

Low Income Energy Efficiency Program Standardization Project Phase 3 Report

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Applicable to:

Pacific Gas & Electric Company
Southern California Edison Company
Southern California Gas Company
San Diego Gas & Electric Company

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Introduction

1.1 Background

California's investor-owned utilities (Pacific Gas & Electric Company, Southern California Edison Company, Southern California Gas Company and San Diego Gas & Electric Company) are currently engaged in a major effort to achieve greater consistency in their Low Income Energy Efficiency (LIEE) Programs. This effort was initiated by a December 29, 1999 California Public Utilities Commission ("CPUC" or "Commission") Assigned Commissioner's Ruling (ACR) instructing the utilities to "work jointly with any interested participants to develop a joint proposal for standardizing the selection criteria and installation manuals for the utilities' low income weatherization programs..." The ACR also instructed the utilities to conduct workshops and/or other forums to solicit input from interested individuals, and to submit a joint proposal to the Commission.

On March 22, 2000, Commissioner Neeper issued a second ACR relating to the standardization of LIEE programs. This ACR essentially clarified and extended the scope of standardization effort. As indicated in the March 22 ACR, the review of the Policy and Procedures Manuals "shall cover not only issues relating to installation standards, but also other policies and procedures that differ across programs." Moreover, the ACR instructed the utilities to develop recommendations for standardizing inspection policies and procedures across programs.

On May 8, 2000, the utilities filed a report on Phase I of the Project. That report provided recommendations on statewide Weatherization Installation Standards, a set of common measure-specific policies and procedures, and recommendations relating to measure selection criteria. In a July 5, 2000 follow-up filing, the utilities submitted additional recommendations relating to Weatherization Installation Standards. These recommendations were made in response to comments on the Phase I report made by contractors and other interested parties.

On September 7, 2000, just a week or so before the Phase 2 report was to be submitted, the Commission issued an Interim Ruling.¹ This ruling accepted a set of recommendations submitted earlier by the utilities in a the May 8, 2000 Phase 1 report and the July 5, 2000 follow-up filing, but instructed the utilities to further consider a set of recommendations on Program Year 2001 low-income programs filed by the Low Income Advisory Board on May 10, 2000, and instructed the utilities to develop a Customer Bill of Rights for low income customers.

The Phase 2 Report was filed on September 15, 2000. It made recommendations for standardizing a wide range of LIEE policies and procedures relating to customer eligibility, eligibility of rental units for certain measures, limits on minor home repairs and furnace repairs/replacements, inspections, ceiling insulation levels, and a number of other issues. An October 26, 2000 follow-up report was subsequently submitted to respond to the September 7, 2000 Interim Decision. It further discussed four issues that could not be resolved in the course of Phase 2, including ceiling insulation levels, the eligibility of master-metered dwelling units, the eligibility of evaporative coolers for rental units, and gas appliance testing. The Customer Bill of Rights was filed on March 9, 2001.

While the two Phase 2 reports discussed all of the issues referred to the Standardization Team by the Commission and made considerable progress in the development of proposals for standardization, they did not fully resolve all issues referred to the Team by the Commission. As a result, several remaining issues were carried over by the Commission into a third project phase. In its March 21, 2001 decision on the LIEE Standardization Project,² the Commission instructed the Team to make certain changes in the recommendations provided by the Team in its September 15, 2000 and October 26, 2000 Phase 2 reports. The Commission also ordered the Utilities to further consider a series of standardization issues deferred from Phase 2 or, in Commission's view, not adequately addressed by the Phase 2 reports. These instructions resulted in Phase 3 of the project.

In its Interim Opinion on Rapid Deployment of Low-Income Assistance Programs during the Energy Crisis (D. 01-05-033), the Commission ordered the utilities to offer an expanded set of measures through LIEE as part of Rapid Deployment. The Commission also instructed the Standardization Team to “develop recommendations for evaluating these new measures, including reporting requirements, evaluation methodology, budget and schedule.”³

¹ *Interim Opinion: Low Income Assistance Program Policies for Program Year 2001 and Standardization Project (Phase 1)*, D. 00-09-036, September 7, 2000, R. 98-07-037.

² *Interim Opinion: Low-Income Energy Efficiency Standardization Project (Phase 2) and Reporting Requirements Manual*, D. 01-03-028, March 15, 2001.

³ *Interim Opinion: Rapid Deployment of Low-Income Assistance Programs during the Energy Crisis*, D. 01-05-033, Ordering Paragraph 18.

Discussions with the Energy Division indicated that this instruction also covered the assessment of the cost-effectiveness of these measures as well as the development of installation standards for them. As a result of the issuance of D. 01-05-033 on May 3, 2001, the Standardization Team requested an extension of the filing date for the Phase 3 report, from May 15 to July 2, 2001. The Commission granted this request in Commissioner Lynch's June 6, 2001 Assigned Commissioner's Ruling.

1.2 Objectives of Phase 3

The objectives of phase 3 are essentially the results of previous Commission instructions and Standardization Team decisions. These objectives are:

- To develop additional sections and appendices for the Statewide Weatherization Installation Standards Manual. The need for these sections and appendices was identified by the Standardization Team in the course of Phases 1 and 2.
- To respond to the Commission's instructions to modify several policy and procedures recommendations made in the Team's Phase 2 report as well as its October 26, 2000 follow-up report;
- To address several policy and procedures issues unresolved in Phase 2; and
- To respond to the Commission's instruction to develop a Bill of Rights for low income customers.
- To satisfy the Commission's order relating to the assessment of new measures to be offered under the LIEE Program as part of Rapid Deployment.
- To develop new statewide installation standards for the Rapid Deployment measures.

1.3 Phase 3 Public Workshops

Public workshops have been a critical element of all three phases of this project. As noted in previous reports, several public workshops were held in Phases 1 and 2. The following workshops were held in the course of Phase 3:

- An October 23, 2000 workshop was held in San Diego to receive input on issues relating to various policies and procedures subsequently covered in the Phase 2 follow-up report.
- Workshops were held on January 25, 2001 in San Diego and on February 20, 2001 in San Francisco to discuss the Customer Bill of Rights. Summaries of those workshops were submitted with the Customer Bill of Rights Report on March 9, 2001.

- Workshops were held on April 3, 2001 in Downey and April 10, 2001 in San Francisco to receive input on Phase 3 issues. Appendix A contains a summary of the April 3 workshop. No members of the public attended the April 10 workshop.

The input received in these workshops and written comments provided by interested parties had a significant influence on the recommendations contained in this report.

1.4 Organization of Report

The remaining sections of this report are organized as follows:

- Section 2 discusses revisions in recommended statewide policies and procedures made on the basis of the Commission's March 21, 2001 decision on the LIEE Standardization Project (D. 01-03-028);
- Section 3 presents recommendations relating to several previously unresolved issues highlighted in the Commission's March 21, 2001 decision;
- Section 4 summarizes the changes made to the WIS Manual in the course of Phase 3;
- Section 5 discusses the assessment of energy efficiency measures offered as part of Rapid Deployment; and
- Section 6 offers some comments relating to the standardization process and the ongoing process of measure assessment.

The following appendices are also included to provide additional detail relating to Team recommendations:

- Appendix A presents a summary of the April 3, 2001 public workshop held to discuss Phase 3 issues.
- Appendix B summarizes current program eligibility criteria based on the customer's end-use fuels.
- Appendix C contains additional sections of the Conventional Home Weatherization Installation Standards Manual developed during Phase 3.
- Appendix D contains Additional sections of the Mobile Home Weatherization Installation Standards Manual developed during Phase 3.
- Appendix E contains new installation standards for Rapid Deployment measures.
- Appendix F contains draft Appendices for the Weatherization Installation Manuals.
- Appendix G contains technical details on the assessment of Rapid Deployment measures.
- Appendix H presents technical details on the assessment of ceiling insulation levels.

2

Modifications to Phase 2 Recommendations

2.1 Introduction

Ordering Paragraphs 3 and 5 of the Commission’s March 15, 2001 decision¹ instructed the utilities to make several specific changes in the recommended statewide policies and procedures contained in the Phase 2 reports. These changes dealt with limits on prior participation in the LIEE Program, fractional qualification in multifamily complexes and mobile home parks, limits on minor home repairs and furnace repairs/replacements, inspection policies and procedures, ceiling insulation levels, use of per-home Pass rates, minor home repairs and caps on the treatment of multifamily and master-metered units. The Team has complied with all of these instructions. Subsection 2.2 cites the specific instructions and explains how the Team’s recommended policies and procedures have been modified to accommodate the Commission’s directives.

2.2 Modifications

2.2.1. *Limits on Prior Participation in the LIEE Program*

The Commission instructed the Team to alter its policies on prior participation in the LIEE Program to provide that “any unit that previously failed a combustion appliance safety pre-test, and therefore did not receive infiltration-related measures (but received other measures) shall be considered eligible for the measures it did not receive if the test is subsequently passed during the 10-year window.”² The Team has made this change in Section 2.8 of the Statewide Policy and Procedures Manual (P&P Manual). A copy of the P&P Manual is being submitted to the Commission under separate cover. The specific wording of the section dealing with prior program participation now reads:

In general, homes that have been weatherized under the LIEE Program within the past 10 years are not eligible for weatherization in the current program. However, a home that has been treated under the LIEE program during the past 10 years will be considered eligible for participation if the home needs ceiling insulation, and if ceiling insulation was previously deemed non-feasible as a result

¹ D. 01-03-028.

² D. 01-03-028, Ordering Paragraph 3.

of a structural inadequacy (e.g., knob and tube wiring) that has since been resolved or is no longer considered to result in non-feasibility. Moreover, any unit that previously failed a combustion appliance safety pre-test, and therefore did not receive infiltration-related measures (but received other measures) shall be considered eligible for the measures it did not receive if the test is subsequently passed during the 10-year window. Other exceptions may be granted with the written approval of the utility Administrator's Program Manager.

2.2.2. Fractional Qualification in Multifamily Complexes and Mobile Homes

The Commission also ordered the Team to alter the policy with respect to fractional qualification in multifamily complexes and mobile homes, as follows: “The Utilities shall qualify the entire multi-family complex or mobile home park for LIEE services if at least 80% of all the individual dwelling units meet the LIEE Program income requirements, irrespective of whether they have been previously treated. This 80% rule should apply separately to attic insulation levels for common attic areas.”³ In compliance with this instruction, Section 2.2.6 of the P&P Manual has been modified to read:

To qualify an entire multifamily building for the full Program, households living in 80% of all (occupied and unoccupied) dwelling units must be occupied by income-qualified households. However, if 80% of all units adjacent to a common attic space satisfy the 80% rule, that attic space may be treated even if the 80% rule is not satisfied for the entire building. In the event that fewer than 80% of the dwelling units are occupied by income-qualified households, individual dwelling units occupied by qualifying households may still be treated.

To qualify an entire mobile home park for the full Program, households living in 80% of all dwelling units must be occupied by income-qualified households. In the event that fewer than 80% of the relevant dwelling units are occupied by income-qualified households, individual dwelling units occupied by qualifying households may still be treated.

2.2.3. Limits on Minor Home Repairs and Furnace Repairs/Replacements

The Commission instructed the Utilities that “The 20% overall expenditure limit on minor home repairs/furnace replacements and repairs adopted by Resolution E-3586 shall apply to all utilities. If a utility sees that it is likely to exceed the 20% level, then it can request a relaxation of that guideline via Advice Letter on a case by case basis.”⁴ The Team has added this expenditure limit to Section 6.3 of the P&P Manual. The relevant portion of that section now reads:

³ D. 01-03-028, Ordering Paragraph 3.

⁴ D. 01-03-028, Ordering Paragraph 3.

Total expenditures on the combination of minor home repairs and furnace repairs and replacements are limited to 20% of total program expenditures. In the event that a utility expects that it may exceed this level, it may request a relaxation of this guideline via an advice letter on a case by case basis.

The Commission also instructed the Team to clarify the P&P Manual “to indicate under what circumstances additional repairs (if any) can be made by the LIEE weatherization contractor to respond to gas leak/carbon monoxide emission problems identified during the utility’s gas appliance testing procedures, and what expenditure limits would apply to those repairs.”⁵ In response to this directive, the Team added the following language to Section 6.3 of the P&P Manual:

It should be noted that the expenditure limits apply to all minor home repairs and furnace repairs and replacements, including any actions taken to respond to gas leak/carbon monoxide emission problems identified during the utility’s gas appliance testing procedures.

The Team also refined Section 6.4 of the Manual to read:

In the event that a contractor requests permission from the utility Program Manager to exceed the limit on minor home repairs or the combination of minor home repairs and furnace repairs and replacements, the Program Manager will base a decision on the status of the Contractor’s minor home repair budget, the overall program budget, and the need for the repairs in question. If the Program Manager deems it necessary to limit expenditures on the home, measures will be prioritized using the following general priority list: repairs needed to mitigate imminent hazards (e.g., repairs made to mitigate carbon monoxide problems, or door repairs where doors will not close or lock); repairs needed to mitigate major infiltration sources (e.g., broken windows, holes in doors, etc.); repairs required to permit the installation of a measure; other repairs.

2.2.4. Inspection Policies and Procedures

The Commission’s decision instructs the Utilities to modify the Phase 2 Report “to describe the circumstances that may warrant larger sample sizes than the minimums presented in Table 5-2,” and to “clarify that the utilities will keep records of actual inspection frequencies, by contractor, as well as the number of minor corrections.”⁶ The Team has added the following language to Section 8.4.3 of the P&P Manual:

Utilities or their inspection contractors may exceed these minimum sample sizes if, in the judgment of the administrator, larger sample sizes are necessary to preserve

⁵ D. 01-03-028, Ordering Paragraph 3.

⁶ D. 01-03-028, Ordering Paragraph 3.

program quality control. Circumstances that may justify larger sample sizes include, but not be limited to, the following:

- 1. If the utility's program is small enough that 100 % post inspections can be conducted without substantially increasing overall program expenditures.*
- 2. If a particular contractor exhibits a pattern of inspection failures that justifies inspection of a higher percentage of jobs.*
- 3. If a contractor is on a quality improvement plan which requires them to improve their inspection pass rates.*
- 4. If contractor crews are newly trained or new to the program, and require closer field supervision and on the job training.*
- 5. If a contractor's installation crews are not sure of the program inspection standards, as exhibited in failed inspection results.*
- 6. If a contractor's allocation of homes covers multiple counties.*
- 7. If post-inspections are done in conjunction with post-installation CO tests.⁷*
- 8. If sample inspection results are also used to estimate measure pass rates for the population of homes treated by a contractor.*

Utilities will keep records of actual inspection frequencies by contractor.

The Team has also included the following language in Section 8.4.9:

Each time a minor job correction is made, the contractor will be notified. Minor corrections will become part of the contractor's record. Inspector reports will be entered into a database, and reports on contractor performance will be monitored.

2.2.5. Ceiling Insulation Levels

In its Phase 1 and 2 reports, the Team had recommended the use of an average of avoided costs and retail rates to value the savings from ceiling insulation for the purposes of determining amounts of insulation to be added. The Commission accepted this practice on an interim basis, but indicated that “the final determination on whether to establish ceiling insulation levels based on retail rates, avoided costs or combination of the two will be a continuing issue until the overall LIEE cost-effectiveness methodology is determined.”⁸ This issue is considered in Section 3 of this report.

2.2.6. Minor Home Repairs

D. 01-03-028 also instructed the Utilities to “expand the definition of minor home repairs in the WIS manuals, list replacement of switch/outlet covers as a repair that mitigates [an] imminent hazard and clarify that replacement applies to all walls.” The P&P Manual now

⁷ The rationale here is that there are economies associated with conducting post-installation inspections and post-installation CO testing.

⁸ D. 01-03-028, Ordering Paragraph 3.

includes the following minor home repair (MHR) under the heading of MHRs designed to mitigate imminent hazards: *Replace broken/cracked switch/outlet covers*. The WIS manuals also list this MHR and indicate that it applies to all walls.

3

Additional Recommended Policies and Procedures

3.1 Introduction

To date, the Standardization Team has submitted three reports to the Commission: a Phase 1 report, filed on May 8, 2000; a Phase 2 report, filed on September 15, 2000; and a follow-up report, submitted on October 26, 2000. While the Phase 2 reports discussed all of the issues referred to the Standardization Team by the Commission and made considerable progress in the development of proposals for standardization, they did not fully resolved all issues to the satisfaction of the Commission. As a result, several remaining issues were carried over by the Commission into a third project phase. In its March 15, 2001 decision on the LIEE Standardization Project (D. 01-03-028), the Commission instructed the utilities to “consider the (following) carryover standardization issues identified in today’s decision, with inputs from interested parties in a workshop setting:

- (a) Whether customers being served on a business rate should be automatically excluded from the LIEE program.
- (b) Whether customers who do not purchase their heating fuel from the utility should be excluded from the LIEE program.
- (c) Procedures for limiting expenditures by housing type, including specific caps proposed by the utilities along with an explanation of
 - (1) How the caps are determined
 - (2) The relationship between the housing stock in each utility’s service territory and the maximum percentage of funds devoted to multi-family housing.
 - (3) How the proposed caps are consistent with the approach recommended for limiting treatment of master-metered units (see (d) below).
- (d) Procedures for limiting the treatment of master-metered units, including specific caps proposed by the utilities and an explanation of how they were determined.
- (e) Whether the procedures explained in (c) and (d) above should be standardized across utilities and if so, how.
- (f) Whether PG&E’s measure pre-approval approach should be continued on a standardized basis across utilities and, if so, how inspectors should evaluate contractors’ work with respect to pre-approvals in determining a “pass” or “fail” situation.

- (g) How dispute resolution procedures for inspector-contractor disagreements should be standardized across utilities. Alternates to having utility employees serve as arbitrators under these procedures should be carefully considered.
- (h) Whether renters should be provided with evaporative coolers under the LIEE program and if so, what type (i.e., portable versus permanent) and whether co-payments should be required.
- (i) How the avoided cost assumptions used in the designation of ceiling insulation levels should be modified based on the avoided cost determinations made in the PY 2001 energy efficiency program planning process, A.99-09-049 et al.
- (j) More detailed specification for the gas appliance safety/combustion appliance safety (CAS) testing minimum standards adopted in Phase 2, including threshold CO levels.”¹

These issues were discussed at several Team meetings as well as at public workshops held on April 3, 2001 and April 10, 2001. This section summarizes the Standardization Team’s recommendations relating to these aspects of the LIEE Program.

The rest of this section report is organized as follows:

- Subsection 3.2 considers policies relating to the eligibility of residential customers on a business rate;
- Section 3.3 discusses the practice of basing customer eligibility partly on the heating fuel used by the customer;
- Section 3.4 discusses limitations on the treatment of master-metered dwelling units;
- Section 3.5 deals with the means of achieving equity across housing types;
- Section 3.6 considers the use of pre-approvals of measures to be installed in individual homes;
- Section 3.7 discusses standardization of inspection related dispute resolution procedures;
- Section 3.8 considers designating renters eligible for evaporative coolers and other equipment measures;
- Section 3.9 presents revised ceiling insulation levels based on updated assumptions; and
- Section 3.10 presents a more detailed specification of the natural gas appliance testing minimum standard.

¹ *Interim Opinion: Low-Income Energy Efficiency Standardization Project (Phase 2) and Reporting Requirements Manual*, D. 01-03-028, March 15, 2001.

3.2 Eligibility of Residential Customers on a Business Rate

3.2.1 Background

Some low-income customers live in facilities (group homes, migrant worker housing, etc.) that are not on residential rates. Under the current LIEE structure, these households are not eligible for the LIEE Program. In its Phase 2 report, the Team recommended the continuation of the requirement that customers on nonresidential rates be considered ineligible for the LIEE Program. However, The CPUC Consumer Services Division (CSD) argued in filed comments that low-income customers “living in nonprofit group living facilities, migrant farmworker housing centers, certain employee housing and housing for agricultural employees” should be considered eligible.² The Team agreed to reconsider this issue in the course of Phase 3.

