Final Report for

# LIEE Program and Measure Cost Effectiveness

(in response to D. 01-12-020, ordering paragraph #9)

Submitted by:

Cost Effectiveness Subcommittee of the RRM Working Group and Standardization Project Team

**March 28, 2002**

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# 1 EXECUTIVE SUMMARY

The Reporting Requirements Manual (RRM) Working Group and the Standardization Team created a joint subcommittee (Joint RRM/ST Cost Effectiveness Subcommittee) to assure compliance with ordering paragraph (OP) 9 of Decision (D.) 01-12-020, December 11, 2001. OP 9 requires that the utilities:

> "…evaluate the Low Income Energy Efficiency (LIEE) program and individual measures by calculating both the participant cost test and utility cost test, including in that calculation the non-energy related benefits developed by the RRM Working Group. The RRM Working Group and Standardization Project Team shall jointly develop recommendations, after obtaining public input, on:
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> - how each of these tests should be considered in making final measure selections, or in evaluating the overall effectiveness of LIEE programs from year to year or across utilities, and
> - an explicit method for addressing the "gross" versus "net" costs and savings issue in measure and program evaluation.
>
> The joint report shall include a discussion of the pros and cons of the various options considered."

Public workshops on these issues were held in San Francisco on March 26 and in San Diego on March 27, 2002. In appropriate areas where the input from the public could not be reconciled with that of the Joint RRM/ST Cost Effectiveness Subcommittee, it has been noted.

For comparison purposes, utility level analysis was performed with the SoCalGas and SCE programs as a combined entity, since they serve roughly the same customers. Exhibit 1.1 provides the program level results of the analysis.

**Exhibit 1.1**
**Cost Effectiveness Test Results for the LIEE Program**

| LIEE Program | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Participant Cost Test | | | Utility Cost Test | | | Participant Cost Test$_m$ |
| Utility | Benefits | Costs | B/C | Benefits | Costs | B/C | Participant Benefits / Utility Costs |
| PG&E | $ 23,700,706 | $0 | Undefined | $ 10,269,895 | $ 25,211,144 | 0.41 | 0.94 |
| SDG&E | $ 6,292,154 | $0 | Undefined | $ 3,561,770 | $ 6,414,269 | 0.56 | 0.98 |
| SCE & SoCalGas | $ 20,702,988 | $0 | Undefined | $ 9,802,003 | $ 21,382,824 | 0.46 | 0.97 |
| SCE | $ 14,749,473 | $0 | Undefined | $ 8,229,064 | $ 4,971,208 | 1.66 | 2.97 |
| SoCalGas | $ 5,953,515 | $0 | Undefined | $ 1,572,939 | $ 16,411,616 | 0.10 | 0.36 |

Cost effectiveness is clearly an important element in the assessment of programs and measures. However, the Joint RRM/ST Cost Effectiveness Subcommittee believes that, especially in the LIEE arena, clear cut rules on inclusion and exclusion of measures cannot always be made based solely on measure test results. Policy and social welfare considerations not fully captured by these cost-effectiveness tests are often the main

guiding element in decisions to retain measures within low-income programs. Additionally, the benefits of many measures offered under the LIEE program (particularly weatherization measures) are strongly interactive, so that it is very difficult, if not impossible, to disaggregate and assess their impacts.

The fact that the modified participant cost test ($PC_m$) and a utility cost test (UC) results are uniform across the state indicates that program offerings are comparable statewide if considered on an electric and gas utility service area basis. This lead to the use of the average program $PC_m$ and UC test values for each utility as the threshold selection criteria for measure retention/exclusion.

The Joint RRM/ST Cost Effectiveness Subcommittee recommends a three level methodology for assessment of LIEE program measures. Measure level benefit-cost (B/C) ratios that include NEBs should be used along with the following guidelines:

1. Measures that have both a $PC_m$ and a UC greater than or equal to the average program $PC_m$ and UC for that utility should be included in the LIEE program. This applies for both existing and newly proposed measures.
2. Existing measures with one of the two benefit-cost (B/C) ratios less than the average program $PC_m$ and UC for that utility should be retained in the program. New measures meeting this criterion would not be accepted because of the substantial effort required to integrate a new measure.
3. Existing and new measures with both the UC and $PC_m$ test results less than the average program $PC_m$ and UC for that utility should be excluded from the LIEE program unless substantial argument can be made that significant NEBs are not currently being accounted for in the $PC_m$ and UC test values or there are other policy or program considerations that require the measure to be retained.

It is necessary to use the utility specific values in order to fairly assess the programs offered by single fuel utilities. If the statewide values were used as the criteria, then, despite the acceptable level of program offering when SCE and SoCalGas are considered together, the SCE programs would pass handily and the SoCalGas programs would fail many measures. By using the utility specific $PC_m$ and UC values, each is measured against its own criteria, and measures are not unduly eliminated from the combined SCE and SoCalGas service area.

Under this approach, the elimination of low cost-effectiveness measures will slowly raise the average program $PC_m$ and UC test values. The program level criteria would be held constant for two-year periods (with some exceptions).

Using these guidelines, a very broad look at the electric appliances, gas appliances, and weatherization measures shows that electric appliances often have both a $PC_m$ and UC that are over the utility-specific thresholds. The electric appliances falling into category #1 are measures that are relatively easy to install and have the potential for high savings. For gas appliances, there are slightly more measures that have neither cost effectiveness tests over the thresholds. This is in line with the fact that gas measures tend to have lower impacts. The weatherization measures are manpower-intensive measures to install, yet provide relatively small impacts. As such, there is a high percent of measures that fail

both cost-effectiveness tests. Interestingly, for weatherization measures, there are no measures which pass one test while failing the other.

The following conclusions and recommendations are made:

- Use a modified participant test to enable benefit-cost ratio comparisons of the participant and utility cost tests. The modified participant test ratio is the participant benefits divided by the utility program costs.
- When addressing specific measures, adopt a three level methodology using average program $PC_m$ and UC for each utility as the measure screening criteria for that utility's measures.
- Caution should be used when comparing program level cost effectiveness across utilities for a single year. Variations in measure mix provided, gas versus electric savings, and reported program costs make such comparisons problematic.
- Comparing cost effectiveness of a single utility across different years requires an understanding of the underlying reasons for changes. Variations in the mixes of measures installed and the resident types targeted, combined with the associated changes in program costs and benefits make comparisons difficult. However, an understanding of differences can be useful for deciding future program measure mix.
- When comparing program level cost effectiveness across utilities, consider SCE and SoCalGas benefits and costs together to obtain a better representation of utility-to-utility customer and utility benefits versus costs.
- Use "gross" savings and costs for all measures in the LIEE program. (Note: In this context, "gross" savings means the total kWh difference between the new equipment and the existing equipment applied over the entire useful life of the new equipment.) The Joint RRM/ST Cost Effectiveness Subcommittee reviewed the PY2001 rapid deployment measures and concluded that the use of the "gross" costs and savings should be applied to them as well.

The remainder of this report provides details on the analysis and results.

# 2 INTRODUCTION

The Reporting Requirements Manual Working Group and the Standardization Team created a joint subcommittee (the Joint RRM/ST Cost Effectiveness Subcommittee) to assure compliance with ordering paragraph (OP) 9 of Decision (D.) 01-12-020, December 11, 2001. OP 9 requires that the utilities:

> "…evaluate the Low Income Energy Efficiency (LIEE) program and individual measures by calculating both the participant cost test and utility cost test, including in that calculation the non-energy related benefits developed by the RRM Working Group. The RRM Working Group and Standardization Project Team shall jointly develop recommendations, after obtaining public input, on:
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> - how each of these tests should be considered in making final measure selections, or in evaluating the overall effectiveness of LIEE programs from year to year or across utilities, and
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> The joint report shall include a discussion of the pros and cons of the various options considered."

The non-energy benefits (NEBs) developed by the RRM Working Group Cost Effectiveness Subcommittee are reported in the "Low-income Public Purpose Test (The LIPPT) Final Report", dated April 3, 2001. Conclusion of Law number 11 of Decision (D.) 01-12-020 stated, "The non-energy benefits developed by the Working Group and presented in Attachment 4 are reasonable and should be adopted".

The remainder of this report will cover the approaches used to meet the requirements of OP 9, the results of those analyses, and recommendations based on the analysis. The development of the findings in this report incorporated a public input process. In appropriate areas where the input from the public could not be reconciled with that of the Joint RRM/ST Cost Effectiveness Subcommittee, it has been noted.

# 3 METHODOLOGY

Ordering Paragraph 9 required the Joint RRM/ST Cost Effectiveness Subcommittee to address several issues.

- Cost effectiveness tests for the LIEE Program
- Cost effectiveness tests for measures within the LIEE Program
- Use of these tests in decision making
- Method to address "gross" versus "net" issues

These first two issues are discussed next. No specific methodologies were developed to address the last two issues – the recommendations for addressing these issues were based on public input and group discussions. Therefore, the recommendation on the use of cost effectiveness tests in making decisions and "gross" versus "net" issues are presented in the results section (Section 4).

## 3.1 Cost Effectiveness Tests for LIEE Program

Ordering Paragraph 9 clearly stated which cost effectiveness tests were required – the participant cost test (PC) and the utility cost test (UC). As stated in the Decision:

> "The Participant Cost Test (PC) measures benefits and costs from the perspective of the customer receiving the measures or services. This test compares the reduction in the customer's utility bill, plus any incentive paid by the utility, with the customer's out-of-pocket expenses. In the case of LIEE program measures, where there generally are no out-of-pocket expenses to the eligible customer, the PC basically measures the bill savings associated with the program or measure.
>
> The Utility Cost Test (UC) measures the net change in a utility's revenue requirements resulting from the program. The benefits for this test are the avoided supply costs of energy and demand ("avoided costs") – the reduction in transmission, distribution, generation and capacity costs valued at marginal costs – for the periods when there is a load reduction. The costs for the UC test are the program costs incurred by the utility, including any financial incentives paid to the customer, and the increased supply costs for the periods in which load increased. "[1]

The "California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects" October 2001, provides further specifics regarding these two tests. The formulas from the Standard Practice Manual are presented in Appendix F; for each of these tests, there is a net present value (NPV) formulae that is the benefits minus the costs and a benefit-cost (B/C) ratio formulae that divides the benefits by the costs.[2] The inputs and methods used to determine the results for each test are provided next.

[1] Page 57. R.01-08-027, D. 01-12-020, December 11, 2001, Section V.
[2] California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects. October 2001. Chapters 2 and 5.

D.01-12-020 accepted the NEBs proposed by the LIPPT report. All NEBs presented in the LIPPT report have been included in the calculations in this report. Appendix A presents a listing of the NEBs, a description of the NEB, the measures included for each NEB, and comments on which NEB is recommended for further study in the future.

### 3.1.1 Participant Cost Test

As stated in the description of the PC included in D.01-12-020, participant costs for the LIEE program are zero. This effectively removes the PC B/C ratio from consideration as division by zero results in an undefined number. Therefore, the PC simply defaults to the NPV formula discussed above, or the net present value of the benefits received by the customer[3]. These benefits are the bill savings due to the installation of the program measures.

The work that created the LIPPT report also developed a spreadsheet model for calculating LIPPT values. The spreadsheet included all inputs needed to calculate the PC, both with and without NEBs, with one exception. The avoided costs for energy were used instead of energy rates encountered by the customer. Based on how the spreadsheet was set up, by simply substituting energy rates for avoided costs, a bill savings value was calculated for the analysis in this report.

The energy rates used in this analysis for PY2000 and beyond are the same as presented in the "Joint Utility Low Income Energy Efficiency Program Costs and Bill Savings Standardization Report" of March, 2001. The rates by utility are shown in Exhibit 3.1.

**Exhibit 3.1**
**Energy Rates Used in Participant Cost Tests**

| Utility | PY 2000 kWh Rate | PY 2000 Therm Rate |
|---|---|---|
| PG&E | 0.1159 | 0.6537 |
| SCE | 0.1040 | NA |
| SDG&E | 0.1179 | 0.5926 |
| SoCalGas | NA | 0.6110 |
| All Subsequent Years | Previous Year * (1 + Escalation Rate) | |

The escalation rate was set to 3% per year with an 8.15% discount rate.[4] Because these rates do not take into account recent rate increases, the bill savings over time are most likely conservative.

D.01-12-020 recognized that it was not possible to compute a B/C ratio for LIEE participants since the participants have no costs related to the installations. While the PC

[3] In actuality, it is the net-present-value of the participant benefit minus the net-present-value of the participant cost, but with the participant cost term equal to zero, it reduces to only the first term.
[4] ALJ Bytof ruling, dated October 25, 2000, in Application (A.) 99-09-049, et. al

and UC tests can be computed as the NPV of the benefits, those NPVs have little meaning in isolation. The Joint RRM/ST Cost Effectiveness Subcommittee discussed the difficulties in comparing PC and UC tests if the PC test is simply an NPV dollar value and the UC test is a NPV and a B/C ratio. As part of this discussion, and as directed by D.01-12-020, the group reviewed the relevant portions of D.92-09-080.[5] This decision discusses the possibility of using the utility costs to create a benefit cost ratio, while not specifically addressing its use to create a modified participant cost test. On this basis, the subcommittee decided to also calculate a "modified" participant cost test ($PC_m$) whereby the participant benefits are divided by the utility costs to provide a $PC_m$ B/C ratio. (As it turns out, this value is the ratio of the bill savings divided by the utility cost, which is already being calculated by the utilities as part of the bill savings reporting.) The utility costs used in the $PC_m$ are identical to those in the UC test.

The Joint RRM/ST Cost Effectiveness Subcommittee feels that the creation of the $PC_m$, or some similar ratio, is an important step toward being able to evaluate and rank measures in conjunction with the UC. Without the creation of a participant related ratio, the comparison would be between two different types of measures/units of vastly differing orders of magnitudes.

It is important to note that the NEBs applied in this test are only those benefits that apply to the participants. For example, "fewer customer calls" and any others NEBs that accrue to the utility are not included in the participant cost test or modified participant cost test benefits.

### 3.1.2 Utility Cost Test

The utility cost test, as defined by the Standard Practices Manual, also has a net-present-value and B/C ratio formula. In the UC test the benefits for the utility are determined using the utility avoided costs rather than the energy rates used in the participant cost test. The avoided cost forecast as adopted by the Commission for PY2000,[6] and used in this analysis to value electricity savings, was a statewide kWh value.[7] It is anticipated that that future efforts in this area will use the avoided cost values most recently adopted by Commission.

The electric and gas avoided costs used in the determination of benefits for the UC test presented here include energy, transmission and distribution, and environmental externalities. The values used were $0.0452 per kWh for electricity and $0.3580 per therm for natural gas.

The utility costs used do not include incentives paid since no incentives are paid in this program. Likewise, there are no increased supply costs since this is not a fuel substitution or load shifting program. Therefore, the costs used in the UC are the program costs only.

[5] Section 6.1.2.2 Consideration of Total Resource and Utility Costs.
[6] D. 99-08-021 and further adopted in D. 00-07-017.
[7] While the electric use is expressed only in kWh, the avoided cost value was developed using a hybrid demand profile. Thus extracting the relative demand contribution is virtually impossible. It is believed that the demand component represents between 1% and 6% of the overall avoided cost using 2001 kW values.

The NEBs applied in this test are only those benefits that accrue to the utility. Therefore, NEBs such as "water and sewer savings" and other NEBs that were determined to accrue to the participant are not included in the UC benefits estimates.

## 3.2 Cost Effectiveness Test for LIEE Program Measures

### 3.2.1 Allocation of Non Energy Benefits to Measures

Moving from whole program assessments to measure level assessments significantly increases the complexity of the analysis. The original LIPPT report created utility-specific NEB values per household and multiplied that value by the number of households serviced to obtain an annual monetary value for a non-energy benefit. As such, the OP 9 provision requiring the calculation of measure-specific benefits that include NEBs, means that decisions had to be made regarding allocation of the NEB to a different unit of measurement (i.e., per-measure as opposed to per-household).

While the Joint RRM/ST Cost Effectiveness Subcommittee recognizes that NEBs need to be allocated to individual measures in order to permit their inclusion in measure assessment, it also feels the necessity to document the inherent weaknesses in conducting such a task.

