**BEFORE THE PUBLIC UTILITIES COMMISSION OF THE**

**STATE OF CALIFORNIA**

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| Order Instituting Rulemaking to Examine the Commission's Post-2005 Energy Efficiency Policies, Programs, Evaluation, Measurement and Verification, and Related Issues. | ) ) ) ) | R.06-04-010<br>(Issued April 13, 2006) |

# SOUTHERN CALIFORNIA EDISON COMPANY'S (U 338-E) COMMENTS ON THE REVIEW DRAFT OF THE ENERGY EFFICIENCY 2006-2007 VERIFICATION REPORT


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## I.

## INTRODUCTION

Southern California Edison (SCE) hereby submits these comments regarding the Energy Efficiency 2006-2007 Verification Report Review Draft (Draft Report), prepared by the Energy Division and released on November 18, 2008[1]. It is SCE's conclusion that the Draft Report has such serious shortcomings that it should not be considered by the Commission as any meaningful or reliable indication of SCE's 2006-2007 energy efficiency earnings results. In fact, the Draft Report is so fundamentally flawed that it jeopardizes the tremendous progress California has made in the past few years in establishing energy efficiency as the first energy resource in the State's loading order. Moreover, the Draft Report endangers the State's adopted policy of creating energy efficiency incentives which are comparable to those of generation asset investments. When the Commission adopted the energy efficiency risk/reward mechanism, it

[1] The due date established by the October 20, 2008 ALJ Ruling in this Rulemaking was November 15, 2008. However, this date fell on a Saturday and the report was delayed until Tuesday, November 18.

had a stated purpose to elevate energy efficiency to become a core component of the utility business. The Draft Report completely undermines this vision of the energy efficiency risk/reward incentive mechanism to encourage the increased use of energy efficiency over traditional generation resources thereby reducing the harmful greenhouse gases that cause global climate change.

The uncontroverted fact is that over 2006-2007, SCE has partnered with its customers to save more energy than any other utility in the United States. As a "reward" for SCE's national leadership in energy efficiency, the Draft Report proposes to assess SCE a financial penalty. There is no way to comprehend penalizing SCE's shareholders for leading the country in energy savings and demand reduction from energy efficiency and creating over $400 million of net benefits for our customers.

The Draft Report and the execution to date of the evaluation, measurement, and verification process is inconsistent with the stated purpose of the energy efficiency risk/reward incentive mechanism, the Commission's vision for energy efficiency, objectives for GHG reductions, and the state Energy Action Plan. In these comments, SCE provides numerous examples of how the Draft Report oversteps or is otherwise is in opposition to Commission policy, is technically flawed, and is so strewn with systemic errors that it jeopardizes the Commission's long term goals for Energy Efficiency. As a result, the Draft Report must be rejected along with its recommendations on shareholder earnings/penalties.

## II.

## EXECUTIVE SUMMARY

The Draft Report, released on November 18, 2008, contains such serious and significant errors that it has rendered itself absolutely unreliable as a tool to evaluate SCE's energy efficiency achievements in 2006-2007. The extensive technical flaws in the Draft Report are compounded by its many ill-advised and poorly supported recommendations that, if taken seriously, do not bode well for the future of energy efficiency as a reliable energy policy for the state of California. The Energy Division would have SCE modify its assumptions so drastically

as to alter its level of achievements from earnings-eligible to a recommend penalty, despite the fact that SCE has saved more energy than any other utility in the country. If this is the case, the current process is broken.

In the comments that follow, SCE creates for the public record a list of extensive errors, both policy-driven and technical, that are propagated throughout the Draft Report. A sampling of some of the presented issues is listed below:

- The Draft Report over-steps established Commission policy. The Draft Report does not adhere to the policies and procedures established by the Commission that guide the 2006-2008 energy efficiency programs. In fact, the Draft Report so contradicts current policy, it is apparent that the Energy Division seeks to supplement policy with its own opinions. For example, the Draft Report redefines how SCE is to achieve the Minimum Performance Standard, develops a new unproven methodology to calculate the Performance Earnings Basis, falsely interprets the discount rate, and bypasses the protocols guiding the Draft Report.
- The Draft Report relies heavily on the faulty and un-vetted DEER 2008 assumptions. The appropriate means to propose, consider, and change assumptions in the Database for Energy Efficient Resources would be to initiate a collaborative forum with input from all stakeholders. This was not the case in the manner that Energy Division sought to change DEER assumptions. In fact, the scope of Energy Division's proposed changes remains incomplete. SCE has provided lengthy, substantive, and well-supported comments (with limited or no ED response) on the significant issues with the quality of the proposed DEER 2008 updates. These include the miscalculation of net-to-gross ratios and effective useful lives, utilizing inputs which are not based upon ex-post studies, and injecting biased judgment into the overall process. There is absolutely no evidence that the DEER 2008 assumptions are better than the currently Commission-approved and vetted assumptions.

- The Draft Report is technically flawed and rife with errors. Not only is a complete review hampered by the lack of transparency in the Draft Report, the review is further complicated by the fact that Energy Division still has not released all of the appropriate and needed documentation. Thus, these comments include only those issues and recommendations which can be made based upon the data provided to date. The ED, contrary to Commission direction, established a new software tool (VRT) to conduct the calculations contained in the Draft Report. This tool is fundamentally flawed. The Draft Report and the VRT are woefully incomplete as they omit large numbers of SCE programs that were approved, implemented, and reported to the Commission.
- The Draft Report does not conform to the Commission-approved EM&V protocols. The EM&V protocols guide the foundation of the Verification Report and if applied correctly would not result in the detrimental recommendations contained in the current Draft Report. For instance, many recommendations were made that, per the EM&V protocols, should be left to an impact evaluation where a more established formal process exists. Furthermore, the Draft Report went beyond the verification of measure installations by injecting opinion-driven policy changes.
- The Draft Report misapplies the faulty DEER 2008 assumptions to SCE's portfolio. For virtually every type of update addressed in DEER 2008, the Draft report erred in applying them to SCE's portfolio. There were significant errors in the application of net-to-gross ratios, effective useful lives, incremental measure costs, unit energy savings, and building type mapping. The errors were bound together by a troublingly common theme; in every case negatively impacting SCE's achievements.