This is a complex issue. Arguments in favor of making low-income households living in some group quarters eligible for the Program are:

- They tend to be among the poorest of the poor, and deserve the same treatment as other low-income customers.
- Eligibility should be the same for LIEE and CARE, and customers living in certain qualified nonprofit group living facilities and qualified agricultural employee housing facilities are eligible for CARE services.

On the other hand, there are also arguments against making these group homes eligible for the LIEE Program:

- They contribute to Public Goods Charges through non-residential rates, rather than residential rates. As a result, they should be treated under non-residential programs.
- It may be difficult to certify that savings from the installation of LIEE measures will be used to benefit low-income residents of these facilities.
- They are eligible for a variety of nonresidential programs, and can receive weatherization measures without participating in LIEE.
- Group homes may be structurally different from typical residential dwellings, and this could create difficulties for contractors attempting to weatherize them.
- Group home decision makers may not be on-site, and as a result may be difficult to contact for necessary approvals.

² See *Comments of the Consumer Services Division on the Low-Income Weatherization Program Standardization Project: Phase II Final Report/Joint Proposal*, October 19, 2000.

3.2.2 Phase 3 Recommendations

The Standardization Team has discussed this issue at length, and recommends that a group home should be eligible for LIEE services as long as it is currently eligible for CARE under current CARE guidelines applicable to group living facilities,³ and the structure in question is a single family, multifamily or mobile home suitable for weatherization under LIEE standards.⁴ CARE-eligible facilities include but are not limited to the following:

- Migrant farmworker housing centers, as defined in Section 50710 of the Health and Safety Code, provided that 70% of all energy usage in master-metered facilities and 100% of all energy usage in individually-metered facilities is residential;
- Privately owned employee housing, as defined in Section 17008 of the Health and Safety Code, that is licensed and inspected by the state and local agencies pursuant to Part I of Division 13, and in which 100% of all energy use is residential;
- Housing for agricultural employees operated by non-profit entities, as defined in Subdivision (b) of Section 1140.4 of the Labor Code, and that has an exception from local property taxes pursuant to subdivision (g) of the Revenue and Taxation Code, provided that 70% of all energy usage in master-metered facilities and 100% of all energy usage in individually-metered facilities is residential;
- Group living facilities, defined as transitional housing (such as a drug rehabilitation or half-way house), short- or long-term care facilities (such as a hospice, nursing home, children's home or seniors' home), group homes for physically or mentally challenged persons, or other nonprofit group living facilities; and
- Homeless shelters, hospices and women's shelters with the primary function of providing lodging and which are open for operation with at least six beds for a minimum of 180 days and/or nights (including satellite facilities in the name of the licensed corporation, where 70% of the energy supplied is for residential purposes).

³ See D. 92-04-024, April 8, 1992; D. 92-06-060, June 17, 1992. D. 95-10-047, October 18, 1995. Also see *Commission Advisory and Compliance Division, Workshop Report on California Alternate Rates for Energy (CARE): The Development of Guidelines to Implement CARE for Migrant Farmworker Housing, Agricultural Employee Housing, and Employee Housing*, May 1995.

⁴ It should be noted that CARE income eligibility requires that 100% of the residents of the facility (other than live-in staff) meet the 175% income guideline. According to this recommendation, this income eligibility criterion will be applied to group homes for the purposes of determining LIEE income eligibility.

3.3 Eligibility of Customers Based on Heating Fuel

3.3.1 Background

With one exception, each utility currently limits LIEE eligibility to customers using a heating fuel it distributes.⁵ Moreover, each utility places other fuel-related restrictions on individual measures for which households are eligible. Appendix B summarizes specific eligibility criteria based on end-use fuels for each of the four utilities.

Several issues have been raised in the course of the discussion of standardization. Some of these have been raised internally by Team members; others have been raised by other parties in workshops and/or in comments on Team filings. The Commission's Preliminary Decision instructs the utilities to further consider "whether customers who do not purchase their heating fuel from the utility should be excluded from the LIEE program."⁶

The Team has interpreted this instruction relatively broadly to include cases where a customer may not be eligible for a specific set of measures because of the fuel used for either heating or water heating. Some of the issues associated with fuel-related eligibility are discussed below.

In comments on the Phase 2 report, CSD questioned the practice of making customers with electricity service, but without natural gas service, who choose to heat with a fuel other than electricity or natural gas ineligible for weatherization services.⁷ While the Team understands that weatherization could "increase the comfort level of the household, reduce energy related hardships and be cost effective for the customer,"⁸ it questions the efficacy of providing free weatherization services to customers who heat with fuels on which the Public Goods Charge (PGC) is not collected. Expanding LIEE eligibility to these customers would essentially force households who contribute to the PGC for their heating fuels to subsidize those who do not. In the view of the Standardization Team, this would be an inequitable practice. Nonetheless, the Team proposes a means of accommodating the needs of such customers in Subsection 3.2.

SESCO, Inc. (SESCO) has argued that customers who use non investor-owned utility (non-IOU) heating fuels but who have air conditioning should receive weatherization services. There are presumably two rationales for this proposal. First, providing weatherization services to these customers may still result in utility bill reductions. Second, customers with air conditioning may expend considerable amounts on cooling, and thus contribute to

⁵ Note, however, that, under an inter-utility agreement, SoCalGas treats homes with electric space heat in their overlap area with SCE.

⁶ Op. cit, p. 78.

⁷ CSD, October 19, 2000, p.3.

⁸ CSD, op. cit.

program funding through their payment of PGCs on electricity.⁹ While this point of view may seem to have some merit at first glance, a policy of providing weatherization measures to these homes could be problematic. Under the Team’s recommended statewide policies, all utilities will observe a minimum standard for natural gas appliance testing. However, under the minimum standard no testing would be conducted for homes using a combustion fuel other than natural gas. The Team does not feel that this minimum standard should be extended to apply to cases where other non-utility combustion fuels are used.

Although parties to the proceedings have not specifically raised this point, fuel-related limitations may cause some inequities in overlapping service areas where one IOU provides electricity and another distributes natural gas. Unless customers participate in programs offered by both utilities, they may not be eligible for all of the measures for which they would be eligible if they were served by a dual-fuel utility. However, a household in an overlap area may not be aware that they have the opportunity to participate in both programs. In Subsection 3.3.2, the Team will make recommendations designed to mitigate this concern.

3.3.2 Phase 3 Recommendations

In order to improve the extent to which LIEE customer energy fuel-related eligibility criteria treat customers in similar circumstances equitably, the Team offers the following recommendations:

- In the event that a customer uses a heating fuel provided by an entity other than an IOU, the utility will install measures for which the customer is eligible under the utility’s program and refer the customer to the Department of Community Services and Development (DCSD) Program. In order to implement this step, the utilities will work with DCSD and its local contractor agency network to set up a formal referral procedure.
- In the event that a customer lives in an area where one IOU utility provides one service (either natural gas or electricity) and another IOU provides the other fuel (either electricity or natural gas), and if one utility is not providing all measures, a referral system will also be used to give the customer the opportunity to receive all measures for which he/she is eligible under the LIEE Programs of the two utilities. If the electric utility contacts the household first, it will install measures for which the household is eligible under the electric utility’s Program and refer the customer to the natural gas utility’s program for measures relating to natural gas end uses. If the initial contact is made by the natural gas utility, this utility will install measures for which the customer is eligible under the utility’s program and refer the

⁹ The Commission instructs the utilities to “discuss whether (and under what circumstances) providing weatherization services to customers that do not use the utility’s services for heating will actually result in utility bill reductions under the ratepayer-funded LIEE program.” (Preliminary Decision, p. 13) This is such a case.

customer to the electric utility's program for measures applicable to electric end uses. In both cases, the utility installing infiltration measures will conduct natural gas appliance testing as long as the utility serves natural gas somewhere in its service area (and thus has trained gas service representatives). In the event that the customer has electric space heat served by an electric-only utility, the electric utility will not install infiltration measures if natural gas appliances are present. However, in this case the electric utility will refer the home to the DCSD Program.

- In order to mitigate the duplication of costs that could otherwise be associated with customers participating in two utility programs, two steps will be taken: first, outreach staff in each program will accept customer income qualification documentation already obtained by outreach staff in the other program; second, gas and electric utilities will offer common energy education in overlap areas so that customers will need to receive education only under one program.

3.4 Limitations on Treatment of Master Metered Housing

3.4.1 Background

Current utility practices relating to the treatment of master-metered dwellings are as follows:

- For PG&E and SDG&E, master-metered customers are not eligible for the LIEE Program; customers must be individually metered or sub-metered to be eligible.
- For SoCalGas, master-metered customers are eligible, but cannot exceed 15% of any contractor's allocation.
- For SCE in the non-overlap area, master-metered customers are eligible as long as they have electric space heat.

There are a variety of advantages and disadvantages associated with making master-metered customers eligible for the LIEE Program. The primary advantages are:

- Tenants in master-metered units indirectly pay the Public Goods Charge through rents,
- Installation of measures could reduce these rents or at least reduce pressures for rent increases over time,
- Tenants receiving measures may enjoy increases in comfort, health and safety, and
- Some of the possibly neediest households in the State, including migrant farm workers, live in master-metered dwellings.

Key disadvantages of making master-metered customers eligible for the Program are:

- There is no guarantee that tenants will receive the benefits of reductions in energy bills associated with the installation of LIEE measures (no feasible way to enforce

- a landlord pass-through of bill reductions, since the CPUC has no jurisdiction over the landlord-tenant relationship),
- The installation of minor home repairs could even lead to increases in rents under some circumstances if measures increased the habitability of dwelling units,
 - It is difficult to measure energy savings for a dwelling unit when master metering is present,
 - It may be difficult to get owner approval in the event that master-metered housing is substandard, and
 - Recruiting participants could cause friction between tenants and landlords if housing is substandard.

In the October 26, 2000 report, the Standardization Team recommended that master-metered dwellings be eligible for the LIEE Program under the following conditions:

- Deemed savings should be permitted for use in the evaluation of LIEE Program savings for master-metered units.
- Program personnel should attempt to explain the Program to the landlord or property manager prior to contacting tenants, in order to minimize the creation of friction between landlords and tenants.
- If the master-metered dwellings are multifamily units, the fractional (80%) qualification used for multifamily dwellings should be used for the purposes of qualifying tenants for the Program. Landlords should be informed that income documentation will be required for the purposes of determining eligibility.
- Utilities may set a maximum on the percentage of participants treated by a contractor in a program year that are master-metered. This percentage should reflect the predominance of master-metered dwellings in the service area, but should be no higher than 15%.

In D. 01-03-028, the Commission instructed the utilities to provide additional information on “procedures for limiting the treatment of master-metered units, including specific caps proposed by utilities and an explanation of how they were determined.”¹⁰

3.4.2 Phase 3 Recommendations

The Team now proposes a specific set of caps and provides an explanation of the mechanism for determining these caps. Table 3-1 presents the limits on the treatment of master-metered units for the four service utility programs. In general, these caps are based on the proportions of customers on master meters, subject to the limit of 15%. As shown, three of the utilities have relatively high proportions of low-income customers on either electric or gas master meters, and will impose caps of 15%. SoCal Edison, which has a relatively low percentage

¹⁰ Op. cit, p. 78.

of low-income customers on master meters (primarily because master metering is less common on electric meters) will impose a lower cap of 8%.

Table 3-1: Caps on Master-Metered Dwellings

Characteristic	PG&E	SCE	SoCal Gas	SDG&E
Estimated percentage of low-income dwellings with electric master meters	10.0%	8.0%	na	5.0%
Estimated percentage of low-income dwellings with natural gas master meters	18.0%	na	16.0%	30.0%
Cap on master-metered dwellings as a percentage of total treated units	15.0%	8.0%	15.0%	15.0%

These caps will be implemented through limits placed in contracts with installation contractors.

3.5 Limitations on Expenditures by Housing Type

3.5.1 Background

Currently, the utilities differ with respect to limitations on the treatment of multifamily dwellings. PG&E has minimums and maximums on the treatment of multifamily units as a percentage of total units treated by specific contractors, while other utilities do not currently impose such a limit.

In the October 26, 2000 Phase 2 follow-up report, the Standardization Team recommended that the utilities have the option of imposing caps on the treatment of multifamily dwellings, and that these caps be cast in terms of the percentage of program funds expended on such units. The purpose of allowing such caps was to give utilities the ability to balance the treatment of various residence types. The belief was that in the absence of such caps, there could be a tendency for contractors to target multifamily dwellings at the expense of single family dwellings and mobile homes.

In a recent Interim Opinion,¹¹ the Commission instructed the Standardization Team to explain three aspects of this proposal: how these caps will be determined; the relationship between the housing stock in each service area and the caps; and the way in which these caps would be consistent with the caps on master-metered dwellings.

¹¹ Op. cit, p. 78.

3.5.2 Phase 3 Recommendations

In considering the Commission’s instructions, the Team decided to alter the way in which controls on the residence type mix of treated units are imposed. After considerable discussion, the Team concluded that the primary reason for being concerned with the mix of residence types treated under the LIEE Program was that equity needed to be preserved across residence types. To preserve equity, the utilities agree to adopt *long term* goals of having the mix of dwellings treated under the Program reflect the residence type mix found in the low income communities served by their programs. Note that the rationale for this provision is very different from the rationale for limiting the treatment of master-metered units. Most importantly, there are considerably more questions relating to the extent to which benefits are passed on to low-income customers living in master-metered households. As a result, the Team proposes the use of long-term targets, rather than caps, for multifamily dwellings. The Team further recommends that these targets be cast in terms of *units treated*, and that they be set equal to the *proportions of multifamily dwellings in the overall low-income housing stock of each utility’s service area*. Table 3-2 presents the Team’s best estimates of the percentage of low-income households living in multifamily dwellings in each utility’s service area.

Table 3-2: Long-Term Targets for Treatment of Multifamily Dwellings

Characteristic	PG&E	SCE	SoCal Gas	SDG&E
Estimated percent of low-income households living in multifamily (5+ units)	23.1%	51.3%	32.8%	47.5%

There are, of course, several reasons why homes treated in a specific year may not reflect the dwelling type mix of low-income housing:

- Other programs (e.g., Hard-to-Reach programs) may overlap the LIEE Program, and may affect the overall treatment of eligible units. This could be a serious issue if contractors in other programs target low-income households.
- The mix of homes treated in the past, under individual utility programs, may not represent the dwelling type mix of that utility, so current programs may be designed to bring total program treatment rates into alignment.
- It may make sense from a marketing and outreach standpoint to target certain residence types each year, with the expectation that equity would be achieved over time.

As a result, the Team recommends that utilities be allowed to retain the discretion to deviate from long-term targets within specific program years. It is also recommended that utilities

have the flexibility to promote or limit the treatment of multifamily units in individual program years as long as these actions are consistent with the achievement of these long-term goals.¹²

3.6 Measure Pre-Approval

3.6.1 Background

The utilities differ to some extent with respect to the use of measure pre-approvals in their weatherization programs. Utility practices in this area are as follows:

- PG&E has the installation contractor's Energy Specialist (ES) perform a measure evaluation at the time of the energy education. While still on the customer's premises, the ES will call the Central Inspection Program (CIP) toll free number and report the weatherization measures and quantities feasible, report the type and operating status of all combustion appliances present, and co-ordinate the pre-inspection appointment with the customer and PG&E. CIP will print an Inspection Work Order (IWO) with the ES's measures, quantities, and comments about the home for use by the inspector. At the time of the PG&E visit, the inspector will confirm that the measures identified by the Energy Specialist are feasible, the quantities are accurate, and no feasible measures were overlooked. In addition, the inspector will fill out a refrigerator application and check the refrigerator outlet for proper wiring. The inspector will perform a CAS inspection and based on the results will identify which of the feasible measures can be installed. After the IWO is data entered, an electronic file will be sent to the contractor identifying which of the ES's measures and quantities were approved, any additional measures required, CAS inspection results, and inspector comments about the home. If PG&E is unable to complete a CAS test, the home will be reported to the contractor as eligible for non-infiltration measures only, until a CAS test is completed. When the ES, the pre inspector, and the installation crew all miss a feasible measure, the post inspector will make that measure a correction fail rather than a standard fail. (Correction fails that are repaired within 10 days are changed to first inspection passes.)¹³
- SDG&E has its program management prime contractor do an initial assessment of the need for measures, prior to assigning a home for installation by the installation subcontractor. The subcontractor then does a more detailed audit and reconciles any discrepancies in its audit findings with the prime program management contractor. SDG&E also has its inspectors conduct a "job start" inspection prior to measure installations in multifamily complexes.

¹² It should be noted that the Commission's Needs Assessment Project will provide a benchmark with respect to the current status of the utilities in meeting this target.

¹³ PG&E's year 2001 program is allowing the ES to install five Compact Fluorescent Lights (CFL) at the time of the Energy Education because contractors have reported increased success in enlisting participants when they were able to offer CFL's at the time of the energy education.

- In the SoCalGas weatherization program, the installation contractor (or a subcontractor) does the initial measure assessment. SoCalGas does not have a pre-inspection process conducted separate from outreach and assessment. Every service provider under the program contracts with or hires personnel to income-qualify customers for the program. Outreach and assessment personnel are required to attend extensive training given by SoCalGas. This training provides them with the tools for qualifying customers and assessing the measures that are feasible to install under program guidelines. The certified outreach and assessment personnel recruit customers for the service providers by which they are employed. They are responsible to qualify the customer and the dwelling and make an assessment (pre-inspection) of the home for feasible measures to be installed. In addition, they provide the customer with energy education. The customer is advised of the measures identified for installation but are told that the installation contractor will make final determination for feasibility of installation.
- In the SCE program, the installation contractor assesses the need for measures, and no pre-approval is needed from any other entity.

In D. 01-03-028, the Commission instructed the utilities to consider, with the help of public input, “whether PG&E’s measure pre-approval approach should be continued on a standardized basis across utilities and, if so, how inspectors should evaluate contractors’ work with respect to pre-approvals in determining a “pass” or “fail” situation.”¹⁴

3.6.2 Recommendations

The Standardization Team recommends that all utilities be permitted to continue the use of their current inspection approach, rather than adopting PG&E’s pre-approval approach. This position is offered for the following reasons:

- PG&E believes that pre-approval is a useful means of assessing the structure, determining the feasibility of specific measures, and identifying pre-existing conditions. PG&E has had serious problems with specific contractors removing and replacing serviceable weatherization measures in the past, which it believed necessitated this practice. While the other utilities agree with the need to accomplish these functions, they believe that they can be accomplished at a lower cost by using other means.
- In the programs administered by SCE, SDG&E and SoCalGas, some kind of assessment is done prior to the installation of weatherization measures. In all except the SCE weatherization program, this assessment is done by a party other than the installation crew, so an independent third party check is provided. Although SCE does not have an independent party do such an assessment, SCE does not believe that the cost of independent pre-assessment would be justified for the limited number of measures it installs under its electric only programs.

¹⁴ Op. cit, p. 78.

- Adopting pre-approval inspections could substantially increase inspection-related administrative costs for SCE, SDG&E and SoCalGas. While PG&E has required pre-approvals for several years, its cost of pre-approval is lower than might be faced by the other utilities because it is able to take advantage of economies associated with doing pre-installation natural gas appliance CO testing¹⁵ and pre-installation inspections. A portion of the cost of PG&E's pre-installation home visits is charged off to its natural gas appliance CO testing budget, which the other utilities do not have authorization to collect from their customers at this time.