- The LIPPT Report collected and documented NEBs from many disparate sources. The NEBs were developed at a global level. At times, a specific NEB was calculated based on a sampled population of participants, regardless of the exact measures in each participant's home.
- Because these estimates are at the household level, no consistent uniformly applicable criteria exist for distributing the household/program level NEB values amongst the program measures.
- Regardless of how the NEBs are allocated to measures, there is a false sense of precision inherent in the process – it may or may not be true that a certain measure would provide the level of non-energy benefits attributed to it.

Given those caveats, three methods of allocating the NEBs across measures received serious consideration and analysis. These methods weighted the NEB based on the:

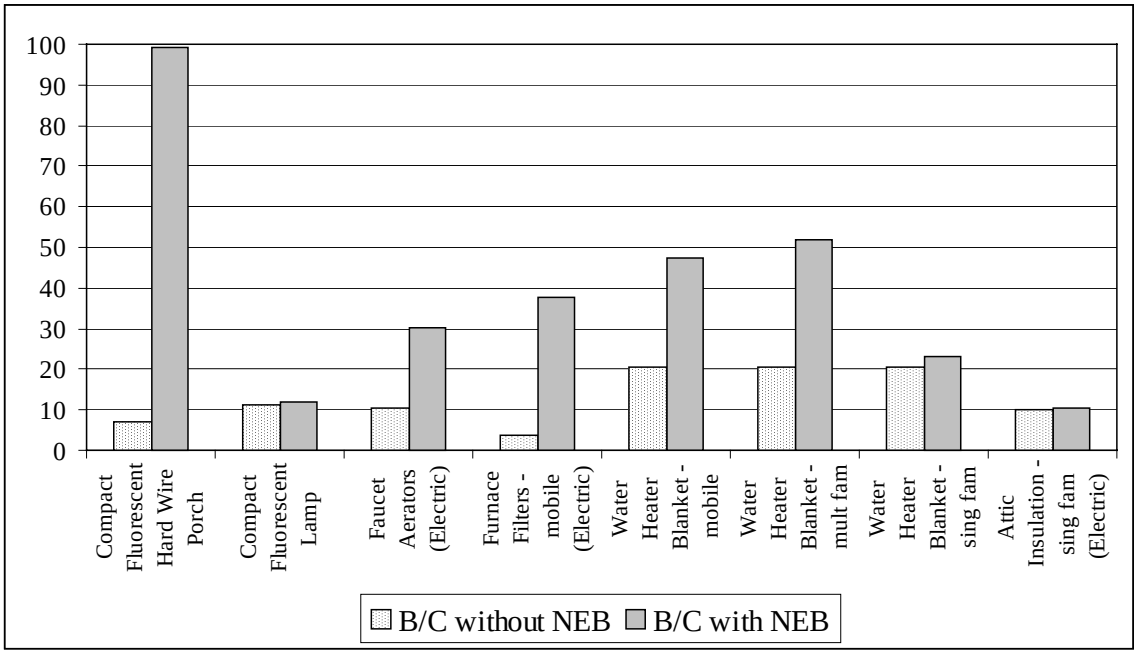
- simple association of a measure with that NEB,
- average installations per house in the program for that measure, and
- NPV of the energy savings over the life of the measure.

Each of these three methods is discussed in the order presented above.

Simple Association of a Measure – With the concept of allocation by association, if a measure type is logically associated with an NEB (e.g., lower water costs are associated with faucet aerators) then program level savings for that NEB is divided equally across the associated measures, independent of how many units of each measure were installed. The problem with this approach is that it causes the B/C ratio to fluctuate greatly. As an example using this allocation method, there only a few compact fluorescent lamp (CFL) porch lights installed and the measure subsequently has small benefits. When the NEB allocation is added to the benefit portion of the B/C, it has a huge effect on the B/C ratio.

At the other end of the spectrum is the measure of regular compact fluorescent lamps. This measure has large energy benefits already. As such, adding a comparatively small amount more to the benefits results in a tiny change in the B/C ratio. As a result, this method causes changes in the measure level B/C ratios that logically seem to be out of proportion to any rationally expected effects (see Exhibit 3.2). Thus allocation based on the simple association of the measure with an NEB was rejected as an allocation method.

**Exhibit 3.2**
**Example of Weighting Method – Simple Association**




The rejection of the Simple Association of a Measure method left two competing methods for allocating the NEBs: (1) the lifecycle monetary benefit of a measure (called the kWh weighting method for simplicity) and (2) the average installations per household method. The Joint RRM/ST Cost Effectiveness Subcommittee discussed at great length how to make a decision between these two methods and whether the chosen method of allocation was appropriate and defendable.

Both methods use the same mathematical mechanics to allocate the NEBs; it is just the weighting values that differ. Exhibit 3.3 below graphically shows how the NEB is allocated for the average installations per household method. As shown there, NEB dollars are only allocated to measures that have been determined to have a relationship to the NEB. (Appendix A documents which measures are included in each NEB.) In Exhibit 3.3 the dollar values are weighted based on the average number of measures installed per home. A measure with a higher average number of measures installed per home would receive a larger proportion of the NEB dollars compared to a measure with a lower average number of measures installed per home. After allocating the dollars for each NEB, the values are summed across a measure to determine the measure specific NEB benefit.

If the kWh weighting method were to be used, the lifecycle monetary savings of the measure would replace the values in the second column (Average Measures Installed per Home). Those measures with a higher lifecycle savings would receive a higher proportion of the NEB dollars. Higher lifecycle savings would be due to measures with high initial energy savings and/or long effective useful lives.

**Exhibit 3.3**
**Illustration of Allocation Method**

| Efficiency Measures | Average Measures Installed per Home | Total NEB Benefits | Non-energy Benefit Component | | | | | Total NEBs for particular |
|---|---|---|---|---|---|---|---|---|
| | | | NEB #1 | NEB #2 | NEB #3 | NEB #4 | NEB #5 | |
| Measure #1 | 0.026 | | Yes | Yes | No | Yes | Yes | 4 |
| Measure #2 | 0.013 | | Yes | No | No | Yes | Yes | 3 |
| Measure #3 | 0.930 | | Yes | Yes | No | Yes | Yes | 4 |
| Measure #4 | 1.136 | | Yes | Yes | No | Yes | Yes | 4 |
| Measure #5 | 0.093 | | No | Yes | Yes | Yes | Yes | 4 |
| Measure #6 | 0.003 | | No | Yes | Yes | Yes | Yes | 4 |
| Measure #7 | 0.065 | | No | No | Yes | Yes | No | 2 |
| Measure #8 | 0.084 | | Yes | Yes | No | Yes | Yes | 4 |
| Measure #9 | 0.039 | | Yes | Yes | No | Yes | Yes | 4 |
| Measure #10 | 0.006 | | Yes | Yes | No | Yes | Yes | 4 |
| | Total Number of Measures in NEB | | 7 | 8 | 3 | 10 | 9 | |
| | Total NPV of NEB Benefit | | $ 10,000 | $ 150,000 | $ 250,000 | $ 75,000 | $ 250,000 | |

2. Measure-specific benefits summed across all NEBs

1. NEB-specific benefit allocated across measures with a Yes

| Efficiency Measures | Average Measures Installed per Home | Total NEB Benefits | Non-energy Benefit Component | | | | |
|---|---|---|---|---|---|---|---|
| | | | NEB #1 | NEB #2 | NEB #3 | NEB #4 | NEB #5 |
| Measure #1 | 0.026 | $ 13,352 | $ 308 | $ 4,202 | $ - | $ 1,937 | $ 6,906 |
| Measure #2 | 0.013 | $ 4,575 | $ 154 | $ - | $ - | $ 968 | $ 3,453 |
| Measure #3 | 0.930 | $ 26,705 | $ 615 | $ 8,403 | $ - | $ 3,874 | $ 13,812 |
| Measure #4 | 1.136 | $ 320,458 | $ 7,385 | $ 100,840 | $ - | $ 46,488 | $ 165,746 |
| Measure #5 | 0.093 | $ 119,308 | $ - | $ 15,126 | $ 72,347 | $ 6,973 | $ 24,862 |
| Measure #6 | 0.003 | $ 3,314 | $ - | $ 420 | $ 2,010 | $ 194 | $ 691 |
| Measure #7 | 0.065 | $ 55,524 | $ - | $ - | $ 50,643 | $ 4,881 | $ - |
| Measure #8 | 0.084 | $ 43,395 | $ 1,000 | $ 13,655 | $ - | $ 6,295 | $ 22,445 |
| Measure #9 | 0.039 | $ 20,029 | $ 462 | $ 6,303 | $ - | $ 2,905 | $ 10,359 |
| Measure #10 | 0.006 | $ 3,338 | $ 77 | $ 1,050 | $ - | $ 484 | $ 1,727 |
| | Total NPV of NEB Benefit | $ 610,000 | $ 10,000 | $ 150,000 | $ 125,000 | $ 75,000 | $ 250,000 |

Given that the mechanics of allocation are identical, the main task that remained was the choice of the criteria to be used to select the "better" or more logical method for distributing NEBs amongst the measures. Many discussions and email exchanges ensued amongst the Joint RRM/ST Cost Effectiveness Subcommittee.

- Since little basis exists for judging what the correct allocation of NEBs should be, on what basis should the group judge whether the changes in B/C were reasonable?
- Should a teleological argument be made – a method is better based on the end results (and the years of experience of the group that gives judgment to that end result)?
- Should a theoretical argument be made based on how the NEBs were estimated in the first place?

As part of the struggle with these and other issues, the group developed the following arguments for and against each of the final two allocation methods.

**Allocating based on the average measures installed per household.**

Pros:

- Acknowledges that each measure installed can provide a benefit to the customer that cannot be quantified by the energy savings.
- De-links NEB savings from energy savings and can cause dramatic changes in rank when adding in NEBs. If the a priori expectation of adding in the NEBs is that changes should occur, such changes may be warranted.
- The original participant NEBs were developed based on general participation in a low-income type program, which might suggest that they are more directly tied to the number of measures installed per household.

Cons:

- For some measures the participant benefit/cost ratio moves from below 1.0 to above 1.0 based solely on the addition of the NEB. This occurs for those measures with low initial energy benefits and low costs that are installed frequently.
- There are dramatic changes in ranking when moving from rank without NEBs to rank with NEBs. For example, one measure changed from 11$^{th}$ rank without NEBs to 25$^{th}$ rank with NEBs.
- Methods used to determine NEBs that apply to utility benefits were originally tied to energy savings. This allocation method does not seem to be a good fit for allocating utility NEBs.

**Allocating based on the lifecycle monetary benefit of the installed measures.**

Pros:

- Method of determining utility NEBs was originally tied to energy savings.
- Measures do not change rank compared to other measures in a dramatic fashion. In the PG&E data analyzed, the top ten measures without NEBs are still the top ten measures with NEBs (as are the second and third ten measures).
- Increased energy savings, and the resultant monetary savings, potentially gives participants more opportunity to impact their comfort, safety, etc., suggesting that the NEBs may be directly tied to energy savings.

Cons:

- Directly ties the non-energy benefit to the energy benefit regardless of potential benefits derived from the interaction with the LIEE personnel or the interaction of the measure in the house. Does not acknowledge that benefits can occur that are not correlated to energy savings.
- The measures do not change rank significantly. If one believes a priori that the NEBs should have an effect on measure ranking, then this method does not meet that expectation.

In addition to discussing the advantages and disadvantages of these two methods, the subcommittee discussed potential combinations of the two methods. By about the mid-

point in the deliberations, it was generally accepted that the kWh allocation method was particularly applicable to the UC test, since the NEBs that applied to the UC test were highly correlated with energy savings. Thus the majority of the later discussion centered on the best approach to use in allocating the NEBs for the $PC_m$ test. Consideration was given to using the kWh allocation method for the UC test and the average measures installed per household method for the $PC_m$, however consensus was that the dramatic changes in the $PC_m$ could not be justified. Appendix C and Appendix D have the B/C ratios both with and without NEB for these two allocation methods.

Throughout the Joint RRM/ST Cost Effectiveness Subcommittee discussions, continual attention was paid to the fact that the method employed had to be readily applicable on a mass basis across the utility databases and could not require detailed, minute adjustments.

Recommendation: The Joint RRM/ST Cost Effectiveness Subcommittee recommends that, for the present, both UC and the PC tests should allocate NEBs based on the lifecycle monetary benefit of the installed measures. Given the lack of documented, concrete information on how the measure level NEBs should be distributed, this method allocates the NEBs to the measures without causing significant changes to the order ranking of the UC and $PC_m$ test. In lieu of better information, this approach is considered reasonable.

In choosing to allocate participant related NEBs by energy savings, the Joint RRM/ST Cost Effectiveness Subcommittee does not disallow the fact that NEBs in general are intended to capture those effects not reflected in the standard ways of valuing energy impacts. Rather, the Subcommittee seeks to develop a systematic and consistent rule for allocating program-level NEBs to the measure level. Because, in many cases, it can be shown that these NEBs are correlated with energy savings, the Subcommittee believes that allocating participant NEBs according to energy savings yields a more consistent and believable result than allocating them according to the average number of measures installed per household.

In addition, the Joint RRM/ST Cost Effectiveness Subcommittee wants to make clear that the choice of the kWh allocation method is based partly on a shortage of information that might allow other approaches. Its choice as a proxy now should not preclude changes to alternate, more appropriate methods when better information becomes available, or discarding NEBs at the measure level altogether.

It should be noted that measures with no claimed energy saving receive no NEB allocation.

### 3.2.2 Decision Making for Measures

The Joint RRM/ST Cost Effectiveness Subcommittee reviewed several different approaches to screening measures for the LIEE program. Early in the process, the following general three-stage approach to screening measures was agreed.

1. Both the $PC_m$ and the UC test results are above the “pass” criteria, the measure is included.
2. One of the two test types falls below the “pass” criteria then the measure should probably be included.

3. Both the $PC_m$ and the UC test results fall below the "pass" criteria, the measure is excluded.

Given this three stage approach, the main issue remaining was the selection of the threshold criteria for pass/fail. While many criteria were discussed, several criteria received the majority of the attention. The following descriptions summarize these approaches and describe why they were rejected or accepted.

- Standard threshold of 1.0 (where the benefit exceeds the cost) for both tests. This approach was the first approach discussed since it represents the "traditional" break point for cost effectiveness testing. However, it was considered to be inappropriate at this time since (1) the current program level $PC_m$ and UC averages both fall below this value, (2) the $PC_m$ and UC current program averages have substantially different values (making the selection of one criteria for both inappropriate for screening), and (3) well over half of the current measures would be eliminated by this approach.
- A threshold value below 1.0 based on the idea that a dollar of services has a higher value to the LIEE customer than the dollar cost to the average ratepayer. While this approach would seem to have some validity in the literature, the identification or choice of a supportable multiplier would be difficult to support, or would have to be arbitrary.
- An average program threshold equal to the current average statewide values for the $PC_m$ and UC tests, with no individual measure thresholds. This approach would be consistent with the manner that other energy efficiency programs are managed and would place the emphasis on the program level numbers, which are which are more supportable than the measure level values. This approach was considered non responsive to the order by the Energy Division representative. Additionally, this approach would not have worked for the gas only utility, since their program would have been virtually, if not completely, eliminated, despite the fact that the comparisons demonstrates that on a service area basis their customers are getting LIEE program services comparable to other service territories.
- A measure threshold equivalent to each utility's PY2000 average program. This approach relies on the finding discussed in Section 4, that the program level $PC_m$ and UC results are uniform across the state if considered on an electric and gas utility service area basis, indicating that program offerings to LIEE customers are comparable statewide. A corollary to this statement is that each of the individual utility program offerings are roughly comparable. Given this, current individual utility program average $PC_m$ and UC values would represent reasonable measure thresholds, and would not bias for or against single fuel utilities. By using the utility specific $PC_m$ and UC values, each is measured against its own criteria, and measures are not unduly eliminated from the combined SCE and SoCalGas service area.

The Joint RRM/ST Cost Effectiveness Subcommittee selected the last of these options; the average program $PC_m$ and UC test values for each utility, as the threshold selection criteria for measure retention/exclusion. Once this selection was made, many specific

details and situations were discussed. These are documented below in order to supply an expanded description of the measure selection process and to give guidance to the Standardization Team who's responsibility it will be to apply this standard.

