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BILL TEXT

CHAPTER 700
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INTRODUCED BY Assembly Member Wright

FEBRUARY 26, 1999

An act to amend Section 2790 of, and to add Sections 327 and 381.5 to, the Public Utilities Code, relating to public utilities.

LEGISLATIVE COUNSEL'S DIGEST

AB 1393, R. Wright. Low-income electric and gas customers.

(1) The Public Utilities Act requires the Public Utilities Commission to establish a program of assistance to low-income electric and gas customers, which is referred to as the California Alternate Rates for Energy or CARE program.

This bill would require the electric corporations and gas corporations that participate in the CARE program to administer low-income energy efficiency and rate assistance programs, as described, subject to commission oversight. The bill would require the administrators of the program to undertake certain functions and would allow the commission to require these participating corporations to competitively bid, to the extent practical, service delivery components of these programs. The bill would require the bidding criteria to recognize specified factors, subject to commission modification. The bill would make conforming changes. The bill would set forth the intent of the Legislature regarding community service providers.

Because a violation of the act is a crime, this bill would impose a state-mandated local program by creating new crimes.

(2) Existing law requires the commission to require an electric or gas corporation to perform home weatherization services, as defined, for low-income customers, as determined by the commission.

This bill would revise the definition of "weatherization."

(3) The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement.

This bill would provide that no reimbursement is required by this act for a specified reason.

THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:

SECTION 1. Section 327 is added to the Public Utilities Code, to read:

327. (a) The electric and gas corporations that participate in the California Alternative Rates for Energy program, as established pursuant to Section 739.1, shall administer low-income energy efficiency and rate assistance programs described in Sections 739.1, 739.2, and 2790, subject to commission oversight. In administering the programs described in Section 2790, the electric and gas corporations, to the extent practical, shall do all of the following:

(1) Continue to leverage funds collected to fund the program described in subdivision (a) with funds available from state and federal sources.

(2) Work with state and local agencies, community-based organizations, and other entities to ensure efficient and effective delivery of programs.

(3) Encourage local employment and job skill development.

(4) Maximize the participation of eligible participants.

(5) Work to reduce consumers electric and gas consumption, and bills.

(b) If the commission requires low-income energy efficiency programs to be subject to competitive bidding, the electric and gas corporation described in subdivision (a), as part of their bid evaluation criteria, shall consider both cost-of-service criteria and quality-of-service criteria. The bidding criteria, at a minimum, shall recognize all of the following factors:

(1) The bidder's experience in delivering programs and services, including, but not limited to, weatherization, appliance repair and maintenance, energy education, outreach and enrollment services, and bill payment assistance programs to targeted communities.

(2) The bidder's knowledge of the targeted communities.

(3) The bidder's ability to reach targeted communities.

(4) The bidder's ability to utilize and employ people from the local area.

(5) The bidder's general contractor's license and evidence of good standing with the Contractors' State License Board.

(6) The bidder's performance quality as verified by the funding source.

(7) The bidder's financial stability.

(8) The bidder's ability to provide local job training.

(9) Other attributes that benefit local communities.

(c) Notwithstanding subdivision (b), the commission may modify the bid criteria based upon public input from a variety of sources, including representatives from low-income communities and the program administrators identified in subdivision (b), in order to ensure the effective and efficient delivery of high quality low-income energy efficiency programs.

SEC. 2. Section 381.5 is added to the Public Utilities Code, to read:

381.5. It is the intent of the Legislature to protect and strengthen the current network of community service providers by doing the following:

(a) Directing that any evaluation of the effectiveness of the low-income energy efficiency programs shall be based not solely on cost criteria, but also on the degree to which the provision of services allows maximum program accessibility to quality programs to low-income communities by entities that have demonstrated performance in effectively delivering services to the communities.

(b) Ensuring that high quality, low-income energy efficiency programs are delivered to the maximum number of eligible participants at a reasonable cost.

SEC. 3. Section 2790 of the Public Utilities Code is amended to read:

2790. (a) The commission shall require an electrical or gas corporation to perform home weatherization services for low-income customers, as determined by the commission under Section 739, if the commission determines that a significant need for those services exists in the corporation's service territory, taking into consideration both the cost effectiveness of the services and the policy of reducing the hardships facing low-income households.

(b) (1) For purposes of this section, "weatherization" may include, where feasible, any of the following measures for any dwelling unit:

- (A) Attic insulation.
- (B) Caulking.
- (C) Weatherstripping.
- (D) Low flow showerhead.
- (E) Waterheater blanket.
- (F) Door and building envelope repairs that reduce air infiltration.

(2) The commission shall direct any electrical or gas corporation to provide as many of these measures as are feasible for each eligible low-income dwelling unit.

(c) "Weatherization" may also include other building conservation measures, energy-efficient appliances, and energy education programs determined by the commission to be feasible, taking into consideration for all measures both the cost effectiveness of the measures as a whole and the policy of reducing energy-related hardships facing low-income households.

SEC. 4. No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because the only costs that may be incurred by a local agency or school district will be incurred because this act creates a new crime or infraction, eliminates a crime or infraction, or changes the penalty for a crime or infraction, within the meaning of Section 17556 of the Government Code, or changes the definition of a crime within the meaning of Section 6 of Article XIII B of the California Constitution.

Decision 00-07-020 July 6, 2000

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Application of Southern California Gas Company
(904-G) for Authority to Continue Low Income
Assistance Programs and Funding Through 2000.

Application 99-07-002
(Filed July 1, 1999)

Application of San Diego Gas & Electric
Company (U 902-E) Authority to continue Low
Income Assistance Programs and Funding
Through 2000.

Application 99-07-004
(Filed July 1, 1999)

Southern California Edison Company for
Approval of Year 2000 Low Income Energy
Efficiency Program Plans.

Application 99-07-011
(Filed July 1, 1999)

Application of Pacific Gas and Electric Company
for Approval of Year 2000 Low Income Programs
(U 39M).

Application 99-07-012
(Filed July 1, 1999)

**FINAL OPINION: PROGRAM YEAR 2000
LOW-INCOME ASSISTANCE PROGRAMS**

(See Attachment 1 for appearances.)

short-list of highest ranking bidders. This will help to ensure that final contract negotiations can take place in good faith.

15. Pay-For-Measured Savings

Contractors' Coalition proposes that a portion of each LIEE program be implemented on the basis of pay-for-measured savings. Instead of basing the price upon measures installed, under this approach contractors would be paid based on measured energy savings achieved in the home. More specifically, the utility would pre-specify the expected bill savings per home, and contractors would agree to achieve those savings at a fixed price per unit of savings, based on measured performance. (Exh. 14, pp. 75-78; RT at 1149-1157.) Utilities and other parties oppose this proposal, arguing that it would unduly emphasize cost considerations over performance quality. In particular, LIAB expresses concerns that pay-for-measured savings mechanisms could result in less-profitable measures not being installed and less homes weatherized overall for the same program dollars.

In Res. E-3586, we deferred consideration of this issue, along with the issue of competitive bidding for SoCal, due to uncertainties over the future of administration for the low-income energy efficiency program. (Res. E-3586, pp. 30-31.) Those uncertainties have been eliminated with the passage of AB 1393, which directs that utilities continue to administer these programs. It is therefore appropriate and timely to consider Contractors' Coalition's proposal in this proceeding.

We find considerable appeal in the concept of paying contractors based on bill savings, rather than solely on the number and type of measures installed in each home. As discussed above, focusing on measure installations as verified by inspections is really a proxy for a major goal of the Commission and the

Legislature for this program: meaningful bill savings for the low-income customer. It is reasonable to initiate a pilot to implement and test an approach that directly measures the achievement of this goal. Moreover, in our Annual Earnings Assessment Proceeding we have established protocols for measuring energy efficiency savings that may be utilized for this purpose.

Recognizing that some measurement and evaluation protocols can be complex and time-consuming, and therefore expensive to implement on a pilot basis, we direct the utilities to work with stakeholders, particularly CBOs, in the development of this aspect of the pilot design. The goal should be to enhance our ability to directly demonstrate bill savings for low-income customers through energy usage reductions. As discussed in Section 8 above, this goal is consistent with one of the major objectives articulated by the Legislature and by this Commission.

In addition, the utilities in construction of their pilots should be mindful of the possibility that extended withholding of payment for installed measures may affect the financial viability of participating contractors, if measurement and evaluation protocols require such payment schedules. Consultation between utilities and stakeholders, especially CBOs, in the design of the pilot should address this issue specifically.

We believe that LIAB's concerns over potential reductions in homes served by the program can be addressed in the pilot program design. With regard to the issue of less-profitable measures not being installed, we are not convinced that this is a problem per se, if the pilot requires certain measures to be installed (e.g., the measures listed under Pub. Util. Code § 2790 (b)(1)) and/or additional measures are installed that produce measurable bill savings. This issue should be further discussed and considered in the development of the pilot design.

In their comments on the proposed decision, several parties argue against implementing a pilot program due to concerns over pilot design or recommend that the Commission address specific program design issues prior to pilot implementation. Further delay in testing the concept of basing payments to LIEE installation contractors based on actual measured savings is unwarranted. We believe that the concerns raised by parties in their testimony and comments on the proposed decision can and should be addressed through the pilot design process discussed below. We expect parties to work together productively to develop meaningful pilots that enable us to evaluate the potential of incorporating measured savings into the payment structure for contractors working on LIEE programs, irrespective of whether they were selected via competitive bidding or other outsourcing means.

Accordingly, we direct the utilities to implement and evaluate a pay-for-measured savings pilot for their PY2002 LIEE programs. The pilot size should be meaningful, covering a specific geographic region in each utility's service territory, but we will limit it to no more than 10% of the utility's program in terms of the number of units treated. The pilot may be conducted in conjunction with a competitive bid or may be proposed in conjunction with a different outsourcing approach. Under one approach, we envision that the utility would estimate the savings per home it expects to achieve under the program, and allow contractors the opportunity to bid (or negotiate) a price for which they would get paid on the basis of savings achieved.

The utility and contractor should agree on measurement protocols that are consistent with those we have already adopted in the Annual Earnings Assessment Proceeding (AEAP), or with modifications thereto that we approve for the purpose of this pilot. In order to ensure the necessary public debate, we will require that proposals to modify the AEAP measurement protocols for this

pilot be discussed in the public workshops described below prior to submission to the Commission. Proposed modifications that have been discussed in the public workshops may be presented in the utility pilot program applications and parties' responses to those applications. We expect all interested parties to actively participate in those workshops.

In order to have sufficient time to evaluate the pilot proposals in time for implementation in the PY2002 program cycle, the utilities should file applications describing their proposed pay-for-measured savings pilots no later than February 1, 2001. Between now and then, we expect the utilities to jointly hold public workshops to discuss pilot design. In particular, the utilities should obtain input from those contractors and utilities in other states that have implemented a pay-for-measured savings approach. The utility proposals should include a schedule for pilot program evaluation, and the evaluation criteria to be used. The proposals should include the estimated cost of the pilot, including measurement and evaluation necessary to pay contractors. We expect the utilities to coordinate closely with each other and staff from the Energy Division, in developing the pilots, so that the pilot designs and evaluation approaches are standardized. At their option, the utilities may file a joint application rather than separate applications in submitting their proposals.

16. Customer Lists, Confidentiality

PG&E routinely provides lists of potentially eligible participants (including customers that participate in the CARE program) to its LIEE contractors, subject to confidentiality agreements. SCE promotes the LIEE program to CARE participants through direct mailings, and only forwards customer information to their contractors if the CARE participant requests

participation in the LIEE program. SCE, SoCal, and SDG&E encourage their contractors to locate eligible participants through independent means.

PG&E states that its approach has worked successfully in the past. Contractors' Coalition, LIAB, and Latino Issues Forum recommend that the southern California utilities also release CARE customer lists to LIEE contractors

contracts will not be considered in the bid evaluation process, up to the selection of a short-list of highest ranking bidders.

23. LIEE programs should be expected to achieve measurable bill savings to low-income customers. To this end, paying LIEE contractors on the basis of savings achieved for low-income households may be an improvement over the current practice of paying contractors based solely on the number and type of measures installed in each home. This approach should be explored on a pilot basis, as described in today's decision.

24. Utilities should provide LIEE contractors with lists of eligible (including CARE) customers, subject to confidentiality agreements. This information should be provided to the contractor, at cost, provided that: (1) the contractor has documented its need for such records based on the specifics of its program implementation or marketing plan and (2) appropriate security arrangements have been made that will protect the confidentiality of these records. The utilities shall negotiate with contractors the specific procedures for (1) releasing customer records (without prior customer consent), (2) contacting the customer with program information, and (3) ensuring confidentiality of customer-specific information. Utility customer information received through this process may be used only for PGC-funded programs and purposes. The use of utility customer information for purposes other than PGC-funded programs and purposes may result in penalties. Including, but not limited to revocation of contractor's or subcontractor's ability to participate in PGC-funded efforts.

25. As described in this decision, SDG&E and SoCal should clarify whether or not carbon monoxide testing activities (under CAS or any other program name) are being funded in whole or in part with LIEE funds, and should remove these costs from the LIEE program budgets immediately.

26. The Commission does not have jurisdiction over contractor licensing issues.

27. Consistent with the provisions of Pub. Util. Code § 327(b)(5), all bidders and LIEE contractors in general should be in good standing with the CSLB. As discussed in this decision, the utilities should file a report that demonstrates compliance with California's licensing requirements.

FINAL ORDER

IT IS ORDERED that:

1. Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E), Southern California Edison Company (SCE) and Southern California Gas Company (SoCal), collectively referred to as "the utilities," shall outsource their low-income energy efficiency (LIEE) program functions during Program Year (PY) 2000 and PY2001, and prepare for the PY2002 planning cycle as follows:

- a. If PG&E, SDG&E, SCE or SoCal elects to outsource the prime contractor function, then inspections should be retained in-house. If the prime contractor function is performed in-house, inspections should be outsourced with the exceptions described below.
- b. At this time, SoCal may continue its current practice of retaining in-house both the prime contractor function and furnace repair/replacement inspections. This issue shall be revisited during the PY2002 program planning cycle. Between now and then, SoCal is directed to explore with interested parties the feasibility of providing specialized training and outsourcing with third parties to provide these inspection services. In addition, we do not expect PG&E to outsource inspection functions during the interim period (e.g., six months) when LIEE administration is temporarily handled in-house. However, should PG&E elect to retain the prime contractor role in-house, and not outsource that function, PG&E should outsource inspections on an expedited basis.

- c. The utilities may continue their current roles in providing LIEE training for PY2000 and PY2001. However, this issue shall be revisited during the PY2002 program planning cycle.
- d. As discussed in this decision, the standardization project coordinated by the Commission's Energy Division, in consultation with the Assigned Commissioner in Rulemaking (R.) 98-07-037, shall further standardize LIEE program policies and procedures for PY2001 and PY2002.
- e. In preparation for their PY2002 LIEE applications, PG&E and SoCal (on behalf of SoCal's and SCE's programs) shall document their in-house training costs and training requirements for the LIEE program. This information shall be used as a benchmark for the utility's presentation and review of proposals from other market entities that can also provide training to LIEE installation contractors, either at the utilities' training facilities (i.e., renting them as needed) or in other facilities and locations. In its PY2002 LIEE application, SDG&E shall submit to the Commission a breakdown of its current outsourced training costs for the LIEE program, and projected costs for PY2002.
- f. As described in today's decision, the utilities, in coordination with the Energy Division, shall jointly conduct public workshops to develop, explain, and obtain feedback on (1) their calculations of current training costs, and (2) how best to obtain comparison cost information from other market entities. These costs are to be presented during the PY2002 program review on a standardized, consistent basis.
- g. As described in today's decision, utilities that outsource via competitive bidding shall obtain additional public input and coordinate with each other and the Energy Division, with the objective of developing more consistency in their competitive bid practices for PY2002, including contract language. As part of their PY2002 program applications, the utilities shall jointly file a report on these efforts.
- h. Utilities shall not establish quotas or set-asides for any particular type of organizational entity in their competitive outsourcing process. PG&E or any other utility who chooses to articulate a goal for community-based organization (CBO) participation in a competitive bid shall include language to clarify that the goal requires good faith

efforts by the contractor, but is not a mandatory provision that can bring upon the contractor penalties for breach of contract.