The themes illustrated above are prominent in the Draft Report and are addressed in further detail in SCE's comments. However, the conclusion is clear: the errors are so extensive

and distributed throughout the Draft Report, that it has no credibility as a basis to measure SCE's achievements or earnings.

## III.

## POLICY COMMENTS: INCENTIVE MECHANISM PROCESS

The Commission spent nearly three years developing the process and protocols for evaluation, measurement, and verification, prior to discussions of a Risk / Reward Incentive Mechanism (RRIM). During this period, the Commission also established that energy efficiency programs should be administered by the IOUs. The reason for these extensive discussions was to ensure a system, including the protocols, was developed well before their use in the RRIM. However, the decisions from the many workshops and Rulings which preceded discussions on the RRIM are being overwritten by the recommendations in the Draft Report.

### A. Verification Reports Should Follow The Protocols and Decisions And Simply Provide Unit Counts, Audit Results, and Properly Vetted DEER Updates Based Upon the Commission's Adopted Rules

#### 1. Application of the DEER Updates Not Based on Ex Post Studies and Is Inconsistent with the Adopted Protocols

The Draft Report should not update PEB metrics based upon studies not adhering to the measurement process developed in this Rulemaking. The current Energy Efficiency Order Instituting Rulemaking, 06-04-010, was opened on April 17, 2006. In this Rulemaking the Commission set forth overarching policy goals and direction for the Rulemaking, including the scoping of the following major categories of energy efficiency issues: 1) Shareholder Risk/Reward Incentive Mechanism, 2) EM&V, 3) Refinements to Policy Rules and Reporting Requirements, 4) Updates to Energy Efficiency Potentials Studies and Savings Goals, 5) Implementation of 2006-2008 Portfolio Plans and Planning Process for 2009-2011 Program Cycle, and 6) Transition Issues and Filings Related to

Pre-2006 Programs. The OIR summarized the myriad of EM&V activities that require ongoing attention during the 2006-2008 program cycle, including "(3) updating the Database for Efficiency Resources (DEER) using the results of ex post (post-installation) measurement studies"[2].

These issues were not new, but built upon the many workshops held and comments received during 2004 and 2005 regarding DEER and other measurement issues. In the Commission's September 2, 2005 Ruling the Commission reminded Staff that there was a need for protocols for DEER updates which reflect Commission ex post studies, stating "I remind Joint Staff that they will also need to present the schedule and process for updating DEER on a regular basis, using the results of *ex post* measurement studies, as directed by D.05-04-051."[3] The Commission continued its emphasis on the need for DEER protocols in January 2006, stating "The Commission has directed that EM&V protocols be developed under an expedited review process, so that they can be put in place as quickly as possible as we move to the new administrative and policy framework for energy efficiency in 2006 and beyond. The EM&V protocols are to include the following information…

e) A schematic and accompanying description that illustrates the integrated EM&V cycle, that is, ***how the required studies will inform the program planning*** and resource planning process. This document should indicate when studies will be completed, how they will be submitted/made available for public review and describe how the resulting updated information will feed into the next energy efficiency program planning cycle and/or resource planning cycles;

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[2] OIR 06-04-010, pp 5
[3] September 2, 2005 ALJ Ruling, pp 18

f) A schedule and process for updating the Database for Energy Efficiency Resources (DEER) on a regular basis, **using the results of ex post measurement studies, as part of e) above**…"[4]

The protocols requested by the Commission for how to use ex post studies to update the DEER metrics were never complete. Nonetheless, many of the DEER updates relied upon by the Draft Report do not conform to the Commission's direction to utilize the ex post studies completed as part of the California integrated EM&V cycle. The Draft Report should remove any such DEER updates and their impacts.

## 2. Application of the DEER Expected Useful Lives – A Metric Not Subject To True-Up by Ex Post Measurement Studies – Is Inconsistent With the Adopted Protocols

While Decision 08-01-042 noted that Expected Useful Lives (also referred to as Effective Useful Lives) could be updated as part of the DEER update, the process adopted by the Commission after many workshops on protocols clearly noted the difference in changes to each metric in the Performance Earnings Basis calculation. The Draft Report goes well beyond the measurement protocols to update metrics which will have no opportunity for true-up. The Draft Report should exclude changes to Expected Useful Lives in the application of the DEER Updates.

The Performance Earnings Basis (PEB) and resulting estimates of resource benefits and earnings adopted in Decision 07-09-043 were based upon the protocols adopted by the Commission. Prior to the adoption of a RRIM, the Commission adopted the performance basis for the earnings claims. This performance basis was adopted after a series of workshops and comments from interested parties. In determining the

[4] January 11, 2006 Administrative Law Judge's Ruling Adopting Protocols For Process And Review Of Post-2005 Evaluation, Measurement And Verification (EM&V) Activities, pp 1-2

performance basis the Commission concluded the following with regard to the calculation of performance basis:

"At the end of the three year cycle the utility will be responsible for truing up the performance basis for all of the previous three years of programs with the exception of the following three parameters which the commission has agreed to only use in prospective "true ups":

- Expected useful lives or technical degradation of the measure or system installed
- Avoided costs forecast on a TDV basis.
- Incremental measure cost estimates"

In this and subsequent Rulings, the Commission determined that the ex ante expected effective useful lives (EUL) utilized during 2006-2008 would not be updated during the cycle, but only updated for use in future cycles. Accordingly, the adopted EM&V Protocols for EUL evaluations only address the evaluation activities needed for implementing the EUL evaluations for use in 2009-11 planning. These protocols acknowledge the longer time period needed to plan and implement such critical studies.

