Opinion Dynamics

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2013-2014 Statewide WE&T Program

Program Theory and Logic Model Update; Centergies Data Needs; And Critical WE&T Data Needs

CALMAC Study ID SDG0278.01

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1. Overarching Findings and Recommendations

This report provides the following:

- A revised program theory and logic model update for the 2013-2014 WE&T Centergies program based on workshops with the Centers and a review of the existing program theory and logic model for the 2013-2014 WE&T Connections program.
- An investigation into the Centers' program data tracking to determine whether the Centers are consistent and collecting the right data to support the new Program Theory and Logic.
- An investigation into how the WE&T Centergies program can and should respond to Decision 12-05-015 based on interviews with WE&T Centergies implementation and EM&V staff and an early investigation into how some IOU resource programs have responded to Decision 12-05-015 based on interviews with IOU staff, program implementation staff and secondary research.

WE&T Centergies Program Overall Conclusions and Recommendations

The program focus has evolved due to implementation of the California Workforce Education & Training Needs Assessment (WE&T Needs Assessment) findings, sector strategies and additional CPUC requirements. The goals of the Energy Centers have been revised. Historically, this program has been a non-resource program that promotes energy efficiency to a variety of customer segments and trade allies through its Energy Centers. The Centers' prior objectives were to disseminate information about efficient technologies and practices to electric, natural gas, and water utility customers for the purposes of assisting them in reducing energy and water usage, lowering their utility bills, reducing operation and maintenance costs, and improving customer productivity. Program activities were designed to produce energy savings indirectly, and to channel students into other IOU programs. Now, the Centers, while continuing their traditional activities and goals, are increasing partnerships in order to:

- Facilitate and contribute to certification programs
- Reach out to disadvantaged workers
- Increase awareness of integrated demand side management (IDSM) among the trades and professions that attend seminars
- Increase the number of market actors and/or the skill levels in the green workforce

The new Centergies Logic Model in this report shows how the Centers' current activities and strategies support traditional and new program goals. The activities are divided into two parts. One set of activities supports the traditional goals of the Centers, and the second set supports the newer goals generated by the CA Strategic Plan and the Needs Assessment. However, there is no indication in the theory or model currently to determine the relative importance of the traditional versus new program goals to the State or to the rate payer.

There needs to be some recognition of what activities, strategies and goals are achievable given the Centers' limited resources and the current Program Performance Metrics (PPMs). Notably, providing courses that align with Adult Learning Principles and skill-building are more costly than courses that largely focus on presenting and disseminating information. One of the three current PPMs monitors the number of classes offered rather than the level of training offered. If PPMs continue to only cover the number of courses then the Centers will naturally focus on the cheapest way to get a large number of classes to the market.

- **Policy direction needed to guide level of emphasis for skills building and market building**: The Centergies program has expanded its activities to address new goals; however it is uncertain at this time how much of an emphasis should be placed on the new goals versus the traditional goals. The program needs policy direction to help them determine how much of an emphasis to place on skills building versus market building. Currently the program activities allocate 45% to skills building and 55% to market building. The IOU program team should be involved in determining the level of emphasis that should be placed on these two critical foci. This decision will also require that clear criteria for each focus are well-defined.

- **Revisit PPMs for alignment with skills and market building goals**: The PPMs should be revisited by the CPUC and the Centergies program to determine whether they align with the goals for skills building and market building. For example, the program should not just track the number of classes it offers but the number offered for skills building versus market building. Also, the PPMs could be more outcome oriented such that they track whether the classes are designed to propel students to implement their new learnings into their job.

We reviewed the Centers current data collection efforts in light of what the Centers need to collect as evidentiary support for its Theory and Logic. The Centers are inconsistent in their data tracking and collection efforts and these should be modified to better support the Theory. As such, the study provides a number of suggestions for how the Centers can collectively improve data tracking and collection efforts in support of its Theory and Logic. Including:

- **Revise and enhance registration data collection**: The study team and the IOUs collectively identified five key variables to add to mandatory registration requirements and a potential rolling update of participant profiles including questions that allow us to determine the following: 1. Market Actor or End-User; 2. Home zip code (determines disadvantaged worker reach); 3. Employment status; 4. Industry; and 5. Occupation. These five variables and the purpose they serve are well-defined with suggested question designs in the body of the report (See Section 3.10).

- **Revise and enhance center course tracking databases:** The study team recommends changes for each IOU to ensure that appropriate and consistent data is captured across all Centers such as common categories to help categorize courses by sector and learning level. The detailed recommendations per IOU are included in the body of the report (See Section 3.10).

- **Revise and enhance course feedback surveys**: Each Center administers a survey at the end of each course for feedback. Each Center has different survey design and data collection and analysis procedures. The study team recommends that the Centers move to one survey design, data collection and analysis method so that this data can be analyzed electronically and on a statewide level. The Centers should develop a concrete plan to ensure this is implemented in 2014. The plan should include a core set of questions that are consistent across all Centers (See Section 3.10 for more detail)

- **Revise and enhance tool lending library data tracking**: The tool lending libraries at each Center collect inconsistent information and the study team recommends that they collectively improve the data tracking to support the Program Theory and Logic and future energy savings claims. Specific recommendations can be found in Section 3.10.

- **Determine plan of action for making course tracking, registration and feedback survey changes**: Notably, multiple past evaluations of the Centers have recommended similar data tracking and survey changes. We strongly recommend that the Centergies program take action to improve their data tracking systems. This action is necessary for statewide consistency and to allow for program performance monitoring and evaluation. All of the detailed improvements necessary can be found in Section 3.10.

WE&T Critical Data Needs

The 2013-2014 WE&T research roadmap references two decisions (Decisions 12-05-015 and 12-08-044) that are relevant to Workforce Education and Training initiatives. The WE&T roadmap called for the IOUs to initiate a study to explore these decisions, how the IOUs have responded to the decisions thus far and what options they might have for responding to them in the future. Since these decisions were included in the WE&T roadmap it was initially assumed they were directly relevant to the Centergies activities. However, based on a deeper analysis of the Decisions, it is clear that these decisions are actually relevant to specific IOU resource programs and not Centergies as much of the data collection activities should be initiated by the specific programs rather than the WE&T team. Since the IOU WE&T Centergies M&E team initiated this research, the team was uncertain how far they should go with these Decisions.

The study team investigated the 12-05-015 Decision in the context of three certifications for three specific sectors: CALCTP for the non-residential lighting sector, BPI for the residential whole house retrofit sector, QI/QM for the residential HVAC sector. This Decision will continue to be explored through IOU and CPUC ED led research throughout 2014 and 2015. It is uncertain at this time whether there are any other certifications or sectors that should follow-up on this Decision.

After exploring these decisions, it became clear that WE&T is no longer clearly defined as a distinct program. The Statewide IOU WE&T Program currently includes three pivotal Sub-Programs; Centergies, Connections and Strategy. However, general discussions between the CPUC, IOUs and stakeholders and recent Decision language, refer to WE&T as something beyond these three sub-programs. Sometimes it is referred to as something that is part of the IOU Resource Programs' specific program training, mentoring and requirements. At other times, it is referred to as the training and education happening in the market generally and outside of the IOUs funding and purview such as external certification training that people may receive at the Centers or elsewhere such as BPI Certification. WE&T is now something that cuts across multiple programs and entities. The cross-cutting nature of WE&T has produced uncertainty amongst the IOUs and Centers as to who is supposed to act on policy decisions related to WE&T.

- **Better define what programs are WE&T and what specific programs should respond to WE&T related policy decisions**: The CPUC needs to better define what WE&T is and the IOUs need to determine whether a different taskforce or group needs to be created in order to best respond to how WE&T is defined. The current program management and EM&V structure is too fragmented across the Centers, Connections and IOU resource programs to efficiently respond to WE&T related directives from the CPUC. Further, WE&T policy decisions need to clearly state who should respond to directives, i.e. the Centers, Connections or specific IOU Resource Programs. The IOUs recommend a forum whereby the program teams and the WE&T team can sit down and discuss issues. It would allow the WE&T team an opportunity to understand the rebate program team training needs. Each month they could rotate through key contractor areas (i.e., HVAC, Lighting) and discuss what is working and what is not. The IOUs agree that this is vital to improving WE&T efforts however additional resources and time are needed.

- **Conduct further research for policy decisions under the ED-led studies for '13-'14**: Based on the research to date, the WE&T team is recommending that the Decisions 12-05-015 and 12-08-044 are researched by a broader project team than just the WE&T Centergies program and EM&V staff since these decisions are largely directed toward the IOU resource program teams. These Decisions will be further explored under the 2013-2014 Energy Division evaluation contracts and will need support from the IOU resource program teams throughout the evaluation process. Relevant IOU resource program staff are ready and willing to be engaged in this and have already joined a WE&T Project Coordination Group to facilitate some of this research.

2. Introduction to the WE&T Program

The Statewide IOU WE&T Program includes three pivotal Sub-Programs that form an integrated and cohesive structure for implementing WE&T curriculum and related activities in support of IOU energy savings targets and the long-term strategic goals. The WE&T program structure essentially remains the same for the 2013-2014 program cycle. However, the program focuses have evolved due to implementation of the California Workforce Education & Training Needs Assessment (WE&T Needs Assessment) findings, sector strategies and additional CPUC requirements.

The WE&T program consists of three Sub-Programs:

- WE&T Centergies Sub-Program (no change)
- WE&T Connections Sub-Program (no change)
- WE&T Planning Sub-Program (no change)

The WE&T Centergies Sub-Program consists of seven Energy Centers (across PG&E, SCE, SCG and SDG&E service territories[1]) and several free-standing programs that the Centers partner with, such as the Building Operator Certification program. The training is targeted primarily to workers that serve commercial and residential customers. Further, the program activities are generally organized around market sectors and cross-cutting segments to facilitate workforce education and training appropriate to achieve the energy savings, demand reduction, and related energy initiatives required of the IOUs. Historically, the Energy Centers have offered displays, equipment testing and technical consultations, and technology demonstrations on energy-efficient technologies. The Energy Centers also offer classes, workshops, educational seminars, and interactive training exhibits. In addition, some Energy Centers offer a Tool Lending Library so that customers can do their own analysis of technology alternatives.

More recently, the goals of the Energy Centers have been revised by the California Energy Efficiency Strategic Plan (CEESP[2]) and the associated WE&T Needs Assessment (Needs Assessment) to include increased emphasis on facilitating the goals of the CEESP. These goals include deep reductions in energy use and greenhouse gasses, and a trained workforce in energy management and systems energy efficiency.

[1] There are seven center locations including the PG&E Food Service Technology Center (a stand-alone location in PG&E territory) which was not interviewed separately for this program theory and logic model update.

[2] California Energy Efficiency Strategic Plan, January 2011 Update

The Needs Assessment and Decision D12-05-015 also call on the IOUs to develop sector strategies that will lead to the development of a green[3] and high-road[4] workforce. The Energy Centers have a part to play in these sector strategies.

The WE&T Connections Sub-Program addresses lost opportunities in the school market by implementing a comprehensive, innovative approach that involves incorporating some of the nation's leading energy education programs. The sub-program is organized around downstream and upstream relationships between the IOUs and the educational sector by offering entry and intro-level community-based training efforts that support workforce development in energy efficiency, energy management, and new emerging green careers. The Connections programs are curriculum- and education-driven programs offered to K-12 and post-secondary school agencies to facilitate interest in green careers. According to the program theory offered by the IOUs, WE&T Connections programs are designed to:

- Promote green careers through energy and environmental curriculum
- Educate students on energy, water, renewable energy, demand response, distributed generation as well as greenhouse gases and impact to the environment with the goal of influencing day-to-day decisions of students and their households
- Educate schools/facilities on the benefits of implementing energy efficiency policies and demand response programs at their sites to impact energy use in schools and universities and to project energy and environmental leadership by example

The WE&T Planning Sub-Program involves the management and execution of several strategic statewide planning tasks and resulting project implementation actions initiated by the Strategic Plan[5].

[3] The Needs Assessment describes the need for a green workforce to meet the needs of a green economy, which is defined as businesses that are involved in generating or storing renewable energy, recycling, producing, distributing, maintaining, or implementing products that increase energy efficiency, environmental education, compliance, and training, and production of natural and sustainable products. But since the CEESP addresses only a sub-sector of that economy, for our purposes, the green economy and the green workforce that supports it are limited to those involved in energy efficiency, demand response, and distributed generation.

[4] The Needs Assessment also describes a high-road sector of the economy, and the workforce that supports it. The high-road economy is the part of a particular market that is oriented to high quality and therefore high cost as well as minimum standards for skills and practices and certifications for those who work in it. The Needs Assessment focuses especially on the residential housing market as a target for improvement in workforce skills and certifications

[5] WE&T 2013-2014 Energy Division-Investor Owned Utility Energy Efficiency EM&V Plan, August 2013.

