&T research with the following:

1. Workforce analysis by Economic Modeling Specialists, Inc. (EMSI) provided estimates of workforce supply versus demand. The result was projections through 2016 for PG&E's service territory across 60 different occupations in 13 industries engaged in commercial/industrial energy efficiency products and services.

2. Interviews with more than 50 energy efficiency employers built a broad basis for workforce development priorities.

3. Focus groups with more than 100 representatives from industry, education, Labor and the workforce investment system identified priority occupations, skill requirements, barriers to workforce development, and collaboration models that would accelerate market adoption.

4. Surveys of 22 top-performing energy efficiency professionals characterized their functions in driving market adoption. These surveys identified the education and work experience needed to define the top end of career ladders (or lattices) through which energy efficiency workers can progress.

5. Top tier energy efficiency programs were identified in the California Community Colleges and California State Universities. This research characterized the most relevant educational and training resources that can be aligned with and leveraged by EWSS.

Summary of 2012 Accomplishments

- Completed interviews of 40 electrical contractors, 12 senior energy professionals, 8 third-party partner firm executives, and 7 university energy center research and program staffers in order to identify market adoption challenges, workforce needs, and staff training priorities.
- Developed content for a sales/business development course for EE industry specialists based upon the industry input mentioned above.
- Sales course instructor candidates identified and vetted. Daryl DeJean selected as the initial instructor.
- Obtained input and guidance from educators and industry stakeholders via Advisory Council and Steering Committee meetings.
- Researched CSU and Community Colleges existing programs that relate to EWSS and priority occupations. Identified courses that relate to the top 20 EE occupations and mapped CC and CSU EE program intensities by campus. Presented results to CSU and CC representatives at the

Advisory Committee meeting and solicited additional input. (Portions of this 2012 work was completed in Phase 1, with remaining tasks done in Phase 2.)

- Researched courses and curricula offered at NECA-IBEW training facilities.
- Researched courses and curricula offered at Pacific Energy Center (PEC). Recommended positioning of PEC programs as a gateway to advanced training at colleges, universities, and NECA-IBEW facilities.
- Produced a working draft of the Energy Efficiency Sector Strategy and incorporated feedback from PG&E Customer Care organization and the Steering Committee into the paper.
- Proposed a stackable credentials framework to encompass various education and training programs. Introduced the concept of "badges" or micro-credentials that reflect priorities for student learning outcomes critical to EE industry stakeholders.
- Developed EWSS web portal (www.eesectorstrategy.com) and updated content periodically, including reports and meeting summaries, in order to keep stakeholders apprised of EWSS activities and accomplishments.
- Developed 2013-2014 metrics to evaluate effectiveness of EWSS activities and initiatives. These were distilled from various CPUC and PG&E documents relating to measurement and evaluation of progress toward overall WE&T goals.
- Phase 1 work in 2012 included survey of 53 UEPs with 20 interviews; commissioned EMSI report of 67 SOCs in 13 NAICS related to EE; and inventoried EE programs at all Nor-Cal CSUs and CCs, which set the foundation of data for Phase 2 activity. EWSS Phase 2 was launched in February at the large convening of stakeholders in San Ramon.

Outcome 1. Align the Sector Strategy with the Project Implementation Plan

Metric : Complete by August 27, 2012

Result:
Addressed key elements of the Project Implementation Plan -

- College & university: identified programs, developed relationships
- Internships: in discussions with Connections team
- Labor market information: gathered, analyzed, published
- Market Transformation: researched, published baseline info

Published the EWSS Sector Strategy Implementation Report

Outcome #2: Train the first cohort of incumbent Senior Industry Professionals to increase adoption of energy efficiency solutions by C-level Executives and Facilities Managers.

Metric: Complete training of the first cohort by December 31, 2012.
Result:

- Course specifications completed in fall 2012 following completion of interviews with energy efficiency industry professionals.
- Initial instructor selected after vetting of various candidates suggested by industry stakeholders.

- Instructor contract negotiation handed off to PG&E staff and management.
- First cohort scheduled tentatively set for Q2 2013 in accordance with internal PG&E funding/budget considerations.

Outcome # 3: Create linkages between existing courses at Tier 1 colleges and the new Senior Industry Professional curriculum (Outcome #2).

Metric: Create linkages by December 31, 2012.

Result:

- Researched CSU and Community College energy efficiency programs and related these to top 20 occupations for which training is needed. Identified intensity of energy efficiency offerings by school.
- CSU and Community College educators participated in December meetings of the Advisory Council and Steering Committee.
- Educators received briefings on the research results of college energy efficiency programs intensity and proposed sales/business development training course specifications resulting from industry interviews.
- These linkages will be expanded and enhanced in 2013 through a set of career pathway development tasks and associated deliverables.

Outcome #4: Create a platform for 2013 strategy.

Metric: Complete platform and submit to PG&E management for review by November 30.

Result:

- Incorporated 2013 platform into EWSS Strategic Implementation Plan, approved by PG&E Management
- Reviewed with industry and education partners in Advisory Committee meeting in December
- Reviewed with CPUC WE&T Task Force Lead in December
- Began implementation in December

Outcome # 5: Provide measurements to indicate effectiveness of the 2012 Sector Strategy.

Metric: Develop metrics to evaluate 2012 EWSS effectiveness and submit for review by PG&E staff by December 15, 2012.

Result:

- 2012 metrics were drafted and submitted by October 18, 2012.
- These were tied to expected outcomes of the 2012 EWSS Project Plan.
- These measurements form the basis for this 2012 evaluation report.

Outcome # 6: Deliver a “how-to” primer on Sector Strategy development.

Metric: How-to primer completed by December 31, 2012.

Result:

- First draft of the primer delivered in August, 2012 (commenced in June).
- PG&E project manager suggested moving the target completion date into 2013.
- Web portal developed as potential delivery vehicle for final product.

Outcome # 7: Develop and implement the communication plan to drive the Energy Workforce Sector Strategy.

Metric: Complete EWSS communication plan by December 31, 2012.

Result: Draft plan completed January 2, 2013

- The outline of the 2013 EWSS Communications Plan was created the first week of January, 2013 (Detailed messaging components of the plan to be completed in early 2013).
- It is designed to drive interactions with industry and education stakeholders through proactive communications.
- The outline identified:
- Primary industry stakeholders
- Key topics for outreach communications with associated messaging
- Frequency and mode of communications
- Measurement and evaluation of outreach communication activities

Appendix 8. 2013 Metrics

2013 Accomplishments

EWSS Metrics

Course Development

Objective: Train 100 business development professionals to achieve higher conversion rate for energy efficiency demand creation.

*Metric: Deliver PEC Business Development Se*minar

- Facilitated development, funding, and delivery of the PEC Business Development Seminar.
- 55 business professionals enrolled for the November seminar; 60 enrolled for December.

Metric: Complete the first series of Energy Professionals at CCSF

- Created a mini-pathway for Commercial Energy Auditors by facilitating a three seminar sequence in collaboration with the PEC and City College of San Francisco.
- 60 trainees attended the introductory seminar; 50 enrolled for the capstone.

Stakeholder Development

Objective: Develop an ongoing relationship with industry stakeholders and educators to assure responsiveness to market needs.

Metric: Establish and maintain linkages with EE industry and education stakeholders

- Cultivated stakeholder community of ≈150 industry participants representing ≈75 organizations, ≈80 educators representing ≈40 institutions, and ≈10 local and state government officials representing 10 agencies.
- Maintained EWSS stakeholder access to latest information and regional developments across PG&E service territory via the www.eesectorstrategy.com portal.
- The portal also provides information to assist employers target their recruiting activities in this sector more effectively and with a higher return on investment

Metric: Obtain stakeholder input to inform EWSS on needs and of EE industry and educators and effective strategies for addressing needs

- Acted as project facilitator, convening advisory board and regional industry group meetings, and developing champions for initiatives from within the 240-strong stakeholder group.
- Continued to develop programs for priority occupations through regional industry group meetings.

Metric: Develop regional collaboratives to advance EWSS across PG&E Service Territory; add capacity to existing workforce programs for priority occupations

- Convened three employer forums in Modesto, Visalia, and Sacramento.

- Established a new regional employer engagement model in collaboration with Sacramento Employment and Training Agency (SETA).
- Facilitated the Sacramento regional coalition of WIB, industry, community college, Labor, K-12 district, and economic development alliance stakeholders to secure state funding for training programs directly related to EWSS.

Career Pathway Development

Objective: Develop and document career pathways that are responsive to needs of industry stakeholders; develop or expand programs to better assure compliance with codes and standards.

Metric: Identify industry-specific training needs at community college and CSU levels

- Mapped priorities to existing pathways for the following occupational groups: Engineers, HVAC Installers, Electricians/Lighting Specialists, Commercial Energy Auditors, Business Development Professionals, Certified Energy Managers, and Acceptance Testers.
- Updated EMSI labor market data to derive a new job openings forecast across 13 industries and 67 occupational groups in PG&E service territory.
- Documented current pathways at all participating colleges and universities and posted the inventory in a searchable format on the portal.

Metric: Establish new linkages between industry and educators, develop multiple career pathways

- Facilitated college and university planning for integration of 2013 Title 24 updates including CALCTP, and new Quality Performance Measures for HVAC into existing curriculum.

Integration with Other Initiatives

Objective: Integrate EWSS with other related sector strategy activities.

Metric: Integrate EWSS into a statewide strategy as appropriate

- EWSS created the following framework which can be used in replicating best practices and career pathways, and for scaling successful programs:
    - A stakeholder group that provides guidance to all EWSS initiatives
    - A database that can be used to project workforce needs
    - An inventory of relevant community college and CSU programs and pathways
    - A portal that provides ongoing communications support
- Assisted in developing the statewide adoption of a common definition of sector strategy
- Develop a statewide platform for program execution in collaboration with the California Community College System.

Appendix 9. Notes from Stakeholder Meetings

Initial Stakeholder Convening – February 29, 2012

Executive Summary

Many occupations including Engineers, energy auditors, project managers, skilled contractors and demand-side energy efficiency experts will all be called on to make commercial, industrial and agricultural buildings more energy efficient.

For the most part, colleges, businesses and utilities are all addressing those needs separately. The CPUC has said that individual approach is holding back the full potential of the clean energy industry. On February 29, PG&E hosted a kickoff Energy Workforce Sector Strategy meeting, the first step in getting alignment and coordination around the creation of commercial business energy-efficiency jobs.

The working session was the result of a request by the CPUC to get all investor-owned utilities in the state to adopt and lead the development of coordinated job training to achieve California's energy efficiency goals based on market demand.

"Our goal is to start to have a road map that links all of our partners with what they have to offer and develop a plan," said Steve Kline, a PG&E vice president and its chief sustainability officer. "Right now we're working hard, but we're doing things independently. This meeting is the first leg of a much larger journey."

The meeting, attended by about 150 professionals at PG&E's San Ramon conference center, included everyone from officials with the California Energy Commission to industry employers to community college, UC and Cal State professors. Representatives with Southern California Edison and Sempra Energy also participated.

As part of the meeting, attendees broke into separate groups and identified workforce needs. Some of the suggestions were apprenticeship programs, job shadowing and cross-training within companies. Each group then reported on their discussions. Among the feedback:

- "Rather than reinvent the wheel and recreating other certifications, everyone should be part of one single initiative."
- "We hear a lot about hot jobs, but a lot of those hot jobs aren't here yet. What we need to talk about is hot skills."
- "We need to get property owners and other end users at the table and begin to understand what their needs are."

With 9 billion square feet of non-residential commercial, industrial and agricultural building space in California, there are huge opportunities for a skilled energy-efficiency workforce, said Jim Caldwell, executive director of the Workforce Incubator, a team providing PG&E with market and education research.

"How do we grow this market and accelerate progress toward the state's energy efficiency goals?" Caldwell said. "That means we have to address a larger part of the market faster and more effectively, and that's a huge component of what we're planning to do."

The research was gathered with PG&E's territory in mind, but the results could be applied statewide.

Robert Marcial of PG&E's Pacific Energy Center described using Internet-based training to reach more people, reduce costs and track progress during and after the course. One of the presenters then introduced vignettes of an online course created by PG&E that demonstrates a lesson on solar geometry.

At the end of the meeting, Caldwell said a plan would be created with input from those who attended the meeting. A team of stakeholders from the meeting is scheduled to be in place by April 30.