When applied using the a three level assessment framework for LIEE measures discussed above, the measure level benefit-cost (B/C) ratios, including NEBs should be assessed as follows:

1. Measures that have both a $PC_m$ and a UC greater than or equal to the average program $PC_m$ and UC for that utility should be included in the LIEE program. This applies for both existing and newly proposed measures.
2. Existing measures with one of the two benefit-cost (B/C) ratios less than the average program $PC_m$ and UC for that utility should be retained in the program. New measures meeting this criterion would not be accepted because of the substantial effort required to integrate a new measure.
3. Existing and new measures with both the UC and $PC_m$ test results less than the average program $PC_m$ and UC for that utility should be excluded from the LIEE program unless substantial argument can be made that significant NEBs are not currently being accounted for in the $PC_m$ and UC test values or there are other policy or program considerations that require the measure to be retained.

The applications of these criteria are presented in a tabular form in Exhibit 3.4.

**Exhibit 3.4**
**Measure Assessment/Decision Rules for Retention/Addition**

| | **Assessment Test Type** | | **Decision Rule** | |
|---|---|---|---|---|
| **Pass/Fail Guideline Number** | **Modified Participant Cost Test** | **Utility Cost Test** | **Existing Measure** | **Proposed New Measure** |
| **1** | Pass | Pass | Retain | Add to Program |
| **2** | One Pass/ One Fail | | Retain | Do Not Add |
| **3** | Fail | Fail | Retain ONLY if significant excluded NEBs can be identified. | Do Not Add |

The more restrictive approach to adding new measures is believed to be justified because adding measures requires added support costs (e.g., development of standards, training, etc.) and measures already in the program have received some level of scrutiny. Additionally, some non-energy related measures are already in the program for policy reasons (e.g., furnace repair/replacement, some minor home repairs). These measures will need to be assessed on a case-by-case basis.

The reasoning behind retaining measures that pass one test and the other test is that either marginal adjustments in the measure offering or changes in economic conditions can swing measures back into a pass/pass situation. The Joint RRM/ST Cost Effectiveness Subcommittee does not want to see measures that have marginal utility precipitously rejected from the program.

Under this approach, the elimination of low cost-effectiveness measures will slowly raise the average program $PC_m$ and UC test values. As the average program $PC_m$ and UC rise, the pass/fail criteria should not exceed a maximum of 1.0 for either test. This is the point at which the benefits exceed the cost, and it is not reasonable to eliminate measures with a benefit greater than the cost. In addition, it is recognized that for all electric utilities (where the benefits are high) that some added measures may actually reduce the overall utility B/C ratio. This would still be considered appropriate, since the new measure still has a benefit greater than the cost.

The Joint RRM/ST Cost Effectiveness Subcommittee recommends that the program level criteria be held constant for two-year periods and then updated to the average program value of the second year. . The primary recognized exception to this rule would be when a utility institutes a large structural change in the LIEE program, in which case the criteria ought to be updated in the year the program is changed.

The assessment of measure inclusion or exclusion should occur biennially for existing measures to coincide with the biennial program impact evaluation, with new measures being evaluated in the program year in which they are proposed.

The Joint RRM/ST Cost Effectiveness Subcommittee reviewed the following possible issues that could arise from the proposed methodology:

- What should be done when a measure (e.g., ceiling insulation) is slated to be offered to selected subpopulations (e.g., single family, multi-family, mobile homes) based on the test results? The subcommittee decided that it was appropriate to offer measures to selected subpopulations, as long as the criteria is applied uniformly.
- What should be done with measures that are cost effective in the service areas for one or more utilities but not cost effective in other service territories? It was acknowledged that this could occur and was an issue for uniformity of the program statewide. Similar to the previous issue, it is believed that a uniform application of the methodology should occur, but that it should be tempered by the RRM Standardization Team giving close scrutiny to measures that fall into this category.
- What happens to measures that may not appear to make sense based on the B/C ratios of the single measure but that have interactive effects with other measures? The subcommittee felt that interactive measures may need to be considered as part of a complete group of measures (e.g., it may not make sense to eliminate one of the weatherization measures since they act as a group to make the LIEE customer comfortable.)

The Joint RRM/ST Cost Effectiveness Subcommittee realizes that it is likely that the Standardization Team will need to review and make decisions on many cases such as those presented above.

The current utility-by-utility retention/addition criteria are documented in Section 4, Results and Recommendations, which follows.

# 4 RESULTS & RECOMMENDATIONS

This section addresses (1) cost effectiveness tests results for the LIEE Program, (2) cost effectiveness tests results for measures within the LIEE Program, (3) use of these tests in making decisions, and (4) "gross" versus "net" issues, as required by OP 9. These discussions are followed by recommendations that evolved from the methods and approaches presented.

After considerable discussion, the Subcommittee decided that all cost effectiveness tests should be performed using program year (PY) 2000 data. This decision means that a full year of data is available as input to the calculations, while allowing the Task Group to meet the required deadline for this report.[8] Consequently, no Rapid Deployment measures (SBX 5) are included in this analysis of the program or measures.

It should be noted that these results were obtained using utility estimates of costs and benefits from previous filings, and are presented only to illustrate the application of NEBs to the assessment of the Program. The utilities are currently conducting an impact evaluation of the LIEE Program, and this evaluation will generate new estimates of savings. These new estimates of savings will be used in subsequent program and measure assessments. For instance, the assessment of LIEE measures to be conducted by the LIEE Standardization Team to support PY 2003 planning will be based on new estimates of savings and updates of costs. Thus, the results shown in this section and in the associated appendices will not be used to determine measure selection for the PY2003 Program.

## 4.1 Cost Effectiveness Results of the LIEE Program

Using the inputs as specified in Section 3.1, the program level results of each cost effectiveness test are shown in Exhibit 4.1. In order to compare cost effectiveness across the state, it is useful to compare the total service by service area. Thus, for comparison purposes, utility level analysis was performed with the SoCalGas and SCE programs as a combined entity, since they serve roughly the same customers. For completeness, SoCalGas and SCE individual results are also presented.

[8] PY2001 data will not be available until March, 2002. This report was due to be filed April 10, 2002.

**Exhibit 4.1**
**Cost Effectiveness Test Results for the LIEE Program**

| LIEE Program | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Participant Cost Test | | | Utility Cost Test | | | Participant Cost Test$_m$ |
| Utility | Benefits | Costs | B/C | Benefits | Costs | B/C | Participant Benefits / Utility Costs |
| PG&E | $ 23,700,706 | $0 | Undefined | $ 10,269,895 | $ 25,211,144 | 0.41 | 0.94 |
| SDG&E | $ 6,292,154 | $0 | Undefined | $ 3,561,770 | $ 6,414,269 | 0.56 | 0.98 |
| SCE & SoCalGas | $ 20,702,988 | $0 | Undefined | $ 9,802,003 | $ 21,382,824 | 0.46 | 0.97 |
| SCE | $ 14,749,473 | $0 | Undefined | $ 8,229,064 | $ 4,971,208 | 1.66 | 2.97 |
| SoCalGas | $ 5,953,515 | $0 | Undefined | $ 1,572,939 | $ 16,411,616 | 0.10 | 0.36 |

The results presented in Exhibit 4.1 show that, when comparing the total service by service area at the program level, each test shows similar results for all utility service areas. The UC test B/C included ranges from 0.41 to 0.56 and the $PC_m$ test B/C ratio varies from 0.94 to 0.98. Appendix B presents the UC and $PC_m$ test results both with and without NEBs, for completeness.

## 4.2 Cost Effectiveness Results of LIEE Program Measures

For the same LIEE measure, the measure level cost effectiveness results can vary across utilities if there are differences in either the incremental measure costs or the energy savings resulting from impact evaluations. Exhibit 4.2 through Exhibit 4.5, presented below, provide a simple top-to-bottom ranking for the measures, by B/C test result, for each individual utility. Shaded cells signify a B/C ratio equal to or greater than individual utility pass/fail criteria for that test. The individual criteria for UC and $PC_m$ test are shown in the two right hand columns of Exhibit 4.1 above (Note: for this purpose the combined SCE & SoCalGas values are not used). The ranking is based on the cost effectiveness test including the NEBs. All test values, by utility and test type, with and without the NEBs, are documented in Appendix C. Again, it should be noted that the rankings reflected in the tables below and in Appendix C may differ from those conducted in the course of the LIEE Standardization Team's assessment of current and potential Program measures.

## Exhibit 4.2
## PG&E Measure Test Results – Most to Least Effective

| Pacific Gas & Electric | |
|---|---|
| $PC_m$ with NEB | UC with NEB |
| Low Flow Showerhead (Gas) | Low Flow Showerhead (Gas) |
| Water Heater Pipe Wrap (Gas) | Water Heater Pipe Wrap (Gas) |
| Compact Fluorescent Hard Wire Porch Lights ( 20 Year EUL) | Compact Fluorescent Hard Wire Porch Lights ( 20 Year EUL) |
| Compact Fluorescent Lamp (8 year EUL) | Water Heater Blanket (Gas) |
| Faucet Aerators (Gas) | Compact Fluorescent Lamp (8 year EUL) |
| Water Heater Blanket (Gas) | Faucet Aerators (Gas) |
| Building Envelope (Minor Home) Repair - sing fam (Gas) | Building Envelope (Minor Home) Repair - sing fam (Gas) |
| Building Envelope (Minor Home) Repair - mobile (Gas) | Building Envelope (Minor Home) Repair - mobile (Gas) |
| Door Weatherstripping (98 & 99) | Door Weatherstripping (98 & 99) |
| Building Envelope Repair (Gas) | Building Envelope Repair (Gas) |
| Refrigerator Replacement | Refrigerator Replacement |
| Evaporative Coolers (Portable) | Attic Access Weatherstripping - sing fam (Gas) |
| Attic Access Weatherstripping - sing fam (Gas) | Furnace Filters - sing fam (Gas) |
| Attic Insulation - sing fam (Gas) | Attic Insulation - sing fam (Gas) |
| Attic Access Weatherstripping (98 & 99) | Attic Access Weatherstripping (98 & 99) |
| Attic Access Weatherstripping - mobile (Gas) | Furnace Filters - mobile (Gas) |
| Furnace Filters - sing fam (Gas) | Evaporative Coolers (Portable) |
| Furnace Filters - mobile (Gas) | Attic Access Weatherstripping - mobile (Gas) |
| Attic Insulation (Gas) | Furnace Filters (98 & 99) |
| Furnace Filters (98 & 99) | Outlet/Switch Gaskets (Gas) |
| Outlet/Switch Gaskets (Gas) | Attic Insulation (Gas) |
| Door Weatherstripping - sing fam (Gas) | Door Weatherstripping - sing fam (Gas) |
| Door Weatherstripping - mobile (Gas) | Door Weatherstripping - mobile (Gas) |
| Building Envelope (Minor Home) Repair - mult fam (Gas) | Building Envelope (Minor Home) Repair - mult fam (Gas) |
| Attic Insulation - mult fam (Gas) | Attic Insulation - mult fam (Gas) |
| Attic Access Weatherstripping - mult fam (Gas) | Attic Access Weatherstripping - mult fam (Gas) |
| Furnace Filters - mult fam (Gas) | Evaporative Cooler Cover for Permanent |
| Caulking - mobile (Gas) | Furnace Filters - mult fam (Gas) |
| Door Weatherstripping - mult fam (Gas) | Caulking - mobile (Gas) |
| Evaporative Cooler Cover for Permanent | Caulking - sing fam (Gas) |
| Caulking - sing fam (Gas) | Caulking |
| Caulking | Door Weatherstripping - mult fam (Gas) |
| Caulking - mult fam (Gas) | Caulking - mult fam (Gas) |
| **Furnace Repair/Replacement** | **Furnace Repair/Replacement** |

Measures in **BOLD** type have zero claimed impacts.

PG&E results indicate that about a third of the measures have $PC_m$ test results greater than 0.94 and a similar number have UC test results above 0.41.

**Exhibit 4.3**
**SCE Measure Specific Test Results – Most to Least Effective**

| Southern California Edison | |
|---|---|
| $PC_m$ with NEB | UC with NEB |
| Compact Fluorescent Hard Wire Porch Lights (2 year EUL) | Compact Fluorescent Hard Wire Porch Lights (2 year EUL) |
| Refrigerator Replacement | Refrigerator Replacement |
| Compact Fluorescent Lamp (6 year EUL) | Compact Fluorescent Lamp (6 year EUL) |
| Weatherization | Weatherization |
| Evaporative Cooler Replacement | Evaporative Cooler Replacement |

As the shading indicates, and as expected based on the overall program cost effectiveness tests for SCE (Exhibit 4.1), four of the five measures offered provide more benefit to the utility than they cost. The one measure that costs the utility more than the utility benefits, however, does provide participant benefits greater than utility costs.

## Exhibit 4.4
## SDG&E Measure Specific Test Results – Most to Least Effective

| San Diego Gas & Electric | |
|---|---|
| $PC_m$ with NEB | UC with NEB |
| Water Heater Pipe Wrap (Gas) | Water Heater Pipe Wrap (Gas) |
| Low Flow Showerhead (Electric) | Faucet Aerators (Gas) |
| Faucet Aerators (Gas) | Low Flow Showerhead (Electric) |
| Weatherization (Gas) | Weatherization (Gas) |
| Water Heater Blanket (Electric) | Water Heater Blanket (Electric) |
| Compact Fluorescent Lamp (9 year EUL) | Compact Fluorescent Lamp (9 year EUL) |
| Compact Fluorescent Hard Wire Porch Lights ( 20 Year EUL) | Compact Fluorescent Hard Wire Porch Lights ( 20 Year EUL) |
| Furnace Repair (Gas) | Low Flow Showerhead (Gas) |
| Low Flow Showerhead (Gas) | Evaporative Cooler Covers |
| Evaporative Cooler Covers | Water Heater Blanket (Gas) |
| Refrigerator Replacement | Refrigerator Replacement |
| Water Heater Blanket (Gas) | Energy Education (Gas) |
| Energy Education (Gas) | Attic Insulation (Gas) |
| Attic Insulation (Gas) | Building Envelope Repair (Gas) |
| Building Envelope Repair (Gas) | Caulking - sing fam (Gas) |
| Caulking - sing fam (Gas) | Caulking - mult fam (Gas) |
| Evaporative Cooler Replacement | Furnace Repair (Gas) |
| Caulking - mult fam (Gas) | Evaporative Cooler Replacement |
| Furnace Replacement (Gas) | Caulking - mobile (Gas) |
| Attic Insulation (Electric) | Weather stripping - sing fam (Gas) |
| Caulking - mobile (Gas) | Attic Insulation (Electric) |
| Weather stripping - sing fam (Gas) | Weather-stripping - mult fam (Gas) |
| Building Envelope Repair (Electric) | Building Envelope Repair (Electric) |
| Weather-stripping - mult fam (Gas) | Weather-stripping - mult fam (Electric) |
| Weather-stripping - mult fam (Electric) | Weather stripping - sing fam (Electric) |
| Weather stripping - sing fam (Electric) | Furnace Replacement (Gas) |
| **Glass Replacement** | **Weatherization (Electric)** |
| **Door Replacement** | **Glass Replacement** |
| **Auto Sweep** | **Door Replacement** |
| **Faucet Aerators (Electric)** | **Door Shoe (Gas)** |
| **Weatherization (Electric)** | **Faucet Aerators (Electric)** |
| **Water Heater Pipe Wrap (Electric)** | **Auto Sweep** |
| **Register Seal (Electric)** | **Door Shoe (Electric)** |
| **Door Shoe (Electric)** | **Register Seal (Gas)** |
| **Outlet/Switch Gaskets (Gas)** | **Water Heater Pipe Wrap (Electric)** |
| **Outlet/Switch Gaskets (Electric)** | **Attic Venting - mult fam (Electric)** |
| **Attic Venting - mult fam (Electric)** | **Jamb Replacement** |
| **Attic Venting - mult fam (Gas)** | **Outlet/Switch Gaskets (Electric)** |
| **Door Threshold (Gas)** | **Outlet/Switch Gaskets (Gas)** |
| **Door Threshold (Electric)** | **Door Threshold (Electric)** |
| **Jamb Replacement** | **Attic Venting - mult fam (Gas)** |
| **Door Shoe (Gas)** | **Register Seal (Electric)** |
| **Register Seal (Gas)** | **Door Threshold (Gas)** |

Measures in **BOLD** type have zero claimed impacts.

San Diego Gas & Electric has measures with no savings claimed because there were no studies supporting impacts for some measures or commodities. These measures have a cost, but no energy impacts or NEBs allocated to them. Therefore the B/C ratio is zero.