- i. Utilities shall not require that bidders demonstrate a minimum number of years providing weatherization services to low-income communities in a specific geographic location, such as the utility's service territory. In addition to other factors, the utilities shall consider in their bid evaluation process the bidder's experience in providing energy efficiency services outside of the utility's service territory, or to non-low income program participants.
 - j. Utilities shall establish bid evaluation criteria consistent with the goals of this Commission and the Legislature. Utilities may reveal the relative scoring and weighting of those criteria to potential bidders prior to bid submission, at the utility's discretion. However, in any event, the utilities shall provide this information to bidders, upon written request, after the bid selection process has been completed.
 - k. Utilities shall negotiate final contract terms with all LIEE contractors in good faith. No contract provision or utility action shall restrict a contractor from discussing in a public forum (e.g., workshop, hearing, the Low-Income Advisory Board (LIAB) meeting) any aspect of the LIEE program that is non-proprietary and non-confidential. The utilities should clearly state in their RFPs that proposed changes to their sample contracts will not be considered in the bid evaluation process, up to the selection of a short-list of highest ranking bidders.
2. The utilities shall implement and evaluate a pay-for-measured savings pilot for their PY2002 LIEE programs, as described below:
- a. The pilot size shall be limited to no more than 10% of the utility's program in terms of the number of units treated.
 - b. The pilot may be conducted in conjunction with a competitive bid or may be proposed in conjunction with a different outsourcing approach. As one approach to the pilot design, the utility may estimate the savings per home it expects to achieve under the program, and allow contractors the opportunity to bid (or negotiate) a price for which they would get paid on the basis of savings achieved. Other requirements may be added in the pilot design, as appropriate.

- c. The utility and contractor shall agree on measurement protocols that are consistent with those we have already adopted in the Annual Earnings Assessment Proceeding (AEAP), or with modifications thereto that we approve for the purpose of this pilot. Any proposals to modify the AEAP measurement protocols for this pilot shall be discussed in the public workshops described below prior to submission to the Commission. Proposed modifications that have been discussed in the public workshops may be presented in the utility pilot program applications and parties' responses to those applications.

3. The utilities shall file applications describing their proposed pay-for-measured savings pilots no later than February 1, 2001, and serve them on the appearances and state service list in this proceeding and R.98-07-037 or successor proceeding. Between now and then, the utilities, in coordination with the Energy Division, shall jointly hold public workshops to discuss pilot design. In particular, the utilities shall obtain input from those contractors and utilities in other states that have implemented a pay-for-measured savings approach. The utility proposals shall include a schedule for pilot program evaluation, and the evaluation criteria to be used. They shall also include the estimated cost of each pilot, including measurement and evaluation necessary to pay contractors. In their applications, the utilities shall describe how the proposed pilot design considers the issues raised by LIAB in this proceeding. The utilities shall coordinate closely with each other in developing the pilots, so that the pilot designs and evaluation approaches are standardized. At their option, the utilities may file a joint application rather than separate applications in submitting their proposals.

4. The utilities shall provide LIEE contractors with lists of eligible (including the California Alternate Rates for Energy (CARE)) customers, subject to confidentiality agreements. This information shall be provided to the contractor,

at cost, provided that: (1) the contractor has documented its need for such records based on the specifics of its program implementation or marketing plan and (2) appropriate security arrangements have been made that will protect the confidentiality of these records. The utilities shall negotiate with contractors the specific procedures for (1) releasing customer records (without prior customer consent), (2) contacting the customer with program information, and (3) ensuring confidentiality of customer-specific information. Utility customer information received through this process may be used only for LIEE programs and purposes. The use of utility customer information for purposes other than LIEE programs and purposes may result in penalties, including, but not limited to revocation of contractor's or subcontractor's ability to participate in LIEE programs.

5. Within 20 days from the effective date of this order, SDG&E and SoCal shall file an advice letter that clarifies whether or carbon monoxide testing activities (under a combustion appliance safety (CAS) program or another program name) are being funded in whole or in part with LIEE funds. If any such activities are being funded by LIEE program funds, a revised PY2000 budget removing those costs from program expenditure levels shall be submitted with the Advice Letter. SDG&E and SoCal shall recommend a reallocation of those costs to other LIEE budget categories, subject to our approval by Resolution.

6. PG&E, SCE, SDG&E and SoCal shall individually or jointly submit a report that demonstrates the good standing of all of their current LIEE contractors and subcontractors with California State Licensing Board's licensing requirements at the time the contractor or subcontractor (1) submitted a bid (if applicable) to win the initial or current contract with the utility or prime contractor, or

A Tale of Two DSM Low-Income Residential Performance Bidding Projects in Oregon

Kevin Bell, Convergence Research
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In 1992, both Portland General Electric Company (PGE) and Pacific Power & Light Company (PP&L) independently sought to obtain DSM for low-income residential customers by means of competitive bidding for 3-year “pay for performance” contracts expected to pay about \$5 million each. Through competitive bidding, PGE selected SESCO, Inc.; PP&L chose ECONS, Inc.

The results of the projects are dramatically different.

1. The PGE-SESCO project is saving about 3.7 times as many *ex post* measured first post-retrofit year kWh per home treated as the PP&L-ECONS project (2822 kWh v 760 kWh).
2. The PGE-SESCO project is achieving *ex post* measured savings at a cost of about 2.4 cents per life-cycle kWh saved (1994 dollars), while the cost of the PP&L-ECONS project, comparably expressed, is 5.5 cents.
3. The PGE-SESCO project installed a greater variety of measures and substantially more weatherstripping, caulking, and other building shell infiltration reduction measures, along with more duct measures and compact fluorescent bulbs.

These differences stem from the design of each utility’s “pay for performance” competitive bidding approach.

1. The PGE approach rewarded SESCO for:
 - A. Comprehensive treatments by means of a “tiered pricing” system that offered a higher price for annual savings in excess of 1200 kWh per house treated;
 - B. Long-lived actual kWh savings by truing up all initial payments to the *ex post* measured results, primarily to those achieved in the second and third post-retrofit years.
2. The PP&L approach failed to reward ECONS for:
 - A. Comprehensive treatments by paying a flat amount per kWh saved, regardless of the level of savings per home treated;
 - B. Long-lived actual kWh savings by not truing up any of the initial payment (50% of the *ex ante* estimated savings) to the *ex post* measured savings achieved.

Both programs provided energy savings at costs well below the utilities’ other low-income weatherization programs operated under a “pay per measure” system.

INTRODUCTION

In 1991, the two largest Oregon investor-owned electric utilities considered new approaches to home weatherization programs for low-income customers (“low-income weatherization” or LIW). Portland General Electric Company (PGE)

and Pacific Power & Light Company (PP&L), acting independently, each initiated a competitive bidding approach, with each utility committing approximately \$5 million for expected treatment of about 4000–5000 homes over a 3-year implementation period. This represented about a 5-fold increase in annual LIW funding for each utility. Both utilities also continued their existing LIW programs, operated by

community-based organizations, at undiminished levels of funding.

Both utilities attempted to implement these programs using energy service companies (ESCOs) under a “pay for performance” approach, with ultimate payment to the ESCO calculated on the basis of *ex post* measured savings over a period of 4–5 years after treatment of each home.

PGE undertook the program at its own behest. The PP&L program was mandated as part of a Settlement Agreement of rate case litigation between PP&L and public interest groups, including the Utility Reform Project. Compliance with the LIW provisions in the Settlement Agreement is monitored by a 3-person Conservation Panel, with one member each selected by PP&L, by the Northwest Conservation Act Coalition (NCAC), and by Natural Resources Defense Council (NRDC).

Through competitive bidding, PGE selected SESCO, Inc., headquartered in New Jersey; PP&L chose ECONS, Inc., a Washington company. ECONS later changed its name or otherwise assigned the contract to UCONS, Inc., but is referred to in this paper as ECONS.

Both ESCOs commenced their work in 1993 and completed treatment of residences in 1995. SESCO treated 4650 homes. ECONS treated 2931 homes. *Ex post* measured savings for the first post-retrofit year (PY 1) are available for the 1139 homes treated by SESCO in 1993, the 2082 homes treated by SESCO in 1994, and all homes treated by ECONS.

Although similar on the surface, the two projects differed significantly in several respects, including:

1. comprehensiveness of treatments
2. actual savings achieved
3. cost-effectiveness of savings
4. system for pricing kWh saved
5. measurement and verification of savings

THE UTILITIES

PGE and PP&L are investor-owned utilities headquartered in Portland, Oregon. PGE sold about 1700 average megawatts (MWa) of electricity at retail in 1994, all in northwest Oregon (primarily in the Portland and Salem metropolitan areas in the northern Willamette Valley).

PP&L, a subsidiary of PacifiCorp, had Oregon 1994 retail sales of about 1500 MWa in service areas scattered through-

out the state. The PP&L service areas east and south of the Willamette Valley have somewhat harsher climates (colder winters and hotter summers) than the Willamette Valley. Of the homes treated in the PP&L-ECONS project, however, 80% were located in or near the Willamette Valley, which has relatively mild winters and cool summers. Space heat requirements there are around 4500 annual heating degree days (HDD) and can occur in all months of the year. Residential cooling loads are negligible.

The Pacific Northwest has a legacy of abundant, relatively low cost hydroelectric energy, causing a high penetration of residential electric space and water heating. A combination of higher prices for electricity, increased availability of low-cost natural gas, and bifurcated energy codes (with more stringent energy efficiency building codes for new electric-heated residences) have reduced new installations of electric heating. But use of electric heating applications in multifamily and older single-family housing stock in western Oregon remains high. As a result, low-income electrically heated residences represent a significant customer service and DSM resource opportunity.

RESULTS

Comprehensiveness of Treatments

Both utilities allowed the ESCO to install measures that the ESCO believed would be cost-effective, limited by the utility’s pre-approval of measures and materials for long-term savings persistence and for safety and customer satisfaction. Table 1 indicates that the PGE-SESCO project installed a wider variety of measures, including several that were not installed by the PP&L-ECONS project, such as compact fluorescent bulbs, outlet and switch gaskets, door sweeps and thresholds, sash locks, and joist insulation. SESCO installed caulking and weatherstripping in more homes (overall 90% v. 28% for ECONS) and applied more linear feet of weatherstripping per home treated (300 v. 23 for ECONS). SESCO appeared to direct more attention to attic penetrations by providing insulation of attic hatches and pulldowns and sealing attic hatches and other by-passes.

While both ESCOs installed floor insulation in about 30% of the homes treated, ECONS installed far more square footage (870 v. 76) per home than did SESCO; SESCO primarily repaired existing floor insulation. ECONS installed attic insulation more often (51% of homes v. 46% for SESCO) but installed less square footage per treated home (789 v. 1195 square feet for SESCO), probably because the homes treated by ECONS were on average significantly smaller (see Table 9). ECONS installed setback thermostats in 11.7% of the homes, while SESCO installed only one.

Table 1. Measures Installed by ECONS and SESCO

	Units	SESCO		ECONS	
		% of Homes Receiving Measure	Average Quantity Where Installed	% of Homes Receiving Measure	Average Quantity Where Installed
Lighting Efficiency					
compact fluorescent bulbs	#	99.6%	5.1		
Furnace Efficiency					
Duct caulking	linear feet	24.3%	69.4		
Ducting insulation	linear feet	26.9%	54.3	0.4%	74.0
Setback thermostat	#		1.0	11.7%	1.0
Water Heating Efficiency					
Pipe insulation	linear feet	98.8%	48.2	78.0%	3.0
Water heater insulation wrap	#	87.1%	1.1	73.9%	1.0
Reset water heater temperature	#	42.4%	1.1		
Showerheads low-flow	#	85.8%	1.6	78.4%	1.1
Aerators	#	97.4%	3.3	89.9%	2.1
Building Shell Measures					
Attic Insulation	square feet	46.0%	1,195.2	51.3%	788.6
Floor Insulation	square feet	27.3%	75.6	30.1%	870.1
Wall Insulation	square feet			0.9%	874.4
Hatch/Pulldown Insulation	square feet	50.2%	7.7		
Joist Insulation	linear feet	26.0%	95.3		
Weatherstripping	linear feet	92.2%	300.0	53.5%	23.0
Caulking	linear feet	89.8%	433.0	20.6%	342.0
Seal Bypasses	#	99.1%	20.9		
Outlets Insulation	#	98.9%	31.2		
Switches Insulation	#	98.8%	23.3		
Outlet cap	#	98.4%	40.4		
Sash locks	#	90.0%	3.7		
Door sweeps	#	88.7%	2.6		
Range vent sealing	#	62.4%	1.0		
New door threshold	#	43.3%	1.7		
Attic hatch seal	#	35.8%	1.4		
Chimney plug	#	28.3%	1.2		
Pulley plug	#	7.4%	7.6		
A/C cover	#	6.0%	1.2		

Table 2 again shows the percentage of homes treated by SESCO and ECONS receiving each type of measure, along with recent percentages from the regular LIW programs funded by PGE and PP&L and in PGE's program for all customers. The utility programs installed large numbers of storm windows and doors, with less emphasis on water heating and lighting measures. For comparability to the PGE-SESCO project, which PGE limited to single-family homes, the PGE data on Table 2 includes only the single-family homes treated.

Actual Savings Achieved

The programs were implemented in climate zones that would appear to offer the PP&L program a greater opportunity to achieve energy savings. The PGE-SESCO project was entirely in the Willamette Valley, near Salem, Oregon, west of the Cascade Range. The PP&L-ECONS project allowed ECONS to treat homes in the Willamette Valley, in the Umpqua River Valley, and in the Rogue River Valley—all with similar climate zones—and in the colder reaches east

Table 2. Percentage of Treated Homes Receiving Each Type of Measure Installed in ESCO and Utility Programs

	SESCO	ECONS	PGE 1994 Low-Income	PGE 1994 Other	PP&L 1991 Low-Income
Lighting Efficiency					
compact fluorescent bulbs	99.6%				
Furnace Efficiency					
Duct caulking	24.3%				
Duct insulation	26.9%	0.4%	16%		4%
Setback thermostat		11.7%		4%	
Water Heating Efficiency					
Pipe insulation	98.8%	78.0%			
Water heater insulation wrap	87.1%	73.9%	25%		
Reset water heater temperature	42.4%				
Showerheads low-flow	85.8%	78.4%			
Aerators	97.4%	89.9%			
Building Shell Measures					
Attic Insulation	46.0%	51.3%	64%	49%	69%
Floor Insulation	27.3%	30.1%	35%	41%	47%
Wall Insulation		0.9%	21%	20%	21%
Storm Windows or Doors			82%	80%	68%
Hatch/Pulldown Insulation	50.2%				
Joist Insulation	26.0%				
Weatherstripping	92.2%	53.5%	63%	13%	51%
Caulking	89.8%	20.6%	57%	14%	2%
Seal Bypasses	99.1%				
Outlets Insulation	98.9%				
Switches Insulation	98.8%				
Outlet cap	98.4%				
Sash locks	90.0%				
Door sweeps	88.7%				
Range vent sealing	62.4%				
New door threshold	43.3%				
Attic hatch seal	35.8%				
Ground cover			25%	35%	
Chimney plug	28.3%				
Pulley plug	7.4%				
A/C cover	6.0%				

Sources: PGE 1995; PP&L 1994; Reeves 1996a.

of the Cascade Range, around Klamath Falls, Oregon. As it turned out, 80% of the homes treated by ECONS were in the Willamette/Umpqua/Rogue valleys. The other 20% of the homes, east of the Cascade Range, experienced 80% higher savings than the ECONS-treated homes in the river valleys west of the Cascades and thus raised the overall average level of savings achieved by ECONS.

Tables 3 shows the available first post-retrofit year (PY 1) *ex post* measured kWh savings results, as determined by the measurement and verification studies called for in the contracts between the utilities and the ESCOs. Applying uniformly the PRISM methodology specified in the PGE-SESCO contract and also applied to the PP&L-ECONS data by the PP&L-ECONS verification contractor, the overall

Table 3. SESCO and ECONS First Post-Retrofit Year Measured Savings Using Contractual Methodologies

	Homes Treated	Ex post Savings per Home (kWh)		Total PY 1 Savings (kWh)	Savings-Weighted Average Measure Life ^a
		PRISM Method	BCI Regression Method		
SESCO 1993 Cohort	1,139	3,358		3,824,762	
SESCO 1994 Cohort	2,082	2,528		5,263,296	
SESCO Total	3,221	2,822		9,088,058	22
ECONS	2,931	760	859		25

Sources: BCI 1996b; WECC 1995; Reeves 1996b, 2–4.