3. WE&T Program Theory and Logic Model

3.1 Motivation for Update

This program theory and logic model was updated for all IOUs in California because of the redirection of the Centers requested by the CEESP and the Needs Assessment. While these documents have not required the Centers to stop providing their traditional services, new objectives were added to the old. The IOUs have been re-orienting themselves to include new objectives that focus on workforce training toward developing a green workforce capable of supporting CEESP goals, and toward bringing disadvantaged workers into that workforce. As a result, it is an appropriate time to gain clarity on the current direction of the Centers through an updated program theory and logic model (PTLM).

In addition, the updating of the PTLM will facilitate the generation and selection of new success indicators that are based on new needs and demands. This document brings together the Centers' goals, barriers, assessments of the economic environment, strategies and metrics.

3.2 Centergies Program Description

Historically, this program has been a non-resource program that promotes energy efficiency to a variety of customer segments through its Energy Centers (the Centergies program). The Centers' aims have been to disseminate information about efficient technologies and practices to electric, natural gas, and water utility customers for the purpose of assisting them in reducing energy and water usage, lowering their bills, reducing operation and maintenance costs, and improving customer productivity. This has been accomplished through the offering of classes, demonstrations, consultations and tool lending libraries. They have provided services to end-users as well as to a variety of midstream and upstream market actors, including architects, engineers, distributors, and contractors, who use information and tools to design more efficient buildings or processes, and to conduct efficient energy system retrofits and renovations. These activities were designed to produce energy savings indirectly, and to channel students into other IOU programs.

In response to the CEESP, the Needs Assessment and Decisions D12-05-015 and D12-11-015, the Centers, while continuing their traditional activities and goals, are increasing partnerships in order to:

1. Facilitate and contribute to certification programs
2. Reach out to disadvantaged workers
3. Increase awareness of integrated demand side management (IDSM) among the trades and professions that attend seminars
4. Increase the number of market actors and/or the skill levels in the green workforce

3.3 Centergies Market Barriers & Challenges

Traditionally, the Centergies program has addressed the market barriers of performance uncertainty, asymmetric product information, and as first-cost barriers[6]. However, the barriers and challenges more closely related to the Centers' achievement of its own goals include:

1. Limited reach of Center offerings to customers
2. Limited access to disadvantaged workers
3. Limited resources
4. Inability to create demand for energy efficiency products and services

The limited reach of The Energy Centers has been both geographic and time-related. Specifically, there are a limited number of Centers serving the entire state of California. This has meant that Center participants sometimes had to travel long distances to benefit from the program, potentially leading them to decide not to participate at all. In addition, the scheduled seminars took place during business hours, limiting the ability of workers to attend during their own working hours. These traditional limitations have been somewhat mitigated in recent years by sometimes using other locations for Center instruction, by adding some online courses, and by offering more seminars during evening and weekend time periods. Nevertheless, these limitations of geography still remain, though at a lower level.

The Energy Centers have traditionally marketed their offerings mainly to trade and professional organizations. However, the newer goal of reaching disadvantaged workers, including the unemployed, presents a new challenge: how to reach them. Disadvantaged workers may not belong to trade or professional organizations.

The CEESP sets very high goals and the Needs Assessment calls on the Energy Centers to address goals such as training the green workforce of the future. However, the limitations of Center resources sets constraints on how much they can achieve, especially when the traditional goals of the Centers have not been abandoned.

One of the themes of the Needs Assessment is the generation of and supply for a "high-road" residential construction industry. In other words, the development of an industry that includes demand for high-quality construction processes, materials and features (including energy efficiency). For this to occur there must be both demand for and supply of high-road processes, materials, and features. This supply can be provided via a workforce with greater energy efficiency skills and knowledge. The resources of the Centers put limits on how much of the supply can be produced by their efforts, and the lack of resources results in almost no ability to create demand.

Finally, the recent economic environment has produced limits to companies' ability to sponsor their employees to attend Center classes.

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[6] Performance uncertainty is a market barrier that refers to the fact that buyers may worry about whether a new product will perform as well as similar, older products of that type have in the past. This creates a barrier to purchasing the product. Asymmetric product information is a market barrier that refers to the fact that the buyer of a product has less knowledge than the seller and may therefore be uncertain about whether the seller is providing the right information or that the product will meet the buyer's needs. Strictly speaking, the first-cost barrier is not a market barrier because products promoted by IOUs are economically beneficial over the long term. However, consumers are often reluctant to spend the extra money when purchasing in spite of the expectation of savings over the long term (Eto, Prahl, & Schlegel, 1996).

These are some of the major barriers and challenges the Centergies program faces in the 2013-2014 program cycle. Following sections of this program theory document will discuss the ways that the Centers are working to overcome these barriers, which are listed in the next section.

3.4 Centergies Program Goals

The long-term goals of the Centers (as well as other IOU departments) are to contribute to the CEESP goals. The intermediate-term goals, which will move the Centers toward that long-term goal, are broken down by End-users and Market Actors. The intermediate-term goals are as follows:

3.4.1 End-users

1. Increase energy and demand savings (indirectly through end-user practices and program participation)
2. Increase integration of the elements of demand side management (IDSM) in the thinking and practice of its customers

3.4.2 Market Actors

1. Increase the number of people in the green and high-road workforce
2. Increase the level of energy efficiency skills available to the green and high-road workforce, and their application
3. Increase the inclusion of disadvantaged workers in the green and high-road workforce (employed by market actors)

Shorter-term goals will facilitate the achievement of these intermediate- and long-term goals, and are similarly broken down by End-users and Market Actors. These are to:

3.4.3 End-users

1. Increase energy and demand savings where Center participants are employed or in the businesses they own
2. Increase awareness and knowledge of energy efficiency, demand response, and distributed generation (IDSM) among their participants
3. Increase the channeling of Center participants into other IOU programs
4. Improve energy efficiency practices of Center participants

3.4.4 Market Actors

1. Improve energy efficiency skills, and their application, of Center participants
2. Facilitate the career advancement of Center participants
3. Increase the number of certified workers
4. Increase the number of continuing education units of participants in the professions and relevant trades
5. Increase the participation of disadvantaged workers in the Centers (employed by market actors)

6. Increase the knowledge, skills and benefits listed in all goals for other market actors

Of course the long-, intermediate-, and short-term goals are interlinked. Their connections are made explicit in the logic model that is incorporated into this document.

3.5 Centergies Program Strategies

The activities and strategies that support achievement of the program goals can be usefully divided into two parts. The first part consists of activities and strategies that support the traditional goals of the Centers, including increasing savings and demand reduction, as well as increased participation in other IOU programs. The second part of the activities and strategies can be characterized as supporting the newer goals generated by the CEESP and the Needs Assessment. These include increasing the focus on IDSM, increased focus on skills and certifications, participation in sector strategies, and the focus on including disadvantaged workers into the green and high-road workforce.

3.5.1 Strategies for Traditional Goals

These strategies include offering seminars, consultations, demonstrations, and tool lending libraries. To overcome the barriers to the traditional goals, the strategies of offering classes online, in different locations, and in non-working hours are continuing. These strategies also include the use of adult learning principles to maximize the learning that Center participants gain. Marketing in the traditional manner will continue to help meet the traditional goals. Continuing to emphasize the connections between what participants are learning and other energy programs offered by the IOUs will help to achieve the goal of further channeling Center participants to additional DSM programs and thus promote savings at places of employment.

3.5.2 Strategies for New Goals

A discussion of strategies to attain new goals must include the sector strategies that have been mandated by Decision D12-05-015. Work on these strategies has begun, including attempts at defining “sectors” for this purpose. Three are agreed upon already: Lighting, HVAC, and energy program managers. Discussions of other sectors and definitions of what constitutes a sector for this purpose are under way among the IOUs. Some may be defined in terms of end uses and others by professions or those who practice in a workforce segment.

In the meantime, a lighting sector strategy is detailed in the Statewide Lighting Market Transformation Program Report, and referred to as the CALCTP (June, 2013). An HVAC sector strategy is described in the California HVAC Contractor & Technician Behavior Study (CALMAC Study ID SCE0323.01). An Energy Efficiency Workforce Sector Strategy (October, 2012, PG&E) is also in progress.

The sector strategies that have been developed or in progress are quite detailed, and they have implications for the Centers. The major implication for them is that they should offer classes whose goals align with the sector strategies’ goals. While it is clear that the Centers can support the sector strategies by facilitating series of courses that lead to certification, not all of the strategies are developed. Further, where they are developed, details of the required certifications (e.g. uniform standards for CA) are not complete. For this reason, the activities, outputs and outcomes specific to sector strategies are not detailed in this document or the logic models it includes.

The Needs Assessment further describes the need to increase the targeted skills and the number of workers with those skills within the green and high-road workforce. Alignment with the Needs Assessment requires that the Centers add courses that emphasize skills beyond simply knowledge, that they collaborate with other organizations to offer courses that lead to third-party certification, and

that they offer more courses that align with existing and future sector strategies. These activities will upgrade the skills and promote the career advancement of Center participants because of additional certifications and courses focused on skills.

A major strategy for increasing certifications that will advance individual careers as well as develop the green and high-road workforce is to develop more formal and informal partnerships with existing certifying agencies and programs. Examples include the Centers' partnerships with the Institute of Heating and Air Conditioning Industries (IHACI) and the American Institute of Architects (AIA). This strategy helps to overcome the challenge of limited resources by leveraging the resources of these agencies and organizations. Furthermore, the IOUs are not in the business of certifying skills. The Energy Centers offer space, instructors, and funding to supplement them.

The major strategy that the Centers have adopted for more inclusion of disadvantaged workers is to develop partnerships with agencies such as Workforce Investment Boards and the Los Angeles Job Corps who have contact with some of these workers. Through their mailing lists and contacts, the Centers are able to reach some disadvantaged workers and offer them programs. With increased participation in Center offerings, the Centers anticipate that more of these workers will attain the knowledge and skills that will lead them to full participation in all of the benefits of these offerings as well as career advancement. While the Centers have some responsibility to reach out to disadvantaged workers and include them in their activities and courses, they are also expected to be addressed within the Community College component of the Connections program.

3.6 Centergies External Influences

The most influential external force for the Centers is the economy. When the economy is bad, companies cannot afford to send employees to the Centers to take classes, even though many are free. When businesses operate with fewer employees, it is difficult to spare them for class time. Of course it is also difficult for companies to pay the fees associated with the various certification series.

The regulatory environment is also an important influence on the Centers and the activities undertaken. The funding level for this program, as well as the direction that regulators give to the Centers' activities and goals, are heavily influential.

3.7 Centergies Relationship to Other Programs and Activities

One relationship for the Centers is with the Emerging Technologies Program (ETP). This is the source of some of the Centers' knowledge of new technologies that can be incorporated into classes. It is essential that the Centers keep current on new technological developments.