**Exhibit 4.5**
**SoCalGas Measure Specific Test Results – Most to Least Effective**

| Southern California Gas | |
|---|---|
| $PC_m$ with NEB | UC with NEB |
| Low Flow Showerhead (Gas) | Low Flow Showerhead (Gas) |
| Faucet Aerators (Gas) | Water Heater Pipe Wrap (Gas) |
| Water Heater Pipe Wrap (Gas) | Faucet Aerators (Gas) |
| Building Envelope (Minor Home) Repair - mobile (Gas) | Building Envelope (Minor Home) Repair - mobile (Gas) |
| Water Heater Blanket - mobile (Gas) | Water Heater Blanket - mobile (Gas) |
| Water Heater Blanket - sing fam (Gas) | Water Heater Blanket - sing fam (Gas) |
| Water Heater Blanket - mult fam (Gas) | Water Heater Blanket - mult fam (Gas) |
| Attic Insulation - sing fam (Gas) | Attic Insulation - sing fam (Gas) |
| Attic Insulation - mult fam (Gas) | Attic Insulation - mult fam (Gas) |
| Outlet/Switch Gaskets (Gas) | Outlet/Switch Gaskets (Gas) |
| Caulking - mobile (Gas) | Caulking - mobile (Gas) |
| Caulking - sing fam (Gas) | Caulking - sing fam (Gas) |
| Caulking - mult fam (Gas) | Caulking - mult fam (Gas) |
| Evaporative Cooler Covers (Gas) | Evaporative Cooler Covers (Gas) |
| Register Sealing | Register Sealing |
| Exhaust Vent Damper | Exhaust Vent Damper |
| Building Envelope (Minor Home) Repair - mult fam (Gas) | Building Envelope (Minor Home) Repair - mult fam (Gas) |
| Building Envelope (Minor Home) Repair - sing fam (Gas) | Building Envelope (Minor Home) Repair - sing fam (Gas) |
| **Caulking and Weatherstripping (Gas)** | **Caulking and Weatherstripping (Gas)** |
| **Furnace Repair / Replacement** | **Furnace Repair / Replacement** |
| **Weatherstripping - sing fam (Gas)** | **Weatherstripping - sing fam (Gas)** |
| **Weatherstripping - mult fam (Gas)** | **Weatherstripping - mult fam (Gas)** |

Measures in **BOLD** type have zero claimed impacts.

There are over half of measures that pass the low threshold of the SoCalGas program. Similar to SDG&E, there are a few measures with zero claimed impacts and zero B/C ratios.

## 4.3 Decision Making with Cost Effectiveness Tests

Ordering Paragraph 9 of D. 01-12-020, requires that the utilities:

> "…The RRM Working Group and Standardization Project Team shall jointly develop recommendations, after obtaining public input, on:
>
> - how each of these tests should be considered in making final measure selections, or in evaluating the overall effectiveness of LIEE programs from year to year or across utilities, ….
>
> The joint report shall include a discussion of the pros and cons of the various options considered."

### 4.3.1 Decision Making for the LIEE Program

The Joint RRM/ST Cost Effectiveness Subcommittee believes that the decision has been made at the legislative level that the LIEE program is a social equity program that is not necessarily required to be cost effective (i.e., costs being less than benefits). As such, decisions about the continuation of the LIEE program as a whole are made on a policy basis rather than a cost-effective basis.

However, OP 9 of D. 01-12-020 mandated the Joint RRM/ST Cost Effectiveness Subcommittee to determine how program level cost effectiveness tests should be compared across utilities for a single year or within a single utility for multiple years. This is discussed next.

*Comparison between utilities* – While there are four utilities that provide the LIEE program, there are, effectively, only three service areas. The customer base of SCE and SoCalGas overlap greatly. Overlapping customers are provided LIEE services from both utilities within this overlap area. Therefore, it is recommended that the benefits and costs for SCE and SoCalGas be considered together for determining a single value for the $PC_m$ or UC.

While it is useful to understand why different utilities have different cost effectiveness results, the Joint RRM/ST Cost Effectiveness Subcommittee feels that caution should be used when comparing these differences or attempting to make judgments about variation in values between utilities. As discussed at some length in the Bill Savings Standardization Report (which calculates a $PC_m$ for three full years), variations between the utilities are due to differences in the installed measure mix, the customer mix, and gas versus electric savings. As the standardization of the program continues and is applied consistently, some, but not all, of the variability based on measure mixes will diminish. Moreover, the effects of the other factors mentioned above will continue to cause variations across utilities for any given year. For example, compact fluorescent bulbs provide high electric savings. If a utility has a large number of this measure installed compared to another utility, then the overall program cost effectiveness ratio may be different due to the installed measure mix. While it is useful to compare between utilities for a single year, these points need to be kept in mind.

*Comparison across years* – Year-to-year comparisons of results for a single utility may be both useful and instructive. Using the fact that LIEE programs are not necessarily required to be cost effective, a case can be made for striving to improve the program from year-to-year to become as cost efficient as possible. Policy or legislative decisions will always be made to keep certain measures. While these measures may be expensive, additional measures could be added to offset that expense. An assessment of the differences from one year to the next would be required to understand why the B/C ratio changes. The forecasting of energy rates and avoided costs play a large role in determining benefits. Therefore, one could not compare between years if the forecasts are different. It should also be considered that comparison of past programs may not provide much useful information. The on-going standardization of this program, though, may lend itself to future comparisons.

### 4.3.2 Decision Making for Measures

The Joint RRM/ST Cost Effectiveness Subcommittee believes that, especially in the LIEE arena, clear-cut rules on inclusion and exclusion of measures cannot be made based solely on measure cost effectiveness test numbers. Policy considerations are often a primary guiding element in decisions to retain measures within low-income programs.

Using the approach described in Section 3.2.2 results in the values presented in Exhibit 4.6, identifying which measures met which criteria, by utility. The number in the exhibit matches the guideline value indicated Exhibit 3.4. In most cases, if the measure met criteria #2, it is the UC test that fails to meet the criteria.

## Exhibit 4.6
## Decision Making for Measures Using Recommended Method

| Energy Efficient Measure | PG&E | SCE | SDG&E | SoCalGas |
|---|---|---|---|---|
| **Electric Appliances** | | | | |
| Compact Fluorescent Hard Wire Porch Lights (2 year EUL) | | 1 | | |
| Compact Fluorescent Hard Wire Porch Lights ( 20 Year EUL) | 1 | | 1 | |
| Compact Fluorescent Lamp (6 year EUL) | | 1 | | |
| Compact Fluorescent Lamp (8 year EUL) | 1 | | | |
| Compact Fluorescent Lamp (9 year EUL) | | | 1 | |
| Evaporative Cooler Covers | | | 1 | |
| Evaporative Cooler Replacement | | 2 | 3 | |
| Evaporative Coolers (Portable) | 2 | | | |
| Faucet Aerators (Electric) | | | * | |
| Low Flow Showerhead (Electric) | | | 1 | |
| Refrigerator Replacement | 1 | 1 | 1 | |
| Water Heater Blanket (Electric) | | | 1 | |
| Water Heater Pipe Wrap (Electric) | | | * | |
| *Additional electric measures* | | | | |
| Weatherization | | 1 | | |
| **Gas Appliances** | | | | |
| Faucet Aerators (Gas) | 1 | | 1 | 1 |
| Furnace Filters - mobile (Gas) | 3 | | | |
| Furnace Filters - mult fam (Gas) | 3 | | | |
| Furnace Filters - sing fam (Gas) | 3 | | | |
| Furnace Repair (Gas) | * | | 2 | * |
| Furnace Replacement (Gas) | * | | 3 | * |
| Low Flow Showerhead (Gas) | 1 | | 1 | 1 |
| Water Heater Blanket (Gas) | 1 | | 2 | |
| Water Heater Blanket - mobile (Gas) | | | | 1 |
| Water Heater Blanket - mult fam (Gas) | | | | 1 |
| Water Heater Blanket - sing fam (Gas) | | | | 1 |
| Water Heater Pipe Wrap (Gas) | 1 | | 1 | 1 |
| *Additional "other" measures* | | | | |
| Evaporative Cooler Covers (Gas) | | | | 1 |
| Register Sealing | | | | 3 |
| Exhaust Vent Damper | | | | 3 |
| Furnace Filters (98 & 99) | 3 | | | |
| Evaporative Cooler Cover for Permanent | 3 | | | |

*This measure has no claimed energy savings. B/C ratio is zero.

1 = Both $PC_m$ and UC are >= threshold

2 = $PC_m$ >= threshold and UC < threshold

3 = Both $PC_m$ and UC are < threshold

## Exhibit 4.6 - continued

| Energy Efficient Measure | PG&E | SCE | SDG&E | SoCalGas |
|---|---|---|---|---|
| **Weatherization Measures** | | | | |
| Attic Access Weatherstripping - mobile (Gas) | 3 | | | |
| Attic Access Weatherstripping - mult fam (Gas) | 3 | | | |
| Attic Access Weatherstripping - sing fam (Gas) | 3 | | | |
| Attic Insulation (Electric) | | | 3 | |
| Attic Insulation (Gas) | 3 | | 3 | |
| Attic Insulation - mult fam (Gas) | 3 | | | 1 |
| Attic Insulation - sing fam (Gas) | 3 | | | 1 |
| Attic Venting - mult fam (Electric) | | | * | |
| Attic Venting - mult fam (Gas) | | | * | |
| Building Envelope (Minor Home) Repair - mobile (Gas) | 1 | | | 1 |
| Building Envelope (Minor Home) Repair - mult fam (Gas) | 3 | | | 3 |
| Building Envelope (Minor Home) Repair - sing fam (Gas) | 1 | | | 3 |
| Building Envelope Repair (Electric) | | | 3 | |
| Building Envelope Repair (Gas) | 1 | | 3 | |
| Caulking - mobile (Gas) | 3 | | 3 | 1 |
| Caulking - mult fam (Gas) | 3 | | 3 | 1 |
| Caulking - sing fam (Gas) | 3 | | 3 | 1 |
| Caulking and Weatherstripping (Gas) | | | | * |
| Door Shoe (Electric) | | | * | |
| Door Shoe (Gas) | | | * | |
| Door Threshold (Electric) | | | * | |
| Door Threshold (Gas) | | | * | |
| Door Weatherstripping - mobile (Gas) | 3 | | | |
| Door Weatherstripping - mult fam (Gas) | 3 | | | |
| Door Weatherstripping - sing fam (Gas) | 3 | | | |
| Energy Education (Gas) | | | 3 | |
| Outlet/Switch Gaskets (Electric) | | | * | |
| Outlet/Switch Gaskets (Gas) | 3 | | * | 1 |
| Register Seal (Electric) | | | * | |
| Register Seal (Gas) | | | * | |
| Weather stripping - sing fam (Electric) | | | 3 | |
| Weather stripping - sing fam (Gas) | | | 3 | * |
| Weatherization (Electric) | | | * | |
| Weatherization (Gas) | | | 1 | |
| Weather-stripping - mult fam (Electric) | | | 3 | |
| Weather-stripping - mult fam (Gas) | | | 3 | * |
| *Additional weatherization measures* | | | | |
| Auto Sweep | | | * | |
| Door Replacement | | | * | |
| Glass Replacement | | | * | |
| Jamb Replacement | | | * | |
| Attic Access Weatherstripping (98 & 99) | 3 | | | |
| Caulking | 3 | | | |
| Door Weatherstripping (98 & 99) | 1 | | | |
| | | | | |

*This measure has no claimed energy savings. B/C ratio is zero.

1 = Both $PC_m$ and UC are >= threshold

2 = $PC_m$ >= threshold and UC < threshold

3 = Both $PC_m$ and UC are < threshold

Using these guidelines, a very broad look at the electric appliances, gas appliances, and weatherization measures shows that electric appliances often have both a $PC_m$ and UC that are over the utility-specific thresholds. The electric appliances falling into category #1 are measures that are relatively easy to install and have the potential for high savings. For gas appliances, there are slightly more measures that have neither cost effectiveness tests over the thresholds. This is in line with the fact that gas measures tend to have lower impacts. The weatherization measures are manpower-intensive measures to install, yet provide relatively small impacts. As such, there is a high percent of measures that fail both cost-effectiveness tests. Interestingly, for weatherization measures, there are no measures which pass one test while failing the other.

## 4.4 "Gross" versus "Net" Issues

Ordering Paragraph 9 of Decision (D.) 01-12-020, requires that the utilities:

> "…The RRM Working Group and Standardization Project Team shall jointly develop recommendations, after obtaining public input, on:
>
> ….
>
> - an explicit method for addressing the "gross" versus "net" costs and savings issue in measure and program evaluation.
>
> The joint report shall include a discussion of the pros and cons of the various options considered."

The gross versus net costs and savings[9] issue being discussed here should be clarified. As stated in the discussion in the decision, "…using "gross" savings and costs assumes that the old equipment would not have been replaced for some number of years at least as great as the lifetime of the new equipment. The "incremental" approach assumes that the measures would have been replaced with standard efficiency new units in the absence of the installation of high efficiency units."

It is important, and useful to the discussion, to point out that currently this is only a practical issue for the high efficiency refrigerator measures. This is the only measure (other than some Rapid Deployment measures) where the utilities claim savings that have the logical potential for incremental costs and savings. Weatherization measures (such as caulking and weather stripping) are considered to have no "standard efficiency" level. They are either installed or not – therefore all weatherization measures are "gross" costs and savings. The same argument is made for the remainder of the electric appliances and gas appliance measures. This issue is not applicable to gas furnace replacement since the units are only replaced if broken. It is assumed that the customer would (or could) not replace the current unit at all, but would find a different way to heat their premises. Therefore, there is no "standard efficiency" level that would apply when determining costs or savings.

For the refrigerator measure it is the position of the Joint RRM/ST Cost Effectiveness Subcommittee that the most likely replacement for a broken refrigerator for the LIEE

[9] "Gross" and "net" savings should not be confused with gross impact, net-to-gross ratio, and net impact nomenclature used in energy efficiency program evaluations.

customer is a used refrigerator of comparable vintage or efficiency. It is considered highly unlikely that LIEE customers would buy a new standard efficiency refrigerator upon failure.

Additionally, the Joint RRM/ST Cost Effectiveness Subcommittee reviewed the current list of rapid deployment measures fielded during 2001, and concluded that the use of the "gross" costs and savings would seem to apply to them as well. It will be important to revisit this issue for all new measures brought into the LIEE program, as they are incorporated, to be sure that the logic of using "gross" costs and savings still applies.

Thus, the Joint RRM/ST Cost Effectiveness Subcommittee recommends use of the "gross" cost and savings for all measures in the LIEE program.

## 4.5 Recommendations

The Joint RRM/ST Cost Effectiveness Subcommittee makes the following recommendations:

- Use a modified participant test to enable benefit-cost ratio comparisons of the participant and utility cost tests. The modified participant test ratio is the participant benefits divided by the utility program costs.
- When addressing specific measures, adopt a three level methodology using average program $PC_m$ and UC for each utility as the measure screening criteria for that utility's measures.
- Caution should be used when comparing program level cost effectiveness across utilities for a single year. Variations in installed measure mix, gas versus electric savings, and reported program costs make such comparisons problematic.
- There are no apparent fixed criteria for comparing cost effectiveness of a single utility across different years. Variations in the mix of measures installed, combined with changes in program costs make comparisons difficult. However, an understanding of differences can be useful for deciding future program measure mix.
- When comparing program level cost effectiveness across utilities, consider SCE and SoCalGas benefits and costs together to obtain a better representation of utility-to-utility customer and utility benefits versus costs.
- Use "gross" savings and costs for all measures in the LIEE program. (Note: In this context gross savings means the total kWh difference between the new equipment and the existing equipment applied over the entire useful life of the new equipment.) The Joint RRM/ST Cost Effectiveness Subcommittee reviewed the PY2001 rapid deployment measures and concluded that the use of the "gross" costs and savings should be applied to them as well.