3.7 Standardization of Dispute Resolution Procedures

3.7.1 Issues

Each utility has a dispute resolution process designed to deal with situations in which a contractor contests an inspection failure. Two of the utilities (PG&E and SDG&E) have procedures in which two parties (the in-house utility inspection group and the weatherization contractor) work together to resolve disputes.¹⁶ However, SoCalGas has a dispute resolution process involving three parties: the third party inspection contractor, the weatherization contractor, and a SoCalGas arbitrator. SCE recently adopted a similar model using a third party mediator. In its Phase 2 report, the Standardization Team proposed that current differences across programs be allowed to reflect outsourcing of inspections by SCE and SoCalGas and the need to have in-house staff involved in dispute resolution.¹⁷

The Commission's D. 01-03-028 instructed the utilities to consider "how the dispute resolution procedures for inspector-contractor disagreements should be standardized across utilities. Alternates to having utility employees serve as arbitrators under these procedures should be carefully considered."¹⁸

3.7.2 Recommendation

The Standardization Team has considered this issue further, and maintains its position that current utility practices be permitted to continue in this area. The Team believes strongly that individual utilities have the ultimate responsibility to ensure the proper installation of program measures, and that this responsibility cannot be left to a third party. The Commission has found repeatedly that the utilities have the ultimate responsibility for

¹⁵ The natural gas appliance test is called a Combustion Appliance Safety (CAS) test by PG&E. PG&E's CAS test involves more steps than the minimum standard for natural gas appliance testing, and includes the testing of propane and kerosene appliances for CO before the installation of infiltration-reducing measures in a home heated with PG&E electricity.

¹⁶ *LIEE Standardization Project: Phase II Final Report*, p. 5-3.

¹⁷ *Op. cit.*, p. 5-4.

¹⁸ See Ordering Paragraph 6(g), p. 78.

program quality control, and that this responsibility cannot be delegated to third parties. While the Team understands the Commission's apparent interest in having a neutral party mediate disputes, the utility cannot simply defer to such a party when the interests of its low-income customers, ratepayers and shareholders are at stake. Even though the utility may not be perceived by some parties as being "neutral," it nonetheless has no reason to act unfairly in resolving such disputes. If this form of mediation involved repeated visits by multiple parties to customers' homes, the process might violate customers' privacy rights and erode customer's service satisfaction. The neutrality of any third party mediator hired by the utility might still be challenged by disgruntled parties, simply on the grounds that they are being paid by the utilities, so outsourcing this task does not really represent an opportunity to avoid disputes. The current procedures seem to be working reasonably well for contractors and customers, and should be retained.

3.8 Eligibility of Renters for Evaporative Coolers and Other Measures

3.8.1 Background

As noted in the October 26, 2000 report, PG&E, SCE, and SDG&E all provide evaporative coolers to owner-occupied units with functional refrigerated air conditioning in some weather zones. However, these electric utilities' policies differ with respect to the treatment of rental units. SCE has been given Commission authorization to provide permanently installed evaporative coolers for renter-occupied dwellings. SCE requires a co-payment from the tenant. The other utilities do not offer any type of evaporative coolers to rental units.

The arguments in favor of making rental units with existing air conditioning eligible for evaporative coolers include:

- The use of evaporative coolers in place of refrigerated air conditioning results in significant energy bill savings to the renter,
- Renters pay Public Goods Charges, directly or indirectly, and deserve benefits of savings, and
- Evaporative coolers are one of the few measures that can significantly affect cooling loads during the hottest months of the year, which coincide with the utilities' summer peak electric demand periods.

The primary argument against providing evaporative coolers to rental units is that:

- Since the landlord takes ownership of the evaporative cooler, some of the major benefits of the unit might accrue to landlord in the form of enhanced property values.

SCE currently requires the tenant to make a small copayment on the unit. According to SCE, this provides a sense of ownership on the part of the customer and maximizes the use of Program funds.

The Standardization Team did not offer recommendations on the provision of evaporative coolers to rental units in its October 26, 2000 report. Instead, the Standardization Team proposed to consider this issue further as part of Phase 3. In its Interim Decision, the Commission ordered the Team to make recommendations in its Phase 3 report on “whether renters should be provided with evaporative coolers under the LIEE program and if so, what type (i.e., portable versus permanent) and whether co-payments should be required.”

3.8.2 Recommendations

The Team has considered this issue at length in the broader context of the eligibility of rental units for equipment measures (defined in this context as evaporative coolers, refrigerators and hard-wired fixtures). The Team offers the following recommendations with respect to equipment measures:

- *Rental units should be eligible for evaporative coolers, refrigerators and hard-wired fixtures.* While the installation of these measures may benefit the landlord, the Team does not consider this an adequate reason to disqualify renters from benefiting from the potential savings from these measures. A number of other measures—like ceiling insulation and minor home repairs—probably increase property values to the benefit of landlords as well, yet they are traditionally offered through the LIEE program for rental units.
- *Rental units should not be eligible for furnace replacements or major furnace repairs.* The reason for this recommendation is that landlords have a legal responsibility to maintain heating systems in rental properties, and substantial LIEE program funds should not be spent for this purpose. However, the Team proposes that *utilities be permitted to make minor repairs and adjustments to furnaces if these actions would improve the performance of the system at a minimal cost.*
- *Evaporative coolers and hard-wired fixtures should be provided without charge to either the tenant or the landlord. Refrigerator replacements should also be provided at no charge if the units belong to the tenants. However, if the refrigerator is owned by the landlord, the utilities may make payments to installation contractors that cover only part of the cost of replacement.* This recommended policy recognizes the need to defray the full cost of these measures when lower payments might discourage participation in the program. The utilities have found in other programs that landlords are generally willing to contribute a portion of the cost of refrigerators that will become their property, because of the benefits they receive. However, landlords are unlikely to believe that they will receive any direct significant benefits from evaporative coolers or hard-wired

fixtures, and are unlikely to be willing to contribute to their costs, thereby denying low-income tenants access to these measures.

It should be noted that the Commission mandated that the utilities make renter-occupied units eligible for equipment measures as part of its Rapid Deployment policy.¹⁹ The Commission also indicated that partial incentives like those offered in the utilities' rebate programs, rather than free measures, should be offered in cases where the landlord owns the refrigerator or air conditioner in question and also pays the utility bill.²⁰

3.9 Ceiling Insulation Levels

3.9.1 Background

In its October 26, 2000 report, the Standardization Team presented recommendations for the ceiling insulation R-values that should be added to various existing levels in each of five climate zones. These recommendations were based upon an analysis of the net benefits of alternative insulation level additions, and this analysis was designed to account for reductions in hardship in several ways. The analysis was based partly on the use of avoided cost assumptions that had been adopted by CALMAC. However, as noted by SESCO in its comments on the October 26, 2000 report, the Commission subsequently adopted revised avoided cost forecasts for use in the PY 2001 energy efficiency planning process.²¹ In D. 01-03-028, the Commission instructed the Team to further consider this issue as part of Phase 3.

One other event has influenced the assessment of ceiling insulation levels. Since the last Standardization Team report was filed, the RRM Working Group has delivered its recommended Low Income Public Purpose Test. While that test has not yet been approved by the Commission, it seemed reasonable to incorporate its main provisions into the assessment of ceiling insulation levels.

3.9.2 Analysis

Given the background described above, the Team used both new avoided cost assumptions and the LIPPT approach in a revised assessment of insulation levels. The following specific features distinguish this analysis from the one underlying the Team's October 26, 2000 follow up report.

- Forecasts of overall time-weighted avoided costs are used to value electricity and natural gas savings. These avoided cost forecasts are the most recent ones adopted by the Commission in October 2000, and include environmental adders.

¹⁹ See Ordering Paragraph 5.

²⁰ Op. cit, p. 36.

²¹ See A.99-09-049 et al.

- Energy savings were estimated using building simulations rather than relatively simple engineering algorithms. This change was made to refine the estimates.
- The Standardization Team used a variety of assumptions designed to incorporate hardship in its previous analyses of ceiling insulation. For instance, we assumed that all homes receiving ceiling insulation have air conditioning, as a crude means of capturing the increased thermal comfort enjoyed by households without air conditioning when ceiling insulation is added. However, in order to avoid double-counting with the RRM Working Group's estimates of non-energy benefits (NEBs), we have dropped this assumption. Instead, we now assume that 50% of all homes receiving ceiling insulation have air conditioning. This assumption will eventually have to be refined on the basis of actual air conditioning saturations for low-income homes, as determined by the Statewide Needs Assessment.
- Non-energy benefits based on the application of the RRMWG methodology are also applied to energy savings. For this purpose, the present value of lifetime NEBs for each increment in ceiling insulation is set equal to roughly 15% of the present value of the energy savings associated with that increment.

As in our previous analysis, the implied insulation additions were those that gave the largest net benefits. In the context of the LIPPT, however, these net benefits were defined as lifetime energy savings, plus NEBs, less measure costs. The methodology used in the analysis is described more fully in Appendix H. In this section, we focus only on the implied ceiling insulation policies.

Table 3-3 presents the results of the project team's Phase 2 analysis and two new analyses. Column 3 presents the results presented in our Phase 2 follow up report. These results were adopted by the Commission on an interim basis in D. 01-03-028 (Ordering Paragraph 3), pending the team's consideration of the implications of the October 2000 avoided cost forecasts. The results shown in column 4 are the results of the analysis of ceiling insulation using October 2000 avoided costs and the LIPPT methodology. Again, this analysis is described in appendix H. As shown, the insulation levels implied by the new methodology and assumptions are generally higher than those implied by the Phase 2 analysis. It should be noted that while the inclusion of NEBs has some influence on the results, the dominant reason for the differences in results between the two analyses is the dramatically higher avoided cost forecast adopted by the Commission in October 2000.

Table 3-3: Implied Ceiling Insulation Policies For Various Project Phases

(1) Climate Zone	(2) <i>Existing Ceiling Insulation Level</i>	Insulation to be <i>Added</i>		
		(3) From Phase 2 Follow-up Report	(4) LIPPT Analysis	(5) Recommended Levels
North Coast	R-0 (uninsulated)	R-19	R-30	R-30
	R-1 to R-11	R-11 ²²	R-19	R-19
	R-12 to R-19	None	None	None
	Above R-19	None	None	None
South Coast	R-0 (uninsulated)	R-19 ²³	R-19	R-19
	R-1 to R-11	None	None	None
	R-12 to R-19	None	None	None
	Above R-19	None	None	None
Inland	R-0 (uninsulated)	R-19	R-30	R-19
	R-1 to R-11	R-11	R-19	R-11
	R-12 to R-19	None	None	None
	Above R-19	None	None	None
Desert	R-0 (uninsulated)	R-30	R-30	R-30
	R-1 to R-11	R-19	R-19	R-19
	R-12 to R-19	None	None	None
	Above R-19	None	None	None
Mountain	R-0 (uninsulated)	R-30	R-38	R-38
	R-1 to R-11	R-19	R-19	R-19
	R-12 to R-19	None	R-19	R-19
	Above R-19	None	None	None

3.9.3 Recommendation

The Team recommends a set of insulation policies that falls between the policies implied by the Phase 2 analysis and the analysis conducted using the LIPPT and new avoided costs. Specifically, the Team recommends the additions shown in column 5 of Table 3-3. These levels are identical to those implied by both analyses for South Coast and Desert. They are consistent with the more recent analysis for the North Coast and Mountain areas, and with the earlier Phase 2 analysis for the Inland zones. This set of recommendations is based on the following considerations:

²² The net benefit of adding insulation for an existing insulation level of R-11 was negative, but the net benefit of adding insulation for existing insulation levels of R-10 and less was positive, so R-11 was used here.

²³ Analysis results indicate a level of R-11, but R-19 was used for consistency with Title 24 minimum value.

- While the actual benefits of ceiling insulation differ as avoided costs change for all regions, the implications of the Phase 2 and Phase 3 analyses for the South Coast and Desert regions did not change. Given that these results are robust even for a fairly broad range of avoided costs, we continue to recommend the insulation additions implied by the analysis for these regions.
- For the relatively cool North Coast and Mountain regions, the new analysis suggests that greater amounts of insulation should be added. For these regions, the differences in recommended insulation additions between the Phase 2 analysis and the most recent analysis can be traced primarily to the changes in gas avoided costs. The reason for this is that the primary effect of ceiling insulation is to reduce space heating, most of which is conducted using natural gas.²⁴ The gas avoided cost forecast adopted on October 25, 2000 accurately reflects changes in gas markets. As a consequence, it seems reasonable to adopt the implications of the more recent analysis based on these higher gas avoided costs.
- For the Inland region, the difference between the Phase 2 and Phase 3 analyses is primarily attributable to the differences in electricity avoided costs. This is the case because heating requirements are modest and cooling requirements are significant in this region. However, the Team believes that the electricity avoided costs adopted by the Commission on October 25, 2000 should be revisited given recent events in California. These forecasts were based on the California Energy Commission's forecasts of market-clearing Power Exchange (PX) prices, coupled with multipliers reflecting the estimated effects of reductions in usage on PX prices. Given the demise of the PX and the continued revamping of the California electricity market, neither the PX price forecasts nor the multipliers may be relevant any longer.²⁵ Specifically, while they may still represent spot market conditions to some extent, they do not reflect the activities of the Department of Water Resources in acquiring electricity through long-term contracts. Given the large impact of the multipliers on avoided costs in the early years of the forecast, the rationale for using these multipliers in projections of avoided costs should be reconsidered by the Commission.

3.10 Natural Gas Appliance Testing

3.10.1 Issues

In its October 26, 2000 report, the Standardization Team recommended a minimum standard for natural gas appliance testing. This standard entailed a mix of tests, including visual examinations, combustion air evaluation, ambient carbon monoxide tests, and draft tests. In

²⁴ The analysis is based on the assumption that 85% of all space heating is natural gas.

²⁵ These multipliers were based on the assumption that all electricity is purchased from the spot market. With a significant portion of electricity needs being satisfied through long-term contracts, these multipliers should probably be revised.

its Interim Decision, the Commission instructed the Team to provide a “more detailed specification for the gas appliance safety/combustion appliance safety (CAS) testing minimum standards adopted in Phase 2, including threshold CO levels.”²⁶

3.10.2 Recommendation

Table 3-4 contains the Team’s current recommendations for the minimum standard, including the designation of a threshold value for investigation and corrective action. A maximum level for exposure of 10 ppm is being proposed. An alternative level under consideration was 35 ppm, which is EPA’s allowable time weighted average for outdoor exposure to CO during just one hour. The limit of 10 PPM was selected for the following reasons:

- 10 ppm is more stringent than 35 ppm or even the 15 ppm recommended by CPSC.
- UL standard 2034-98 requires that residential CO Alarms sound after being exposed to a CO concentration ranging from 34 to 75 ppm CO over a period of 1 to 4 hours. Thus, the recommended level of 10 ppm is well below the UL threshold for alarm activation.
- Although CO limits for state and federal agencies vary widely, research indicates the most common CO action level utilized by local jurisdictions for indoor air is 9 ppm.
- Most CO limits were developed for workplace applications and are based on an average 8-hour exposure followed by 16 hours away from the workplace. However, in a residential setting occupants are usually present for periods longer than 8 hours (up to 16 hours for many people, and longer for those not working or in school). Since the magnitude of carboxyhemoglobin formation is a function of exposure duration, long-term exposure levels must be lower than 8-hour levels. In addition, infants, young children, pregnant women, and the elderly are believed to be more susceptible to CO poisoning, and they are often in the home for long periods of time. These facts were taken into consideration when establishing the 10 ppm Indoor Ambient CO limit for natural gas safety testing.

²⁶ Ordering Paragraph 6(j), p. 79.

Table 3-4: Recommended Minimum Standard for Gas Appliance Testing

General Procedure	Specific Procedures
Olfactory Test	Smell for natural gas leaks.
Visual Examinations	<p>Flue and Vent System—Check for: Draft hood defects: Multiple, missing or improperly installed</p> <ul style="list-style-type: none"> ■ Holes in pipe or other hazardous conditions. ■ Connection with a solid fuel appliance chimney. ■ Flue/vent cap missing or damaged. ■ Inadequate distance from an evaporative cooler inlet. <p>Appliance Components—Check for:</p> <ul style="list-style-type: none"> ■ Furnace combustion chamber door(s) <u>not</u> present. ■ Water Heater combustion chamber cover (rollout shield <u>or</u> access door) <u>not</u> present. ■ Excessive amounts of carbon or rust in/around heat exchanger, draft hood or flue/vent pipe.
Combustion Air Evaluation	<p>Combustion Air Vents—Check for:</p> <ul style="list-style-type: none"> ■ Vents are present and adequate (size and location) ■ Source of combustion air is adequate and unobstructed.
Indoor Ambient CO Tests	<ul style="list-style-type: none"> ■ CO tester zeroed outdoors. ■ [A] Equipment-<i>Off</i> Indoor Ambient CO sample: Taken in an open location away from duct registers and appliances. All combustion appliances are turned off. ■ [B] Equipment-<i>On</i> Indoor Ambient CO sample: Taken after all space-heating systems have been operating at least five minutes. Measured in the same location as [A]. ■ [C] Equipment-<i>On</i> Appliance Ambient CO sample: <i>Forced-air units</i>: inside the register nearest the supply plenum. <i>Non-ducted units</i>: in the atmosphere just above the heat exchanger. ■ Investigative action, and correction if needed, is required when: <ul style="list-style-type: none"> [A] or [B] CO level exceeds 10 ppm. [C] CO level exceeds [B] CO level. ■ Gas heating system(s) shall be repaired/replaced when required.
Draft Tests	<ul style="list-style-type: none"> ■ Visual (non-instrument) test ■ Tactile test

4

Modifications of the WIS Manual

4.1 Background

A Statewide Weatherization Installation Standards (WIS) Manual for conventional homes was developed under Phase 1 and submitted as part of the Phase 1 final report. A WIS Manual for mobile homes was drafted during Phase 2 and submitted as an attachment to the Phase 2 final report. During the course of Phases 2 and 3, the Standardization Team identified the need for additional sections and appendices for these manuals, and Richard Heath and Associates (RHA) prepared these items for the Team as part of Phase 3. Additional sections of the manuals are described in Subsection 4.1 below; additional appendices are discussed in subsection 4.3.

4.2 Additional Sections

In the course of Phase 3, RHA drafted eight sections for the LIEE WIS Manuals, five for the Conventional Home WIS Manual and three for the Mobile Home WIS Manual. These sections are:

- Conventional Home Evaporative Cooler Standards;
- Conventional Home Refrigerator Replacement Standards;
- Conventional Home Central Forced Air Furnace Repair/Replacement Standards;
- Conventional Home Wall/Floor Furnace Repair/Replacement Standards;
- Conventional Home Duct Reconnection Standards;
- Mobile Home Evaporative Cooler Standards;
- Mobile Home Refrigerator Replacement Standards; and
- Mobile Home Central Forced Air Furnace Repair/Replacement Standards.

All additional conventional home sections are included in Appendix C of this report. Mobile home sections are contained in Appendix D.

The Team also developed WIS sections for a series of measures added to the LIEE Program on a pilot basis as part of the Rapid Deployment strategy. These sections are:

- Conventional Home High Efficiency Window/Wall Air Conditioners;

- Conventional Home High Efficiency Central Air Conditioners;
- Conventional Home High Efficiency Gas Water Heaters;
- Conventional Home High Efficiency Electric Water Heaters;
- Conventional Home Programmable or Setback Thermostats;
- Conventional Home Duct Sealing and Repair;
- Conventional Home Whole House Fans;
- Conventional Home Evaporative Cooler Repair;
- Mobile Home High Efficiency Wall Air Conditioners;
- Mobile Home High Efficiency Central Air Conditioners;
- Mobile Home High Efficiency Gas Water Heaters;
- Mobile Home High Efficiency Electric Water Heaters;
- Mobile Home Programmable or Setback Thermostats;
- Mobile Home Duct Sealing and Repair; and
- Mobile Home Evaporative Cooler Repair.