Introduction to Day, Jim Caldwell

Jim Caldwell started off the morning by welcoming the meeting participants and discussing the goals for the day:

- To grow the energy efficiency market and achieve California Public Utilities Commission (CPUC's) strategic goals outlined in the Workforce, Education, & Training Needs Assessment;
- Describe how the energy sector will be changing more in the next 10 years then it has in the past 100 and will need a new professional that we call, the "Uber Energy Professional or (UEP)"—which will be defined and explained in detail later today as well as the skills identified to become an UEP from both current professionals and their companies.
- Explain the work created to launch this event and what is needed from the experts in the room to ensure it is successful.
- Finally, it's a daunting task, preliminary data is showing that it is more than 72,000 jobs and 2,200 annual openings. But, given the publically recognized by the White House, PG&E PowerPathway model we have the foundation to be successful.
- Overview of Day:
    - *From Steve Kline: PG&E's commitment to growth of this market*
    - *From Panama Bartholomy: CEC's policies and programs to grow the market*
    - *From Lisa Paulo: CPUC goals and why we need a Sector Strategy*
    - *From our research team: A model program that's already working*
      The types of workers that are most in demand
      Top-tier education programs
      New considerations for career pathways
      A demonstration of technology-enabled learning
    - *Then we'll have a couple of working sessions where you'll join your regional colleagues*
        - *To develop a common understanding of workforce needs and possibilities*
        - *To focus on the kinds of activity that will enable a successful Sector Strategy*

        - *To agree on a basic framework for developing and managing the Sector Strategy*
    - *We'll close out with a discussion on how we'll move forward together*

- What We Would Like to Accomplish by the End of the Day:
    - Our objective is to set the stage by which industry and education stakeholders build regional workforce collaborative
    - By the end of the second quarter, we want to see initiatives in place that will demonstrate progress by the end of 2012 and build a foundation for the future
    - And PG&E's commitment is to continue to facilitate the development and implementation of this Sector Strategy in partnership with you

Introduction, Steve Kline

- In my view, the Energy Efficiency Workforce Sector Strategy is the perfect example of PG&E's sustainability vision, achieving many different goals for many different stakeholders.

Energy Efficiency is a Cornerstone of PG&E's Sustainability Strategy

- As many of you know well, energy efficiency is central to PG&E's sustainability efforts.
- For more than 30 years, PG&E's energy efficiency programs have delivered both cost and energy savings to our customers.
- In fact, over this time period, we and our customers have prevented the emission of more than 168 million metric tons of carbon dioxide.
- And our commitment continues. Between 2010 and 2012 alone, we plan to spend more than $1 billion on energy efficiency – the largest such investment by any U.S. utility.
- Beyond our own efforts, it's exciting to see other important developments that are advancing energy efficiency in California.
- First, the statewide emphasis on energy efficiency in secondary education has been impressive, from the pioneering work at the UC Davis Energy Efficiency Center to the educational programs now available at Stanford University. This also extends to the expanding role of energy efficiency curricula in community colleges across the state, many of whom PG&E has partnered with directly.
- Earlier this year, we also saw the implementation of AB 32, which has set goals around carbon reduction – with energy efficiency as a key component of its framework.
- But despite great progress in the state and the country on energy efficiency, significant opportunities still exist.
- So, how do we get there? It's clear that advances in technology, such as IT integration strategies, will be crucial to enabling our ability to achieve the greatest possible reductions in energy usage.

- A technology-driven future requires new sets of skills for workers. After all, one of AB 32's goals is to "ensure that California will have a green technology workforce to enable transition to a clean energy future."

- Therefore, workforce development is also important to energy efficiency. Luckily, workforce development is, and has for a long time been, important to PG&E as well.

- The PowerPathway program is a core component of PG&E's strategy to produce a pipeline of skilled workers by collaborating with community colleges and industry to develop training programs.

- PG&E's vision is one of "stackable credentials," wherein opportunities for training and skill development exist from the technician level through to higher education – a true career pathway for the next generation of energy workers.

- This Initiative--The Energy Efficiency Workforce Sector Strategy--can help PG&E achieve its goals of workforce development and energy efficiency, while preparing a new generation of technically trained workers and reducing environmental impact within our service area.

- But PG&E can't do this work alone – our existing partnerships and new collaborations are required to help develop and execute this strategy.

- For that reason, we are pleased to welcome you to the launch of this strategy.

- By working together, we can achieve uncommon results for California. Thank you for joining us in this vision.

- I'm now pleased to introduce Panama Bartholomy from the California Energy Commission.

PANAMA BARTHOLOMY - Deputy Director for the Efficiency and Renewables Division California Energy Commission

- Thanked PGE, he was impressed that PG&E's workforce program encompasses the entire spectrum of occupations.
- Governor Brown has stated that the cheapest way to fulfill green jobs growth for the state is through energy efficiency employment, from zero net energy (ZNE) buildings to deep retrofits.
- The California Energy Commission (CEC) is working with CPUC on regulations for ZNE buildings – 2020-residential and 2030-commercial.
    - All multi-family – 40% below 2008
    - 15 billion existing commercial square feet: 50% ZNE by 2030
- Two major initiatives by the end of this year: Codes and Standards Action Plan 5-7 year, next three code updates will be announced in 2013, 2016, and 2019
    - Existing Building Action Plan is based on Representative Skinner's proposed legislation.
    - It is important to develop workforce development training to keep pace with and develop a prepared workforce to implement future incentives and regulations/requirements in California.

    - Code Updates help the state move towards its ZNE goals; this year's includes changes to Appliances and compliance information related installations. Green building code – implemented Calgreen 2010 – voluntary basis. Builds on this foundation. Clarity will come by 4th quarter 2012. It will reflect the single largest jump in energy efficiency in code updates the state has ever seen.
    - Just issued 45 day comment period on Friday, 2/24. It includes an increase of efficiency in homes by 33% per square foot vs. 2008 stds. It widens the criteria for what is acceptable, including solar photovoltaic as an efficiency measure with on-site generation.
- Tiered levels of Calgreen – Tier 15% better than code
- Tier 2 – 30% better than code
- Tier 3 – 45% better than code
- Just under 50 communities in CA adopted Tier 1.N

Assessment/financing and workforce development provisions, including:

1) Standards – workforce
2) Work with industry and government leaders to define and undertake voluntary actions
3) Move to mandatory requirements.

Energy Upgrade CA Home Retrofit Program – BPI Building Analyst

2009-CA only had 2,500 BPI Building Analysts

2012-now there are 25,000 BPI Building Analysts in CA

- Match incentives with clear standards for workforce to "train to."
- CEC is working closely with CPUC on bridge period funding
- There will be more limited funding than in ARRA years.
- Lisa Paulo is extremely committed and gets the job done despite the 30% vacancy rate in every division of CPUC. It is with great pleasure that I introduce Lisa Paulo

LISA PAULO – CPUC

- Cited 2008 Energy Efficiency Strategic Plan with $311 billion for three years.
- There is a chapter on workforce training.
- By 2020 – trained and fully engaged in demand side management (DSM) activities. DSM is being used in an expansive sense of the term and includes everything on the customer side, including demand response, energy efficiency, and renewable energy.
- The plan also calls for inclusion of K-12 educational activities and engagement.
- We requested the UC Berkeley Don Vial Center report
- For Energy Sector Strategies, it will be important to see partnerships form and function over time.

- Please visit: http://www.sectorstrategies.org/
- It is with great pleasure that I introduce Ellen Avis from the Don Vial Center on Employment in the Green Economy, UC Berkeley Labor Center.

Ellen Avis, UC Berkeley Labor Center

- $11b in EE investment creates just 5000 new jobs in 2020
- There are four critical elements to a Sector Strategy:
    1. Dual customer focus
    2. Partnerships of employers, trainers, labor, colleges and others for workforce planning
    3. Employers have 'skin in the game' through funding or hiring commitments
    4. Career pathways with stackable credentials
- As this Energy Efficient Sector Strategy gets underway, we would recommend the Steering Committee consider the following questions:
    - What workforce issue is impeding market expansion in this area?
    - What market segment is being targeted?
    - What occupational track is this focused on? (trades, professional, contractor, etc)
    - What are the existing training resources that can be leveraged?
    - What are the appropriate certification mechanisms to ensure high road work?
    - What is the relationship between this target job and the contractors doing EE work? How to ensure quality?
- Now I am pleased to introduce Mark Ouellette to discuss a sample of a high-road workforce training program that is working.

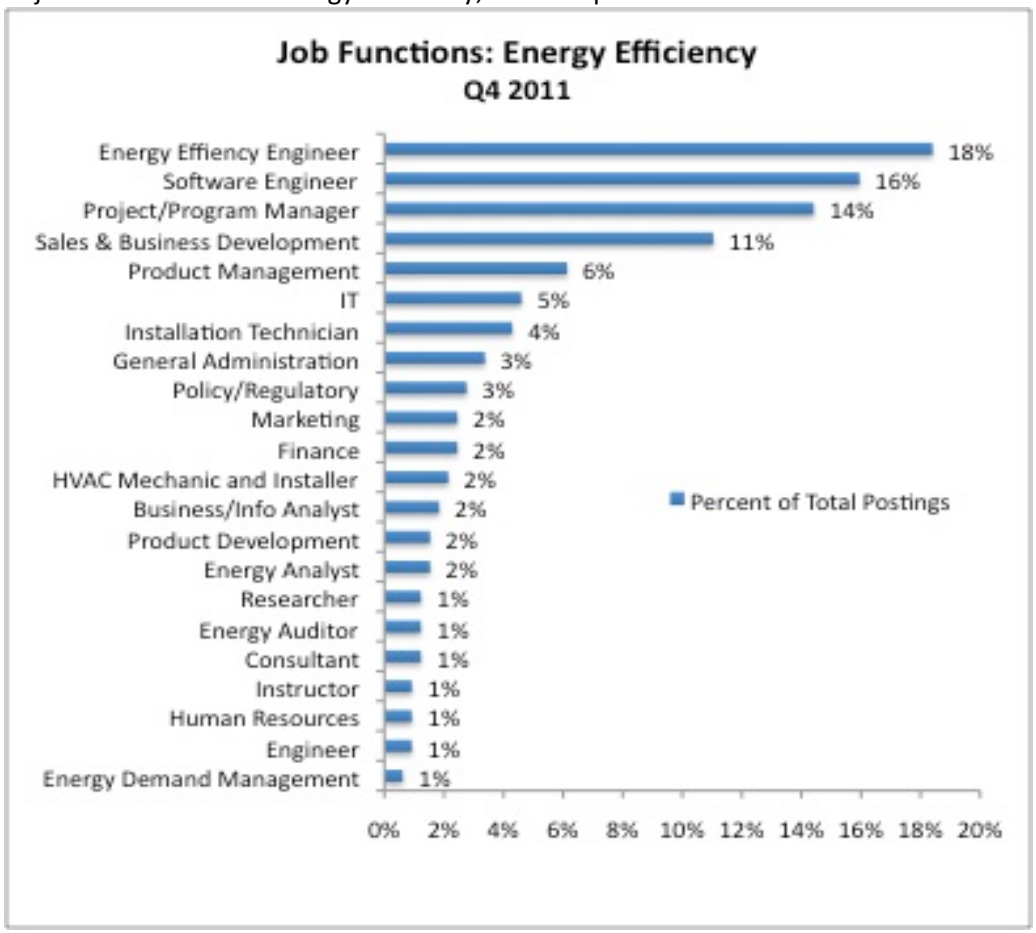
Mark Ouellette, ICF International, CALCTP Administrator

- The goal of CALCTP is to provide support to help sell, select, design and install lighting systems for new and existing commercial, industrial and institutional facilities that are:
    - Energy-efficient & cost effective
    - Installed and function correctly
    - Improve the quality of the lighting for commercial facilities
- CALCTP was developed in response to findings cited in the 2006 California Commercial End-Use Survey report; which indicated that interior lighting (29%), refrigeration (15%), and ventilation (12%) were the top commercial uses of electricity.
- There is a state-wide certification for electricians and businesses
- Evidence is showing that a certified electrician and company is seeing discounts deeper than anticipated because of knowledge of the system.
- Electricians are gaining skills quickly as seen by, "*The CALCTP program connected the dots for me. It would have taken me six years in the field to cover what I learned. This program is a must for all electricians."* Macario Musquez, Electrician, **Collins Electrical Co., Inc.**
- Businesses are seeing new opportunities through incentives such as Sacramento Municipal Utilities District and are growing their business model. "As a result of the program, we have hired a sales professional and are adding energy auditing to our services. The program has expanded our business model

- Now it is my pleasure to introduce Rebecca Eaton and Brad Hurte to discuss a Sector Strategy within the PG&E regional territory.