As noted in the Decision 08-01-042, updating ex ante load impacts using the DEER database prior to the payout of interim claims in 2008 and 2009 may mitigate the risk of large swings in earnings (positive or negative) at the final earnings true-up. This may be true for those portions of the PEB calculation which are subject to true up at the conclusion of the program cycle, such as the net-to-gross ratios. However, this does not apply to the expected useful lives, which will not be changed at the conclusion of the program cycle. Such a change would be a significant change to the calculation of the PEB and the mechanism adopted for energy efficiency. All of the calculations included in the shareholder incentives decision related to earnings are based upon the TRC, PAC, and PEB calculations adopted and utilized throughout the proceeding. The Draft Report

is now attempting to apply EULs which are not based upon retention and persistence studies. The Draft Report should exclude the recommended DEER updates to EULs.

As noted in the January 27, 2005 ALJ Ruling addressing this issue, previous ex post studies of EULs have shown to underestimate the lifecycle savings of the energy efficiency programs. To incorporate the number of changes reflected in the Draft Report could have the impact of significantly underestimating the lifecycle benefits of California's energy efficiency programs. The Draft Report should adhere to the Protocols and not adopt the DEER EULs based upon the limited data presented in support of these metrics.

## B. The Verification Report Goes Well Beyond the Protocols

The annual verification reports are to be a simple calculation of the number of measure installations and portfolio and program costs, applied to the ex ante estimates of savings.[5] This was a core assumption of the adopted protocols utilized in the development of the RRIM. In contrast, a great deal of the effort spent in the Draft Report and the discussions at the December 5 workshop were around how benefits are calculated based upon the reports. In combination with the extensive DEER updates which were well beyond the adopted evaluation, measurement, and verification protocols, as discussed above, the report goes well beyond the adopted protocols.

This exercise has unduly delayed the process, with no benefits provided. Pursuant to the adopted RRIM, the Advice Letters which will be filed by the utilities, utilizing the appropriate unit counts, costs, and DEER updates will provide the earnings claims, not the verification report. There is no reason for a pre-calculation of earnings to be performed in a report which is

[5] January 11, 2006 Administrative Law Judge's Ruling Adopting Protocols For Process And Review Of Post-2005 Evaluation, Measurement And Verification (EM&V) Activities, Attachment 2, p.1. See also, Decision 07-09-043, pp 115

supposed to be focused on unit counts and costs. This is pursuant to all of the protocols used to develop the mechanism and the Decision adopting the mechanism.[6]

### C. Future Evaluation, Measurement, and Verification Reports Must be Timely

The RRIM is based upon the use of evaluation, measurement, and verification both during the cycle and at the end of the cycle. During the cycle, annual verification reports and interim performance basis reports provide feedback to the administrators on the ongoing success in implementing the programs designed for the program cycle. At the end of the cycle, timely evaluation, measurement, and verification studies are used to provide timely and appropriate estimates of installations and savings occurring from the cycle. Due to the elimination of the 2006 Verification Report and March 2008 Interim Report and the delay in the 2007 Verification Report there has been no interim feedback during the current cycle on progress towards goals. Such delays have not provided timely information which the administrators could use to modify programs during the current cycle. The process for future reports should be improved to ensure the timeliness that is necessary for successful energy efficiency portfolios in the long-term. The adopted protocols allowed for the flexibility of reports, such that not every program may receive a report each year. This flexibility and other efforts allowed under the protocols should be exercised to ensure the timeliness of future reports.

## IV.

## POLICY COMMENTS: DRAFT REPORT

### A. The Energy Division Made Significant Errors that Bring Question to the Integrity of the Draft Report

The Draft Report is so systematically flawed and riddled with errors that it cannot be used as any meaningful indication of the level of SCE's performance. It is clearly apparent that

[6] Decision 07-09-043, pp 133

the Draft Report was developed in short order with no time to conduct a thorough quality control effort. The December 5 workshop led by the Energy Division and its consultants became a forum in which they both voiced their frustration at the process used to generate the report. This deficiency shows through as in the short time that SCE has reviewed the report we have uncovered numerous significant errors in every facet of the Draft Report.

## B. Energy Division is Over-Stepping the Direction Provided by the CPUC

The Draft Report does not adhere to the policies and procedures established by the Commission that guide SCE's 2006-2008 energy efficiency portfolio. In fact, the Draft Report is so contradictory to current policy, it is apparent that the Energy Division seeks to supplement policy with its own opinions. For example, the Draft Report redefines how SCE is to achieve the MPS, develops a new unproven methodology to calculate PEB, falsely interprets the discount rate, and bypasses the protocols guiding the report. These items are addressed in detail below:

### 1. Draft Report Reverses CPUC Direction on Cumulative Savings for 2006-07 Interim Claims

The Draft Report is fundamentally flawed in part due to its false interpretation that the 2006-2007 MPS is to be calculated using achievements from 2004-2005. The Draft Report includes the impacts recorded in SCE's 2004-2005 Energy Efficiency and Low Income Energy Efficiency programs. None of the Decisions leading up to Decision 07-09-043, including the Rulings related to the RRIM and the adopted measurement protocols, discuss the use of pre-2006 savings or benefits being included in the incentive mechanism. In contrast, the Rulings and Decisions clearly discuss the distinction between pre-2006 and post-2005 savings and measurement protocols. ED's inclusion of 2004-2005 achievements in the Draft Report, in blatant disregard of Commission policy, undermines its integrity as an objective analysis tool.