These sections are included in Appendix E of this report.

4.3 Additional Appendices

Three additional appendices were also prepared by RHA in the course of Phase 3:

- Lead-Safe Practices;
- Combustion Air Requirements for Gas Furnaces and Water Heaters (both Conventional Homes and Mobile Homes); and
- Net Free Venting Area Charts (Conventional Homes only).

These appendices are contained in Appendix F of this Phase 3 Final Report.

4.4 Production of the Final WIS Manual

All of the elements of the Conventional Home and Mobile Home WIS Manuals have now been filed with the Commission, and the elements filed under Phase 1 have been approved. As soon as the Commission approves the eight sections and three appendices filed with this report, the Team will produce the final WIS manuals for use in PY 2002 programs.

5

Rapid Deployment Measure Assessment

5.1 Background

This section discusses the assessment of the cost-effectiveness of LIEE energy efficiency measures. Two issues are relevant to measure assessment: the specific cost-effectiveness methodology used for the assessment; and the process by which measures are proposed for inclusion in or deletion from LIEE offerings. The Standardization Team addressed both of these issues in a preliminary way in its Phase 1 Report, but considerable activity relating to this issue has transpired since then. Since the submission of the Phase 1 report, the Reporting Requirements Manual Working Group (RRMWG) was instructed by the Commission to develop a methodology for assessing the cost-effectiveness of both LIEE Programs and individual LIEE measures. The RRMWG recently submitted its report to the Commission,¹ and recommended the use of an approach called the Low Income Public Purpose Test (LIPPT). More recently, the Commission instructed the Standardization Team to make recommendations on the general methodology of assessing measures, and to apply the LIPPT to measures added to the LIEE Program on a pilot basis under the policy of Rapid Deployment.²

In Section 5.2, we review the Team's Phase 1 recommendations and discuss the LIPPT in general terms. In Section 5.3, we illustrate the application of the LIPPT to several Rapid Deployment measures. Section 5.4 offers a brief recommendation on the use of this methodology to assess measure cost-effectiveness. Then, in Section 6 of this report, we offer general recommendations relating to the general process of measure assessment.

5.2 Overview of Methodology

The LIPPT considers program (measure) costs as well as a variety of program (measure) benefits. *Energy benefits* are measured as the present discounted value of energy savings valued using a forecast of avoided costs. *Non-energy benefits* (NEBs) consist of a variety of

¹ See TecMRKT Works, Skumatz Economic Research Associates, Inc. and Megal and Associates, *Low-Income Public Purpose Test: Final Report*, prepared for the RRM Working Group's Cost Effectiveness Committee, April 3, 2001.

² D. 01-05-033, May 3, 2001.

benefits accruing to participants, utilities, and society as a whole.³ Some of these benefits to participants are meant to capture hardship in the form of impacts on health, safety, and comfort. Others are meant to account for reduced utility costs associated with fewer arrearages and collection costs.

In general, the LIPPT incorporates many of the features recommended earlier by the Standardization Team. In its Phase 1 report, the Team offered the following specific recommendations with respect to the methodology to be used to assess the cost-effectiveness of LIEE measures. These recommendations are listed below in italics, and the consistency of the LIPPT with these recommendations is considered:

- *The test should be broad enough to consider non-energy benefits (reductions in hardship) as well as energy benefits.* The LIPPT is a relatively comprehensive framework encompassing both energy benefits and a wide range of non-energy benefits.
- *Direct energy benefits should be valued at an average of avoided costs and retail rates.* The LIPPT makes use avoided costs to value energy savings.
- *Variations in avoided cost across times of use (TOUs) should be recognized through the use of TOU avoided costs and energy savings.*⁴ The LIPPT uses an overall average of avoided costs across time-of-use periods. This aspect of the methodology differs from the approaches currently used for the total resource cost (TRC) test, but mirrors the practice recommended by the CBEE in the Public Purpose Test.⁵
- *An environmental benefits adder should be used in the assessment of indirect energy benefits.* The LIPPT is structured to use avoided costs that include an environmental adder.
- *An adder representing the reduced costs of arrearages associated with lowering the energy bills of low-income customers should also be used in the valuation of energy savings.* The LIPPT explicitly addresses the value of reduced arrearages in the calculation of non-energy benefits.

³ But note RRMWG sets non-energy benefits to society as a whole equal to zero pending the availability of better information.

⁴ This recommendation was not made in the Phase 1 report, but TOU avoided costs were previously used in the Standardization Team's analysis of ceiling insulation levels.

⁵ It should also be noted that the avoided cost forecast included in the RRMWG report is the one recommended by the CBEE for the evaluation of 1999 programs, rather than the more recent forecast adopted by the Commission in October 2000 (A. 99-09-049). For the purposes of the Standardization Team's demonstration of the RRMWG methodology, we have used the Commission's most recently adopted avoided costs.⁵

- *The non-energy benefits associated with measures should include comfort, safety, and health. To the extent practicable for a quantitative methodology, the LIPPT does address customer comfort, safety, and health.*
- *For measures with strongly weather-sensitive impacts, cost-effectiveness analysis should be conducted at the climate zone level. The LIPPT does not directly address this recommendation, but is perfectly consistent with it.*

From the perspective of measure assessment, one notable feature of the LIPPT methodology is that both programs and measures can be assessed using the LIPPT. Thus, it has potential as a means of evaluating measures for inclusion in or exclusion from the LIEE Program. The next section demonstrates this application.

5.3 Application of LIPPT to Rapid Deployment Measures

5.3.1. Introduction

In order to demonstrate the application of the LIPPT, the Standardization Team has applied the approach (with updated avoided costs) to the assessment of measures currently offered by the utilities under the policy of Rapid Deployment. It should be noted that this assessment is not meant to determine whether or not these measures should be offered on a more permanent basis by the LIEE Program, but rather simply to demonstrate the application of a methodology that is being considered by the Commission. Our demonstration applies the LIPPT to eight Rapid Deployment measures: high efficiency window/wall air conditioning, high efficiency central air conditioning, programmable/setback thermostats, duct sealing and repair, whole house fans, evaporative cooler maintenance, high efficiency gas water heaters and high efficiency electric water heaters. These analyses are presented below. First, however, some concepts associated with our approach are explained.

5.3.2. General Concepts

Residence Type/Weather Zone. Each measure is evaluated for three residence types: Single Family Home, Multifamily Home and Mobile Home. For weather sensitive measures, each measure is evaluated for the following five weather zones: North Coast, South Coast, Inland, Desert, and Mountain. These five weather zones are based on the 16 CEC climate zones as shown below in Table 5-1.

Table 5-1: Weather Zones and CEC Climate Zones

Weather Zone	CEC Climate Zones
North Coast	1, 2, 3, 4, 5
South Coast	6, 7, 8, 9
Inland	10, 11, 12, 13
Desert	14, 15
Mountain	16

Effective Useful Life. The effective useful life (EUL) of a measure is the average length of time the measure is expected to yield energy savings. EULs were obtained from a variety of sources including CADMAC, utility studies, and other utility programs.

Measure Costs. Estimates of measure costs were obtained from various sources including the 1996 Xenergy Measure Cost Study, utility documents, and other documents relating to utility programs. Appendix G describes the sources of information on measure costs. For equipment measures like high efficiency central air conditioners, two versions of measure costs were used in the assessment: *total measure cost* and *incremental measure cost*. Total cost is the full installed cost of a new measure (e.g., the cost of the high efficiency unit). Incremental cost is the cost of the measure over and above the cost of a model that would just meet appliance standards (in this example, the difference between the cost of the high efficiency central air conditioner and a new air conditioner that would just meet standards).

Energy Savings. For each measure, annual energy savings (both kWh and therms) were also estimated. For some measures, the Standardization Team used building simulation software called DOE-2 to estimate savings. For other measures, savings estimates previously estimated by/for the utilities were used. Sources of savings estimates are provided in Appendix G. Again, for equipment measures, estimates of two types of savings were developed: annual gross savings and annual incremental savings. *Annual gross energy savings* represent the annual energy savings associated with the installation of the energy efficiency measure, as compared to the preexisting situation prior to measure installation. *Annual incremental energy savings* represent the annual energy savings between the new, high-efficiency equipment and new standard efficiency equipment.

Present Value Lifetime Savings. Lifetime savings represent the lifetime energy savings of a measure, valued at avoided costs. In order to recognize the time value of money, these lifetime dollar savings are converted to present value through the application of a discount rate of 8.15. For equipment measures, lifetime energy savings values were developed for both gross and incremental savings. These estimates are called *present value lifetime gross energy savings* and *present value lifetime incremental energy savings*.

Lifetime Non-Energy Benefits. Lifetime non-energy benefits (NEBs) are the present values of lifetime non-energy benefits. They are calculated using the LIPPT model developed by the RRM Working Group. These values are calculated by adding the rapid deployment measures and their incremental energy savings to an existing comprehensive low-income program as recommended by the RRM Working Group's contractor, TechMarket Works. As with energy savings, these NEBs are calculated over the lifetime of the measure and then brought back to their present value using a discount rate of 8.15%.

Low Income Public Purpose Test. For each measure, the LIPPT is calculated by summing the lifetime energy savings and the lifetime NEBs, and dividing by the measure cost. For equipment measures, the LIPPT was developed using two approaches:

- The first version, which will be referred to as the *gross LIPPT*, gross savings and total measure costs were used. This approach essentially treats these measures as pre-failure replacements, and assumes that the old equipment would not have been replaced some number of years at least as great as the lifetime of the new equipment.
- In the second approach, which we will call the *incremental LIPPT*, incremental savings and costs were employed. This treats these equipment measures as replace-on-burnout measures, and assumes that they would have been replaced with standard efficiency new units in the absence of the installation of high efficiency units.

Insofar as equipment replaced under the LIEE is generally old but not yet at the end of its lifetime, neither of these approaches is ideal. Given that existing equipment must be fairly old before it is replaced, the first approach tends to overstate both measure costs and measure savings. However, given that replaced measures generally have some useful lifetime, the second approach tends to understate both costs and benefits. Some mix of approaches may be more appropriate, but this issue is beyond the scope of this report.

For comparison, we also developed the LIPPT ratios with and without NEBs. While NEBs are an integral part of the LIPPT, this exercise illustrates their importance in the analysis. If NEBs are excluded from the LIPPT, the test comes very close to a traditional total resource cost (TRC) test.⁶ This results in four versions of the LIPPT for each measure.

⁶ The LIPPT without NEBs differs from the TRC in two respects: first, the LIPPT makes use of avoided costs that include an environmental adder, while the TRC does not incorporate an environmental adder; and second, the LIPPT uses a single time-weighted avoided cost stream, while the TRC makes use of time-of-use avoided costs.

5.3.3. High Efficiency Window/Wall Air Conditioning

High efficiency window/wall air conditioners are assumed to have energy efficiency ratios (EERs) of 10.8.⁷ New standard efficiency window/wall units (which are used as the baselines for calculating incremental costs and savings) are assumed to have EERs of 9.0. Existing window/wall units found in low-income homes (which comprise the baselines for the estimation of gross savings and costs) are assumed to have EERs of 7.0. Gross and incremental energy savings were estimated using a building simulation model. Costs were estimated from market data. As for all measures, NEBs were estimated using the RRM Working Group methodology. Appendix G presents detailed assumptions and results.

The values of the four versions of the LIPPT are shown in Table 5-2. A value greater than 1.0 indicates that the measure in question is cost-effective using that version of the LIPPT. As shown, this measure tends to be much more cost-effective when incremental costs and savings are used than when gross costs and savings are employed. This is because incremental costs are far lower than gross costs. It should also be noted that the measure's cost effectiveness varies sharply across climate zones, as should be expected. It is far more cost effective in hot areas than in those with mild summers. Finally, we note that the cost effectiveness is not particularly sensitive to the inclusion of NEBs, although the impacts of this type of benefit are not trivial.

⁷ This is consistent with the requirement that new units in PY2002 have EERs of 10.7 or higher.

Table 5-2: LIPPT Ratios for High Efficiency Window/Wall Air Conditioners

Residence Type/ Weather Zone	LIPPT Ratios			
	LIPPT with Gross Savings and Costs, with NEBs	LIPPT with Incremental Savings and Costs, with NEBs	LIPPT with Gross Savings and Costs, without NEBs	LIPPT with Incremental Savings and Costs, without NEBs
Single Family				
North Coast	0.22	0.70	0.20	0.58
South Coast	0.45	1.46	0.42	1.21
Inland	1.06	3.43	0.98	2.84
Desert	1.98	6.40	1.84	5.30
Mountain	0.29	0.95	0.27	0.79
Multifamily				
North Coast	0.17	0.44	0.16	0.36
South Coast	0.30	0.79	0.28	0.65
Inland	0.65	1.70	0.60	1.41
Desert	1.17	3.09	1.09	2.57
Mountain	0.22	0.58	0.21	0.48
Mobile Homes				
North Coast	0.21	0.61	0.19	0.50
South Coast	0.50	1.48	0.47	1.23
Inland	1.16	3.39	1.07	2.81
Desert	2.14	6.28	1.99	5.21
Mountain	0.29	1.84	0.27	0.69

5.3.4. High Efficiency Central Air Conditioning

High efficiency central air conditioners are assumed to have energy efficiency ratios (EERs) of 10.6.⁸ New standard efficiency central units (which are used as the baselines for calculating incremental costs and savings) are assumed to have EERs of 8.6. Pre-existing central units (which comprise the baselines for the estimation of gross savings and costs) are assumed to have EERs of 6.6. Gross and incremental energy savings were estimated using a building simulation model. Costs were estimated from market data. Again, NEBs were estimated using the RRM Working Group methodology. Details on assumptions and results are presented in Appendix G.

The resultant values of the LIPPT are shown in Table 5-3. Again, a value greater than 1.0 indicates that the measure in question is cost-effective using that version of the LIPPT. According to these estimates, this measure tends to be more cost-effective when incremental costs and savings are used than when gross costs and savings are used. This is because

⁸ This is consistent with the requirement that new units in PY2002 have EERs of 10.6 or higher.

incremental costs are significantly than gross costs. As expected, the measure's cost effectiveness varies sharply across climate zones because this measure is very dependent on weather. The overall cost effectiveness of this measure is not particularly sensitive to the inclusion of NEBs.

Table 5-3: LIPPT Ratios for High Efficiency Central Air Conditioning

Residence Type/ Weather Zone	LIPPT Ratios			
	LIPPT with Gross Savings and Costs, with NEBs	LIPPT with Incremental Savings and Costs, with NEBs	LIPPT with Gross Savings and Costs, without NEBs	LIPPT with Incremental Savings and Costs, without NEBs
Single Family				
Gas Space Heat/AC				
North Coast	0.24	0.43	0.22	0.37
South Coast	0.48	0.87	0.45	0.75
Inland	0.80	1.36	0.75	1.18
Desert	1.19	2.03	1.12	1.76
Mountain	0.32	0.58	0.30	0.50
Electric Space Heat/AC				
North Coast	0.09	0.32	0.08	0.27
South Coast	0.17	0.66	0.15	0.57
Inland	0.26	1.08	0.23	0.94
Desert	0.39	1.67	0.33	1.45
Mountain	0.12	0.42	0.11	0.37
Multifamily				
Gas Space Heat/AC				
North Coast	0.15	0.42	0.14	0.37
South Coast	0.28	0.80	0.27	0.69
Inland	0.49	1.40	0.46	1.21
Desert	0.71	2.02	0.67	1.75
Mountain	0.20	0.57	0.19	0.49
Electric Space Heat/AC				
North Coast	0.13	0.45	0.12	0.39
South Coast	0.25	0.85	0.24	0.74
Inland	0.49	1.03	0.46	0.89
Desert	0.72	1.53	0.68	1.33
Mountain	0.18	0.61	0.17	0.53
Mobile Homes				
Gas Space Heat/AC				
North Coast	0.19	0.34	0.18	0.30
South Coast	0.42	0.76	0.39	0.66
Inland	0.67	1.15	0.63	1.00
Desert	0.99	1.70	0.93	1.48
Mountain	0.26	0.48	0.25	0.42
Electric Space Heat/AC				
North Coast	0.17	0.30	0.16	0.26
South Coast	0.38	0.68	0.35	0.59
Inland	0.61	1.04	0.57	0.90
Desert	0.91	1.56	0.86	1.35
Mountain	0.23	0.42	0.22	0.37

5.3.5. Programmable/Setback Thermostats

Setback/programmable thermostats are assumed to reduce thermostat set points for heating from 10 p.m. to 6 a.m. No setbacks (or setups) in cooling settings were assumed. Energy savings were estimated using a building simulation approach. Appendix G contains detailed results of the analysis. Note that this measure is considered a retrofit measure (as opposed to a replace-on-burnout measure); as a result, gross and incremental energy savings are the same, as are gross and incremental costs.

Table 5-4 indicates the cost-effectiveness of this measure under the assumptions used in the analysis. As indicated, this measure is cost effective in most residence types and weather zones. As with all weather sensitive measures, the degree of cost effectiveness of programmable/setback thermostats varies sharply across climate zones. The inclusion of NEBs has a moderate impact on the cost effectiveness of this measure.

Table 5-4: LIPPT Ratios for Programmable/Setback Thermostats

Residence Type/ Weather Zone	LIPPT Ratios			
	LIPPT with Gross Savings and Costs, with NEBs	LIPPT with Incremental Savings and Costs, with NEBs	LIPPT with Gross Savings and Costs, without NEBs	LIPPT with Incremental Savings and Costs, without NEBs
Single Family				
Gas Space Heat/AC				
North Coast	1.80	1.80	1.52	1.52
South Coast	1.04	1.04	0.88	0.88
Inland	1.75	1.75	1.48	1.48
Desert	1.35	1.35	1.14	1.14
Mountain	2.43	2.43	2.05	2.05
Electric Space Heat/AC				
North Coast	1.15	1.15	0.96	0.96
South Coast	0.69	0.69	0.58	0.58
Inland	1.25	1.25	1.04	1.04
Desert	1.02	1.02	0.85	0.85
Mountain	1.88	1.88	1.57	1.57
Multifamily				
Gas Space Heat/AC				
North Coast	0.77	0.77	0.65	0.65
South Coast	0.58	0.58	0.49	0.49
Inland	0.74	0.74	0.62	0.62
Desert	0.59	0.59	0.50	0.50
Mountain	0.84	0.84	0.71	0.71
Electric Space Heat/AC				
North Coast	0.82	0.82	0.69	0.69
South Coast	0.54	0.54	0.45	0.45
Inland	0.81	0.81	0.68	0.68
Desert	0.67	0.67	0.56	0.56
Mountain	1.25	1.25	1.04	1.04
Mobile Homes				
Gas Space Heat/AC				
North Coast	1.36	1.36	1.15	1.15
South Coast	0.76	0.76	0.65	0.65
Inland	1.33	1.33	1.13	1.13
Desert	1.08	1.08	0.95	0.95
Mountain	1.84	1.84	1.55	1.55
Electric Space Heat/AC				
North Coast	1.52	1.52	1.27	1.27
South Coast	0.81	0.81	0.68	0.68
Inland	1.64	1.64	1.37	1.37
Desert	1.43	1.43	1.20	1.20
Mountain	2.90	2.90	2.42	2.42

5.3.6. Duct Sealing and Repair

In analyzing this measure, it was assumed that duct leakage is 30% before and 15% after the duct sealing and repair is completed. Energy savings were estimated using a building simulation approach (See Appendix G for detailed results). Gross and incremental energy savings and costs are identical for this measure. Subsequently, LIPPT ratios for gross and incremental costs and savings will be the same for each case.

As noted above and indicated in Table 5-5, this measure's cost effectiveness varies significantly by climate zone. The cost effectiveness is not particularly sensitive to inclusion of NEBs, although the impacts of this type of benefit are not trivial.