Rebecca Eaton, ICF International

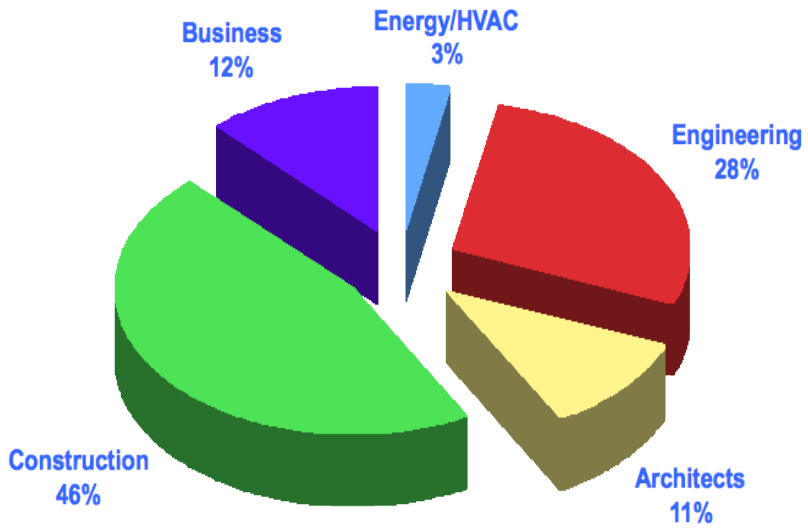
- Of jobs ads that do list energy efficiency; 70% are professional versus trades.



- Employers seek:
  - 2-5 years working experience in highly quantitative environments
  - Electrical Engineering/Construction experience (25%)
  - Software Development (25%);
  - HVAC (15%)
  - Project Management Skills (10%)
  - Solid writing/presentation skills
  - Good soft skills

- Preliminary Energy Sector Projections
  - Region's energy sector trends track statewide energy sector trends
  - 2006-2011 - 11.0% decline in employment
    - vs. 11.4% statewide
  - 2011-2016 - 6.6% employment growth

        - vs. 5.1% statewide
    - Opportunity for greater alignment between training offerings and employer needs, with focus on skilled workers
    - Challenging to line up data given employer preferences for experienced candidates versus recent graduates

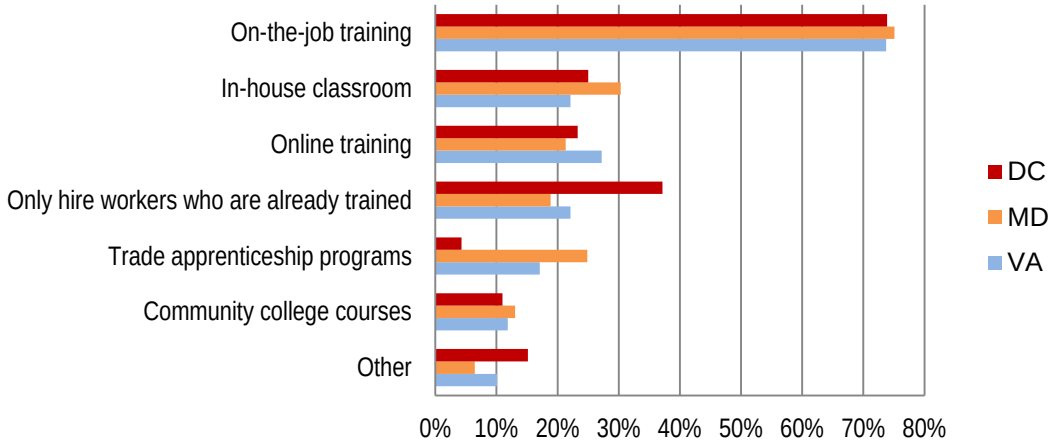


- Energy Sector Projections—2016
    - Industrial Building Construction
    - Commercial and Institutional Building Construction
    - Nonresidential electrical contractors
    - Nonresidential plumbing and HVAC contractors
    - Air Purification Equipment Manufacturing
    - Industrial and Commercial Fan and Blower Manufacturing
    - Heating Equipment (except Warm Air Furnaces) Manufacturing
    - Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing
    - Relay and Industrial Control Manufacturing
    - Architectural Services
    - Engineering Services
    - Drafting Services
    - Building Inspection Services

Now that you have seen the projections, I'm going to turn it over to Brad Hurte to discuss further employer preferences.

Brad Hurte, Workforc Incubator

- We surveyed employers on their training practices and preferences
    - Concern: some do their own training, and look at it as a competitive differentiator; other training programs may represent competitive threat.
    - Concern: circumstances in industry move too quickly for conventional educational programs to keep up with changes; we'll talk about contract and extension programs in the next slides
    - Employers expressed interest in PG&E's involvement: makes this truly a <u>sector</u> strategy



- California employers express opinions largely in line with other regions.
- Top three items (OJT, in-hosue, on-line) can be addressed through contract and extension programs at Community Colleges & State Universities.
- This is training relevant to a specific company or group of companies.
- Colleges are already in this business - an example is on the next slide.

- Examining profile of unemployed and/or underemployed:
    - Training programs can be used to transition unemployed and dislocated workers, a significant source of experienced talent.
    - Tremendous talent sitting on the sidelines in this region. There is an opportunity to help people repurpose their careers
    - Community colleges provide opportunity for new courses and certifications to position these workers in the energy arena.
    - E.g., mechanical engineer may need minimal training to upskill for an Energy Efficiency engineering occupation.
- Yet, the audiences that need retraining aren't being hit by the Energy Centers as reported from UC Berkeley's Don Vial Center. A look at the three largest industries by jobs:

Industry Area	Market Sector (Statewide)	Estimated Reached by PEC	Percent Reached
Engineering/Architectural Design	58,200	13,053	22%
Construction	161,200	9,064	6%
Facility Operations and Maintenance	163,000	3,263	2%

- California State University system and various community colleges maybe be able to meet the need:
    - An analysis of "Tier 1" California State University programs—a quantitative analysis (inventory of programs from Chancellor's Office ranked by degree units) identified 7 top programs programs addressing those program areas with the top 20 occupations (Construction, Engineering, Architecture, Energy/HVAC, Business).
    - Likewise, a quantitative analysis (inventory of programs from the Chancellor's Office) of the Community Colleges in Northern California identified 17 schools as top tier across the program areas addressing the top 20 jobs – same program areas & jobs as CSU slide.
- In Summary, Colleges can provide a pipeline of students for energy efficiency occupations.
- CSUs and CCs are also a source of customized programs designed to meet specific industry needs (e.g., contract and extension programs)

So, how are we going to get there, one way is to develop pre-requisites online courses to funnel students into these careers, with that I want to present Robert Marcial from PG&E.

Robert Marcial, PG&E

- We want to introduce you to an investment we are making and specifically in the design and development of technology enabled learning.
- As we identify potential gaps between employers' needs and training and education offerings, an important next step is to address those gaps.
- With that in mind, PG&E is making an early investment to make our courses more accessible and interactive to the user, with the opportunity for individuals to access the courses on-line with Technology Enabled Learning.
- Technology Enabled Learning, or Web-based training, has many advantages and among them are reaching a global and geographically dispersed workforce, providing self-paced instruction that can be taken anytime at the learner's convenience, leveraging existing content to repurpose, building collective subject matter expertise, reducing travel and lodging costs,

interfacing with learning management systems that provide enrollment capabilities, tracking, reporting, and more.

Let me introduce Lisa Nonamaker from ICF to show a short demonstration of a new web-based course we have developed at PG&E. We look forward to your feedback on using Technology Enabled Learning to build the region's understanding of key energy efficiency concepts and increase the competency of the workforce.

Lisa Nonamaker, ICF International

- I will be sharing with you a brief demonstration or montage with short clips from a Technology Enabled Learning course entitled *Introduction to Solar Geometry*.
- The purpose of today's demonstration is to share with you the look, feel, and interactivity of this type of offering.
- This particular course was developed by leveraging some existing content as well as augmenting it with the expertise of both PG&E and ICF subject matter experts.
- The intended audience for this particular course spans many different potential training participants including, Architects, Installers, and even the general public who are interested in taking this course as a pre-cursor to additional classes in their topic of interest.
- The purpose of today's demo is to show you the interface and interactivity. Later, and during breaks, you will see we have a few computers set up [enter location here] and we invite you to launch one of the modules for this course to experience it first-hand. Brian Kleinfelt, a Senior Instructional Systems Designer, and the Project Manager for the development of this course, will be here to answer any questions or take feedback you may have to offer. Let's begin the demo.

Breakouts:

- Participants were broken out into five facilitated sessions to discuss the findings and make recommendations for building a PG&E regional Sector Strategy.
- The entire documented comments are attached, but summary of the discussions include:
    - While we are asked to focus on "Hot Jobs" it's more about "New Skills" needed in all jobs such as:
        - Sales—how to motivate end user on the benefits of Energy Efficiency projects
        - Financing—developing an understanding to the business and end user that there are "green financing" options that make sense.
    - In terms of models, we have the elements between apprenticeship, community college, on-the-job training, and the energy centers, but we aren't coordinated, nor can the systems react as a whole quickly to meet changing industry needs.
    - We can get there with a communication mechanism and a way to align individuals into the appropriate career paths.

Next Steps:

- 19 Individuals signed on to be Steering Committee members for the initiative. The initial meeting will happen within 45 days of convening.
- 42 Individuals signed on to be Advisory Council members for the initiative. Will provide expertise to Steering Committee members.
- Meeting notes will be sent to participants and a Steering Committee will be formed.

Focus Group Notes:

All attendees were divided into five focus group sessions, with the EWSS team assigning focus group members to get an approximate mix in each group that mirrored the overall set of participants in the Convening. The notes from those focus groups are on the following pages. Although many diverse ideas were generated, the EWSS team identified three categories – Hot Jobs, New Skills, and In Our Way - that produced the strongest patterns for further emphasis.

Focus Group Topics	Top Priority Responses			
Hot Jobs	Facility Managers	Engineers	Sales	Energy Auditors
New Skills	Energy Efficiency Principles	Commercial PV Design	Energy Engineering	
In Our Way	Funding	Time (Bandwidth)	Instructor Skills	
Response Color Code	5 of 5 Focus Groups	4 of 5 Focus Groups		

Focus Group 1 - San Ramon, CA February 29, 2012						
Hot Jobs	**New Know-How, New Skills**	**Collaborative Models**	**In Our Way**	**The Tasks**	**The Process**	**The People**
sales	soft skills	on-the-job training/apprenticeship	money for lab materials	identify logical regional clusters, needs, and career lattices	communication	leadership/steering committee
facility operators and managers	energy efficiency	contract education	time	define scope: VEP? Trades? End goal?	effective employer engagement/commitments to hire/OTJ training	pilot: need? What's working? What's missing; ramp up
engineers	commercial PV design	internship partnership/stamp of approval	instructor skills	HVAC- what existing? What's new? Title 24. What are new goals?	employer engagement then incentives or "punishment"	RICOG: build on this but need to create demand
HVAC contractors/techs	energy engineering	partnership WIBs	liability issues/stipends	updating existing training for incumbent workers	RICOG (model)	
entry level solar and weatherization: R/C/I	EV/storage	CBO/employee/colleges/internships/WIBs (one-stop employee centers)	WIB's aren't cross geographic	do existing training opportunities meet goals/needs? Where are gaps?	look at apprenticeship as a model to toll out (not just restricted to "trades" as a sector strategy	
energy auditor- R/C/I	interdisciplinary IDSM	online- coordination and colleges/utilities	WIB governance varies by county	engage regional clusters to identify new training	pilots- to create linkages (smaller scale) (no one size fits all)	
project managers	multiple skills: building systems, finance, demand/BD/drive, customer interface, technical skills	train the trainer	understanding demand	where are you finding employer-driven linkages?	use codes/standards to inform/engage employers and consumers	
software developers	use of new technologies	mentorship program	funding			
control systems programmers	contracting and insurance	volunteer programs (job shadowing)	commercial vs. residential apprenticeships			
up skill construction workers for green jobs	latest technologies must be learned by installers/maintenance and communicated to customers	incumbent worker certification model (PGE example)	preference for BAU (contractor)			
distinguish between new/up skill	1st line technicians need customer service and technology skills. (up skills?)	Collaborative grant application (SITM DOE grant)	linkages between the different industry/utilities/colleges			
water efficiency/waste water treatment	integrated project delivery	Partner with Ind. Associations	backlog of pipeline to apprenticeship (2 yrs.), no movement to journeyman level			
Smart Grid construction technologies (electricians, HVAC, IT)	energy modeling software	high school- academies to foster ind. Participation				
verification/rating inspectors	industry standards/codes; title 24					
Haz, waste issues/specialists						
electric vehicles/storage	new language, relevant policies/codes					
	demand response					