SCE submitted portfolio and budget levels in 2005 for the 2006-2008 program cycle that were approved as sufficient to meet the cumulative goals for this cycle. SCE

has implemented this portfolio in accordance with that approval and towards the goals established for this cycle and utilized in the RRIM. Any change to such goals would require a review of the funding adopted to accomplish these goals, the protocols utilized to measure the results contributing to these goals, and all of the "transitional" decisions made in support of the portfolios. This was not the intention of the adopted programs for this cycle, nor the intention of the adopted RRIM. In D.05-09-043, which approved SCE's 2006-2008 portfolio, the Commission clarified that they were adopting programs which met the three-year cycle goals adopted in the Goals Decision (D.04-09-060):

> "In D.04-09-060 we also authorized a **three-year program implementation and funding cycle** for electric and natural gas energy efficiency (program cycle). We directed that the proposed energy efficiency plans and funding levels for the 2006-2008 program cycle be developed to **meet the adopted savings goals for those years**."[7]

There were a great many transitional issues which arose in defining what would count towards the post-2005 CPUC goals. It was necessary to settle all of the transitional issues due to the clear change of the goals and results from the pre-2006 program cycles to the goals and results for 2006 and beyond. After taking comments on each of the transitional issues between the 2004-05 cycle and the 2006-08 cycle, the Commission acknowledged that they could require a re-review of the goals, but determined this would be very inefficient:

> "Furthermore**, a great amount of resources and time have been devoted to planning and decision-making based on these 2006-2008 cumulative goals**. Several months of reconsideration and redoing would be required to meet different goals. As a result, the whole timetable for launching the 2006-2008 programs in time to achieve the desired savings would be threatened. (emphasis added)"[8]

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[7] Decision 05-09-043, pp 10
[8] Decision 05-09-043, pp 126

In fact, the adoption of three individual, annual goals leading up to the adoption of a cumulative three-year goal was a clear part of the scope of the review of the portfolios in support of these goals. The transitional issues regarding the difference between pre-2006 savings and post-2005 savings were also the focus of the May 11, 2005 Assigned Commissioner's Ruling and discussed again in the Decision adopting the 2006-008 programs:

> "After consulting with lead staff on the savings goals analysis, both ALJ Gottstein and I believe that changing the accounting to "actuals only" will materially affect the ability of program administrators to reach near term annual savings goals (particularly in 2006 and 2007), **since they can no longer count the installations and associated savings from pre-2006 commitments as part of their program achievements.**[9]"

This was further clarified in the Decision in the Commission's discussion on how to treat the impacts of previous years towards the adopted goals:

> "In the decision establishing energy efficiency savings goals (D.04-09-060), the Commission had directed that only savings from "actual" installations from program activities would count towards those goals, **beginning in program year 2006 and beyond**."[10]

Furthermore, the workshop discussions leading up to the RRIM and the D.07-09-043 discussion in Section 8.1 and summarized in Attachment 5 were the results of a long, collaborative process where parties discussed the adoption of a mechanism applicable to the post-2006 results only. Attachment 5 of D.07-09-043 discusses the calculation towards the MPS as a calculation under the adopted "Cumulative-to-Date Basis" method. This Attachment provides examples which discuss how the "Cumulative-to-Date Basis" method compares to the other proposed methods. Specifically, the Attachment discusses how the adopted method is the same when calculating each of the years of a cycle as the simple math of adding the year 1 accomplishments to the year 2 accomplishments to

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[9] Ibid, pp 7
[10] Ibid, pp 84

determine the cumulative impact in a second year (using verified numbers from verification studies). None of these discussions or calculations was altered in Decision 08-01-042 which modified the 2006-2008 RRIM.

In summary, the Draft Report incorrectly applies 2004-2005 goals and results to the 2006-07 MPS. Such results were not part of the 2006-2008 funding proposal, review, or adoption and are not part of the adopted RRIM. In addition, thrusting this new policy on SCE now gives SCE no opportunity to modify the 2006-2008 programs and budgets which were approved by the Commission to meet the 3-year, 2006-2008 savings targets. However, the distinction is clearly established by the Commission's Rulings and Decisions preceding the adoption of the RRIM. The Energy Division twists that distinction and wrongly includes cumulative savings and goals in the Draft Report.

## 2. The CPUC-Approved Methodology to Calculate Energy Savings and Performance Earnings Basis is the E3 Calculator, Not the VRT

All recent Commission Decisions, including the Energy Efficiency Policy Manual and CPUC reporting requirements, identify the E3 Calculator as the required method for SCE to calculate energy savings, cost-effectiveness, and PEB. For example, Decision 08-01-042, Ordering Paragraph 3 points to SCE's assumptions contained in its 4th Quarter 2007 Report as the foundation of its 1st Interim Claim. SCE is compliant with this direction and has submitted its E3 Calculators to the Commission on a quarterly basis. However, the Draft Report goes beyond Commission direction and creates a new tool to calculate SCE's energy savings, cost-effectiveness, and PEB. This tool is named the Verification Reporting Template (VRT).

By developing the VRT to calculate SCE's performance, the ED not only overstepped its authority, but did so in a manner as to catch SCE off guard. Introduction of a new software platform with implications as important as shareholder earnings must be vetted. In fact, despite the Draft Report being released on November 18, SCE has still

not received all of the documentation, software tables, and methodologies used by the ED to create the VRT. Not only has the VRT not been properly vetted, it is inaccurate. The Draft Report speaks to these inaccuracies; page 51 identifies calculation errors between SCE's Commission-approved E3 Calculators and the ED's newly developed VRT. In fact, the software errors contained in the VRT remove nearly 3 million kWh from SCE's MPS achievement. Although this error was blatantly evident, how many more are not?

The VRT did not correctly calculate SCE's MPS or PEB, it only sought to confuse. The VRT is a new software platform, which incorporates a new database coded in a SAS format. SAS is not a readily available or utilized program for most utility employees working on reviewing the Draft Report. Ease of use and transparency are the key reasons why Microsoft Excel was adopted as the format for the E3 Calculator. The use of SAS as a key means to create the Performance Earnings Basis calculations has made a complete review of the Draft Report extremely difficult. Instead it establishes a black box which somehow generates ED's interpretation of SCE's results, which the ED already identified as being incorrect. In addition, the files provided by ED for review were so large to the point that they crashed several of SCE's computers. This placed SCE in the position of having to review the Draft Report with a significant dearth of either crucial information or confidence that the software is doing what is expected of it. The fact that SCE cannot trace back what was done to so drastically reduce its achievements creates an authoritative lack of transparency that is not conducive to a collaborative process. The Draft Report should conform to Commission policy by removing the VRT and use the E3 Calculator.