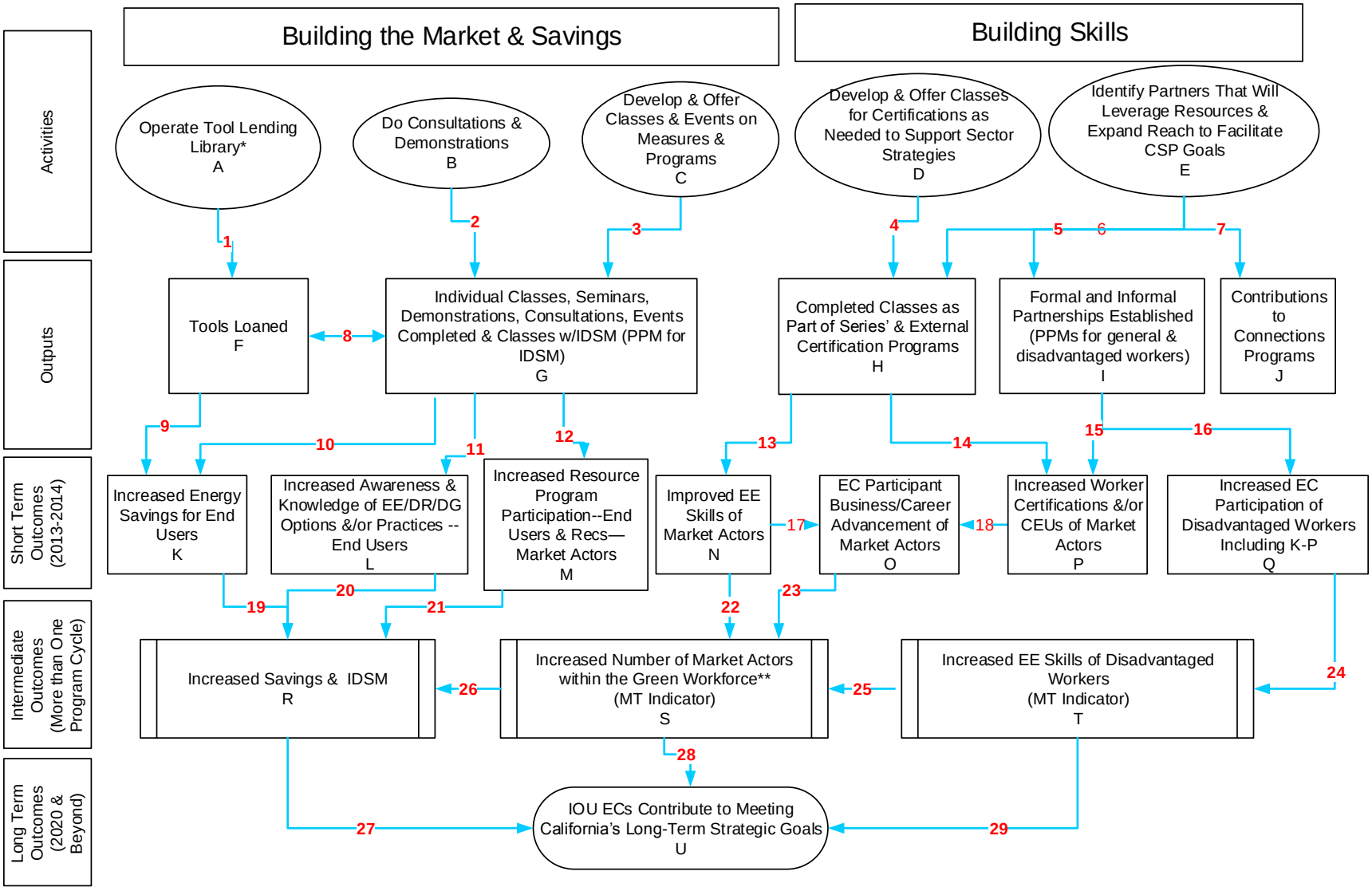
Centers are also closely linked with all other customer service and energy efficiency programs within their associated IOUs. One of the goals of the Centers is to channel Center participants into direct resource acquisition programs. This goal is most effectively met when representatives of those programs visit classes in person to point out the benefits of the programs to Center participants.

3.8 Centergies Program Logic Model

Figure 1 portrays the program theory of how the activities, outputs, short-, intermediate-, and long-term outcomes expected based on the 2013-2014 program are inter-related. Note that the outcomes that go beyond 2013 are also represented in the intermediate- and long-term outcome sections. Table 1 explains the links between activities, outputs and outcomes in more detail than can be represented

in the diagram in Figure 1. Note that in the figure, there is a letter in each oval or box and a number in each line that represents a link between them. The table is organized by the link numbers.

Figure 1: 2013-2014 WE&T Centergies Sub-Program Logic Model



* Not all centers operate tool lending libraries
**See definition in Program Theory

Table 1. Explanation of Links

Link	Segment Theory	Potential Indicators	Success Criteria (TBD at a later date by the IOUs)
1	The output of the tool lending library activity (A) is the number of tools loaned (F). End-user oriented.	# of tools loaned	TBD
2	The output of Consultations and Demonstration activities (B) is a list of completed Consultations & Demonstrations for end-users (G). End-user oriented.	• # of Consultations and Demonstrations • # of classes that include IDSM	TBD
3	The output of classes & events focused on EE measures and programs (C), including adult learning principles, is the completed classes and seminars that focus on those topics (G). An increasing number and percent of those classes is to include IDSM content. End-user oriented.	• # & % of Classes and Seminars + Hours of class • # & % of classes and Seminars with at least 50% of the content on IDSM + Hours of class • # & % of Classes that include Adult Learning Principles + Hours of class	TBD
4	The output of the development and offering of class series, certifications that support sector strategies (D) is the completed Series & Certification Programs (H). The organization and marketing (and completion) of these classes (C) is paired with sector strategies. Thus the output includes classes that lead to certifications (H). One of the points of emphasizing series' and certifications is that they will be skills oriented—i.e. not just knowledge or information oriented (see Link 13). Market actor oriented.	• # & % of classes (+Hours of class) that are part of a series • # & % classes (+Hours of class) that are part of certification programs	TBD
5	Forming new partnerships with other relevant organizations (E) will have multiple outcomes related to different goals. The first is the ability to offer and facilitate classes that involve certifications and/or form parts of series (H). Market actor oriented.	• # & % of classes (+Hours of class) that are part of series' • # & % classes (+Hours of class) that are part of certification programs	TBD
6	Another output (I) that will come from formation of new partnerships (E) is partnerships for multiple goals: facilitating certification and series of classes, and reaching disadvantaged workers. The output of this activity will be more partnerships that facilitate these goals (I). This path focuses mostly on workers employed by market actors, in this case, disadvantaged workers. Market actor oriented.	• # of partnerships with certifying agencies • # of partnerships that involve series' of classes • # of partnerships that allow outreach to disadvantaged workers	TBD
7	Another type of partnership (E) is with schools and colleges. This type of partnership facilitates the goals of the Connections program (J). This link is not followed	List of contributions to Connections program	TBD

Link	Segment Theory	Potential Indicators	Success Criteria (TBD at a later date by the IOUs)
	further in this program theory as it would be represented in the Connections program theory.		
8	Classes and seminars promote use of the tool lending library and vice versa. Both F and G have impacts on the same outputs and outcomes.		
9	Tools that are loaned from the Centers that operate tool lending libraries (F) should result in energy savings for the businesses that borrow them (K). However, some tools are borrowed that will increase comfort more than decrease usage. This may be seen in customer satisfaction, which is not part of the logic model. End-user oriented.	KWh/Therms saved (part of impact evaluation)	TBD
10	The individual classes, seminars, consultations, and demonstrations (G) should result in energy savings where the participant works or in the business he/she owns (K). End-user oriented.	KWh/Therms saved (part of impact evaluation)	TBD
11	The individual classes, seminars, demonstrations, consultations, and events (G) should result in increased knowledge and practices on how to be efficient in the use of energy, in saving energy, and for the ability to think in terms of the integration of EE, DR, and DG (L). This is mainly focused on end-users, but can serve the general EE education of market actors as well; in the latter case, a multiplier effect is expected while it is not with end-users.	Measures of increased awareness, knowledge of practices about efficient energy use, conservation of energy, and IDSM among participants, identified by market status: end-user or market actor.	TBD
12	Individual classes, seminars, demonstrations, consultation, and events (G) should result in increased participation of Center participants who are end-users in other IOU programs. When attended by market actors we would expect increased recommendations for participation in other IOU programs to their customers (M). End-user and market actor oriented.	# & % of Center end-user participants participating in other IOU programs or measure of increase in recommending their clients participate in other IOU programs after Center participation for market actors	TBD
13	Participants completing a series and/or attaining certification (H) will support an increase in EE skills (N) as indicated by reaching at least the Analyze/Apply level of learning or higher. This should be especially true for certifications that include a mentoring component. Market actor oriented.	# & % of Center participants completing series' and/or certification that report increases in energy-related skills and/or practices as measured by attainment of the Analyze/Apply level of learning. Broken out by those involving mentoring vs those that do not.	TBD
14	Completed class series and certification programs resulting from partnerships (I) should result in	# & % of participants in these types of classes that attained certification	TBD

Link	Segment Theory	Potential Indicators	Success Criteria (TBD at a later date by the IOUs)
	increased certifications (P) and/or CEU credits. Market actor oriented.		
15	Partnerships, formal and informal (I), should result in more certifications of participants enrolled in classes that result (P). Market actor oriented.	# & % of Center participants that receive certifications and CEU credits connected with classes resulting from partnerships.	TBD
16	The partnerships that are formed by the Centers (I) should result in increased participation of disadvantaged workers in the Center offerings and this should result in the same outcomes as listed for other participants in outcomes K through P. Market actor oriented.	• # & % of Center participants that are disadvantaged workers • # & % of disadvantaged worker participants who report increases in outcomes associated with the classes they take. (i.e., Links 8-14)	TBD
17	Improved EE skills &/or practices (N) should result in Center participants' business/career advancement (O). This may mean increased employment for disadvantaged workers. Market actor oriented.	# & % of participants (including disadvantaged) who report career advancement, including employment, promotions, pay increases, and business improvements (for owner participants) such as jobs won and jobs won in new categories.	TBD
18	Increased worker certifications &/or CEUs (P) should result in Center participants' business & career advancement (O). Market actor oriented.	# & % of participants with certifications or CEUs resulting from Center classes who report career advancement, including employment, promotions, pay increases, and business improvements (for owner participants) such as jobs won and jobs won in new categories.	TBD
19	Increased energy savings where Center participants are employed or in the businesses they own (K) will contribute to savings over the longer term (R). End-user oriented.	KWh & Therms saved (part of impact evaluation)	TBD
20	Increased awareness & knowledge of EE, DR, & DG options and/or practices (L) should lead to increased participation in multiple areas of EE, DR, & DG, and that should lead to more savings over the longer term (R). End-user oriented.	• # & % of Center participants who participate in multiple program categories	TBD

Link	Segment Theory	Potential Indicators	Success Criteria (TBD at a later date by the IOUs)
		• KWh & Therms saved (part of impact evaluation)	
21	Increased participation in resource acquisition programs (M) should lead to more savings (R). End-user oriented.	KWh & Therms saved (part of impact evaluation)	TBD
22	Improved energy efficiency skills and practices among Center participants (N) should contribute to the growing number of people and/or skills within the green workforce (S). Market actor oriented.	# & % of Center participants employed in the green workforce; i.e. with EE, DR, or DG skills.	TBD
23	Energy Center participants should experience career and/or business advancement (O) due to the increase in their skills (N), which should contribute to the growing number of people and/or skills within the green and high-road workforce (S). Market actor oriented.	• # & % of Center participants who have experienced career advancement • # & % of Center participants employed in the green workforce; i.e. with EE, DR, or DG skills.	TBD
24	Increased participation of disadvantaged workers in the energy Center activities (Q) should lead to increased high-road skills (T) as well as all other benefits of participating in the Centers' activities: Increased energy savings where employed (if employed) (R), increase awareness, knowledge and practices in EE, DR, & DG (L), increased participation in resource acquisition programs (M), improved energy efficiency skills &/or practices (N), career advancement (which would include becoming employed if unemployed before)(O), & increased certifications and CEUs (where applicable)(P). Market actor oriented.	• # & % of disadvantaged workers participating in Center activities who: • have green skills; i.e. with EE, DR, or DG skills. • become aware of & knowledgeable in EE,DR, & DG options &/or practices • participated in resource acquisition programs (if employed) • improved energy efficiency skills & practices • experienced career advancement, including becoming employed if unemployed before • gained certifications &/or CEUs (where applicable)	TBD
25	Increased EE skills of disadvantaged workers (T) will contribute to the increasing number of people or skills within the green workforce (S). Market actor oriented.	# & % of disadvantaged workers employed in green workforce, i.e. with EE, DR, or DG skills.	TBD

Link	Segment Theory	Potential Indicators	Success Criteria (TBD at a later date by the IOUs)
26	The increases in the number of people or skills in the green workforce (S) should lead to longer-term savings & IDSM (R). Market actor oriented.	KWh & Therms saved (part of impact evaluation)	TBD
27-28	Increased energy savings & IDSM (R), increased number of people or skills in the green workforce (S), and the increased high-road skills of disadvantaged workers (T) will contribute to meeting California's long-term strategic goals (U)	Achievement of deep savings goals in 2020 and beyond	TBD