^aSavings-weighted average measure life is estimated by the authors, using PP&L-assumed measure lives for both projects.

results in PY 1 kWh saved per home treated are 2822 kWh for SESCO and 760 kWh for ECONS.

The PGE-SESCO contract, signed December 1992, included a fully specified method for using a PRISM model to determine *ex post* measured savings, based on utility billing records, local weather data, and utility-selected control groups. As part of their contract, PGE and SESCO agreed to hire Wisconsin Energy Conservation Corporation (WECC) as an independent measurement contractor to conduct the savings calculations for the program. Because the method was fully specified in the contract, not allowing modifications, the model should produce the same result for anyone who implements it.

The PP&L-ECONS contract, signed July 1993, contained less specific measurement provisions, requiring only use of a pooled regression model to be developed later. PP&L later hired Barakat & Chamberlin, Inc. (BCI), with the approval of ECONS, to develop a specific model. BCI then performed the measurement studies using the “contract” model and its own variants on the model, all using utility billing records, weather data, and control groups.

For comparison purposes, PP&L also asked BCI to determine the results of ECONS treatments, using the fully-specified PRISM measurement methodology previously specified in the PGE-SESCO contract. BCI concluded that the PGE-SESCO PRISM method found PY 1 savings of 760 kWh

per home treated by ECONS, or about 12% less overall than the PP&L-ECONS “contract” method.

Thus, the different measurement methods appeared to produce similar results, if applied to the same data, although the PGE-SESCO PRISM model produced 12% lower savings results than the PP&L-ECONS “contract” method, applied to the same data on homes treated by ECONS.

BCI also applied other methods in its PP&L-ECONS measurement studies, finding that results of its other methods would suggest PY 1 savings for about 3.5% higher than the PP&L-ECONS “contract” method (889 kWh) or 6.8% higher than the PGE-SESCO PRISM method (812 kWh). This paper focuses on the most directly comparable results, those produced by using the same fully-specified PRISM model on all of the data.

PGE’s recent study of kWh savings from its 1991 standard LIW program found PY 1 savings at treated single-family residences averaging 1009 kWh (control group consisting of program non-participants, similar to the control group used in the WECC calculations for the PGE-SESCO project) or 1674 kWh (control group consisting of past program participants). PGE 1994, Table 4. Based upon this, it appears that the PGE-SESCO project is achieving savings between 70% and 180% higher than PGE’s standard LIW effort.

PP&L’s recent study of kWh savings from its 1990–91 regular LIW program these PY 1 savings:

Table 4. PP&L 1990–91 Low-income Weatherization Program First Post-Retrofit Year Measured Savings

Housing Type	Savings per Home (kWh)	
	PP&L Standard Program	ECONS Project
Single-family	614	1,093
Multifamily	1,138	764
Mobile homes	961	1,001
Overall	849	889

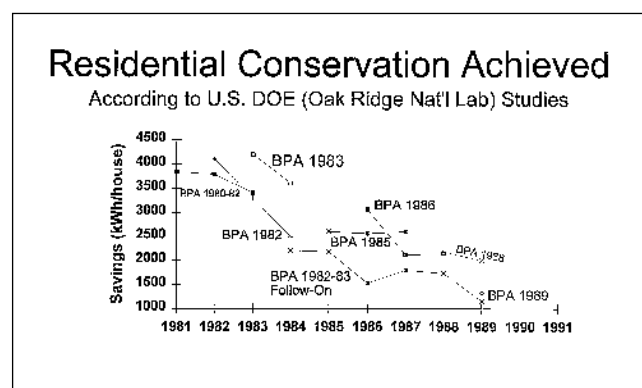
Sources: BCI 1996b, 11 (not using “contract” method); PP&L 1994, 17.

If we disregard that these studies did not use the same methodologies, it appears that the PP&L-ECONS project is achieving about the same overall savings level (+ 5%) as PP&L’s standard LIW effort. But the ECONS project appears to be saving 78% more in single-family homes, 33% less in multifamily homes, and 4% more in mobile homes, compared with the PP&L standard LIW program.

Savings Persistence

In several studies, residential weatherization savings have tended to drop significantly after the first post-retrofit year. Figure 1 indicates that the savings in the weatherization program funded by the Bonneville Power Administration

Figure 1. BPA Residential Weatherization Program Savings Persistence.



Sources: BPA 1992, ERC 1991

(BPA) in the Pacific Northwest experienced such deterioration.

The PGE and PP&L performance pilots were designed to offset this potential for savings deterioration by requiring that measurement and payment be stretched over several years.

No data on savings beyond the first post-retrofit year (PY 1) for the ECONS project has been made available. For SESCO, Table 5 shows that the weather-adjusted savings for the 1993 Cohort Treatment Group of 1139 homes increased by 212 kWh per house (6.4%) in PY 2 v. PY 1. The 1993 Cohort’s control group, however, experienced a large reduction in weather-adjusted usage (534 kWh), so that the 1993 Cohort’s net savings for payment purposes was 322 kWh less in PY 2 than in PY 1, a reduction of 9.6%. While this is significantly less than the average yearly deterioration experienced in similar programs in the same region, a final answer will depend upon the overall PY 2 and PY 3 results.

Cost-Effectiveness of Savings

The PGE-SESCO project produced kWh savings at a significantly lower cost than the PP&L-ECONS project.

PGE-SESCO. PGE’s annual payments (for 5 years) to SESCO are \$.074/kWh for Tier 1 savings (the first 1200 kWh per house per year) and \$.176/kWh for Tier 2 savings (all savings in excess of Tier 1). These prices were approximately equal to 40% and 90%, respectively, of PGE’s avoided cost. PGE’s first such performance payment occurs after verification of PY 1 *ex post* measured savings by the independent contractor, WECC, or on average 22 months after SESCO has installed the measures. PGE then repeats the payment annually for the following 4 years (post-retrofit months 35, 47, 59, and 71) but not for any subsequent years. Thus, on average, SESCO receives its payment for a treated home about 4 years (47 months) following treatment.

To reduce financing costs, PGE pays SESCO \$450 per treated house (within 45 days after invoicing), which SESCO must repay to PGE out of PY 1 and PY 2 payments due to SESCO for the *ex post* measured savings. If the PY 1 and PY 2 savings do not equal a credit of at least \$450, SESCO must repay the \$450, with interest.

Table 6 shows the resulting payment stream to SESCO, assuming that the PY 1 average savings for all 3 annual cohorts remains at the 2822 kWh level demonstrated by the 1993 and 1994 Cohorts and that there is no deterioration in savings during PY 2 and PY 3. The result is an overall payment in 1994 dollars (discounted at an 8% discount rate per annum) of 54 cents per PY 1 kWh saved. Using measure

Table 5. PGE-SESCO Cohort Savings in Post-retrofit Years 1 & 2

Post-Retrofit Year (PY)	Treatment Group Gross Savings (kWh)	Control Group Savings (kWh)	Treatment Group Net Savings (kWh)
1	3296	– 63	3,359
2	3508	471	3,037
Change	212	534	– 322

Sources: WECC, 1995, 2; Reeves 1996b, 2–4.

lives and *ex ante* savings estimates developed by PP&L, the average savings-weighted life of the SESCO treatments is about 22 years. If the savings are not discounted, the present valued cost becomes about 2.45 cents per life-cycle kWh saved (1994 dollars).

PP&L-ECONS. PP&L's payments to ECONS were based on what evolved in their contract negotiations into a 3-tier system. Tier 1 is half of the *ex ante* estimated life-cycle savings per measure installed multiplied by 40% of the utility's residential avoided cost (7.6 cents per kWh in 1994 dollars). Tier 2 is zero and applies to all *ex post* measured savings up to 50% of the *ex ante* estimated savings; the ESCO receives no additional payment, unless *ex post* measured savings exceed 50% of the *ex ante* estimated savings. Tier 3 is 40% of the utility's avoided costs for any *ex post* measured kWh in excess of 50% of the *ex ante* estimated savings.

ECONS received the Tier 1 payment approximately a month after invoicing for each treated home. Tier 3 was to be paid to ECONS over the first 5 post-retrofit years, based on *ex post* measured savings. Because the actual PY 1 savings, using any method, are less than half of the *ex ante* estimated savings of 2,499 kWh per home, it appears that PP&L will not need to make further payments to ECONS, unless the homes receive additional work. There is no requirement for ECONS to repay any of its initial payments, if the 50% realization ratio is not achieved.

Table 6 shows the resulting payment stream to ECONS. Because *ex post* measured savings appear to be less than half of the *ex ante* estimated savings, the actual savings achieved per home and the prospect for future deterioration of savings have become irrelevant. The payment stream to ECONS ends up based totally on *ex ante* estimated savings. The result is an overall payment in 1994 dollars (discounted

at an 8% discount rate per annum) of \$1.38 per PY 1 kWh saved. Using measure lives and *ex ante* savings estimates developed by PP&L, the average savings-weighted life of the ECONS treatments is about 25 years. If the savings are not discounted, the present valued cost becomes about 5.52 cents per life-cycle kWh saved (1994 dollars).

But the PP&L-ECONS contract is not entirely clear on this matter. It is possible that it requires PP&L to pay ECONS an additional amount equal to the effective contract price (3.04 cents per kWh, as explained later in this paper) times 50% times the *ex post* measured savings, which equals an additional \$326,000 (1994 dollars). Such payments would increase the cost per life-cycle kWh saved by 11%, to 6.13 cents per kWh.

PGE's recent study of its 1991 regular LIW program reported a average cost of \$1,975 per home treated, with PY 1 savings pegged at 1347 kWh (the average of the 1009 kWh and 1674 kWh calculations described under actual savings achieved above). The result is a cost of \$1.47 per PY 1 kWh saved. Using the control group consisting of program non-participants only would show a cost of \$1.96 per PY 1 kWh saved; using past participants as the control group shows cost of \$1.18 per PY 1 kWh saved [PGE 1994].

PP&L's recent study of its 1990–91 regular LIW program reported an average cost of \$1,634 per home treated, with PY 1 savings averaging 849 kWh. The result is a cost of \$1.92 per PY 1 kWh saved.

Table 7 shows that both the SESCO and ECONS projects appear to achieve *ex post* measured savings more cost-effectively than the regular utility LIW programs.

Table 6. Payments to the ESCOs and Resulting Cost-effectiveness

	SESCO	ECONS
Initial Payment upon Treatment of Homes (occurred on average in 1994)	1,449,450	3,085,047
Payment After Measurement of:		
PY 1	480,523	0
PY 2	480,523	0
PY 3	1,205,248	0
PY 4	1,205,248	0
PY 5	1,205,248	0
Total Payment (nominal dollars)	6,026,240	3,085,047
Total Payment (1994 dollars) ^a	4,894,545	3,085,047
Homes Treated for Which PY 1 Results Available	3221	2931
Average Annual Savings per Home (based on PY 1 PRISM results)(kWh)	2822	760
Cost per PY 1 kWh Saved (1994 dollars) ^a	0.54	1.38
Savings-Weighted Average Measure Life (years)	22	25
Cents per Life-cycle kWh Saved (1994 dollars) ^a	2.45	5.52

^aAnnual discount rate of 8 percent.

REASONS WHY THE RESULTS WERE DIFFERENT

Comprehensiveness of Treatments

The apparently greater comprehensiveness of the SESCO treatments may have resulted from (1) the type of housing PGE did not allow SESCO to treat (multifamily and mobile homes) and (2) the authentic “tiered pricing” system adopted by PGE.

PGE’s Restrictions on Housing Types Treated. The PGE program required that SESCO treat only single-family houses, not multifamily housing or mobile homes. Bidders had been required to offer a price for single-family and multifamily residences, but PGE decided to allow treatment of single-family units only.

The PP&L program did not limit ECONS to single-family homes or require that it treat multifamily housing or mobile homes. Table 8 shows that, of the homes selected for treatment by ECONS, 38% were single-family, 51% were in multifamily units, and 10% were mobile homes. Conse-

Table 7. Cost-effectiveness of ESCO and Utility Low-income Weatherization Programs^a

	<u>PGE-SESCO Project(1994 \$\$)</u>	<u>PGE Standard Program(1991 \$\$)</u>	<u>PP&L- ECONS Project(1994 \$\$)</u>	<u>PP&L Standard Program(1991 \$\$)</u>
Cost per Home Treated	\$1,519	\$1,975	\$1,052	\$1,634
Post-Retrofit Year 1 (PY 1) Savings per Home(kWh)	2822	1347	760	849
Cost per PY 1 kWh Saved	0.54	1.47	1.38	1.92

^aThis table understates the cost differences between the ESCO and utility projects. The PGE-SESCO and PPL-ECONS columns are expressed in 1994 dollars. The PGE Standard and PP&L Standard columns are expressed in 1991 dollars. Also, the kWh savings results may not be comparable, as the utility standard programs were not evaluated with the PRISM methodology used to determine the savings for the SESCO and ECONS projects.

quently, the homes treated by SESCO were on average larger than the ECONS-treated units.

Table 4 shows, however, that the ECONS project did not save a great deal more per home in single-family dwellings than in multifamily residences or mobile homes. The differential in type of housing treated seems to have accounted for about 10% of the 2062 kWh per home PRISM-measured savings differential between the programs. This may be because ECONS did not concentrate on duct work and shell infiltration measures in the single-family homes, as SESCO did.

PGE's Tiered Pricing System. PGE recognized the possibility that a "pay for performance" ESCO, to be paid a flat price per actual kWh saved, might engage in "cream skimming," attempting to maximize profits by:

1. installing only the least expensive measures in every residence, such as water heater blankets and attic insulation, while
2. not installing measures thought to produce somewhat more expensive (though still cost-effective) savings, such as floor insulation, comprehensive infiltration sealing, and compact fluorescent bulbs.

To avoid this, PGE implemented a tiered pricing system for kWh savings on a house-by-house basis. Under the PGE plan, the ESCO is paid a lower price for the first increment of measured savings in each home and a higher price for

any additional savings in that home. PGE decided that the lower price should apply to the first 1200 kWh of annual savings per treated residence (Tier 1), as PGE believed that its existing LIW program was achieving that level of savings. The higher price would apply to all additional savings per treated residence (Tier 2). PGE decided to set the higher, Tier 2 price equal to about 90% of its long-run avoided cost. PGE asked that each bidder set the Tier 1 price as a principal component of its bid. SESCO offered the winning Tier 1 price, equal to about 40% of PGE's avoided cost.

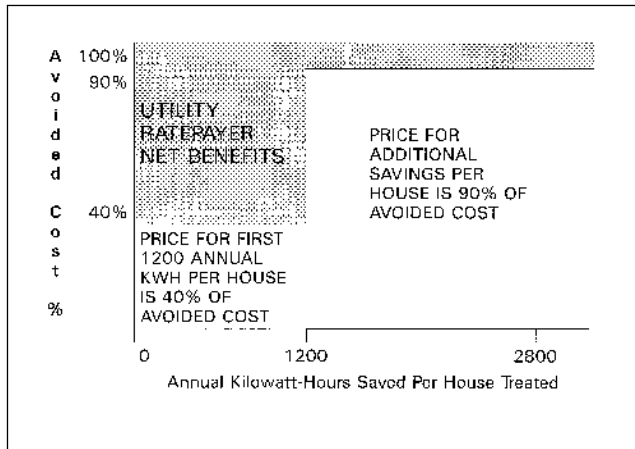
PGE's tiered pricing system effectively replicated the historic "S" curve between costs and comprehensiveness inherent in most residential weatherization analyses. The average price paid to SESCO varies from a low of 40% of avoided cost for net annual savings below 1200 kWh/house to about 75% of avoided cost if annual savings average 4000 kWh/house or more.

Figure 2 illustrates how tiered pricing provides financial incentive for comprehensive treatment, while helping to ensure that utility ratepayers benefit from the program. If SESCO had installed only the least expensive measures and had saved only 1200 kWh per year per house, PGE would have paid SESCO a price equal to only 40% of avoided cost. SESCO had to achieve higher levels of savings per house in order to earn payment for any kWh at 90% of avoided cost. At the level of the verified PY 1 measurement studies and assuming no savings deterioration prior to PY 2 and PY 3 measurements, SESCO will eventually receive payment equal to 69% of PGE's avoided cost.

