

PUBLIC UTILITIES COMMISSION

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June 11, 2010

Advice Letter 3078-G-B/3594-E-B

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**Subject: Second Supplement to Zero Net Energy Pilot Program
Advice Letter Pursuant to D.09-09-047**

Dear Ms. Yura:

Advice Letter 3078-G-B/3594-E-B is effective June 7, 2010.

Sincerely,

A handwritten signature in blue ink, appearing to read "Julie A. Fitch".

Julie A. Fitch, Director
Energy Division



Jane Yura
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June 3, 2010

Advice 3078-G-B/3594-E-B

(Pacific Gas and Electric Company ID U 39 M)

Public Utilities Commission of the State of California

**Subject: Second Supplement to Zero Net Energy Pilot Program Advice Letter
Pursuant to D.09-09-047**

Pacific Gas and Electric Company (PG&E) hereby submits this supplemental advice filing to implement the Zero Net Energy (ZNE) Pilot Program for its 2010-2012 Energy Efficiency (EE) Portfolio in compliance with Decision (D.) 09-09-047 (Decision), Ordering Paragraph (OP) 20 and other directives. This supplement is being filed at the request of Energy Division (ED) and replaces in its entirety PG&E Advice 3078-G-A/3594-E-A.

Purpose

OP 26 of the Decision conditionally approved PG&E's ZNE Pilot Program. In OP 20, PG&E was ordered to file an advice letter providing additional details of the pilot program. This advice letter submits for approval the Local Program Implementation Plan (PIP) for the Zero Net Energy Pilot Program incorporating the requirements of OP 20 and subsequent guidance from the Energy Division to increase the ZNE Pilot Program budget to \$13.65 million. On May 26, 2010, PG&E received additional guidance from ED on clarifications to be incorporated into the program plan and performance metrics. The program budget is also increased by \$6.05 million above the \$7.6 million that PG&E filed in its EE Compliance Advice Letter (AL) 3065-G/3562-E on November 23, 2009. PG&E requests that \$1.4 million of the increase come from the allocation of 2010-2012 EM&V funds to complete the proposed market characterization and technical potential studies, which PG&E proposes to conduct in collaboration with Energy Division, consistent with the guidelines for EM&V studies set forth in EM&V Decision 10-04-029.

Background

On July 21, 2008, PG&E and the other investor-owned utilities (IOUs) filed their 2009-2011 EE portfolio applications (A.08-07-031). On September 18, 2008, the California Public Utilities Commission (Commission) adopted the California Long Term Energy Efficiency Strategic Plan (Strategic Plan) in D.08-09-040. Following Energy Division review of their portfolio applications, PG&E and the other IOUs amended their applications on March 2, 2009, including statewide and local program implementation plans, in compliance with the Strategic Plan and as directed through a series of Commission

rulings. Per D.09-05-037 issued May 21, 2009, PG&E and the other IOUs also supplemented their portfolio requests on July 2, 2009.

On September 24, 2009, the Commission issued D.09-09-047 (EE Decision), which adopted the three-year 2010-2012 portfolio budgets for each IOU. The adopted PG&E budget was \$295 million less than the requested budget in its July 2, 2009 filing. D.09-09-047 conditionally approved the ZNE Pilot Program at a level of \$25 million on a pilot program basis¹. In its July 2009 filing, PG&E proposed two additional ZNE program initiatives: a ZNE Lab and Demonstration Home, which required capital funds. The EE Decision declined this capital funding request stating that these capital funding requests are appropriate within the scope of the GRC.² In accordance with the EE Decision, PG&E is pursuing the capital funds for this initiative through its General Rate Case (A.09-12-020).

In accordance with OP 15 of the EE Decision, PG&E filed its Compliance AL on November 23, 2009, which proposed, in part, detailed program budgets for the 2010-2012 EE portfolio. The total proposed budget for ZNE Pilots in the Compliance AL was \$7.6 million, a \$23.1 million reduction from PG&E's requested budget in its July 2, 2009 filing. On December 18, 2009, the ED suspended the Compliance AL stating, however, that the suspension should not delay the implementation of the 2010-2012 programs effective January 1, 2010.

OP 20 of the EE Decision directed the IOUs to file Pilot Program ALs for each approved Pilot Program specifying the content required for these ALs. On January 21, 2010, PG&E filed its ZNE Pilot Program AL 3078-G/3594-E with a \$7.6 million budget, which was consistent with the PG&E Compliance AL and reduced program activities. On February 19, 2010, ED staff suspended the ZNE Pilot Program AL for a period of up to 120 days for further staff review. On April 21, 2010, the Energy Division provided direction to PG&E to increase the ZNE pilot funding level to assure sufficient funding to implement the scope of the program as approved in D.09-09-047 and to revise the ZNE PIP accordingly. On May 3, 2010, PG&E filed its supplemental ZNE Pilot Program AL 3078-G-A/3594-E-A to implement those changes. On May 26, 2010, ED requested supplemental information to be incorporated into the program plans and performance metrics and requested that these changes be submitted through a supplemental advice letter and accompanied by a redlined version.

Revisions to ZNE Pilot Program

This supplemental advice letter submits for approval the revised ZNE PIP as shown in Attachment B. The revised PIP provides additional program details as required by OP 20 of the EE Decision and increases the ZNE Pilot Program budget to \$12.25 million plus \$1.4 million to be funded from EM&V. This is an increase of \$6.05 million in funding above the \$7.6 million that PG&E proposed in its EE Compliance AL. Since the 2010-2012 EE program cycle is already under way and the ZNE program cannot be implemented until this advice letter is approved, PG&E is proposing a budget for program activities that will be accomplished over the next two and half years. Due to the shortened

¹ D.09-09-047, OP 26, pp 173-175

² D.09-09-047, OP 4

time period, certain follow-up and performance assessment activities will not be completed in this program cycle and will be included in PG&E's next program cycle. PG&E also intends to supplement its EE Compliance AL to reflect this change in the detailed program budgets for the 2010-2012 EE Portfolio.

The ZNE pilot program approved in the EE Decision includes PG&E's proposal to perform market characterization studies to create a statewide roadmap and also conduct a key study entitled "Assessment of the Technical Potential for Achieving Net Zero-Energy Buildings in the Commercial Sector" to identify key commercial building types for California that have the technical potential to achieve ZNE. PG&E estimates that the cost for these studies would be approximately \$1.4 million. These studies are discussed in further detail in Attachment B.

PG&E has identified these EM&V studies as potential candidates for projects to be conducted in collaboration with Energy Division. In the EM&V Decision 10-04-029, issued April 8, 2010, the Commission recognized that such collaboration can promote "cost-efficiencies, more reliable results, broader stakeholder buy-in, and fewer disputed issues."³ Energy Division has also indicated its desire to participate in market studies that inform Commission energy efficiency policies.⁴ PG&E proposes to draft a scope of work for each project in collaboration with Energy Division. PG&E will administer the collaboratively-planned research and continue to consult with Energy Division as the research progresses. The *2010 – 2012 Joint Energy Division and IOU Evaluation Measurement and Verification Plan*, (Joint Plan), adopted by the Commission in D.09-09-047, funds allocated for the Overarching Policy and Support Projects and specifically, for Strategic Plan Update Studies.⁵ Therefore, PG&E requests that the cost of these comprehensive studies be funded from this portion of the 2010-2012 EM&V budget.

Other revisions and clarifications have been made to the ZNE PIP to remove discussion of the ZNE Lab and Demonstration Home that will not be funded through EE funds pursuant to the EE Decision, and to reflect the reduced length of time (two and half years) in which to implement the program. PG&E has updated its program performance metrics, consistent with the revisions made herein as shown in Attachment A. Additional changes made to ZNE PIP and performance metrics are shown in track changes.

Effective Date

Consistent with Energy Division guidance, PG&E is requesting that this supplemental advice letter be approved as soon as possible but no later than **June 7, 2010**, which is **30** days from the original filing date.

Protests

Per Energy Division's May 26, 2010 guidance further comment period is waived.

³ D.10-04-029, Att. 1, p.4

⁴ D.10-04-029, p.18

⁵ D.09-09-047, OP 1 and Att. 1, p.18

Notice

In accordance with General Order 96-B, Section IV, a copy of this advice letter is being sent electronically and via U.S. mail to parties shown on the attached list. Address changes to the General Order 96-B service list and all electronic approvals should be directed to email PGETariffs@pge.com. Advice letter filings can also be accessed electronically at: <http://www.pge.com/tariffs>.

A handwritten signature in black ink that reads "Jane Yura-OB". The signature is written in a cursive, flowing style.

Vice President – Regulation and Rates

Attachments:

Attachment A: Program Performance Metrics

Attachment B: ZNE Program Implementation Plan

cc: Service List for A.08-07-021

CALIFORNIA PUBLIC UTILITIES COMMISSION

ADVICE LETTER FILING SUMMARY ENERGY UTILITY

MUST BE COMPLETED BY UTILITY (Attach additional pages as needed)

Company name/CPUC Utility No. **Pacific Gas and Electric Company (ID U39 M)**

Utility type:

☒ ELC ☒ GAS

☐ PLC ☐ HEAT ☐ WATER

Contact Person: Olivia Brown

Phone #: 415.973.9312

E-mail: oxb4@pge.com

EXPLANATION OF UTILITY TYPE

ELC = Electric

GAS = Gas ☐

PLC = Pipeline

HEAT = Heat WATER = Water

(Date Filed/ Received Stamp by CPUC)

Advice Letter (AL) #: 3078-G-B/3594-E-B

Tier: 2

Subject of AL: Second Supplement to Zero Net Energy Pilot Program Advice Letter Pursuant to D.09-09-047

Keywords (choose from CPUC listing): Compliance, Energy Efficiency

AL filing type: ☐ Monthly ☐ Quarterly ☐ Annual ☒ One-Time ☐ Other _____

If AL filed in compliance with a Commission order, indicate relevant Decision/Resolution #: D.09-09-047

Does AL replace a withdrawn or rejected AL? If so, identify the prior AL: No

Summarize differences between the AL and the prior withdrawn or rejected AL:

Is AL requesting confidential treatment? If so, what information is the utility seeking confidential treatment for: No

Confidential information will be made available to those who have executed a nondisclosure agreement: N/A

Name(s) and contact information of the person(s) who will provide the nondisclosure agreement and access to the confidential information: N/A

Resolution Required? ☐ Yes ☒ No

Requested effective date: June 7, 2010

No. of tariff sheets: N/A

Estimated system annual revenue effect (%): N/A

Estimated system average rate effect (%): N/A

When rates are affected by AL, include attachment in AL showing average rate effects on customer classes (residential, small commercial, large C/I, agricultural, lighting). N/A

Tariff schedules affected: N/A

Service affected and changes proposed: N/A

Protests, dispositions, and all other correspondence regarding this AL are due no later than 20 days after the date of this filing, unless otherwise authorized by the Commission, and shall be sent to:

CPUC, Energy Division

Tariff Files, Room 4005

DMS Branch

505 Van Ness Ave., San Francisco, CA 94102

jnj@cpuc.ca.gov and mas@cpuc.ca.gov

Pacific Gas and Electric Company

Attn: Jane K. Yura, Vice President, Regulation and Rates

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ADVICE 3078-G-B/3594-E-B

Attachment A:

Program Performance Metrics

Attachment A - PG&E Zero Net Energy Pilot Program Performance Metrics 2010-2012

(Information in this worksheet is derivative of Table 5 in the ZNE PIP)