# *Appendix A*
## *NON-ENERGY BENEFITS USED IN CALCULATIONS*

**Utility Non-Energy Benefits**

| Utility Benefit Category | NEB Description | Measures with this NEB | Comments on NEB |
|---|---|---|---|
| Reduced Carrying Cost on Arrearages (7A) | Measured as the utility's interest savings from reduced arrearages carried. This is measured from the utility cost point of view. | All measures except attic venting | |
| Lower Bad Debt Written Off (7B) | Measured as the reduction in total bad debt written off for participants in the program. These represent a direct savings to the utility because extra revenues are received that would not otherwise have been received. | All measures except attic venting | The theory behind this NEB is strong, but the studies may be a bit weak. Recommended for further study in the future. |
| Fewer shutoffs (7C) | Reduced shutoffs are measured in terms of the net marginal cost to the utility from not having to send staff out to disconnect the account. | All measures except attic venting | The studies may be a bit weak. Recommended for further study in the future. |
| Fewer reconnects (7D) | Reduced reconnects from the program are measured only in terms of the net marginal cost to the utility from the reconnect – and is net of any reconnect fees paid by customers for the service. | All measures except attic venting | The studies may be a bit weak. Recommended for further study in the future. |
| Fewer notices (7E) | The improved payment behavior by customers leads to a reduction in utility costs for calls, notices, and other collection activities. This category measures only the reduced marginal cost to the utility because it can send fewer notices for poor payment behavior. | All measures except attic venting | |
| Fewer customer calls (7F) | Improved payment behavior by participants allows the utility to make and respond to fewer | All measures except attic venting | |

| Utility Benefit Category | NEB Description | Measures with this NEB | Comments on NEB |
|---|---|---|---|
| | customer calls related to bill payment behavior. This is valued at the utility's marginal cost of fielding calls. | | |
| Reduction in gas emergency calls (7H) | On-site activities undertaken by the program pro-actively address some safety issues that could lead to expensive gas emergency calls. These benefits are valued at the marginal staff and travel cost of addressing fewer gas emergency calls. The value for this NEB is affected by the degree of safety efforts included in the utility's program. | Furnace repair and furnace replacement only | Based on one study. Recommended for further study in the future. |
| Reduced Subsidy (7K) valued at utility and ratepayer savings | The California utilities provide a 15% rate subsidy to qualified low-income customers. This subsidy is paid by other ratepayers and the cost is incorporated into the utility's revenue requirements. Lower energy use by participants leads to lower subsidies paid, increasing public benefits. This is valued at 15% of the bill savings for eligible participants. | All measures except attic venting | |

| Participant Benefit Category | NEB Description | Measures with this NEB | Comments on this NEB |
|---|---|---|---|
| Participant water and wastewater bill savings (9A) | Lower water and wastewater use provides direct participant bill savings from those utilities. | Faucet aerator, low-flow showerhead, and energy education | |

| Participant Benefit Category | NEB Description | Measures with this NEB | Comments on this NEB |
|---|---|---|---|
| Participant value from fewer shutoffs (9B) | Lower bills help reduce bill payment problems, reducing shutoffs. This reduces the time customers need to spend trying to get power restored. To be conservative, additional benefits that customers realize from the reduced service they receive from their homes when power is terminated was not included. | All measures except attic venting | Based on a few studies. Recommended for further study in the future. |
| Participant value from fewer calls to the utility valued as time savings (9C) | Lower energy use reduces bill payment problems and reduces the amount of time participants spend on the phone dealing with bill payment issues with the utility. This was computed as the saved hours that the participant no longer needs to spend on the phone, valued at minimum wage. The utility savings from these avoided calls were included separately. | All measures | Background study results have a wide range. Recommended for further study in the future. |
| Fewer reconnects (9D) valued in saved time and costs for participants | Lower energy use reduces bill payment problems for participants, reducing the hassles of both terminations (above) and reconnects. This NEB was valued as the reduction in reconnect fees that customers must pay to have service restarted. Recall that the utility valuation of reconnects was computed net of these customer payments, so double-counting this source of benefits has been avoided. | All measures except attic venting | Background study results have a wide range. Recommended for further study in the future. |
| Property value benefits from program-provided home repairs (9E) | When repairs are made to the property (broken panes replaced, porch repair, etc.) the value of the property increases for the participants. That is, if | All measures except energy education | |

| Participant Benefit Category | NEB Description | Measures with this NEB | Comments on this NEB |
|---|---|---|---|
| repairs (9E) | they were to sell the property, the price would increase, and the best estimate of that increase in value is the cost of the repairs. These costs were amortized over the period of the benefit cost evaluation. The benefit valuation from this source specifically excludes any energy savings contributions of these repairs to avoid double-counting with the energy benefits portions of the computations. | | |
| Fewer fire losses to participants and society (9F) | Health and safety equipment and checks conducted through the program help reduce the risk of fires. This results in benefits to participants in terms of reduced property losses and mortality. These benefits (which can be viewed as accruing to the participants or to society) were valued at reduced losses and the lifetime earnings losses from lives that were estimated saved from the program. | Furnace repair, furnace replacement, and furnace filters | Recommended for further study in the future on the property value assumption in this NEB. |
| Fewer health-related expenses from health and safety improvements (9G) | When health and safety measures (e.g., carbon monoxide monitors) are included in the programs, their benefits are not energy savings, but rather health and safety benefits accruing directly to the residents in terms of lower hospitalization costs and health-related expenses. These benefits can be estimated either as the amortized cost of installation of the devices or as the avoided illnesses and mortality prevented because of the | No measures | |

| Participant Benefit Category | NEB Description | Measures with this NEB | Comments on this NEB |
|---|---|---|---|
| | presence of the H&S equipment. However, the computed value of the benefit is zero because no health and safety measures were included in the default LIEE program design | | |
| Participant savings from fewer moves (9H) | Evidence indicates that utility bills and shutoffs are the cause of some customer move-outs. Avoiding moves through lower energy use allows residents to avoid a variety of direct and indirect costs associated with moves. To be conservative, only a portion of direct costs of moves incurred by residents (search time valued at minimum wage) was included. Indirect benefits were omitted from the estimation. | All measures except attic venting | Background studies may be weak. Recommended for further study in the future. |
| Fewer lost sick days from work (9I) | Homes that are "tighter" and less drafty and have fully functional heating systems can result in fewer sick days for residents. This includes both direct costs for sick days lost from work (which was valued at minimum wage), and indirect costs from lower educational achievement from children losing days from school (not included in this computation). | All weatherization measures except energy education | |
| Improved comfort, noise, and similar benefits to participants ($9K_1$) | The most commonly reported non-energy benefit noted and recognized by participants is additional comfort in the home. Similar extra benefits provided by weatherization programs include lower noise from added insulation, additional features on replacement equipment, and similar | All weatherization measures except energy education and attic venting. Also, furnace repair, replacement, | |

| Participant Benefit Category | NEB Description | Measures with this NEB | Comments on this NEB |
|---|---|---|---|
| | benefits. A proxy for these benefits, net of negative aspects of the program, was included in the computations. | and filters – evap cooler replacement, covers, and maintenance – window AC | |
| Reduced other hardship benefits – control over bill and energy use ($9K_2$) | A key benefit associated with low-income weatherization programs is reduction in hardship. Some of these benefits are reflected in other categories, including reduced calls, shutoffs, reconnects, moves, and other categories included above. Additional hardship benefits accrue from participants gaining greater control over their bill, and reduced worries and concerns from this source. A multiplier derived from a willingness to pay (WTP) survey of California participants was used to estimate the extra benefits from this remaining portion of the hardship benefits. | All measures | |

# *Appendix B*

## *PROGRAM LEVEL RESULTS WITH AND WITHOUT NEBS*

| LIEE Program | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Participant Cost Test | | | | Utility Cost Test | | | | | Participant Cost Test$_m$ | |
| Utility | Benefits - without NEB | Benefits - with NEB | Costs | B/C | Benefits - without NEB | Benefits - with NEB | Costs | B/C - without NEB | B/C - with NEB | Participant Benefits without NEB / Utility Costs | Participant Benefits with NEB/ Utility Costs |
| PG&E | $ 17,292,375 | $ 23,700,706 | $0 | Undefined | $ 7,848,354 | $ 10,269,895 | $ 25,211,144 | 0.31 | 0.41 | 0.69 | 0.94 |
| SDG&E | $ 4,751,805 | $ 6,292,154 | $0 | Undefined | $ 2,466,406 | $ 3,561,770 | $ 6,414,269 | 0.38 | 0.56 | 0.74 | 0.98 |
| SCE & SoCalGas | $ 14,210,268 | $ 20,702,988 | $0 | Undefined | $ 6,598,922 | $ 9,802,003 | $ 21,382,824 | 0.31 | 0.46 | 0.66 | 0.97 |
| SCE | $ 12,046,980 | $ 14,749,473 | $0 | Undefined | $ 5,235,803 | $ 8,229,064 | $ 4,971,208 | 1.05 | 1.66 | 2.42 | 2.97 |
| SoCalGas | $ 2,163,288 | $ 5,953,515 | $0 | Undefined | $ 1,363,119 | $ 1,572,939 | $ 16,411,616 | 0.08 | 0.10 | 0.13 | 0.36 |

# *Appendix C*
## *RESULTS OF MEASURE SPECIFIC COST EFFECTIVENESS TESTS*

***Benefit Cost Ratio's when Allocating by NPV of Energy Savings over the Life of the Measure***

| | **Pacific Gas & Electric** | | | | **Southern California Edison** | | | | **San Diego Gas & Electric** | | | | **Southern California Gas** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Energy Efficient Measure** | Participant Cost Test | | Utility Cost Test | | Participant Cost Test | | Utility Cost Test | | Participant Cost Test | | Utility Cost Test | | Participant Cost Test | | Utility Cost Test | |
| | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| **Electric Appliances** | | | | | | | | | | | | | | | | |
| Compact Fluorescent Hard Wire Porch Lights (2 year EUL) | | | | | 11.98 | 12.88 | 5.21 | 8.18 | | | | | | | | |
| Compact Fluorescent Hard Wire Porch Lights ( 20 Year | 2.7 | 3.26 | 1.05 | 1.36 | | | | | 2.78 | 3.15 | 1.07 | 1.54 | | | | |
| Compact Fluorescent Lamp (6 year EUL) | | | | | 7.32 | 7.87 | 3.18 | 5.00 | | | | | | | | |
| Compact Fluorescent Lamp (8 year EUL) | 2.26 | 2.72 | 0.88 | 1.14 | | | | | | | | | | | | |
| Compact Fluorescent Lamp (9 year EUL) | | | | | | | | | 3.60 | 4.07 | 1.38 | 1.99 | | | | |
| Evaporative Cooler Covers | | | | | | | | | 1.47 | 1.94 | 0.95 | 1.38 | | | | |
| Evaporative Cooler Replacement | | | | | 1.37 | 1.89 | 0.59 | 0.93 | 0.22 | 0.29 | 0.09 | 0.12 | | | | |
| Evaporative Coolers (Portable) | 0.67 | 0.99 | 0.26 | 0.34 | | | | | | | | | | | | |
| Faucet Aerators (Electric) | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Low Flow Showerhead (Electric) | | | | | | | | | 7.62 | 10.45 | 2.92 | 4.21 | | | | |
| Refrigerator Replacement | 1.12 | 1.34 | 0.43 | 0.56 | 11.82 | 12.72 | 5.14 | 8.08 | 1.04 | 1.18 | 0.40 | 0.58 | | | | |
| Water Heater Blanket (Electric) | | | | | | | | | 3.74 | 4.23 | 1.44 | 2.07 | | | | |
| Water Heater Pipe Wrap (Electric) | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| *Additional electric measures* | | | | | | | | | | | | | | | | |
| Weatherization | | | | | 2.14 | 2.30 | 0.93 | 1.46 | | | | | | | | |
| **Gas Appliances** | | | | | | | | | | | | | | | | |
| Faucet Aerators (Gas) | 1.35 | 2.06 | 0.79 | 1.02 | | | | | 5.47 | 7.50 | 3.55 | 5.12 | 1.29 | 3.98 | 0.81 | 0.87 |
| Furnace Filters - mobile (Gas) | 0.49 | 0.73 | 0.27 | 0.34 | | | | | | | | | | | | |
| Furnace Filters - mult fam (Gas) | 0.14 | 0.2 | 0.06 | 0.08 | | | | | | | | | | | | |
| Furnace Filters - sing fam (Gas) | 0.52 | 0.76 | 0.28 | 0.36 | | | | | | | | | | | | |
| Furnace Repair (Gas) | | | | | | | | | 0.08 | 2.50 | 0.05 | 0.14 | | | | |
| Furnace Replacement (Gas) | | | | | | | | | 0.01 | 0.24 | 0.01 | 0.01 | | | | |
| Low Flow Showerhead (Gas) | 5.51 | 8.43 | 3.19 | 4.12 | | | | | 1.58 | 2.17 | 1.03 | 1.48 | 3.37 | 10.44 | 2.12 | 2.28 |
| Water Heater Blanket (Gas) | 1.55 | 1.87 | 0.9 | 1.16 | | | | | 0.79 | 0.89 | 0.51 | 0.74 | | | | |
| Water Heater Blanket - mobile (Gas) | | | | | | | | | | | | | 0.56 | 1.31 | 0.35 | 0.38 |
| Water Heater Blanket - mult fam (Gas) | | | | | | | | | | | | | 0.51 | 1.19 | 0.32 | 0.34 |
| Water Heater Blanket - sing fam (Gas) | | | | | | | | | | | | | 0.55 | 1.30 | 0.35 | 0.37 |
| Water Heater Pipe Wrap (Gas) | 2.98 | 3.59 | 1.73 | 2.23 | | | | | 17.00 | 19.22 | 11.04 | 15.92 | 1.44 | 3.39 | 0.91 | 0.98 |
| *Additional "other" measures* | | | | | | | | | | | | | | | | |
| Evaporative Cooler Covers (Gas) | | | | | | | | | | | | | 0.18 | 0.41 | 0.11 | 0.11 |
| Register Sealing | | | | | | | | | | | | | 0.14 | 0.32 | 0.09 | 0.09 |
| Exhaust Vent Damper | | | | | | | | | | | | | 0.12 | 0.28 | 0.07 | 0.07 |
| Furnace Filters (98 & 99) | 0.59 | 0.68 | 0.31 | 0.31 | | | | | | | | | | | | |
| Evaporative Cooler Cover for Permanent | 0.14 | 0.16 | 0.08 | 0.08 | | | | | | | | | | | | |
| Furnace Repair/Replacement | 0 | | 0 | 0 | | | | | | | | | | | | |