Table 8. Composite Pre-Treatment Characteristics of SESCO and ECONS Treatment Cohorts

		<u>SESCO</u>	<u>ECONS</u>	<u>SESCO %</u>	<u>ECONS %</u>
Type	Single Family	3,229	1,126	100%	38%
Type	Multi Family	—	1,502	0%	51%
Type	Mobile	—	303	0%	10%
Heating System	Zoned	1,257	—	39%	0%
Heating System	Forced Air	961	—	30%	0%
Heating System	Stove	4	—	0%	0%
Heating System	Heat Pump	1,007	—	31%	0%
Heating System	Not reported	—	2,931	0%	100%
Heating Fuel	Electric	3,219	2,928	100%	100%
Heating Fuel	Gas	8	—	0%	0%
Heating Fuel	Other	2	3	0%	0%
Wood Stove?	Yes	1,857	—	58%	0%
Wood Stove?	No	1,372	—	42%	0%
Wood Stove?	Not Reported	—	2,931	0%	100%
Water Heat	Electric	3,183	2,919	99%	100%
Water Heat	Gas	44	11	1%	0%
Water Heat	Other	2	1	0%	0%
Duct Insulation	No ducts	1,264	—	39%	0%
Duct Insulation	0	166	—	5%	0%
Duct Insulation	<R-11	566	—	18%	0%
Duct Insulation	R-11 +	1,229	—	38%	0%
Duct Insulation	Not reported	4	2,931	0%	100%
Under Floor Access	Yes	2,798	1,126	87%	38%
Under Floor Access	No	431	526	13%	18%
Floor Insulation	0	2,150	1,120	67%	38%
Floor Insulation	<R-21	889	203	28%	7%
Floor Insulation	R-21 +	190	2	6%	0%
Floor Insulation	Not Reported	—	1,307	0%	45%
Attic Insulation	0	174	500	5%	17%
Attic Insulation	<R-13	474	1,049	15%	36%
Attic Insulation	R-13 – R-26	1,660	1,803	51%	62%
Attic Insulation	R-26 +	787	383	24%	13%
Attic Insulation	Not reported	134	391	4%	13%
Average Floor Area	Square feet	1,834	881		

Figure 2. PGE Tiered Pricing System: Price per kWh/House Saved.



With tiered pricing, the utility ratepayers receive their share of the economic benefits first, by paying a very low price for the Tier 1 savings. As savings per house increase into Tier 2, the ESCO is paid a higher price, yet the utility ratepayer benefit continues to increase, as PGE set the Tier 2 price at less than its avoided cost.

The incrementally higher price for annual kWh savings in excess of 1200 per home provided a major added incentive for SESCO to install measures SESCO believed were more expensive than the average price of the project yet less expensive than the Tier 2 price. For example, doubling the average annual savings from 1200 kWh to 2400 kWh per home will more than triple the payments to the ESCO. Since each block of kWh savings is incrementally more expensive to capture, tiered pricing provides a major incentive to the ESCO to maximize cost-effective energy savings.

Had the PGE-SESCO program only secured the 760 kWh per home savings achieved by the PP&L-ECONS project, SESCO would have received only 16% of the payments it earned at the 2822 kWh level actually realized. PGE's tiered pricing performance payments program provided the incentive to pursue the additional savings.

PP&L's Tiered Pricing System. The PP&L program's tiered pricing program reversed these incentives. In effect, PP&L paid its performance contractor:

- (1) a very high price for the first block of savings, because the payment was 50% of the *ex ante* estimated savings, even if the *ex post* measured savings turned out to be small or zero;
- (2) a price of zero for the next block of *ex post* measured savings (between zero and 50% of the *ex ante* estimated savings); and

- (3) a price of 40% of PP&L's avoided cost for all savings in excess of the *ex ante* estimated savings.

Figure 3 shows the incremental payment (in cents per life-cycle kWh) that each system actually offered to the ESCO. The initial PP&L-ECONS payment was based on *ex ante* estimated savings, so the payment to ECONS, expressed in cents per *ex post* measured kWh saved, could in theory have been infinite (payment for zero savings). To avoid scaling the Y-axis to infinity, Figure 3 assumes annual *ex post* measured savings of at least 600 kWh per home for ECONS.

Figure 4 translates the incremental payments into the average price per life-cycle kWh saved under each system. The average payment per kWh saved to SESCO increases with larger savings per home treated. For ECONS, the average payment per kWh saved declines with larger savings per home.

Figure 3. Incremental Payment to ESCOs per kWh/House Saved.

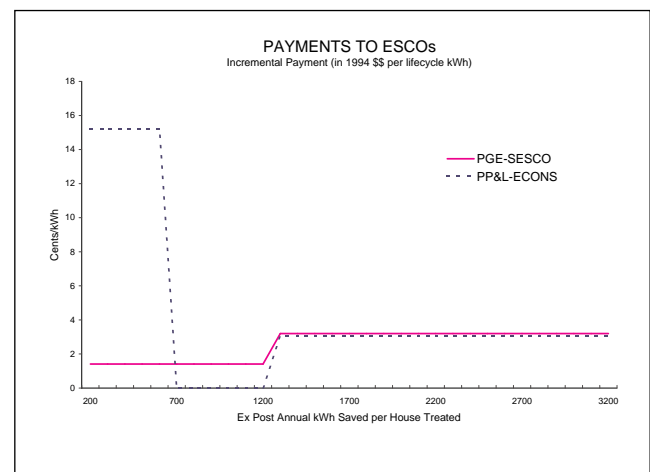
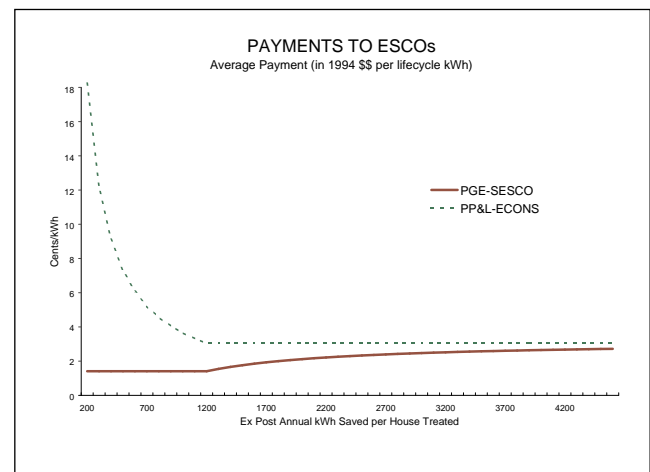


Figure 4. Average Payment to ESCOs per kWh/House Saved.



The pricing system adopted in the PP&L-ECONS contract was contrary to the tiered pricing principles adopted by the Conservation Panel overseeing the PP&L project. The Conservation Panel had stated that the contractor should be paid nothing for Tier 1 savings and should be paid an amount per kWh equal to PP&L’s conservation cost-effectiveness limit for Tier 2 savings, thereby providing the maximum incentive for the ESCO to install a comprehensive set of measures, all of which are cost-effective. The dividing line between Tier 1 and Tier 2 was to be determined by the winning bid, with the bidders competing to offer a larger amount of “free” Tier 1 savings, in kWh per dwelling unit treated (and differentiating between single-family, multifamily, and mobile homes). The PP&L RFP specifically stated: “Tier 1 shall be an amount of electric energy savings in kWh per housing unit, as designated by the bidder, that will be supplied without charge.”

Instead of ranking bids on the basis of the level of Tier 1 kWh each offered, PP&L accepted the ECONS bid, which did not offer tiered pricing at all. Instead of offering a number of Tier 1 kWh per housing unit, the ECONS bid stated that 60% of all kWh saved would be priced at zero, while the remaining 40% would be priced at 7.6 cents per kWh (the PP&L residential conservation cost-effectiveness limit in 1994 dollars). The mathematical result of this is payment to ECONS of 3.04 cents per kWh for every kWh saved, with no tiering on the basis of the quantity of kWh saved per dwelling unit treated. This eliminated the incentive for comprehensive treatments that tiered pricing was designed to provide.

One bidder offered PP&L a “free” Tier 1 of 950 kWh per single-family house treated. If PP&L had accepted that bid, and that ESCO had produced the same results as did ECONS (1093 kWh per single-family house, using the more generous regression method of measurement), PP&L would have paid for only 143 kWh per house, or less than \$300,000 for the project. Instead, PP&L is paying ECONS over \$3 million.

Savings Persistence

Residential weatherization savings deterioration may be due to any number of factors, such as:

- (1) reliance upon short-lived, fast deteriorating measures or upon those quickly removed or ignored, such as showerheads or thermostats;
- (2) improper education producing significant but short-lived results; or
- (3) insufficient or improper follow-up for measures which need maintenance.

PGE’s Payment Weighting System. To encourage the ESCO to work on assuring little or no deterioration, PGE weighted its payment plan so that the actual results for post-retrofit years 2 and 3 carry one and a half to twice the value as the savings in the first post-retrofit year. Table 9 shows the payment weighting system, which bases SESCO’s payments 22% on post-retrofit year 1 (PY 1), 45% on PY 2 savings, and 33% on PY 3 savings. Thus, 78% of all payments to SESCO are based upon the actual measured savings occurring during PY 2 and PY 3 for each house. Because PGE grouped the houses into annual instead of monthly cohorts for measurement, the average time between treatment and the beginning of measurement is over 6 months. Thus, on average, PY 2-3 savings are those occurring during post-retrofit months 18–42.

In sum, PGE’s ultimate payments to SESCO depend heavily upon the *ex post* measured savings results during the period 18–42 months following installation of measures. This provided SESCO an incentive to install measures in a manner to minimize savings deterioration. SESCO further seeks later-year savings by again contacting residences where PY 1 *ex post* measured savings is less than expected and performing any needed repairs or replacements to the installed measures.

PP&L’s Payment Weighting System. Because PP&L paid ECONS upon installation an amount equal to 50% of the *ex ante* estimated savings for each home treated, and the PY 1 *ex post* measured results show the homes in aggregate to be saving only 35% of the estimate, the weighting of the PP&L payments was 100% upon installation. The Conservation Panel had directed that payments be based on *ex post*

*Table 9. PGE-SESCO Payment Weighting Scheme
Rewards Later-Year Savings*

Payment After:	Payment is Based on Measurement of <i>Ex Post</i> Savings for:	Resulting Weighting of Each Year’s <i>Ex Post</i> Measured Savings
PY 1	PY 1	22%
PY 2	PY 1 + PY 2	45%
PY 3	PY 2 + PY 3	33%
PY 4	PY 2 + PY 3	
PY 5	PY 2 + PY 3	

measured savings and be made over a period not less than 5 years. The PP&L-ECONS contract contemplated such payments (7.5% after each of the first 4 post-retrofit years, with 20% at the end of PY 5), but the initial payment of 50% of *ex ante* estimated savings rendered that system essentially irrelevant. An ambiguous term of the contract may require PP&L to pay ECONS an additional \$326,000, assuming zero savings deterioration through PY 5, but that amounts to only 11% of the initial payments to ECONS.

Motivation for Expanding Low-income Weatherization Efforts

At first glance, it might appear that essentially simultaneous decisions by the Oregon utilities to launch similarly sized DSM programs would be the result of a regulatory mandate to do so. But the Oregon Public Utility Commission had no direct involvement in the genesis of either initiative.

As noted in the introduction, PGE undertook this program voluntarily, while PP&L's efforts were required by a Settlement Agreement with public interest groups, including a requirement that PP&L implement “*a \$5 million LIRC [low-income residential conservation] program for housing units located in PP&L's Mid-Willamette valley, Northeast Portland, and Douglas/Josephine/Jackson county service areas . . . on a pay for performance (PFP) basis.*” The PP&L effort ran into many difficulties, with PP&L and the Conservation Panel frequently clashing.

Selection of Residences Eligible for Treatment

The PGE-SESCO contract allowed SESO to treat a maximum of 5000 single-family residences from a list of 15,000 residences in low-income neighborhoods in and around Salem, Oregon, compiled by PGE. PGE maintains a system of small districts, each encompassing a few square blocks within cities or larger areas outside of cities. PGE ranked its districts by the number of Low-Income Heating Assistance Program (LIHEAP) qualified applicants within each district. PGE then aggregated sufficient districts in its Southern Division (in and around Salem) to furnish a list of somewhat more than 15,000 single-family residences in what PGE called “low-income neighborhoods.” PGE personnel then toured the selected districts by car and removed from the list the houses in areas that did not appear to be “low-income,” thus producing a list of 15,000 single-family homes.

PP&L allowed the contractor to select for treatment any low-income dwelling unit or house (income 125% or less of federal poverty guideline) anywhere in PP&L's western Oregon service areas. ECONS initially expected to begin

operations with a geographically targeted program in Portland, moving into other parts of western Oregon as the program expanded. Considerable effort was spent unsuccessfully searching for low-income customers in Portland. Installations accelerated dramatically a year into the program, as contacts improved with community action agencies in central and southern portions of western Oregon. Program implementation remained low in Portland throughout the program (less than 2% of total installations), even though PP&L's Portland service area includes the largest identifiable concentration of low-income customers in the state.

CONCLUSIONS

Given the similarity between the demographics and energy consumption patterns of the residential customers of the two utilities, the difference in results between the PGE and PP&L programs is striking in several respects.

- (1) The PGE-SESCO project is saving about 3.7 times as many *ex post* measured first post-retrofit year kWh per home treated as the PP&L-ECONS project (2822 kWh v 760 kWh). If only single-family houses are considered, then the PGE-SESCO project appears to be saving 2.6 to 3.0 times as much (2282 kWh v. 934—1093 kWh).
- (2) The PGE-SESCO project is achieving *ex post* measured savings at a cost of about 2.4 cents per life-cycle kWh saved (1994 dollars). The cost of the PP&L-ECONS project, comparably expressed, is 5.5 cents per life-cycle kWh or, if PP&L makes additional payments to ECONS under ambiguous terms of the contract, could be 6.13 cents per life-cycle kWh.
- (3) The PGE-SESCO project installed a greater variety of measures and substantially more weatherstripping, caulking, and other building shell infiltration reduction measures, along with more duct measures and compact fluorescent bulbs.
- (4) A system of tiered pricing (paying a lower price for the first several hundred kWh per home treated and a higher price for higher levels of savings) can induce ESCOs to install a greater variety and larger quantities of measures, providing more comprehensive treatments.
- (5) Basing ultimate payments upon *ex post* measured savings, and truing up any initial payments to the *ex post* measured results, will result in higher levels of *ex post* measured savings. A true “pay for performance” DSM program produces superior results to a “pay for deemed savings” approach.

- (6) Basing payments on *ex post* measured savings achieved after the first post-retrofit year will encourage ESCOs to install longer-lived measures and to take steps to avoid savings deterioration.
- (7) You get what you pay for. Both ESCOs examined here responded rationally to the financial incentives provided by the utilities.

ACKNOWLEDGEMENTS

The authors acknowledge the significant assistance of Anthony Riordan, currently Project Director of the SESCO Free Energy Program (contract with San Diego Gas & Electric Co.) and former Project Director of the PGE-SESCO low-income performance pilot. Mr. Riordan provided significant insight into the workings of a performance contractor and allowed the authors ready access to many previously unpublished materials.

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PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

ENERGY DIVISION

**RESOLUTION E-3703
SEPTEMBER 7, 2000**

R E S O L U T I O N

Resolution E-3703. Sempra Energy, on behalf of San Diego Gas & Electric Company (SDG&E), requests authorization to reallocate a portion of its PY 2000 Low-Income Energy Efficiency funds in accordance with Commission directives and to utilize unspent 1998 and 1999 funds for increased program activities. SDG&E's request is conditionally approved in part.

By Advice Letter 1239-E/1207-G Filed on July 21, 2000.

SUMMARY

By Advice Letter (AL) 1239-E/1207-G, San Diego Gas & Electric Company (SDG&E) requests approval to reallocate program funds for carbon monoxide testing activities performed under its Program Year (PY) 2000 Direct Assistance Program (DAP) in accordance with Commission directive in Decision (D.) 00-07-020. SDG&E also requests authorization to use unspent PY 1998 and 1999 Low Income Energy Efficiency (LIEE)¹ funds to augment its PY 2000 LIEE authorized budget for increased program costs related to new studies and reports specified in Ordering Paragraph 11 of D.00-07-020. SDG&E further requests approval to allocate unspent PY 1998 and 1999 funds to augment its LIEE program in PY 2000 and 2001.