Subprograms	Description	Specific PPM Element	2010 Target	2011 Target	2012 Target	Implications for future program cycles
Subprogram 1, "ZNE Communities"	Community-level design assistance	Consultation to at least 5 Project teams	Establish consultation specifications, issue RFP, report on progress	Identify candidates, establish consultation agreements with 5 teams; report on progress	Deliver consultative reports to all participants (minimum 5); report on progress	Findings and efficacy of this method to be incorporated into future program activities
		EM&V on projects selected	N/A (must occur post-construction)	N/A (must occur post-construction)	Establish contract scope for EM&V; report	Progress and results to be measured using contract(s) established in 2010-12 cycle; findings to be incorporated into future activities
		Quarterly coordination meetings	1 meeting Q4; report	4 meetings quarterly; report	4 meetings quarterly; report	Based upon outcomes, decide upon whether or not to continue in future cycles
		Integration with resource programs	Report on activities	Report on activities	Report on activities	Address as appropriate going forward
Subprogram 2, "ZNE Demonstration Showcase"	Project-level (building level) demonstration and documentation	Design, technical and financial assistance to at least 8 residential buildings	Establish consultation specifications; begin identification of participants; report	Establish final list of 8 participants; report	Complete reports on 8 residential buildings; create summary report covering all projects.	Incorporate findings into future program cycles as appropriate
		Design, technical and financial assistance to at least 4 commercial buildings	Establish consultation specifications; begin identification of participants; report	Establish final list of 4 participants; report	Complete reports on 4 commercial buildings; create summary report covering all projects.	Incorporate findings into future program cycles as appropriate
		Technology studies on at least 5 advanced technical areas under-represented in ZNE arena	Identify at least 5 advanced areas for study; report	Establish agreements to execute at least 5 studies; report	Complete at least 5 studies; report	Incorporate findings into future program cycles as appropriate
		Resource web site on key information on projects and technologies	Establish specifications for Web site; report	Populate Web site with relevant information and findings; report	Populate Web site with relevant information and findings; report	TBD
Subprogram 3, "ZNE Technology Advancement"	Technology assessments, demonstrations and market characterizations for ZNE	Assessments of at least 25 technologies	Complete assessments of at least 5 technologies, report	Complete assessments of at least 15 technologies (cumulative), report	Complete assessments of at least 25 technologies (cumulative), report	Incorporate findings into future program cycles as appropriate
		Establish roadmap and market characterization by building type for ZNE	Establish roadmaping plan in consultation with CPUC and other stakeholders; report	Identify contractor(s) for plan and establish implementation contract; report	Complete roadmap; report	Roadmap to provide guidance to program and policy decisions going forward
Subprogram 4, "ZNE Design Integration"	Tools, training, education and design competition	Contribute to creation of at least one community, planning, decision-making and code-review tool	(Defer activity until other elements are underway)	Establish contract to develop tool; report	Establish tool; report	TBD based on perceived value
		Coordination and facilitation of at least 2 forums of key ZNE players	Plan first forum; report	Hold first forum by June 30; report	Hold second forum by September 30, report	TBD based on perceived value
		Present at least 25 public educational workshops on key ZNE topics	Deliver 5 workshops; report	Deliver 15 workshops (cumulative); report	Deliver 25 workshops (cumulative); report	TBD based on perceived value
		Conduct at least 2 design competitions among the architectural and student communities	Plan first competition, report	Conduct first competition; report	Conduct second competition; report	TBD based on perceived value
		Develop 2-5 best practice guidelines for the commissioning, operation, and maintenance of ZNE buildings. These guidelines should be as fully representative of the residential and commercial market segments as feasible. Commercial market segments may need additional best practice guidelines to be applicable and useful for the varying types of commercial buildings (ie. office buildings, grocery stores, hospitals, multi-family housing projects, etc.);	Compile and research existing ZNE buildings.	Develop 2-5 preliminary best practice guidelines from the 2010 workshops, and present/gather feedback at the 2011 scheduled workshops.	Revise best practices and disseminate to leading practitioners and broader stakeholder audiences. By mid-year, submit memo to Energy Division summarizing top three most promising market-based financing mechanisms identified via investigations and, share memo and discuss at OBF and other PG&E-led ZNE workshops	Possible foundation for future ZNE training, educational, or industry guidelines.
		Investigate the development of at least 2-4 market based financing mechanisms to create Zero-Net development for residential and commercial buildings;	Compile and research financing mechanisms that could be applicable to ZNE development.	Share findings from market-based financing mechanisms investigation at PG&E-led ZNE workshops		Possible financial incentives to be used in future ZNE programs

ADVICE 3078-G-B/3594-E-B

Attachment B:

ZNE Program Implementation Plan

**PACIFIC GAS AND ELECTRIC COMPANY
2010-2012 ENERGY EFFICIENCY PORTFOLIO
PROGRAM IMPLEMENTATION PLAN
LOCAL PROGRAM
ZERO NET ENERGY PILOT PROGRAM
PGE2112**

MAY 2010

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- 1) Zero Net Energy Pilot Program, PGE 2112
- 2) Projected Program Budget Table

Table 1
Projected Program Budget (\$M)

Subprogram	Total Administrative	Marketing & Outreach	Direct Implementation	Total Program Budget	EM&V	Total Program Funding
1. ZNE Communities	\$0.46	\$0.06	\$2.37	\$2.89		\$2.89
2. ZNE Demonstration Showcase	\$0.69	\$0.06	\$3.71	\$4.46	\$0.40	\$4.86
3. ZNE Technology Advancement	\$0.46	\$0.05	\$2.90\$	\$3.41	\$1.00	\$4.41
4. ZNE Design Integration	\$0.23	\$0.05	\$1.20	\$1.49		\$1.49
Program Total	\$1.84	\$0.22	\$10.19	\$12.25	\$1.40	\$13.65

The projected program budget shown in Table 1 includes \$1.4 million for market characterization studies to create a statewide roadmap and a key study entitled “Assessment of the Technical Potential for Achieving Net Zero-Energy Buildings in the Commercial Sector” to identify key commercial building types for California that have the technical potential to achieve ZNE. These EM&V studies will be considered as potential candidates to be conducted in collaboration with Energy Division and to be funded from EM&V allocated for Overarching Policy and Support Projects and specifically, for Strategic Plan Update Studies, consistent with D.10-04-029, Attachment 1, p.418. These studies are discussed further in Section 6.

- 3) Projected Program Gross Impacts Table

Table 2 – Not applicable for this program

For a detailed summary of objectives and strategies that the Zero Net Energy (ZNE) Pilot Program contributes towards the near-term goals of the California Long-Term Energy Efficiency Strategic Plan (Strategic Plan), please see Appendix 1 to this PIP entitled “Zero Net Energy Pilot Program Alignment with California Long-Term Energy Efficiency Strategic Plan.”

- 4) Program Description

a) Program Summary

The Zero Net Energy (ZNE) Pilot Program is a Pacific Gas and Electric Company (PG&E) specific local non-resource program that supports the Strategic Plan by initiating research, development, and demonstration (RD&D) projects around ZNE buildings. The ZNE Pilot Program aligns with the implementation plan and timeline of the Strategic Plan, aiming to “push” the development of long-term (2016 – 2030) cost-effective

technologies to the market while “pulling” customers towards the adoption of long-term advanced energy efficiency (EE) technologies and practices.¹

“Zero net energy” is defined as “the implementation of a combination of building energy efficiency design features and on-site clean distributed generation that result in no net purchases from the electricity or gas grid, at the level of a single “project” seeking development entitlements and building code permits.”² This broad definition enables the ZNE Pilot Program to mirror the energy resource loading order as outlined in the Energy Action Plan³ and to analyze and implement a wide range of EE and renewable energy (RE) measures.

The ZNE Pilot Program is also a direct response to the CPUC ruling that “the utilities jointly and individually should design and implement several ZNE building pilot projects during the 2009-2011 period in order to advance rapidly towards the ZNE commercial and residential building programmatic initiatives adopted by the CPUC in D.07-10-032 and by the CEC in its 2007 Integrated Energy Policy Report (IEPR).”⁴

Advancing rapidly towards the ZNE commercial and residential building programmatic initiatives will require significant changes in current standard practice. According to a U.S. Green Building Council (USGBC) report, “to achieve 50% improvement and beyond – and especially to achieve net-zero energy buildings—prescriptive, independent measures will no longer suffice. Leaps forward in building performance require design that fully integrates envelope, lighting, HVAC, and water systems, and integrates energy efficiency with renewable energy applications.”⁵ These leaps will require a shift because there is a limit to the overall savings potential of mainstream approaches for reducing energy use in new buildings. Major national studies agree that this limit ranges from 30 to 50% beyond standard practice.^{6,7,8,9}

¹ California Long Term Energy Efficiency Strategic Plan, July 14, 2008, page 5.

² Interim Opinion On Issues Relating To Future Savings Goals And Program Planning For 2009-2011 Energy Efficiency And Beyond, Decision 07-10-032, October 18, 2007, page 38.

³ See http://www.energy.ca.gov/energy_action_plan/index.html for the 2005 Energy Action Plan II and the 2008 Update to the State of California Energy Action Plan.

⁴ Joint Assigned Commissioners’ Ruling Providing Guidance On Integrated Demand-Side Management In 2009-2011 Portfolio Applications, Rulemaking 06-04-010, April 11, 2008, page 8.

⁵ USGBC Research Committee. 2007 (revised 2008). A National Green Building Research Agenda, page 26. <http://www.usgbc.org/ShowFile.aspx?DocumentID=3402>.

⁶ Ibid., page 26.

⁷ Anderson, R., Hendron, M. Eastment, and A. Jalalzadeh-Azar. 2006. Building America Residential System Research Results: Achieving 30% Whole House Energy Savings in Hot-Dry and Mixed-Dry Climates. NREL/SR-550-38201. www.nrel.gov/docs/fy06osti/38201.pdf

⁸ Griffith, B., N. Long, P. Torcellini, R. Judkoff, D. Crawley, and J. Ryan. 2007. Assessment of the Technical Potential for Achieving Net-Zero Energy Buildings in the Commercial Sector. NREL/TP-55041957. www.nrel.gov/docs/fy08osti/41957.pdf

⁹ Levine, M., D. Urge-Vorsatz, K. Blok, L. Geng, D. Harvey, S. Lang, G. Levermore, A. Mongameli, Mehlwana, S. Mirasgedis, A. Novikova, J. Rilling, H. Yoshino. 2007. Residential and Commercial Buildings. In Climate Change 2007: Mitigation. www.mnp.nl/ipcc/pages_media/FAR4docs/final_pdfs_ar4/Chapter06.pdf

Taking a first step towards ZNE will require an integrated approach that builds on the efforts of the New Construction program. This first step will encourage teams to move incrementally beyond standard practice. For instance, the proposed California Advanced Homes Program (CAHP) encourages residential teams to exceed California's Title 24 EE standard by a minimum of 15%, while the proposed Savings By Design Program (SBD) encourages commercial teams to exceed Title 24 by a minimum of 10%.

To create a near-term (2010-2012) bridge to future program cycles and to align with referenced estimates of the upper limit of mainstream approaches to EE, the entry point for participation in the ZNE Pilot Program will be higher than currently required by other statewide resource programs. Therefore, the ZNE Pilot Program will engage "whole building"¹⁰ research, development, and demonstration projects that meet a 40% improvement requirement compared to Title 24 – selected via a competitive process with strong preference for projects that will show at least 50% savings compared to Title 24 – and that have a plan to include on-site clean distributed generation such that, for homes, the building is a zero energy building, or, for commercial/institutional buildings, strives in innovative ways towards the zero net energy goal. – In this way, the ZNE Pilot Program will build on the foundations laid by the CAHP and SBD programs and provide a clear link to the mid-term (2013 – 2015) and long-term (2016 – 2030) timeline outlined in the Strategic Plan.

The ZNE Pilot will recognize the need for objective measures of performance and rating, including but not limited to the LEED system, the HERs system and other systems which may come into this rapidly-evolving marketplace. The Pilot will recognize and encourage the use of such systems, both from the perspective of initial design as well as ongoing performance.

Achieving the Strategic Plan's ambitious goals will require integration, cooperation, and collaboration with a wide range of market actors. Many stakeholders have already participated in the Zero Energy Pathways (ZEP) workshops and have contributed to the draft action plan. The ZNE Pilot plans to address the priorities highlighted in this document and will coordinate with other IDSMP programs. Playing a coordinating role, the ZNE Pilot Program will engage the publicly owned and investor owned utilities; developers, architects, builders, municipalities, and redevelopment agencies; the CEC PIER program; the U.S. Department of Energy (DOE) National Laboratories (National Renewable Energy Laboratory, Lawrence Berkeley National Laboratory, etc.); professional building and trade associations; research institutions; state, federal, regional and local agencies; and the CPUC. With the above organizations, the program will engage in long-term strategic planning, identify near-term steps towards the Strategic Plan goals, give careful consideration to how this program can be structured to reach low

¹⁰ A working definition of "whole building" design can be found at the Whole Building Design Guide website: http://www.wbdg.org/wbdg_approach.php. Whole building processes are ideally part of an integrated project delivery (IPD) process. As defined by the AIA, IPD is "a project delivery approach that integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize project results, increase value to the owner, reduce waste, and maximize efficiency through all phases of design, fabrication, and construction."

and moderate-income communities, and provide customers with seamless integrated demand-side management solutions framed by four subprograms:

1. ZNE Communities Subprogram
2. ZNE Demonstration Showcase Subprogram
3. ZNE Technology Advancement Subprogram
4. ZNE Design Integration Subprogram

Details of each subprogram are included in section 6 of this program implementation plan.

b) List of Measures

A specific list of measures from the California Database for Energy Efficient Resources (DEER) is not applicable to the ZNE Pilot Program because the program will only engage “whole building” research, development, and demonstration projects. As stated above, the ZNE Pilot Program will target residential and commercial projects that are designed to exceed Title 24 by 40%. [PG&E will select participants in this program by way of a competitive process. For commercial projects, PG&E’s competitive process will be designed to target and solicit projects across the range of commercial market segments \(office buildings, grocery stores, hospitals, multi-family housing projects, etc\). PG&E will give strong preference to projects that show at least a 50% savings compared to Title 24 \(independent of a generation system\). For homes, PG&E’s competitive process will be designed to target and solicit designs for a range of feasible home-owner income levels \(ie, from affordable housing residents to higher income residents\), and will give strong preference to projects that show between 50-70% energy savings compared to Title 24, and that will include on-site generation to make the home a zero energy home.](#) To achieve this level, design teams and building owners will need to take a whole building approach. To support this approach, teams will be encouraged to flex a full range of integrated demand-side management (IDSM) options such as Energy Efficiency (EE), Demand Response (DR), Distributed Generation (DG), and Advanced Metering Infrastructure (AMI).

