

May 3, 2016



PG&E Energy Efficiency Workforce Education & Training

Problem Statements, Solutions, Approaches,
Potential Success Indicators



BUSINESS PLAN
STAGE 2

Inspire and empower our customers to eliminate unnecessary energy use.



**Pacific Gas and
Electric Company**[®]

Table of Contents

PG&E Customers 1

Energy Efficiency Workforce Education & Training at PG&E.....Error! Bookmark not defined.

PG&E’s Energy Centers and K-College Programs 1

PG&E WE&T Program Staff 2

Energy Efficiency Jobs Forecast Data..... 2

Problem Statement 1:

"WE&T's audience is large in scale, and its needs vary widely in depth and breadth" 3

Observations and Discussion, Solutions, Approaches, Potential Success Indicators 3

Problem Statement 2:

"Energy Efficiency is not always the highest priority for workers and other training providers" 5

Observations and Discussion, Solutions, Approaches, Potential Success Indicators 5

Problem Statement 3:

"Professions are, by nature, ‘siloeed’ " 6

Observations and Discussion, Solutions, Approaches, Potential Success Indicators 6

PG&E Customers

PG&E has a broad and diverse customer base. PG&E serves approximately 16 million customers who collectively speak nearly 200 different languages. PG&E provides service to approximately 5.5 million electric accounts and 4.5 million natural gas accounts located across a territory spanning 70,000 square miles. Our customers' facilities span all sectors—commercial, residential, public, agriculture, and industrial—and are located across 9 climate zones.

Energy Efficiency Workforce Education & Training at PG&E

The purpose of PG&E's Energy Efficiency organization is to **inspire and empower our customers to eliminate unnecessary energy use**. Workforce Education and Training (WE&T) is one of several energy efficiency programs PG&E utilizes toward that purpose. As part of meeting its ambitious energy efficiency (EE) targets, PG&E recognizes the need for a well-trained workforce equipped with the knowledge and skills needed to recognize and act on energy efficiency opportunities. WE&T provides professionals who design, build, and operate buildings with the relevant skills needed to help eliminate unnecessary energy use in buildings.

PG&E's Energy Centers and K-College Programs

PG&E's WE&T program includes three energy efficiency training centers strategically located in parts of the territory ranging from urban to rural.

- The Pacific Energy Center (PEC), focused on the commercial building sector, is located in downtown San Francisco and is easily accessible via public transportation. The primary target audiences of the PEC are the design and engineering community and the commercial building trades.
- The Energy Training Center (ETC), focused on the residential building and agricultural sectors, is located in the Central Valley city of Stockton. The primary target audiences of the ETC include residential building contractors and small- and medium-sized business owners.
- The Food Service Technology Center (FSTC), focused on the food service sector, is located in San Ramon. The FSTC's primary target audiences include food service workers and business owners.

PG&E's Energy Centers have been serving the California residents and members of the energy efficiency workforce for over 90 years of cumulative service.

PG&E's WE&T training sessions are also offered in other parts of the territory in partnership with internal and external organizations that help us reach the right audience. During program years 2013-2015, PG&E offered over 1,200 classes in approximately 60 locations throughout the PG&E service territory.

PG&E's WE&T program also serves the K-college sector by providing energy efficiency and green career awareness resources and materials to teachers and students. In 2015, PG&E served over 168,000 students at approximately 1,450 schools, with approximately half of those schools served qualifying as U.S. Department of Education Title 1 schools.

PG&E WE&T Program Staff

PG&E’s WE&T program staff members are subject matter experts (SMEs) in their respective fields. As SMEs they serve as educators in the classroom, technical advisors to building professionals, and education program designers to better serve PG&E’s diverse WE&T audience. As SMEs they also serve as technical advisors to various professional and industry groups, including the American Institute of Architects, the Illuminating Engineering Society, and various other commissioning organizations. Additionally, other California Investor Owned Utilities (IOUs) leverage PG&E’s SMEs for course delivery and expertise on curriculum development.