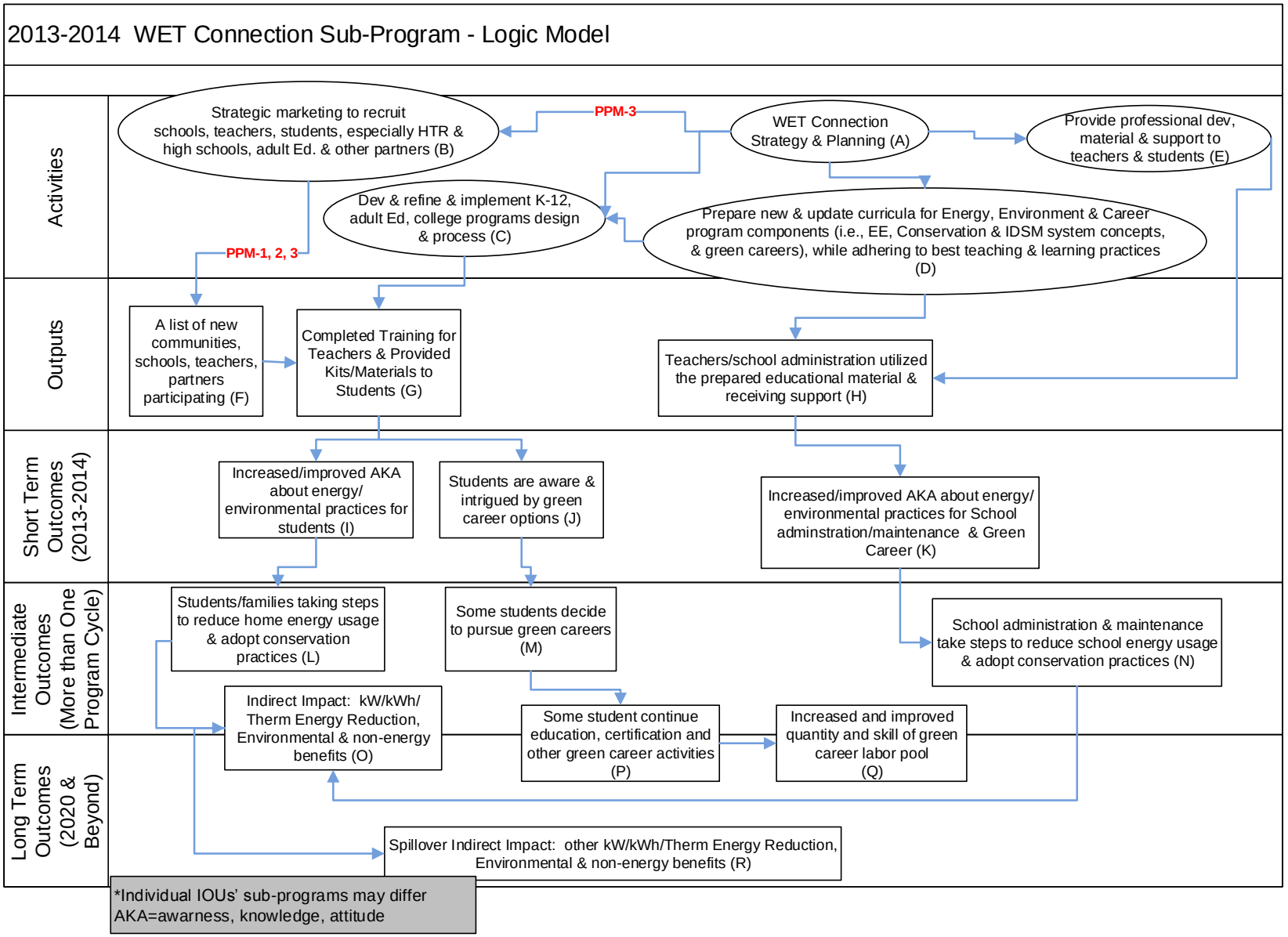
3.9 Connections and Strategies Program Logic Models

Although not part of the original project scope, the Opinion Dynamics team received a request to address two additional logic models. It was not feasible to do a full development of the other WE&T PTLMs, but we have agreed to review and critique the existing logic model for the Connections sub-program and the overarching model that encompasses the whole WE&T program. The following addresses that request.

The existing Connections model is shown in Figure 2. The following points describe what the Opinion Dynamics team considers potentially worthy modifications/updates to this model.

- We suggest taking out some of the process statements in the Activities section.
- It might be more useful to enter the various Connections programs as Activities.
  - This would allow the outcomes for each to be clear since they are different by sub-program.
  - The logic of the activities to outcomes would then become very clear
- The long-term goals about building the green workforce are not shown, though they do appear in the PIP.
- The Centergies logic model shows a link to Connections, but it is not clear where that would tie in to the Connections program—is it curriculum input? We did not see anything in the PIPs about this, but we did think we heard in the workshops that Centergies provides consultation on content to Connections. If there is a tie-in, that should be reflected in the Connections as well as the Centergies logic model. If there isn't, it should be removed from the Centergies model.
- Communities are mentioned in box F, but the outcomes from that output are not clear, and what leads to work in the communities or what outcomes that work produces are not shown.
- The special efforts and outcomes for disadvantaged workers/students are not shown in a clear way within the logic model: How are they to be found and recruited? Where will they fit in the Connections program, and what are the expected outcomes from that segment?

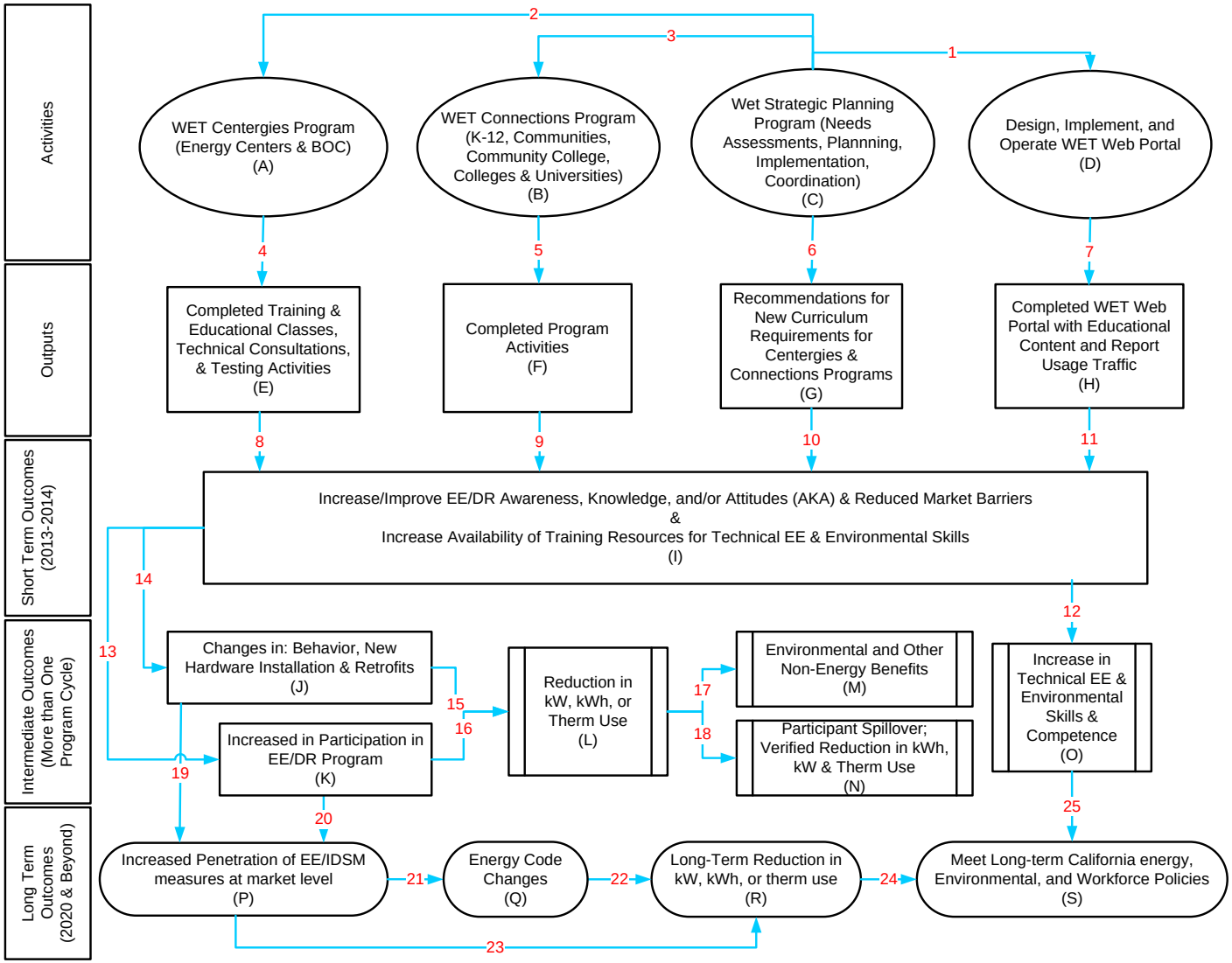
Figure 2: 2013-2014 WE&T Connections Sub-Program Logic Model



The overarching model is shown in Figure 3. The following points describe what the Opinion Dynamics team considers potentially worthy modifications/updates to this model.

- Tie in the WE&T Centergies inputs to Connections colleges/universities, if appropriate.
  - We don't know if Centergies actually has input into Connections curricula.
  - Currently the logic model indicates that the Strategic Planning component provides input to Connections (as well as to Centergies).
- Make the skills aspect of WE&T Connections path more explicit.
- Make the market actor aspect of WE&T Connections path explicit.
- Make distinctions between market actor and end-user outcomes explicit.
- Remove the attitude aspect of the outcomes for Centergies as it was determined through the PTLM workshops that the Centergies program does not intend to change the participants' attitudes toward energy efficiency given that most participants come to the centers with a favorable attitude toward it. However, it is still appropriate to the Connections outcomes.
- We don't know where the WE&T Web Portal stands right now, so we don't know if the logic model represents it correctly or not
- While box O mentions increase in skills and competence, there is no long-term goal of building a green workforce (except that it is embedded in the bubble (S) for meeting CA long-term policies).
- Bubble B mentions communities as part of the activities, but it isn't clear what is to happen in them that comes from the Connections program (communities also appear in the Connections logic model as an output, but what leads to that output or what outcomes result from community activities is not clear).
- The WE&T overarching logic model refers to a strategic component as well as a Web Portal. This raises the question of whether each should also be represented by a logic model.

Figure 3: 2013-2014 WE&T Overarching Logic Model



3.10 Centergies Data Needs

The evaluation team reviewed the Centers current data collection efforts in light of what the Centers need to collect as evidentiary support for its Theory and Logic. We found that the Centers are inconsistent in their data tracking and collection efforts and we also found that some of the data tracking and collection efforts could be modified to better support the Theory. As such, below we provide some suggestions for how the Centers can collectively improve data tracking and collection efforts in support of its Theory and Logic.

3.10.1 Registration Questions

Information collected from participants at the time of registration makes it possible to understand who we are reaching, and how that might change over time. This goal is all the more important now that the Centers are charged with recruiting new categories of participants such as disadvantaged workers and to focus more on skills appropriate to participant types and to increase the ability of market actors to fully participate in the field of energy efficiency. (See Links 11, 12, 17, 18, 22-25 in Table 1.) The Centers currently collect the following information from people when they register for a course:

- Name, address, phone number, email, course name, company name, course date, enrollment date and job title

This is crucial information that should continue to be collected. However, there are a few critical data points that the Centers could collect at registration time that will help to better understand who is coming to the Centers in terms of market actors and end-users. As stated earlier in this report, the paths to energy savings are very different between these two sectors and future impact evaluations would benefit from knowing this information in advance of scoping future studies. Further, it would help to collect additional information at registration to better understand how many underserved or disadvantaged workers are coming to the Centers. Collecting this data once and then developing a protocol for updating this information on an annual or semi-annual basis will allow the Centers to track changes over time given that a Center participant's career profile and location are fluid over time.

The evaluation team collaborated with the Centers to explore the barriers to adding questions at the registration stage. The Centers are limited in what they can add to registration data collection because they want to maintain the ease and convenience of the current registration process.

There is also complexity in that the Centers can easily add new data fields for registering new participants but past participants who are already in the system present a larger challenge of how to get past participants to update their registration information. Some options may include encouraging course participants to update their profile through information cards distributed at each course, or surveys/email requests on a frequent basis to encourage profile updates.

Fortunately, the Centers all use the same data tracking software vendor. However, they all may have purchased different products from that vendor (Currently SDG&E and SCG are using EBMS).

The most cost-effective and efficient way to collect additional information at registration and to collect frequent profile updates may be to identify the exact data needs and then have the Centers work with their software vendor to develop a technological solution for all of the Centers in the next PIP cycle (PG&E is leading the PIP effort). To help facilitate this process, we begin to describe the data needs below for the registration process.

The evaluation team and the IOUs collectively identified five key variables to add to mandatory registration requirements and a potential rolling update of participant profiles including questions that allow us to determine the following:

- Market Actor or End-User
- Home zip code (determines disadvantaged worker reach)
- Employment status
- Industry
- Occupation

Below is a draft of five additional registration and profile/update questions for the Centers' consideration. These questions should be reviewed by the Don Vial Center to see if they would recommend revisions given their position as the WE&T Strategic Consultant.