***Benefit Cost Ratio's when Allocating by NPV of Energy Savings over the Life of the Measure***

| Energy Efficient Measure | Pacific Gas & Electric | | | | Southern California Edison | | | | San Diego Gas & Electric | | | | Southern California Gas | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Participant Cost Test | | Utility Cost Test | | Participant Cost Test | | Utility Cost Test | | Participant Cost Test | | Utility Cost Test | | Participant Cost Test | | Utility Cost Test | |
| | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| **Weatherization Measures** | | | | | | | | | | | | | | | | |
| Attic Access Weatherstripping - mobile (Gas) | 0.46 | 0.8 | 0.26 | 0.33 | | | | | | | | | | | | |
| Attic Access Weatherstripping - mult fam (Gas) | 0.14 | 0.25 | 0.06 | 0.08 | | | | | | | | | | | | |
| Attic Access Weatherstripping - sing fam (Gas) | 0.53 | 0.92 | 0.28 | 0.37 | | | | | | | | | | | | |
| Attic Insulation (Electric) | | | | | | | | | 0.14 | 0.21 | 0.05 | 0.08 | | | | |
| Attic Insulation (Gas) | 0.42 | 0.72 | 0.22 | 0.29 | | | | | 0.42 | 0.66 | 0.28 | 0.40 | | | | |
| Attic Insulation - mult fam (Gas) | 0.14 | 0.25 | 0.06 | 0.08 | | | | | | | | | 0.39 | 0.95 | 0.24 | 0.26 |
| Attic Insulation - sing fam (Gas) | 0.51 | 0.89 | 0.27 | 0.35 | | | | | | | | | 0.41 | 1.01 | 0.26 | 0.28 |
| Attic Venting - mult fam (Electric) | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Attic Venting - mult fam (Gas) | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Building Envelope (Minor Home) Repair - mobile (Gas) | 1.00 | 1.74 | 0.54 | 0.7 | | | | | | | | | 0.69 | 1.71 | 0.44 | 0.47 |
| Building Envelope (Minor Home) Repair - mult fam (Gas) | 0.29 | 0.51 | 0.13 | 0.17 | | | | | | | | | 0.11 | 0.26 | 0.07 | 0.07 |
| Building Envelope (Minor Home) Repair - sing fam (Gas) | 1.05 | 1.82 | 0.56 | 0.72 | | | | | | | | | 0.08 | 0.20 | 0.05 | 0.05 |
| Building Envelope Repair (Electric) | | | | | | | | | 0.04 | 0.07 | 0.02 | 0.02 | | | | |
| Building Envelope Repair (Gas) | 0.92 | 1.59 | 0.48 | 0.62 | | | | | 0.35 | 0.54 | 0.23 | 0.33 | | | | |
| Caulking - mobile (Gas) | 0.11 | 0.18 | 0.06 | 0.07 | | | | | 0.11 | 0.16 | 0.07 | 0.10 | 0.29 | 0.72 | 0.19 | 0.20 |
| Caulking - mult fam (Gas) | 0.06 | 0.1 | 0.03 | 0.03 | | | | | 0.16 | 0.26 | 0.11 | 0.15 | 0.21 | 0.53 | 0.13 | 0.14 |
| Caulking - sing fam (Gas) | 0.09 | 0.15 | 0.05 | 0.06 | | | | | 0.21 | 0.33 | 0.14 | 0.20 | 0.29 | 0.72 | 0.19 | 0.20 |
| Caulking and Weatherstripping (Gas) | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 |
| Door Shoe (Electric) | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Door Shoe (Gas) | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Door Threshold (Electric) | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Door Threshold (Gas) | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Door Weatherstripping - mobile (Gas) | 0.35 | 0.61 | 0.19 | 0.24 | | | | | | | | | | | | |
| Door Weatherstripping - mult fam (Gas) | 0.1 | 0.17 | 0.04 | 0.06 | | | | | | | | | | | | |
| Door Weatherstripping - sing fam (Gas) | 0.37 | 0.63 | 0.2 | 0.25 | | | | | | | | | | | | |
| Energy Education (Gas) | | | | | | | | | 0.56 | 0.72 | 0.37 | 0.53 | | | | |
| Outlet/Switch Gaskets (Electric) | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Outlet/Switch Gaskets (Gas) | 0.38 | 0.66 | 0.22 | 0.29 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.35 | 0.87 | 0.22 | 0.24 |
| Register Seal (Electric) | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Register Seal (Gas) | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Weather stripping - sing fam (Electric) | | | | | | | | | 0.03 | 0.05 | 0.01 | 0.02 | | | | |
| Weather stripping - sing fam (Gas) | | | | | | | | | 0.10 | 0.15 | 0.06 | 0.09 | | | | |
| Weatherization (Electric) | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Weatherization (Gas) | | | | | | | | | 0.00 | 6.13 | 0.00 | 3.70 | | | | |
| Weather-stripping - mult fam (Electric) | | | | | | | | | 0.03 | 0.05 | 0.01 | 0.02 | | | | |
| Weather-stripping - mult fam (Gas) | | | | | | | | | 0.04 | 0.07 | 0.03 | 0.04 | | | | |
| *Additional weatherization measures* | | | | | | | | | | | | | | | | |
| Auto Sweep | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Door Replacement | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Glass Replacement | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Jamb Replacement | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| Attic Access Weatherstripping (98 & 99) | 0.51 | 0.88 | 0.27 | 0.35 | | | | | | | | | | | | |
| Caulking | 0.09 | 0.15 | 0.05 | 0.06 | | | | | | | | | | | | |
| Door Weatherstripping (98 & 99) | 0.99 | 1.72 | 0.52 | 0.67 | | | | | | | | | | | | |

1 B/C without NEB

2 B/C with NEB

# *Appendix D*
## *RESULTS OF DIFFERENT ALLOCATION METHOD*

The data shown herein is the same table as in Appendix C except the allocation variable is the average number of measures installed per home. This appendix is provided for comparison purposes only, so an interested part can see the different B/C ratios determined by the two allocation methods.

***Benefit Cost Ratio's when Allocating by Average Measures Installed per Home***

| | **Pacific Gas & Electric** | | | | **Southern California Edison** | | | | **San Diego Gas & Electric** | | | | **Southern California Gas** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Energy Efficient Measure** | Participant Cost Test | | Utility Cost Test | | Participant Cost Test | | Utility Cost Test | | Participant Cost Test | | Utility Cost Test | | Participant Cost Test | | Utility Cost Test | |
| | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| **Electric Appliances** | | | | | | | | | | | | | | | | |
| Compact Fluorescent Hard Wire Porch Lights (2 year EUL) | | | | | 11.98 | 13.25 | 5.21 | 9.40 | | | | | | | | |
| Compact Fluorescent Hard Wire Porch Lights ( 20 Year | 2.7 | 2.94 | 1.05 | 1.21 | | | | | 2.78 | 2.87 | 1.07 | 1.21 | | | | |
| Compact Fluorescent Lamp (6 year EUL) | | | | | 7.32 | 8.59 | 3.18 | 7.37 | | | | | | | | |
| Compact Fluorescent Lamp (8 year EUL) | 2.26 | 2.73 | 0.88 | 1.19 | | | | | | | | | | | | |
| Compact Fluorescent Lamp (9 year EUL) | | | | | | | | | 3.60 | 3.79 | 1.38 | 1.71 | | | | |
| Evaporative Cooler Covers | | | | | | | | | 1.47 | 1.64 | 0.95 | 1.14 | | | | |
| Evaporative Cooler Replacement | | | | | 1.37 | 1.80 | 0.59 | 0.62 | 0.22 | 0.23 | 0.09 | 0.09 | | | | |
| Evaporative Coolers (Portable) | 0.67 | 0.72 | 0.26 | 0.28 | | | | | | | | | | | | |
| Faucet Aerators (Electric) | | | | | | | | | 0.00 | 2.64 | 0.00 | 1.40 | | | | |
| Low Flow Showerhead (Electric) | | | | | | | | | 7.62 | 8.10 | 2.92 | 3.18 | | | | |
| Refrigerator Replacement | 1.12 | 1.13 | 0.43 | 0.45 | 11.82 | 11.86 | 5.14 | 5.26 | 1.04 | 1.05 | 0.40 | 0.41 | | | | |
| Water Heater Blanket (Electric) | | | | | | | | | 3.74 | 3.90 | 1.44 | 1.72 | | | | |
| Water Heater Pipe Wrap (Electric) | | | | | | | | | 0.00 | 1.04 | 0.00 | 1.84 | | | | |
| *Additional electric measures* | | | | | | | | | | | | | | | | |
| Weatherization | | | | | 2.14 | 2.15 | 0.93 | 0.97 | | | | | | | | |
| **Gas Appliances** | | | | | | | | | | | | | | | | |
| Faucet Aerators (Gas) | 1.35 | 4.61 | 0.79 | 1.59 | | | | | 5.47 | 8.11 | 3.55 | 4.95 | 1.29 | 5.75 | 0.81 | 0.89 |
| Furnace Filters - mobile (Gas) | 0.49 | 2.54 | 0.27 | 1.02 | | | | | | | | | | | | |
| Furnace Filters - mult fam (Gas) | 0.14 | 2.19 | 0.06 | 0.82 | | | | | | | | | | | | |
| Furnace Filters - sing fam (Gas) | 0.52 | 2.57 | 0.28 | 1.03 | | | | | | | | | | | | |
| Furnace Repair (Gas) | | | | | | | | | 0.08 | 3.11 | 0.05 | 0.21 | 0.00 | 0.09 | 0.00 | 0.14 |
| Furnace Replacement (Gas) | | | | | | | | | 0.01 | 0.18 | 0.01 | 0.01 | 0.00 | 0.02 | 0.00 | 0.03 |
| Low Flow Showerhead (Gas) | 5.51 | 7.06 | 3.19 | 3.57 | | | | | 1.58 | 2.07 | 1.03 | 1.28 | 3.37 | 6.00 | 2.12 | 2.17 |
| Water Heater Blanket (Gas) | 1.55 | 1.91 | 0.9 | 1.13 | | | | | 0.79 | 0.95 | 0.51 | 0.80 | | | | |
| Water Heater Blanket - mobile (Gas) | | | | | | | | | | | | | 0.56 | 1.18 | 0.35 | 0.37 |
| Water Heater Blanket - mult fam (Gas) | | | | | | | | | | | | | 0.51 | 1.11 | 0.32 | 0.34 |
| Water Heater Blanket - sing fam (Gas) | | | | | | | | | | | | | 0.55 | 1.17 | 0.35 | 0.37 |
| Water Heater Pipe Wrap (Gas) | 2.98 | 3.94 | 1.73 | 2.36 | | | | | 17.00 | 18.04 | 11.04 | 12.88 | 1.44 | 3.31 | 0.91 | 0.96 |
| *Additional "other" measures* | | | | | | | | | | | | | | | | |
| Evaporative Cooler Covers (Gas) | | | | | | | | | | | | | 0.18 | 0.98 | 0.11 | 0.11 |
| Register Sealing | | | | | | | | | | | | | 0.14 | 2.91 | 0.09 | 0.09 |
| Exhaust Vent Damper | | | | | | | | | | | | | 0.12 | 1.00 | 0.07 | 0.07 |
| Furnace Filters (98 & 99) | 0.59 | 1.75 | 0.31 | 0.31 | | | | | | | | | | | | |
| Evaporative Cooler Cover for Permanent | 0.14 | 0.34 | 0.08 | 0.08 | | | | | | | | | | | | |
| Furnace Repair/Replacement | 0 | 0 | 0 | 0 | | | | | | | | | | | | |

***Benefit Cost Ratio's when Allocating by Average Measures Installed per Home***

| | Pacific Gas & Electric | | | | Southern California Edison | | | | San Diego Gas & Electric | | | | Southern California Gas | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Energy Efficient Measure** | Participant Cost Test | | Utility Cost Test | | Participant Cost Test | | Utility Cost Test | | Participant Cost Test | | Utility Cost Test | | Participant Cost Test | | Utility Cost Test | |
| | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| **Weatherization Measures** | | | | | | | | | | | | | | | | |
| Attic Access Weatherstripping - mobile (Gas) | 0.46 | 2.69 | 0.26 | 0.84 | | | | | | | | | | | | |
| Attic Access Weatherstripping - mult fam (Gas) | 0.14 | 2.39 | 0.06 | 0.64 | | | | | | | | | | | | |
| Attic Access Weatherstripping - sing fam (Gas) | 0.53 | 2.78 | 0.28 | 0.86 | | | | | | | | | | | | |
| Attic Insulation (Electric) | | | | | | | | | 0.14 | 0.15 | 0.05 | 0.07 | | | | |
| Attic Insulation (Gas) | 0.42 | 0.45 | 0.22 | 0.23 | | | | | 0.42 | 0.44 | 0.28 | 0.29 | | | | |
| Attic Insulation - mult fam (Gas) | 0.14 | 0.18 | 0.06 | 0.07 | | | | | | | | | 0.39 | 0.46 | 0.24 | 0.25 |
| Attic Insulation - sing fam (Gas) | 0.51 | 0.55 | 0.27 | 0.28 | | | | | | | | | 0.41 | 0.46 | 0.26 | 0.26 |
| Attic Venting - mult fam (Electric) | | | | | | | | | 0.00 | 0.12 | 0.00 | 0.00 | | | | |
| Attic Venting - mult fam (Gas) | | | | | | | | | 0.00 | 0.12 | 0.00 | 0.00 | | | | |
| Building Envelope (Minor Home) Repair - mobile (Gas) | 1.00 | 1.5 | 0.54 | 0.67 | | | | | | | | | 0.69 | 1.36 | 0.44 | 0.46 |
| Building Envelope (Minor Home) Repair - mult fam (Gas) | 0.29 | 0.79 | 0.13 | 0.26 | | | | | | | | | 0.11 | 0.25 | 0.07 | 0.07 |
| Building Envelope (Minor Home) Repair - sing fam (Gas) | 1.05 | 1.55 | 0.56 | 0.69 | | | | | | | | | 0.08 | 0.19 | 0.05 | 0.05 |
| Building Envelope Repair (Electric) | | | | | | | | | 0.04 | 0.11 | 0.02 | 0.07 | | | | |
| Building Envelope Repair (Gas) | 0.92 | 1.44 | 0.48 | 0.62 | | | | | 0.35 | 0.41 | 0.23 | 0.28 | | | | |
| Caulking - mobile (Gas) | 0.11 | 0.73 | 0.06 | 0.22 | | | | | 0.11 | 0.19 | 0.07 | 0.14 | 0.29 | 1.06 | 0.19 | 0.21 |
| Caulking - mult fam (Gas) | 0.06 | 1.3 | 0.03 | 0.35 | | | | | 0.16 | 0.49 | 0.11 | 0.35 | 0.21 | 0.98 | 0.13 | 0.16 |
| Caulking - sing fam (Gas) | 0.09 | 0.59 | 0.05 | 0.18 | | | | | 0.21 | 0.39 | 0.14 | 0.28 | 0.29 | 1.06 | 0.19 | 0.21 |
| Caulking and Weatherstripping (Gas) | | | | | | | | | | | | | 0.00 | 0.18 | 0.00 | 0.01 |
| Door Shoe (Electric) | | | | | | | | | 0.00 | 0.23 | 0.00 | 0.18 | | | | |
| Door Shoe (Gas) | | | | | | | | | 0.00 | 0.23 | 0.00 | 0.18 | | | | |
| Door Threshold (Electric) | | | | | | | | | 0.00 | 0.35 | 0.00 | 0.27 | | | | |
| Door Threshold (Gas) | | | | | | | | | 0.00 | 0.35 | 0.00 | 0.27 | | | | |
| Door Weatherstripping - mobile (Gas) | 0.35 | 1.04 | 0.19 | 0.37 | | | | | | | | | | | | |
| Door Weatherstripping - mult fam (Gas) | 0.1 | 0.79 | 0.04 | 0.22 | | | | | | | | | | | | |
| Door Weatherstripping - sing fam (Gas) | 0.37 | 1.05 | 0.2 | 0.37 | | | | | | | | | | | | |
| Energy Education (Gas) | | | | | | | | | 0.56 | 0.73 | 0.37 | 0.48 | 0.00 | 0.84 | 0.00 | 0.04 |
| Outlet/Switch Gaskets (Electric) | | | | | | | | | 0.00 | 8.15 | 0.00 | 6.20 | | | | |
| Outlet/Switch Gaskets (Gas) | 0.38 | 1.97 | 0.22 | 0.64 | | | | | 0.00 | 8.15 | 0.00 | 6.20 | 0.35 | 1.75 | 0.22 | 0.26 |
| Register Seal (Electric) | | | | | | | | | 0.00 | 0.09 | 0.00 | 0.07 | | | | |
| Register Seal (Gas) | | | | | | | | | 0.00 | 0.09 | 0.00 | 0.07 | | | | |
| Weather stripping - sing fam (Electric) | | | | | | | | | 0.03 | 0.11 | 0.01 | 0.08 | | | | |
| Weather stripping - sing fam (Gas) | | | | | | | | | 0.10 | 0.18 | 0.06 | 0.13 | 0.00 | 0.14 | 0.00 | 0.00 |
| Weatherization (Electric) | | | | | | | | | 0.00 | 0.15 | 0.00 | 0.12 | | | | |
| Weatherization (Gas) | | | | | | | | | 0.00 | 4.14 | 0.00 | 2.71 | | | | |
| Weather-stripping - mult fam (Electric) | | | | | | | | | 0.03 | 0.11 | 0.01 | 0.08 | | | | |
| Weather-stripping - mult fam (Gas) | | | | | | | | | 0.04 | 0.13 | 0.03 | 0.09 | 0.00 | 0.23 | 0.00 | 0.01 |
| *Additional weatherization measures* | | | | | | | | | | | | | | | | |
| Auto Sweep | | | | | | | | | 0.00 | 0.15 | 0.00 | 0.12 | | | | |
| Door Replacement | | | | | | | | | 0.00 | 0.09 | 0.00 | 0.07 | | | | |
| Glass Replacement | | | | | | | | | 0.00 | 0.15 | 0.00 | 0.12 | | | | |
| Jamb Replacement | | | | | | | | | 0.00 | 0.30 | 0.00 | 0.23 | | | | |
| Attic Access Weatherstripping (98 & 99) | 0.51 | 2.8 | 0.27 | 0.86 | | | | | | | | | | | | |
| Caulking | 0.09 | 0.72 | 0.05 | 0.21 | | | | | | | | | | | | |
| Door Weatherstripping (98 & 99) | 0.99 | 3.28 | 0.52 | 1.11 | | | | | | | | | | | | |

1 B/C without NEB

2 B/C with NEB

# *Appendix E*
## *PARTICIPANTS OF PUBLIC WORKSHOP*

### *Summary of Public Workshops on LIEE Cost Effectiveness Draft Report*

Two Public Workshops were noticed per California Public Utilities Commission (CPUC) requirements and held on March 26, 2002 in San Francisco and March 27, 2002 in San Diego. Equipoise Consulting facilitated and recorded the events at the meetings. Attendance lists are appended in Attachment A.