Focus Group 2 - San Ramon, CA February 29, 2012						
Hot Jobs	**New Know-How, New Skills**	**Collaborative Models**	**In Our Way**	**The Tasks**	**The Process**	**The People**
sales	jobs vs. skills- unemployed. Where is this going?	on-the-job training	money for lab materials	gaps- what have vs. what need. Educating end users? Maybe better educated.	communication	leadership/steering committee
facility operators and managers (largest segment)	energy efficiency	contract education	time	defining the sector, subsectors, stakeholders, strategies	J.D. stakeholders- occupations at the table; facilities/business managers; more employers	
information systems	commercial PV design	WIB's	instructor skills	prioritizing sectors- commercial	building partnerships	
controls/leverage systems	energy engineering	educating on rebates/incentives	funding for projects	packaging- renewable/residential	expanding worker knowledge base- counseling	
engineers	marketing of financing	financing and long-term users	lack of programs	know the training needs	strategize on occupant ed.	
energy audits- entry level (BPI) pre-apprentices	education	PV- leasing models. Esco model; marketing of financing now; Cash positive day 1	BPI- understanding programs; property owners - funds	UEP- help prioritize	focus groups with key audiences: apt. complex managers; ask; solicit feedback to ID needs. Ex. Auto industry	
construction laborers (green)	end user education	internships and field experience	commercial audits- don't have sales skills	connecting = key elements	break-up into key industries	
green finance- to fund projects	partnership- C.C/industry/apprenticeship ex. Lancy)	WIB- base level	rebates/funds: owner/can't get funding. KWH, ROI strategies	focus discussion with stakeholders	educate- new codes	
power systems engineer	utilities- convener; field lab	volunteering/add to resume; make relevant to new industry	show cash flow	define the drivers; energy pricing not a good driver	what your needs are	
sales- commercial; residential/in most cases, general contractor	connecting manufacturers	transferable skills	lack of real apprenticeships and access to field alternatives	focus group/survey = end users, or why not hire	should know finance/packages/sales	
IT element/Building control and dashboards	skills of incumbent workers to move up the career ladder		manufacturer- create new system, competitive edge	determine technology- ex., early wireless		
sales engineer: show technology (ex. Digital copier)			skills training connected to career pathways			
HVAC building Automation			understanding what existing occupations fit into jobs.			

Focus Group 3 - San Ramon, CA February 29, 2012						
Hot Jobs	**New Know-How, New Skills (auditors)**	**Collaborative Models (auditors)**	**In Our Way**	**The Tasks**	**The Process**	**The People**
sales: product sales, solar sales, EE classes- commercial	energy efficiency	on-the-job training	money for lab materials	What's out there? Incoming, placement	communication	leadership/steering committee/design strategy oversight
facility operators and managers	commercial PV design	contract education	time	Pieces fit together? Roles and responsibilities	demand side (more carrot)	LCC: authorities with jurisdiction author the standards
engineers	energy engineering	national labs and technology transfer	instructors skills	CC and employer collaboration over	phase 1: advisory group formation or identification	advisory council: experts turn vision into action.
auditors (commercial, residential, industrial)- best practices, standardized credentials	need to calculate financial benefits (ROI)	DTSC- Dept. of toxic substance control	commercial PV design- other requirements (over and above training)	what is the demand and what will sustain it? regulation? Future jobs? Incentives?	phase 2: designate sector navigator (R&R)/funding/curriculum model, etc.	community colleges
control techs	technical and soft skills	community college and university plus industry- teachers/guest instructors create collaborations, hiring of students, internships	controlling waste/recycling	job task analysis	Phase 3: engage stakeholders (plan and do)	green academy
energy techs	blending IT into audits	Industry Assn.: CA Community college; AEE, AESP	laws/liability	curriculum development	phase 4: commitment/actions "owners"	
project managers	product knowledge, innovation awareness	CC and CSU- planning ahead	motivated buyer; demand?	look at apprenticeships	phase 5: measuring/reporting status	
data analysts	Title 24 energy code (driver)	colleges and employers		development of use of technology	phase 6: redesign	
software developer engineers, IT	incentives knowledge	candidates		engage/entice civic engagement		
placement specialist	behavioral skills/sciences	licensing boards		engagement: web-based dialogue; show proof (money, other benefits); recognition		
agriculture position- precision agriculture, hydraulic energy	bi-lingual/multilingual	certification		certification from trusted program		
utility workers	utility rates					
sales project managers	general education (basics)					
software engineering/IT	calculate and explain ROI	step 1: develop/identify advisory body; regional advisory body; skills/capabilities bodies (elevate 1 to lead)				
control technicians	technical and soft skills	step 2: identify next steps/design plan of action				
energy technicians	blending IT into audits					
data analysts		**Collaborators:**				
utility workers		utilities				
energy managers, technicians, etc.		labor				

Focus Group 4 - San Ramon, CA February 29, 2012						
Hot Jobs	**New Know-How, New Skills**	**Collaborative Models**	**In Our Way**	**The Tasks**	**The Process**	**The People**
sales	energy efficiency	what about employers investing into education fund? CRTTC model	funding for course programs	examine collaborative models and how they are funded (employers invest)	communication	leadership/steering committee
facility operators and managers	commercial PV design	CALCTP	money for lab materials	policy deep dive (barriers?)	align tasks with code	CABAG region model
engineers	energy engineering	on-the-job training	time	DACUMS	inform implementation plan (now and in future)	NGOs/trades/utilities/employers already in place to tackle barriers
senior managers, execs, program managers= "graying of workforce"	renewable energy and tech developments- we train our own to groom skill set	contract education	instructor skills	review/summarize key relevant reports (maybe: clearinghouse)	ensure tasks are consistent	area pollution control district involved too
CSP; grid developments (do DACUM of each cos. In region)	engineering Co. technicians- train own reduces cost. Diligent, willing to know, gather info to hand off to engineer	JATC- net zero-integration	challenge engineers not immediately ready to add value to energy efficiency companies	core competencies- consistent student learning outcomes; develop/publicize	feasibility screen- short and long term	leverage existing groups (energy Cal a plus)
trained HVAC technicians will be in short supply	E2 +RE leads to integration	energy upgrade CA- connecting people to jobs. BPI CCAs to part of PGE	vocational + education- lack of transferability- need to streamline/cooperate	clearinghouse of training models/courses	regional focus (explore articulation) and continue connecting to workforce	include market makers for innovation (incubator/JV/investors)
equipping smart homes (as tiered utility rates come in)	even more tech people need to teach about the impact, relevance, importance of pieces	do businesses/employers want a hybrid degree? Business with technical? (at graduate level, makes sense)	need to know classes will be filled before starting (conduct LMI analysis)	process for employers to come together to ID core competencies and common elements as needed by smaller businesses.		CEC/CPUC/CARB/WIBs- also be inclusive
electronics tech	sales- how to sell a job and understanding of finance mechanisms available	DOE IATC- 2 in CA. one in NoCAL-SFState. Industry assessment centers graduates are skilled	need better communication and coordination between colleges and training and employers. Regional coordination	CEL/CSU system/community college need framework for ongoing energy education (tech, social)		high schools
smart meter data analysis- building regional view with data crunching	combo- technical/engineering	social SCRTTI collaboration as possible model	trainers would like employers to commit to hire (maybe RFPs could specify to hire from workforce programs). Sometimes being done, ex. Sonoma	idea- faculty internship/sabbatical into employers and regulatory bodies		
fuel cell techs	train the faculty	PGE integrated energy solutions- employers as instructors	need more rapid response training	build in research innovation. State-wide, incubators/labs		
EVITP- electronic vehicles		maybe energy upgrade CA frameworks to commercial	predictability of public policy to justify job creation (will also feed into education for planning purposes)	explore with CPUC- can they mandate or support certainty- e.g., hire x for audits/energy work and ratepayers paying for it		
		cross-platform sales tech		WIB and community college share best practices (pre-screen, placement)		
		EVITP				
		viable articulation agreements. Between technical, 2-year and 4-year				
		pre-app with community colleges				

Focus Group 5 - San Ramon, CA February 29, 2012						
Hot Jobs	**New Know-How, New Skills**	**Collaborative Models**	**In Our Way**	**The Tasks**	**The Process**	**The People**
sales	energy efficiency	On-the-Job training	money for lab materials	ID entry and exit points, clarify target of who comes out of process with skills needed, who's coming in, pathways	communication	determine players, plans
facility operators and managers	commercial PV design	contract Education	time	measuring progress: how do you know someone is "done"	website- email, docs, disc. Groups	**leadership/steering committee:**
engineers	energy engineering	apprenticeship programs (paid for by Vets admin)	instructor skills	existing exams/certifications and training	marketing/PR outreach. Clear message and brand	EWP, Funders, Labor Educators, WIB, building managers-operators, end users
project managers: tech, project management	water efficiency- inside, outside buildings	high school curriculum, skyline college, CSU, internships: pathway	funding	document best practices	get participants to rebrand their websites, align to mission statement	Tony Castillo- WIB
Director of sustainability/LEED Certification	control systems	multidisciplinary training- very different orientations. Not systematized.	siloed programs/efforts/need to coordinate/partner	look at gaps from data	feedback loop- things are changing fast. Need to stay up-to-date	EDD
certifier: energy efficiency	energy performance	CALCTP model- match with jobs open. Tech, big, customer service, writing, web design, sales training- get them ready. Certification then partnerships.	making the economic case- at residential level, rental, etc.	ID the actual sectors- is it regional, tech focus, state?	good behavior rewarded and recognized. Reinforce success. Show someone cares.	Kevin O'Brien- Energy Commission
analyst/auditor	data analysis/collection	cross training within company. Ex.: demand and sp./energy efficiency	high cost to train 100 electricians across state- need online education or Adobe Connect to see ed., mentors and lab time	create app. Programs to meet expected needs	look at existing content and curriculum. Don't reinvent.	Gerald Bernstein- CC
HVAC/trades generally	integrating tools that exist	job shadow	divide up into sectors: design, testing, validations- but then collaborate connect	take lessons from CALCTP efforts to link training to jobs	key stakeholder buy-in	EE coordination council
Smart Grid/IT Jobs	need new tools, more training.	online communities- career pathways (biz., nonprofit, ed)	money for training/can't put in new students or courses	define stackable credentials- communicate them		Dylan Romero- CSU
Compliance/2013	ex: comp. maint. Mgmt., energy usage	create real world connection for education		create a document (strategic plan?) mission statement, roles, etc.		include certifying bodies- Ashray?
trainers	Onsite energy audit skills- online tools	work with professional associations to understand needs		need way for all to communicate, like a cop.		knowledge of regional affairs
	ensure tools meet standards and meet needs			match up jobs, those with needs, educations, WIBs		
Issues	onsite generation			Look at RECOG- Cal. WIB did; look at econ data; develop criteria of who on each reg. team; tailor plan to econ		advisory council: Harvey Delorm (learning)
budget/state	tenant behavior			Disc. Groups- important short-term topic		
staff rehiring- can't backfill in time	doing business smarter			do we need to carve out different efforts between mid-level and exec level efforts- statewide vs. regional, or technology/programmatic players		
lack of trained faculty	ability to distill data, connect to end users					
	Bldg equipment energy star program computerized maintenance					

Energy Workforce Scoping Session – May 30, 2012

Purpose

Determine the strategy, deliverables, and timeline to guide the Energy Workforce Sector Strategy in 2012 as a platform for 2013-2014 energy efficiency workforce initiatives in PG&E's service area.