### 3. Energy Division Incorrectly Recommends Changes to Commission Policy Regarding the Discount Rate (Weighted Average Cost of Capital)

The discount rate reflects the Weighted Average Cost of Capital (WACC) which is the weighted average of the common equity cost and the preferred stock costs, plus the

weighted average of the long-term debt cost after a tax deduction for interest expense is applied. This factor is used to determine the present-valued benefit stream that constitutes a key component of the PEB. The discount rate was determined by the Energy Division in preparation of the 2006-2008 program cycle, included and approved by the CPUC in SCE's E3 Calculator, and utilized in the development of the RRIM. The Energy Efficiency Policy Manual, Version 4.0, addresses the discount rate in the following manner, "For the 2006-2008 program cycle an average IOU weighted cost of capital may have been used for cost effectiveness calculations. The value used for ex ante calculations should also be used for ex post calculations.[11]" However, the ED makes the following statement in its Draft Report, "It should also be noted that these E3 Calculator versions contain discount rates not consistent with CPUC policy….the net-benefits for all IOU will be larger than use of the correct value would proved.[12]"

The CPUC policy is clear; the ex ante discount rate will also be used for ex post. However, the ED in its Draft Report is bypassing this mandate by recommending that the rate be updated, to the significant detriment to the utilities.

### 4. ED Is Bypassing EM&V Protocols in the Draft Report

After review of the contractor verification reports contained in the Draft Report, one overarching issue is clear: The Draft Report does not comply with the approved EM&V protocols. The Energy Division in its guidance document[13] to the evaluation contractors for the Verification Reports cites the Commission RRIM Decision 07-09-043 that outlines requirements for Verification Report requirements as follows:

> "The Verification Reports are used to true-up the ex ante estimates of GWh, MW and MTherm savings and PEB with respect to the number and type of measures installed, and the associated program costs. They do not, however, provide all the updated information

[11] Energy Efficiency Policy Manual, Version 4.0, Rule IV.2, pp 8
[12] Review Draft of Energy Efficiency 2006-2007 Verification Report, pp 22
[13] EvaluationPlansCoverLetter_zap_121807_v05_WAttachments.pdf

on parameters that go into the calculation of GWh, MW and MTherm savings and PEB."

It is under the above CPUC requirements that the 1st verification reports are expected to be produced. However, it is clear that in multiple instances the ED Contractor verification reporting has not been limited to the measure or unit installation verification as required in the above CPUC directive. For example, in the Upstream Lighting Program, the proportion of business customer purchases among the types of customer purchases is a parameter of interest in determining UES values for bulbs used for such business applications. Such parameters, as rightly stated in the verification report need further investigation and SCE believes that this should be left to more rigorous impact evaluation for this program. Similarly, in the PG&E2000 Single Family Program, estimates of both wall and attic insulation unit installation rates were based on re-assessing efficiency baseline at the installation site and included in determining the per unit installation rate. These parameters are outside the scope of a verification report and should be left to an impact evaluation.

The Draft Verification Report must conform to the CPUC and EM&V requirements for the report. There are a number of cases in the verification reports where the verification rate is not based on quantities reported by programs to be received and installed by customers, but are based on if found to still operating despite early removals or breakage. These programs include the Upstream Lighting program, the Multifamily Rebate program and the Small and Major Commercial Contract groups. These reports need to be re-visited as they go well beyond the mandate established for the Draft Report. Specifically, the CPUC EM&V Protocols for measurement and verification (M&V) requires onsite verification of installations for both basic and enhanced rigor levels. The verification of installation rate for a very high impact program, Upstream Lighting Program, was based only on telephone surveys that unlike other programs did not include a nested sample on-site verification of telephone data. By utilizing methodologies in

opposition to the guiding protocols, the Draft Report is fundamentally flawed. This issue is further explained in detail in our technical verification report comments in Section VII below. SCE strongly urges that in the final report, the ED should carefully assess and include only verification results that are consistent and strictly conform to the CPUC directives.

## C. ED Misinterprets the Incentive Mechanism

The Draft Verification Report contains a fundamental misunderstanding of the RRIM. The rules for determining the MPS and PEB are outlined in Decisions 07-09-043 and 08-01-042. The Energy Division does not follow the CPUC rules for either the MPS or the PEB.

### 1. ED Incorrectly Calculates the Performance Earnings Basis

The Draft Report wrongly captures the costs that are to be included in the calculation of the PEB. Decision 07-09-043 specifies these costs, specifically, "With the exception of the Emerging Technologies Program and LIEE, all energy efficiency portfolio costs including associated evaluation, measurement and verification (EM&V) shall be included in the calculation of PEB[14]." The Draft Report incorrectly applies three of the four cost items mentioned above. First, the costs associated with SCE's Emerging Technologies program (SCE2515) are included in ED's calculation of SCE's PEB. This serves only to underestimate the proper PEB accredited to SCE's level of achievement. Secondly, the Draft Report does not contain the costs and benefits associated with all of SCE's programs. Two programs, the Aggregation of Housing Agencies program (SCE2547) and the Modernization and New Construction Program for Schools (SCE2558) are not included in the Draft Report. Finally, the Draft Report does not include the costs associated with SCE's EM&V projects. In sum, the Draft Report contradicts CPUC policy around the types of costs that are to be included in the PEB.