At the March 26th workshop in San Francisco utility and regulatory representatives attended but no members of any outside groups chose to attend. The meeting was called to order at 10:00 AM and was adjourned at 10:22 AM by unanimous agreement.

In San Diego on March 27th, one company outside the utility and regulatory members involved in development of the report was represented. The meeting was called to order at 10:00 AM. A presentation summarizing the results of the Draft Final Report for LIEE Program and Measure Cost Effectiveness (Attachment B) was reviewed and discussed.

The following issues were raised and responded to at the San Diego Workshop:

1. How do non-energy benefits (NEBs) continue to get evaluated and updated?
    - If the subcommittee hears of new research, we will attempt to incorporate it, but currently there are no plans to update the NEBs
2. What is the next step for this work?
    - Assuming that the ALJ accepts this method, it will be applied on measures for the July filing.
3. Are job creation NEBs incorporated into the current NEBs?
    - While the subcommittee agrees that there are potential NEBs in this area, it was dropped due to possible double counting and very poor data quality. We felt that we could not substantiate a value for it.
4. Energy Education has many synergies. Are they captured by the current NEBs?
    - There are some energy savings associated with this that are captured in bill savings. However, this is considered an integral service of the program, not a measure. We are not planning to evaluate energy education and do not expect that it will go away.
5. How do you separate interactions of individual measures versus the whole house?
    - Because of known interactions, there are certain measures that potentially may be bundled for assessment purposes and to determine a retain/drop of the measures.
6. How should we apply NEBs to measures not in PY2000?
    - The subcommittee agreed that how to apply NEBs to new measures is a potential problem that the standardization team will address.

The San Diego workshop was adjourned at approximately 11:00 AM by unanimous agreement since all issues had been discussed

# *Attachment A*
# *Attendees at Both Workshops*

**Public Workshop on LIEE Program and Measure Cost Effectiveness Report**
**Prepared by the Joint RRM Standardization Team and Cost Effectiveness Subcommittee**
**Tuesday, March 26, 2002, PG&E Pacific Energy Center, 851 Howard St., San Francisco**
**Wednesday, March 27, 2002, Sempra Headquarters, 101 Ash St., San Diego**
**10:00 AM to 2:00 PM**

| | Name | Organization | Mailing Address | Phone Number | Email Address | 26-Mar | 27-Mar |
|---|---|---|---|---|---|---|---|
| 1 | Mary O'Drain | Pacific Gas & Electric | 123 Mission Street, MC H14G, San Francisco, CA 94177 | 415-973-2317 | mjob@pge.com | X | X |
| 2 | Fred Sebold | RER | 11236 El Comino Real, San Diego, CA 92130 | 858-481-0081 | fred@rer.com | X | X |
| 3 | George Sanchez | Richard Heath Associates | 7847 Convoy Ct., San Diego, 92123 | 858-514-4025 | gsanchez@rhainc.com | | X |
| 4 | Don Wood | San Diego Gas & Electric | 8335 Century Park Ct., San Diego, CA 92123 | 858636-5799 | dwood@sdge.com | | X |
| 5 | Kevin McKinley | San Diego Gas & Electric | 8335 Century Park Ct., San Diego, CA 92123 | 858-654-1250 | kmckinley@sdge.com | X, by phone | X |
| 6 | Jim Green | Representing Southern California Gas | 555 W Fifth Street, ML 24A1, Los Angeles, CA 90013 | 213-244-3614 | jgreen@socalgas.com | | X, by phone |
| 7 | Gilbert Escamilla | Office of Ratepayer Advocates | Public Utilities Commission, Office of Ratpayer Advocates, 505 Van Ness Ave, San Francisco, CA | 415-703-1862 | gil@cpus.ca.gov | X | X, by phone |
| 8 | Sharon Lee | Southern California Gas | 555 W Fifth Street, ML 24A1, Los Angeles, CA 90013 | 213-244-3248 | slee@socalgas.com | | X, by phone |
| 9 | Angela Jones | Southern California Edison | 3rd Floor, B7, 2131 Walnut Grove Ave., Rosemead, CA 91770 | 626-302-8061 | angela.jones@sce.com | X, by phone | X, by phone |
| 10 | Tim Caulfield | Equipoise Consulting Inc. | 4309 Whittle Ave, Oakland, CA 94602 | 510-531-1080 | equipoise@covad.net | X | X |
| 11 | Mary Sutter | Equipoise Consulting Inc. | 4309 Whittle Ave, Oakland, CA 94602 | 510-864-8507 | msutter@alamedanet.net | X | X |
| 12 | Jessica Hecht | Office of Ratepayer Advocates | Public Utilities Commission, Office of Ratpayer Advocates, 505 Van Ness Ave, San Francisco, CA | 415-355-5599 | jhe@cpuc.ca.gov | X | |
| 13 | Barbara Cronin | San Diego Gas & Electric | 8335 Century Park Ct., CP12F, San Diego, CA 92123-1569 | 858-654-8782 | bcronin@sdge.com | X, by phone | |
| 14 | Donna Wagoner | CPUC Energy Division | Public Utilities Commission, Energy Division, 505 Van Ness Ave, San Francisco, CA | 415-703-3175 | dlw@cpuc.ca.gov | X | |
| 15 | Jeorge Tagpipes | CPUC Energy Division | Public Utilities Commission, Energy Division, 505 Van Ness Ave, San Francisco, CA | 415-703-2451 | jst@cpuc.ca.gov | X | |

***Attachment B***
***Summary Presentation of Cost Effectiveness Report for Workshop***

# LIEE Program and Measure Cost Effectiveness

(response to D. 01-12-020
ordering paragraph #9)

Workshops presenting work conducted jointly by
the Reporting Requirements Manual (RRM)
Working Group and the Standardization Team
Cost Effectiveness Subcommittee

March 26, 2002, PEC, San Francisco
March 27, 2002, Sempra, San Diego

1

## Requirements – (Verbatim)

…ordering paragraph (OP) 9 of Decision (D.) 01-12-020, requires that the utilities:

"…evaluate the Low Income Energy Efficiency (LIEE) program and individual measures by calculating both the participant cost test and utility cost test, including in that calculation the non-energy related benefits developed by the RRM Working Group. The RRM Working Group and Standardization Project Team shall jointly develop recommendations, after obtaining public input, on:

- how each of these tests should be considered in making final measure selections, or in evaluating the overall effectiveness of LIEE programs from year to year or across utilities, and
- an explicit method for addressing the "gross" versus "net" costs and savings issue in measure and program evaluation.

The joint report shall include a discussion of the pros and cons of the various options considered."

2

## Requirements – (Paraphrased)

OP 9 requires that the utilities:
"…evaluate LIEE program and individual measures by calculating both the PC test and UC test, including NEBs. The RRM/ST shall jointly develop recommendations, after obtaining public input, on:

- ❑how each of these tests should be considered in making final measure selections, or in evaluating the overall effectiveness of LIEE programs from year to year or across utilities, and
- ❑an explicit method for addressing the "gross" versus "net" costs and savings issue in measure and program evaluation.

The joint report shall include a discussion of the pros and cons of the various options considered."

3

## Requirements – (Implications)

Joint RRM/ST Cost Effectiveness Subcommittee had to address:

- Cost effectiveness tests for the LIEE Program
- Cost effectiveness tests for measures within the LIEE Program
- Use of these tests in decision making
- Method to address "gross" versus "net" issues

4

## Cost Test Challenge

- Both PC and UC tests have a Benefit to Cost (B/C) ratio and a Net-Present-Value (NPV) version in the Standard Practice Manual.
- There are no participant costs to the LIEE customers.
- Therefore: The PC test only has an NPV version.
- Challenge: How to compare test results.

5

## Modified Participant Cost Test

Participant Cost Test B/C – Modified ($PC_m$)
= Participant Benefits/Utility Costs

- Allows comparison of $PC_m$ and UC tests on an equivalent basis.
- Both B/C and NPV are calculated.
- B/C test primary discriminator.

6

## Assessing Program Level Results

- SCE and SoCalGas have substantial overlap in service territories.
- Consider SCE and SoCalGas as a single entity for utility program comparisons.
- This approach was used in the bill savings assessment.

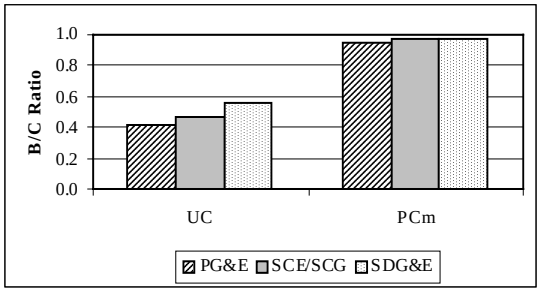
7

# Program Level Results

| LIEE Program | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Participant Cost Test | | | Utility Cost Test | | | Participant Cost Test$_m$ |
| Utility | Benefits | Costs | B/C | Benefits | Costs | B/C | Participant Benefits / Utility Costs |
| PG&E | $ 23,700,706 | $0 | Undefined | $ 10,269,895 | $ 25,211,144 | 0.41 | 0.94 |
| SDG&E | $ 6,292,154 | $0 | Undefined | $ 3,561,770 | $ 6,414,269 | 0.56 | 0.98 |
| SCE & SoCalGas | $ 20,702,988 | $0 | Undefined | $ 9,802,003 | $ 21,382,824 | 0.46 | 0.97 |
| SCE | $ 14,749,473 | $0 | Undefined | $ 8,229,064 | $ 4,971,208 | 1.66 | 2.97 |
| SoCalGas | $ 5,953,515 | $0 | Undefined | $ 1,572,939 | $ 16,411,616 | 0.10 | 0.36 |

8

# Program Level B/C Results




9

## Program Level Conclusions

- When using comparable service area program offerings, statewide LIEE programs offer comparable cost effectiveness across California.
- Use caution when comparing program level B/C results across utilities or across years for one utility. Customer and calculation variations make such comparisons problematic.

10

## Measure Level B/C Test - Issues

- The NEBs were developed at a global level. At times, a specific NEB was calculated based on a sampled population of participants, regardless of the exact measures in each participant's home.
- Because these estimates are at the household level, no consistent uniformly applicable criteria exist for distributing the household/program level NEB values amongst the program measures.
- Regardless of how the NEBs are allocated to measures, there is a false sense of precision inherent in the process.

11

## Measure Level Allocation Methods Studied

- Simple association of a measure with that NEB,
- Average installations per house in the program for that measure, and
- NPV of the energy savings over the life of the measure.

12

## Selected Method for Allocation of NEBs to Measures

- For the present, both UC and the PC tests should allocate NEBs based on the lifecycle monetary benefit of the installed measures.
- Given the lack of documented, concrete information on how the measure level NEBs should be distributed, this method allocates the NEBs to the measures without causing significant changes to the order ranking of the UC and PC test.

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## Measure Level Decision Making

| | Assessment Test Type | | Decision Rule | |
|---|---|---|---|---|
| **Pass/Fail Guideline Number** | **Modified Participant Cost Test** | **Utility Cost Test** | **Existing Measure** | **Proposed New Measure** |
| **1** | Pass | Pass | Retain | Add to Program |
| **2** | One Pass/ One Fail | | Retain | Do Not Add |
| **3** | Fail | Fail | Retain ONLY if significant excluded NEBs can be identified. | Do Not Add |

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## Current Measure Test B/C Criteria by Utility

| | UC | PCm |
|---|---|---|
| **PG&E** | 0.41 | 0.94 |
| **SDG&E** | 0.56 | 0.98 |
| **SCE** | 1.00 | 1.00 |
| **SoCalGas** | 0.10 | 0.36 |

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## Measure Assessment Approach Details

- Elimination of low cost-effectiveness measures will slowly raise the average program $PC_m$ and UC test values.
- Pass/fail criteria will be reset biennially or more often if major program redesign occurs.
- $PC_m$ and UC B/C thresholds should never exceed a maximum of 1.0 for either test.

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## Measure Assessment Approach Details (continued)

- Assessment of existing measure inclusion or exclusion should occur biennially when the biennial evaluation results are available.
- New measures will be evaluated in the program year in which they are proposed.
- Some non energy related measures (e.g., furnace repair/replacement, some minor home repairs) will need to be assessed on a case-by-case basis.

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## Measure Level Results by Utility

Exhibits 4.2 - 4.6
From Report

18

**Exhibit 4.2**

## PG&E Measure Test Results – Most to Least Effective

Shaded area = test results above threshold criteria

| Pacific Gas & Electric | |
|---|---|
| $PC_m$ with NEB | UC with NEB |
| Low Flow Showerhead (Gas) | Low Flow Showerhead (Gas) |
| Water Heater Pipe Wrap (Gas) | Water Heater Pipe Wrap (Gas) |
| Compact Fluorescent Hard Wire Porch Lights ( 20 Year EUL) | Compact Fluorescent Hard Wire Porch Lights ( 20 Year EUL) |
| Compact Fluorescent Lamp (8 year EUL) | Water Heater Blanket (Gas) |
| Faucet Aerators (Gas) | Compact Fluorescent Lamp (8 year EUL) |
| Water Heater Blanket (Gas) | Faucet Aerators (Gas) |
| Building Envelope (Minor Home) Repair - sing fam (Gas) | Building Envelope (Minor Home) Repair - sing fam (Gas) |
| Building Envelope (Minor Home) Repair - mobile (Gas) | Building Envelope (Minor Home) Repair - mobile (Gas) |
| Door Weatherstripping (98 & 99) | Door Weatherstripping (98 & 99) |
| Building Envelope Repair (Gas) | Building Envelope Repair (Gas) |
| Refrigerator Replacement | Refrigerator Replacement |
| Evaporative Coolers (Portable) | Attic Access Weatherstripping - sing fam (Gas) |
| Attic Access Weatherstripping - sing fam (Gas) | Furnace Filters - sing fam (Gas) |
| Attic Insulation - sing fam (Gas) | Attic Insulation - sing fam (Gas) |
| Attic Access Weatherstripping (98 & 99) | Attic Access Weatherstripping (98 & 99) |
| Attic Access Weatherstripping - mobile (Gas) | Furnace Filters - mobile (Gas) |
| Furnace Filters - sing fam (Gas) | Evaporative Coolers (Portable) |
| Furnace Filters - mobile (Gas) | Attic Access Weatherstripping - mobile (Gas) |
| Attic Insulation (Gas) | Furnace Filters (98 & 99) |
| Furnace Filters (98 & 99) | Outlet/Switch Gaskets (Gas) |
| Outlet/Switch Gaskets (Gas) | Attic Insulation (Gas) |
| Door Weatherstripping - sing fam (Gas) | Door Weatherstripping - sing fam (Gas) |
| Door Weatherstripping - mobile (Gas) | Door Weatherstripping - mobile (Gas) |
| Building Envelope (Minor Home) Repair - mult fam (Gas) | Building Envelope (Minor Home) Repair - mult fam (Gas) |
| Attic Insulation - mult fam (Gas) | Attic Insulation - mult fam (Gas) |
| Attic Access Weatherstripping - mult fam (Gas) | Attic Access Weatherstripping - mult fam (Gas) |
| Furnace Filters - mult fam (Gas) | Evaporative Cooler Cover for Permanent |
| Caulking - mobile (Gas) | Furnace Filters - mult fam (Gas) |
| Door Weatherstripping - mult fam (Gas) | Caulking - mobile (Gas) |
| Evaporative Cooler Cover for Permanent | Caulking - sing fam (Gas) |
| Caulking - sing fam (Gas) | Caulking |
| Caulking | Door Weatherstripping - mult fam (Gas) |
| Caulking - mult fam (Gas) | Caulking - mult fam (Gas) |
| **Furnace Repair/Replacement** | **Furnace Repair/Replacement** |

Measures in **BOLD** type have zero claimed impacts.