Background

The PG&E Energy Workforce Sector Strategy (EWSS) was launched on February 29th, 2012, to accelerate progress toward achieving the CPUC Long Term Strategy for Energy Efficiency. EWSS is currently conceived as an umbrella strategy for multiple energy efficiency subsectors – HVAC, lighting, building control systems, building envelope technologies, etc.

EWSS will develop a workforce capable of marketing, designing, installing, and maintaining non-residential energy efficiency technologies. Over the long term, EWSS proposes to add workforce development initiatives for distributed generation and demand response to the present energy efficiency focus, completing a Sector Strategy for "Integrated Demand Side Management" or IDSM.

The May 30th meeting convened industry stakeholders as a prelude to assembling the full Steering Committee comprised of industry, education, and workforce system representatives. Sector strategies are logically based on priorities established by industry, which was the main purpose of this meeting. A major he Steering Committee

Attendees

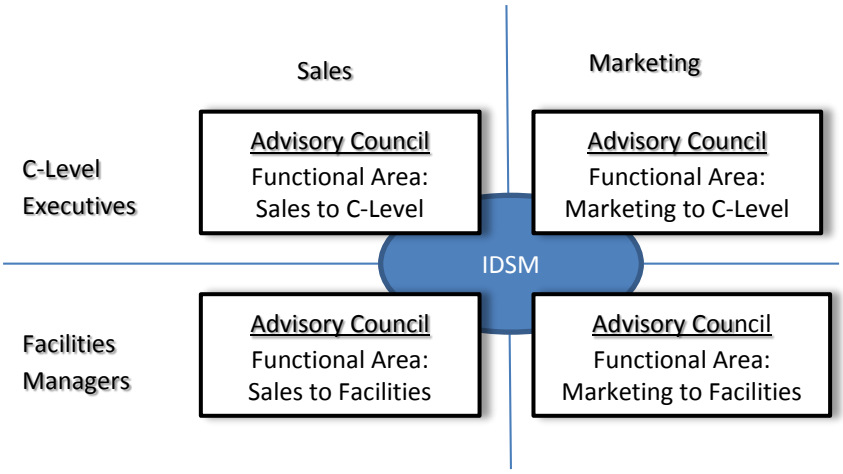
Darlene Besst, NECA
Jim Caldwell, Workforce Incubator
Daryl DeJean, Emerging Technology Associates
Harvey DeLorm, CSU Chancellor's Office
Terry Fry, Nexant
Jessie Halpern-Finnerty, Don Vial Center
Yonnie Leung, PG&E
Elizabeth Lowe, Barakat Consulting
Laurie Maak, WestEd
Robert Marcial, PG&E
Joanne Martens, The Intelleto Advantage
Meg Matt, AESP
Pam Murray, PG&E
Kevin O'Brien, Energy Commercialization
Michele Rodriguez, BKI
Lisa Shell, PG&E

Outcomes

Strategy: Starting with energy efficiency, develop the workforce to drive growth of the Integrated Demand Side Management market through more effective engagement of executives that own and/or operate non-residential buildings.

Tactics:

1. Form Advisory Councils per the diagram below, with further direction from the Steering Committee on the mission and makeup of each.



Notes: *Marketing – analytics, segmentation, messaging tailored by segment*
Sales – messaging by segment and C-Level/ Facilities Manager contact, consultative selling
Comment: *It's possible that Advisory Councils will be combined into three or fewer Councils.*

2. Through Advisory Council interaction with C-Level Executives and Facilities Managers, identify and prioritize the messaging and presentation elements necessary to create a positive environment for energy efficiency adoption.
3. Develop and deliver curricula by leveraging existing programs that align with the above.
4. Build collaboration with industry, education, and the state workforce system to offer courses and promote enrollment in these curricula.
5. Drive workforce development across the full spectrum of occupations via linkages to other sub-sector workforce programs in lighting (CALCTP), HVAC, building control systems, building envelope, etc. in non-residential buildings.
6. Create templates that can be used in EWSS and other Sector Strategies.
7. Make an impact in 2012 to serve as a platform for 2013-14.
8. Link to other utilities' workforce development programs on an opportunistic basis.

Timeline:

June 30	Form Advisory Councils
July 15	Full Steering Committee – approve 2012 EWSS deliverables and plan
November 30	Launch the first pilot cohort [course(s) to be determined by Advisory Councils]

Assignments:

Steering Committee coordination	Jim Caldwell
Advisory Council formation	Jim Caldwell
Linkages to subsector programs	Lisa Shell
Steering Committee participation	All present at the May 30th meeting
Advisory Council participation	Volunteers from the May 30th meeting

Discussion

Training people for jobs that create new demand for energy efficiency is the focus of EWSS. As these training programs begin to produce results – new energy efficiency projects – the design, installation, operations, and maintenance workforce needs to be prepared to address new technologies and meet new standards.

"Increasing market adoption rates" is the key variable in creating new demand for non-residential energy efficiency solutions and meeting the goals of the CPUC's Long Term Strategic Plan. This strategy involves engagement of C-Level Executives and Facilities managers in a dialog that causes them to change from "business as usual" to higher energy efficiency adoption rates. In order to be effective, market adoption activities needs to occur between energy efficiency systems/services providers and the decision-makers who own and/or operate non-residential buildings. These decision-makers are typically C-Level Executives – CEO, COO, CFO, etc. There are excellent examples of executives in these positions generating positive cash flow by investing in energy efficiency. In many cases, these C-Level Executives rely on recommendations from their Facilities Managers before committing to new energy efficiency solutions.

The EWSS Steering Committee is initially focused on up-skilling the energy efficiency systems/services providers' incumbent workforce to more effectively drive market intervention strategies with potential clients (C-Level executives and Facilities Managers). It's typical that executives, engineers, and program managers at very senior levels interface with these potential clients, making up the target audience for training in market intervention strategies. High-level definition of the training includes:

Marketing – analytics, segmentation, messaging tailored by segment
Sales – messaging by segment and C-Level/ Facilities Manager contact, consultative selling

Curricula will integrate knowledge, skills, and abilities in technical, business, financial, interpersonal and analytical domains within the energy efficiency space. Initial instruction is likely to be delivered by industry practitioners with fifteen or more years experience in energy efficiency.

There may be a rationale and demand for seminars or symposia based on the above training to educate Facilities Managers and C-Level Executives.

Follow-on programs are needed to build the pipeline of professionals to assume market intervention responsibilities after further real-world seasoning.

Linkages to the trades and skilled craft training are essential to assure a comprehensive workforce solution for installation, operations, and maintenance.

EWSS Project Team Directional Planning – June 26, 2012

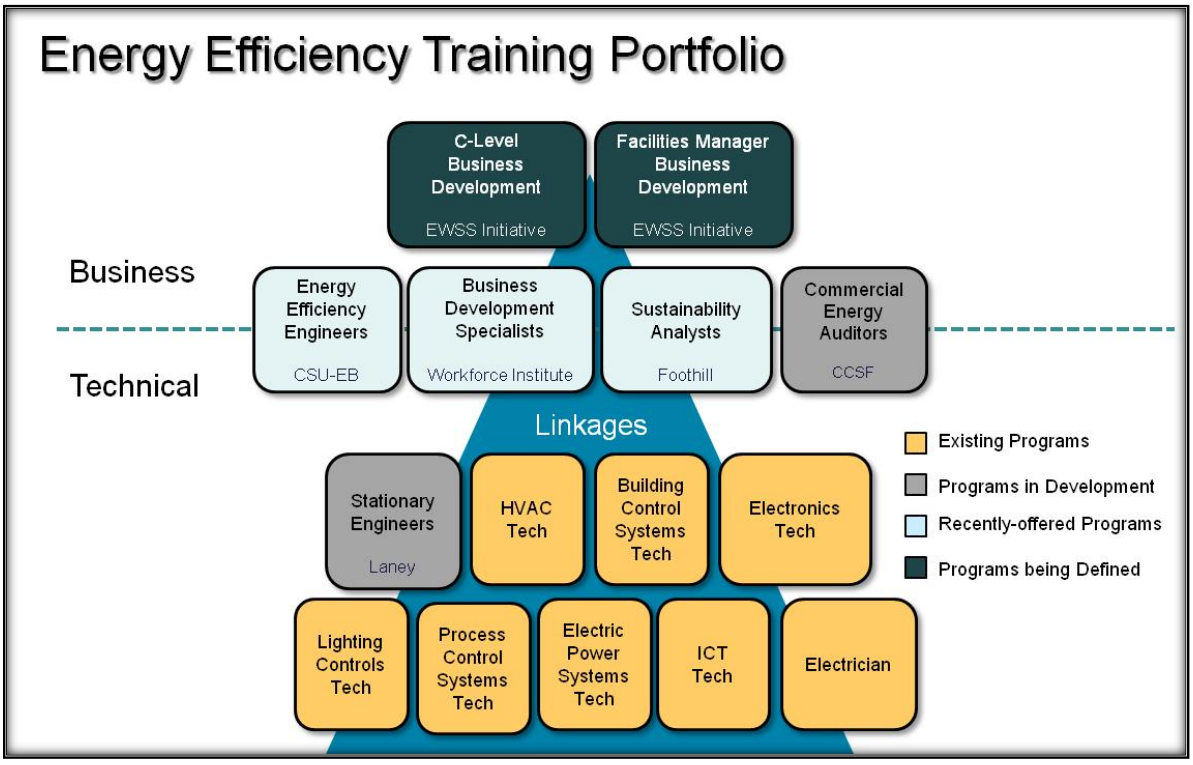
Purpose

Modify the Workforce Incubator Statement of Work to align with direction set by the Steering Committee on May 31.

Attendees

Lisa Shell, PG&E
Jim Caldwell, Workforce incubator
Don Chislow, Workforce incubator
Brad Hurte, Workforce Incubator
JD Stack, Workforce incubator
Bob Yapp, Workforce Incubator

Proposed Curriculum Lineup



Overarching EWSS Theme:

Drive job creation and address the full spectrum of workforce needs to implement the CPUC's Long Term Strategy for Energy Efficiency. http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf.

EWSS Governing Principles:

1. **Priority 1:** Demand creation is first priority

    a. Achieve higher energy efficiency adoption rates with decision-makers (C-Level executives)
    b. Create positive energy efficiency recommendations from Facilities Managers
2. **Priority 1 Target Audience:** The initial target audience for new skills development is incumbent workers currently charged with energy efficiency demand creation; the secondary target audience is students and career-changers from which a recruiting pipeline can be built
3. **Priority 2:** EWSS monitors concurrent and parallel workforce development, training, and education programs at all levels, creating linkages with Priority 1 and Priority 2 programs as appropriate
    a. Bachelors and Graduate-level
    b. Community College
    c. Labor Union JATCs
4. **Priority 2 Target Audience:** The full workforce spectrum is addressed by linking EWSS initiatives and associated resources to existing and proposed workforce programs
    a. Stationary Engineers
    b. HVAC Technicians/Sheet Metal Workers
    c. Lighting Technicians/Electricians
    d. Building Control Systems Technicians
    e. Process Control Systems Technicians
    f. Other
5. **Segmentation:** Creating more effective engagement with C-Level Executives and Facilities Managers requires market segmentation to determine appropriate financial and technology training for building classification, size, nature of ownership/operation, etc.
6. **Data-Driven:** C-Level and Facilities Manager engagement training will be based on research with stakeholders in those positions as well as evaluation of proven models, parameters, and justifications
7. **Bridge to the Future:** In 2012, the EWSS Steering Committee will build and test a platform of strategies and programs that will guide development of EWSS programs for 2013-14
8. **Sustainability:** Training programs will be made sustainable through collaboration between industry, education and workforce system stakeholders
9. **Leveraged Curricula:** Existing curricula and case studies will be leveraged to the extent possible in creating training programs for more effective engagement with C-Level and Facilities Managers
10. **Modularity:** Training programs will be tailored such that they can be delivered as modules within existing academic settings or delivered through short stand-alone courses
11. **Credentials:** Industry recognition of the education/training is a key objective for EWSS programs in meeting the needs of employers (recruiting) and students (employment and career advancement)
12. **Accessibility:** To the extent possible, training programs will evolve to technology-enabled platforms that allow access across the barriers of time and distance
13. **Implementation:** The EWSS Steering Committee plans and manages implementation through its own actions and those of Advisory Councils established for collaboration of industry, education, and workforce system stakeholders
14. **Progress Reporting:** The EWSS Steering Committee provides progress reports and metrics for PG&E review to assist in fulfilling PG&E's responsibility to the CPUC

Stakeholder Leadership Meetings – December, 2012

The EWSS project team convened both Advisory Council and Steering Committee members in parallel discussions to solicit feedback around 2013 strategic planning.