Measures considered as part of a whole building IDSM approach may include:

Solar Hot Water Heating:

- A. Direct Systems
- B. Indirect Systems
- C. Space Heating Systems
- D. Heat Pump Systems

Passive Environmental Systems:

- A. Direct Gain Passive Solar Systems
- B. Indirect Passive Solar Systems
- C. Isolated Passive Solar Systems
- D. Passive Cooling Systems
- E. Hybrid Cooling Systems

District Heating/ Cooling Systems:

- A. Renewable Systems
- B. CHP Based Systems
- C. Ground Coupled Systems
- D. Seasonal Storage Systems

Residential Building IMC Reductions:

- A. Site Planning (infrastructure cost reductions, site layout methods/ tools)
- B. Shell (including prefabrication, structural insulated panels)
- C. Interior Materials (including phase change materials)
- D. HVAC (esp. radiant heating/ cooling)
- E. Lighting (including daylighting)
- F. Other Equipment (including DC power systems)
- G. Design Tools (including Building Information Modeling)
- H. Zero Net Energy Cost Estimating Methods and Tools
- I. Planning/ Code Review Methods and Tools

Commercial Building IMC Reductions:

- A. Site Planning (infrastructure cost reductions, site layout methods/ tools)
- B. Shell (including prefabrication)
- C. Interior Materials (including phase change materials)
- D. HVAC (esp. radiant heating/ cooling)
- E. Lighting (including daylighting)
- F. Other Equipment (including DC power systems)
- G. Design Tools (including Building Information Modeling)
- H. Zero Net Energy Cost Estimating Methods and Tools
- I. Planning/ Code Review Methods and Tools

In addition to engaging whole building design and IDSM, the ZNE Pilot Program will serve to push the envelope on land-use planning issues such as building orientation, compact planning, transit oriented development, advanced and efficient district heating and cooling systems, and RE systems that have the capacity to serve multiple homes and/or businesses. Distributed generation systems will not be funded using EE public goods fund charges, and any investigations of DG systems will be limited to technologies that have been pre-approved by the CPUC in programs such as the Self-Generation Incentive Program (SGIP), DR programs, the EE low-income program, and the California Solar Incentive (CSI) Program.

In all of the ZNE Pilot Program subprograms, careful consideration will be given to how they will be structured to reach low and moderate-income communities and how each will serve as a stepping stone toward ZNE for the existing residential and commercial structures in California.

c) List Non-Incentive Customer Services

Details for the non-incentive customer services for each of the four subprograms of the ZNE Pilot Program are included in Section 6 of this PIP, with program targets summarized in Table 5.

1. ZNE Communities Subprogram

The ZNE Communities Subprogram will offer design assistance and technical support to teams considering commercial or residential projects. The Communities Subprogram will target mixed-use complexes, multi-family complexes, advanced residential new construction, advanced commercial new construction, compact development, and transit-oriented development at the early stages of the entitlement and design process, helping to capture energy and resource savings that would normally fall outside of the scope of a typical project.

To be eligible to participate in the Communities Subprogram, a project will need to be in the early stages of entitlement, planning, or design; be primarily a residential or commercial development; plan to exceed Title 24 by at least 40%; and plan to include on-site clean distributed generation. [PG&E will select participants in this subprogram by way of a competitive process. For this program, PG&E's competitive process will be designed to target and solicit projects across the range of communities including both commercial and residential buildings. For commercial market segments, \(office buildings, grocery stores, hospitals, multi-family housing projects, etc\) PG&E will give strong preference to projects that show at least a 50% savings compared to Title 24 \(independent of a generation system\). For homes, PG&E's competitive process will be designed to target and solicit designs for a range of feasible home-owner income levels \(ie, from affordable housing residents to higher income residents\), and will give strong preference to projects that show between 50-70% energy savings compared to Title 24, and that will include on-site generation to make the home a zero energy home.](#) Preference will be given to projects that exceed these minimum requirements, include more than one building in the development, include other principles of sustainable development, and are targeting a certification from an established green building rating system such as the Leadership in Energy and Environmental Design (LEED) or Build it Green (BIG).

To implement the program, the Communities Subprogram will coordinate with the other IOU non-resource Sustainable Community and ZNE programs and the statewide CAHP and SBD programs. As part of this effort, the subprogram will engage in the following steps on the path to ZNE:

- Raising plug load efficiency,
- Whole building solutions, with a focus on zero peak buildings as an interim step toward ZNE homes and commercial buildings,
- Building monitoring and visual display tools,

- Green Building Codes and Standards,
- Integrated Demand Side Management, including EE, DR, DG, and AMI.

2. ZNE Demonstration Projects Subprogram

The Demonstration Showcase Subprogram has two key elements: a series of commercial and residential demonstration projects, and case studies and performance monitoring and assessment of existing passive, low energy, and ZNE buildings. In its July 2009 filing, PG&E had proposed two additional ZNE program initiatives: a ZNE Lab and Demonstration Home, which required capital funds. The Decision (D.09-09-047) declined this capital funding request stating that these capital funding requests are appropriate within the scope of the GRC (Decision, OP 41). In accordance with the Decision, PG&E is pursuing the capital funds for this initiative through its General Rate Case (A.09-12-020).

The Pilot Program will initiate a series of third-party demonstration residential and commercial projects. In this portion of the program, similar in concept to the “Home of the Future” program currently administered by the Sacramento Municipal Utility District (SMUD), PG&E will provide detailed technical assistance, design assistance, and cost sharing of advanced EE measures for developers and design teams interested in building cutting edge homes and commercial buildings. In exchange for this assistance, after the design and construction is complete, each home and building will be made available to the public, published as a case study, and subjected to performance verification and assessment.

To be eligible to participate in the Subprogram, a project will need to be in the early stages of entitlement, planning, or design; be primarily a residential or commercial development; plan to exceed Title 24 by at least 40%; and plan to include on-site clean distributed generation. PG&E will select participants in this program by way of a competitive process. For commercial projects, PG&E’s competitive process will be designed to target and solicit projects across the range of commercial market segments (office buildings, grocery stores, hospitals, multi-family housing projects, etc) and will give strong preference to projects that show at least a 50% savings compared to Title 24 (independent of a generation system). For homes, PG&E’s competitive process will be designed to target and solicit designs for a range of feasible home-owner income levels (ie, from affordable housing residents to higher income residents), and will give strong preference to projects that show between 50-70% energy savings compared to Title 24, and that will include on-site generation to make the home a zero energy home.

PG&E’s offer of direct financial assistance for building measures will only be available for projects that actually meet the minimum stated performance level beyond Title 24 through the participant selection process. Projects receiving direct financial assistance for building measure installation should perform to at least the agreed percent improvement compared to Title 24 reference conditions for that building type (as applicable when the building permit is issued) independent of a generation system, i.e., if

a project is selected for participation based a participant-stated target of "at least 53% better than Title 24," that project would need to perform to at least that level to receive the direct financial assistance.

These demonstration projects will give teams the opportunity to design, build, and construct a near ZNE building at a lower direct cost and lower risk environment than if they were to undertake the projects on their own. This will be accomplished by partnering with research organizations such as CEC PIER, the National Renewable Energy Laboratory (NREL), and the Lawrence Berkeley National Laboratory (LBNL) to provide lessons learned from other demonstration project programs¹¹ and to offer design and technical assistance for the construction of several homes and commercial projects.

These demonstration projects will give teams the opportunity to “practice” ZNE design and construction techniques and to have access to research expertise and “lessons learned” from past projects that are not normally available to a design team. In addition, the showcases will engage the public in on-site activities, while ongoing performance assessment and verification will allow teams to refine their techniques for future design projects.

For the final portion of this subprogram, PG&E will conduct case studies and performance monitoring and assessment of existing passive, low energy, and ZNE buildings. As part of this effort, PG&E will identify a number of homes and commercial buildings, and several district heating and cooling systems for study. Based in part on the paper “Lessons Learned from Field Evaluation of Six High-Performance Buildings”¹² these case studies will be valuable to design teams and developers as they consider the techniques and technologies necessary to make ZNE residential and commercial buildings a reality.

3. ZNE Technology Advancement Subprogram

The ZNE Pilot Program will integrate with the existing Emerging Technologies Program (ETP) to deliver information, insights, analytical tools, and resources to accelerate and expand the commercialization of innovative technologies. In this integration, the ZNE Pilot Program will provide the ETP essential information and insights on customer and community planning needs, as well as technology integration opportunities to help the ETP screen and assess potential technologies. In turn, the ETP will provide insights on technology evolution and trends, market potential, adoption rates, participation in vendor technology evaluations,

¹¹ Programs such as the SMUD “Home of the Future” and U.S. DOE Building America program.

¹² Torcellini, P., M. Deru, B. Griffith, N. Long, S. Pless, R. Judkoff, and D. Crawley. (2004). Lessons Learned from Field Evaluation of Six High-Performance Buildings. Paper #358, Proceedings (CD-ROM), ACEEE Summer Study on Energy Efficiency in Buildings, August 22-27, 2004, Pacific Grove, CA. Golden, CO: National Renewable Energy Laboratory, 16 pp. www.nrel.gov/docs/fy04osti/36290.pdf.

implementation and management of pilot programs, and design specifications for needed technology to support the ZNE Pilot Program.

In addition, this program will look beyond 2010-2012 and create a roadmap to push the market such that new and existing technologies, tools, and processes are leveraged in support of the Strategic Plan. This approach follows the recommendation of the CPUC that a comprehensive, integrated long-term strategy to achieve maximum energy savings in residential and commercial new construction is both promising and critically needed.

4. ZNE Design Integration Subprogram

The ZNE Pilot Program will develop and disseminate information on the best practices for the design of ZNE communities, buildings, and homes by engaging organizations such as the American Institute of Architects California Council (AIACC), the U.S. Green Building Council (USGBC), and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Additionally, in order to close the loop and allow for the evaluation of proposed ZNE communities, buildings, and homes, assistance will be offered to planning and code officials who are in the process of reviewing proposed ZNE buildings and developments.

The results of the Design Integration Subprogram will include best practice guidelines and software tools to design and evaluate “beyond-code” projects. The goal will be to close the loop from design through occupancy, including project phases such as code review and on-site code related inspections. This will require convening and coordinating the ongoing efforts of national energy experts, software developers, regulatory bodies, and code officials to adopt a common language for the design, construction, and evaluation of ZNE buildings.

5) Program Rationale and Expected Outcome

a) Quantitative Baseline and Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and cannot be directly attributed to all program efforts. Market transformation metrics cannot be readily offered for this program at present.

Table 3 – Quantitative baseline metrics cannot be readily offered for this program

b) Market Transformation Information

This program addresses a gap in current utility programs by filling a need to be involved early in the planning process for master-planned communities and advanced commercial projects, thereby capturing significant energy savings related to location, infrastructure

choices (e.g., land use, transportation, water, waste) and community-scale choices (e.g., street orientation to optimize solar). As previously mentioned, this program will look beyond 2010-2012 and create a roadmap to push the market such that new and existing technologies, tools, and processes are leveraged in support of the Strategic Plan. The approach follows the recommendation of the CPUC that a comprehensive, integrated long-term strategy to achieve maximum energy savings in residential and commercial new construction is both promising and critically needed.

In addition to filling a gap in existing utility programs, the ZNE Pilot Program will play a unique role in supporting PG&E resource programs by generating project leads and facilitating and assisting in the design of a project. Due to the amount of time needed to plan, design, and construct a building or a residential development, the energy savings resulting from this program cycle's activities will likely not be apparent in this funding cycle. However, this program will likely serve as a conduit for achieving the Big, Bold Energy Efficiency Strategies (BBEES) through the resource programs in this and future funding cycles. For specific connections to other statewide EE programs and other relevant ZNE activities, please reference the ZNE Pilot Program diagram included in Section 7 of this PIP.

By its nature, market transformation occurs as a result of numerous factors and cannot be directly attributed to all program efforts. Market transformation metrics cannot be readily offered for this program at present.