This Resolution conditionally approves SDG&E's request to use \$4.01 million in unspent PY 1998 and 1999 funds to augment its PY 2000 and PY 2001 budget for an increase in its current LIEE program activities.

¹ SDG&E's Low-Income Energy Efficiency Program consists of two components: the Direct Assistance Program and the Energy Education for Low-Income Program.

The substantial increase in current DAP and Energy Education for Low Income (EELI) program services authorized in this Resolution is consistent with the Commission's efforts to mitigate the impact of increasing energy prices on SDG&E's customers. The additional customers who are able to participate because of the expansion in current DAP program goals should experience bill savings and/or a reduction in financial hardship. The increase in the number of program participants and the expansion of the education sessions under SDG&E's EELI program should help customer participants make informed energy choices.

SDG&E is authorized to reallocate \$160,000 of its PY 2000 and PY 2001 program money, formerly intended for carbon monoxide testing, to other DAP program areas, and to set aside \$450,000 of the unspent PY 1998 and 1999 monies for the studies and reports ordered in D.00-07-020.

Today's approval is conditioned upon SDG&E's submittal of a revised budget and supporting tables that conform to today's authorization and correct the inconsistencies discussed in this Resolution.

As discussed in this Resolution, adding new measures to the DAP program at this time would be contrary to the standardization project currently before the Commission. In that venue, participants are proposing a consistent methodology to evaluate new measures for their future adoption in the DAP program. Therefore, we deny SDG&E's request to implement new DAP program measures for PY 2000 and PY 2001.

BACKGROUND

In this advice letter, SDG&E requests Commission authorization for the following:

1. Utilization of unspent PY 1998 and 1999 program monies totaling \$4.01 million to augment SDG&E's PY 2000 and 2001 program budgets to increase DAP and Energy Education for Low Income (EELI) program services to achieve energy demand reductions and reduce financial hardships. The proposed allocation of these funds is \$1.93 million to PY 2000 and \$2.08 million to PY 2001.
2. Proposed new measures for the PY 2000 and 2001 DAP and EELI programs.

3. Removal of \$160,000 in PY 2000 program expenditures for actual and planned carbon monoxide (CO) testing activities and reallocation of these monies to provide a portion of the funding for the additional proposed measures.
4. Set-aside of \$450,000 of the unspent PY 1998 and 1999 program funds for studies and reports ordered in D.00-07-020 until such time as SDG&E has had an opportunity to work with other parties to determine the cost of these studies and reports.

SDG&E proposes to augment its PY 2000 and PY 2001 DAP and EELI programs with unspent PY 1998/1999 LIEE monies in order to provide additional services to help mitigate the financial hardship to its low-income customers resulting from significant increases in electricity prices and customer bills beginning in June 2000. SDG&E notes that its request is consistent with its July 21, 2000 filing in A.99-09-049, et. al., in response to D.00-07-017, which directed utilities to file program proposals to achieve reductions in electric demand and usage through energy efficiency programs (Summer Initiatives). In that filing, SDG&E is proposing a number of new residential programs, some are targeted to low-income and senior customers. SDG&E urges the Commission to consider additional measures for low-income customers, and requests expedited review and approval of the additional LIEE funding and activities it proposes in this advice letter on the same schedule as its Summer Initiative proposals.

SDG&E proposes that the following measures be increased or added to its LIEE programs for PY 2000 and 2001:

- Increase the number of units for currently implemented program measures such as homes weatherized and tenant-owned refrigerator replacements
- Refrigerator replacement incentives paid to landlords of low-income housing
- Room air conditioner replacement for low-income customers who own their own air conditioner
- Room air conditioner replacement incentives paid to landlords of low-income housing
- Evaporative cooler maintenance and repair
- Expand the EELI program curriculum to incorporate additional information about the competitive energy market, service options, and other SDG&E programs that can help them manage their bills

- Increase the number of customers participating in the PY 2001 EELI program by 5,000

SDG&E recognizes that many of these efforts fall outside the current low-income program standardization efforts being undertaken by the utilities, but believes that they need to be implemented as quickly as possible to address the increased financial hardship currently facing its limited-income customers in the deregulated energy market. SDG&E states its continued commitment to the standardization efforts; hence, it asks for Commission authorization to diverge from the standardization efforts on an interim basis until such time as the utility working group can address these new efforts through the standardization process.

SDG&E requests the redirection of \$160,000 in PY 2000 program expenditures for actual and planned CO testing activities in response to Ordering Paragraph 5 in D.00-07-020. In that decision, the Commission directed SDG&E to file an advice letter that clarifies whether CO testing activities conducted as part of its low-income energy efficiency program are being funded in whole or in part with LIEE funds. If any such activities are being funded by program funds, SDG&E was directed to submit with the advice letter a revised PY 2000 budget removing these costs from program expenditures and a recommended reallocation of those costs to other program categories subject to Commission approval by resolution.

SDG&E proposes to set-aside \$450,000 of unspent PY 1998 and 1999 program funds in accordance with Ordering Paragraph 11 of D.00-07-020. This decision directs the utilities to file advice letters, within 60 days of the effective date of the decision, requesting budget augmentation sufficient to cover the cost of new studies and reports specified in the decision. Pursuant to the decision, the budget augmentation request is to include a breakout of the costs of each study or report.

On July 25, 2000, Sempra Energy, on behalf of SDG&E, submitted substitute sheets for tables on A-9 and Attachments C.1 through C.8 included in AL 1239-E/1207-G. Sempra Energy indicated that they mailed copies of the corrected sheets to all parties on the G.O. 96 list and the service list for R.98-07-037 and A.99-07-002, et al.

The following parties submitted comments in support of AL 1239-E/1207-G: Low Income Advisory Board, East Los Angeles Community Union; Maravilla Foundation; the Southern California Forum; Bay Area Poverty Resource Council;

and Richard Heath and Associates and its subcontractors (the Alliance for African Assistance; Campesinos Unidos, Inc.; Catholic Charities Refugee & Immigrant Services; Metropolitan Area Advisory Committee Project; Native American Council; Refugee Assistance Program; and San Diego American Indian Heath Center).

NOTICE

Notice of AL 1239-E/1207-G was made by publication in the Commission's Daily Calendar. SDG&E states that a copy of the Advice Letter was mailed and distributed in accordance with Section III-G of General Order 96-A.

PROTESTS

On August 7, 2000, the Office of Ratepayer Advocates (ORA) filed a protest to AL 1239-E/1207-G. ORA protests the portion of SDG&E's Advice Letter filing that addresses mitigation of increased financial hardship of its low-income and elderly customers. ORA contends that SDG&E's request does not offer immediate relief to SDG&E's qualified DAP low-income customers. ORA suggests that the excess funds from PY 1998 and 1999 be used instead to provide immediate bill reductions for low-income and elderly customers. ORA proposes that immediate financial relief could be provided through a one-time emergency bill credit spread out over 3 to 6 months. ORA asserts that the decrease in the electric bills from the use of energy efficient appliances is not enough to mitigate the financial burden that low-income and elderly ratepayers are currently experiencing.

ORA believes that Public Utilities Code Section 382 gives the Commission flexibility in implementing programs for qualified low-income customers and does not preclude the monies from being used for new types of programs for the low-income customers.² ORA proposes that the Commission approve its alternate bill reduction plan or another plan which provides immediate emergency financial relief to SDG&E's qualified DAP low-income customers to mitigate the financial hardship due to the increased energy cost.

² ORA cites Public Utilities Code Section 382 which states: "Programs provided to low-income electricity customers, including, **but not limited to, targeted energy efficiency services and the California Alternative Rates for Energy Program** shall be funded at not less than..." (emphasis added by ORA)

ORA protests SDG&E's proposal to implement new measures because it is contrary to the standardization of utility LIEE programs ordered by the Commission. ORA states that the LIEE Standardization Project was initiated in January 2000 in response to the December 29, 1999 Assigned Commissioner's Ruling (ACR), which called for increased consistency in utility LIEE programs.

ORA points out that air conditioner and refrigerator replacement incentives to landlords does not provide an immediate benefit to low-income customers, and that the immediate benefit goes to the landlords instead. ORA concludes that these new measures proposed by SDG&E are long-run resolutions to conservation and provide very little or no decrease in current bills, and therefore do not provide financial relief to the low-income customers. ORA recommends that SDG&E's request to implement new measures be denied.

On August 16, 2000, Sempra, on behalf of SDG&E filed a response to ORA's protest. In its response to ORA's protest, SDG&E asserts that ORA's bill credit proposal would provide only short-term bill relief for SDG&E's low-income and elderly customers. SDG&E estimates that a low-income customer could save more per year from the installation of energy efficient measures compared to the one-time bill credit under ORA's proposal. SDG&E points out that the benefits from energy-efficient appliances would be realized for several years and not just for a few months.

Furthermore, SDG&E contends that ORA's proposal is not workable in that all of SDG&E's low-income customers are not easily identified; hence, determining who should receive ORA's proposed credit would necessitate a costly and time consuming process. SDG&E alleges that there would also be additional administrative costs associated with processing ORA's proposal, which could reduce the available funds to help the customers.

SDG&E is concerned that ORA's proposal would entail using LIEE funds for purposes other than their intent of energy efficiency, and could potentially overlap with and duplicate other efforts to help customers pay their bills, without providing on-going long-term benefits. SDG&E notes that the Legislature and the Commission have endorsed energy efficiency as an important measure to assist low-income customers in managing their energy bills.

With respect to its proposal to provide incentives to landlords of low-income housing, SDG&E alleges that ORA is incorrect in asserting that such a proposal

would only provide immediate benefit to landlords and not to low-income customers. SDG&E clarified that it plans to limit this program to multi-family dwellings where the low-income tenants pay their energy bills, such that any assistance to landlords to install energy saving measures would translate into savings on the low-income customers' bills. SDG&E claims its proposal is intended to provide an incentive to landlords to replace existing refrigerators now (before burnout) with an energy-efficient model so that the low-income tenant can begin to realize the energy savings now instead of later.

In response to ORA's criticism that SDG&E's proposal is contrary to the Commission directives to standardize the utility low-income energy efficiency programs, SDG&E acknowledges that its proposal deviates from the standardization efforts being undertaken by the utilities. Nevertheless, SDG&E notes that current conditions in San Diego support adoption of its proposal. SDG&E suggests that the Commission can approve SDG&E's Advice Letter with a caveat that it does not reduce the Commission's flexibility to add or drop LIEE program measures in the future or set a precedent regarding statewide LIEE program measures.

DISCUSSION

In its advice letter, SDG&E identified four areas for which it seeks Commission authorization. Basically, SDG&E is requesting Commission approval of its revised budgets for LIEE program for PY 2000 and 2001, which reflect the use of unspent monies from PY 1998 and 1999 for increased program goals and proposed new measures, as well as for Commission ordered studies and reports in D.00-07-020. SDG&E proposes to allocate \$1.93 million of the unspent PY 1998 and 1999 dollars to PY 2000 and \$2.08 million to PY 2001. SDG&E asks for Commission authorization to diverge from the standardization efforts and to implement new measures for its DAP and EELI programs for PY 2000 and 2001, on an interim basis, until these measures can be addressed in the on-going standardization process.

SDG&E would like to utilize \$4.01 million in unspent program funds from 1998 and 1999 for increased program goals and new measures for DAP and EELI for PY 2000 and PY 2001. ORA contests the use of the said funds for the purposes outlined in SDGE's advice letter. ORA recommends that a new low-income program be authorized to use the unspent funds from PY 1998 and 1999. ORA proposes that those funds be used to provide immediate bill reductions through

a bill credit to DAP-eligible ratepayers to help minimize the impact of high electricity bills.

Although ORA's recommendation is well intentioned, we agree with SDG&E's comments that ORA's proposal only provides short-term bill relief for SDG&E's low-income and elderly customers, could be administratively costly and burdensome to implement, and would entail using LIEE designated funds for purposes other than energy efficiency. Recently, the Commission has adopted rate relief and bill credit measures in other proceedings to mitigate the increases in energy costs faced by San Diego customers.³ There are also other efforts underway to assist SDG&E customers in dealing with high electricity rates.⁴ In addition, though ORA's protest does merit consideration, this Advice Letter request is not the venue for interested parties to recommend significantly distinct alternatives that were not proposed by the applicant. Therefore, we reject ORA's protest recommendation at this time. Our rejection of ORA's proposal today does not prejudice the adoption of such a program for PY 2002.

We approve, in principle, SDG&E's proposal to use a portion of the unspent monies from PY 1998 and 1999 to augment its PY 2000 and PY 2001 budgets to increase the level of current DAP and EELI program services. We also approve, in principle, SDG&E's request to expand the curriculum of its EELI program. The expanded curriculum is to cover electric industry deregulation, the changes in the price of electricity based on supply and demand and how this may effect the customer. It is reasonable to adopt the proposed expanded curriculum. We approve the expanded curriculum for the EELI program, but such education efforts are to be funded consistent with D.97-08-064 and D.97-03-069 and not by the low-income program funds. We urge SDG&E to coordinate with the Electric

³ In D.00-08-037, issued on August 21, 2000, the Commission adopted a rate stabilization plan that will ensure that those customers who consume 500 kWh or less will pay no more than \$68 per month through January 2001 and no more than \$75 per month through the end of December 2001. For low-income customers under the California Alternate Rate for Energy (CARE) program, this stabilized rate would be reduced further by the CARE discount. In Resolution E-3699, issued on August 3, 2000, the Commission adopted a new methodology for calculating the CARE discount to ensure that low-income participants receive a full 15% discount on their electric bill.

⁴ For example, SDG&E has established the Summer Utility Relief Fund to provide bill paying assistance to customers in need. On August 23, 2000, President Clinton released \$2.6 million in emergency funds to help low-income Southern Californians cope with the surge in electricity bill.

Education Trust Advisory Committee (EETAC) to seek funding to provide low-income customers with this type of information. Alternatively, SDG&E could fund such education efforts with shareholder funds.

In D.99-03-056, dated March 18, 1999, the Commission continues the programs and funding for 1999 low-income assistance activities through December 31, 2001, unless subsequent program and budget changes are adopted by the Commission. The Assigned Commissioner, in his March 26, 1999, Ruling, indicated that only high priority modifications would be made to the programs in PY 2000 and PY 2001. In D.00-07-020, dated July 6, 2000, the Commission declined to implement any new program measures for PY 2000. We note that in Rulemaking (R.) 98-07-037, a draft decision on "Low-Income Assistance Program Policies for PY 2001 and the Standardization Project (Phase I)" was mailed on August 4, 2000 and is scheduled for Commission consideration on September 7, 2000.

We do not find it reasonable to approve the new measures SDG&E proposes for its DAP program for PY 2000 and PY 2001. We agree with ORA that these measures appear to be contrary to the standardization project currently before the Commission. In that venue, participants are proposing a methodology to evaluate new measures for their future adoption in the DAP program. In addition, there are extensive administrative costs associated with the implementation of new measures such as for developing installation standards, changes to the policy and procedures manuals, and training the installation contractors. We find it unreasonable to incur substantial administrative costs to implement SDG&E's proposed new measures only for an interim period. In addition, in Resolution E-3586, dated January 20, 1999, the Commission indicated that the LIEE program should not be subsidizing landlords with high cost measures such as with the replacement of refrigerators, evaporative coolers, and furnaces. Furthermore, approving these new measures for PY 2000 and PY 2001 may prejudice the outcome of the standardization project currently underway in R.98-07-037 for PY 2002.

We emphasize that we do not approve SDG&E's proposed new measures (i.e., evaporative cooler maintenance and repair, room air conditioner replacement program, room air conditioner and refrigerator replacement incentive program for landlords) for PY 2000 and PY 2001. Our rejection of SDG&E's proposed new DAP measures for PY 2000 and PY 2001 in this resolution, however, does not prejudice the adoption of these program measures for PY 2002. At this time, nothing precludes SDG&E from proposing new measures for PY 2002.