In both meetings, recent research was shared regarding the alignment of education and training programs to market needs, and discussed (1) priorities for building programs responsive to industry, (2) cross-stakeholder engagement, and (3) the recommended structure to guide EWSS development. Breakout sessions for the community colleges and CSUs focused on priorities for 2013. Following is a summary of the priorities expressed by these two groups:

Community Colleges Breakout Group

P 1	P 2	P 3	Community Colleges Pathways Development Priorities		
			Sustainability ideology – cross discipline		
3			MAP • Commercial/Industrial/All of the above		
	2	2	Stakeholder engagement		Incumbent vs new hire training
			Legislation / Regulation	PATH for education	
			Global picture		
1	1		Reach decision-makers		
2	1		Outside funding	Personal energy intensity	Certifying agencies
			WIB partnerships		
			Union partnerships	Building owners & mgrs	NG vs elec
	3		Employer partnerships		
1		3	Research • employers / hiring patterns – complex map	Faculty development	
			Benchmarking EE on CC campuses	DACUM	
		2	Shareable innovation		

Pathway Priorities:

1. Develop a map of employment opportunities and pathways into them
2. Engage employers and other stakeholders
3. Acquire outside funding

P1	P2	P3	Community Colleges Recommended Advisory Council Structure	
			Special Council for new entrants	
4	1			Regional Activities Qrtly
			Regional consortia focus (Community Colleges)	Annual Convening
	1	2		Executive Committee (regional reps)
		1		Include K-12 (knowledge enthusiasm)
	3	1	Connect to DWM (Doing What Matters) framework	Sector navigator rep at all consortia meetings
		1		Goal – share resources & best practices
2	3	1	Need a mechanism to share resources & best practices	? Pay attention to market drivers and policies
				? Who will catalyze

Structural Priorities:

1. Develop a mechanism to share best practices
2. Conduct regional activities quarterly
3. (Not rated) Need to identify how the colleges will be represented as EWSS advisors

CSUs Breakout Group

P1	P2	P3	CSU Pathways Development Priorities	
				Incumbent & new workers
			Who are target audiences – Multiple Pathways	(Resource – Top Occupations List: Top 20 = 90% of EE jobs)
			Articulation agreements w/CCs in place + PLTW, MESA	But, need to focus on consumerization of smart energy / ICT & eco-integrated living (gap)
			Need – more to applied research	
			Internships, externships good	
	4	2		Help Faculty communicate with on best practices
				CSUEB certificate programs used instructors from industry – use that model
3	1	2	Challenge: Faculty not well prepared to teach (practical industry skills)	Industry engagement (PG&E did curriculum & instructors)
				Core technical curriculum vs
				Specialized skills needed
			Support core curriculum and graduates will find jobs	
			So where does specialized training come in?	
4	1	2		Grants come and go, as do programs
			Q: Who's going to pay for specialized training?	All levels of education are starving
				This is NOT just for utility workforce
			Most value from industry: curriculum development & lecturers	
			Consumerization of faculty, ICT	
			Need collaboration/network to find experts (call on as needed)	
			Faculty externships needed	PG&E may do a pilot in 2013
			Power infrastructure outdated	Smart energy coming (desk jobs, boots on the ground)
	1	1	Make bigger pie, i.e., pathways to prepare more students (start early)	Project-based learning may fit this model

1. Funding required
2. Need professional development for faculty

P1	P2	P3	CSU Recommended Advisory Council Structure	
			CEC welcomes this input on a game-changing sector	Keep meeting
			Great place to develop a plan	
6			WIB model works	Private, public, NGO, workforce development
1	3	3	Maybe combine with Steering Committee - "close the loop"	
			Frequency – quarterly	
			Mixer – Industry & educators	
			Reality – faculty stretched too thin	
	7		Look at other models of advisory groups statewide	E.g., state task force on health care

Structural Priorities

1. WIB Model works
2. Look at other models
3. Combine Advisory Council & Steering Committee

In both meetings, we shared recent research around the alignment of education and training programs to market needs, and discussed (1) priorities for building programs responsive to industry, (2) cross-stakeholder engagement, and (3) the recommended structure to guide EWSS development. All meeting documents can be found here on the EWSS portal (left-side of the page).

As we distilled our notes from each session, the following priorities rose to the top of the list. Our next steps will consist of:

- Developing a map of employment opportunities and onramp education pathways for key occupations.
- Further engagement of employers: we'll be developing an outreach program in early 2013, partly mirrored after models within the healthcare industry.
- Exploring additional funding streams: e.g., perhaps linking into Prop 39 funding priorities.
- Developing a professional development strategy which may include mentorship/train-the-trainer by existing employers as well as PG&E subject-matter-experts.
- Continuing to develop the Business Development Course and broadly integrating that content, once refined.

In terms of leadership team structure moving forward, due to overwhelming feedback, we've decided to simply have one core advisory team, comprised of education, industry, labor, non-profit, other. We'll be developing taskforces within this core group, as necessary, to manage individual projects. Throughout 2013, we'll be assembling this team roughly once a quarter.

Executive Committee Meeting – March 11, 2013

Attendees (identifier for comments):

Jerry Bernstein (JB)
Robert Marcial (RM)
Chris Graillat (CG)
Sheila Thomas (ST)
Natalie Culver-Dockins (NCD)
Denise Adams (DA)
"Participant" ?
Lisa Shell (LS)
Jim Caldwell
JD Stack
Brad Hurte
415-762-8160?
562-951-4000 (Sheila?)
661-380-4724 ?
916-653-0378 ?

Questions/Comments:

JB Was the interview population different between phase 1 & 2 (yes, about 50% overlap)
JB Curious about the Business Development course content
JB There's an SFSU program that doesn't seem to be identified (for follow-up)
CG Skyline should be added? (possibly residential focus, for follow-up)
NCD Fresno City may not be characterized for programs adequately (for follow-up)
RM Portal an excellent resource, can it be used for other Sector Strategies?
LS Portal interim, resource constrained; WE&T portal in the works; branding concerns if bigger
JB Turning portal into a job board sounds ambitious
JB Does "portfolio" slide map to 4-yr/CTE/regional jobs slide? (yes)
JB Regional work groups a good idea, needs "porous" boundaries (echoed by DA)
JB Staffing/organizing concerns around regional work groups
DA Be clear about the work required of the regional work groups
JB/DA CC Sector Navigators and Deputy Sector Navigators (where they exist) could lead work groups (especially if the requirements are known now to get into RFPs)
LS/RM Charles Segerstrom's organization may provide some leadership for work groups
ST Approach the Deans of Engineering at the CSUs for work groups
NCD May have structures at Fresno State to help with work groups
RM How does Ryan Stroupe get credit for help with CCSF Energy Auditor program? (JB – he does)
JB Good agenda for AC; a bit "amorphous" as to what is 2013, what is longer term
JB Suggested tighter integration between regional work groups and Executive Committee

Other Observations:

- Presentation (and meeting announcements!) need to be posted on portal (done)
- We filled all 90 minutes; this isn't going to be shorter with a larger audience

- Structured follow-up on items noted above needs to start this week

Advisory Council Meeting – March 28, 2013

Participants

In Person:

Christa Ansbergs – Lockheed Martin
Catherine Ayers – Foothill-DeAnza CCD
Chris Beaven – Chevron Energy Solutions
Darlene Besst - NECA
Gerald Bernstein – City College of San Francisco
Justin Bradley – Bradley EE Group
Ed Cheng – S.F. State University School of Engineering
Jose L. Galvan – S.F. State College of Extended Learning
Chris Graillat – California Energy Commission
Bruce Greenstein – Skyline College & Impact Energy, Inc.
Brenda Hopewell – Portland Energy Conservation, Inc. (PECI)
Avni Jamdar – Emerald Cities, S.F.
Bob Knight – Bevilacqua-Knight, Inc. (BKI)
Guido Krickx – CSU, Sacramento College of Continuing Education
Michael Leung – Cal State East Bay
Mark S. Martinez – Southern California Edison
Wendy Miller – City College of San Francisco
Walter Mizund – Fresno State, Lyles College of Engineering
Saeid Motavalli – Cal State East Bay
Jenni Murphy – CSU, Sacramento College of Continuing Education
Susan Propst – S.F. State Extended Learning
Michele Rodriguez – Consultant
Pete Shoemaker – PG&E Pacific Energy Center
Tom Stewart – Workforce Development Board of Contra Costa County
Aaron Wilcher – Skyline College ESTM
Lisa Shell – PG&E EWSS Project Manager
Jim Caldwell – Workforce Incubator
J.D. Stack – Workforce Incubator

By Phone/Webinar:

Patrick Barney – Southern California Gas
Patti Castro – Alameda County
Ryan Connally – Cosumnes River College
Bob Cormia – Foothill College
Emily Courtney – Strategic Energy Innovations

Peter Crabtree – Laney College
Natalie Culver-Dockins – Fresno City College
Harvey DeLorm – CSU
Glen Foreman – Division of Apprenticeship Standards
Michael Hsieh – UC Berkeley Extension
Bob Johnson, Cosumnes River College
_____ Lamar – CSU Chico
Bonnie Low – Ecology Action
Emir Jose Macari – CSU, Sacramento College of Engineering & Computer Science
Tara Marchant – Emerald Cities
Sally Martin – RHA
Laura McKaughan – S.F. Conservation Corps
John Mummert – CSU, Bakersfield
Mark Novak, CSU San Jose
Mark Ouellette – ICF International
Lisa Paulo - CPUC
Rebecca Riveira – Southern California Edison
Lori Sanchez – Community Colleges Center of Excellence
Charles Segerstrom – PG&E
Devla Singh – CPUC
Lee Stevens – Emerging Technologies Associates, Inc.
Sheila Thomas – CSU
Ingrid Thompson – Workforce Institute
Suresh Vadhva - CSU, Sacramento College of Engineering and Computer Science
Mike Ward – CSU, Chico
David Wylie – ASW Engineering
Carol Zabin – UC Berkeley Don Vial Center

Presentation and Discussion

- Lisa Shell opened the meeting, welcomed all participants and asked participants to introduce themselves and their professional affiliation.
- She explained why we are here discussing workforce preparation needs in the commercial, industrial, and agricultural energy efficiency industry.
- Jim Caldwell then presented a recap of 2012 project activities. Accomplishments included characterization of senior energy professionals, interviews of 67 representatives of energy efficiency (EE) firms, research of community colleges and CSU EE related programs, creation of the EWSS web portal (www.eesectorystrategy.com), and identification of the Pacific Energy Center as a possible gateway to an array of programs delivered by other organizations.
- Brad Hurte summarized research performed on the top 20 categories of EE jobs, which cover approximately 80% of annual EE job openings.
- Participants raised questions about the job forecast methodology, such as how commercial and residential EE jobs were separated in the forecast. (Note: Brad recommends that the EMSI report be made available to interested stakeholders.)