Table 4 – Market transformation metrics cannot be readily offered for this program.

c) Program Design to Overcome Barriers

Below is a description of four of the priority barriers that the ZNE Pilot Program will address:

i. Cost Effectiveness

To enable widespread adoption of EE, the upfront cost of many ZNE technologies will need to be reduced. This occurs by reducing the capital cost of a technology, or, as part of a whole building solution, by reducing other costs of construction to “buy” room in a project budget for deeper levels of EE. Cost reduction may also be accomplished through better design integration, real-time construction cost estimations during the design process, or utilizing new software tools such as “Building Information Modeling” or BIM. In addition, cost effectiveness is attained by reducing the amount of time spent identifying, learning about, and locating EE measures.

Core ZNE Subprograms to improve cost effectiveness include:

- ZNE Communities Subprogram
- ZNE Demonstration Showcase Subprogram

- ZNE Technology Advancement Subprogram
- ZNE Design Integration Subprogram

ii. Openings in Current Utility Offerings

To encourage deep levels of EE on the path to ZNE, there is a need to have an integrated approach to demand side management early in the design process. Programs such as the Communities Subprogram will work with building owners and design teams to affect the form of a building, orientation, and decisions regarding energy consuming equipment in predesign or the schematic design phases of a project.

Core ZNE Subprograms to overcome gaps in current utility offerings include:

- ZNE Communities Subprogram
- ZNE Design Integration Subprogram

iii. Public Awareness

There is a general lack of knowledge regarding ZNE in the general public. Through the demonstration projects and case studies, future building owners and the general public will be able to view ZNE buildings and “kick the tires” on new technologies. This will begin to create demand in the market for better demand side management and for buildings on the path to ZNE. Increasing public awareness may also help to overcome institutionalized behavior by companies, departments, professional groups, and government entities that may discourage forward thinking and proactive implementation of EE measures.

Core ZNE Subprograms to increase public awareness include:

- ZNE Communities Subprogram
- ZNE Demonstration Showcase Subprogram

iv. Reduction of Perceived Risk

Until there is a critical mass of ZNE homes and commercial buildings, the perceived difficulty of acquiring the information needed to evaluate measures during design, construction, and operation of a ZNE building may cause design teams and building owners to not pursue ZNE design.

Core ZNE Subprograms to overcome perceived risk include:

- ZNE Communities Subprogram
- ZNE Demonstration Showcase Subprogram
- ZNE Technology Advancement Subprogram
- ZNE Design Integration Subprogram

d) Quantitative Program Targets

Below is an estimate of the number of projects and non-incentive customer services that the total program aims to deliver and/or complete in the remainder of the 2010-2012 timeframe, assuming program approval by the end of the second quarter of 2010.

Table 5
Projected Program Targets by Subprogram

Subprogram	Program Target By End of 2010	Program Target By End of 2011	Program Target By End of 2012
ZNE Communities	ZNE Community Projects: Depending on market activity, execute agreements for design assistance and technical support for at least five (5) teams considering commercial or residential ZNE projects over the remainder of the 2010 through 2012 timeframe. The projects could include mixed-use complexes, multi-family complexes, advanced residential new construction, advanced commercial new construction, compact development, and transit-oriented development at the early stages of the entitlement and design process. At a minimum, the projects will need to be utilizing a “whole building” approach and meet a 40% improvement requirement compared to Title 24. Preference will be for projects including comprehensive site planning and plans to include on-site clean distributed generation to progress as rapidly as possible towards ZNE. Evaluation, Measurement, and Verification: Because large projects will take years to be completed, the Program Implementation Plan for the next program cycle (2013-2015) will include funding and staff to complete case studies and sample monitoring of all developments that receive technical assistance and incentives from the Communities Subprogram. The results of the sample measurement and verification studies will be used in the design of future research, development, and demonstration projects, and best practices will be disseminated as case studies through the existing energy education and training centers. Coordination Meetings: The Communities Subprogram will host quarterly meetings that will target developers, architects, and builders; municipalities and redevelopment agencies; the CEC PIER program; professional building and trade associations; research institutions; state, federal, local, and regional agencies; and the CPUC to coordinate the statewide ZNE initiative. The first meeting will be held no more than four (4) months after the CPUC’s adoption of PG&E’s proposed program. Integration with Existing Resource Programs: ZNE staff will provide and track resource program leads in a database that result in a rebated EE project.		
ZNE Demonstration			

Showcase	
	ZNE Pilot Homes: Provide design, technical, and financial assistance for at least eight (8) pilot homes across the PG&E service territory. Depending on when the homes are completed, conduct showcase and open house events, and contract for ongoing performance verification and assessments. The Program Implementation Plan for the next program cycle (2013-2015) will include funding and staff to conduct showcase and open house events, and contract for ongoing performance verification and assessments for the pilot homes completed after the end of the current program cycle. After two (2) years of normal occupancy, publish report on ZNE performance.
	ZNE Commercial Building Case Studies: Depending on market conditions, provide design, technical, and financial assistance for at least four (4) pilot commercial buildings across the PG&E service territory. Depending on when the buildings are completed, conduct showcase and open house events, and contract for ongoing performance verification and assessments. The Program Implementation Plan for the next program cycle (2013-2015) will include funding and staff to conduct showcase and open house events, and contract for ongoing performance verification and assessments, for the buildings completed after the end of the current program cycle. After two (2) years of normal occupancy, publish report on ZNE performance. Tools and technologies that perform well will be added to future programs.
	ZNE Pilot Program staff will collaborate with CPUC EM&V staff to plan and conduct a key study entitled “Assessment of the Technical Potential for Achieving Net Zero-Energy Buildings in the Commercial Sector” to identify key building types for California that have the technical potential to achieve ZNE. This study will be funded from EM&V allocated for Overarching Policy and Support Projects and specifically, for Strategic Plan Update Studies. PG&E will administer the study and consult with Energy Division as the study progresses. The results of this study will be used to guide future program efforts including but not limited to incentives programs, training and education efforts, and C&S advocacy work.
	Foster Markets: Depending on market conditions, conduct at least five (5) studies on selected ZNE technologies including advanced and efficient district heating and cooling, multi-tenant renewable energy projects, and advanced energy conservation measures. Preference will be given to sites within PG&E’s service territory.
	Increasing Awareness: Create, maintain, and update a resource website in consultation with the CPUC and other stakeholder groups. Contribute regular messages to press releases, and deliver articles for journals, trade publications, and websites.
ZNE Technology Advancement	
	Technology Assessments: The program will aim to complete at least ten (10) technology assessments each year, prorated for partial years.

	Appropriate technologies may be included in a future program cycle.
	Market Characterization Studies: ZNE Pilot Program staff will collaborate with CPUC EM&V staff and other entities that deliver EE related goods and services to create a statewide roadmap to achieve the ZNE goals. The roadmap will provide the process and strategies for including customer behavior considerations into product development. . It will assess customer and developer participation rates in current and recent incentive programs (such as SBD and CAHP). The roadmap will also provide recommendations for follow-up customer behavior studies in the remaining years in the current program cycle, and in the next program cycle (2013-2015). These studies will be funded from EM&V allocated for Overarching Policy and Support Projects and specifically, for Strategic Plan Update Studies. PG&E will administer the studies and consult with Energy Division as the studies progress.
ZNE Design Integration	
	Tools and Modeling: Contribute to the creation of at least one (1) community planning, design decision-making, and/or code review ZNE design tools.
	Foster Innovation: Facilitate at least two (2) forums to encourage and support interaction between developers, production builders, architects, engineers, city and regional planners, and funding forums addressing the issue of ZNE development.
	Public Education and Training: Present at least ten (10) workshops annually, prorated for partial years, on ZNE design through the existing education and training network, public meetings, conferences, and trade shows.
	Develop an annual design competition to encourage architecture and engineering firms (and students in schools of architecture) to create ZNE developments and buildings. Contingent on program approval by the end of 2010, hold at least two (2) rounds of the annual competition.
Note: All metrics are expressed as 2.5-year goals because the ZNE Pilot Program is not expected to be approved until mid-2010. The budget presented in Table 1 of this PIP corresponds to the activities listed in this table with the exception of those activities to be funded with EM&V funds.	

e) Advancing Strategic Plan Goals and Objectives

For a detailed summary of objectives and strategies that the ZNE Pilot Program contributes towards the near-term goals of the California Long-Term Energy Efficiency Strategic Plan (CEESP or Strategic Plan) please see Appendix 1 to this PIP entitled, “Zero Net Energy Pilot Program Alignment with California Long-Term Energy Efficiency Strategic Plan.”

6) Program Implementation

6.1) ZNE Communities Subprogram

a) Statewide IOU Coordination

The ZNE Communities Subprogram will share lessons learned and coordinate as applicable with the Southern California Edison (SCE) Sustainable Communities Program (SCP), the San Diego Gas & Electric (SDG&E) Advanced Home and Sustainable Community Case Studies Programs, and the Sacramento Municipal Utility District (SMUD) SolarSmart and Advantage Homes Programs.

i. Program name

ZNE Communities Subprogram

ii. Program delivery mechanisms

The Communities Subprogram will be coordinated by staff of the ZNE Pilot Program. Primary outreach to developers will be through Service and Sales.

Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts across EE, DR, LIEE, DG, ET, SmartMeter, green programs such as ClimateSmart, marketing and outreach, Service and Sales, and all applicable delivery channels, including third parties and LGPs.

iii. Marketing and outreach plans, e.g., research, target audience, collateral, delivery mechanisms

As appropriate, PG&E Service and Sales representatives, developer representatives, and industry associations will encourage participation in the program. In addition, the ZNE Pilot Program staff will disseminate technical information to target audiences that include developers, production builders, and the professional architecture and engineering community by utilizing the statewide network of energy training centers, by participating in conferences and trade shows, and by authoring articles for technical journals and other trade publications.

The ZNE Pilot Program plan to create an integrated marketing and outreach strategy for the market that targets a variety of delivery channels (e.g., technical and program information, case studies, fact sheets, seminars, brochures, advertisements, point-of purchase materials, trade shows, and direct mailing) as appropriate. This effort will be coordinated with all appropriate EE, DR, and self-generation programs, and an emphasis will be placed on internet-based information and assistance.

iv. IOU Program Interactions

1. CEC PIER: The results of completed communities or communities “on the boards” will be made available to the CEC PIER program in order to help that program better support developers interested in ZNE and greenhouse gas reductions.
2. ARB: Expected greenhouse gas reductions and results will be made available to the ARB as necessary to support AB 32.

v. Similar IOU and POU programs

1. Southern California Edison (SCE) Sustainable Communities Program (SCP)
2. San Diego Gas & Electric (SDG&E) ZNE Home Case Studies
3. Sacramento Municipal Utility District (SMUD) SolarSmart and Advantage Homes Programs

b) Program delivery and coordination

Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts. (Refer to Section 7 for a graphical representation of the coordination between ZNE and other EE and DSM program offerings. Refer to Section 8 for points of DSM/EE integration in the ZNE Program Logic Model.)

Preprogram Activities:

- a. Create EM&V evaluation matrix and reporting database
- b. Coordinate activities (as applicable) with other IOUs and POU sustainable communities type program activities
- c. Issue RFP for Technical Assistance Providers to support subprogram
- d. Develop a Standardized Project Application Form
- e. Provide Internal Service & Sales Training
- f. Coordinate processes with PG&E integration efforts including EE, DR, LIEE, Solar, SmartMeter
- g. Provide Customer Training through Service & Sales representatives and energy training centers

Standardized Program Offering:

- a. Review Project Applications
- b. Conduct a Project Scoping Meeting

- c. Develop Scope of Work
- d. Secure Design Assistance Agreement (DAA)
- e. Provide Predesign/ Entitlement/ CEQA Services
 - i. Design Charette
 - ii. Assist in the evaluation of EE measures, energy conservation measures, district heating and cooling systems, and distributed generation systems
 - iii. Assist in the evaluation of indirect and direct energy savings associated with water, waste, land use, and transportation
- f. Design Development Services
 - i. Provide cost-sharing for the evaluation of system designs
- g. Construction Administration Services
 - i. Provide review of in-process construction documents to ensure follow-through on ZNE design concepts. Troubleshoot measures before bidding or construction phase.
- h. Quality Control/ Quality Assurance Services
 - i. Provide cost-sharing for commissioning to achieve ZNE status
 - ii. Recommend operations and maintenance procedures to maintain ZNE
 - iii. Assist with the development of owners manuals

Post-Construction Activities:

- a. Case Studies
 - i. Benchmark and monitor energy performance and cost effectiveness
 - ii. Prepare case studies for presentation in the existing energy centers and/or at conferences, or for publication in journals or books

- i. Emerging Technologies program

Scaled field placements¹³ made available from the ETP will be offered to developers that participate in this program (as detailed in the ETP PIP). The role of the ZNE program in scaled field placement will be to match the needs of the ETP with interests of developers participating in ZNE. The ZNE pilot itself will not be conducting these placements.