Energy Efficiency Jobs Forecast Data

Jobs forecast data from Economic Modeling Specialists, Inc. in the 2013 *Commercial Energy Efficiency Sector Strategy Summary Report* indicated that 80 percent of the energy efficiency job openings in PG&E’s service territory are projected to be in 18 of the study’s 67 occupational categories. These occupational categories are summarized below. The occupations with an asterisk (*) are the primary target audiences across PG&E’s three Energy Centers. What’s not clear from the data is which of these professions has the highest potential for achieving energy savings.

Professional Categories	Career Technical Education
<ul style="list-style-type: none"> - Civil Engineers - Architects* - General and Operations Managers* - Construction Managers* - Mechanical Engineers* - Engineers, all other* - Accountants and Auditors - Management Analysts - Environmental Engineers* 	<ul style="list-style-type: none"> - Electricians* - Plumbers, Pipefitters, Steamfitters* - Carpenters* - First Line Supervisors* - Managers, all other - Cost Estimators* - HVAC/R Mechanics and Installers* - Construction and Building Inspectors* - Sheet Metal Workers*

Source: *Commercial Energy Efficiency Sector Strategy Summary Report*, December 2013

Problem Statement 1:

WE&T's audience is large in scale, and its needs vary widely in depth and breadth.

Observations and Discussion:

The WE&T audience spans a wide age range of professionals with varying skill sets spanning entry level to seasoned professional. The WE&T target audience designs, builds, operates, and maintains buildings and facilities across all sectors. A "one size fits all" approach to course delivery does not meet the audience's needs, hence the WE&T program needs to offer multiple delivery mechanisms. A recent contractor training market characterization Evaluation, Measurement and Verification (EM&V) study identified awareness about WE&T opportunities as a significant barrier to participation in WE&T program offerings.¹ The study also concluded that hands-on training is preferred by many industry stakeholders.

Solution:

Develop and deliver WE&T education programs that reach the right audiences with the right classes in the right way.

Approaches:

- **Focus participation on the right audiences**

This approach needs to be data-driven. Data similar to what was included in the *PG&E 2013 Commercial Energy Efficiency Sector Strategy Summary Report* needs to be updated on a regular basis to assure that WE&T is addressing the correct professions. The data should go beyond jobs forecasting in the PG&E territory, and should also include potential for influencing building energy efficiency. The data should answer the questions:

- What part of a building has the most potential to reduce a building's overall energy use?
- Which members of the workforce have the most influence over the proper design, construction, installation, and maintenance of those building parts?

- **Match course content to course attendees**

PG&E has experienced that advanced courses are attended by students that do not have the knowledge and skills necessary for meaningful participation in an advanced-level course, which results in a slower pace and suboptimal learning experience for other, qualified participants. The contractor training market characterization EM&V study cited above confirms the need to assure the right audience is served with the right course content. "Contractors and technicians may need help determining which are the best trainings for their needs. IOUs may be able to help package together trainings and provide guidance for individuals at different points in their careers."² By implementing pre-course exams and/or instituting prerequisite requirements for participation,

¹ "PY2013-2014 California Statewide Workforce Education and Training Program – Contractor Training Market Characterization", Opinion Dynamics, 2016

² "PY2013-2014 California Statewide Workforce Education and Training Program – Contractor Training Market Characterization", Opinion Dynamics, 2016

PG&E could help ensure that course participants are partaking in the right courses needed to fill any needs or skills gaps.

- **Secure employer/in-field feedback**

It is essential to understand the needs of employers and in-field challenges to energy efficiency education. While PG&E has a long history of collaborating with people in the field, and takes much of its technical staff directly from industry, deeper, and more regular collaboration is necessary. Collaboration with employers will not only increase the likelihood that the right audience is reached, with relevant knowledge, and increases the likelihood of students being supported or required to use the acquired knowledge and skills into their jobs.