SUGGESTED CENTER PARTICIPANT PROFILE QUESTIONS

1. Please check the box that best describes your job as it relates to the energy efficiency industry.
   A. I own or manage a facility
   B. I build, install, or maintain equipment for clients
   C. I am involved with the design of non-residential and/or residential buildings
   D. My work is in the sales, manufacturing and/or distribution of energy-using equipment
   E. I am a building inspector, home energy rater, or other type of energy-use auditor/consultant
   F. I work for the government (city, county, state, federal)
   G. I work for a utility
   H. I am a full time or part time student
   I. I am currently unemployed
   J. None of the above, please specify _____

[If 1A is checked]

2a. Which of the following best describes your position:
   A. Plant Manager
   B. Building/Facility Operator or Manager
   C. Restaurant Business Owner/Manager
   D. Food and Beverage Manager
   E. Energy Manager
   F. Other, specify_____

[If 1B is checked]

2b. Which of the following best describes your position:
   A. General Contractor
   B. Lighting Contractor
   C. HVAC Contractor
   D. Solar Contractor
   E. New Construction Builder
   F. Water Heating Contractor
   G. Equipment Installers (fitters, plumbers, sheet metal workers)
   H. Other, specify _____

[If 1C is checked]

2c. Which of the following best describes your position:

A. Architect, Engineer
B. Lighting Designer or Consultant
C. Restaurant/Facility Designer
D. Other, specify _____

[If 1D is checked]

2d. Which of the following best describes your position:

A. Manufacturer or Manufacturers' Rep
B. Equipment Distributor
C. Equipment Sales
D. Other, specify _____

[If 1E is checked]

2e. Which of the following best describes your position:

A. Building Inspector, Plan Checker, Health Department
B. Sustainability Consultant
C. Home Energy Rater
D. Other, specify _____

[SKIP IF STUDENT OR UNEMPLOYED]

Q3. Which sector do you currently work in? Please select all that apply.

A. Residential
B. Commercial
C. Industrial
D. Agricultural
E. Other, please specify_____

[SKIP IF STUDENT OR UNEMPLOYED]

Q4. Are you involved in the following kinds of decisions at your company? Please select all that apply.

A. Making energy-efficiency improvements
B. Purchasing energy-using equipment
C. Operating and/or maintaining energy-using equipment

Q5. What is the zip code where you live?

3.10.2 Course Tracking Databases

Information about the courses offered, skills taught, etc. has become very important due to the new goals the Centers are being asked to meet. With the increased emphasis on skills, IDSM, contributions to certification series, employment of ALP, leveraging partnerships etc., it is essential that information about those aspects of Center offerings be tracked. The evaluation team reviewed how the Centers are tracking course information in comparison to what they could collect to best support the Theory and Logic of the program (See Links 2-5,11,13-18, 23-25 in Table 1). The table below shows what the Centers should ideally collect to support the PTLM. It also shows that some of the Centers are already tracking courses in the ideal fashion (shown by a full green mark). Some Centers need to alter their current approach (shown by the half blue marks) and some need to start collecting this data (shown by red marks).

Table 2. Suggestions for Course Data Tracking

Data Needs to Support PTLM	Purpose of Data	Ideal to Collect	Current IOU Data Tracking			
			PG&E	SCE	SDG&E	SCG
Center Activities Information						
Participant Information	For tracking customers and ability to survey them after course attendance - currently these data fields are optional. Additionally IOUs can gather current and historical attendance by each participant.	Name	▮	▮	▮	▮
		Address	▮	▮	▮	▮
		Phone Number	▮	▮	▮	▮
		Email	▮	▮	▮	▮
		Company Name	▮	▮	▮	▮
		Job Title	▮	▮	▮	▮
		Courses attended	▮	▮	▮	▮
		Enrollment Date	▮	▮	▮	▮
		Course Date	▮	▮	▮	▮
Attendance information	For measuring reach of each course	Size limit	▮	–	–	–
		# registered	▮	–	–	–
		# attendees	▮	▮	▮	▮
# & % of individual classes, seminars and conventions (not part of a series)	Track the number of courses offered. This will help determine how to augment other objectives of the Centers.	Course ID	▮	–	–	▮
		Course Name	▮	▮	▮	▮
		Start Date	▮	▮	▮	▮
		End Date	–	–	▮	▮
		Start Time	▮	▮	▮	▮
		End Time	▮	▮	▮	▮
		Classes per year	–	▮	–	–
		Instructor Information	▮	–	–	–
		Learning Level (basic, intermediate, advanced etc.)	▮	▮	–	–
		Class Type (on site, off site, seminar, workshop, etc.)	–	▮	▫	▫
		Category (IDSM categories such as building integration EE, DR, DG etc.)	▮	▫	▫	▫
		Topic (Lighting, HVAC, ZNE, etc.)	▮	▮	▮	▫
		Collaboration (internal or external and specification of collaborators)	–	▫	▮	–

Data Needs to Support PTLM	Purpose of Data	Ideal to Collect	Current IOU Data Tracking			
			PG&E	SCE	SDG&E	SCG
		Cost	–	■	–	–
		Funding Source	–	■	–	–
# & % of class syllabi that incorporate ALP	Determine adult learning needs being met	Yes/No (specify type of ALP e.g. Entry level, continued education, etc. and type of continued education)	▪	■	–	▪
# & % of classes that are part of a series		Yes/No (Specify which series)	–	–	▪	–
		Duration (in hours)	–	–	–	–
# & % of classes that are part of a certification program	Determine certification needs being met	Yes/No (Specify certification program e.g. BOC, CALCTP etc.)	–	–	■	▪
End-use focus of class or demonstration	Whether the courses are targeting the correct sectors	Sector Targeted (end-use sectors such as HVAC, lighting)	■	■	■	–
		Market Sector Targeted (residential, commercial etc. which more detailed sectors within these categories)	■	■	–	–
		Market Actor Target (specify contractor, architect, building operator etc.)	■	■	▪	–
Class type		Training Delivery (classroom, hands-on, webinar etc.)	■	–	■	–

3.10.3 Course Feedback Surveys

Each Center administers a survey at the end of each course for feedback. Each Center has different survey design and data collection and analysis procedures. Below is a suggestion for how the Centers can improve these surveys for both statewide consistency and to best support the PTLM. We recommend that the Centers move to one survey design and data collection and analysis method so that this data can be analyzed electronically and on a statewide level.

The table below shows what the Centers should ideally collect from surveys to support the PTLM, and to help the Centers understand customer needs and satisfaction. It also shows that some of the Centers are already collecting ideal data (shown by a full green mark). Some Centers need to alter their current approach (shown by the half blue marks) and some need to start collecting this data (shown by red marks).

Table 3. Suggestions for Course Feedback Surveys

Data Needs to Support PTLM	Purpose of Data	Ideal Question	Current IOU Surveys				
			PG&E		SCE	SDG&E	SCG
			PEC	ETC			
Participant Information							
Participant Information	Participant tracking	Name	■	■	–	–	–
	Participant information	Job Title	–	■	–	–	–
	Reason for attending course (For ECs to understand what customers want, not to support testing PTLM)	What were your goals or reasons for attending the course? (Check all that apply) 1. Career advancement within the company 2. Career advancement into a new company or industry 3. Required by employer 4. Suggested by employer 5. To gain new customers 6. To deliver a higher level of service to customers 7. To stay competitive in the marketplace 8. To learn about new technologies 9. Personal desire/decision 10. Help obtain certification 11. Was unemployed or underemployed and thought it would help in job search 00. Other, please specify _____ 96. I did not have any reasons or goals	■	–	■	■	–
	Course met reason for attending (For ECs to benefit in understanding participant satisfaction, not to support testing PTLM)	Do you think the course was successful in meeting these goals or reasons? 1. Yes 2. No (Why not?) 8. Don't know	–	–	–	■	■
Level of relevant knowledge-before	Knowledge baseline (Links 11,20,24)	Before taking this class, how knowledgeable were you about the subject (use scale of "Extremely Knowledgeable, Very Knowledgeable, Somewhat knowledgeable, Not at all Knowledgeable")	■	–	■	–	■

Data Needs to Support PTLM	Purpose of Data	Ideal Question	Current IOU Surveys				
			PG&E		SCE	SDG&E	SCG
			PEC	ETC			
Level of relevant knowledge-after	Knowledge gain (Links 11,20,24)	After taking this class, how knowledgeable are you about the subject (use scale of "Extremely Knowledgeable, Very Knowledgeable, Somewhat knowledgeable, Not at all Knowledgeable") (In wording this question, the questionnaire developer should take account of the fact that when we learn more we realize more clearly what we still do not know)	■	–	■	–	■
Knowledge outcome level (Reaction/Learning/Work-Behavior/Organizational)							
Level of knowledge targeted (Remember/Understand, Analyze/Apply, Evaluate/Create) by class	Scaled questions for comparing what is and what is not leading to create value for the participants (Links 11,13)	Please rate your agreement or disagreement with each of the following statements on a 1-7 scale, where 1 is "completely disagree" and 7 is "completely agree." If a statement is not relevant to your situation, please indicate "Not applicable." a. Overall, the course provided useful knowledge b. The course provided me with a better understanding of how to apply energy efficiency best practices in my job c. The course included training that applied to my everyday job responsibilities d. The course helped me understand a program or technology better so that I could participate in an energy-related program e. The course helped me deliver a higher level of service to my customers f. The course will help me do my job better g. The course will help me advance my career h. The course will help me in seeking employment i. I am now more aware of the solutions available to meet my or my company's energy needs j. I now have a better understanding of what energy savings to expect from the solutions discussed. k. There is an increase in likelihood that I, my company, or my clients will purchase energy efficient equipment or implement energy efficiency practices in the future.	–	–	■	–	■
	How the knowledge gained through the Center is being applied by the participants (Links 12-14)	What kinds of things are you able to do as a result of the course you completed? [CHECK ALL THAT APPLY] 1. Design or develop a new work product or new approach to accomplishing an end result 2. Evaluate alternatives or judge an issue or process using specific criteria or standards	–	–	–	–	–

Data Needs to Support PTLM	Purpose of Data	Ideal Question	Current IOU Surveys				
			PG&E		SCE	SDG&E	SCG
			PEC	ETC			
		3. Analyze situations to identify patterns or trends in the work environment or organize information or tasks 4. Apply information or concepts to perform tasks or solve problems 5. Explain ideas or describe how something works or does not work 6. Other, please specify _____ 7. Cannot do anything new or different as a result of the course					
	Application of knowledge (Links 12-14)	Has your company done any projects resulting from your course participation? If so, when and what was the project. (including improving EE, repair or replace existing inefficient equipment)	–	–	–	▮	–
	Application of knowledge (Links 12-14)	Do you plan to start an energy efficiency project within the next 6 months?	–	–	–	–	▮
Process Related Questions							
Center/Course Marketing and Satisfaction	Marketing and Outreach to increase customer reach (Link 3,6,16)	How did you hear about this course (add in center specific marketing and outreach efforts)	▮	–	–	–	▮
		How did you register for this course (add in center specific registration options)	–	–	▮	–	–
		Do you have a preferred day or time for the courses?	–	–	–	–	▮

Data Needs to Support PTLM	Purpose of Data	Ideal Question	Current IOU Surveys				
			PG&E		SCE	SDG&E	SCG
			PEC	ETC			
	Satisfaction with the course and instructor - for ways to improve classwork (For ECs to benefit in understanding participant satisfaction, not to support testing PTLM)	Please rate your satisfaction with each of the following items on a 1-7 scale, where 1 is "Not at all satisfied" and 7 is "Extremely satisfied." If any item is not relevant to the course you took, please indicate "Not applicable." a. The course overall b. The course materials (including presentations, exhibits, displays and handouts) c. The instructor knowledge d. The instructor teaching style e. The course design (including the course structure and activities) f. The times and days that courses are offered g. The course duration h. The technical difficulty of the course i. Opportunity for Audience participation j. Alignment of course topic with course content	■	■	■	■	■
	Satisfaction with the center and ways to improve (For ECs to benefit in understanding participant satisfaction, not to support testing PTLM)	Please rate your satisfaction with each of the following items on a 1-7 scale, where 1 is "Not at all satisfied" and 7 is "Extremely satisfied." If any item is not relevant, please indicate "Not applicable." a. The Center overall b. Registration process c. Learning environment	–	–	■	–	–
		On a scale of 1 to 7, where 1 is very unlikely and 7 is very likely, how likely are you attend another course at this Center?	–	–	–	–	■
		On a scale of 1 to 7, where 1 is very unlikely and 7 is very likely, how likely are you to recommend this course to others?	–	–	■	–	–
		Is there something that you liked or disliked about the center and / or course?	■	–	–	–	–
		Please provide any other comments or suggestions that you may have.	■	■	–	■	–
	Other training needs to augment current classes (For ECs to understand what customers want, not	What other offerings, seminars, or exhibits would you like to see at the Energy Centers?	■	■	■	■	–

Data Needs to Support PTLM	Purpose of Data	Ideal Question	Current IOU Surveys				
			PG&E		SCE	SDG&E	SCG
			PEC	ETC			
	to support testing PTLM)						

Table Note: Link numbers refer to Table 1

3.10.4 Tool Lending Library

The tool lending libraries at each Center collect inconsistent information and could collectively improve the data tracking to support the PTLM and future energy savings claims. The table below shows what the Centers should ideally collect for the tool lending libraries to support the PTLM. It also shows that some of the Centers are already collecting ideal data (shown by a full green mark). Some Centers need to alter their current approach (shown by the half blue marks) and some need to start collecting this data (shown by red marks).