We note that SDG&E made a proposal to add similar measures to address their low-income customers in its Summer Initiative filing submitted on July 21, 2000. For example, SDG&E proposed to implement a refrigerator and air conditioner replacement program targeted to low-income customers and landlords of low-income housing. In their August 21, 2000, Ruling on the Summer Initiatives, the Assigned Commissioners and Administrative Law Judge selected a more generic program approach designed to address multi-family residential sector, over the specific measures and approaches proposed by SDG&E. Our decision in this resolution is consistent with that direction.

We authorize SDG&E to remove \$160,000 in PY 2000 program expenditures for actual and planned CO testing activities and to reallocate these monies towards the 1,000 additional homes it plans to weatherize in PY 2000. We authorize SDG&E to do the same for PY 2001. We further authorize SDG&E to set aside \$450,000 of the unspent PY 1998 and 1999 program funds for studies and reports ordered in D.00-07-020 until such time as SDG&E has had an opportunity to work with other parties to determine the cost of these studies and reports.

Our approval, in part, of SDG&E's advice letter as discussed above, is conditioned upon SDG&E's resubmission of the proposed budgets and supporting attachments to its advice letter for PY 2000 and PY 2001. SDG&E should reallocate the portion of the \$4.01 million unspent PY 1998 and 1999 monies that it originally intended for new DAP program measures and expanded EELI curriculum to augment current program activities. Using unspent PY 1998 and 1999 funds for the purposes set forth in this resolution is consistent with the Commission's original intent for the use of these funds.

Prior to implementing the aspects of the advice letter that we approve herein, SDG&E must file, and Energy Division must review and find compliant with this Resolution, a supplemental advice letter to validate and correct certain data SDG&E has presented. We note that the Energy Division has substantial questions regarding the validity and accuracy of certain numbers provided on pages A-6, A-7, and Attachments B.1 to B.8 of AL 1239-E/1207-G. In particular, the Energy Division noted the following discrepancies:

- The amounts shown as authorized budget for PY 2000 and PY 2001 on pages A-7 and A-9 of the advice letter do not reconcile with the amounts shown in Attachment 4 to D.00-07-020, which is the budget currently approved by the Commission for PY 2000 and PY 2001.

- The original program goals shown on pages A-6 and A-8 of the advice letter for in-home energy education, energy-efficient porch light fixtures, furnace inspection/repair, and furnace replacement are not consistent with the numbers that are used in Attachments B.4 and C.4. Consequently, the budget for these program areas shown on pages A-7 and A-9 is erroneous.
- The increased amount shown on pages A-7 and A-9 for tenant-owned refrigerator replacement is calculated based on the same unit costs as those for landlords and therefore does not reflect the full cost of the measure.
- Although the amount for furnace replacement/repairs shown on page A-7 is reduced by \$160,000 to remove the dollars attributable to CO testing, this same amount does not appear to have been reallocated to the other program areas. The proposed increase in budget shown on page A-7 of \$1,824,884 plus the \$104,500 additional cost for the EELI shown on page A-12 only sum up to around \$1.93 million, which corresponds to the unspent funds from PY 1998 and 1999 that SDG&E wishes to allocate to PY 2000. The same is true for the costs presented on A-9. Energy Division contends that an additional \$160,000 should have been reflected in the proposed budget to account for the reallocated CO testing dollars.

In addition, the unit costs (e.g., \$16.71) for each compact fluorescent lamp and the unit costs for Administrative Costs for each program area shown in Attachments B.4, B.5, C.4 and C.5 are questionable. We also doubt the ability of SDG&E to carry out the additional program goals shown on pages A-6 and A-8. A review of SDG&E's monthly CARE and DAP expenditure reports submitted to the Energy Division, indicates that SDG&E appears to be already behind in implementing its original DAP program commitment for PY 2000. It is unclear whether SDG&E would be able to meet its proposed additional program goals (e.g., additional 1,000 homes for weatherization) within the few months remaining this year. A reassessment of the increased program goals shown on page A-6 should be made and a resetting of these goals might be in order to reflect what could be realistically accomplished given the time frame involved.

SDG&E should provide interest on the unspent PY 1998 and 1999 funds since SDG&E has had use of this money during this entire time period. This interest amount should be added to the available program funds. In its comments on the draft resolution, SDG&E agreed to calculate and add the interest to the total of the unspent PY 1998 and 1999 funds. We require SDG&E to determine the amount of interest due based on the applicable commercial paper rate in effect for the period. Interest on the unspent 1998 program funds shall be calculated on a month to month basis beginning in the first month of 1998 when program

funds were collected but not used to fund 1998 programs, until the unspent 1998 funds are fully expended. Similarly, interest on the unspent 1999 program funds shall be calculated on a month to month basis beginning in the first month of 1999 when program funds were collected but not used to fund 1999 programs, until the unspent 1999 funds are fully expended. SDG&E shall include the interest calculations and include the interest as an increase to the unspent PY 1998 and 1999 program funds in its resubmission. PY 2000 program funds shall be fully expended before any of the unspent PY 1998 and 1999 monies can be used in PY 2000. PY 2001 program funds shall be fully expended before any of the unspent PY 1998, 1999, and 2000 monies can be used in PY 2001.

The Energy Division has requested that SDG&E identify and correct the discrepancies in the numbers provided in its advice letter and to resolve the issues identified above. SDG&E should develop revised budgets and supporting attachments for PY 2000 and PY 2001. We shall require SDG&E to submit these revisions in a supplemental advice letter within two weeks of the effective date of this resolution.

As to SDG&E's request to set aside \$450,000 of the unspent PY 1999 LIEE program funds for Commission ordered studies and reports, we believe that SDG&E is out of compliance with D.00-07-020, Ordering Paragraph 11. In Ordering Paragraph 11, the Commission directs utilities to file advice letters within 60 days of the effective date of D.00-07-020, requesting a budget augmentation sufficient to cover the costs of the new studies and reports specified in the decision. Pursuant to the decision, the budget augmentation request is to include a breakdown of the costs of each report and study. SDG&E identified the following studies and reports required by the decision: (1) SDG&E report outlining its outsourced training costs; (2) public workshop on utility training costs; (3) initial and on-going reports on the access of their low-income program participants to programs provided by community based organizations; (4) pay-for-measured savings pilot design public workshops; (5) utility reports on contractor and subcontractor compliance with California State Licensing Board requirements; (6) public workshops and report on standardized bill savings calculations and expenditures; and, (7) report on alternatives to per home inspection proposals. SDG&E did not provide a breakdown of the estimated costs for each of these studies or reports.

SDG&E stated that it is unable to provide a specific breakdown of the cost of these studies and reports at this time and will need to work jointly with interested parties to determine the costs of many of the activities resulting from

D.00-07-020. However, SDG&E proposes to set aside \$450,000 of the unspent PY 1998 and 1999 program funds in PY 2000 for these studies until such time that it can provide a detailed cost estimate and to file an advice letter to detail the costs by no later than September 5, 2000. In this subsequent advice letter, SDG&E proposes to reallocate any remaining balance from the set aside to the PY 2001 program budget or request a further budget augmentation if necessary.

We expect SDG&E to fully comply with D.00-07-020, Ordering Paragraph 11, and provide the Commission with a detailed cost estimate for Commission ordered studies and reports in an advice letter as ordered in that decision. On September 5, 2000, Sempra Energy on behalf of SDG&E filed Advice Letter 1252-E/1215-G requesting budget augmentation for the new studies and reports that were ordered by D.00-07-020 and Resolution E-3646.

A draft of this resolution was issued for comments on August 25, 2000 as described below. In addition to the revisions made pursuant to the comments, as described below, the following revisions were made to the draft resolution to clarify and correct inconsistencies with D.99-03-056 and D.00-07-02:

- (1) Denies SDG&E's proposed new DAP program measures for PY 2001 and conditionally approves the increase in the level of current programs for PY 2001.
- (2) Requires SDG&E to reallocate the money intended for the new DAP program measures to other existing program areas for PY 2000 and PY 2001 in its budget resubmission.

The draft resolution was also revised to clarify and correct typographical errors.

COMMENTS

Public necessity requires that the 30-day comment period of Public Utilities Code section 311(g) be reduced in order to secure the benefits of the proposals contained AL 1239-E/1207-G. We have balanced the public interest in avoiding the possible harm to public welfare flowing from the delay in considering this resolution against the public interest in having the full 30-day period for review and comment as required by Rule 77.7(f)(9). We conclude that the former outweighs the latter. We conclude that failure to adopt a decision before the expiration of the 30-day review and comment period would cause significant harm to the public welfare. Accordingly, we reduce the comment period for this resolution.

Sempra Energy on behalf of SDG&E filed comments on August 31, 2000. SDG&E states that it agrees with much of what was decided in the draft resolution, but comments on three areas of disagreements. First, SDG&E urges the Commission to reconsider its rejection of SDG&E's request to implement new DAP measures. SDG&E reiterates its view that the Commission should allow it to deviate temporarily from the standardization efforts and implement these new measures to provide additional bill savings assistance to its low income customers. SDG&E contends that the concern expressed in the draft resolution about potential increase in program administrative costs is without merit. SDG&E notes that any additional administrative costs SDG&E might incur in implementing these new measures pale in comparison with those it is already incurring to pursue other studies and pilot projects mandated in D.00-07-020 and the recently-approved Summer Initiative programs. We are not persuaded by SDG&E's arguments and decline to adopt SDG&E's proposed new measures as discussed above.

Second, SDG&E advises against using the Electric Education Trust (EET) funds in lieu of LIEE funds for the expanded EELI curriculum as the draft resolution recommends. SDG&E contends that its proposed revised EELI curriculum has a very narrow focus and is designed to help customers better understand the recent price spikes and propose steps to help reduce their demand and energy bills. SDG&E further suspects that any EET funds have already been earmarked for certain programs and contracts awarded to Community Based Organizations (CBOs) to carry out these programs. SDG&E asks for further guidance should the Commission decide to fund the expanded EELI curriculum by EET funds. We remain convinced that funds for this particular activity should not come from the LIEE program. We therefore clarify that our approval of SDG&E's proposed expanded EELI curriculum is contingent upon SDG&E procuring funding for the said activity from sources other than the low-income assistance funds.

Third, SDG&E contends that its advice letter is not contrary to Ordering Paragraph 11 of D.00-07-020 as discussed in the draft resolution. SDG&E notes that it clearly stated in its advice letter its intent to file a subsequent advice letter by September 5, 2000 to provide the specific breakdown of the funds as ordered in D.00-07-020. SDG&E requests that the last paragraph under Discussion, Finding 20, and Ordering Paragraph 6 of the draft resolution as mailed on August 21, 2000, be deleted in the final order. We agree with SDG&E and modified the resolution accordingly.

FINDINGS

1. Sempra Energy, on behalf of SDG&E, filed Advice Letter (AL) 1239-E/1207-G on July 21, 2000. On July 25, Sempra Energy, on behalf of SDG&E, submitted substitute sheets for A.9 and Attachments C.1 through C.8 in the above advice letter.
2. By AL 1239-E/1207-G, SDG&E requests approval to reallocate a portion of its PY 2000 Low-Income Energy Efficiency funds in accordance with Commission directives, and to use unspent 1998 and 1999 funds for increased program activities and new program measures for PY 2000 and 2001.
3. SDG&E requests removal of \$160,000 in PY 2000 program expenditures for actual and planned CO testing activities in response to Ordering Paragraph 5 in D.00-07-020.
4. SDG&E proposes to set-aside \$450,000 of unspent PY 1998 and 1999 program funds in accordance with Ordering Paragraph 11 of D.00-07-020, which directed utilities to file advice letters requesting budget augmentation sufficient to cover the cost of new studies and reports specified in the Decision.
5. The following parties submitted comments in support of AL 1239-E/1207-G: Low Income Advisory Board, East Los Angeles Community Union; Maravilla Foundation; the Southern California Forum; Bay Area Poverty Resource Council; and Richard Heath and Associates and its subcontractors (the Alliance for African Assistance; Campesinos Unidos, Inc.; Catholic Charities Refugee & Immigrant Services; Metropolitan Area Advisory Committee Project; Native American Council; Refugee Assistance Program; and San Diego American Indian Heath Center).
6. On August 7, 2000, the Office of Ratepayer Advocates (ORA) filed a protest to AL 1239-E/1207-G. ORA contends that SDG&E's request does not offer immediate financial relief to qualified DAP low-income customers and that the proposed new measures are contrary to the Commission's standardization efforts. ORA recommends that the unspent program funds for 1998 and 1999 be used instead to provide immediate bill reductions for low-income and elderly customers.
7. In its response to ORA's protest, SDG&E argued that ORA's bill reduction proposal provides only short-term bill relief for SDG&E's low-income and elderly customers, would necessitate a costly and time consuming process, and would entail using LIEE funds for purposes other than their intent of

energy-efficiency.

8. ORA's bill reduction proposal in its protest is denied at this time and all other aspects of ORA's protests are resolved as described in the discussion section of this resolution. Our rejection of ORA's proposal today does not prejudice the adoption of such a program for PY 2002.
9. SDG&E's request to use a portion of the unspent monies from PY 1998 and 1999 to augment its PY 2000 and PY 2001 budget for an increase in current LIEE program activities is consistent with the Commission's efforts to mitigate impact of increasing energy prices on San Diego ratepayers.
10. SDG&E's request to implement new DAP program measures for PY 2000 and PY 2001 should be evaluated in conjunction with the standardization project currently before the Commission in R.98-07-037. At this time, nothing precludes SDG&E from proposing new measures for PY 2002.
11. It is reasonable to authorize SDG&E to reallocate the \$160,000 for CO testing to fund the weatherization of additional homes in PY 2000 and PY 2001, and to set aside \$450,000 of unspent PY 1998 and 1999 funds for studies and reports ordered in D.00-07-020.
12. There are discrepancies with the budgets and supporting attachments to AL 1239-E/1207-G and the validity of certain numbers pertaining to unit costs and program goals is questionable.
13. Since SDG&E has had use of the unspent PY 1998 and 1999 funds during this entire time period, it is reasonable to require SDG&E to provide interest on these monies and to add this interest payment to the available program funds.
14. SDG&E should continue working with the Energy Division in developing revised budgets and supporting attachments for PY 2000 and PY 2001.
15. In D.00-07-020, the Commission directed the energy utilities to file advice letters, within 60 days of the effective date of D.00-07-020, requesting a budget augmentation sufficient to cover the costs of the new studies and reports specified in the decision. Pursuant to the decision, the budget augmentation request is to include a breakout of the costs of each report and study.
16. SDG&E did not provide a breakdown of the costs of the new studies and reports that have been recently ordered by the Commission, and said that it could not do so at this time. SDG&E is expected to fully comply with D.00-07-020, Ordering Paragraph 11, and provide the Commission with a detailed

cost estimate for Commission ordered studies and reports in an advice letter as ordered in that decision.

17. On September 5, 2000, Sempra Energy on behalf of SDG&E filed Advice Letter 1252-E/1215-G requesting budget augmentation for the new studies and reports that were ordered by D.00-07-020 and Resolution E-3646.
18. We have balanced the public interest in avoiding the possible harm to public welfare flowing from the delay in considering this resolution against the public interest in having the full 30-day period for review and comment as required by Rule 77.7(f)(9). We conclude that the former outweighs the latter. We conclude that failure to adopt a decision before the expiration of the 30-day review and comment period would cause significant harm to the public welfare.

THEREFORE IT IS ORDERED THAT:

1. San Diego Gas & Electric Company's (SDG&E) request to use \$4.01 million of unspent program year (PY) 1998 and PY 1999 monies to implement changes in its Low Income Energy Efficiency (LIEE) program activities and budget for PY 2000 and PY 2001 is approved, subject to the conditions discussed in this order. .
2. SDG&E's request with respect to the following changes in its LIEE program activities and budget for PY 2000 is approved, in principle, and is conditioned upon SDG&E's submission of a supplemental advice letter that is compliant with this order. San Diego Gas & Electric is authorized to:
 - a. Use a portion of the unspent monies from PY 1998 and 1999 to augment PY 2000 and PY 2001 budget to increase the levels of current DAP program services. SDG&E shall first apply all PY 2000 funds for this purpose, before applying any unspent PY 1998 or 1999 program funds. SDG&E shall first apply all PY 2001 funds for this purpose, before applying any unspent PY 1998, 1999, or 2000 program funds.
 - b. Implement the expanded EELI program curriculum in PY 2000 and PY 2001, and provide energy education to additional 5,000 customers in PY 2001. Funding for the expanded curriculum shall not come out of the PY 2000 and PY 2001 LIEE funds. Expansion of the program curriculum is contingent upon SDG&E procuring alternative funding.
 - c. Remove \$160,000 of the PY 2000 program expenditures for carbon monoxide testing activities and reallocate these monies towards the

weatherization of additional homes in PY 2000.