- **Align course delivery method to the expected student actions after class.**

Course delivery methods including online, on-demand, lectures, hands-on activities, and in-the-field training serve different purposes and meet different needs. For example, if a student is expected to perform a specific installation or system diagnostic procedure, the course should provide the student with the opportunity to not only learn the process, but to practice what they will do in the field.

Potential Success Indicators:

- **WE&T participants use course information and skills at their workplace.**

In accordance with recommendations from the *Program Theory and Logic Model Update; Centergies Data Needs; And Critical WE&T Data Needs* EM&V study, WE&T is in the process of redesigning post-course evaluations to assess whether or not participants are using the knowledge and skills they acquired from WE&T courses. WE&T is in the early planning stages of an IOU-led EM&V study to better understand students use of course content, skills and abilities. This study will provide WE&T program managers information to understand current course content, to improve content of future courses, or to prioritize types of courses and delivery methods.

- **Other organizations' curricula are transformed.**

By collaborating with the right organizations, PG&E has provided course curriculum to community colleges and building trades' training programs. This is one cost-effective way for PG&E to support other training providers in expanding and enhancing their own curriculum to incorporate energy efficiency. This type of approach is most appropriate and cost-effective with organizations that have a broad, perhaps statewide, reach.

- **PG&E WE&T course offerings are integrated into other training institutions structure**

PG&E has collaborated with colleges and universities in the San Francisco Bay Area to provide college course credit to students who attend specific courses at the Pacific Energy Center. This has been a relatively efficient way of exposing college students to energy efficiency information and skills. Furthermore, it provides an opportunity for college students to interact with people who are

in energy efficiency jobs and careers. This type of collaboration can further evolve into formal articulation agreements between colleges and IOU energy centers.

- **Incentive program participation due to awareness through WE&T.**

PG&E's WE&T and EE incentive programs have the common goal of eliminating unnecessary energy use. The PG&E commercial sector has identified one problem statement as *"Customers have limited capacity for energy management and may not have technical expertise or understand the value of energy efficiency to take action."* This presents an opportunity for WE&T to fill that void in technical expertise while also raising awareness around EE incentive programs.

Problem Statement 2:

Energy Efficiency is not always the highest priority for workers and other training providers.

Observations and Discussion:

Organizations, including training organizations, in the building design, construction and operations field have a wide range of valid and important priorities, often greater than Energy Efficiency, for their audiences, including life safety, soft skills, job placement, and remaining financially competitive. Therefore "upskilling" their students and employees on energy efficiency is often not a priority. One of PG&E's Commercial sector's problem statements included, *"Split-incentives between tenant and landlord and multiple levels of decision makers make it difficult to motivate customers to implement energy efficiency projects."* WE&T can assist by offering education programs that focus on ways of maximizing energy efficiency at the front end of a project. With a building designed and built to be as energy efficient as possible, the need and opportunities for tenants to "be more energy efficient" exist, but to a lesser degree. WE&T can also address this "split incentives" problem by continuing to provide case-study-based training on innovative lease agreements between tenants and owners.

Solution:

Lower barriers to participation and communicate the indirect yet tangible benefits of energy efficiency to the right members of the decision-making process.

Approaches:

- **Leverage partnerships to expand and enhance energy efficiency into other organizations' curricula.**

PG&E is collaborating with organizations that have similar audiences—professionals who have the potential to save energy in buildings through their daily work. Given the scale of the workforce that needs to be trained, PG&E will emphasize collaborating with other organizations to develop and infuse energy efficiency into other organizations' core curriculum. PG&E has worked with Local 39 of the International Union of Operating Engineers (Stationary Engineers) in the San

Francisco Bay Area to develop energy efficiency course content that Local 39 will integrate into its core training program. The statewide WE&T team is currently working with a California carpenters training trust to train their trainers on the use of blower doors and infrared cameras in inspecting and testing the energy performance of building envelopes. These examples of curriculum infusion have facilitated the process of other training organizations to integrate energy efficiency into their students' core education.