Table 4. Suggestions for Tool Lending Library Data Tracking

Data Needs to Support PTLM	Data Currently Collected that we received during Evaluability Assessment	Current IOU Data Tracking			
		PG&E		SCE	Sempra
		PEC	ETC	AGTAC	CCSE
Participant Information					
Contact Information (Links 9-15,22,23)	Project Name	▮	▮	–	–
	Address	▪	▮	–	–
	Phone	–	–	▪	–
	Email	▪	–	▪	–
	Company	▪	▮	–	–
	Company Description	▪	–	–	–
	Customer Profile (end-user, market actor)	–	–	–	–
	Market Sector	–	–	–	–
Tool Lending Library					
Inventory of Tools (Link 1)	Tool Name	▮	▮	▮	▮
	Number of available tools	▮	▮	▮	▮
	Tool end-use	▮	–	▮	–
	Tool model number	▮	▮	–	–
	Tool description	▮	▮	–	–
	What tool measures	▮	▮	–	–
# of tools loaned (Link 1)	Loan Start Date	▮	▮	–	▮
	Duration of loan	▮	–	–	▮
Purpose of borrowing tool with end-use specified (for EC benefit, not PTLM)	Intended Use	▪	–	–	–
Expected outcome of tool use (at time it is borrowed) (Link 9)	Annual Savings - kWh (via post survey)	▮	–	▮	–
	Annual Savings - kW (via post survey)	▮	–	–	–
	Annual Savings - Therms (via post survey)	▮	–	–	–
	Annual Savings - Dollars (via post survey)	–	–	▮	–
	Satisfaction (via post survey)	▮	–	–	–
	Participated in EE Program (via post survey)	▮	–	–	–
	Possible energy conservation measures implements as result of using tool (via post survey)	–	–	▮	–

Data Needs to Support PTLM	Data Currently Collected that we received during Evaluability Assessment	Current IOU Data Tracking			
		PG&E		SCE	Sempra
		PEC	ETC	AGTAC	CCSE
Process Related (For EC benefit, not PTLM)	Where or how did you find out about TLL (via post survey)	–	–	▮	–
	What other tools of services would you like to see as part of the TLL (via post survey)	–	–	▮	–
	Next steps to implement EE practices (via post survey)	–	–	▮	–
	Would you recommend TLL to others (via post survey)	–	–	▮	–
	Did TLL provide the information needed to complete your project (via post survey)	–	–	▮	–
	Comments and suggestions (via post survey)	–	–	▮	–

Table Note: Link numbers refer to Table 1

4. Critical Data Gap Assessment

The 2013-2014 WE&T research roadmap references two decisions (Decisions 12-05-015 and 12-08-044) that are relevant to Workforce Education and Training initiatives. The WE&T roadmap called for the IOUs to initiate a study to explore these decisions and to explore how the IOUs have responded to the decisions thus far, and what options they might have for responding to them in the future. Since these decisions were included in the WE&T roadmap it was initially assumed they were directly relevant to the Centergies activities. However, based on a deeper analysis of the Decisions, it is clear that these decisions are actually relevant to IOU resource programs and not Centergies as much of the data collection activities should be initiated by the specific programs rather than the WE&T team. Since the IOUs WE&T Centergies M&E team initiated this research, the team was uncertain how far they should go with these Decisions. Based on the research to date, the WE&T team is recommending that these Decisions are no longer researched by this project team, but that these Decisions are further explored under the WE&T Energy Division contract. Relevant IOU resource program staff are ready and willing to be engaged in the future for any such research.

This chapter describes the results of an investigative effort into these Decisions. This investigation set out to assess these Decisions, understand to whom they are directed, and explore the gaps in data. This study also set out to ultimately scope a study to fill the data gaps. However, there is limited information at this time to scope a specific study. Therefore, this chapter summarizes the information known to date and serves as foundational knowledge to help guide the decision to move forward with the study and where that study should focus (e.g. determining the IOU program, measure and certification on which the study should focus).

4.1 Investigative Methods

The information contained in this section is based upon meetings with IOU staff, interviews with IOU staff and consultants, and a review of several studies, study plans and CA roadmaps. The meeting with IOU staff included a workshop held at San Diego's Energy Innovation Center on 10/28/13 with ten key stakeholders in these Decisions including all IOU WE&T M&E staff, some WE&T Centergies Staff, and Don Vial WE&T Strategy Consultants. Further, the evaluation team reviewed multiple documents (see Appendix E for Sources).

In addition, we interviewed a few of the Residential HVAC and CALCTP IOU resource program staff and implementation contractors to better understand what data is available or planned in relation to the Decisions. This was a limited and exploratory effort in November 2013 just before the Thanksgiving holiday and we recommend that further program and implementation staff across all of the IOUs be included in further discussions to help shape the scope of a potential study. The following individuals were interviewed to date:

- SCE Res HVAC Consultant
- SCE Res HVAC Program Manager
- ICFI Consulting regarding CALCTP proposed research in collaboration with the UC Davis, CEC & UC Berkeley

If the Energy Division wants to further explore the study options for assessing the costs and benefits of Quality Installation (QI) Certification in the Residential HVAC program, the current few interviews are insufficient. Further research with the following organizations will help illuminate what kind of study is feasible for this program and certification.

- All IOU Res HVAC program managers and M&E staff
- Residential HVAC program implementation staff, e.g. CSG
- Organizations that support the QI certification, e.g. WHPA

4.1.1 The Decisions

The table below shows the Decisions that are referenced in the WE&T Roadmap and language within them that is relevant to Workforce Education and Training initiatives.

Table 5. Relevant Decisions

Decision Number	Page Number Reference	Relevant Language
12-05-015	278-279	We direct the utilities to include in their applications the following information regarding HVAC quality installation, CALCTP-certified installations, and any other sector strategy-induced skill standards identified by then: (1) data or estimation of the incremental customer cost, if any, of requiring skill standards; (2) data or estimation of the average and range of permitting/compliance costs across permitting jurisdictions in the IOUs' service territories; (3) data or estimation of impacts, if any, mandatory skill standards would have on program participation rates; (4) data or estimates of the incremental energy savings and customer cost savings over the life of the equipment; and (5) any other potential benefits associated with higher standards, such as fewer call-backs, lower frequency of customers over-riding control systems, lower life-cycle costs, and increased consumer uptake of measures based on higher quality and certainty.
12-08-044	168-185	The IOUs are directed to immediately begin collecting the following data in these seven WE&T areas: (1) contractor and subcontractor contract terms (competitive bid, direct award, etc.); (2) contractor and subcontractor compensation schemes (hourly, piecemeal, salaried, etc.); (3) number of inspection failures and the types of failures (including the number of enrolled customers later deemed ineligible, number of incorrectly assessed households and instances of measure installation inspection failures); (4) level and type of IOU training (including lead safety training) and screening (including background check) these specific contractors have completed; (5) customer feedback for these contractors, positive and negative; (6) demographic data of the current ESA workforce, including minority, local, low income, disabled, displaced, and other disadvantaged communities; and (7) the IOU's assessment of any other needs of the existing workforce to meet the current and future ESA Program demands.
12-11-05	91	In the meantime, while a more comprehensive approach is being designed, the utilities should emulate, for their energy efficiency programs, the data collection protocols with respect to workforce initiatives recently adopted by the Commission for the low-income programs in D.12-08-044. This will assist us in evaluating new proposals for energy-efficiency program workforce efforts, based on a more robust set of data in the future.

The evaluation team and the WE&T roadmap team initially assumed that there was likely a large amount of overlap in the Decisions and that one study could be scoped to address them. However, upon closer examination, it was determined that these decisions are vastly different with minimal overlap. The Decisions have different research objectives that are likely directed at different IOU resource programs and data sources. Decision 12-08-044 is asking the ESA (low-income) program to collect data from ESA program participating contractors to better understand workforce conditions and potential outcomes. Decision 12-11-015 asks that other programs emulate this data collection from

contractors. However, it is uncertain which programs should act upon this and whether the data items are feasible to collect from contractors given barriers such as company privacy, willingness to share private company data, and concerns with contractor response rates. It is also unclear how this data will be analyzed for future decision making. At this time, this Decision does not appear to be directed at the current WE&T Centergies or Connections programs, and appears that this Decision needs thoughtful follow-up with the specific IOU program teams to which it pertains.

Conversely, D.12-05-015 asks for data to analyze the overall cost/benefit to multiple parties for mandating that contractors obtain specific certifications, such as the HVAC QI certification, to participate in IOU resource programs. A specific cost/benefit analysis plan would need to be conducted separately for each program that currently requires certification or is planning to as part of future sector strategies.

The Decision specifically called out the HVAC QI certification, CALCTP and any other Sector strategy induced skills. Follow-up on this decision should involve the specific IOU program and M&E teams to which it pertains since this Decision does not seem to directly pertain to the courses offered at the Centers. Contractors may obtain certifications through the Centers or elsewhere but the process of determining whether the certification is a beneficial program component should reside with specific program staff. Specific program management and strategy teams are likely the staff that can help provide data and/or support data collection efforts. Therefore, we recommend that these Decisions be incorporated into the specific program roadmaps to which they are directed.

4.2 Decision 12-05-015

The evaluation team began to explore Decision 12-05-015 as it pertains to the QI certification requirement for the Residential HVAC program and the new CALCTP certification since these two certifications are mentioned in the Decision. The Decision may also be relevant to QI for the Non-Res HVAC program however it appears that QI is not currently a requirement for the Non-Res HVAC programs. The Decision may also be relevant to the BPI certification requirement for the EUC/Whole House Program, however, it is uncertain how much this decision relates to the EUC program and the BPI requirement. Follow-up on the costs/benefits of this certification may be limited since this program is already implemented and not in a trial period. Further, BPI certification has long been a requirement of Advanced Audit programs since it provides the training needed to conduct a comprehensive energy audit (required as part of the EUC program) and conduct HERS scoring. Finally, contractors supporting EUC have been over-researched by multiple evaluation parties in the past few years.

The table below dissects the data elements in the Decision for the QI certification requirement for the Residential HVAC program and the new CALCTP certification in terms of the types of data needed, the potential data sources and who should best champion this data collection effort for each certification requirement.

After the table we dive deeper into what this investigation found for existing or planned data that addresses the Decision.

Table 6. Decision 12-05-015 Mapping to QI Certification and CALCTP

		IOU Program/Skill Requirement					
		Res HVAC Program: HVAC QI Certification Standard			**Potential Requirement for C&I Lighting Program: CALCTP**		
		Data Needs	Potential Data Source	Study Champion	Data Needs	Data Source	Study Champion
Costs							
	Incremental customer cost of requiring skill	Project cost for new HVAC system from contractors w/ QI certiciation and w/o	Res HVAC program data; Contractor survey	IOU Res HVAC Program Teams/Incorporate into PIPs	Project cost for new Lighting system from contractors w/ CALCTP certification and w/o	CALCTP data; ICFI Study; Additional Pilot Contractor survey	C&I Lighting Program Teams/Incorporate into PIP
		Labor rates for new HVAC system from contractors w/ QI certification & w/o	Res HVAC program data; Contractor survey		Labor rates for new Lighting system from contractors w/ CALCTP certification & w/o	CALCTP data; ICFI Study; Additional Pilot Contractor survey	
	Average or range of costs associated with permitting/compliance	General permitting costs (cost and time) for installing new HVAC system; any additional costs based on how its installed	Res HVAC program team; Contractor survey; or random sample mystery calls to permitting offices		General permitting costs (cost and time) for installing new lighting system; any additional costs based on how its installed	CALCTP program team; Contractor survey; or random sample mystery calls to permitting offices	
Benefits							
	Incremental energy savings	Difference in Res HVAC energy savings from QI certified installer vs non-certified	Res HVAC program work papers?	IOU Res HVAC Program Teams/Incorporate into PIPs	Difference in lighting energy savings from CALCTP certified installer vs non-certified	CALCTP data; Pilot Study;	C&I Lighting Program Teams/Incorporate into PIP
	Customer cost savings over life of equipment	Cost savings over life of HVAC system when it meets QI standards versus not	Res HVAC program work papers?		Cost savings over life of lighting system when it meets CALCTP standards versus not	CALCTP data; Pilot Study;	
	Fewer call-backs	Number of quality issues with HVAC equipment installed by QI cert verus non QI cert	Res HVAC program inspection records/QA/QC records prior to QI mandate and after; Contractor survey; Customer Survey		Number of quality issues with lighting equipment installed by CALCTP cert verus non CALCTP cert	CALCTP data; Pilot Study; C&I program inspection/QA/QC records prior to CALCTP standard and after	
	Lower freq of customers over-riding control systems	Number of customers over-riding Res HVAC thermostat temp settings with QI installer versus non-QI installer	Res HVAC program participant surveys comparing QI installs to non-QI installs; customer survey		Number of customers over-riding lighting control settings with CALCTP installer versus non-CALCTP installer	C&I lighting program participant surveys comparing CALCTP installs to non-CALCTP installs; customer survey	
	Increased consumer uptake of measures because of higher quality & certainty	Number of customers saying QI certification influenced decision to pick their contractor	Res HVAC program participant surveys		Number of customers saying CALCTP certification influenced decision to pick their contractor	CALCTP program participant surveys	
	Any other potential benefits associated with higher standard	Increased quality of contractor occupation; eg. increased wages for worker, more marketable	Contractor Survey		Increased quality of contractor occupation; eg. increased wages for worker, more marketable	Contractor Survey	
Impact on Program Participation Rates							
	Impact of mandatory skill standards on program participation rates	If Contractor focused: number of participating contractors in Res HVAC program prior to mandating QI certification and number after	Res HVAC program data	IOU Res HVAC Program Teams/Incorporate into PIPs	C&I lighting in prep for potential CALCTP-certification could determine how the contractor participant pool would drop if set a CALCTP cert mandatory for participation	Cross C&I Lighting Program contractor data with CALCTP certificate graduates	C&I Lighting Program Teams/Incorporate into PIP