- ii. Codes and Standards program

Approaches to exceeding Title 24 and any local implementation issues will be coordinated with the Codes and Standards program.

¹³ For a description of the scaled field placements, see the Statewide ET PIP.

c) Best Practices

The Communities Subprogram will encourage best practices in design teams and building owners/ developers.¹⁴

d) Innovation

The Communities Subprogram is an innovative program that builds on the success of other IOU “Sustainable Community” subprograms. In addition to filling a gap in existing utility programs, the ZNE Pilot Program will play a unique role in supporting PG&E resource programs by generating project leads and facilitating and assisting in the design of a project. Due to the amount of time that it takes to plan, design, and construct a building or a residential development, the energy savings resulting from this program cycle’s activities may not be apparent within this funding cycle. However, this subprogram will serve as a key conduit for achieving the Big, Bold Energy Efficiency Initiatives through the other resource programs in this and future funding cycles.

e) Integrated Demand Side Management

Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts. (Refer to Section 7 for a graphical representation of the coordination between ZNE and other EE and DSM program offerings. Refer to Section 8 for points of DSM/EE integration in the ZNE Program Logic Model.)

f) Integration Across Resource Types

Because the program will encourage participation in recognized green building rating systems, issues of other resource types will be addressed by the program as an element secondary to achieving extremely low energy or ZNE status.

g) EM&V:

The Communities Subprogram, in close consultation with ED, will submit a detailed EM&V plan for program evaluation, including a plan to utilize this information to continuously improve integrated program offerings, prior to the start of the program. The EM&V plan will build on lessons learned from existing “sustainable community” subprograms offered by the other IOUs and programs from other organizations such as the DOE Building America program.

¹⁴ Integrated Project Delivery: A Guide. Published by the AIA and AIA California Council, 2007. Available from the AIA through the www.aia.org website.

6.2) ZNE Demonstration Showcase Subprogram

a) Statewide IOU Coordination

The Demonstration Showcase Subprogram has two key elements: a series of commercial and residential scaled field placements, and case studies and performance monitoring and assessment of existing passive, low energy, and ZNE buildings. All facilities and projects targeted for inclusion in this program element must be designed to produce savings of at least 40% compared to Title 24.

Between the ETCC, ETP, and the Demonstration Showcase Subprogram, coordination and collaboration on research, development, and demonstration projects is planned to occur. More detail on the proposed testing and research programs is included in the ETP PIP.

i. ZNE Pilot Homes

To give production builders the opportunity to design, build, and construct a ZNE home in a low risk environment, PG&E plans to partner with the other IOUs and research organizations such as the CEC PIER program and the National Renewable Energy Laboratory (NREL) to provide design, technical, and financial assistance for a series of pilot homes across the PG&E service territory.

The program, similar in concept to the “Home of the Future” program currently administered by the Sacramento Municipal Utility District (SMUD), will provide close technical assistance, design assistance, and cost sharing of advanced EE measures. In return, the builder will be obligated to offer open houses for the general public, allow for performance verification and measurement, collaborate with research teams and utility staff, share lessons learned through courses at the energy training centers, and participate in documentation of the project in a case study format to be determined.

Key features of the homes will include:

- Cost effective, energy-efficient design: Through detailed cost/ benefit analysis the homes will integrate the most cost effective, energy-efficient technologies, including advanced framing, super-insulated walls and ceilings, and ENERGY STAR® appliances and lighting.
- On-site renewable energy generation: All homes will have solar domestic hot water heating and photovoltaic panels.
- Whole house energy management: Homes will incorporate energy management systems that automatically adjust heating, cooling, lighting, home office, landscape irrigation, and home entertainment systems to maximize EE and performance.

- Increased comfort: By reducing summer heat gains, drafts, and cold walls and windows, and by using the latest in heating and cooling equipment, the homes will improve comfort while lowering annual energy usage.

ii. ZNE Pilot Commercial Buildings

To give commercial building owners and design teams the opportunity to design, build, and construct a ZNE commercial building in a low risk environment, PG&E plans to partner with the other IOUs and research organizations such as the CEC PIER program, the Lawrence Berkeley National Laboratory (LBNL), and the National Renewable Energy Laboratory (NREL) to provide design and technical assistance for a series of pilot commercial buildings that showcase techniques, technologies, and designs that are on the path to ZNE.

The program, which will be similar in concept to the “Home of the Future” program currently administered by the Sacramento Municipal Utility District (SMUD) will provide close technical assistance, design assistance, and cost sharing of advanced EE measures. In return, the owner/ design teams will be obligated to offer open houses to the general public (for a limited period of time after construction is complete), allow for performance verification and measurement, collaborate with research teams and utility staff, share lessons learned through courses at the energy training centers, and participate in documentation of the project in a case study format to be determined.

In addition, PG&E will collaborate with CPUC EM&V staff to help conduct a research project, using nationally-recognized experts from national labs and other institutions, similar to the one described by B. Griffith, N. Long, P. Torcellini, R. Judkoff, D. Crawley, and J. Ryan in “Assessment of the Technical Potential for Achieving Net Zero-Energy Buildings in the Commercial Sector.”¹⁵ The goal of the project will be to model what building types, technologies, and climate zones within California are best suited to achieve the ZNE goal. Results of the study will shape subsequent commercial building pilots, but the expectation is that the initial pilots will focus on non-refrigerated warehouses, education facilities, low-rise office buildings, service, and non-mall retail facilities as documented in the

¹⁵ Griffith, B., N. Long, P. Torcellini, R. Judkoff, D. Crawley, and J. Ryan. 2007. Assessment of the Technical Potential for Achieving Net-Zero Energy Buildings in the Commercial Sector. NREL/TP-55041957. www.nrel.gov/docs/fy08osti/41957.pdf

In the referenced study, NREL used DOE’s energy modeling tool EnergyPlus to quantify the energy performance opportunities for a large set of building models derived from the 2003 Commercial Buildings Energy Consumption Survey. Each building was modeled first as a baseline with energy features and performance consistent with new 2005 buildings complying with ANSI/ASHRAE/IESNA 90.1-2004. Then, they modified these baseline building models with a set of technologies and practices that represent projections for improvements out to 2025. These annual simulations provide estimates for the energy performance levels that might be achievable in 2025. These estimates included projections of the number of buildings and floor area that could achieve the ZEB goal. The analysis was limited to the technical potential and does not assess market penetration or make detailed projections for how the various commercial building subsectors might evolve by 2025.

NREL study. The study will be funded from EM&V allocated for Overarching Policy and Support Projects and specifically, for Strategic Plan Update Studies. PG&E will administer the study and consult with Energy Division as the study progresses.

iii. Program name

ZNE Demonstration Showcase Subprogram

iv. Program delivery mechanisms

The Demonstration Showcase will be coordinated by staff of the ZNE Pilot Program. Primary outreach to candidate projects will be through Service and Sales and PG&E EE technical staff.

Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts.

v. Marketing and outreach plans, e.g., research, target audience, collateral, delivery mechanisms

As appropriate, PG&E Service and Sales representatives, developer representatives, and industry associations will encourage participation in the program. In addition, the ZNE Pilot Program staff will disseminate technical information to target audiences including developers, production builders, and the professional architecture and engineering community by utilizing the statewide network of energy training centers, by attending conferences and trade shows, and by authoring articles for technical journals and other trade publications.

The ZNE Pilot Program plans to create an integrated marketing and outreach strategy for the market that targets a variety of delivery channels (e.g., technical and program information, case studies, fact sheets, seminars, brochures, advertisements, point-of purchase materials, trade shows, and direct mailing) as appropriate. This effort will be coordinated with all appropriate EE, demand response (DR), and self-generation programs, and an emphasis will be placed on internet-based information and assistance.

vi. IOU Program Interaction

1. CEC PIER: The results of completed residential and commercial demonstration projects, or projects “on the boards,” will be made available to the CEC PIER program and other programs offered by the U.S. Department of Energy to help those programs better support developers and design teams interested in ZNE and greenhouse gas reductions.
2. ARB: Expected greenhouse gas reductions and results will be made available to the ARB as necessary to support AB 32.

vii. Similar IOU and POU programs

1. Sacramento Municipal Utility District (SMUD) Home of the Future Programs
2. Emerging Technologies Program Scaled Field Placements
3. U.S. DOE Building America Program

viii. Program delivery and coordination:

Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts.

b) Program delivery and coordination

Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts. (Refer to Section 7 for a graphical representation of the coordination between ZNE and other EE and DSM program offerings. Refer to Section 8 for points of DSM/EE integration in the ZNE Program Logic Model.)

i. Emerging Technologies program

The ZNE Demonstration Showcase Subprogram will work closely with the ETP to coordinate the ZNE Pilot Homes and ZNE Pilot Commercial Buildings.

ii. WE&T efforts

Insofar as the ZNE Demonstration projects are thoroughly tested and vetted, this subprogram will coordinate with the Education & Training team to inform the appropriate workforce actors of findings and breakthroughs.

iii. Program-specific marketing and outreach efforts

Marketing and outreach plans are provided for this subprogram in Section 6.2.a.vii.

iv. CEC Work on PIER

The ZNE Pilot Homes program plans to partner with the CEC PIER program to provide design, technical, and financial assistance for a series of pilot homes across the PG&E service territory (refer to Section 6.2.a.i). The ZNE Pilot Commercial Buildings program plans to collaborate with the CEC program in a similar capacity to provide assistance to pilot commercial buildings that demonstrate techniques, technologies, and designs that forge the path to ZNE (refer to Section 6.2.a.ii).

c) Best Practices

The Demonstration Showcase Subprogram will encourage best practices in design teams and building owners/ developers.

d) Innovation

The Demonstration Showcase Subprogram is an innovative program that builds on the success of other IOU demonstration subprograms and programs offered by the CEC through the PIER program. This program's emphasis on factors such as whole house energy management and how energy efficiency can increase occupant comfort is a marked departure from how residential buildings are planned and constructed presently. Lastly, this subprogram is in direct alignment with the Strategic Plan, which is expanded upon in Appendix 1 of this PIP.

e) Integrated Demand Side Management

Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts. (Refer to Section 7 for a graphical representation of the coordination between ZNE and other EE and DSM program offerings. Refer to Section 8 for points of DSM/EE integration in the ZNE Program Logic Model.)

f) Integration across resource types

Because the program will encourage participation in recognized green building rating systems, issues of other resource types will be addressed by the program as an element secondary to achieving extremely low energy or ZNE status.

h) EM&V

The Demonstration Showcase Subprogram, in close consultation with ED, will submit a detailed EM&V plan for program evaluation, including a plan to utilize this information to continuously improve integrated program offerings, prior to the start of the program. The EM&V plan will build on lessons learned from existing demonstration programs offered by the ETP and the other IOUs and programs from other organizations such as the SMUD "Home of the Future" program.

6.3) ZNE Technology Advancement Subprogram

a) Statewide IOU Coordination

The ZNE Pilot Program will integrate with the existing Emerging Technologies Program (ETP) to deliver information, insights, analytical tools, and resources to accelerate and expand the commercialization of innovative technologies as stated in the CEESP. In this integration, the ZNE Pilot Program can provide the ETP essential information and insights on customer/community planning needs, as well as technology integration opportunities to help the ETP screen and assess potential technologies. To support the ZNE Pilot Program, the ETP will provide insights on technology evolution and trends, market potential, adoption rates, participate in vendor technology evaluations, implement pilot programs, and design specifications for needed technology. As noted in Table 5, PG&E plans to produce a minimum of 25 such studies during the program cycle estimated to cost in the range of \$100,000 per study.

In addition to advancing emerging technologies, a goal of the ZNE Pilot Program will be to identify and document the energy savings possible through technologies that have already “emerged” but have not been adopted. These technologies will likely include passive environmental technologies (e.g., cross ventilation, stack ventilation, trombe walls, sun spaces). Work in this area will build on any existing or proposed pilot programs, such as those offered for solar hot water heating in the San Diego Gas & Electric (SDG&E) service territory. A key goal of investigating “emerged” but underutilized technologies will be to create a cost-effective program that can be implemented as part of a future EE resource program and identify any barriers to adoption within the design, construction, and maintenance communities. All such work in this area will utilize internal program and project management expertise from other PG&E programs such as the CSI incentive program or the ETP, will be coordinated with the statewide IDS Task Force, and will leverage existing relationships with distributors, contractors, and installers.

To better leverage resources and take advantage of large-scale efforts, many of the technology advancement efforts will be with statewide collaborations, coordinated through the Emerging Technologies Coordinating Council. Careful consideration will also be given to how this program can be structured to reach low and moderate-income communities and serve as a stepping stone toward ZNE for the existing residential and commercial structures in California.

i. Program name

ZNE Technology Advancement Subprogram

ii. Program delivery mechanisms

The Technology Advancement Subprogram will be coordinated by staff of the ZNE Pilot Program. Primary outreach to technology developers will be through

staff of the program or through the ETP. Outreach to scaled field placement sites will be through Service and Sales and PG&E EE technical staff.