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[14] Decision 07-09-043, O.P. 2, pp. 215

## 2. ED Incorrectly Calculates the Minimum Performance Standard

Decision 07-10-032 clarifies the previously ambiguous CPUC-Decisions around the counting of program savings toward the MPS. Specifically, the language around mid-cycle funding augmentation states, "savings from these programs will not count towards achievement of energy savings goals for the purpose of assessing whether performance has reached the MPS.[15]" Prior to the clarifying language, the Decision identifies an example of programs that meet the qualifications of mid-cycle augmentation. It states, "The Palm Desert Demonstration Project is one example of funding augmentation for the current 2006-2008 program cycle.[16]" However, the Draft Report incorrectly includes the achievements of SCE's Palm Desert program (SCE2566) towards the MPS in direct contradiction to CPUC policy.

## 3. Draft Report Incorrectly Calculated Earnings/Penalty Amounts

The Draft Report contained an error in the formula that calculated the recommended penalty for SCE. ED's formula was:

=ABS(((C18-C44)*0.05 *1000000)>((C19-C45)*25*1000)>((C20-C46)*0.45*1000000))

This formula contained two errors that led to the incorrect calculation of SCE's recommended penalty. First, the recommended penalty is calculated on the delta of SCE's performance from the 65% of goal level and not the CPUC goal itself. Second, by adding an absolute value function, the formula incorrectly took the amount that SCE was above the kWh 65% MPS threshold and inversely included the figure in the penalty calculation. This error overstated the Draft Reports recommended penalty for SCE by nearly $11 million.

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[15] Decision 07-10-032, Section 6.7.3, pp 98
[16] Decision 07-10-032, Section 6.7.3, pp 96

The three types of errors listed above represent a fundamental misunderstanding of the Commission's policies surrounding the energy efficiency RRIM and its determination of the MPS and PEB.

## D. ED Arbitrarily Determines What To and Not To Include in the Draft Report

The Draft Report sporadically determined which of SCE's measures, methodologies, and assumptions were to be updated. For instance, the Draft Report changes SCE's market sector allocation of its Upstream CFL program. The December 5 workshop pointed out that the change was made simply "to determine a conservative value" – a clear and unacceptable introduction of policy bias to a measurement issue. The Draft Report should have been limited to updating DEER 2008 values based upon recent CPUC studies and verifying IOU installations, as required by the Commission, and not make opinion-based judgments that by the ED's own admission are not documented. In addition, the ED chose not to include nonresidential interactive effects despite ED's clear recommendation for their inclusion in the Draft Report. These issues are addressed in further detail both below and in the technical section of SCE's comments. The arbitrary decisions that guided the rationale in the report's development cast severe doubt on the completeness, accuracy, and meaningfulness of the Draft Report.

### 1. Clear CPUC Policy on Nonresidential Interactive Effects

The Draft Report chooses not to include proven and measurable interactive effects from the nonresidential sector. Interactive effects occur when lighting system efficiency improvements directly results in efficiencies to the air conditioning system in non-residential buildings. The Draft Report states, "Energy Division believes that interactive effects are real, and should be included in the UES values applied to the final true-up.[17]" The Draft Report can be deemed nothing but woefully incomplete and inaccurate when proven energy savings and demand reduction benefits are not included despite being

[17] Review Draft of Energy Efficiency 2006-2007 Verification Report, pp 56

recommended for inclusion. Not only does this significantly and adversely affect SCE, the judgment displayed by the ED in coming to this decision calls into question their ability to accurately assess the impacts of SCE's portfolio.

Nonresidential interactive effects have been utilized previously in the estimation of results for past, present, and future energy efficiency measures. In addition, the goals established by the Commission in D.04-09-060 as well as the 2006-2008 SCE program planning estimates approved in D.05-09-043 and used in the development of the RRIM contain nonresidential interactive effects. The exclusion of nonresidential interactive effects creates a situation whereby SCE's results are artificially lowered while remaining judged against a constant goal. The Draft Report seeks to compare "apples and oranges," by modifying yardstick so that SCE falls further short of its goals. By excluding nonresidential interactive effects from the Draft Report, but acknowledging their credibility in the past and recommending their use for the future, the ED makes selective judgment that misrepresents SCE's achievements.

The Draft Report also recommends inclusion of residential interactive effects. SCE does not include and does not recommend the inclusion of residential interactive effects due to the significant uncertainty surrounding them. There is a lack of empirical information on the interaction of the interactive effects with the dwelling size and the proximity of the thermostat to the offending appliance. As a comparison, in the same way that uncertainty prohibits capturing benefits generated by participant spillover, the uncertainty around residential interactive effects should prohibit their inclusion. From a technical standpoint, the residential interactive effects are unproven and immeasurable and are referenced in further detail in Section V, part D**.**

### 2. Draft Report Focuses on High Impact Measures That Were Negatively Affected by DEER 2008 and Does Not Address Measures That Were Positively Affected by DEER 2008

The Draft Report selectively implements the methodological changes that were imposed on SCE's portfolio. It is apparent that many updates were made that adversely affected SCE's portfolio while not including other updates that would have resulted in an positive adjustment. A Draft Report that so blatantly trends negative, while ignoring offsetting positives, loses total credibility as an objective measurement tool. For example, in the lighting portion of the Nonresidential Direct Installation (SCE2511) program, DEER net-to-gross ratios were negatively updated, DEER unit energy savings were also negatively updated; however, DEER effective useful lives, which would produce a significantly positive effect, were not updated. Of the three potential DEER updates to the program, why were only the negative updates applied and not the positive benefit? The answer is clear; the Draft Report seeks to prevent SCE from achieving its goals.

The selective treatment of adjustments in the Draft Report does not stop there. In general, a comparison of SCE's ex-ante values, including DEER 2005, and DEER 2008 sees a substantial decrease in the impacts associated with lighting measures. As a corollary, lighting measures consisted of the vast majority of the updates SCE received in the Draft Report. However, when one compares SCE's ex ante values to DEER 2008, there are many updates that consisted of upward adjustments. For example many of the residential and nonresidential HVAC measures, including package units, refrigerant charge adjustments, and duct sealing saw increased benefits in DEER 2008. However, these measures, which account for a sizeable portion of SCE's total portfolio, were not updated in the Draft Report. This obviously biased approach to update SCE's portfolio destroys the integrity of the Draft Report and should render it irrelevant in any consequential measurement of achievements or earnings.