4.2.1 Quality Installation for the Residential HVAC Programs – Critical Data Needs Gap Analysis

The evaluation team investigated SCE's QI Residential HVAC program in light of the Decision. SCE's Quality Installation program (QI), started in 2010, provides rebates to residential customers who have a new or replacement central air conditioner or air-source heat pump (HVAC System) installed by a QI program qualified contractor. By paying the customer rebate, the QI Program helps offset the additional costs of a higher-quality installation meeting the ENERGY STAR® Quality Installation Guidelines. Higher-quality installation helps solve issues such as low airflow, improper refrigerant charge and duct leakage. The program's major goals are to encourage better energy efficiency in HVAC installation practices, and reducing peak loads.

The program offers up to $1,100 in rebates, which are dependent on the climate zone and SEER level of the air conditioning system. To participate in this program, a customer must have a single-family (attached or detached) residence, an active service account and have an existing central air conditioner that needs to be maintained or repaired or install a new or replacement central air conditioner or heat pump. Customers who have more than one system at a qualifying site are eligible for rebates for each system.

The services are delivered through independent HVAC contractors that have participated in program-sponsored technical training, which includes load calculation software training (enabling the contractor to perform Manual J, D and S load calculations) and field commissioning training (provides the contractor with an overview of the proper documentation and process to commission a unit using ACCA/ANSI standards). All licensed HVAC contractors who complete training are able to perform the higher-quality installation services.

Currently all training has been on hold for the program in this cycle due to funding constraints. The program has a waitlist of contractors who want to participate in the program once funding allows.

This investigation found that most studies conducted to date for the program do not address the data needs in the Decision. However, there are several studies that should be released soon that may cover some of the data needs including:

- PY10-12 Residential and Small Commercial HVAC Impact Evaluation by DNV-KEMA
- HVAC market effects study by NMR Group (Planned Q3, 2013 release)

Further, there is one planned study to release in Q3 2014 in the Res HVAC roadmap that appears to be focused on addressing this Decision as its research objectives are "to further understanding of the opportunities and challenges surrounding HVAC contractor and technician behavior. Quality Installation Skills Standards – estimate impacts of program requirements for skill standards that promote technician certifications on program participation rates as well as potential incremental costs and benefits for customers".

- HVAC Contractor & Technician Behavior Phase II: (Currently out to bid by SCE)

Further action in this area requires collaboration with the CPUC, IOU program staff and evaluation consultants to ensure that the planned studies collect some of the data needs or that a new study is created that focuses entirely on these research objectives. Collaboration should also include the Western HVAC Performance Alliance (WHPA), the Davis Energy Group and Conservation Services Group (CSG) who is implementing the program.

The table below summarizes the studies known to date for the Residential HVAC program

Table 7. Residential HVAC Program Studies

Study Name	Evaluator	Status	Study Date	Research Objective	Methodology	Study has Cost / Benefits of QI Certification?
HVAC Contractor & Technician Behavior Phase II	Managed by IOUs	To Start	Q3 2014	Objectives are to further understanding of the opportunities and challenges surrounding HVAC contractor and technician behavior. Quality Installation Skills Standards – estimate impacts of program requirements for skill standards that promote technician certifications on program participation rates as well as potential incremental costs and benefits for customers.	TBD - pending results of final Phase I study due August 2012	Yes
Market Effects Study	NMR Group	Completed	Q3 2013	HVAC market effects study	Non-participant metering	?
Work Order 32: 2010-12 Residential and Small Commercial HVAC Impact Evaluation	DNV-KEMA	In progress	Q4 2013	Develop savings estimates for residential and commercial measures implemented through the statewide core Utility programs as well as 3rd party Utility programs and to provide feedback that can be used for program improvement. To extract the greatest value from this evaluation, this study will focus on estimating the savings for the new QM and QI programs and targeted evaluation of key parameters for the continuing Upstream Equipment Incentives	Contractor survey, market actor interviews, large distributor surveys, residential participant survey, residential non-participant surveys, non-residential participant survey, non-residential non-participant surveys, field observations (residential and non-residential), calibrated simulation modeling	?
California HVAC Contractor & Technician Behavior Study [CALMAC ID SCE0323.01]	Energy Market Innovations	Completed	14-Sep-12	• To document contractors' and technicians' understanding of HVAC maintenance, installation, and service, and the protocols that exist within their companies for each • To identify contractors' and technicians' experiences with, interest in, and barriers to participating in utility HVAC maintenance/installation programs.	Contractor survey, field observations	No

Study Name	Evaluator	Status	Study Date	Research Objective	Methodology	Study has Cost / Benefits of QI Certification?
WET Non-Resource Indirect Impact Evaluation (WO069)	Itron, KEMA, Opinion Dynamics	In Progress	2013	• Direct or indirect energy savings • Size and significance of energy savings and or other benefits	Participant survey, onsite audits	No
Statewide WET Centergies & Connections Process Evaluation [CALMAC ID: PG&E 317.01 & 317.02]	Opinion Dynamics	Completed	1-Dec-12	• Assessment of WE&T program alignment with the Strategic Plan • Program effectiveness	Participant survey, secondary research, sector representative interviews	No
Indirect Impact Evaluation of the Statewide Energy Efficiency Education and Training Program	Opinion Dynamics	Completed	2009	Assess the indirect energy efficiency impacts of the WE&T programs	Participant survey, Course instructor survey, case studies	No
Impact Evaluation of Residential and Commercial Quality Installation Programs and proposed incentives for "to code" installations in the Residential sector	Managed by ED	To Start	Q4 2014	• Rigorous study and quantification of QI savings is needed to assess the true potential for energy savings of these programs • Scope will depend on what is accomplished in 2010-2012 and should include pilots for "to-code" installations of HVAC units.	Field monitoring of residential and commercial QI program participants, to-code installations and installations where a permit wasn't pulled	No
Market Assessment of Residential and Commercial Customer Decision-making on High Efficiency HVAC Systems, Quality Maintenance and Quality Installation	Managed by IOUs	To Start	Q3 2014	Objective is to identify the drivers behind QI/QM/high efficiency customer purchasing decision-making across various market sectors	Participant and non-participant surveys	No
Comparison of AMI Billing Analysis Methods for Estimating Energy Savings from Residential and Commercial Quality Maintenance	Managed by IOUs	To Start	Q3 2014	• Objectives are to explore methods for disaggregating HVAC loads from site loads, and opportunities for marrying load cycling with HVAC programs to optimize site energy consumption. • The second objective of this study is to investigate opportunities for marrying load cycling with Quality Installation and Quality Maintenance programs to optimize site energy consumption.	SAE models, Non-intrusive load monitoring	No

Study Name	Evaluator	Status	Study Date	Research Objective	Methodology	Study has Cost / Benefits of QI Certification?
Market Assessment to Identify Baselines and Barriers for Existing HVAC Conditions, Building Permit and Title 24 Compliance	Managed by ED	To Start	Q4 2014	Identify market intervention strategies for increasing customer understanding of the QM/QI value proposition to increase their receptiveness to contractor QM/QI offerings and eventually proactively demand QM/QI in manner that contractors understand and can meet with the appropriate QM/QI services	Participant and non-participant surveys, site visits	No
Impact Evaluation of Residential and Commercial Quality Maintenance Programs	Managed by ED	To Start	Q4 2014	Objectives for this study are to quantify first year and lifecycle gross and net kWh, kW and therm impacts.	Pre-post monitoring, billing analysis, calibrated simulation models	No

4.2.2 CALCTP for the C&I Lighting Program– Critical Data Needs Gap Analysis

The California Advanced Lighting Controls Training Program (CALCTP) is a statewide initiative aimed at increasing the use of lighting controls in commercial buildings. CALCTP educates, trains and certifies licensed C-10 electrical contractors, state-certified general electricians in the proper programming, testing, installation, commissioning and maintenance of advanced lighting control systems. Advanced lighting control systems typically include: dimmers, occupancy sensors, photo-sensors, relay modules, and communication-based control devices.

CALCTP started in part because the IOUs wanted more quality control around lighting installations as they were not being installed at optimum levels. ICF has helped to administer the program since 2008. Currently, the IOUs are not offering incentives for CALCTP installations in the C&I programs specifically but some projects may have been installed and submitted by CALCTP-certified contractors. Both SMUD and PG&E offered trial incentives in 2013 and 2014, but have both completed their trials. CALCTP began in CA but it wants to go nationwide and has already expanded to MI, WA and IL.

There is still research to be done to determine the overall costs and benefits (both energy and non-energy) of CALCTP lighting installations compared to non-CALCTP installations. Currently there are two CA studies planned in this area over the next few years. In addition, two CALCTP/lighting control studies are likely to be initiated by the lighting program team.

Study 1: ICFI Consulting is collaborating with Davis Energy Group and Lawrence Berkeley National Laboratories (LBNL) to explore the costs and benefits of CALCTP lighting installations. This study was commissioned by the CEC. It is a small and focused study that is leveraging easily accessible data and has a short turnaround. The study starts in December 2013 and plans to provide results by May 2014. The study is comparing data from 30 total projects; 15 conducted by CALCTP contractors and 15 conducted by non-CALCTP contractors. The non-CALCTP projects are projects that were done by LBNL on federal buildings as part of a Department of Energy contract. Therefore, this is a limited comparison group in this study because it is not representative of the type of projects that the market would install in the absence of government support and control. This study also does not account for what happens in the market when a program incentive is added. The study team is aware of the limitations but plans this study as an initial exploration into this topic to see if any conclusions can be drawn with a tight timeline and budget.

Study 2: The EM&V Non-Residential roadmap for the Lighting Program mentions a planned study in 2013-2014 called “Sustainable Office Lighting” as part of the IOU-led research under the Process Area called “Lighting Early M&V and Pilots/Trial to support Lighting Innovation. Currently, two studies are underway or planned by the IOUs. PG&E is leading a study to conduct an assessment of the CALCTP Midstream Trial Program. The assessment has multiple research objectives including creating a case study of benefits of complying with Title 24 code requirements including energy savings and non-energy benefits. SCE is also leading a study to identify the differences expected in contractors after undergoing the CALCTP training and how they can be measured.

It is uncertain as to whether any additional study scope for CALCTP is needed at this time to address this Decision.

Appendix A. WE&T Strategic Plan References

The table below shows how WE&T is referenced in the CEESP both within the WE&T section and in other sections throughout the strategic plan.

Table 8. WE&T References in CA's Energy Efficiency Strategic Plan

Section Name	Section Number	Page Number	Goal Expected to Support	Activities to Support Goal / Goal Results
Residential and Low income - Goals	2.2.3	23	Goal 1 - By 2020, all eligible customers will be given the opportunity to participate in the LIEE program.	A trained LIEE workforce will accommodate future job demand and educate their communities.
Residential and Low income - Goals	2.2.5	25	Goal 1.4 - Promote the growth of a trained LIEE workforce	Incorporate LIEE training needs into the Workforce Training needs assessment, Develop Training Roadmap, which includes funding requirements and sources other than IOUs, Coordinate resources for training related to LIEE program needs to ensure delivery of LIEE-trained resources to the program
Commercial Sector - Goals	3.5	33	Goal 1.6 - Develop a multipronged approach to advance the practice of integrated design	Form partnerships with industry and architectural/engineering schools to promote the practice of and education in ID, Provide incentive credits for professionals who maintain their accreditation with ID training, Ongoing curriculum enhancements to promote ID, professional boards establish minimum guidelines for A/E and construction firms to require ID skills as a core competency among personnel
Industrial Sector - Strategies	4.4	42	Workforce Training	Leverage existing training initiatives and technical exchange forums so that California industries have access to highly-skilled professionals who are fully knowledgeable in the areas of system energy efficiency and energy management
Industrial Sector - Goals	4.5	44	Goal 2-3 -- Develop and implement workforce training program (integrated with national training effort)	Adopt the national curriculum for certification, Consider curriculum enhancements for awareness-level training on integrating energy efficiency into the workplace and developing a new curriculum to fast track for future energy management professionals, Begin pilot courses with key industry segments
Agricultural Sector - Strategies	5.4	47	Workforce Training	There must be a statewide focus on the workforce needs to achieve the goal, with adequate funding and support for development of the needed workforce.