Coordination of the program will occur through an internal integration team that meets weekly to integrate efforts.

- iii. Marketing and outreach plans, e.g., research, target audience, collateral, delivery mechanisms

As appropriate, PG&E Service and Sales representatives, developer representatives, and industry associations will encourage participation in the program. In addition, the ZNE Pilot Program staff will disseminate technical information to target audiences including developers, production builders, and the professional architecture and engineering community by utilizing the statewide network of energy training centers, by attending conferences and trade shows, and by authoring articles for technical journals and other trade publications.

The ZNE Pilot Program plans to create an integrated marketing and outreach strategy for the market that targets a variety of delivery channels (e.g., technical and program information, case studies, fact sheets, seminars, brochures, advertisements, point-of purchase materials, trade shows, and direct mailing) as appropriate. This effort will be coordinated with all appropriate EE, DR, and self-generation programs, and an emphasis will be placed on internet based information and assistance.

- iv. IOU Program Interactions

- 1. CEC PIER: The results of completed technology assessments or assessments underway will be made available to the other IOUs, POUs, the CEC PIER program, and other programs such as those offered by the U.S. Department of Energy to help those programs better support developers and design teams interested in ZNE and greenhouse gas reductions.
- 2. ARB: Expected greenhouse gas reductions and results will be made available to the ARB as necessary to support AB 32.

- v. Similar IOU and POU programs

- 1. Emerging Technology Program (ETP)
- 2. SMUD Emerging Technology Program (ETP)
- 3. U.S. DOE Building America Program

- b) Program delivery and coordination

Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts. (Refer to Section 7 for a graphical

representation of the coordination between ZNE and other EE and DSM program offerings. Refer to Section 8 for points of DSM/EE integration in the ZNE Program Logic Model.)

i. Emerging Technologies program

The support of the ETP is essential to determine information on innovative new technologies, customer/community planning needs, and opportunities to test and assess potential technologies, as well as interactions between new and tested technologies. Refer to Section 6.3.a for more information on the collaboration effort between this subprogram and the ETP.

ii. Program-specific marketing and outreach efforts

Marketing and outreach plans are provided for this subprogram in Section 6.3.a.iii.

c) Best Practices

The Technology Advancement Subprogram will help advance to the market EE measures that will be long-term (2016 – 2030) best practices for design teams and building owners/developers. The focus of the technology advancement will be on “whole building” and community scale solutions or techniques (such as passive solar) that are currently overlooked by the design community.

d) Innovation

The Technology Advancement is an innovative program that builds on the success of other IOU ET programs and programs offered by the CEC through the PIER program. This program will add to the current scope of services offered through the ETP by expanding into whole building and community scale solutions in addition to identifying and documenting the energy savings possible through technologies that have already “emerged” such as passive solar and solar domestic hot water heating. (Refer to Sections 4.a-b for more information on innovation of the ZNE Pilot Program with respect to whole building design and community-scale planning.)

e) Integrated Demand Side Management

Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts. (Refer to Section 7 for a graphical representation of the coordination between ZNE and other EE and DSM program offerings. Refer to Section 8 for points of DSM/EE integration in the ZNE Program Logic Model.)

f) Integration across resource types

Because the overall ZNE Pilot Program will encourage participation in recognized green building rating systems, many measures to be investigated may have additional benefits beyond energy savings. (For example, green roof technologies increase the heat capacity of the roof to save energy, but may also delay storm water runoff and reduce the heat island effect.) Issues discovered during technology assessments will be documented to accelerate adoption of the technology by the market, but will be an element secondary to achieving extremely low energy or ZNE status. However, this coupling with green rating systems is likely to achieve a higher market adoption/ transformation rate than to analyze EE alone.

g) EM&V

The Technology Advancement Subprogram, in close consultation with ED, will submit a detailed EM&V plan for program evaluation, including a plan to utilize this information to continuously improve integrated program offerings, prior to the start of the program. The EM&V plan will build on lessons learned from the ETP and other organizations such as the CEC PIER program or the USDOE. The EM&V plan will also detail the proposed scope of the studies required to create a statewide roadmap to achieve ZNE goals. The roadmap will provide the process and strategies for including customer behavior considerations into product development. The roadmap will also provide recommendations for follow-up customer behavior studies in the remaining years in the current program cycle, and in the next program cycle (2013-2015). It will likewise examine participation rates in current and recent programs available to builders and developers such as SBD and CAHP. These studies will be funded from EM&V allocated for Overarching Policy and Support Projects and specifically, for Strategic Plan Update Studies. PG&E will administer the studies and consult with Energy Division as the studies progress.

6.4) ZNE Design Integration Subprogram

a) Statewide IOU Coordination

The ZNE Pilot Program will develop and disseminate information on the best practices for the design of ZNE communities and buildings by engaging the other IOUs and organizations such as the American Institute of Architects California Council (AIACC), the U.S. Green Building Council (USGBC), and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Through this portion of the program, the program will:

- Encourage improvements in standard design practice of large-scale communities to capture early-stage and community-scale energy savings;
- Encourage the capture of direct and indirect energy savings associated with water, waste, land use, and transportation and assist with the definition of verifiable savings associated with these synergies;
- Develop an annual design competition to encourage architecture and engineering firms (and students in schools of architecture) to create ZNE developments and buildings. We anticipate both “professional” and “student” competition tracks with an award philosophy which recognizes and publicizes technical achievement such that material or financial awards would be relatively nominal;
- Accelerate the move to ZNE buildings by providing validated and tested software tools to assist with the development and construction of homes and/or commercial buildings;
- Develop best practice guidelines for the commissioning, operation, and maintenance of ZNE buildings;
- Investigate the development of market based financing mechanisms to create “grid-neutral” ZNE development;
- Identify cost effectiveness metrics and ways in which the knowledge and experience gained by the ZNE Pilot Program will be transferred to other PG&E programs and utilities, the private sector, CEC codes and standards, local building standards, and the state’s Green Building Initiative (Executive Order S-20-04); This program will review results from other IDSM programs (DR, HVAC, Lighting, etc.), research academic studies, and review sub-program feedback to suggest metrics for cost effectiveness in ZNE buildings. The program will publish the results of this effort in a report.
- Develop a plan to disseminate information on the design, construction, and operation of ZNE buildings in collaboration with the CPUC; the CEC PIER program; developers, architects, and builders; municipalities and redevelopment agencies; professional building and trade associations; research institutions; and state, federal, and local agencies.

The program elements by which these items will be developed and achieved will be through tool development, training and educational activities. Solutions for best practices in ZNE will be developed into public education workshop curricula to be presented with leading practitioners. Best practice topics will include technical topics together with topics around financing mechanisms and cost-effectiveness. ZNE will also create an annual forum among leading ZNE practitioners and market players to bring these parties together to share ideas and foster innovation on the topics listed above.

Integrated design does not end at construction, and in order to ensure code compliance, the subprogram will make a concerted effort to offer assistance to planning and code officials to review proposed ZNE buildings and developments. Part of this effort will be to lead the development of best practice guidelines and software tools to evaluate “beyond-code” projects – a key part of evaluating whether a development or building has achieved ZNE status. Any software tools supported under the ZNE program would evaluate potential design decisions made at the early stages of community-scale project development, would help evaluate the trade-offs between energy efficiency and distributed generation options, or would help with code review of ZNE buildings. This will require coordination between energy experts, software developers, regulatory bodies, and code officials to adopt a common set of evaluation and measurement metrics.

i. Program name

ZNE Design Integration Subprogram

ii. Program delivery mechanisms

The Design Integration Subprogram will be coordinated by staff of the ZNE Pilot Program. Primary interaction with customers will be through staff of the program or through the ETP, LGP, 3P or Codes and Standards statewide programs.

Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts.

iii. Marketing and outreach plans, e.g., research, target audience, collateral, delivery mechanisms

As appropriate, PG&E technical staff and industry associations will encourage participation in the program. In addition, the ZNE Pilot Program staff will disseminate technical information to target audiences including developers, production builders, and the professional architecture and engineering community by utilizing the statewide network of energy training centers, by attending conferences and trade shows, and by authoring articles for technical journals and other trade publications.

iv. IOU Program Interactions

1. CEC PIER: The results of any design method research, design tools, or codes and standards work will be made publicly available, and target audiences may include to the other IOUs, POU, the CEC PIER program, the CEC Codes and Standards programs, and other programs such as those offered by the U.S. Department of Energy.
2. ARB: Expected greenhouse gas reductions and efforts to improve code compliance for ZNE buildings will be made available to the ARB as necessary to support AB 32 efforts.

v. Similar IOU and POU programs

1. Emerging Technology Program (ETP)
2. Codes and Standards Program

b) Program delivery and coordination

Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts. (Refer to Section 7 for a graphical representation of the coordination between ZNE and other EE and DSM program offerings. Refer to Section 8 for points of DSM/EE integration in the ZNE Program Logic Model.)

i. Codes & Standards program

The ZNE Design Integration Subprogram will, in conjunction with the IOU C&S Program, work to develop best practice guidelines for the commissioning, operation, and maintenance of ZNE buildings. These best practices will feed into and be informed by the work of the C&S Program team, as well as various other agencies. This subprogram will also put a special emphasis on code compliance, one area that is unfortunately lacking in building design, construction, and operations and maintenance. As described in Section 6.4.a, the subprogram will make assistance to planning and code officials a priority.

ii. WE&T efforts

A key component of this subprogram is disseminating the information gleaned on the design, construction, and operation of ZNE buildings to a variety of actors, which include architects, planners, developers, builders, and other members of the workforce who need to be educated and trained on ZNE practices.

c) Best Practices

The Design Integration Subprogram will help advance best practices by improving design tools and code enforcement practices that will be critical for the long-term success of the ZNE BBES efforts.

d) Innovation

The Design Integration Subprogram is an innovative program that builds on the success of other IOU ET programs, Codes and Standards, and programs offered by the CEC for code updates and the PIER program. The subprogram's focus on early-stage and community-scale energy savings has been for the most part previously ignored by planners and is a crucial means of achieving sustainable, cost-effective ZNE buildings in the long term. Additionally, this subprogram is looking beyond direct energy savings to integrate potential water, land use, and transportation savings into building design.

e) Integrated Demand Side Management

Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts. (Refer to Section 7 for a graphical representation of the coordination between ZNE and other EE and DSM program offerings. Refer to Section 8 for points of DSM/EE integration in the ZNE Program Logic Model.)