## E. ED Makes Errors in their Assertions of SCE Non-Compliance

The Draft Report makes many false implications that SCE is out of compliance with the rules and regulations adopted by the Commission. SCE is in fact in compliance with the Commission's requirements and strongly objects to ED's statements in the Draft Report.

### 1. SCE Uses the CPUC-Approved E3 Calculator for Quarterly Reporting

The Draft Report implies that SCE is non-compliant with the Commission's energy efficiency reporting requirements. Specifically, the Draft Report addresses the difference between how the E3 Calculator for SCE and the other IOUs aggregate installation data. The data is presented in SCE's E3 Calculator annually, while the remainder of the IOUs is viewed quarterly. The Commission has approved the E3 methodology in numerous Decisions and Rulings, and SCE uses the E3 Calculator that has been approved and made available to SCE. This E3 Calculator strictly prohibits SCE from entering its data quarterly, and contains only the ability to provide annualized numbers.

### 2. SCE Does Not Aggregate Its Measure Level Reporting As Indicated By ED

SCE complies with the reporting requirements that have been approved by the Commission. This includes providing on a quarterly basis, program narratives, a portfolio performance report, and customer-level installation data. However, the Draft Report states, "It should be noted that ED believes the utilities continue to be out of compliance with the 2/21/2006 ALJ ruling…which require the utilities to report measure level data that is not aggregated in any way in their quarterly reports.[18]" In its quarterly report, SCE provides Microsoft Access files for each of its programs that contain information for every measure installation that is installed during the reporting period. The data is not aggregated in any fashion and delineates each installation per building type, climate zone, and customer account. The aforementioned statement made by the

[18] Review Draft of Energy Efficiency 2006-2007 Verification Report, pp 20

ED is false and should be removed from the Final Report as SCE abides by the reporting requirements approved by the Commission.

### F. Lack of Transparency in Draft Report Hampers IOU Review

The Draft Report is a 66-page report with 14 attachments addressing complex methodologies and new software tools that in aggregate amounts to over 6 gigabytes of data. As such there are significant issues regarding the lack of transparency in the overall report that makes it extremely difficult for SCE to provide a complete review. The size and already-evident error proneness of the report is coupled with the fact that as of now, ED still has not provided all of the documents and software tables needed to comprehend the magnitude of the Draft Report. As it stands, the Draft Report as a work product is convoluted with no proper justice given to the importance of the recommendations it makes.

For instance, there are several methodologies outlined in the Draft Report that were not used in the calculation of the numerical results. The Draft Report included a process by which to update the Appliance Recycling and Multifamily EE Rebate program and showed their corresponding reductions, however, the calculations prove that those programs did in fact receive no update. This wasted the valuable time of SCE reviewers that could have been addressing the myriad of other errors found in the report. In addition, DEER 2008 for 2006-07 does not include an update for measure cost information; however the Draft Report grossly errs in updating non-incremental cost values for the Upstream Lighting program. These issues will be discussed in the technical comments below. The fact that the Draft Report was put together in a short time frame, with inadequate quality control procedures, coupled with many contradictory segments leads an objective observer to question the validity of the document.

## V.

## POLICY COMMENTS: DEER 2008

The 2008 DEER update forms a major part of the foundation for the Draft Report. Unfortunately, DEER has so many technical and procedural flaws that it significantly decreases the validity of the Draft Report. This flaws include the fact that DEER was so far behind schedule as to invalidate it as a source of planning and make it difficult to review in time for the Draft Report; DEER continues to be update and is still not complete. DEER lacks a true vetting process that led to significant quality problems. DEER does not rely on appropriate EM&V results, but does include uncertain results, such as residential interactive effects. DEER has too much uncertainty to be valid, and is based on flawed modeling assumptions.

## A. CPUC Goals and Earnings Estimates Were Based Upon Current IOU Ex-Ante Estimates

The energy savings goals were adopted in 2004 in D.04-09-060 assuming a particular set of input assumptions. The 2005 DEER update, which the utilities used for their 2006-2008 portfolios, included assumptions that were less favorable than those used in the goal-setting process in 2004. The utilities' accomplishments should be measured on their delivery of the 2006-2008 plans as approved by the CPUC, which includes the ex ante assumptions from 2005, with the limited DEER updates based upon recent ex post studies, as required in Decision 08-01-042. Because ex ante savings provided the basis for goals and budgets and represent the correct metric in determining utility performance against the CPUC's authorized plan, the Draft Report should adopt the current ex ante savings, with limited updates based upon recent ex post studies for the Final Report. As discussed above, not only are the Draft Report DEER updates not pursuant to the Commission direction, the updates have not been proven to provide better estimates than the CPUC-adopted estimates currently used in the utilities' accomplishment reporting. There have been limited studies completed in California in recent years to update the savings which are being used. Significant uncertainty exists about the level of accuracy and precision of the updated DEER values.

Whereas the current CPUC-adopted estimates are in line with the savings goals and associated funding for energy efficiency programs, the recent DEER updates occur outside of this process. Thus, SCE is being expected to achieve Commission goals, with appropriated funding, which are based on one set of estimates (ex ante savings), while incorporating measurement assessments that undercut the feasibility of those energy savings, regardless of the fact that those updates may not be valid. In addition, DEER estimates are now expanding the program impacts to include such impacts as fuel substitution; something never intended to be calculated or derived as a part of accomplishments towards goals. This is shown in the discussions of interactive effects which would treat electric compact fluorescent bulbs as heating elements being removed and replaced with natural gas furnaces. Fuel substitution is neither part of the energy efficiency programs nor was it captured in the development of the current goals. Such fuel substitution impacts should not be included in any recalculation of savings or benefit impacts.