Table 5-5: LIPPT Ratios for Duct Sealing and Repair

Residence Type/ Weather Zone	LIPPT Ratios			
	LIPPT with Gross Savings and Costs, with NEBs	LIPPT with Incremental Savings and Costs, with NEBs	LIPPT with Gross Savings and Costs, without NEBs	LIPPT with Incremental Savings and Costs, without NEBs
Single Family				
Gas Space Heat/AC				
North Coast	1.54	1.54	1.37	1.37
South Coast	1.12	1.12	0.99	0.99
Inland	3.13	3.13	2.79	2.79
Desert	3.68	3.68	3.28	3.28
Mountain	3.29	3.29	2.94	2.94
Electric Space Heat/AC				
North Coast	2.28	2.28	2.02	2.02
South Coast	1.34	1.34	1.19	1.19
Inland	3.63	3.63	3.23	3.23
Desert	3.79	3.79	3.38	3.38
Mountain	5.49	5.49	4.97	4.97
Multifamily				
Gas Space Heat/AC				
North Coast	0.75	0.75	0.67	0.67
South Coast	0.51	0.51	0.45	0.45
Inland	1.26	1.26	1.12	1.12
Desert	1.46	1.46	1.29	1.29
Mountain	1.40	1.40	1.25	1.25
Electric Space Heat/AC				
North Coast	1.66	1.66	1.47	1.47
South Coast	0.89	0.89	0.79	0.79
Inland	2.28	2.28	2.02	2.02
Desert	2.25	2.25	1.99	1.99
Mountain	3.75	3.75	3.32	3.32
Mobile Homes				
Gas Space Heat/AC				
North Coast	1.50	1.50	1.34	1.34
South Coast	1.15	1.15	1.02	1.02
Inland	3.00	3.00	2.67	2.67
Desert	3.65	3.65	3.24	3.24
Mountain	3.20	3.20	2.86	2.86
Electric Space Heat/AC				
North Coast	2.37	2.37	2.10	2.10
South Coast	1.41	1.41	1.25	1.25
Inland	3.77	3.77	3.34	3.34
Desert	4.01	4.01	3.55	3.55
Mountain	5.85	5.85	5.26	5.26

5.3.7. Evaporative Cooler Maintenance

Evaporative cooler maintenance improves the performance of the evaporative cooler and lowers the amount of energy used for both the cooler and the refrigerated air conditioning unit presumed to be present in the home. Estimates of both savings and costs were obtained from SCE. Again, NEBs were estimated using the RRM Working Group methodology. Detailed results are in Appendix G. Gross and incremental energy savings and costs are identical for this measure. Consequently, gross and incremental LIPPT ratios will be the same.

Table 5-6 presents LIPPTs with and without NEBs. Because evaporative coolers are a weather sensitive measure, the cost effectiveness of this measure varies sharply across climate zones. This measure is far more cost effective in hot areas than in cooler climates. The cost effectiveness of this measure is moderately sensitive to the inclusion of NEBs.

Table 5-6: LIPPT Ratios for Evaporative Cooler Maintenance

Residence Type/ Weather Zone	LIPPT Ratios			
	LIPPT with Gross Savings and Costs, with NEBs	LIPPT with Incremental Savings and Costs, with NEBs	LIPPT with Gross Savings and Costs, without NEBs	LIPPT with Incremental Savings and Costs, without NEBs
Single Family				
North Coast	0.29	0.29	0.20	0.20
South Coast	0.61	0.61	0.43	0.43
Inland	1.59	1.59	1.13	1.13
Desert	2.99	2.99	2.08	2.08
Mountain	0.39	0.39	0.27	0.27
Multifamily				
North Coast	0.10	0.10	0.07	0.07
South Coast	0.19	0.19	0.13	0.13
Inland	0.71	0.71	0.50	0.50
Desert	1.68	1.68	1.19	1.19
Mountain	0.16	0.16	0.11	0.11
Mobile Homes				
North Coast	0.17	0.17	0.12	0.12
South Coast	0.30	0.30	0.21	0.21
Inland	0.80	0.80	0.57	0.57
Desert	1.89	1.89	1.33	1.33
Mountain	0.32	0.32	0.23	0.23

5.3.8. Whole House Fans

Whole house fans were assumed to be installed only in single family residences. Estimates of savings and costs were obtained from a study conducted for the Statewide Residential Contractor Program by RMA.⁹ NEBs were estimated as part of our analysis using the RRM Working Group methodology. The baseline cost and savings and the incremental costs and savings are identical for this measure, since it is a retrofit measure.

As noted above and shown in Table 5-7, this measure is not cost effective in any of the climate zones, although it is close to being cost-effective in the desert. NEBs have little effect on the overall cost effectiveness of this measure.

Table 5-7: LIPPT Ratios for Whole House Fans

Residence Type/ Weather Zone	LIPPT Ratios			
	LIPPT with Gross Savings and Costs, with NEBs	LIPPT with Incremental Savings and Costs, with NEBs	LIPPT with Gross Savings and Costs, without NEBs	LIPPT with Incremental Savings and Costs, without NEBs
Single Family				
North Coast	0.14	0.14	0.12	0.12
South Coast	0.49	0.49	0.43	0.43
Inland	0.60	0.60	0.53	0.53
Desert	0.96	0.96	0.84	0.84
Mountain	0.23	0.23	0.20	0.20

5.3.9. High Efficiency Gas Water Heaters

High Efficiency gas water heaters were assumed to have energy factors of at least 0.60 in single family residences and 0.62 in mobile homes and multifamily residences.¹⁰ Baseline units for both gross and incremental savings were assumed to have energy factors of 0.54 in single family units and 0.56 in other residence types. Estimates of savings were obtained from an RMA study conducted for the Statewide Residential Contractor Program.¹¹ NEBs were estimated as part of our analysis.

⁹ See Robert Mowris & Associates, *Measure Incentives and Cost Effectiveness for the Residential Contractor Program*, January 14, 2000; and Robert Mowris & Associates, *Calculated Multi-Family Energy Savings for the Residential Contractor Program*, August 7, 2000;

¹⁰ Efficiencies are higher in mobile homes and multifamily units due to the lower tank size.

¹¹ Op. cit.

Table 5-8 displays the LIPPTs resulting from the analysis. As indicated, this measure is much more cost effective when incremental costs and savings are used than when gross costs and savings are employed. This is because the incremental costs are far lower than gross costs. This measure was not evaluated by climate zone because differences by climate zone are fairly small. The inclusion of NEBs appears to have very little impact on the cost effectiveness of this measure.

Table 5-8: LIPPT Ratios for High Efficiency Gas Water Heaters

Residence Type/ Weather Zone	LIPPT Ratios			
	LIPPT with Gross Savings and Costs, with NEBs	LIPPT with Incremental Savings and Costs, with NEBs	LIPPT with Gross Savings and Costs, without NEBs	LIPPT with Incremental Savings and Costs, without NEBs
Single Family	0.22	2.34	0.19	2.00
Multifamily	0.21	6.39	0.18	5.45
Mobile Home	0.21	6.39	0.18	5.45

5.3.10. High Efficiency Electric Water Heaters

High Efficiency electric water heaters were assumed to have energy factors of at least 0.92 in all residence types. Baseline units for both gross and incremental savings were assumed to have energy factors of 0.86 in all residence types. Estimates of savings were obtained from an RMA study conducted for the Statewide Residential Contractor Program.¹² NEBs were estimated as part of our analysis.

As shown in Table 5-9, high efficiency electric water heaters are much more cost effective if they are considered a replace-on-burnout measure (in which case incremental costs and savings are used) than when they are considered an early replacement (for which gross costs and savings are employed). This is because the incremental costs are far lower than gross costs. Like gas water heaters, this measure was not evaluated by climate zone because differences by climate zone are fairly small. The inclusion of NEBs appears to have no appreciable impact on the cost effectiveness of this measure.

¹² Opt cit.

Table 5-9: LIPPT Ratios for High Efficiency Electric Water Heaters.

Residence Type/ Weather Zone	LIPPT Ratios			
	LIPPT with Gross Savings and Costs, with NEBs	LIPPT with Incremental Savings and Costs, with NEBs	LIPPT with Gross Savings and Costs, without NEBs	LIPPT with Incremental Savings and Costs, without NEBs
Single Family	0.62	6.48	0.52	5.46
Multifamily	0.57	17.51	0.48	14.75
Mobile Home	0.57	17.51	0.48	14.75

5.4 Recommendations on Measure Assessment Methodology

The Team recommends that the same general approach used for the evaluation of the LIEE Program be used to assess individual measures. While the application of a program evaluation methodology to individual measures is not always completely straightforward and sometimes requires simplifications (e.g., spreading or ignoring administrative costs, or allocating NEBs to measures), simplifying assumptions can be made to accommodate this type of analysis. In the event that the Commission decides to accept the LIPPT as a program evaluation framework, this framework should also be used to assess individual measures.

As market conditions change and energy efficiency technologies evolve, it may be prudent to reevaluate changes in the list of measures offered by the LIEE Programs. This issue is considered in Section 6.

6

Comments on the Standardization Process

6.1 Progress on Standardization

The Standardization Team has been engaged in the standardization process since February 2000. Since then, the Team has held numerous public workshops and has spent literally hundreds of hours discussing both installation standards as well as policies and procedures. The Team communicated its recommendations to the Commission through the submission of the following reports:

- The Phase 1 report, which dealt primarily with installation standards and measure-specific policies and procedures (filed on May 8, 2000);
- A Phase 1 follow-up report, which presented additional recommendations relating to the installation standards (filed on July 5, 2000);
- The Phase 2 report, which made recommendations for standardizing various general policies and procedures relating to customer eligibility, eligibility of rental units, limits on minor home repairs and furnace repairs/replacements, inspections, ceiling insulation levels (filed on September 15, 2000);
- A Phase 2 follow-up report, which responded to questions relating to the Phase 2 report (submitted on October 26, 2000);
- A Bill of Rights report (submitted on March 9);
- This Phase 3 report, which provides additional recommendations for standardizing with a wide range of policies and procedures, discusses the assessment of new Rapid Deployment measures;
- A Statewide Policy and Procedures Manual, which provides a comprehensive and consistent set of policies and procedures; and
- Additional installation standards for program measures not covered by previous standards, including those added to the LIEE Program for Rapid Deployment.

In addition, the Team has filed a series of comments and reply comments associated with various filings by other parties. The Team has acted in good faith to be responsive to the directives of the Commission's March 22, 2000 ACR and subsequent ACRs and Commission decisions. The Team believes that the recommendations developed in the course of the

standardization effort achieve the primary objective of standardization, the consistent and equitable treatment of low income customers across the four utility service areas.

6.2 Acknowledgments

The Standardization Team has benefited significantly from the participation of many parties in the overall standardization process. These parties include members of the public who have attended and participated in various workshops, as well as CPUC staff from the Energy Division and the Office of Ratepayer Advocates.

6.3 Remaining Issues

There are, of course, some issues relating to the structure of the LIEE Program that remain to be resolved. These issues relate to the energy efficiency measures to be offered through the Program, the design of natural gas appliance testing, and other program features that differ across the service areas. These issues are discussed below.

6.3.1. Measure Assessment

The Team has not yet proposed one consistent set of energy efficiency measures across all utility programs. The lack of such a recommendation is attributable to a number of factors, including the following:

- First, the RRM Working Group has just recently recommended a methodology for assessing the cost-effectiveness of specific program measures, and the Commission has not yet ruled on that methodology;¹
- Second, the results of pilot projects and measures initiated by E-3586 and D. 01-05-033 have not yet been evaluated;
- Third, the Phase 3 budget did not cover the assessment of all existing Program measures; and
- Fourth, in its June 6, 2001 ACR, the Commission has Assigned the task of measuring and reporting long-term ex post savings to the RRM Working Group.

The Team has, however, demonstrated the application of the RRM Working Group's proposed measure cost-effectiveness framework (the LIPPT) in two ways. First, we have

¹ But note that the Commission has instructed the RRMWG to consider "technical modifications to cost effectiveness testing and reporting, as appropriate." The issues to be addressed in a second phase report include "the selection of appropriate discount rates, inflation rates and benefit and cost stratagems to use in cost-effectiveness analysis. Recommendations shall also address whether (and if so, how) to incorporate comfort, health and safety effects into the cost-effectiveness testing methodology. (D. -1-03-028, Ordering Paragraph 15)

used the LIPPT to assess a set of measures added to the Program under Rapid Deployment. Second, we have applied the LIPPT to the assessment of required additions of ceiling insulation levels. We now propose to apply the LIPPT to two current program measures (faucet aerators and outlet gaskets) and to submit the results of this assessment to the Commission on or before September 1, 2001.

It is unclear where the responsibility for further measure assessment will fall. If authorized by the Commission to spend the necessary time and resources to engage in this process, the Team will apply the methodology ultimately approved by the Commission to assess all of the current LIEE Program measures under a subsequent phase of the standardization effort. We suggest that measure assessment be part of a broader process of refining program design and the associated statewide manuals, and deal further with this issue below in Section 6.4.

6.3.2. Natural Gas Appliance Testing

The Commission's D. 01-03-028 instructed the Team to "conduct a study of natural gas appliance safety conditions and alternative testing procedures in Phase 4 of the Standardization Project. In compliance with this directive, the Team will obtain public input from the public and interested parties, and will file a proposed study methodology, budget and schedule for Phase 4 by September 1, 2001. As further directed by the Commission in D. 01-03-028, the Team will set a schedule for Phase 4 that makes results available to the Commission in time for their use in the PY 2004 planning process.

6.3.3. Other Remaining Policy Differences

In spite of the considerable resources devoted to the standardization effort, some relatively minor differences across programs remain. In some cases (e.g., dispute resolution procedures), these differences reflect legitimate differences in contracting practices of the utilities. In other cases (e.g., the measure pre-approval process), differences are attributable to differences in service area sizes and/or policies relating to natural gas appliance testing. In still other cases, differences have little or no effect on service delivery from the perspective of participants, and the benefits of further standardization would be questionable at best. The cost of standardization to date has been considerable, and further efforts to align relatively minor program policies and procedures do not appear to be justified. We urge the Commission to accept the policy and procedure recommendations made by the Team in this Phase 3 report, and to concentrate further efforts on the assessment of program measures and the evaluation of natural gas appliance testing practices.

6.4 Procedures for Assessing Subsequent Program Changes

In its Phase 1 Report, the Team proposed a very general process for initiating the evaluation of measures for inclusion in or deletion from the LIEE Program:

“Utilities should evaluate measures in the course of developing recommendations for subsequent year programs. This process should be open to input from other parties. Parties recommending changes in eligibility for a specific measure should offer information regarding the factors to be used in assessing eligibility. The utilities should then evaluate these measures using all available information on both cost effectiveness and impacts on hardship, and develop a set of recommendations. If warranted by the evidence, these recommendations may vary across climate zones.”²

We now propose that measure assessment be integrated into a broader process of considering program changes over time. We offer the following specific recommendations:

- The Policy and Procedures Manual and the Weatherization Installation Standards Manual accepted by the Commission as part of the current process should be used for the full Program Year 2002.
- After a reasonable period using the new manuals, parties should be allowed to nominate changes in these manuals and/or additions or deletions of measures for subsequent years. Proposed changes to the manuals or measure mix for PY2003 should be submitted between January 1, 2002 and March 31, 2002. These recommended changes should be submitted to the Energy Division, with copies to the service list. Recommendations for changes in policies, procedures or installation standards should be accompanied by reasons; suggestions for additions or deletions of measures should be supported by estimates of costs and benefits.
- The Standardization Team should be directed review these proposed changes and file a work plan and budget for manual refinements or technical measure assessments to the Commission for approval. For proposed PY2003 changes, this work plan should be submitted by May 31, 2002.
- Public workshops should be held to obtain input on the proposed changes as part of the refinement and assessment process.
- With the Commission’s approval, the Standardization Team should assess suggested changes and file a set of recommendations. For PY 2003 changes, these recommendations should be filed by September 1, 2002.

² LIEE Standardization Project: Phase 1 Report, p. 3-7.

Appendix A

Public Workshop on Phase 3 Issues

Date and Location: SoCalGas Energy Resource Center, Downey April 3, 2001

Attendees: The following team members and guests were present for the meeting:

RHA: Jim O'Bannon

RER: Fred Sebold

SDG&E: Barbara Cronin

PG&E: Dave Siudzinski, Mary O'Drain

SoCalGas: Lou Estrella, Roberto Del Real

SCE: Jack Parkhill

Maravilla: William Gonzalez, Alex Sotomayor

CSD-San Bernardino: Darryl Johnson

RHA: George Sanchez

TELACU: Richard Villasenor

Call-Ins: The following team members and guests called in to the meeting:

CPUC: Josie Webb, Ivy Walker

The workshop was convened shortly after 10am. A summary of Team recommendations (attached) was presented by Fred Sebold. The floor was then opened for comments and questions. Several issues were raised and discussed. Presented below is a summary of these discussions by topic.

Goals for Residence Mixes. The Team recommended that each utility establish a set of long term goals for the proportion of treated homes falling into the multifamily category. One of the utility representatives questioned how the utilities would determine whether or not their goals were being met. It was suggested that the upcoming needs assessment will develop methods of estimating program penetration, and that penetration rates could be estimated by residence type. This would give utilities their baselines, which in turn could indicate the need to target specific residence types.

Furnace Repairs and Replacements. The Team's recommendations would continue to prohibit furnace replacements and major repairs in rental properties. Darryl Johnson suggested that this could cause a problem if the contractor found high levels of CO and infiltration reduction work had already been completed. A member of the Team pointed out that furnaces would have to be red tagged, and

that the landlord would have the responsibility to make the necessary repairs. Contractors in attendance suggested that there could be several problems with this approach. Darryl Johnson suggested that contacting owners would require more work on the part of the contractor, especially for out-of-state owners, and that it could require more visits to the home. William Gonzalez said that the current practices under the CSD program involve both pre-tests and post-tests and the installation of a CO alarm. Upon questioning, Mr. Gonzales indicated that he recommended at a minimum that major repairs be done for renters, and pointed out that replacements are done in the CSD program and this practice works. The question was raised: How do you stop multifamily owners from using CSD to do all of their furnace repairs and replacements? Alex Sotomayor responded that he has found no problems over the past 15 years with serving renters in the CSD program. He also pointed out that low income customers may compare notes on the different services offered by CSD and the utilities, and that this policy could result in negative publicity for the utilities. A utility representative asked Mr. Sotomayor what percentage of treated homes fail the CO test, and he responded that it was roughly 2%. One utility representative suggested that perhaps cofunding could be used to require the landlord to pay a portion of the cost of replacement or major repairs. Another suggested that perhaps CSD funds could be used to replace or repair furnaces, and utility funds could be used for measures offered under utility programs. Mr. Sotomayor pointed out that this could be difficult to implement insofar as contractors might not be contracted to work in the same areas by CSD and the utilities. George Sanchez recommended that minor appliance repairs be made for both owners and renters, but that capital improvements be made by owners and not ratepayers.

Eligibility Based on Heating Fuel. The Team recommended that eligibility continue to be based partly on the heating fuel used by the prospective participant, but that referral systems be used to ensure that qualified customers receive services for which they are eligible in either a utility program or the CSD program. Darryl Johnson asked if the utility providing the heating fuel would take primary responsibility for weatherization services, and was told that this was the case.

Pre-Inspections. The Team recommended that current practices relating to pre-inspections be continued. One utility representative asked the group to look at the reasons provided for this recommendation and to develop stronger reasons. Alex Sotomayor indicated that pre-inspections could reduce production by slowing up the process, and that the failure rate should speak for itself. George Sanchez suggested that the utility should have the option of requiring pre-inspections if it thinks that contractors are cutting corners and violating program policies. He argued that if a utility has good quality contractors, pre-inspections would be a burden and a waste of ratepayers' funds. Darryl Johnson suggested that perhaps pre-inspections could be conducted on only a fraction of homes. A fairly extensive discussion of the amount of time taken for pre-inspections ensued. One utility representative indicated that PG&E's pre-inspection costs are relatively low because PG&E also conducts combustion appliance safety testing during the same visit. Alex Sotomayor

suggested that while pre-inspection may work for PG&E, current practices should not be changed in Southern California.