- Bob Cormia asked if the college units used to compute program intensity normalized across semester and quarter systems. Brad indicated he would look into this.
- 2013 EWSS plans were then presented by Jim and Brad.
- Brad said that 7 CSU and 9 community colleges were identified as having high intensity energy efficiency related programs.
- He also indicated that the EWSS web portal content would include information on career pathways, a recruiting resource, and links to other programs, in addition to existing content on reports and meeting minutes. He invited AC members to contact him if the portal could help promote their programs.
- Jim summarized the portfolio of EE training programs of existing, planned, and defined-but-not-yet-planned courses.
- Bob Johnson commented that Cosumnes River College has programs for residential EE and Sacramento City College offers programs for commercial EE, including energy auditing.
- Michele Rodriguez mentioned that the Energy Upgrade California program discovered that contractors generally lacked sales training and financial tools skills. She also reported that California WIB's Green Jobs Council highlighted the need to leverage the work of county WIBs.
- Lisa Shell said that the IOU's workforce Education & Training (WE&T) consultant would work with California WIB as early as Q3 2013.
- Peter Crabtree referred to "AACC writing a report" that recommends using a dashboard as an effective tool for building occupants to easily understand and control their energy use.
- Justin Bradley asked if training programs were using the schools' own facilities to educate students. Catherine Ayers responded that Foothill College is using its facilities as a living lab. She said the new courses on Building Science and Systems Engineering will be offered in Fall 2013. Mark Ouellette added that Laney College is using its facilities. He suggested that Prop 39 dollars might offer opportunities to integrate facilities into school training programs.
- Aaron Wilcher suggested that the portal include information about what various schools are doing (e.g., integrating facilities into instruction).
- Jim Caldwell envisions an "expert network" of educators who can help raise the bar on EE instruction and share best practices with other educators.
- Lisa Paulo recommended that the portal be used to link several threads (e.g., information about various college programs and best practices). She said the IOU WE&T consultant could use the portal to collect information on best practices, which could possibly be a good tool for allocating Prop 39 funding.
- Wendy Miller described CCSF's grant-funded program to develop curriculum on energy auditing. She said that this curriculum would be freely shared throughout the CC system.
- John Mummert mentioned that Foothill College's new facility would have a dashboard and hands-on training for students. (Done with assistance from Joint Venture Silicon Valley.)
- Jim Caldwell envisions the future of EWSS as having regional strategies to serve the unique needs of three separate regions (Bay Area, Central Valley, Sacramento North). He suggests that these regional groups will partner with industry, IBEW/NECA, and educational institutions.
- JD Stack said the EWSS team is reaching out to San Joaquin Partnership, Sacramento Area Commerce and Trade Organization (SACTO), and the Bay Area Partnership to help facilitate these regional industry meetings.
- Once this industry input is compiled, EWSS will work with CCs and CSUs to map programs to regional employment needs and to identify skills gaps.
- Jim Caldwell asked for feedback about this proposed regional approach.

- One commenter noted that Prop 39 might demand that training be near the work being performed on the ground. Another commenter said that lessons learned from ARRA-funded training needs to be offered just in time for when the skills are needed and that perhaps the portal could help with that.
- Jim Caldwell observed that Prop 39 will generate a need for more journey and apprentice type labor.
- Michele Rodriguez said a regional approach is critical and that it should be standardized. She pointed to the CPUC-created Regional Energy Networks (RENs) that are well-funded regional models that might dovetail with the EWSS regional groups. She suggested we contact Howard Chow with the L.A. REN and Jerry Larr with ABAG's REN. Michele also pointed to the DOE Better Buildings Grant program, which is focusing on four California regions (e.g., Sacramento, Bay Area, L.A., San Diego).
- Bob Knight said that Brian Gitt of BKI "had run programs similar to REN and that he could be a helpful resource. Bob said he was not sure there were big differences between the regions and that we should start at the market to determine what is needed. He said skills needed are very different between the residential and commercial markets.
- Bob Knight suggested that we need more training for the same people (i.e., go deeper with existing EE practitioners). Either Bob or Peter Crabtree said we should differentiate between small buildings and large buildings because they require very different skills. We may need very different training classes for these distinct markets.
- Jim Caldwell commented that there is a shortage of EE engineers and project managers. We need to address the entire workforce spectrum from apprentices to engineers and project managers.
- Saeid Motavalli commented that CSU East Bay's Integrated Energy Solutions training was completed last summer by 25 people, many of whom were engineers who needed to broaden their skill sets in EE. He said CSUEB plans to repeat the training in Fall 2013 but with a shorter three-course certificate program. Wendy Miller said the CCSF Energy Auditor curriculum would encompass 15 courses.
- Jim Caldwell indicated that the Foothill College Energy Efficiency in Buildings course would be offered in Fall 2013 (starting September 23). It will be an 80-hour course designed for sustainability analysts. Charles Eley, architect and longtime EE industry leader, will partner with a Foothill instructor to team-teach the course. Jim emphasized that "we need Advisory Council members' help recruiting incumbent workers for these courses" (Foothill, CSUEB, CCSF) and that the portal should help promote them as well.
- Avni Jamdar said that Emerald Cities S.F. performs a Comprehensive Energy Retrofit Program using students (handout materials available at this meeting).
- Jim Caldwell commented that there is a LOT of EE curriculum "sitting on the shelf" that was created with ARRA funding and could be offered.
- Tom Stewart recommended seeking WIB dollars for shorter-term training.
- Michele Rodriquez observed that Energy Upgrade California developed contractor training but did not see new requirements for HERS-II and combustion standards coming. Therefore, we need to outreach deeper with CEC and CPUC to find out what else is coming from the regulatory agencies.
- Brad Hurte foresees regional portal updates that link candidates to jobs and internships and link to other websites.
- Jenni Murphy observed that the "missing slice" here is how to create more demand for EE training. She suggested that non-credit certification programs can be nimbly developed and

offered by CSU CCE as soon as Fall for something like Green Project Management. An unknown participant responded, “What a great idea!”

- Lisa Shell stepped in to close the discussion as our allotted meeting time had run out. She thanked all the participants for their time and valuable input to the EWSS project. She plans on convening the Advisory Council three more times during 2013 to help report progress, seek input, and to encourage sharing among members. Notes from this meeting will be compiled and shared with all Advisory Council participants.

Minutes prepared by JD Stack.

Central Valley – Key Occupations

Compiled from Employer Meetings in Modesto and Visalia

July 10 and 17, 2013

Modesto

Occupations	Comments
Installers	Skills for deeper retrofits, commissioning, operational changes, and new technologies
Project Managers	
Lighting Techs	Title 24
HVAC Techs	
Refrigeration Techs	
Common Themes	
Need to discuss EE benefits – qualitative and quantitative – with CFOs.	
Need to better understand and communicate financial drivers (biz dev & technical people)	
Upselling skills are a huge gap	
Sales skills and professional services skills intersect	
Lighting controls cross many skill sets	
PACE programs will require an aggregated whole building approach to retrofit	
“When we can aggregate skill sets at the technical and engineering levels, then we have a workforce”	

Visalia

Occupations	Remarks
Industrial Technicians	Industry needs workers in these categories with >10 years’ experience
Mechanical Engineers	
Electrical Engineers	
Civil Engineers	

Energy Auditors	Need internships and other means for low skill workers and veterans to enter the workforce
Lower level Retrofitters	
Measurement & Evaluation	
Agricultural Specialists	Skills needed for agricultural pumping, irrigation and water conservation work
Building Modeling Specialists	Modeling is often required before EE measures can be established
Common Themes	
Get people up to basic competency levels so they can pivot to other opportunities	
San Francisco State has a program to train energy engineers	
Need more industrial technology programs at the 4-year level (and technician level?)	
Need greater access to internships	

Sacramento Region – Key Occupations

Compiled from Employer Meeting in Sacramento

September 17, 2013

Participants:

Terri Carpenter, Sacramento Employment and Training Agency (SETA), Public Information Officer
Jim Caldwell, Workforce Incubator, CEO
Christopher Cole, SMUD, Principal Energy Advisor
Michael Day, BESTCO (Beutler Energy Services and Technology Company), Division President
Ben Finkelor, UC Davis Energy Efficiency Center, Executive Director
Rick Garbrick, Barnum & Cellilo Electric, Inc., Maintenance/Sustainable Energy
Brad Hurte, Workforce Incubator, Senior Consultant
Kathy Kossick, SETA-Sacramento Works, Executive Director
Rick Larkey, North State Building Industry Foundation, Director – Workforce Development
Kelvin Marshall, SMUD, Principal Energy Advisor
Suzanne Mayes, Green Capital Alliance, Project Manager
Robin Purdy, SETA-Sacramento Works, Deputy Director
Derek Reichstein, Ygrene Energy Fund, Commercial Energy Advisor
Bill Sherbet, BASC Solutions, President
Baldeo Singh, Sacramento Conservation Corps, Director of Work Training Programs & Operations
JD Stack, Workforce Incubator, Senior Consultant
Donnetta Webb, Sacramento City College, Dean – Advanced Technology Division
Susan Wheeler, SMUD, Workforce Planning and Education Relations Strategist
Farah Wissinger, Sacramento Unified School District, Manager – Environmental Sustainability
Jon Zeh, Sacramento City College, Chair – Mechanical Electrical Technology Department

Key Occupations	Skills Needed
HVAC Installers	• Energy modeling + Standards + Methodology • IT skills (e.g., controls, networking)

(expect huge increase in demand due to backlog of equipment replacements)	
Electricians/Lighting Specialists (New Title 24 requirements will dramatically change lighting field from maintenance function to installing and managing advanced lighting controls)	• Advanced lighting controls • Understand whole lighting system (not just installation) • Commercial codes • Energy Management System (EMS) certification • Automatic Lighting Controls (ALS) certification • Automated Demand Response (ADR) certification
Certified Energy Auditors	• Monitoring and verification with sensors and data • Sales training
Certified Energy Managers	• IT skills (e.g., controls, networking)
Building Commissioning	• 2-year program + CALCTP certificate + manufacturer training
Common Themes & Next Steps	
Field experience via paid internships needs to be incorporated with training to "cement learning"	
Use WE&T dollars and WIB funds to integrate 2-4 week paid internships with training	
Establish local government partnerships for projects to enable field experience opportunities	
1. Identify certifications needed for each occupation and set of standards 2. Then identify who in the existing workforce needs training and who should train them 3. Establish direct field experience in conjunction with training	
Set up a consistent evaluation system first. Then components of training and field experience will fall into place.	
Note: Discussions after the forum focused on forming a regional coalition to seek funding for a demonstration of an integrated program of training and direct work experience	

Sacramento Region Action Plan

Construction and Energy Efficiency Workforce Sector Pipeline

October 31, 2013

Organizations represented: Sacramento Area Electrical Apprenticeship, California Labor Federation, Sacramento/Sierra Building Trades Council, Empower Advisors, North State Building Industry Foundation, Northern California Construction Training, Greater Sacramento Urban League, American River College, Sacramento Employment and Training Agency, Sheet Metal Workers Local 104, California Human Development Corporation, Center for Employment Training.
Strategy 1: Recruitment, Assessment, Support: • Building Trades Council will conduct job fairs targeted at recruiting and educating job seekers about the construction trades, application minimum requirements, types of work, and provide panels with successful apprentices talking about their work, and hands-on demonstrations using tools and demonstrating work tasks.

- Coordinate job fairs and recruitment events with existing events, like MLK Celebration in January 2014.
- Building Trades Council and SETA will update Learn Earn Build book and create Sacramento Builds website to educate partners and job seekers about apprenticeship training opportunities.
- Sacramento Works Career and Training Centers will recruit, assess, screen and refer candidates.
- Utilize the SacWorks Virtual One-Stop System (jobs.sacramentoworks.org) as the point of entry for candidates for construction and energy efficiency jobs and for employer to list job vacancies.
- Greater Sacramento Urban League, California Human Development Corp and other community-based organizations will provide case management, support services, and GED preparation.
- Triage candidates by skill and readiness. Candidates with skills are referred to employers and apprenticeship programs, candidates with less skills are referred to pre-apprenticeship and occupational skills training, and candidates without skills are referred to High School completion/GED and work readiness programs.
- Provide students with information about alternative pathways (e.g., union, non-union, further education).
- Provide on-going coaching and retention workshops, including money management skills, Plugged-In (weekly check-ins and support groups for trainees), Communication, Problem Solving, Time Management and Decision making Soft Skills Workshops.
- Recruit a workforce that matches the demographics of the City of Sacramento.
  Clarify points of entry for union and non-union opportunities.

Strategy 2: Pre-apprenticeship Training

- SETA is negotiating to fund 2 pre-apprenticeship training cohorts, one at American River College to provide pre-apprenticeship training program at ARC's satellite site on Grand Avenue in North Sacramento and one at Northern California Construction Training in South Sacramento.
- Work with high school districts to create Career Pathways and Linked Learning in Construction and Energy Efficiency sectors to create a pathway of programs from high school through post-secondary with community support, pre-apprenticeship, apprenticeship, paid work and placement in good jobs
- Recruit employers, workers, and apprenticeship coordinators from the industry to talk with pre-apprentices and high school students about careers in construction and energy efficiency.
- Re-invent the Construction Technologies High School in the Sacramento City Unified School District
- Ensure that career pathways programs that lead to apprenticeship are supported.