Appendix A. WE&T Strategic Plan References

Section Name	Section Number	Page Number	Goal Expected to Support	Activities to Support Goal / Goal Results
Agricultural Sector - Goals	5.5	49	Goal 1-2 -- Ensure workforce has information and training necessary to apply efficiency solutions	Conduct workforce training needs assessment and next steps, Develop training curricula and modules identified by needs assessment, Develop training and education tools for use of date base and benchmarking methods, Begin pilot training & education programs
Heating Ventilation and Air Conditioning - Goals	6.5	58	Goal 2-3 -- Develop and provide expanded QI/QM training for contractors, technicians and sales agents	Conduct comprehensive training needs assessment to identify industry skill gaps; begin expanded training programs, Assess impact of training activities and update needs assessment as required, Expand training programs statewide, particularly at the vocational/technical and community college levels
Heating Ventilation and Air Conditioning - Goals	6.5	58	Goal 2-4 -- Develop and implement comprehensive contractor accreditation program	Develop accreditation program requirements, Statewide certification program
Heating Ventilation and Air Conditioning - Goals	6.5	60	Goal 4: New climate-appropriate HVAC technologies (equipment and controls, including system diagnostics) are developed with accelerated marketplace penetration.	In addition to technology development, a key strategy to achieve this goal is education of contractors and consumers about the advanced technologies‘ availability and value, as well as education and training of service technicians, particularly on the use of diagnostic systems.
Codes and Standards - Goals	7.5	66	Goal 2-1 -- Improve code compliance and enforcement.	Work with local governments to improve code compliance, adopt above code ordinances, and provide training/education
Workforce Training & Education - Vision	9.1	70	Vision	By 2020, California’s workforce is trained and fully engaged to provide the human capital necessary to achieve California’s economic energy efficiency and demand-side management potential.
Workforce Training & Education - Goals	9.5	72	Goal 1-1: Define, initiate and drive long-term WE&T development and strategic planning, including identification of funding streams and market sector specific needs	Conduct an in-depth formal statewide energy efficiency training and education resource inventory and needs assessment, Assess current and alternative funding mechanisms for WE&T activities, Create a WE&T-specific web portal and identify entities to co-fund and co-sponsor the web portal with utilities, Initiate ongoing dialogue with broad group of market participant and education stakeholders to inform the overall plan, Establish task force to oversee utility specific WE&T activities, Maintain ongoing dialogue with actors positioned to lead priority educational and workforce development initiatives

Section Name	Section Number	Page Number	Goal Expected to Support	Activities to Support Goal / Goal Results
Workforce Training & Education - Goals	9.5	73	Goal 1-2: Support the community college and adult education efforts to support students to develop their education based on visible career paths in energy efficiency and related fields	Utilize community colleges to provide technical training such as HVAC maintenance and building operator certification, Develop appropriate linkages with K-12 programs, Coordinate with the community colleges and adult education sector to incorporate an energy component into their career laddering concept
Workforce Training & Education - Goals	9.5	73	Goal 1-3: Incorporate energy efficiency and demand side energy management into traditional contractor and technician training, such as for plumbers and electricians, and expand training resources to produce target numbers of trained workers	Expand or establish training curricula, and training and professional career development programs in building construction, services, building operator and other energy efficiency technical fields, Establish or expand key financial and placement partnerships that demonstrate employment prospects for trained personnel
Workforce Training & Education - Goals	9.5	73	Goal 1-4: Create or expand college and university programs with energy efficiency focus and foster green campus efforts to apply this knowledge in clear view of students and faculty	Utilize existing UC/CSU extension programs to incorporate a continuing education curriculum component, Work with Universities and colleges to expand professional energy related degree offerings and contribute to tailored curriculum
Workforce Training & Education - Goals	9.5	73	Goal 1-5: Develop K-12 curriculum to include energy efficiency fundamentals (e.g. math, science, behavior) and identify career options in energy-related fields	Identify opportunities to leverage governor's career technical initiative, Identify opportunities to work with the California Department of Education to develop curricula with specific content for energy and GHG issues, Support outreach into K-12 schools on energy, water and environmental issues.

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Section Name	Section Number	Page Number	Goal Expected to Support	Activities to Support Goal / Goal Results
Workforce Training & Education - Goals	9.5	74	Goal 2-1: Collaboratively identify appropriate goals and strategies to build California's energy efficiency workforce through 2020, focusing on training that increases participation from within minority, low-income and disadvantaged communities in achieving California's economic energy efficiency potential	Leverage Marketing Education & Outreach and WE&T task forces to partner w/ community-based organizations and provide targeted outreach on employment opportunities with energy efficiency, Develop Low Income WE&T Plan. Train qualified diverse business enterprises from minority, low-income and disadvantaged communities to undertake or expand efficiency services.
Local Government - Goals	12.5	94	Goal 5: Local government energy efficiency expertise becomes widespread and typical.	The workforce education and training strategies outlined elsewhere in this Plan are one vehicle for attacking these issues.
Lighting - Strategies	13.4	104	Education and Certification	Elevate the level of professional practice and performance by expanding access to high-quality new and existing education, training and certification programs.
Lighting - Strategies	13.4	104	Goal 3: Create widespread end-user demand to purchase and use best practice lighting technologies and systems.	For example, in the commercial sector, a combination of codes and standards, education and aggressive utility program promotions reduced new construction office lighting power density by 70 percent

Appendix B. Center Course Funding Nuances

Many of the courses offered at the Center are funded entirely through the WE&T Centergies program. However, some courses are offered at the Centers but mostly funded by other IOU program funds. Some WE&T funds are still used for these courses to help administer them. These courses are identified in the table below based on our IOU workshops.

Table 9. WE&T Course Funding Differences Across Centers

Course	Program Funding	Centers
Building Performance Institute (BPI) and other whole house training	Energy Upgrade CA Whole House Program	All
HVAC QI/QM Training	Residential HVAC Program	All
Solar-focused courses	CA Solar Initiative	All except San Diego EIC
IHACI courses	Residential and Commercial HVAC Program	SCE & SCG Centers
Codes and Standards	Codes and Standards Program	Just at SCE Centers & SCG where WE&T co-funds via Title 24 training
Low Income Trainings	Low Income Program	Just at PG&E Centers
Demand Response Courses	Demand Response Program	Just at PG&E Centers

Appendix C. Center Activity Differences

The table below summarizes the activities that each Center provides.

Table 10. Center Activity Differences

	SCE Tulare	SCE Irwindale	PG&E ETC	PG&E PEC	SDEIC	SCG ERC
WE&T Seminars	Yes	Yes	Yes	Yes	Yes	Yes
Technical Consultations[1]	Yes	Yes	Yes	Yes	Yes	Yes
Marketing Classes	Yes	Yes	Yes	Yes	Yes	Yes
Tool Lending Library	Yes	Yes	Yes	Yes	Yes	No
Partnerships	Yes	Yes	Yes	Yes	Yes	Yes
Equipment Demonstrations	Yes	Yes	Yes	Yes	Yes	Yes

[1] Technical consultations are defined here as times when the Center staff will meet with customers or market actors to consult on specific projects and help them with energy-related decision-making.

Appendix D. Strategic Theory Link Priority and Alignment with PPMs

The table below summarizes the links shown in Table 1 and Figure 1 above. The table shows each IOUs priority ranking of the strategic theory link and the alignment of each link with the three WE&T PPMs. The PPMs are as follows:

WE&T-1: Number of collaborations with partners

WE&T-2: Number of collaborations with organizations serving underserved communities

WE&T-3: Increase percentage of classes with integrated content over 2013 baseline

Table 11. Ranking and Alignment with PPMs

Link	SDG&E	SoCal Gas	SCE	PG&E		SCE	PG&E
	Rate Link as High/Medium/ Low	Rate Link as High/Medium/Low	Rate Link as High/Medium/ Low	Rate Link as High/Medium/ Low		Link Related to which PPM (WET-1, WET-2, WET-3)	Link Related to which PPM (WET-1, WET-2, WET-3)
1	High	No rank ('tool lending library'; currently not reported by SoCalGas; basis for related outcomes/goals in LM)	High	Medium		N/A	N/A
2	High	High (currently reported; basis for related outcomes/goals in LM)	Low	Medium		N/A	N/A
3	Low	High (currently reported; basis for related outcomes/goals in LM; However, application of ALP is situational)	Medium	Medium		WET-3	WET-3
4	High	High (should not be inferred as the only outputs/outcomes)	High	High		WET-1 (Partnerships with Certifying Organizations)	WET-1 (Partnerships with Certifying Organizations)
5	Low	High (should not be inferred as the only outcomes)	Medium	High		WET-1	WET-1
6	High	High (should not be inferred as the only outcomes)	High	High		WET-1 and WET-2	WET-1 and WET-2
7	Low?	Low (This is 'Another type of partnership')	Low	High		Defer to Connections	Defer to Connections
8	Medium	No rank ('tools that are loaned')	High	High		N/A	N/A
9	High	Medium ('energy savings where the participant works')	Medium	High		WET-3 (Indirect Linkage to Integrated Offerings)	WET-3 (Indirect Linkage to Integrated Offerings)
10	High	High (when IDSM applicable)	Medium	High		WET-3	WET-3
11	High	Medium ('should result in	Medium	Medium		WET-3 (Indirect Linkage	WET-3 (Indirect Linkage

Appendix D. Strategic Theory Link Priority and Alignment with PPMs

Link	SDG&E	SoCal Gas	SCE	PG&E		SCE	PG&E
	Rate Link as High/Medium/ Low	Rate Link as High/Medium/Low	Rate Link as High/Medium/ Low	Rate Link as High/Medium/ Low		Link Related to which PPM (WET-1, WET-2, WET-3)	Link Related to which PPM (WET-1, WET-2, WET-3)
		increased participation…in other IOU programs')				to Integrated Offerings)	to Integrated Offerings)
12	Medium	High	High	High		N/A	N/A
13	Medium	High	High	High		WET-1 (Partnerships with Certifying Organizations)	WET-1 (Partnerships with Certifying Organizations)
14	High	Low ('Completed') ????	High	High		WET-1 (Partnerships with Certifying Organizations)	WET-1 (Partnerships with Certifying Organizations)
15	High - similar to #4	Medium ('The partnerships'; should not be inferred as the only basis for partnership or outcomes)	High	High		WET-1 (Partnerships with Certifying Organizations)	WET-1 (Partnerships with Certifying Organizations)
16	Low - see #6	Medium ('The partnerships'; should not be inferred as the only basis for partnership or outcomes)	High	High		WET-1 and WET-2	WET-1 and WET-2
17	Low	Medium ('career advancement')	Medium	Medium		WET-1 and WET-2	WET-1 and WET-2
18	Low	Medium ('career advancement')	Medium	Medium		WET-1 and WET-2	WET-1 and WET-2
19	High	Medium ('longer-term')	Medium	Medium		N/A	N/A
20	High similar to #10	Medium ('longer-term')	Medium	Medium		WET-3	WET-3
21	High see #11	Medium ('participation…more savings')	Medium	High		N/A	N/A
22	Low- see# 17&18	Low ('within…green…workforce')	Medium	Medium		N/A	N/A
23	Low -see# 17 & 18	Low ('should experience…career advancement')	Medium	Medium		N/A	N/A
24	High	High (However, targeted training may be to address some, not all, outcomes)	High	High		WET-1 and WET-2	WET-1 and WET-2
25	Low - see #17	Low ('within…green workforce')	Medium	Medium		WET-1 and WET-2	WET-1 and WET-2
26	High	Medium ('longer-term')	Medium	High		WET-1 and WET-2	WET-1 and WET-2
27-28	High	Medium ('…meeting California's long-term strategic goals'; an objective, not the only objective)	Medium	High		WET-1 and WET-2	WET-1 and WET-2

Appendix E. References

2013-2014 Energy Division-Investor Owned Utility Energy Efficiency Evaluation, Measurement and Verification Plan

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