CO Threshold Levels. The Team recommended the use of 10 ppm as a threshold for CO levels. Darryl Johnson asked if this was realistic given that outdoor levels of 15 ppm were sometimes found. Jim O'Bannon explained that instruments were "zeroed" outside, and that the indoor threshold is effectively 10 ppm above outside levels.

Further Comments. A deadline of April 13 was set for written comments. (One set of written comments was received, from Richard Villasenor. Mr. Villasenor's comments are attached.)

The meeting was concluded at approximately 11:30.

Attachments. The following materials are attached:

- Attachment A: A Workshop Agenda
- Attachment B: A copy of the Summary of Phase 3 Issues distributed at the April 3 Workshop
- Attachment C: Written comments from Richard Villasenor

Attachment A

**Low Income Energy Efficiency Standardization Project
Public Input Workshop
April 3, 2001
10:00 am to 4:00 pm
SoCalGas Energy Resource Center
9240 E. Firestone Blvd.
Downey, CA
Agenda**

1. Workshop Introduction
2. Round Table Introductions
3. Overview of Standardization Team Interim Phase 3 Recommendations
4. Questions and Comments

Handouts:

- Phase 3 Issues Report (Distributed by Energy Division with workshop announcement)
- Summary of Phase 3 Issues

Telephone Access: Call 1-888-452-3494 and dial pass code#22726

Attachment B

Workshop Issues

1. Eligibility of Customers on a Business Rate

Group homes eligible as long as:

- they satisfy eligibility requirements for CARE guidelines applicable to group living facilities; and
- the structure in question is single family, multifamily or mobile home suitable for weatherization under LIEE standards.

2. Eligibility of Customers Based on Heating Fuel

When customer has heating fuel provided by another supplier:

- If heating fuel is provided by non-IOU, utility will install measures for which customer is eligible under utility program and refer customer to DCSD program for other measures
- If heating fuel is provided by another IOU (overlap area), the following procedures will be followed:
 - utility will install measures for which customer is eligible under utility program and refer customer to other IOUs program for other measures for which it is eligible;
 - utility installing infiltration measures will conduct gas appliance testing;
 - outreach staff in second IOU program will accept income qualification documentation obtained by first utility; and
 - gas and electric IOUs will offer common energy education in overlap areas.

3. Limitations on Treatment of Master Metered Housing

Caps on master-metered units to be based on estimated percentage of low-income dwellings with master meters.

4. Limitations on Expenditures by Housing Type

Recommended approach:

- Long-term targets to be established for housing types;
- Targets based on proportions of such dwellings in the overall low-income housing stock;
- Utilities allowed to retain discretion to deviate from targets within specific program years; and

- Utilities may promote or limit treatment of multifamily units in individual program years as long as actions are consistent with long-term goals.

5. Pre-Approval of Measures

Utilities to be permitted to continue use of current inspection approach.

6. Dispute Resolution Procedure

Utilities to continue current practices in this area.

7. Eligibility of Renters for Evaporative Coolers and Other Measures

Recommended approach:

- Renters to be eligible for evaporative coolers, refrigerators and hard-wired fixtures;
- Rental units not to be eligible for furnace replacements or major furnace repairs, but utilities permitted to make minor repairs and adjustments if this would improve performance of system at minimal cost;
- Evaporative coolers and hard-wired fixtures to be provided at no cost to tenant or landlord;
- Refrigerators to be provided at no cost if units belong to tenants, but utility may make payment less than full cost if units owned by landlord

8. Ceiling Insulation Levels

No Recommendation at this time.

9. Natural Gas Appliance Testing

Limit of 10 ppm to be used for minimum standard (further investigative action to be taken, and corrective action, if necessary, to be implemented)

10. Post-Inspection Sample Sizes

Recommend several conditions under which utilities or inspection contractors may exceed minimum sample sizes (see p. 20).

Attachment C

Dear Team Members

Re: Phase 3 Report

1. Measures Pre-Approval: The SCG program has been working for years without this type of system in place. Having to do pre-approval would slow down the process of giving services to low-income ratepayers. Let each utility decide what works best for them, lets not micro manage their programs.

2. Renters: If we are going to allow renters to receive evap coolers than they should be allowed the services of heater repair or replacement. Yes landlords have a responsibility to maintain the heating system for renters, but we all know that its not happening. We see a lot of rental units that don't have functional heating systems. They know if the landlord repairs the heater that they will raise the rent.Maybe we can put some funds into a small pilot program to do heater repair and replacement for renters. We should look into a co-payment program with landlords who are willing to work with us. These ratepayers need are help so there families can be safe and comfortable.

3. CAS Testing: If our recommendation is to do CAS testing on all units prior to measures being installed. Than we should also be recommending some type of corrective action to be done on the home. Just testing without fixing the problems would be a waste of time and money. All this would do is service less low-income customers and leave them with a potential hazard in their home.These customers would not be able to make the repairs so we could services there homes. So I ask what are we really trying to achieve by doing CAS testing ? Maybe we can consider a pilot to repair the problems from CAS testing and see how much it cost the average home to be repaired. What type of liability do we have when we find a home that doesn't pass and we walk away without fixing the problem? Is this the type of service we want to give to low-income customers?

If you need any more information please feel free to contact me.

Richard Villasenor
Telacu Weatherization

Appendix B

Customer Eligibility based on End-Use Fuels

The eligibility of a dwelling unit for a specific utility's LIEE Program and for individual measures offered through that Program depends partly on the entity(ies) from which the dwelling unit receives natural gas and electric distribution service. Tables 2-4 through 2-7 indicate the eligibility of dwelling units receiving various service combinations, by electric service area. Space heating measures (SH) are weatherization measures affecting space heating usage. Water heating measures (WH) are those affecting water heating usage. Electric measures (ele) include CFLs, hard-wired fluorescent porch lights, evaporative coolers, and refrigerator replacements.

As shown in Table B-1 through Table B-4, eligibility for groups of measures with an individual program depends the customer's space heating and water heating fuels as well as the specific provider of these fuels.

Table B-1: Service Eligibility, PG&E Provides Electric Service

Situation Facing Household				Measures for which home is eligible					
Provides Electric Service	Provides Gas Service	Space Heating Fuel	Water Heating Fuel	If the home participates in PG&E Program			If the home participates in the Gas IOU Program		
				SH	WH	ele	SH	WH	ele
PG&E	PG&E	gas	gas	✓	✓	✓			
PG&E	PG&E	electric	electric	✓	✓	✓			
PG&E	PG&E	gas	electric	✓	✓	✓			
PG&E	PG&E	electric	gas	✓	✓	✓			
PG&E	SoCalGas	gas	gas			✓	✓	✓	
PG&E	SoCalGas	electric	electric	✓*	✓	✓			
PG&E	SoCalGas	gas	electric		✓	✓	✓		
PG&E	SoCalGas	electric	gas	✓*		✓			
PG&E	None	electric	electric	✓	✓	✓			
PG&E	None	electric	other	✓		✓			
PG&E	None	other	electric		✓	✓			
PG&E	None	other	other			✓			

* Non-infiltration measures only.

Table B-2: Service Eligibility, SCE Provides Electric Service

Situation Facing Household				Measures for which home is eligible					
Provides Electric Service	Provides Gas Service	Space Heating Fuel	Water Heating Fuel	If the Home Participates in the SCE Program			If the Home Participates in Gas IOU Program		
				SH	WH	ele	SH	WH	ele
SCE	PG&E	gas	gas			✓	✓	✓	
SCE	PG&E	electric	electric	✓	✓	✓			
SCE	PG&E	gas	electric			✓	✓		
SCE	PG&E	electric	gas	✓		✓		✓	
SCE	SoCalGas	gas	gas			✓	✓	✓	
SCE	SoCalGas	electric	electric			✓	✓	✓	
SCE	SoCalGas	gas	electric			✓	✓	✓	
SCE	SoCalGas	electric	gas			✓	✓	✓	
SCE	None	electric	electric	✓	✓	✓			
SCE	None	electric	other	✓		✓			
SCE	None	other	electric			✓			
SCE	None	other	other			✓			

Table B-3: Service Eligibility, SDG&E Provides Electric Service

Situation Facing Household				Measures for which home is eligible					
Provides Electric Service	Provides Gas Service	Space Heating Fuel	Water Heating Fuel	in Electric IOU Program			in Gas IOU Program		
				SH	WH	ele	SH	WH	ele
SDG&E	SDG&E	gas	gas	✓	✓	✓			
SDG&E	SDG&E	electric	electric	✓	✓	✓			
SDG&E	SDG&E	gas	electric	✓	✓	✓			
SDG&E	SDG&E	electric	gas	✓	✓	✓			
SDG&E	SoCalGas	gas	gas	✓	✓	✓	✓	✓	
SDG&E	SoCalGas	electric	electric	✓	✓	✓			
SDG&E	SoCalGas	gas	electric	✓	✓	✓	✓		
SDG&E	SoCalGas	electric	gas	✓	✓	✓			
SDG&E	None	electric	electric	✓	✓	✓			
SDG&E	None	electric	other	✓		✓			
SDG&E	None	other	electric		✓	✓			
SDG&E	None	other	other			✓			

Table B-4: Service Eligibility, Other Utility Provides Electricity Service

Situation Facing Household				Measures for which home is eligible if the Home Participates in Gas IOU Program		
Provides Electric Service	Provides Gas Service	Space Heating Fuel	Water Heating Fuel	SH	WH	ele
Other	PG&E	gas	gas	✓	✓	
Other	PG&E	electric	electric			
Other	PG&E	gas	electric	✓		
Other	PG&E	electric	gas		✓	
Other	SoCalGas	gas	gas	✓	✓	
Other	SoCalGas	electric	electric			
Other	SoCalGas	gas	electric	✓		
Other	SoCalGas	electric	gas			
Other	None	electric	electric			
Other	None	electric	other			
Other	None	other	electric			
Other	None	other	other			

Appendix C

Installation Standards for Additional LIEE Measures: Conventional Homes

Copies of this appendix may be obtained directly from the office of

Richard Heath & Associates
310 Salem Street, Suite B
Chico, California 95928
(530) 898-1323

Appendix D

Installation Standards for Additional LIEE Measures: Mobile Homes

Copies of this appendix may be obtained directly from the office of

Richard Heath & Associates
310 Salem Street, Suite B
Chico, California 95928
(530) 898-1323

Appendix E

Installation Standards for Rapid Deployment Measures

Copies of this appendix may be obtained directly from the office of

Richard Heath & Associates
310 Salem Street, Suite B
Chico, California 95928
(530) 898-1323

Appendix F

New Appendices for Installation Standards Manual

Copies of this appendix may be obtained directly from the office of

Richard Heath & Associates
310 Salem Street, Suite B
Chico, California 95928
(530) 898-1323

Appendix G

Assessment of Rapid Deployment Measures

G.1 Measure Assumptions

Baseline and high efficiency assumptions for each measure are described below. Sizing assumptions are also provided where necessary.

Wall Air Conditioners

Sizes: Single Family – 14,500 btuh
 Multifamily – 9,500 btuh
 Mobile Home – 12,500 btuh

Efficiency: High Efficiency – 10.8 EER
 Baseline Efficiency – 7.0 EER
 Incremental Baseline Efficiency – 9.0 EER

Duct Sealing

Measure: Seal ducts to 15% air loss
Baseline/Incremental Baseline: 30% air loss

Central Air Conditioning

Size: (See table in section G.2)

Efficiency: High Efficiency – 10.6 EER
 Baseline Efficiency – 6.6 EER
 Incremental Baseline Efficiency – 8.6 EER

Programmable Thermostat

Measure: Install programmable thermostat with setback
Baseline/Incremental Baseline: Manual thermostat with no setback.

Evaporative Cooler Maintenance

Measure: Maintenance of Evaporative Cooler, as in previous utility programs
Baseline/Incremental Baseline: No maintenance

Whole House Fan

Size: 1/3 hp

Measure: Installation of whole house fan for single family home

Baseline/Incremental Baseline: No fan

Gas Water Heaters

Single Family

Size = 40 gallon

High Efficiency: 0.60 EF

Baseline/Incremental Baseline: 0.54 EF

Multifamily and Mobile Home

Size 30 gallon

High Efficiency: 0.62 EF

Baseline/Incremental Baseline: 0.56 EF

Gas Water Heaters

Single Family

Size = 40 gallon

High Efficiency: 0.92 EF

Baseline/Incremental Baseline: 0.86 EF

Multifamily and Mobile Home

Size 30 gallon

High Efficiency: 0.92 EF

Baseline/Incremental Baseline: 0.86 EF

G.2 Detailed Results

For each measure, the following tables provide detailed information on effective useful life, gross and incremental cost, gross and incremental energy savings, gross and incremental present value dollar savings, incremental present value NEBs, and LIPPT ratios.

Wall Air Conditioning – Cost and Energy Savings

Space Type/Weather Zone	Effective Useful Life	Total Cost	Incremental Cost	Annual Gross Savings		Annual Incremental Savings		Base Size(btuh)
				kwh	therms	kwh	therms	
Single Family Home								
North Coast	11	\$ 587	\$ 75	147	0	54	0	14500
South Coast	11	\$ 587	\$ 75	306	0	113	0	14500
Inland	11	\$ 587	\$ 75	720	0	266	0	14500
Desert	11	\$ 587	\$ 75	1345	0	496	0	14500
Mountain	11	\$ 587	\$ 75	200	0	74	0	14500
Multifamily Home								
North Coast	11	\$ 480	\$ 75	93	0	34	0	9500
South Coast	11	\$ 480	\$ 75	165	0	61	0	9500
Inland	11	\$ 480	\$ 75	359	0	132	0	9500
Desert	11	\$ 480	\$ 75	651	0	240	0	9500
Mountain	11	\$ 480	\$ 75	123	0	45	0	9500
Mobile Home								
North Coast	11	\$ 533	\$ 75	127	0	47	0	12500
South Coast	11	\$ 533	\$ 75	312	0	115	0	12500
Inland	11	\$ 533	\$ 75	714	0	263	0	12500
Desert	11	\$ 533	\$ 75	1323	0	487	0	12500
Mountain	11	\$ 533	\$ 75	178	0	65	0	12500

Wall Air Conditioning – Dollar Savings and LIPPT Ratios

Space Type/Weather Zone	Gross \$ Savings (Present Value)	Incremental \$ Savings (Present Value)	Incremental \$ NEBs (Present Value)	LIPPT Gross Savings and Costs w. NEBs	LIPPT Inc. Savings and Costs w. NEBs	LIPPT Gross Savings and Costs w/o NEBs	LIPPT Inc. Savings and Costs w/o NEBs
Single Family Home							
North Coast	\$117.86	\$43.30	8.92	0.22	0.70	0.20	0.58
South Coast	\$245.35	\$90.60	18.67	0.45	1.46	0.42	1.21
Inland	\$577.28	\$213.27	43.95	1.06	3.43	0.98	2.84
Desert	\$1,078.40	\$397.68	81.96	1.98	6.40	1.84	5.30
Mountain	\$160.36	\$59.33	12.23	0.29	0.95	0.27	0.79
Multifamily Home							
North Coast	\$74.57	\$27.26	5.62	0.17	0.44	0.16	0.36
South Coast	\$132.29	\$48.91	10.08	0.30	0.79	0.28	0.65
Inland	\$287.84	\$105.84	21.81	0.65	1.70	0.60	1.41
Desert	\$521.96	\$192.43	39.66	1.17	3.09	1.09	2.57
Mountain	\$98.62	\$36.08	7.44	0.22	0.58	0.21	0.48
Mobile Home							
North Coast	\$101.83	\$37.68	7.77	0.21	0.61	0.19	0.50
South Coast	\$250.16	\$92.21	19	0.50	1.48	0.47	1.23
Inland	\$572.47	\$210.87	43.46	1.16	3.39	1.07	2.81
Desert	\$1,060.76	\$390.47	80.47	2.14	6.28	1.99	5.21
Mountain	\$142.72	\$52.12	10.74	0.29	0.84	0.27	0.69

Duct Sealing – Cost and Energy Savings

Space Type/Weather Zone	Effective Useful Life	Total Cost	Incremental Cost	Annual Gross Savings		Annual Incremental Savings	
				kwh	therms	kwh	therms
Single Family Home							
Gas Heat/AC							
North Coast	25	\$ 458	\$ 458	153	72	153	72
South Coast	25	\$ 458	\$ 458	214	30	214	30
Inland	25	\$ 458	\$ 458	607	83	607	83
Desert	25	\$ 458	\$ 458	951	47	951	47
Mountain	25	\$ 458	\$ 458	287	163	287	163
Electric Heat/AC							
North Coast	25	\$ 458	\$ 458	721	0	721	0
South Coast	25	\$ 458	\$ 458	425	0	425	0
Inland	25	\$ 458	\$ 458	1153	0	1153	0
Desert	25	\$ 458	\$ 458	1207	0	1207	0
Mountain	25	\$ 458	\$ 458	1773	0	1773	0
Multifamily Home							
Gas Heat/AC							
North Coast	25	\$ 365	\$ 365	55	29	55	29
South Coast	25	\$ 365	\$ 365	63	14	63	14
Inland	25	\$ 365	\$ 365	175	31	175	31
Desert	25	\$ 365	\$ 365	275	20	275	20
Mountain	25	\$ 365	\$ 365	99	55	99	55
Electric Heat/AC							
North Coast	25	\$ 365	\$ 365	419	0	419	0
South Coast	25	\$ 365	\$ 365	225	0	225	0
Inland	25	\$ 365	\$ 365	575	0	575	0
Desert	25	\$ 365	\$ 365	567	0	567	0
Mountain	25	\$ 365	\$ 365	946	0	946	0
Mobile Home							
Gas Heat/AC							
North Coast	25	\$ 365	\$ 365	105	59	105	59
South Coast	25	\$ 365	\$ 365	174	25	174	25
Inland	25	\$ 365	\$ 365	447	67	447	67
Desert	25	\$ 365	\$ 365	726	42	726	42
Mountain	25	\$ 365	\$ 365	192	133	192	133
Electric Heat/AC							
North Coast	25	\$ 365	\$ 365	597	0	597	0
South Coast	25	\$ 365	\$ 365	355	0	355	0
Inland	25	\$ 365	\$ 365	950	0	950	0
Desert	25	\$ 365	\$ 365	1011	0	1011	0
Mountain	25	\$ 365	\$ 365	1497	0	1497	0