- d. Remove \$160,000 of the PY 2001 program expenditures for carbon monoxide testing activities and reallocate these monies towards the weatherization of additional homes in PY 2001.
- e. Set aside \$450,000 of the unspent PY 1998 and 1999 program funds for the studies and reports ordered in D.00-07-020 until such time as SDG&E has had an opportunity to work with other parties to determine the cost of these studies and reports.

Our approval of the increase in current LIEE program activities for PY 2000 and PY 2001 does not prejudice our authorization of LIEE program levels and budget for PY 2002.

- 3. SDG&E's request to implement new DAP measures for PY 2000 and PY 2001 is denied. At this time, nothing precludes SDG&E from proposing new measures for PY 2002.
- 4. SDG&E shall work with the Energy Division in developing a revised budget and supporting attachments for PY 2000 and PY 2001, and shall file a supplemental advice letter with the revised budget and attachments by September 21, 2000. This supplemental advice letter shall become effective after the Energy Division determines that it is compliant with this order.
- 5. SDG&E shall add interest to the unspent PY 1998 and 1999 program funds calculated using the three-month commercial paper rate in effect for the period.
 - a. Interest on the unspent 1998 program funds shall be calculated on a month to month basis beginning in the first month of 1998 when 1998 program funds were collected, but not used to fund 1998 programs, until the unspent 1998 funds are fully expended.
 - b. Interest on the unspent 1999 program funds shall be calculated on a month to month basis beginning in the first moth of 1999 when program funds were collected but not used to fund 1999 programs, until the unspent 1999 funds are fully expended.

SDG&E shall include the interest calculations and include the interest as an increase to the unspent PY 1998 and 1999 program funds in its supplemental advice letter as indicated in Ordering Paragraph 2 above.

- 6. ORA's protest is resolved as described herein.

This Resolution is effective today.

I certify that the foregoing resolution was duly introduced, passed and adopted at a conference of the Public Utilities Commission of the State of California held on September 7, 2000; the following Commissioners voting favorably thereon:

WESLEY M. FRANKLIN
Executive Director

LORETTA M. LYNCH
President

HENRY M. DUQUE

JOSIAH L. NEEPER

RICHARD A. BILAS

CARL W. WOOD

Commissioners

NATIONAL LOW INCOME ENERGY CONSORTIUM 2000 CONFERENCE Session 1B:
Tuesday, June 13, 1:45-3:15 pm: Achieving Energy Savings Through Performance Contracting
[Introductory Remarks that Reflect Views from US Department of Housing and Urban Development]

1. Paying close attention to utility bills throughout the year pays off in many ways. Tracking your utility consumption can identify mistakes in billing. Unexpected changes key you in early to maintenance, performance and resident problems. The numbers will flag buildings needing attention. And when you go to buy energy having a good record of costs and consumption will be useful.
2. HUD requires that public housing authorities (PHAs) audit their buildings and include steps in their five-year plans for carrying out cost effective energy conservation measures. [See: *Energy Conservation for Housing: A Workbook*, 1998, PIH Information and Resource Center, 1-800 955 2232.] Financing with PHA operating or capital funds carries the lowest transaction costs. HUD offers the incentive of an additional subsidy to amortize payments for a loan contracted to finance energy conservation improvements. Use of the "add-on" is illustrated by the Stark Metropolitan Housing Authority Canton, Ohio [Phone: (330) 454-8051]. [Handout]. Stark used the "add-on" incentive instead of performance contracting, to make resource-efficiency improvements in two separate projects.
3. There are more than fifty PHAs that have made use of the special financial incentives provided by energy performance contracting. EPC has high transaction costs. It takes time to plan and carry out. But it leverages additional capital and it can deliver technical as well as financial support to a PHA that needs it. HUD permits it and issued regulations in 1991 [24CFR990].
4. EPC may be most "appropriate" for a PHA under the following conditions:
 - minimum \$100,000/year utility costs (some say \$200k)
 - potential for at least 20% savings
 - more than 18 months payback
 - stable level of energy use
 - improvements not needed within one year.
5. When entering into an energy performance contract, PHA'S need help to be able to analyze their needs and negotiate the agreement terms with escos. Some help is available from a HUD guidebook that was printed in February 1992: *"Energy Performance Contracting for Public and Indian Housing: A Guide for Participants."* You may get a copy from your HUD office public housing staff or HUD USER, or download one from: www.huduser.org/publications/hsgfin/energy.html. HUD also provided technical assistance through the National Center for Appropriate Technology. NCAT has a collection of guide materials that you can get from the Resource Efficient Multifamily Housing Services entry on their web site: www.NCAT.org.
6. The US Department of Energy's Rebuild America Program has assisted HUD in the delivery of two training sessions on energy performance contracting. There are plans for another session in Chicago next year and exploration of the possibilities for delivery in other parts of the country. For further information, contact Mark Ternes, Oak Ridge National Laboratory 865/574 0749 or Eugene Goldfarb, Senior Environmental Officer, HUD Illinois State Office 312/353 1696 x 2728.
7. The article by Steve Morgan and Lillian Kamalay, EUA Citizens Conservation Services, [handout] from National Association of Energy Services Companies "Energy Efficiency Journal," provides an industry perspective on the use of performance-based energy efficiency in the residential market. [Note that only about 5% of PHAs have portfolios of 1,000+ units.]

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Energy Efficiency Journal

Focus on Trends and Practices**An In Depth Look at the Residential Market****Successfully Delivering Performance-Based Energy Efficiency in the Residential Market**

By **Steve Morgan**
President, EUA Citizens Conservation Services
Lillian Kamalzy
Director of Public Housing Programs, EUA Citizens Conservation Services

The last two decades of energy efficiency have witnessed myriad attempts to serve the various residential markets, most with modest success at best. Most of the success in serving this market has been affected by appliance and building code improvements and accompanying improvements in lighting and appliance technologies are responsible for most of the efficiency gains. Utility demand side management programs have focused on rebates for lighting and appliances, and direct install low cost, no cost measures. One of the few initiatives which combined significant penetration with higher cost measures was the Zero Interest Loan Program, offered by PG&E, followed by similar programs from the Tennessee Valley Authority and Bonneville Power Administration in the early 1980s. Hundreds of thousands of attics were insulated, gas hot water heaters were wrapped, and new thermostats were installed. The utility financed the measures and customers paid back the loan from savings on the utility bill over several years.

Launched to a considerable degree by utility rebate and financing programs, there is now a significant residential product and contractors industry offering high efficiency products. Insulation, low-e windows, high efficiency HVAC equipment, and compact fluorescent lighting products can be found in retail marketplaces throughout North America. Most recently utilities have championed market transformation programs aimed "upstream" in the marketplace. Incentives have been offered to manufacturers

to develop higher efficiency appliances or distribute them more widely. Super-efficient refrigerators and washing machines and fluorescent torchieres are prominent examples.

Performance Contracting: Niche Markets

Performance contracting in this sector has been successful in several discrete markets for some unique reasons. Generally the transaction costs of serving residential customers are too high to permit performance contracting, but there are some exceptions, including the following:

- 1) all electric and high use electric single family households, when the utility is paying for the savings, especially in markets with high electricity costs;
- 2) envelope, controls, and hot water measures in gas heated households where the gas utility is paying for most or all of the savings and where gas costs are high (East, California, Wisconsin);
- 3) lighting, gas hot water controls, and refrigerators in the large (50 units or more) multi-family master metered sector, where the utility is paying for most or all of the savings;
- 4) low flush toilets, low flow showerheads, faucet aerators, and repairing water leaks in large multi-family households;
- 5) public housing authorities, with or without any utility subsidies; and
- 6) all-electric multi-family high rises, which are candidates for gas conversions.

The Northeast and California have been the best places to start a residential energy and water efficiency business, because high utility prices and sizable demand size

management budgets provide dual incentives. The Northeast also has the advantage of older buildings with outdated equipment in need of replacement. Wisconsin is probably most in per capita spending on residential efficiency investments. The discussion that follows focuses upon the multi-family market, where the opportunities for performance based contractors are the greatest.

Multi-Family Markets

There are several multi-family markets; public housing, publicly assisted housing, and conventional housing. There are also large and small multi-family buildings; there are master metered and individually metered buildings. Efficiency improvements in individually metered apartments of any size have been infrequent; free compact fluorescent, water heating blankets, and caulking comprise a typical utility provided package. Due to the split incentive problem—residents pay the bills, owners buy and maintain the HVAC equipment—this is a difficult market to serve. In master metered corridors and hallways, perhaps 40-50 percent of the nation's multi-family stock has been retrofitted with fluorescent lighting, much accompanied by electric utility subsidies.

Water is the exception. Since water is generally on the master meter and its rates are rising 3-5 percent in most parts of the country, water efficiency measures are the visible part of the efficiency business in this sector. Water efficiency services companies number half a dozen or more and while few offer performance contracts as a typical service, most replace or retrofit toilets and install low flow showerheads and faucet aerators. A few will plug leaks. Both conventional and HUD assisted properties are good candidates for



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November 1999

Focus on Trends and Practices, cont'd.

this service. A fast-growing service in this area is the conversion of master meters to individual meters.

Due to high transaction costs, performance contracting is limited generally to properties with \$100,000 in annual utility bills or more. Except for water and electric to gas conversions, there is no perceptible market for performance contracting in conventional housing: the paucity of master metering is one major problem, and creditworthiness is another. Ownership skepticism and ignorance about the ESCO industry and complicated decision making chains are also factors.

In the publicly assisted marketplace, 3-4 million units of larger than 50 unit properties exist. Many are on master meters for space and/or water heating. Perhaps 1.5 million of these are owned and/or managed by 50 large real estate management companies. But the vast majority of these are subject to HUD regulations. These regulations now make performance contracting very difficult; financing approvals and prohibitions on the same company engaging in both design and construction are difficult to overcome. In 1996 HUD finally unveiled an effective financing program, initiated by Energy Capital Partners (now ABB Energy Capital), with Fannie Mae as a partner. After three months in operation, HUD eliminated the program for unrelated political reasons. No program has yet taken its place.

The bright spot in performance contracting has been public housing. In most of the larger, older PHAs, master metering is predominant. PHAs typically have portfolios of 1,000 or more units. Most importantly, since 1991 there has been a federal regulation incentivizing hous-

Due to high transaction costs, performance contracting is limited generally to properties with \$100,000 in annual utility bills or more.

ing authorities to take advantage of performance contracts. The Department of Housing and Urban Development (HUD) will reimburse housing authorities at their pre-retrofit levels of utility usage, adjusted for current prices, and pay housing authorities for up to 12 years at that frozen baseline. The annual HUD payment permits PHAs to select

ESCOs, have measures financed and installed, and keep annual savings, net of debt service obligations, and ESCO fees. ESCOs must guarantee the savings and provide annual maintenance, resident education, and savings monitoring services. PHAs are eligible to receive tax exempt rates for their financing. Heating and hot water system replacements, electric to gas conversions, refrigerators, toilet replacements, controls, envelope measures, and lighting comprise typical measures installed.

As a result, 55 PHAs have gone out to bid to solicit ESCOs, and a projected \$75 million will be spent by the year 2000 in performance contracts. Eight different ESCOs have been active in this market, including seven accredited NABESCO members: EUA Citizens Conservation Services, Viron Energy Services, Energy Masters International, Siemens Building

Technologies, NORESKO, Custom Energy, L.L.C., and Honeywell Inc. have one or more contracts. Contract sizes have ranged from \$1 million to \$15 million to date. The untapped market is probably \$1-1.5 billion among the largest 150 PHAs. Since PHAs are also eligible to capture 50 percent of any rate savings they procure from gas and electric

utilities, this is also a very good market for power marketers.

Emerging Trends in Residential Efficiency Services

Performance contracting will have a modest role in the future residential efficiency marketplace. It will have to accommodate itself to some of the following new developments:

1) utilities and national power marketers are purchasing local HVAC contractors, creating national networks of previously independent firms;

2) utilities have organized strategic partnerships with telephone, home security, cable, and Internet companies to offer customers one stop shopping for services linked to a single billing;

3) sale of high efficiency products through retail chains and Internet direct distributors, bypassing the contractor market; and

4) the development of "smart" appliances which can be controlled at low cost.

Together, these changes promise industry consolidation and more strategic partnerships, with national and regional power marketers taking the lead in offering a wide menu of services. Whether customers will respond readily to a large selection of diverse services from a single provider is an interesting, unanswered question.

Conclusion

The early returns from the deregulation of electricity have not been encouraging for advocates of residential energy efficiency. Small customers have not enjoyed significant decreases in rates and cannot look forward to them in the near future. Except in a handful of states where legislation has mandated them, demand side management programs have all but disappeared. Depending upon a deregulated market to fuel the energy efficiency industry in the residential sector is not a winning strategy.

The optimists among us must argue

The bright spot in performance contracting has been public housing. In most of the larger, older PHAs, master metering is predominant. PHAs typically have portfolios of 1,000 or more units. Most importantly, since 1991 there has been a federal regulation incentivizing housing authorities to take advantage of performance contracts.

Focus on Trends and Practices, cont'd.

that the power marketers and aggregators who can offer commodity and efficiency, along with load controls from a smart meter with services integrated on a single customer bill, will attract a strong customer base. Home

The optimists among us must argue that the power marketers and aggregators who can offer commodity and efficiency, along with load controls from a smart meter with services integrated on a single customer bill, will attract a strong customer base.

security, telecommunications, Internet, cable, and maintenance services may also be added to the package offered by a single provider. For residential customers, the aggregators bear special attention; will there be an effective market for pooling loads, aggregating demand, and providing commodity fuels, efficiency, green power, and a host of other services for the small fry? Municipalities may play a key role in catalyzing or providing this aggregating role. Energy efficiency and green power would certainly be priorities among municipal aggregators - who could

still generate revenues for city budgets in the process.

Whether performance contracting as we know it now will survive is an open question, but the skills required to deliver high quality equipment and persistent savings should find no shortage of work. Marketers must be careful to recognize that each residential segment described above deserves a unique service and mar-

keting approach: those who do this first will be big winners.



Stark Metropolitan Housing Authority
Updated: April 14, 2000

The Stark Metropolitan Housing Authority (SMHA) in Canton, Ohio is using the add-on subsidy incentive to make resource-efficiency improvements under two separate projects.

First Project

SMHA used the add-on subsidy incentive and harnessed local resources in order to finance the electric-to-gas conversions in scattered-site public housing located in Alliance, Ohio. SMHA selected HUD's add-on subsidy incentive for this project because it best fit the situation created by resident-paid utilities in which there is no rolling base to freeze.

In an innovative project that began with building a team of partners, SMHA enlisted the help of the following entities as the key players: Association for Better Community Development — a local non-profit, Ohio Weatherization Training Institute, Columbia Gas of Ohio, First Energy (formerly Ohio Edison), and Key Bank. No energy services company was used in this resource efficiency improvement project.

The project consisted of replacing the electric baseboard heating with 90-percent-efficient, gas-fired furnaces in all 99 units. Because of the resident-paid utilities, individual gas meters were also installed. The project is now finished and took only 16 months to complete.

Total project costs were \$422,266, but the cost to HUD was only \$105,000. The conversion from electric to gas was estimated to yield annual savings of \$194,710; however, the actual savings this year were \$187,000. Steve Ewing, SMHA's Energy Compliance Supervisor, reported that a mild winter and increased utility rates made the difference. He further explained, "The improvements yield annual savings of approximately \$195,000 to HUD, regardless, in reduced utility allowances."

SMHA's Energy Group, part of the Development Department headed by Mike Williams, tracks the weather-normalized energy consumption with the consent of the residents. "The residents realize a savings in their costs," says Williams. "SMHA realizes savings too; it's a win-win proposition."

Other benefits credited to the project include the strong relationships SMHA formed with the private sector, the wealth of experience SMHA staff gained during the process, and the acquisition of physical equipment.