Strategy 3: Apprenticeship and Skills Training:

- Ensure that training in occupational skills that will prepare individuals for emerging jobs in construction and energy-efficiency are available in the region.
- Utilize Sacramento Builds and CareerGPS.com and PG&E's EEsectorstrategy.com websites to make the list of apprenticeship, pre-apprenticeship, community college, adult education, and postsecondary educational providers that train in construction and energy efficiency sector skills.
- Co-enroll students in DAS approved Joint Apprenticeship Training programs and the Workforce Investment Act to provide financial assistance and support during training.

Strategy 4: Earn and Learn and Employer Engagement

- Earn and Learn opportunities, including subsidized employment, and paid Internships or stipends are critical to success. Use federal programs and apprenticeship programs offering wage subsidies to provide payment during training.
- Engage employers by educating the subcontractors for school district Prop 39 and school bond projects and for City and SHRA development projects on the work incentives and wage subsidies offered through federal programs.
- Utilize OJT/subsidized employment providers, including North State Building Industry Foundation, to develop subsidized employment opportunities (wage subsidies for employers who agree to train employees on the job) with construction and energy efficiency companies and subcontractors for the

arena, downtown redevelopment, SHRA housing projects, and energy efficiency and bond projects funded by local school districts. Identify resources like the Community College Foundation and NSBIF which have program infrastructure in place to provide workers comp insurance coverage and wage subsidy payments.

- Utilize non-profit and community construction projects like Habitat for Humanity as paid worksites .
- Research the use of PLAs and CWTAs and first source hiring agreements.

Next Steps:

1. Create list of high-demand jobs projected in the energy efficiency and construction sector. (JD, Building Trades, SETA)
2. Develop a list of organizations/people that should be educated on construction and energy efficiency workforce strategies, including high schools and colleges' facility managers, firms that work on school energy efficiency construction or design, Ygrene's list of contractors who have received training on energy efficiency and inform them of training opportunities and hiring incentives (GreenWise and NSBIF)
3. Identify upcoming community events to ensure better planning and coordination of recruitment events. Use existing resources and connect people who aren't necessarily connected. (SETA)
4. Develop a list of partners we don't have yet-- people who we should be reaching out to. (JD)
5. Ask if Greenwise is doing a follow-up with the schools on energy efficiency and if we can add an agenda item on workforce training to their agenda.
6. Solicit and collect community outreach and success stories during the first year and publicize successful Sacramento residents who are working in construction and EE jobs-- very important to success. (all)
7. Identify the number of apprentices anticipated for downtown arena, and collect the demographics for Sacramento City to use as a goal. (Building Trades Council)
8. Schedule follow-up meeting

Appendix 10. 2013 Communications Plan

PG&E Energy Workforce Sector Strategy

2013 Communications and Outreach Plan

February 15, 2013

As part of the EWSS 2013 Work Plan a proactive communications and industry outreach effort is planned to assure that energy efficiency (EE) industry and education stakeholders are kept apprised of the EWSS project activities, deliverables and outcomes. Additionally, stakeholder input and feedback will be solicited to help guide EWSS direction and facilitate productive interactions among industry, educators and workforce development practitioners.

Objective: Support EE sector strategy development efforts through a proactive, regular course of communications and interactions with industry, education, regulatory, and utility stakeholders.

Industry and Education Stakeholders:

PG&E 3P Partner firms
Senior Energy Professionals (especially those interviewed by EWSS team)
NECA and IBEW representatives
California Energy Efficiency Industry Council
Building Owners and Managers Association (BOMA) representatives
Participants in February 2012 Convening event
Deans, Directors, and professors at Northern California CSUs and CCs who have attended meetings or expressed interest in EWSS, particularly those at 16 targeted "high intensity" schools
EWSS Executive Committee and Advisory Council members
Others as appropriate

Details about stakeholders, their organizations, contact information, and their interest and involvement in EWSS are contained in this plan's accompanying document, the EWSS Stakeholders Master List. This list ranks stakeholders into three ranks (priority 1, 2, 3), according to their demonstrated level of interest and participation in EWSS and their potential influence in supporting project goals.

Stakeholder Group Communications Considerations:

20. **Executive Committee -** A subset of the Advisory Committee, this smaller group consists of key representatives of stakeholder organizations who are "must reach out to" players. It will consist of representatives of the EE industry, education, regulatory agencies, and utilities. They will be asked to provide input on issues and agenda items prior to full Advisory Committee meetings and to assist in securing active participation of others. This committee is expected to meet once per quarter in advance of the Advisory Council (conference call or webinar acceptable, depending on the wishes of the group and matters to be discussed). EWSS contact with EC will occur at least once per month to give status update – email acceptable; phone contact prior to meetings.

Advisory Committee – The Advisory Committee consists of a broader range of stakeholders from industry, education, regulatory agencies, and utilities who have shown an interest in participating actively in the EWSS initiative. They will receive project information by way of regular email communications, web portal updates, and phone calls prior to quarterly committee meetings (to confirm attendance). During committee meetings they will receive presentations on project issues and activities and they will be asked to provide input to help guide EWSS direction. Physical meetings at PEC is desirable, depending upon RSVPs. However, a webinar/conference call facility will be required. Meeting follow-up will occur by email and web portal.

The first Advisory Committee meeting of 2013 (tentatively in late March) will include a brief recap of 2012 metrics, 2013 scope of work, new Advisory Committee/Executive Committee structure. It will also include discussion on areas in which advice and council is needed.

Employers - Representatives of the EE industry, including labor organizations, are key informants to guide EWSS to assure that the workforce is prepared with the needed skills at the appropriate time to help grow energy efficiency implementation efforts to meet statewide goals. Their input is critical for validating the jobs forecast data that is driving EWSS implementation. Experience has shown that the competitive demands of their work make it challenging for them to spend a lot of time in meetings. Therefore, EWSS staff will employ a proactive outreach effort with one-on-one calls once per quarter to apprise them on project issues, opportunities, and results. This personal contact will be used to encourage them to engage with EWSS as much as possible and to participate in quarterly meetings of the Advisory Committee. Emphasis of messaging to industry representatives will be to inform them and to encourage their active participation.

Educators - Representatives of California Community Colleges and the California State University system are also key players in guiding and assisting EWSS in efforts to increase linkage between EE industry workforce needs and education and workforce preparation

programs. They will be encouraged to participate in the Advisory Committee and the Executive Committee. Additionally, they will be actively engaged in the career pathways component of the 2013 work plan. Communications will consist of email contacts at least once per quarter and web updates and phone calls to discuss issues and gather information related to career pathways development.

Regulators – Representatives of the CPUC and the CEC will be invited to participate in the Executive Committee and the Advisory Committee meetings. They will be kept regularly apprised of project progress by way of email and web portal updates and by phone calls when their input and guidance is sought.

Priority 1 Stakeholders - This group will receive at least one phone touch per quarter in light of their importance to EWSS. It is particularly important to maintain their connection to the project and their support for achieving its goals.

Key Topics for Stakeholder Outreach Communications and Associated Messaging:

26. Business Development Training Course
   a. Q1: Launch of first cohort – Promote awareness and participation (email/phone calls/marketing materials)
   b. Q2, Q3, Q4 – Promote awareness and participation (email/phone calls)
   c. Availability and suitability of curriculum for adoption in MBA/EMBA programs at CSUs
   d. Messaging: Who should attend? Why should they attend? Logistics, Post Mortem, What did we learn? What needs to change? For educators - How can this curriculum be adopted in CSUs? Any of it viable in CC business courses?

27. Career Pathways Mapping (in conjunction with colleges)
   a. Q1, Q2, Q3, Q4 – Promote awareness and establish new linkages between industry and educators to develop multiple career pathways (email/phone calls)
   b. Messaging: Encourage industry stakeholders to drill down to the next three occupations that need to be filled and may require additional training (e.g., commercial energy auditors, project specifiers, low-level engineers)

28. EWSS Portal Content Updates
   a. As needed, highlight content updates and solicit feedback/input (email)
   b. Messaging: What is EWSS accomplishing? Industry – what do we want industry to know about EWSS? Education – how can we help publicize the educational resources available? How is workforce contributing to achieving EE goals?

29. Proposition 39 Opportunities

a. As appropriate, inform on Prop 39 funding allocations and program opportunities (email)

30. Advisory Council and Executive Committee Meetings
   a. Q1, Q2, Q3, Q4 – Solicit participation of selected industry and education representatives (phone calls)
   b. Q1, Q2, Q3, Q4 - Seek pre and post meeting input on agenda issues (email/phone calls)

31. EWSS Progress Reports
   a. Q1, Q2, Q3, Q4 – (email)

Measurement and Evaluation of Industry Outreach:

In accordance with the proposed EWSS Metrics for 2013–2014 the following measures will be employed to evaluate the effectiveness of the industry outreach activities.

- Assure alignment with Customer Care LOB goals.
- Stakeholder relationships cultivated.
- Input provided to CPUC as appropriate.

Others measures may be added as experience is gained with the outreach effort.

Communications Strategy:

The following table identifies for each stakeholder group various means of communication that can be employed to keep them apprised of EWSS progress and to solicit their input and direction. The specific means and frequency of communication will likely unfold incrementally throughout the year, of course. But this framework is intended to guide staff in providing stakeholders with regular updates and assuring their confidence in the EWSS initiative. This framework combined with the Stakeholder Master List will determine which groups should receive timely communications on topics pertinent to them.

Stakeholder Group		Estimated Frequency of Communications				
	Meeting	Webinar	Email	Phone	Portal Updates	Published Report
Executive Committee	Quarterly	Quarterly	Monthly	Quarterly	As needed	TBD
Advisory Council	Quarterly	Quarterly	Monthly	Quarterly	As needed	TBD
Priority 1 Stakeholders	TBD	TBD	Monthly	Quarterly	As needed	TBD
All Education Stakeholders	TBD	TBD	Quarterly	As needed	As needed	TBD
All Industry Stakeholders	TBD	TBD	Quarterly	As needed	As needed	TBD
WE&T Task Force	TBD	TBD	TBD	As needed	As needed	TBD
PG&E Management	TBD	TBD	Monthly	As needed	As needed	TBD
PG&E Executives	TBD	TBD	Monthly	As needed	As needed	TBD
CPUC and CEC	TBD	TBD	Quarterly	As needed	As needed	TBD

End Notes

[1] *Working Toward the Very Low Energy Consumption Building of the Future*, Lawrence Berkeley National Laboratory June 2009

[2] Assembly Bill 32, California Global Warming Solutions Act, December 2008 http://www.arb.ca.gov/cc/ab32/ab32.htm

[3] California Long Term Energy Efficiency Strategic Plan, January 2011 http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf

[4] Decision Approving 2013-14 Energy Efficiency Portfolios and Budgets, California Public Utilities Commission December 2012

[5] Comprehensive Energy Efficiency Program for Existing Buildings Scoping Report, California Energy Commission August 2012

[2]Charles Goldman, Merrian C. Fuller and Elizabeth Stuart: Lawrence Berkeley National Laboratory, *Energy Efficiency Services Sector: Workforce Size and Expectations for Growth*, September 2010

[7] http://www.irle.berkeley.edu/vial/publications/WET_Part1.pdf

[4] California Community Colleges Centers of Excellence, March 2013

[ix]http://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/partnersandtradepros/eeis/search/third_party_programs_fs.pdf

[x] EWSS Convening at the San Ramon Conference Center, San Ramon California February 29th, 2012

[xi] Laney College, 2013

[xii] Energy Efficiency in Building Systems, Foothill College 2011-12

[xiii] Economic Modeling Specialists, Inc., *California Energy Sector Alignment*, February 2012

[2]Charles Goldman, Merrian C. Fuller and Elizabeth Stuart: Lawrence Berkeley National Laboratory, *Energy Efficiency Services Sector: Workforce Size and Expectations for Growth*, September 2010

[xv] http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan_Jan2011.pd

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[xix] http://nces.ed.gov/ipeds/cipcode/Default.aspx?y=55

[xx] http://extranet.cccco.edu/Portals/1/AA/BasicSkills/TopTax6_rev0909.pdf

[xxi] http://www.bls.gov/soc/