Duct Sealing – Dollar Savings and LIPPT Ratios

Space Type/Weather Zone	Gross \$ Savings (Present Value)	Incremental \$ Savings (Present Value)	Incremental \$ NEBs (Present Value)	LIPPT Gross Savings and Costs w. NEBs	LIPPT Inc. Savings and Costs w. NEBs	LIPPT Gross Savings and Costs w/o NEBs	LIPPT Inc. Savings and Costs w/o NEBs
Single Family Home							
Gas Space Heat/AC							
North Coast	\$ 628	\$ 628	\$ 76	1.54	1.54	1.37	1.37
South Coast	\$ 454	\$ 454	\$ 57	1.12	1.12	0.99	0.99
Inland	\$ 1,276	\$ 1,276	\$ 159	3.13	3.13	2.79	2.79
Desert	\$ 1,502	\$ 1,502	\$ 185	3.68	3.68	3.28	3.28
Mountain	\$ 1,345	\$ 1,345	\$ 163	3.29	3.29	2.94	2.94
Electric Space Heat/AC							
North Coast	\$ 925	\$ 925	\$ 119	2.28	2.28	2.02	2.02
South Coast	\$ 545	\$ 545	\$ 70	1.34	1.34	1.19	1.19
Inland	\$ 1,479	\$ 1,479	\$ 182	3.63	3.63	3.23	3.23
Desert	\$ 1,548	\$ 1,548	\$ 188	3.79	3.79	3.38	3.38
Mountain	\$ 2,274	\$ 2,274	\$ 242	5.49	5.49	4.97	4.97
Multifamily Home							
Gas Space Heat/AC							
North Coast	\$ 244	\$ 244	\$ 30	0.75	0.75	0.67	0.67
South Coast	\$ 165	\$ 165	\$ 20	0.51	0.51	0.45	0.45
Inland	\$ 410	\$ 410	\$ 51	1.26	1.26	1.12	1.12
Desert	\$ 473	\$ 473	\$ 60	1.46	1.46	1.29	1.29
Mountain	\$ 457	\$ 457	\$ 55	1.40	1.40	1.25	1.25
Electric Space Heat/AC							
North Coast	\$ 537	\$ 537	\$ 69	1.66	1.66	1.47	1.47
South Coast	\$ 289	\$ 289	\$ 37	0.89	0.89	0.79	0.79
Inland	\$ 738	\$ 738	\$ 95	2.28	2.28	2.02	2.02
Desert	\$ 727	\$ 727	\$ 94	2.25	2.25	1.99	1.99
Mountain	\$ 1,213	\$ 1,213	\$ 156	3.75	3.75	3.32	3.32
Mobile Home							
Gas Space Heat/AC							
North Coast	\$ 488	\$ 488	\$ 59	1.50	1.50	1.34	1.34
South Coast	\$ 373	\$ 373	\$ 46	1.15	1.15	1.02	1.02
Inland	\$ 975	\$ 975	\$ 121	3.00	3.00	2.67	2.67
Desert	\$ 1,183	\$ 1,183	\$ 150	3.65	3.65	3.24	3.24
Mountain	\$ 1,044	\$ 1,044	\$ 126	3.20	3.20	2.86	2.86
Electric Space Heat/AC							
North Coast	\$ 766	\$ 766	\$ 99	2.37	2.37	2.10	2.10
South Coast	\$ 455	\$ 455	\$ 59	1.41	1.41	1.25	1.25
Inland	\$ 1,219	\$ 1,219	\$ 157	3.77	3.77	3.34	3.34
Desert	\$ 1,297	\$ 1,297	\$ 167	4.01	4.01	3.55	3.55
Mountain	\$ 1,920	\$ 1,920	\$ 215	5.85	5.85	5.26	5.26

Central Air Conditioner – Cost and Energy Savings

Space Type/Weather Zone	Effective Useful Life	Total Cost	Incremental Cost	Annual Gross Savings		Annual Incremental Savings		Base Size(tons)
				kwh	therms	kwh	therms	
Single Family Home								
Gas Heat/AC								
North Coast	18	1796	411	376	0	144	0	2.3
South Coast	18	1796	411	753	0	289	0	2.3
Inland	18	2342	572	1644	0	631	0	3.2
Desert	18	2342	572	2450	0	940	0	3.2
Mountain	18	1796	411	504	0	194	0	2.3
Electric Heat/AC								
North Coast	18	1874	429	287	0	110	0	2.4
South Coast	18	1874	429	597	0	229	0	2.4
Inland	18	2527	608	7393	0	534	0	3.4
Desert	18	2527	608	2144	0	823	0	3.4
Mountain	18	1874	429	382	0	147	0	2.4
Multifamily Home								
Gas Heat/AC								
North Coast	18	1044	154	139	0	53	0	0.9
South Coast	18	1044	154	260	0	100	0	0.9
Inland	18	1252	184	540	0	208	0	1.2
Desert	18	1252	184	785	0	301	0	1.2
Mountain	18	1044	154	186	0	71	0	0.9
Electric Heat/AC								
North Coast	18	1252	154	146	0	56	0	1.2
South Coast	18	1252	154	276	0	106	0	1.2
Inland	18	1473	291	631	0	242	0	1.7
Desert	18	1473	291	941	0	361	0	1.7
Mountain	18	1252	154	200	0	76	0	1.2
Mobile Home								
Gas Heat/AC								
North Coast	18	1718	393	285	0	109	0	2.2
South Coast	18	1718	393	633	0	243	0	2.2
Inland	18	2216	537	1302	0	500	0	3
Desert	18	2216	537	1931	0	741	0	3
Mountain	18	1718	393	401	0	154	0	2.2
Electric Heat/AC								
North Coast	18	1718	393	252	0	97	0	2.2
South Coast	18	1718	393	569	0	218	0	2.2
Inland	18	2270	555	1217	0	467	0	3.1
Desert	18	2270	555	1827	0	702	0	3.1
Mountain	18	1718	393	353	0	135	0	2.2

Central Air Conditioner – Dollar Savings and LIPPT Ratios

Space Type/Weather Zone	Gross \$ Savings (Present Value)	Incremental \$ Savings (Present Value)	Incremental \$ NEBs (Present Value)	LIPPT Gross Savings and Costs w. NEBs	LIPPT Inc. Savings and Costs w. NEBs	LIPPT Gross Savings and Costs w/o NEBs	LIPPT Inc. Savings and Costs w/o NEBs
Single Family Home							
Gas Space Heat/AC							
North Coast	\$ 402	\$ 154	\$ 24	0.24	0.43	0.22	0.37
South Coast	\$ 805	\$ 309	\$ 48	0.48	0.87	0.45	0.75
Inland	\$ 1,758	\$ 675	\$ 104	0.80	1.36	0.75	1.18
Desert	\$ 2,621	\$ 1,005	\$ 155	1.19	2.03	1.12	1.76
Mountain	\$ 539	\$ 208	\$ 32	0.32	0.58	0.30	0.50
Electric Space Heat/AC							
North Coast	\$ 149	\$ 118	\$ 18	0.09	0.32	0.08	0.27
South Coast	\$ 278	\$ 245	\$ 38	0.17	0.66	0.15	0.57
Inland	\$ 578	\$ 571	\$ 88	0.26	1.08	0.23	0.94
Desert	\$ 840	\$ 880	\$ 136	0.39	1.67	0.33	1.45
Mountain	\$ 199	\$ 157	\$ 24	0.12	0.42	0.11	0.37
Multifamily Home							
Gas Space Heat/AC							
North Coast	\$ 149	\$ 57	\$ 9	0.15	0.42	0.14	0.37
South Coast	\$ 278	\$ 107	\$ 17	0.28	0.80	0.27	0.69
Inland	\$ 578	\$ 222	\$ 34	0.49	1.40	0.46	1.21
Desert	\$ 840	\$ 322	\$ 50	0.71	2.02	0.67	1.75
Mountain	\$ 199	\$ 76	\$ 12	0.20	0.57	0.19	0.49
Electric Space Heat/AC							
North Coast	\$ 156	\$ 60	\$ 9	0.13	0.45	0.12	0.39
South Coast	\$ 295	\$ 113	\$ 18	0.25	0.85	0.24	0.74
Inland	\$ 675	\$ 259	\$ 40	0.49	1.03	0.46	0.89
Desert	\$ 1,007	\$ 386	\$ 60	0.72	1.53	0.68	1.33
Mountain	\$ 214	\$ 81	\$ 13	0.18	0.61	0.17	0.53
Mobile Home							
Gas Space Heat/AC							
North Coast	\$ 305	\$ 117	\$ 18	0.19	0.34	0.18	0.30
South Coast	\$ 677	\$ 260	\$ 40	0.42	0.76	0.39	0.66
Inland	\$ 1,393	\$ 535	\$ 83	0.67	1.15	0.63	1.00
Desert	\$ 2,065	\$ 793	\$ 122	0.99	1.70	0.93	1.48
Mountain	\$ 429	\$ 165	\$ 25	0.26	0.48	0.25	0.42
Electric Space Heat/AC							
North Coast	\$ 270	\$ 104	\$ 16	0.17	0.30	0.16	0.26
South Coast	\$ 609	\$ 233	\$ 36	0.38	0.68	0.35	0.59
Inland	\$ 1,302	\$ 500	\$ 77	0.61	1.04	0.57	0.90
Desert	\$ 1,954	\$ 751	\$ 116	0.91	1.56	0.86	1.35
Mountain	\$ 378	\$ 144	\$ 22	0.23	0.42	0.22	0.37

Programmable Thermostat - Cost and Dollar Savings

Space Type/Weather Zone	Effective Useful Life	Total Cost	Incremental Cost	Annual Gross Savings		Annual Incremental Savings	
				kwh	therms	kwh	therms
Single Family Home							
Gas Heat/AC							
North Coast	12	\$ 170	\$ 170	22	62	22	62
South Coast	12	\$ 170	\$ 170	11	36	11	36
Inland	12	\$ 170	\$ 170	22	60	22	60
Desert	12	\$ 170	\$ 170	18	46	18	46
Mountain	12	\$ 170	\$ 170	46	80	46	80
Electric Heat/AC							
North Coast	12	\$ 170	\$ 170	193	0	193	0
South Coast	12	\$ 170	\$ 170	116	0	116	0
Inland	12	\$ 170	\$ 170	210	0	210	0
Desert	12	\$ 170	\$ 170	172	0	172	0
Mountain	12	\$ 170	\$ 170	316	0	316	0
Multifamily Home							
Gas Heat/AC							
North Coast	12	\$ 170	\$ 170	12	26	12	26
South Coast	12	\$ 170	\$ 170	7	20	7	20
Inland	12	\$ 170	\$ 170	11	25	11	25
Desert	12	\$ 170	\$ 170	9	20	9	20
Mountain	12	\$ 170	\$ 170	19	27	19	27
Electric Heat/AC							
North Coast	12	\$ 170	\$ 170	138	0	138	0
South Coast	12	\$ 170	\$ 170	91	0	91	0
Inland	12	\$ 170	\$ 170	137	0	137	0
Desert	12	\$ 170	\$ 170	112	0	112	0
Mountain	12	\$ 170	\$ 170	210	0	210	0
Mobile Home							
Gas Heat/AC							
North Coast	12	\$ 170	\$ 170	11	48	11	48
South Coast	12	\$ 170	\$ 170	6	27	6	27
Inland	12	\$ 170	\$ 170	11	47	11	47
Desert	12	\$ 170	\$ 170	10	38	10	38
Mountain	12	\$ 170	\$ 170	23	63	23	63
Electric Heat/AC							
North Coast	12	\$ 170	\$ 170	256	0	256	0
South Coast	12	\$ 170	\$ 170	137	0	137	0
Inland	12	\$ 170	\$ 170	276	0	276	0
Desert	12	\$ 170	\$ 170	241	0	241	0
Mountain	12	\$ 170	\$ 170	488	0	488	0

Programmable Thermostat – Dollar Savings and LIPPT Ratios

Space Type/Weather Zone	Gross \$ Savings (Present Value)	Incremental \$ Savings (Present Value)	Incremental \$ NEBs (Present Value)	LIPPT Gross Savings and Costs w. NEBs	LIPPT Inc. Savings and Costs w. NEBs	LIPPT Gross Savings and Costs w/o NEBs	LIPPT Inc. Savings and Costs w/o NEBs
Single Family Home							
Gas Space Heat/AC							
North Coast	\$ 259	\$ 259	\$ 48	1.80	1.80	1.52	1.52
South Coast	\$ 149	\$ 149	\$ 27	1.04	1.04	0.88	0.88
Inland	\$ 251	\$ 251	\$ 46	1.75	1.75	1.48	1.48
Desert	\$ 194	\$ 194	\$ 36	1.35	1.35	1.14	1.14
Mountain	\$ 349	\$ 349	\$ 64	2.43	2.43	2.05	2.05
Electric Space Heat/AC							
North Coast	\$ 163	\$ 163	\$ 32	1.15	1.15	0.96	0.96
South Coast	\$ 98	\$ 98	\$ 19	0.69	0.69	0.58	0.58
Inland	\$ 177	\$ 177	\$ 35	1.25	1.25	1.04	1.04
Desert	\$ 145	\$ 145	\$ 28	1.02	1.02	0.85	0.85
Mountain	\$ 267	\$ 267	\$ 52	1.88	1.88	1.57	1.57
Multifamily Home							
Gas Space Heat/AC							
North Coast	\$ 111	\$ 111	\$ 20	0.77	0.77	0.65	0.65
South Coast	\$ 83	\$ 83	\$ 15	0.58	0.58	0.49	0.49
Inland	\$ 106	\$ 106	\$ 20	0.74	0.74	0.62	0.62
Desert	\$ 85	\$ 85	\$ 16	0.59	0.59	0.50	0.50
Mountain	\$ 121	\$ 121	\$ 22	0.84	0.84	0.71	0.71
Electric Space Heat/AC							
North Coast	\$ 117	\$ 117	\$ 23	0.82	0.82	0.69	0.69
South Coast	\$ 77	\$ 77	\$ 15	0.54	0.54	0.45	0.45
Inland	\$ 116	\$ 116	\$ 23	0.81	0.81	0.68	0.68
Desert	\$ 95	\$ 95	\$ 19	0.67	0.67	0.56	0.56
Mountain	\$ 177	\$ 177	\$ 35	1.25	1.25	1.04	1.04
Mobile Home							
Gas Space Heat/AC							
North Coast	\$195	\$195	\$36	1.36	1.36	1.15	1.15
South Coast	\$110	\$110	\$20	0.76	0.76	0.65	0.65
Inland	\$191	\$191	\$35	1.33	1.33	1.13	1.13
Desert	\$156	\$156	\$29	1.08	1.08	0.92	0.92
Mountain	\$264	\$264	\$48	1.84	1.84	1.55	1.55
Electric Space Heat/AC							
North Coast	\$216	\$216	\$42	1.52	1.52	1.27	1.27
South Coast	\$116	\$116	\$23	0.81	0.81	0.68	0.68
Inland	\$233	\$233	\$46	1.64	1.64	1.37	1.37
Desert	\$203	\$203	\$40	1.43	1.43	1.20	1.20
Mountain	\$412	\$412	\$81	2.90	2.90	2.42	2.42

Evaporative Cooler - Cost and Dollar Savings

Space Type/Weather Zone	Effective Useful Life	Total Cost	Incremental Cost	Annual Gross Savings		Annual Incremental Savings	
				kwh	therms	kwh	therms
Single Family Home							
North Coast	4	\$ 108	\$ 108	55	0	55	0
South Coast	4	\$ 108	\$ 108	117	0	117	0
Inland	4	\$ 108	\$ 108	305	0	305	0
Desert	4	\$ 108	\$ 108	562	0	562	0
Mountain	4	\$ 108	\$ 108	74	0	74	0
Multifamily Home							
North Coast	4	\$ 108	\$ 108	19	0	19	0
South Coast	4	\$ 108	\$ 108	36	0	36	0
Inland	4	\$ 108	\$ 108	135	0	135	0
Desert	4	\$ 108	\$ 108	322	0	322	0
Mountain	4	\$ 108	\$ 108	30	0	30	0
Mobile Home							
North Coast	4	\$ 108	\$ 108	32	0	32	0
South Coast	4	\$ 108	\$ 108	58	0	58	0
Inland	4	\$ 108	\$ 108	154	0	154	0
Desert	4	\$ 108	\$ 108	361	0	361	0
Mountain	4	\$ 108	\$ 108	61	0	61	0

Evaporative Coolers – Dollar Savings and LIPPT Ratios

Space Type/Weather Zone	Gross \$ Savings (Present Value)	Incremental \$ Savings (Present Value)	Incremental \$ NEBs (Present Value)	LIPPT Gross Savings and Costs w. NEBs	LIPPT Inc. Savings and Costs w. NEBs	LIPPT Gross Savings and Costs w/o NEBs	LIPPT Inc. Savings and Costs w/o NEBs
Single Family Home							
North Coast	\$ 22	\$ 22	\$ 9	0.29	0.29	0.20	0.20
South Coast	\$ 47	\$ 47	\$ 19	0.61	0.61	0.43	0.43
Inland	\$ 122	\$ 122	\$ 50	1.59	1.59	1.13	1.13
Desert	\$ 224	\$ 224	\$ 99	2.99	2.99	2.08	2.08
Mountain	\$ 30	\$ 30	\$ 12	0.39	0.39	0.27	0.27
Multifamily Home							
North Coast	\$ 8	\$ 8	\$ 3	0.10	0.10	0.07	0.07
South Coast	\$ 14	\$ 14	\$ 6	0.19	0.19	0.13	0.13
Inland	\$ 54	\$ 54	\$ 22	0.71	0.71	0.50	0.50
Desert	\$ 129	\$ 129	\$ 53	1.68	1.68	1.19	1.19
Mountain	\$ 12	\$ 12	\$ 5	0.16	0.16	0.11	0.11
Mobile Home							
North Coast	\$ 13	\$ 13	\$ 5	0.17	0.17	0.12	0.12
South Coast	\$ 23	\$ 23	\$ 10	0.30	0.30	0.21	0.21
Inland	\$ 61	\$ 61	\$ 25	0.80	0.80	0.57	0.57
Desert	\$ 144	\$ 144	\$ 60	1.89	1.89	1.33	1.33
Mountain	\$ 24	\$ 24	\$ 10	0.32	0.32	0.23	0.23

Whole House Fans

Space Type/Weather Zone	Effective Useful Life	Total Cost	Incremental Cost	Annual Gross Savings		Annual Incremental Savings	
				kwh	therms	kwh	therms
Single Family Home							
North Coast	20	\$ 560	\$ 560	60	0	60	0
South Coast	20	\$ 560	\$ 560	212	0	212	0
Inland	20	\$ 560	\$ 560	259	0	259	0
Desert	20	\$ 560	\$ 560	415	0	415	0
Mountain	20	\$ 560	\$ 560	98	0	98	0

Space Type/Weather Zone	Gross \$ Savings (Present Value)	Incremental \$ Savings (Present Value)	Incremental \$ NEBs (Present Value)	LIPPT Gross Savings and Costs w. NEBs	LIPPT Inc. Savings and Costs w. NEBs	LIPPT Gross Savings and Costs w/o NEBs	LIPPT Inc. Savings and Costs w/o NEBs
Single Family Home							
North Coast	\$ 68	\$ 68	\$ 10	0.14	0.14	0.12	0.12
South Coast	\$ 241	\$ 241	\$ 35	0.49	0.49	0.43	0.43
Inland	\$ 294	\$ 294	\$ 43	0.60	0.60	0.53	0.53
Desert	\$ 471	\$ 471	\$ 69	0.96	0.96	0.84	0.84
Mountain	\$ 111	\$ 111	\$ 16	0.23	0.23	0.20	0.20

Water Heaters

Space Type/Weather Zone	Effective Useful Life	Total Cost	Incremental Cost	Annual Gross Savings		Annual Incremental Savings	
				kwh	therms	kwh	therms
Single Family Home							
Gas	13	\$ 450	\$ 43	0	21	0	21
Electric	13	\$ 450	\$ 43	265	0	265	0
Multifamily Home							
Gas	13	\$ 367	\$ 12	0	16	0	16
Electric	13	\$ 367	\$ 12	200	0	200	0
Mobile Home							
Gas	13	\$ 367	\$ 12	0	16	0	16
Electric	13	\$ 367	\$ 12	200	0	200	0

Space Type/Weather Zone	Gross \$ Savings (Present Value)	Incremental \$ Savings (Present Value)	Incremental \$ NEBs (Present Value)	LIPPT Gross Savings and Costs w. NEBs	LIPPT Inc. Savings and Costs w. NEBs	LIPPT Gross Savings and Costs w/o NEBs	LIPPT Inc. Savings and Costs w/o NEBs
Single Family Home							
Gas	\$85.82	\$85.82	\$ 15	0.22	2.34	0.19	2.00
Electric	\$234.60	\$234.60	\$ 44	0.62	6.48	0.52	5.46
Multifamily Home							
Gas	\$65.39	\$65.39	\$ 11	0.21	6.39	0.18	5.45
Electric	\$177.06	\$177.06	\$ 33	0.57	17.51	0.48	14.75
Mobile Home							
Gas	\$65.39	\$65.39	\$ 11	0.21	6.39	0.18	5.45
Electric	\$177.06	\$177.06	\$ 33	0.57	17.51	0.48	14.75

Appendix H

Assessment of Ceiling Insulation Levels

H.1 Analysis Summary

This document presents revised avoided costs and other underlying assumptions used for the June 2001 ceiling insulation analysis. Comparison with previous results contained in the Phase II Follow-up Report are also presented. Changes from the analysis contained in the Phase II Follow-up Report are summarized as follows:

- Use of avoided costs and discount rate (8.15%) consistent with the October 25, 2000 Administrative Law Judge's (ALJ) "Ruling On Cost Effectiveness Issues for PY 2001 Programs".
- Time basis for the analysis was changed from 2001 through 2025 to 2002 through 2026, for consistency with a 2002 program year implementation date for these standards.
- Energy savings estimates were made using DOE-2 building simulation models.