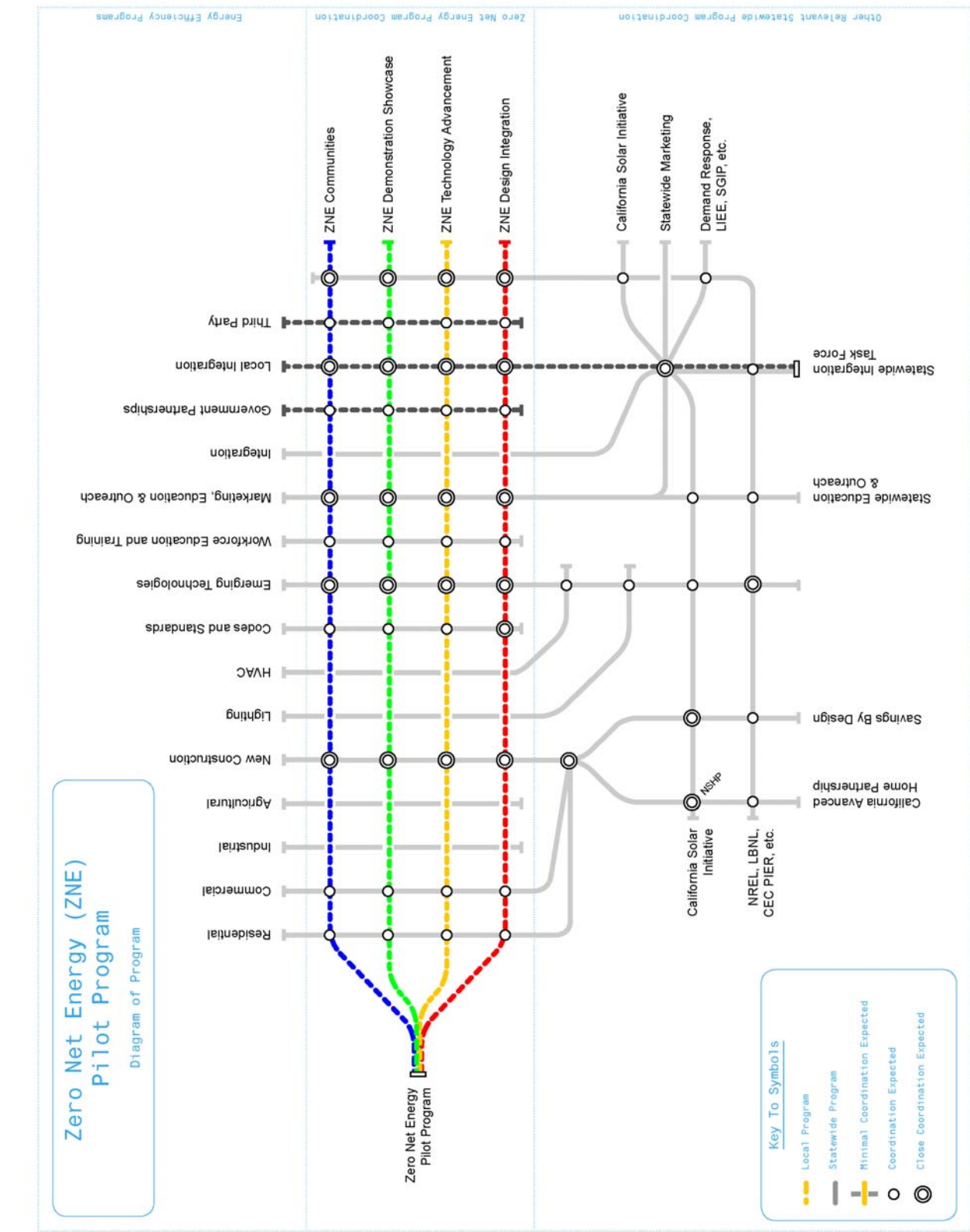
f) Integration across resource types

Because the overall ZNE Pilot Program will encourage participation in recognized green building rating systems, many measures to be investigated may have co-benefits beyond energy savings. (For example, green roof technologies increase the heat capacity of the roof to save energy, but may also delay storm water runoff and reduce the heat island effect.) Issues discovered will be documented to accelerate adoption of the technology by the market, but will be an element secondary to achieving extremely low energy or ZNE status. This may result in a higher adoption/ transformation than just analyzing EE alone. Any state organizations that may have a vested interest in co-benefits (such as water utilities or other EPA pollution control efforts) will be invited to collaborate with the subprogram.

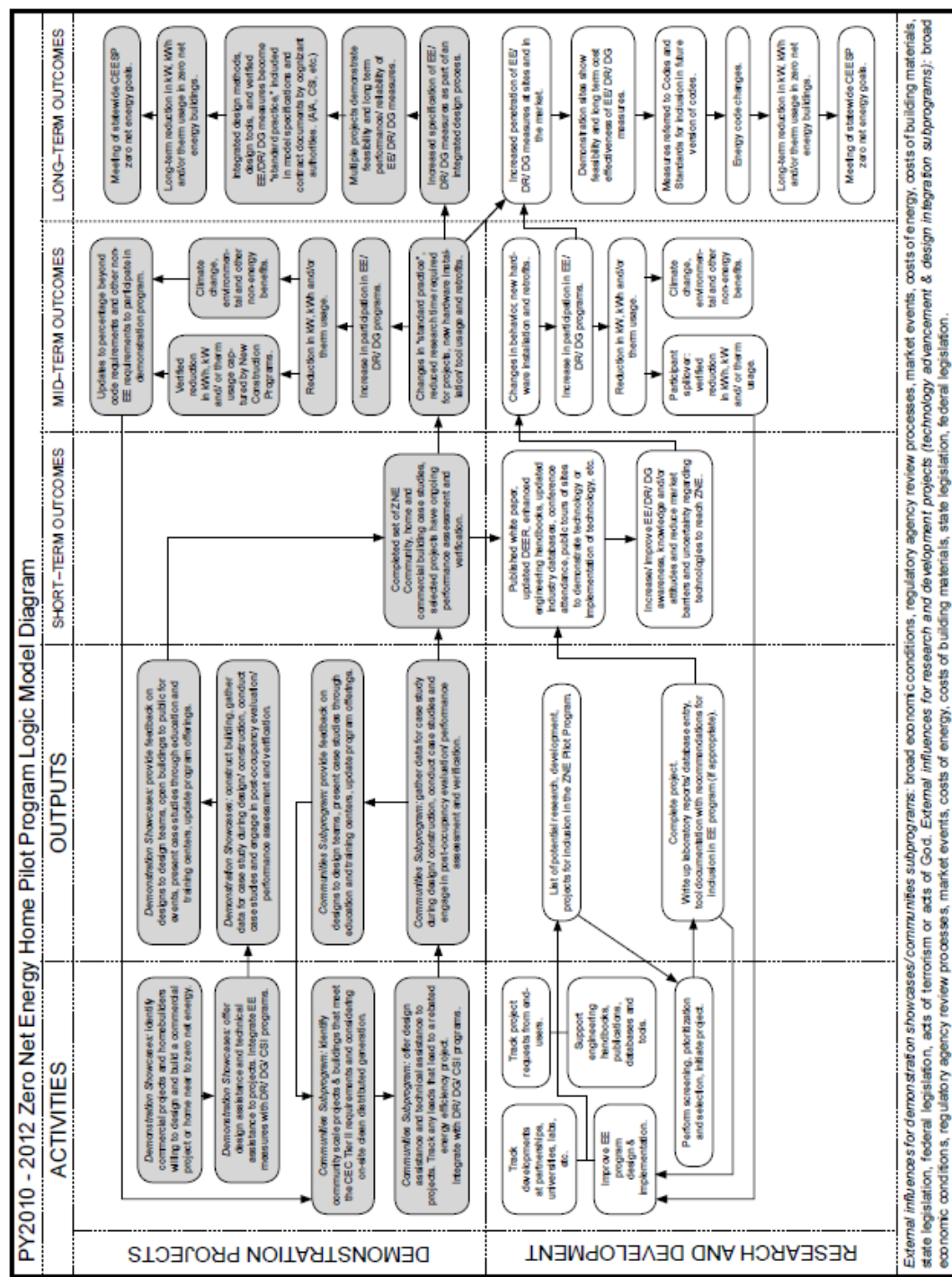
g) EM&V

The Design Integration Subprogram, in close consultation with ED, will submit a detailed EM&V plan for program evaluation, including a plan to utilize this information to continuously improve integrated program offerings, prior to the start of the program. The EM&V plan will build on lessons learned from the ETP, Codes and Standards, Education and Training, and other organizations such as the CEC PIER program or CEC code and standards update efforts.

7) Diagram of Program



8) Program Logic Model



Appendix 1

Zero Net Energy Pilot Program Alignment with California Long Term Energy Efficiency Strategic Plan

Appendix 1 - Strategic Plan Crosswalk

The California Long-Term Energy Efficiency Strategic Plan (Strategic Plan) sets forth a statewide roadmap to maximize achievement of cost-effective energy efficiency in California's electricity and natural gas sectors between 2009 and 2020, and beyond. Appendix 1 summarizes how the Zero Net Energy (ZNE) Objectives and Strategies during the 2010-2012 program cycle contribute to the fulfillment of the Strategic Plan near-term actions and steps toward the plan's longer term goals.

Strategic Plan			Zero Net Energy PIP	
Section/Goal/Strategies	Partners	Near Term 2010 – 2012	Objective/Strategy	Reference/ Page #
Section 2 Residential Goal 1: Zero Net Energy Homes Strategy 1-1: Drive continual advances in technologies in the building envelope, including building materials and systems, construction methods, distributed generation, and building design.	Energy Commission (PIER) Utilities DOE, national Labs Production home builders and building industry organizations	50% of new homes exceed 2008 Title 24 standards by 20%	Entire program structure and close coordination with New Construction Program and subprograms.	ZNE PIP, p. 2
		10% of new homes exceed 2008 Title 24 standards by 40%	Entire program structure and close coordination with New Construction Program and subprograms.	ZNE PIP, p. 3
		Develop and participate in pilot projects in specific climates to prove technologies for next generation of lower and zero energy homes, including affordable housing projects.	ZNE Communities and Demonstration Showcase subprograms will develop pilot projects.	ZNE PIP, pp. 14 - 22
		Continually monitor performance of pilot projects to provide feedback for next level of design and development of technologies.	ZNE Communities and Demonstration Showcase subprograms will monitor performance of pilot projects.	ZNE PIP, pp. 11-12
		Advance technological innovation through collaboration of Energy Commission PIER and Emerging Technologies Programs, LBNL, NREL, Utilities, CBIA, and other appropriate organizations.	Program will be closely coordinated with programs listed.	ZNE PIP, p. 28

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Zero Net Energy Pilot Program Alignment with California Long Term Energy Efficiency Strategic Plan

Strategic Plan			Zero Net Energy PIP	
Section/Goal/Strategies	Partners	Near Term 2010 – 2012	Objective/Strategy	Reference/ Page #
		Assess existing technologies and identify areas for strategic involvement in research and development.	The ZNE Pilot Program will integrate with the existing Emerging Technologies Program (ETP) to deliver information, insights, analytical tools, and resources to accelerate and expand the commercialization of innovative technologies as stated in the CEESP	ZNE PIP, p. 21
Section 2 Residential Goal 1: Zero Net Energy Homes Strategy 1-2: Continual coordination and cooperation between the Energy Commission and others to progressively increase Title 24 building standards and Title 20 appliance standards consistent with the interim and long-term goals set forth in this Plan.	Energy Commission Utilities Local Governments California Building Standards Commission	Map a trajectory for Title 24 mandatory and voluntary standard(s) through 2020.	Integrated design does not end at construction, and in order to ensure code compliance, the subprogram will make a concerted effort to offer assistance to planning and code officials to review proposed ZNE buildings and developments. Part of this effort will be to lead the development of best practice guidelines and software tools to evaluate “beyond-code” projects – a key part of evaluating whether a development or building has achieved ZNE status.	ZNE PIP, pp. 27-29
		Progressively advance Title 24 voluntary, “beyond code” standard(s) and ratings systems in step with changes to the mandatory standards.	ZNE Program will be closely coordinated with Codes & Standards program.	ZNE PIP, p. 29

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Zero Net Energy Pilot Program Alignment with California Long Term Energy Efficiency Strategic Plan

Strategic Plan			Zero Net Energy PIP	
Section/Goal/Strategies	Partners	Near Term 2010 – 2012	Objective/Strategy	Reference/ Page #
Section 2 Residential Goal 1: Zero Net Energy Homes Strategy 1-3: Coordinate and Support “Reach” Building Standards Energy Commission	Energy Commission Utilities Local Governments California Building Standards Commission Building Industry	- Identify and resolve conflicts or inconsistencies between Title 24 and local “green” building ordinances or other standards. - Establish policies and procedures for statewide coordination of local building standards that are acceptable to local governments. - Provide technical support for the development and implementation of reach standards through partnerships with local governments.	Integrated design does not end at construction, and in order to ensure code compliance, the subprogram will make a concerted effort to offer assistance to planning and code officials to review proposed ZNE buildings and developments. Part of this effort will be to lead the development of best practice guidelines and software tools to evaluate “beyond-code” projects – a key part of evaluating whether a development or building has achieved ZNE status.	ZNE PIP, pp. 27-29
Section 2 Residential Goal 1: Zero Net Energy Homes Strategy 1-4: Develop innovative financing programs for the construction of energy efficient homes.	Finance Task Force Financial Institutions Building Industry Utilities	- Convene a task force of financial experts to develop attractive financial products for energy efficiency homes. - Implement Options	The ZNE Design Integration subprogram will investigate the development of market based financing mechanisms to create ~~“grid-neutral”~~ ZNE development and develop a plan to disseminate information on the design, construction, and operation of ZNE buildings in collaboration with the CPUC; the CEC PIER program; developers, architects, and builders; municipalities and redevelopment agencies; professional building and trade associations; research institutions; and state, federal, and local agencies.	ZNE PIP, p. 27

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Zero Net Energy Pilot Program Alignment with California Long Term Energy Efficiency Strategic Plan