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**Exhibit 4.3**

## SCE Measure Specific Test Results – Most to Least Effective

| Southern California Edison | |
|---|---|
| $PC_m$ with NEB | UC with NEB |
| Compact Fluorescent Hard Wire Porch Lights (2 year EUL) | Compact Fluorescent Hard Wire Porch Lights (2 year EUL) |
| Refrigerator Replacement | Refrigerator Replacement |
| Compact Fluorescent Lamp (6 year EUL) | Compact Fluorescent Lamp (6 year EUL) |
| Weatherization | Weatherization |
| Evaporative Cooler Replacement | Evaporative Cooler Replacement |

Shaded area = test results above threshold criteria

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**Exhibit 4.4**

## SDG&E Measure Specific Test Results – Most to Least Effective

Shaded area = test results above threshold criteria

| San Diego Gas & Electric | |
|---|---|
| $PC_m$ with NEB | UC with NEB |
| Water Heater Pipe Wrap (Gas) | Water Heater Pipe Wrap (Gas) |
| Low Flow Showerhead (Electric) | Faucet Aerators (Gas) |
| Faucet Aerators (Gas) | Low Flow Showerhead (Electric) |
| Weatherization (Gas) | Weatherization (Gas) |
| Water Heater Blanket (Electric) | Water Heater Blanket (Electric) |
| Compact Fluorescent Lamp (9 year EUL) | Compact Fluorescent Lamp (9 year EUL) |
| Compact Fluorescent Hard Wire Porch Lights ( 20 Year EUL) | Compact Fluorescent Hard Wire Porch Lights ( 20 Year EUL) |
| Furnace Repair (Gas) | Low Flow Showerhead (Gas) |
| Low Flow Showerhead (Gas) | Evaporative Cooler Covers |
| Evaporative Cooler Covers | Water Heater Blanket (Gas) |
| Refrigerator Replacement | Refrigerator Replacement |
| Water Heater Blanket (Gas) | Energy Education (Gas) |
| Energy Education (Gas) | Attic Insulation (Gas) |
| Attic Insulation (Gas) | Building Envelope Repair (Gas) |
| Building Envelope Repair (Gas) | Caulking - sing fam (Gas) |
| Caulking - sing fam (Gas) | Caulking - mult fam (Gas) |
| Evaporative Cooler Replacement | Furnace Repair (Gas) |
| Caulking - mult fam (Gas) | Evaporative Cooler Replacement |
| Furnace Replacement (Gas) | Caulking - mobile (Gas) |
| Attic Insulation (Electric) | Weather stripping - sing fam (Gas) |
| Caulking - mobile (Gas) | Attic Insulation (Electric) |
| Weather stripping - sing fam (Gas) | Weather-stripping - mult fam (Gas) |
| Building Envelope Repair (Electric) | Building Envelope Repair (Electric) |
| Weather-stripping - mult fam (Gas) | Weather-stripping - mult fam (Electric) |
| Weather-stripping - mult fam (Electric) | Weather stripping - sing fam (Electric) |
| Weather stripping - sing fam (Electric) | Furnace Replacement (Gas) |
| **Glass Replacement** | **Weatherization (Electric)** |
| **Door Replacement** | **Glass Replacement** |
| **Auto Sweep** | **Door Replacement** |
| **Faucet Aerators (Electric)** | **Door Shoe (Gas)** |
| **Weatherization (Electric)** | **Faucet Aerators (Electric)** |
| **Water Heater Pipe Wrap (Electric)** | **Auto Sweep** |
| **Register Seal (Electric)** | **Door Shoe (Electric)** |
| **Door Shoe (Electric)** | **Register Seal (Gas)** |
| **Outlet/Switch Gaskets (Gas)** | **Water Heater Pipe Wrap (Electric)** |
| **Outlet/Switch Gaskets (Electric)** | **Attic Venting - mult fam (Electric)** |
| **Attic Venting - mult fam (Electric)** | **Jamb Replacement** |
| **Attic Venting - mult fam (Gas)** | **Outlet/Switch Gaskets (Electric)** |
| **Door Threshold (Gas)** | **Outlet/Switch Gaskets (Gas)** |
| **Door Threshold (Electric)** | **Door Threshold (Electric)** |
| **Jamb Replacement** | **Attic Venting - mult fam (Gas)** |
| **Door Shoe (Gas)** | **Register Seal (Electric)** |
| **Register Seal (Gas)** | **Door Threshold (Gas)** |

Measures in **BOLD** type have zero claimed impacts.

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**Exhibit 4.5**

## SoCalGas Measure Specific Test Results – Most to Least Effective

| Southern California Gas | |
|---|---|
| $PC_{nn}$ with NEB | UC with NEB |
| Low Flow Showerhead (Gas) | Low Flow Showerhead (Gas) |
| Faucet Aerators (Gas) | Water Heater Pipe Wrap (Gas) |
| Water Heater Pipe Wrap (Gas) | Faucet Aerators (Gas) |
| Building Envelope (Minor Home) Repair - mobile (Gas) | Building Envelope (Minor Home) Repair - mobile (Gas) |
| Water Heater Blanket - mobile (Gas) | Water Heater Blanket - mobile (Gas) |
| Water Heater Blanket - sing fam (Gas) | Water Heater Blanket - sing fam (Gas) |
| Water Heater Blanket - mult fam (Gas) | Water Heater Blanket - mult fam (Gas) |
| Attic Insulation - sing fam (Gas) | Attic Insulation - sing fam (Gas) |
| Attic Insulation - mult fam (Gas) | Attic Insulation - mult fam (Gas) |
| Outlet/Switch Gaskets (Gas) | Outlet/Switch Gaskets (Gas) |
| Caulking - mobile (Gas) | Caulking - mobile (Gas) |
| Caulking - sing fam (Gas) | Caulking - sing fam (Gas) |
| Caulking - mult fam (Gas) | Caulking - mult fam (Gas) |
| Evaporative Cooler Covers (Gas) | Evaporative Cooler Covers (Gas) |
| Register Sealing | Register Sealing |
| Exhaust Vent Damper | Exhaust Vent Damper |
| Building Envelope (Minor Home) Repair - mult fam (Gas) | Building Envelope (Minor Home) Repair - mult fam (Gas) |
| Building Envelope (Minor Home) Repair - sing fam (Gas) | Building Envelope (Minor Home) Repair - sing fam (Gas) |
| **Caulking and Weatherstripping (Gas)** | **Caulking and Weatherstripping (Gas)** |
| **Furnace Repair / Replacement** | **Furnace Repair / Replacement** |
| **Weatherstripping - sing fam (Gas)** | **Weatherstripping - sing fam (Gas)** |
| **Weatherstripping - mult fam (Gas)** | **Weatherstripping - mult fam (Gas)** |

Measures in **BOLD** type have zero claimed impacts.

Shaded area = test results above threshold criteria

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**Exhibit 4.6**

## Decision Making for Measures Using Recommended Method – Page 1

Shaded area = test results above threshold criteria

| Energy Efficient Measure | PG&E | SCE | SDG&E | SoCalGas |
|---|---|---|---|---|
| **Electric Appliances** | | | | |
| Compact Fluorescent Hard Wire Porch Lights (2 year EUL) | | 1 | | |
| Compact Fluorescent Hard Wire Porch Lights ( 20 Year EUL) | 1 | | 1 | |
| Compact Fluorescent Lamp (6 year EUL) | | 1 | | |
| Compact Fluorescent Lamp (8 year EUL) | 1 | | | |
| Compact Fluorescent Lamp (9 year EUL) | | | 1 | |
| Evaporative Cooler Covers | | | 1 | |
| Evaporative Cooler Replacement | | 2 | 3 | |
| Evaporative Coolers (Portable) | 2 | | | |
| Faucet Aerators (Electric) | | | * | |
| Low Flow Showerhead (Electric) | | | 1 | |
| Refrigerator Replacement | 1 | 1 | 1 | |
| Water Heater Blanket (Electric) | | | 1 | |
| Water Heater Pipe Wrap (Electric) | | | * | |
| *Additional electric measures* | | | | |
| Weatherization | | 1 | | |
| **Gas Appliances** | | | | |
| Faucet Aerators (Gas) | 1 | | 1 | 1 |
| Furnace Filters - mobile (Gas) | 3 | | | |
| Furnace Filters - mult fam (Gas) | 3 | | | |
| Furnace Filters - sing fam (Gas) | 3 | | | |
| Furnace Repair (Gas) | * | | 2 | * |
| Furnace Replacement (Gas) | * | | 3 | * |
| Low Flow Showerhead (Gas) | 1 | | 1 | 1 |
| Water Heater Blanket (Gas) | 1 | | 2 | |
| Water Heater Blanket - mobile (Gas) | | | | 1 |
| Water Heater Blanket - mult fam (Gas) | | | | 1 |
| Water Heater Blanket - sing fam (Gas) | | | | 1 |
| Water Heater Pipe Wrap (Gas) | 1 | | 1 | 1 |
| *Additional "other" measures* | | | | |
| Evaporative Cooler Covers (Gas) | | | | 1 |
| Register Sealing | | | | 3 |
| Exhaust Vent Damper | | | | 3 |
| Furnace Filters (98 & 99) | 3 | | | |
| Evaporative Cooler Cover for Permanent | 3 | | | |

*This measure has no claimed energy savings. B/C ratio is zero.

1 = Both $PC_{nn}$ and UC are >= threshold

2 = $PC_{nn}$ >= threshold and UC < threshold

3 = Both $PC_{nn}$ and UC are < threshold

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**Exhibit 4.6 (cont.)**

**Decision Making for Measures Using Recommended Method** – Page 2

| Energy Efficient Measure | PG&E | SCE | SDG&E | SoCalGas |
|---|---|---|---|---|
| **Weatherization Measures** | | | | |
| Attic Access Weatherstripping - mobile (Gas) | 3 | | | |
| Attic Access Weatherstripping - mult fam (Gas) | 3 | | | |
| Attic Access Weatherstripping - sing fam (Gas) | 3 | | | |
| Attic Insulation (Electric) | | | 3 | |
| Attic Insulation (Gas) | 3 | | 3 | |
| Attic Insulation - mult fam (Gas) | 3 | | | 1 |
| Attic Insulation - sing fam (Gas) | 3 | | | 1 |
| Attic Venting - mult fam (Electric) | | | * | |
| Attic Venting - mult fam (Gas) | | | * | |
| Building Envelope (Minor Home) Repair - mobile (Gas) | 1 | | | 1 |
| Building Envelope (Minor Home) Repair - mult fam (Gas) | 3 | | | 3 |
| Building Envelope (Minor Home) Repair - sing fam (Gas) | 1 | | | 3 |
| Building Envelope Repair (Electric) | | | 3 | |
| Building Envelope Repair (Gas) | 1 | | 3 | |
| Caulking - mobile (Gas) | 3 | | 3 | 1 |
| Caulking - mult fam (Gas) | 3 | | 3 | 1 |
| Caulking - sing fam (Gas) | 3 | | 3 | 1 |
| Caulking and Weatherstripping (Gas) | | | | * |
| Door Shoe (Electric) | | | * | |
| Door Shoe (Gas) | | | * | |
| Door Threshold (Electric) | | | * | |
| Door Threshold (Gas) | | | * | |
| Door Weatherstripping - mobile (Gas) | 3 | | | |
| Door Weatherstripping - mult fam (Gas) | 3 | | | |
| Door Weatherstripping - sing fam (Gas) | 3 | | | |
| Energy Education (Gas) | | | 3 | |
| Outlet/Switch Gaskets (Electric) | | | * | |
| Outlet/Switch Gaskets (Gas) | 3 | | * | 1 |
| Register Seal (Electric) | | | * | |
| Register Seal (Gas) | | | * | |
| Weather stripping - sing fam (Electric) | | | 3 | |
| Weather stripping - sing fam (Gas) | | | 3 | * |
| Weatherization (Electric) | | | * | |
| Weatherization (Gas) | | | 1 | |
| Weather-stripping - mult fam (Electric) | | | 3 | |
| Weather-stripping - mult fam (Gas) | | | 3 | * |
| *Additional weatherization measures* | | | | |
| Auto Sweep | | | * | |
| Door Replacement | | | * | |
| Glass Replacement | | | * | |
| Jamb Replacement | | | * | |
| Attic Access Weatherstripping (98 & 99) | 3 | | | |
| Caulking | 3 | | | |
| Door Weatherstripping (98 & 99) | 1 | | | |

*This measure has no claimed energy savings. B/C ratio is zero.
1 = Both $PC_m$ and UC are >= threshold
2 = $PC_m$ >= threshold and UC < threshold
3 = Both $PC_m$ and UC are < threshold

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# "Gross" versus "Net"

- "Gross" savings and costs assumes that the old equipment would not have been replaced for some number of years at least as great as the lifetime of the new equipment.
- Reviewed current, rapid deployment, and planned measures.
- Believe customers actions outside the program will continue to replace failed unit with units of like efficiency from the used equipment market.
- Recommend using "gross" estimate of lifetime savings.

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# Overall Recommendations

- Use a modified participant test to enable benefit-cost ratio comparisons of the participant and utility cost tests. The modified participant test ratio is the participant benefits divided by the utility program costs.
- When addressing specific measures, adopt a three level methodology using average program $PC_m$ and UC for each utility as the measure screening criteria for that utility's measures.

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## Overall Recommendations (Cont.)

- Caution should be used when comparing program level cost effectiveness across utilities for a single year. Variations in installed measure mix, gas versus electric savings, and reported program costs make such comparisons problematic.
- There are no apparent fixed criteria for comparing cost effectiveness of a single utility across different years. Variations in the mix of measures installed, combined with changes in program costs make comparisons difficult. However, an understanding of differences can be useful for deciding future program measure mix.

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## Overall Recommendations (Cont.)

- When comparing program level cost effectiveness across utilities, consider SCE and SoCalGas benefits and costs together to obtain a better representation of utility-to-utility customer and utility benefits versus costs.
- Use “gross” savings and costs for all measures in the LIEE program. In this context gross savings means the total energy difference between the new equipment and the existing equipment applied over the entire useful life of the new equipment

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# *Appendix F*
## *FORMULAS FOR COST BENEFIT ANALYSES*

The following formula for the PC and UC cost effectiveness tests are from the California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects dated October 2001. They are represented here for the convenience of interested readers.

The work performed in this report used algorithms from Chapter 2 (Participant Test) of the Standard Practice Manual for the PC test and from Chapter 5 (Program Administrator Cost Test) of the Standard Practice Manual for the UC test. They are shown below.

***Participant Test***

NPVp = Bp – Cp

BCRp = Bp / Cp

Where: NPVp = net present value to all participants

BCRp = benefit-cost ratio to participants

Bp = NPV of benefit to participants

Cp = NPV of costs to participants

The benefit (Bp) and cost (Cp) terms are further defined as:

$$Bp = \sum_{t=1}^{N} \frac{BR_t + TC_t + INC_t}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{AB_{at} + PAC_{at}}{(1+d)^{t-1}}$$

$$Cp = \sum_{t=1}^{N} \frac{PC_t + BI_t}{(1+d)^{t-1}}$$

where: $BR_t$ = bill reductions in year t
$BI_t$ = bill increases in year t
$TC_t$ = tax credits in year t
$INC_t$ = incentives paid to participant by sponsoring utility in year t
$PC_t$ = participant cost in year t
$PAC_{at}$ = participant avoided costs in year t for avoided alternate fuel devices
$AB_{at}$ = avoided bill from alternate fuel in year t

The second summation in the Bp algorithm is only used for fuel substitution programs and was not used in this analysis. For the analysis in this report, $TC_t$, $INC_t$, $PC_t$, and $BI_t$ were all set to zero.

***Utility Cost Test***

NPVpa = Bpa – Cpa

BCRpa = Bpa / Cpa

Where: NPVpa = net present value of program administrator (utility) costs
BCRpa = benefit-cost ratio of program administrator (utility) costs
Bpa = benefits of the program
Cpa = costs of the program

The benefit (Bpa) and cost (Cpa) terms are further defined as:

$$Bpa = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{UAC_{at}}{(1+d)^{t-1}}$$

$$Cpa = \sum_{t=1}^{N} \frac{PRC_t + INC_t + UIC_t}{(1+d)^{t-1}}$$

where: $UAC_t$ = utility avoided supply costs in year t
$UAC_{at}$ = utility avoided supply costs for the alternate fuel in year t
$PRC_t$ = program administrator program costs in year t
$INC_t$ = incentives paid to participant by sponsoring utility in year t
$UIC_t$ = utility increased supply costs in year t

The second summation in the Bpa algorithm is only used for fuel substitution programs and was not used in this analysis. For the analysis in this report $INC_t$ and $UIC_t$ were set to zero.