- **Explain the benefits to students' or business' "bottom line" and business priorities.**
For businesses and training programs interested in creating and delivering the best possible buildings, the potential benefits of energy efficiency aren't always clear. For example, a well-designed and well-constructed building envelope not only helps save energy, but can also reduce energy costs while simultaneously increasing thermal comfort, cleanliness, and even work productivity. These types of indirect benefits of energy efficiency should be communicated to decision makers to increase their awareness and to influence how they prioritize energy efficiency in their projects. As a trusted and respected advisor, WE&T is well-positioned to emphasize non-energy benefits of energy efficiency.

Success Indicators:

- **Energy efficiency is permanently infused into training organizations' core training program.**
One cost-effective way of not only reaching a broader audience, but also to permanently impact parts of the energy efficiency workforce market is to transform training programs one at a time. PG&E provides or co-develops course content with the training provider, and the training provider becomes self-sufficient, requiring only periodic check-ins with PG&E's WE&T team to remain current on technologies and training materials.
- **Developers and building owners increase emphasis of energy efficiency in their designs and building maintenance goals.**
Assessing this metric would require pre- and post-course surveys and potentially interviews to determine how a developer's or building owner's emphasis on energy efficiency changed as a result of having participated in a WE&T program. The questions would need to include not only what was learned and why the change to the participant's business took place, but also the impacts to having increased the emphasis of energy efficiency.

Problem Statement 3:

Professions are, by nature, 'siloed'

Potential Observations and Discussion:

Buildings are large and complex structures. They require a set of highly-skilled and specialized tradespeople and professionals to design, build, operate and maintain them. Each tradesperson and

design professional undergoes training on specific knowledge and skills needed to master his/her specialty, typically focusing on just one area of specialization. Expecting all tradespeople and professionals to master multiple trades or professions is not realistic, however, it is important to provide an understanding of how one's actions and decisions can impact others' parts of a building. This observation is confirmed in a contractor training market characterization study where it was found that "the gaps that were common to most programs centered on understanding the value of energy efficiency, how different systems work together, and how to communicate these concepts to customers."³

Solution:

Develop and deliver courses explaining benefits of integrative design, construction, and building operations and maintenance.

Approaches:

- **Integrative design courses for project managers**
Integrative design is a collaborative approach to buildings that integrates people, building systems, business structures, and practices into a process that leverages the expertise of all participants. The goals of integrative design include maximizing energy efficiency and optimizing a building's design, construction, and operations. Integrative design courses are best suited for members of the workforce who can bring professions/trades together. This would include project managers who guide and set goals for the work of various members of the building design, construction, and operations teams. It would also include building owners and high level decision makers.
- **Target site supervisor/superintendent for the trades**
Apprentices and journeymen are supervised, advised, and guided by their foremen and superintendent leaders. These leaders are an ideal target audience for training programs focused on understanding and collaborating across multiple trades. With such awareness, the foremen and superintendents would be better equipped to guide apprentices and journeymen to recognize and act upon energy efficiency opportunities.
- **Continue to target facility manager and building operators**
Facility managers and building operators oversee entire buildings and are responsible for optimizing multiple building systems. This level of oversight and responsibility makes them ideal candidates for training programs designed around whole building energy efficiency optimization. PG&E has and will continue to collaborate with organizations that provide training programs for building maintenance and operations personnel. PG&E has a long history of teaching industry leading courses in Existing Building Commissioning and Retrocommissioning, which address many of the needs of Facility Managers and Operators.

³ "PY2013-2014 California Statewide Workforce Education and Training Program – Contractor Training Market Characterization", Opinion Dynamics, 2016

Potential Success Indicators:

- **Increased collaboration with energy efficiency as a high priority**
Targeted audience attends courses on integrated design project management, implements knowledge and skills, and reports increased collaboration across members of the design and construction teams and that the process allowed the project to maximize energy efficiency opportunities.
- **Increased efficiencies in building design, construction, and operations processes**
PG&E's post-course follow-up surveys indicate that there were efficiencies in building design, construction and operations as a result of having implemented the knowledge and skills gained from WE&T programs.