Strategic Plan			Zero Net Energy PIP	
Section/Goal/Strategies	Partners	Near Term 2010 – 2012	Objective/Strategy	Reference/ Page #
Section 2 Residential Goal 1: Zero Net Energy Homes Strategy 1-5: Encourage local, regional, and statewide leadership groups to support pilots and foster communication among pioneering homeowners and builders.	Local Governments Homeowner Groups Leading Builders Utilities	Develop network of building owners (home- owners associations) and builders to help support the dissemination of information and develop peer-to-peer relationships.	The ZNE Design Integration subprogram will develop a plan to disseminate information on the design, construction, and operation of ZNE buildings in collaboration with the CPUC; the CEC PIER program; developers, architects, and builders; municipalities and redevelopment agencies; professional building and trade associations; research institutions; and state, federal, and local agencies.	ZNE PIP, p. 27
Section 3 Commercial Sector Goal 1: ZNE Commercial Buildings Strategy 1-1: Establish a long-term progressive path of higher minimum codes and standards ending with ZNE codes and standards for all new buildings by 2030.	Energy Commission Utilities BSC A&E firms Building Industry	- Establish one- or two-tiered voluntary EE standards, coordinated with green building rating systems. - Align Title 24 targets with goals of AB 32 and carbon reduction.	Look for opportunities to develop standard test protocols for energy efficient products, in support of statewide Codes & Standards Program.	ZNE PIP, p. 6
Section 3 Commercial Sector Goal 1: ZNE Commercial Buildings Strategy 1-2: Expand Titles 20 and 24 to address all significant energy end uses.	Energy Commission Utilities Building Industry BSC	- Develop and adopt broader codes and standards for plug loads, such as copy machines, printers, battery chargers, and televisions. - Expand Title 24 to include whole building approaches including metering and data management; automated diagnostic systems; and sub-metering for tenant-occupied space. - Adopt progressive codes and standards fit high performance commercial lighting applications.	Expected greenhouse gas reductions and efforts to improve code compliance for ZNE buildings will be made available to the ARB as necessary to support AB 32 efforts.	ZNE PIP, pp. 28-29

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Zero Net Energy Pilot Program Alignment with California Long Term Energy Efficiency Strategic Plan

Strategic Plan			Zero Net Energy PIP	
Section/Goal/Strategies	Partners	Near Term 2010 – 2012	Objective/Strategy	Reference/ Page #
Section 3 Commercial Sector Goal 1: ZNE Commercial Buildings Strategy 1-3: Establish a “Path to Zero” Campaign to create demand for high-efficiency buildings.	DOE and other ZNE efforts Building Industries Building owners A&E firms Local and regional governments Utilities	• Convene leading building industry associations to plan and conduct campaign. • Organize forums to develop and exchange experience and data on emerging technologies, practices and designs that deliver ultra-low and ZNE buildings.	A key strength of the ZNE Pilot Program will be the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the goals and objectives of the program. This task will be shared with the ET and New Construction programs.	ZNE PIP, p. 3
Section 3 Commercial Sector Goal 1: ZNE Commercial Buildings Strategy 1-4: Develop innovative financial tools for ZNE and ultra-low energy new buildings.	Finance Task Force Financial and Investment community, Commercial developers and Trade groups Utilities	• Develop and pilot innovative financial tools. • Identify building performance metrics or documentation needed to inform building performance and valuation. • Develop performance data.	The Pilot Program will initiate a series of third-party demonstration residential and commercial projects. In exchange for this assistance, after the design and construction is complete, each home and building will be made available to the public, published as a case study, and subjected to performance verification and assessment.	ZNE PIP, p. 6
Section 3 Commercial Sector Goal 1: ZNE Commercial Buildings Strategy 1-5: Create additional investment incentives and leverage other funding.	Finance Task Force Financial and Investment community Building trade groups	• Investigate other funding support that might be offered such as local government “feebates” for EE/green construction, Federal funding, Federal or State tax incentives, GHG reduction benefits, e.g. via carbon offsets.	The ZNE Design Integration Subprogram will investigate the development of market based financing mechanisms to create <u>“grid-neutral” ZNE</u> development.	ZNE PIP, p. 27

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Zero Net Energy Pilot Program Alignment with California Long Term Energy Efficiency Strategic Plan

Strategic Plan			Zero Net Energy PIP	
Section/Goal/Strategies	Partners	Near Term 2010 – 2012	Objective/Strategy	Reference/ Page #
Section 3 Commercial Sector Goal 1: ZNE Commercial Buildings Strategy 1-6: Develop a multi-pronged approach to advance the practice of integrated design.	Integrated Design Working Group Utilities AIA CAB Architectural schools Building and Building products Industry ASHRAE USGBC	- Promote ID development via Title 24 codes/ standards and market activities. - Identify/develop tools and protocols from building commissioning, retro-commissioning and building M&V to enable ID to be deployed. - 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	The ZNE Pilot Program will develop and disseminate information on the best practices for the design of ZNE communities and buildings by engaging the other IOUs and organizations such as the American Institute of Architects California Council (AIACC), the U.S. Green Building Council (USGBC), and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).	ZNE PIP, p. 27
Section 8 DSM Integration and Coordination Goal 1: Integrated DSM Programs, Messages, and Technologies Strategy 1-1: Carry out integrated marketing of DSM opportunities across all customer classes.	Utilities	- IOUs adopt marketing integration plans, by sector - Streamline and integrate EE, DR, and DG program outreach - Coordinate integrated marketing with AMI deployment - Offer audits and technical assistance that address combined DSM opportunities Propose and launch program delivery pilots testing capabilities and effectiveness in the marketplace, including EE, DR, AMI and DG	Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts across EE, DR, LIEE, DG, ET, SmartMeter, green programs such as ClimateSmart, marketing and outreach, Service and Sales, and all applicable delivery channels, including third parties and LGPs.	ZNE PIP, p. 14
Section 8 DSM Integration and Coordination Goal 1: Integrated DSM Programs, Messages, and Technologies Strategy 1-2: Conduct integrated DSM delivery pilots in the Residential, Commercial, Industrial and Agricultural sectors.	Utilities	Propose and launch program delivery pilots testing capabilities and effectiveness in the marketplace, including EE, DR, AMI and DG	Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts across EE, DR, LIEE, DG, ET, SmartMeter, green programs such as ClimateSmart, marketing and outreach, Service and Sales, and all applicable delivery channels, including third parties and LGPs.	ZNE PIP, p. 14

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Zero Net Energy Pilot Program Alignment with California Long Term Energy Efficiency Strategic Plan

Strategic Plan			Zero Net Energy PIP	
Section/Goal/Strategies	Partners	Near Term 2010 – 2012	Objective/Strategy	Reference/ Page #
Section 8 DSM Integration and Coordination Goal 1: Integrated DSM Programs, Messages, and Technologies Strategy 1-3: Develop integrated DSM programs across resources, including energy, water, and transportation	Utilities	Establish on-going working group to develop and implement blueprint for integration.	Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts across EE, DR, LIEE, DG, ET, SmartMeter, green programs such as ClimateSmart, marketing and outreach, Service and Sales, and all applicable delivery channels, including third parties and LGPs.	ZNE PIP, p. 14
Section 8 DSM Integration and Coordination Goal 1: Integrated DSM Programs, Messages, and Technologies Strategy 1-4: Promote development and support of new technologies that enable or facilitate DSM Coordination and Integration	Utilities	- Assess the current state of integration-enabling technology and develop a guidance document detailing a technology development path for fuller integration. (2009) - Prioritize integration-enabling technologies in RD&D and ET programs based on the technology assessment.	Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts across EE, DR, LIEE, DG, ET, SmartMeter, green programs such as ClimateSmart, marketing and outreach, Service and Sales, and all applicable delivery channels, including third parties and LGPs.	ZNE PIP, p. 14
Section 10 – Marketing, Education and Outreach Goal 1: Comprehensive ME&O Effort Strategy 1-4: Develop a California Energy Efficiency web portal with statewide Information on GHG reductions, efficiency and DSM awareness and options.	Utilities	- Develop initial website/portal for the energy efficiency/DSM industry. - Begin pilot programs in using web portal.	Coordination of the program will occur through an internal integration team that meets weekly to coordinate integration efforts across EE, DR, LIEE, DG, ET, SmartMeter, green programs such as ClimateSmart, marketing and outreach, Service and Sales, and all applicable delivery channels, including third parties and LGPs.	ZNE PIP, p. 14

Appendix 1

Zero Net Energy Pilot Program Alignment with California Long Term Energy Efficiency Strategic Plan

Strategic Plan			Zero Net Energy PIP	
Section/Goal/Strategies	Partners	Near Term 2010 – 2012	Objective/Strategy	Reference/ Page #
Section 11- Research and Technology Goal 1: Create Demand Pull for New Technology Strategy 1-1: Apply systems approaches to establishing research priorities	ETP, other Utilities, National Laboratories	- Collaborate with regional and national labs, manufacturers, universities to develop and enhance technologies that can help meet the statewide strategic EE/DR goals. - Form Utility advisory group to formally provide input into PIER research strategies and programs and coordinate with ETCC promotion process. - Target most promising opportunities for improving plug-loads, lighting, and integrated DSM information and control systems. - Refine ET and PIER process to encourage more rapid evaluation of Emerging Technologies.	Scan a wide variety of sources for measures that could help IOUs meet customer needs and achieve energy savings, demand reduction, and demand response goals. Help transform the market by communicating information on high potential assessment findings to key market actors. Look for opportunities to provide customer contacts for testing and focus groups. Look for opportunities to make expertise / knowledgeable personnel available as resources to product developers.	ZNE PIP, pp. 19-21, 23, coordination with ETP.
Section 11- Research and Technology Goal 1: Create Demand Pull for New Technology Strategy 1-2: Leverage private industry and Federally funded technology research and investment	ETP, other Utilities, National Laboratories	- Expand Federal government R&D support for and integration with California's efforts. - Create an investor-ET network to share market information, technology assessment results, and expedited access to incentive programs. - Pilot incubator program to fast track ET deployment. - Expand upstream relationships and channels to effectively target and generate support for energy-related technology.	Develop and maintain a project tracking database containing the variables and attributes to be tracked quarterly by all ETCC programs statewide, and data will be reported to the CPUC on a regular basis. Help transform the market by communicating information on high potential ET assessment findings to key market actors. Look for opportunities to provide customer contacts for testing and focus groups. Look for opportunities to make expertise / knowledgeable personnel available as resources to product developers.	ZNE PIP, pp. 19-21, 23, coordination with ETP.

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Zero Net Energy Pilot Program Alignment with California Long Term Energy Efficiency Strategic Plan

Strategic Plan			Zero Net Energy PIP	
Section/Goal/Strategies	Partners	Near Term 2010 – 2012	Objective/Strategy	Reference/ Page #
Section 11- Research and Technology Goal 2: Targeted R&D Strategy 2-1: Develop general R&D community support for support Big Bold Initiatives	ETP, other Utilities, National Laboratories	Convene collaboration among researchers and their funders to ensure alignment of activities with big, bold focus areas for ZNE buildings and hot dry climate HVAC technologies and systems.	A key strength of the ZNE Pilot Program will be the value created through ongoing collaboration among the statewide IOUs through programs such as the ETP. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the CEESP goals and objectives.	ZNE collaboration with ETP.
Section 11- Research and Technology Goal 2: Targeted R&D Strategy 2-2: Promote cost-effective near- term performance enhancements of existing technologies	ETP, other Utilities, National Laboratories	- Target building shell, HVAC, lighting and supporting areas, such as real- time energy performance monitoring and automated building commissioning technologies. - Collaborate with manufacturers to improve performance of existing technologies. - Develop specifications to drive / guide improvement activities. Provide technology feedback through ET assessments. - Explore longer term strategies to increase saturation of new big and bold measures and technologies.	Scan a wide variety of sources for measures that could help IOUs meet customer needs and achieve energy savings, demand reduction, and demand response goals. Look for opportunities to develop forward looking product specifications which could be used by a multitude of product developers.	ZNE collaboration with ETP.
Section 11- Research and Technology Goal 2: Targeted R&D Strategy 2-3: Develop initiatives aimed at PIER to support larger gains in support of Big Bold Initiatives.	ETP, other Utilities, National Laboratories	- Provide stakeholder input to ensure alignment of PIER activities with Big, Bold Initiatives. - Collaborate with PIER to develop a formal process to roll PIER developed technologies into ET.	A key strength of the ZNE Pilot Program will be the value created through ongoing collaboration among the statewide IOUs through programs such as the ETP. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the CEESP goals and objectives.	ZNE collaboration with ETP.

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Strategic Plan			Zero Net Energy PIP	
Section/Goal/Strategies	Partners	Near Term 2010 – 2012	Objective/Strategy	Reference/ Page #
Section 11- Research and Technology Goal 2: Targeted R&D Strategy 2-4: Develop initiatives aimed at ET to support Big Bold Initiatives.	ETP, other Utilities, National Laboratories	• Embark on plan to demonstrate big bold measures in customer sites and seed the market. • Conduct “pilot” programs of new technology seeding and market uptake through subsidies and incentives. • Collaborate with manufacturers in new ambitious pilot programs, including full-scale demonstration programs to mature innovative system technologies.	Conduct at scaled field placements during the program period to increase market understanding and traction for new and underutilized measures. Develop IOU Demonstration Showcases to educate stakeholders on the performance of measures.	ZNE PIP, pp. 16, 18-19.

**PG&E Gas and Electric
Advice Filing List
General Order 96-B, Section IV**

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