Retail costs previously used for the Phase II Follow-up analysis were not utilized for this analysis. Detailed descriptions of these changes are discussed in the following sections:

- Avoided Cost Estimates and Reference Sources
- Assumptions Used to Determine Ceiling Insulation Levels
- Implied Ceiling Insulation Levels

H.2 Avoided Cost Estimates and Reference Sources

Avoided cost estimates are consistent with the October 25, 2000 ALJ's "Ruling On Cost Effectiveness Issues for PY 2001 Programs", which directed the utilities to use consistent and up-to-date estimates. The avoided costs satisfying this ruling and used for this analysis were obtained from a PG&E regulatory filing.¹ These estimates were used and modified as follows:

¹ Reference Source: Per Mike Wan, PG&E's CPUC Regulatory Case Filing Program Year 2001 Energy Efficiency Programs (A.00-11-037), Appendix B (Link as of 12/5/00 =>http://www.pge.com/008_rates/008a6_py2001_eep.shtml).

- For electric avoided costs, the “Market Clearing Price with On-Peak & Off-Peak Escalation” costs with the “Environmental Externalities” added, as shown in Table H-1, were used as the starting point for this analysis.
 - An additional \$0.02 were added to summer peak costs for estimated transmission and distribution costs (per Fred Sebold, RER) were added to the base avoided costs shown in Table H-1.
 - To approximate winter peak costs (which were not available from Table H-1), Winter On-Peak (W_ON) costs were estimated by applying the ratio of W_ON/W_SEM for normal costs from the Phase II Follow-up Report to the Winter Semi-Peak (W_SEM) rates.
- For gas avoided costs, the existing estimates shown in Table H-2 were used without modification.
- Both electric and gas avoided costs were extended to year 2026 by escalating the 2025 value by 3.5%. Resultant nominal avoided costs for the years 2001 through 2026 are presented in Table H-3.
- Additional adjustments were made to these costs to get a time-of-use (TOU) weighted average electric cost, and to convert to a discounted present value basis as follows:
 - For electric avoided costs, computed a time-weighted average electricity cost multiplying the TOU avoided cost by the fraction of annual hours in each TOU period.
 - Applied an 8.15% Discount Rate (as approved in the October 25, 2000 ALJ ruling) and converted the nominal values to discounted present values.
 - Applied a Non-Energy Benefits factor (NEB) of 1.154 to the avoided cost estimates. This is the maximum NEB factor determined from other LIEE program measures.

The discounted present value final electric and gas avoided costs derived from this process are presented in Table H-4.

Table H-1: Electric Avoided Costs per October 25, 2000 ALJ Ruling

MARKET CLEARING PRICE WITH ON-PEAK & OFF-PEAK ESCALATION					
(\$/kWh)					
WITH Environmental Adder					
Year	Summer Peak	Summer PartPeak	Summer OffPeak	Winter PartPeak	Winter OffPeak
2001	0.59838	0.21871	0.16887	0.07304	0.06386
2002	0.59838	0.27630	0.16887	0.07304	0.06386
2003	0.26384	0.11598	0.07129	0.10933	0.08401
2004	0.24809	0.10719	0.06732	0.10303	0.07926
2005	0.25335	0.10938	0.06865	0.10513	0.08085
2006	0.22404	0.11228	0.07040	0.10791	0.08295
2007	0.23283	0.11656	0.07299	0.11202	0.08604
2008	0.24058	0.12033	0.07527	0.11563	0.08877
2009	0.24896	0.12441	0.07773	0.11954	0.09171
2010	0.25796	0.12879	0.08038	0.12374	0.09488
2011	0.22424	0.11238	0.07047	0.10801	0.08302
2012	0.23317	0.11673	0.07309	0.11218	0.08616
2013	0.24290	0.12146	0.07595	0.11671	0.08958
2014	0.25320	0.12647	0.07898	0.12152	0.09321
2015	0.26445	0.13194	0.08229	0.12676	0.09716
2016	0.27660	0.13785	0.08586	0.13243	0.10144
2017	0.28969	0.14422	0.08971	0.13854	0.10604
2018	0.30382	0.15110	0.09387	0.14513	0.11101
2019	0.31926	0.15861	0.09841	0.15233	0.11644
2020	0.33550	0.16651	0.10318	0.15991	0.12215
2021	0.35196	0.17452	0.10802	0.16758	0.12794
2022	0.36924	0.18292	0.11311	0.17487	0.13402
2023	0.38738	0.19175	0.11844	0.18329	0.14040
2024	0.40643	0.20102	0.12404	0.19213	0.14710
2025	0.42643	0.21075	0.12992	0.20142	0.15414

Table H-2: Natural Gas Avoided Costs per October 25, 2000 ALJ Ruling

Year	Recommended Gas Commodity Avoided Costs (nominal \$/therm)	T&D Avoided Costs (nominal \$/therm)	Environmental Externality (nominal \$/therm)	Total Gas Avoided Costs (nominal \$/therm)
1	0.5471	0.0568	0.056	0.6599
2	0.4850	0.0552	0.058	0.5982
3	0.3744	0.0518	0.060	0.4863
4	0.3380	0.0513	0.062	0.4512
5	0.3528	0.0527	0.063	0.4685
6	0.3689	0.0542	0.065	0.4882
7	0.3857	0.0558	0.067	0.5085
8	0.4019	0.0574	0.069	0.5283
9	0.4192	0.0590	0.071	0.5492
10	0.4372	0.0607	0.073	0.5709
11	0.3802	0.0595	0.076	0.5157
12	0.3970	0.0612	0.078	0.5361
13	0.4156	0.0630	0.080	0.5586
14	0.4343	0.0648	0.083	0.5820
15	0.4542	0.0666	0.085	0.6058
16	0.4750	0.0686	0.088	0.6315
17	0.4964	0.0705	0.090	0.6569
18	0.5191	0.0726	0.093	0.6847
19	0.5429	0.0747	0.095	0.7126
20	0.5676	0.0769	0.097	0.7415
21	0.5935	0.0792	0.099	0.7715
22	0.6206	0.0815	0.101	0.8027
23	0.6489	0.0839	0.102	0.8349
24	0.6786	0.0864	0.103	0.8685
25	0.7095	0.0890	0.105	0.9033

Table H-3: Nominal Electric and Gas Avoided Costs Used for Analysis

UTILITY AVOIDED COSTS PY2002 w/ADDERS								
\$/kWh \$/therm- Nominal								
Year	Count	S ON	S SEM	S OFF	W ON	W SEM	W OFF	NGAS
2001	1	0.6184	0.2187	0.1689	0.1087	0.0730	0.0639	0.6599
2002	2	0.6184	0.2763	0.1689	0.1087	0.0730	0.0639	0.5982
2003	3	0.2838	0.1160	0.0713	0.1352	0.1093	0.0840	0.4863
2004	4	0.2681	0.1072	0.0673	0.1271	0.1030	0.0793	0.4512
2005	5	0.2734	0.1094	0.0687	0.1298	0.1051	0.0809	0.4685
2006	6	0.2440	0.1123	0.0704	0.1254	0.1079	0.0830	0.4882
2007	7	0.2528	0.1166	0.0730	0.1304	0.1120	0.0860	0.5085
2008	8	0.2606	0.1203	0.0753	0.1348	0.1156	0.0888	0.5283
2009	9	0.2690	0.1244	0.0777	0.1395	0.1195	0.0917	0.5492
2010	10	0.2780	0.1288	0.0804	0.1445	0.1237	0.0949	0.5709
2011	11	0.2442	0.1124	0.0705	0.1256	0.1080	0.0830	0.5157
2012	12	0.2532	0.1167	0.0731	0.1306	0.1122	0.0862	0.5361
2013	13	0.2629	0.1215	0.0760	0.1361	0.1167	0.0896	0.5586
2014	14	0.2732	0.1265	0.0790	0.1419	0.1215	0.0932	0.5820
2015	15	0.2845	0.1319	0.0823	0.1482	0.1268	0.0972	0.6058
2016	16	0.2966	0.1379	0.0859	0.1550	0.1324	0.1014	0.6315
2017	17	0.3097	0.1442	0.0897	0.1624	0.1385	0.1060	0.6569
2018	18	0.3238	0.1511	0.0939	0.1704	0.1451	0.1110	0.6847
2019	19	0.3393	0.1586	0.0984	0.1791	0.1523	0.1164	0.7126
2020	20	0.3555	0.1665	0.1032	0.1883	0.1599	0.1222	0.7415
2021	21	0.3720	0.1745	0.1080	0.1975	0.1676	0.1279	0.7715
2022	22	0.3892	0.1829	0.1131	0.2064	0.1749	0.1340	0.8027
2023	23	0.4074	0.1918	0.1184	0.2166	0.1833	0.1404	0.8349
2024	24	0.4264	0.2010	0.1240	0.2273	0.1921	0.1471	0.8685
2025	25	0.4464	0.2108	0.1299	0.2385	0.2014	0.1541	0.9033
2026	26	0.4621	0.2181	0.1345	0.2468	0.2085	0.1595	0.9349

Table H-4: Discounted Present Value Electric and Gas Avoided Costs Used For Ceiling Insulation Analysis

Year	Avoided Electricity Costs	Discount Factor	Discounted Avoided Electricity Cost	Avoided Gas Costs	Discount Factor	Discounted Avoided Gas Cost
2002	0.1690	1.0000	0.1690	0.5982	1.0000	0.5982
2003	0.1057	0.9246	0.0977	0.4863	0.9246	0.4497
2004	0.0992	0.8550	0.0848	0.4512	0.8550	0.3858
2005	0.1014	0.7905	0.0801	0.4685	0.7905	0.3704
2006	0.1009	0.7310	0.0737	0.4882	0.7310	0.3569
2007	0.1047	0.6759	0.0707	0.5085	0.6759	0.3437
2008	0.1079	0.6249	0.0674	0.5283	0.6249	0.3302
2009	0.1114	0.5778	0.0644	0.5492	0.5778	0.3174
2010	0.1151	0.5343	0.0615	0.5709	0.5343	0.3050
2011	0.1009	0.4940	0.0498	0.5157	0.4940	0.2548
2012	0.1047	0.4568	0.0478	0.5361	0.4568	0.2449
2013	0.1090	0.4224	0.0460	0.5586	0.4224	0.2359
2014	0.1134	0.3906	0.0443	0.5820	0.3906	0.2273
2015	0.1180	0.3611	0.0426	0.6058	0.3611	0.2188
2016	0.1231	0.3339	0.0411	0.6315	0.3339	0.2109
2017	0.1288	0.3087	0.0398	0.6569	0.3087	0.2028
2018	0.1349	0.2855	0.0385	0.6847	0.2855	0.1955
2019	0.1415	0.2640	0.0373	0.7126	0.2640	0.1881
2020	0.1482	0.2441	0.0362	0.7415	0.2441	0.1810
2021	0.1551	0.2257	0.0350	0.7715	0.2257	0.1741
2022	0.1624	0.2087	0.0339	0.7715	0.2087	0.1610
2023	0.1703	0.1929	0.0329	0.7715	0.1929	0.1489
2024	0.1784	0.1784	0.0318	0.7715	0.1784	0.1376
2025	0.1870	0.1650	0.0308	0.7715	0.1650	0.1273
2026	0.1957	0.1525	0.0298	0.7715	0.1525	0.1177
Present Value Avoided Costs						
25 year lifetime	\$1.3872			\$6.4835		
With Non-Energy Benefits Factor of:	1.154	\$1.6008		\$7.4820		

H.3 Assumptions Used to Determine Ceiling Insulation Levels

The process used for generating the energy and dollar savings estimates that were used to determine appropriate ceiling insulation levels are summarized below:

- Energy savings estimates were generated using a building simulation program (DOE-2.2).

- Two detached single family prototypes buildings were used; both had central air conditioning, one utilized gas space heating and the other utilized electric space heating.
 - Runs were done for each prototype at ceiling insulation levels of R-0, R-11, R-19, R-22, R-30, and R-38.
 - Each of these configurations was run using the weather data for the 16 CEC climate zones.
 - Energy savings were computed for the various insulation levels for each climate zone.
 - Average savings for the five LIEE weather zones were computed as a simple average of the savings for those CEC climate zones that they encompassed.
- Avoided costs applied to the energy savings are presented in Table H-5, along with the costs used for the Phase II Follow-up analysis for comparison. Installation costs, heating and cooling equipment efficiencies, and various weighting factors utilized in the assumptions are presented in Figure H-1.
 - Insulation analysis results are presented for the five LIEE weather zones in Table H-6 through Table H-10.

Table H-5: Comparison of Costs Used for Ceiling Insulation Analysis Scenarios

	Phase II Follow-up Values	Phase III Avoided Costs	Phase III with NEBF 1.154	Units
<i>Scenario1 (AvoidedCostsOnly)</i>				
Space Heating: Gas cost	\$5.84	\$6.4835	\$7.4820	\$/therm
Space Heating: Electricity cost	\$1.24	\$1.3872	\$1.6008	\$/kWh
Air Conditioning: Electricity cost	\$1.70	\$1.3872	\$1.6008	\$/kWh
<i>Scenario2 (AvgRetail&Avoided)</i>				
Space Heating: Gas cost	\$10.05	n.a.	n.a.	\$/therm
Space Heating: Electricity cost	\$1.555	n.a.	n.a.	\$/kWh
Air Conditioning: Electricity cost	\$1.785	n.a.	n.a.	\$/kWh
<i>Scenario3 (RetailCostsOnly)</i>				
Space Heating: Gas cost	\$14.26	n.a.	n.a.	\$/therm
Space Heating: Electricity cost	\$1.87	n.a.	n.a.	\$/kWh
Air Conditioning: Electricity cost	\$1.87	n.a.	n.a.	\$/kWh

Figure H-1: Ceiling Insulation Analysis Assumptions

ASSUMPTIONS			
Attic floor area	1500	ft ²	
Measure life	25	years	
Discount rate	8.15%		
Effective Measure Life	1.0000		
Insulation Costs (to install R-)	\$/ft²	TotalInstCost	DiscAnnCost
11	0.35	\$525.00	\$525.00
19	0.47	\$702.78	\$702.78
22	0.51	\$769.44	\$769.44
30	0.63	\$947.22	\$947.22
38	0.75	\$1,125.00	\$1,125.00
HDD Base	HDD65		
CDD Base	CDD70		
Space Heating: Gas cost	\$7.4820	PDV\$/therm	
Space Heating: Electricity cost	\$1.6008	PDV\$/kwh	
Air Conditioning: Electricity cost	\$1.6008	PDV\$/kwh	
Gas heating efficiency	0.65		
Electric heating efficiency	0.95		
Electric cooling efficiency	8.00	SEER (kBtuh/kW)	= 2.34 COP
Cooling Derating Factor	0.5		
Weight/% of Gas heating costs	90%		
Weight/% of Elec heating costs	10%		
NEB Factor	1.154		

Table H-6: North Coast Ceiling Insulation Analysis Results

NORTH COAST

90% GAS HEATING, 10% ELEC HEATING WITH A/C

Existing R-Value	R-Value of Insulation Installed Over Existing			
	11	19	30	38
0	\$3,696	\$4,045	\$4,109	\$4,058
11	\$143	\$164	>R-38	>R-38
19	(\$185)	(\$236)	>R-38	>R-38

Table H-7: South Coast Ceiling Insulation Analysis Results

SOUTH COAST
90% GAS HEATING, 10% ELEC HEATING WITH A/C

Existing R-Value	R-Value of Insulation Installed Over Existing			
	11	19	30	38
0	\$1,869	\$1,976	\$1,902	\$1,800
11	(\$152)	(\$217)	>R-38	>R-38
19	(\$324)	(\$426)	>R-38	>R-38

Table H-8: Inland Ceiling Insulation Analysis Results

INLAND
90% GAS HEATING, 10% ELEC HEATING WITH A/C

Existing R-Value	R-Value of Insulation Installed Over Existing			
	11	19	30	38
0	\$4,146	\$4,573	\$4,685	\$4,658
11	\$237	\$290	>R-38	>R-38
19	(\$137)	(\$164)	>R-38	>R-38

Table H-9: Desert Ceiling Insulation Analysis Results

DESERT
90% GAS HEATING, 10% ELEC HEATING WITH A/C

Existing R-Value	R-Value of Insulation Installed Over Existing			
	11	19	30	38
0	\$3,496	\$3,847	\$3,918	\$3,871
11	\$145	\$173	>R-38	>R-38
19	(\$179)	(\$226)	>R-38	>R-38

Table H-10: Mountain Ceiling Insulation Analysis Results

MOUNTAIN
90% GAS HEATING, 10% ELEC HEATING WITH A/C

Existing R-Value	R-Value of Insulation Installed Over Existing			
	11	19	30	38
0	\$6,266	\$7,000	\$7,299	\$7,338
11	\$610	\$783	>R-38	>R-38
19	\$50	\$89	>R-38	>R-38

H.4 Implied Ceiling Insulation Levels

Implied ceiling insulation levels for the present Phase III (June 2001) analysis are compared to those of the Phase II Follow-up report in Table H-11 below.

Table H-11: Implied Ceiling Insulation Policies for Various Project Phases

Climate Zone	Existing Ceiling Insulation Level	Insulation to be <i>Added</i>	
		From Phase II Follow-up Report	Phase III Analysis (June 2001)
North Coast	R-0 (uninsulated)	R-19	R-30
	R-1 to R-11	R-11²	R-19
	R-12 to R-19	None	None
	Above R-19	None	None
South Coast	R-0 (uninsulated)	R-19³	R-19
	R-1 to R-11	None	None
	R-12 to R-19	None	None
	Above R-19	None	None
Inland	R-0 (uninsulated)	R-19	R-30
	R-1 to R-11	R-11	R-19
	R-12 to R-19	None	None
	Above R-19	None	None
Desert	R-0 (uninsulated)	R-30	R-30
	R-1 to R-11	R-19	R-19
	R-12 to R-19	None	None
	Above R-19	None	None
Mountain	R-0 (uninsulated)	R-30	R-38
	R-1 to R-11	R-19	R-19
	R-12 to R-19	None	R-19
	Above R-19	None	None ⁴

² The net benefit of adding insulation for an existing insulation level of R-11 was negative, but the net benefit of adding insulation for existing insulation levels of R-10 and less was positive, so R-11 was used here.

³ Analysis results indicate a level of R-11, but R-19 was used for consistency with Title 24 minimum value.

⁴ For the “Above R-19” situation, since the most typical existing R-value would probably be R-30 and adding R-11 to this would take the final R-value to R-41 (above R-38), no additional insulation will be added if the existing R-value is above R-19.