Second Project

SMHA recently submitted another proposal to HUD for approval. It was submitted as a performance contract, again using HUD's add-on subsidy incentive. Instead of using an energy services company, however, SMHA intends to use its architect/engineer to over see the entire

process. The proposed project is for a 96-unit housing complex (Sherrick Court Homes) located in Canton, Ohio, that is comprised of 24 4-plex buildings.

In the first phase of the project, an energy services company was hired to perform an energy audit of the buildings. The second phase was contingent on the results of the audit, which did not indicate further action because the savings, based on a 12-year payback, did not seem to be justified. That's when SMHA went back to the drawing board to determine how it could increase the savings enough to satisfy the debt. The first step was to do a heat load analysis on a per unit basis, rather than on each building. Next, SMHA looked at what measures could be combined to produce the savings needed for the project and how to reduce capital outlay by maximizing the involvement of appropriate agencies.

Drawing from its past knowledge about forming and maintaining partnerships, SMHA once again brought together a diverse group of key players for this project that include Lennox, American Electric Power Company, East Ohio Gas Company, and Bank One. Each partner had something to offer such as rebates on the equipment, a service and maintenance agreement on hot water heating systems to offset their purchase and installation costs, and financing at a fixed interest rate of 4.13 percent over eight years.

This project will include five major resource conservation measures in all buildings: super-efficient refrigerators, replacement of all existing 25-year-old individual furnaces with new, gas-fired, 80-percent efficient furnaces, new water-conserving toilets, energy-efficient doors and windows, and heat pumps to provide intermittent heat and air conditioning.

The total budget for this package of measures is \$350,000. The estimated annual savings are \$41,687, making the payback period for the combined measures to be about 8 years. SMHA combined all work with the Comprehensive Grant Program, which will allow a total "revamp" of the development. This project was approved by HUD and just completed.

Steve Ewing, Energy Compliance Supervisor, believes that this project will raise resident morale and help SMHA become more fiscally responsible. He says, "We do what we do by working together to find solutions. But, none of our efforts could bear fruit without the trust, direction, and vision of our Executive Director, Mrs. Cherrie Turner."

PACIFIC GAS & ELECTRIC COMPANY
DEMAND SIDE MANAGEMENT PILOT BIDDING PROGRAM - 1992
POWERSAVING PARTNERS
SAMPLE MEASUREMENT AND VERIFICATION PLAN



CONTRACT MEASUREMENT AND VERIFICATION PLAN FOR LIGHTING RETROFITS

Draft June 13, 1993

I. PRE- AND POST-RETROFIT PLAN DEVELOPMENT

For each facility, the Bidder will submit a detailed DSM measure installation plan, a final measurement and verification (M&V) plan, and a project schedule 60 days before installing any equipment for this contract. If the Bidder fails to provide PG&E with the installation plan, the M&V plan, or the project schedule as described in this section, PG&E may withhold payment. PG&E, at its own expense, may choose to perform an on-site pre-installation inspection within 30 days of receiving these plans from the Bidder. PG&E will either agree to the plans or provide the Bidder with the required changes within 45 days of receiving pre-installation documentation from the Bidder.

A. Pre-Retrofit Verification Activities

1. Installation Plan

For each site, the installation plan will provide an inventory of the equipment to be changed and the replacement equipment to be installed for the site or set of sites under review. The installation plan will also list the circuits and accounts that are affected by the retrofit and indicate whether these circuits or accounts serve other equipment that will not be affected by the retrofit.

The installation plan will include a completed Table I-A, "Pre-Retrofit List of Lighting Equipment Expected to Be Replaced by Lighting-Efficiency Measures," and Table I-B "Pre-Retrofit List of Lighting Equipment Expected to be Installed under PSP." The plan will include a separate copy of Tables I-A and I-B for each *building type/usage area* affected by the installation of measures. Building type/usage areas will be defined in a way that groups together floor space that has similar lighting requirements (i.e., areas of comparable average lighting operating hours as determined by the proportion of lights in operation during each costing period).

The Bidder will record observed information in Tables I-A and I-B. This information will include the nameplate kilowatts of the fixtures (i.e., the sum of the kilowatt rating of the lamps and ballasts) and the average proportion (%) of fixtures on during building operations. The information on nameplate kilowatts and proportion of lights in operation will be obtained by observation to identify similar lighting fixtures and designate similar building type/usage areas. The tables require that identification numbers be assigned to each area and to each circuit serving the area so that the data recorded in these tables can be combined with data recorded in other tables that pertain to these areas and circuits.

2. Final M&V Plan

For each site or set of sites, the Bidder will prepare a final M&V plan based on site-specific information. These site-specific M&V plans will include the following elements:

- Any M&V activities that this Contract M&V Plan treats as alternatives;
- The specific steps the Bidder will follow to measure and verify project savings;
- The sampling plan, including:
 - a delineation of the sample size;
 - the method of selecting sample observations;
 - an indication of the suitability of the sample observations in representing unsampled members of the population; and
 - how these site-specific sampling plans work to achieve the goals specified in this Contract M&V Plan.
- The data the Bidder will collect;
- The type of meter the Bidder will use;
- The length of time the Bidder will meter electrical equipment; and
- The reporting format the Bidder will use to present M&V findings when requesting PSP payments.

3. Project Schedule

For each site or set of sites, the Bidder will prepare a project schedule indicating when the following activities will occur:

- Pre-retrofit metering of operating hours (for lighting controls);
- Installation of measures;
- Commissioning of measures (the process of ensuring measures are working properly and optimally);
- Commercial operation of PSP measures; and
- Post-retrofit metering of operating hours.

B. Post-Retrofit Activities

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The Bidder will notify PG&E in writing within 30 days *after* completing the installation of the measures. PG&E may choose to make an on-site inspection of the facility. At the time of the post-installation inspection, the Bidder will make available to PG&E Tables I-C and I-D. These tables will record the equipment that was actually removed and installed during the retrofit. The Bidder will also indicate any discrepancies between circuits anticipated to be affected and circuits actually affected. The Bidder will provide any operating manuals and O&M procedure manuals for the affected equipment.

Throughout the contract period, the Bidder will provide PG&E access to the facility and all documents related to the performance of the installed measures, provided that PG&E gives the Bidder at least one week's notice before the intended visit.

II. CALCULATION OF SAVINGS FROM LIGHTING EFFICIENCY RETROFITS

A. Measurement of Baseline Demand Data (Connected Load of Pre-Retrofit Equipment in Kilowatts)

The Bidder will take instantaneous wattage measurements from three fixtures for each type of fixture to be retrofitted or from one circuit that serves only fixtures of the given type. The Bidder will use these instantaneous measurements to calculate the per-fixture demand (kW) of each type of fixture to be retrofitted. The Bidder will record this information in Tables II-A and II-B. The column heading "# of Similar Fixtures" indicates the number of operative fixtures to which the per-fixture wattage will be applied.

B. Adjustments to Baseline Demand Data

The Bidder will identify any inoperative fixtures and fixtures with ballasts older than the measure life reported in the PSP RFP and record the number of each in Tables II-A and II-B. For light fixtures with ballasts older than PG&E's assumed standard life that are also subject to Title 20 standards the Bidder will reduce the metered kW to reflect the Title 20 minimum standard.

For inoperative fixtures the Bidder may retrofit and adjust the baseline usage per the following methods. For inoperative fixtures that are subject to Title 20 standards the Bidder may include the kW for a ballast that meets the Title 20 minimum standard and the average kW per fixture for all operating fluorescent light bulbs at the site. For inoperative fixtures with no minimum standards (i.e. incandescents), the Bidder may include the average of all operating fixtures at that site. Both adjustment methods are subject to a cap based on lighting lumen levels not exceeding accepted _____ standards.

C. Measurement of Post-Retrofit Demand Data (Connected Load of Post-Retrofit Equipment in Kilowatts)

After installing the energy-efficient lighting equipment, the Bidder will take instantaneous wattage measurements from three fixtures for each type of fixture to be retrofitted or from one circuit that only serves fixtures of the given type. The Bidder will use these instantaneous measurements to calculate the per-fixture demand of each type of fixture retrofitted. The Bidder will record this information in Table II-C.

D. Measurement of Post-Retrofit Average Operating Hours

The designation of building type/usage areas will identify those areas with comparable average operating hours as determined by the lights in operation during each costing period. For each unique building type/usage area, the Bidder will develop a sampling plan, as described below, to meter the average operating hours of either a sample of

fixtures or a sample of circuits.¹ The Bidder will specify the meter to be used in the final M&V plan. The meter and recording device must be able to measure and record data for each of PG&E's five costing periods.

(Attachment 1 will define PG&E's costing periods.)

If the Bidder chooses to meter fixtures to determine average operating hours, the Bidder can use run-time meters that record the fixture on/off pattern in each costing period. The Bidder must meter fixtures when the circuit serving the lighting retrofit load also serves other non-lighting loads that cannot be distinguished from the lighting load. When lighting and non-lighting loads are separable, the circuits can be metered. To meter circuits, the Bidder will use a data logger that can record the kW-load on the circuit at frequent intervals (i.e., every 15 minutes).

1. Development of Sampling Plan

The Bidder will use the following equation to determine the sample size required for fixtures or circuits:

$$n = z^2 cv(y)^2 (1-R^2) [1-(n/N)] / p^2$$

where:

- n = required sample size (circuits or fixtures)
- z = 1.645 (for 90% confidence level)
- cv(y) = coefficient of variation of hours of use y (conservatively assumed to be 0.5 without other information)
- R² = coefficient of determination (conservatively assumed to be 0.6, unless a regression of actual consumption data on engineering estimates shows otherwise)
- N = population size (fixtures or circuits)
- p = the required precision level (0.10)

A sample size calculated with this equation will allow for estimation of the average hours of operation in the post-retrofit period with 90% confidence level and 10% precision intervals. If the Bidder plans to meter circuits in building type/usage areas with a small number of circuits, the Bidder may choose to meter all the circuits in the building type/usage area.

Each final M&V plan will identify the selected circuits or fixtures. PG&E will approve the designation of representative fixtures or circuits when it accepts the M&V plan.

¹Average operating hours indicates the average length of time a lighting fixture is illuminated. Because lights may be off at various times during the day, the average operating hours typically is less than the period of time the building is occupied.

2. Duration of Metering Time

Fixtures or circuits will be metered for one month per year over the term of the contract. Metering to determine the proportion of fixtures on during PG&E's five costing periods will be repeated every year throughout the contract.

The Bidder will investigate all of the lighting measures at the time of its annual verification inspection. The proportion of retrofit equipment determined upon inspection to be inoperative will be used to reduce the number of retrofit fixtures for which the Bidder seeks payments. The Bidder will reduce the number of fixtures for which it seeks payment over the year by approximately 1/2 the number of fixtures observed to be inoperative.

The Bidder will review building use throughout the contract to identify any changes. Changes in building use are analogous to the creation of a new building type/usage area. These new building type/usage areas will be metered to determine the proportion of lights in operation.

3. Reporting Findings

The Bidder will estimate the average proportion of lights in operation in a given building type/usage area for PG&E's five costing periods of summer peak, summer partial peak, summer off-peak, winter partial peak, and winter off-peak. The Bidder will record this information in Table II-D. If fixtures are metered, the average proportion of lights in operation equals the sum of the time each metered light was on divided by the total time all lights were metered. If circuits are metered, the average proportion of lights in operation equals the average metered circuit load divided by the total lighting load connected to the circuit.

E. Calculation of Peak Capacity Savings and Annual Energy Savings

The Bidder calculates peak capacity savings and annual energy savings by using the baseline demand data, including any adjustments to the baseline data, the post-retrofit demand data, and the post-retrofit proportion of lights in operation. For each retrofitted fixture, the Bidder calculates the savings per fixture as the difference between the pre-retrofit and post-retrofit demand values. The savings per fixture times the number of fixtures equals the total change in connected lighting load. This value times the average proportion of lights in operation during the summer peak period yields the peak capacity (kW) savings from the lighting retrofits. The total change in connected load times the average proportion of lights in operation during the other costing periods yields the average kilowatt savings for each of the other costing periods.

The energy (kWh) savings in each costing period equal the average kilowatt savings for the costing period times the number of hours in the costing period. The annual energy (kWh) savings equals the sum of the energy savings in each costing period.

The Bidder will record this information in Table II-E.

III. CALCULATION OF SAVINGS FROM LIGHTING CONTROLS

A. Measurement of Connected Load of Controlled Equipment (in Kilowatts)

To avoid double-counting the savings from energy-efficient measures that are controlled, the measurement of connected load controlled will occur after all energy-efficiency retrofits have been installed. The Bidder will determine the connected lighting load controlled by each control device by taking instantaneous wattage measurements from three fixtures of each fixture type controlled and calculating the per-fixture load controlled. If there are dedicated lighting circuits whose entire load is controlled by the control device, the Bidder can take an instantaneous wattage measurement of the entire circuit load.

The Bidder will record this information in Table III-A.

B. Measurement of Baseline (Uncontrolled) Average Operating Hours

The Bidder will use the method described in Section II.D, above, to accomplish the following substeps:

1. Develop a sampling plan for metering a sample of fixtures or circuits to determine the proportion of uncontrolled lights in operation within *every* unique building type/usage area.
2. Designate the duration of metering time that ensures the proportion of uncontrolled lights in operation during each costing period is reliably estimated.
3. Select a meter that can record data for the five costing periods.
4. Collect metered data on the proportion of lights in operation during each period for each building type/usage area.
5. Extrapolate sample results to the population of each building type/usage area.

The Bidder will record the information obtained from these substeps in Table III-B.

C. Measurement of Retrofit (Controlled) Average Operating Hours

The Bidder will use the method described in Section II.D, above, to accomplish the following substeps:

1. Sample the same fixtures or circuits sampled for the collection of baseline data.
2. Designate the duration of metering time that ensures the proportion of controlled lights in operation during each costing period is reliably estimated.

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3. Collect metered data on the proportion of lights in operation during each period for each building type/usage area.
4. Extrapolate sample results to the population of each building type/usage area.
5. Repeat the metering of the proportion of lights in operation throughout the contract as facility usage patterns change (i.e., as new building type/usage areas are created).

The Bidder will record the information obtained from these substeps in Table III-C.

D. Calculation of Peak Capacity (kW) and Annual Energy (kWh) Savings

The Bidder calculates peak capacity savings and annual energy savings by using the post-retrofit demand data, the uncontrolled proportion of lights in operation, and the controlled proportion of lights in operation.

For each control device, the Bidder will use the total connected kilowatts of the controlled equipment after any energy-efficiency retrofits. The Bidder will calculate the reduction in the proportion of lights in operation during the costing period caused by the controls (for example, 80% on before control and 40% on after control would indicate a reduction of 40%). This reduction times the connected kilowatts equals the average kilowatt reduction during the costing period. The peak capacity savings is the average kilowatt reduction during the summer peak period.

The energy savings in each costing period equals the average kilowatt savings for the costing period times the number of hours in the costing period. The annual energy savings equal the sum of the energy savings in each costing period.

The Bidder will record this information in Table III-D.

Table I-A
Pre-Retrofit

Area ID Number: 1

Area Location:

Area Type:

[illegible]

**List of Lighting Equipment Expected
to Be Installed Under PSP**

Area Type:

[illegible]

Table I-C
Post-Retrofit

Area ID Number:

Area Location: _____

Area Type: _____

[illegible]

Installed Under PSP

Area Type: _____

Table II-A & B

Area ID Number:

Area Location:

Area Type:

[illegible]

Table II-C
Measurement of Lighting Postretrofit Demand Data

Area ID Number: _____
Area Location: _____
Area Type: _____

[illegible]

Table II-D
Measurement of Lighting Postretrofit Operating Hours

Area ID Number: _____
Area Location: _____
Area Type: _____

[illegible]

Table III-B
Measurement of Pre-Retrofit (Uncontrolled) Operating Hours

Area ID Number: _____
Area Location: _____
Area Type: _____

[illegible]

Table III-C
Measurement of Post-Retrofit (Controlled) Operating Hours

Area ID Number: _____
Area Location: _____
Area Type: _____

[illegible]

Table III-D
Calculation of Peak Capacity and Annual Energy Savings

Area ID Number: _____
Area Location: _____
Area Type: _____

[illegible]