Current energy savings estimates are from the DEER database, as required in the CPUC's Policy Rules, supplemented with estimates of savings based upon historical performance in California's programs. Again, while any number of mathematical derivations of savings are possible, resulting in both increases or decreases to these estimates, such new estimates may or may not be more accurate than the current estimates based upon California measurement and evaluation. Effective Useful Lives are also based upon the DEER databases, resulting from the many studies of measure retention and persistence in California. There should be no update to these numbers in the current cycle, since by definition measurement of the effects of these measures over their lives takes a great deal of time. In addition, there is no "true up" of savings in the ex post measurement of these programs. Thus, an end-of cycle change to these metrics would provide no opportunity for revision should such changes be determined to be inaccurate. This is the reason that this metric was not subject to ex post changes in the adopted evaluation, measurement and verification protocols. In addition, as noted in the January 27, 2005 ALJ Ruling, effective useful lives have been significantly underestimated in the past. Thus, as

opposed to reductions in other metrics, any reductions to the ex ante effective useful lives utilized in the cycle would result in no ability to modify portfolios and no ability to modify the estimates in the ex post studies.

DEER updates used in the Final Report should be limited to new studies completed in California on the impacts of the programs being delivered by the utilities today. There is no guarantee that any new estimates would be more representative of the energy savings and benefits being utilized by the utilities today and delivered to the customers of California. This will be determined as a part of the $163 million in evaluation, measurement, and evaluation projects being completed throughout the cycle. As noted in the previous evaluation of the subject, over time the ex ante and ex post savings estimates tended to be accurate.

## B. DEER Updates (Partially) Finalized in Late October 2008

The DEER 2008 updates for 2006-2007 were finalized in October of 2008. In fact, DEER 2008 is incomplete to this day as the gross measure cost data is still not available. These updates, like the Draft Report, are severely behind schedule. Decision 08-01-042 (page 17) indicated, "The 2008 and 2009 DEER updates are expected to be completed in early 2008 and 2009, respectively, under the direction of Energy Division." The 2008 DEER database was not finalized until October 10th, 2008 and continues to get updated without formal notices. The RRIM intended that the utilities would receive interim performance updates to provide feedback to the utilities throughout the program cycle. To date, the 2006 Verification Report has been eliminated, the March 2008 Interim Report has been eliminated, and both the Draft Report and the DEER 2008 update have been exceedingly behind schedule. These cancellations and delays have not provided timely information which the utilities could use to modify programs during the current cycle.

The innumerable inconsistencies that surround the Draft Report are mostly due to the lack of a fixed set of impact assumptions. The 2006-2008 planning was conducted with DEER 2005 along with program operations and reporting for nearly three years. There have already

been multiple DEER 2008 updates in October 2008, with only two months of a three year program cycle remaining. Not only does this eliminate any chance that the utilities can proactively manage their portfolios, it serves only to cause confusion. Had the utilities been given ample time to react to these issues early in the program cycle, they would have proactively adjusted the portfolios accordingly.

SCE is now in a precarious position. The utilities were granted funding, using an approved set of impact assumptions, to achieve the Commission's goals. Now, the Energy Division would have SCE modify its assumptions so drastically as to alter its level of achievements from earnings-eligible to a recommend penalty. If this is the case, the DEER process is broken. Such a process that gives utilities no chance to alter their portfolios to achieve a fixed set of goals does not bode well for the future of energy efficiency as a reliable energy policy for the state of California.

### C. DEER 2008 for 2006-07 Is incomplete

The Draft Report is incomplete in part because the DEER 2008 database is incomplete. The DEER 2008 release for 2006-2007 as of now does not include any update to gross measure cost data despite the fact that this data has been partially released for the 2009-2011 DEER 2008 release. The DEER 2008 cost estimates for CFLs delivered upstream are lower than those currently contained in DEER 2005, which are being used by SCE. This is troubling because it is indicative of the pattern that the Draft Report only contains updates that are detrimental to the utilities.

The DEER 2008 update is already obsolete. Since its public release, some of the 2004-2005 Impact Evaluations have been released. The DEER 2008 update process was supposed to draw on these studies as a foundation for its updates. Specifically, the 2004-2005 Standard Performance Contract Impact Report became finalized in September, 2008. This report updated the statewide weighted average for the net-of-free ridership ratio from 54% to 57%. The DEER 2008 release contains the 54% value and must be updated to the proper percentage. DEER 2008

remains incomplete and obsolete until changes such as this occur. As a corollary, the Draft Report will continue to be deficient because it uses these incorrect assumptions that incorrectly devalue SCE's portfolio.

## D. ED Did Not Implement A Proper Vetting Process that Facilitates Valued IOU Input

SCE has previously offered comments criticizing the lack of openness of the DEER update process and the absence of a meaningful vetting process open to stakeholders. The Energy Division has replied that they held webinars and meetings and responded to comments. Unfortunately, many of SCE's submitted comments have never received a response, including comments on net-to-gross ratios, effective useful lives and unit energy savings. In other cases, responses were received, but they were inadequate, as a result, significant disputes have not yet been resolved.

### 1. Net-to-Gross Ratio and Net-of-Free Rider Ratio

In its comments of September 3, 2008 regarding NTFR, SCE made multiple comments that received no response, while others received a response that only addressed tangential issues, rather than main point of the comment. SCE commented that the NTG update process utilizes a method that does not correctly identify program participants for analyzing attribution (I.a.1), but received no response on this point. Instead the response came to an issue discussed during a meeting held on September 24 of whether the narrow net definition equation used by the DEER team was correct. This equation, that free-ridership is equal to baseline sales per household divided by program-associated sales incorrectly makes the assumption that all sales contained within the baseline become part of the program. Given that the baseline is estimated in this method by looking at sales rates in other geographic areas, this is a false assumption because sales continue, in the presence of the program, to occur outside the program. These sales, which will be attributed to the baseline, are effectively counted as free-rider savings and debited from the program, even though they were never credited to the program to begin with. The

DEER team quoted the Protocol definition of NTGR, net load impacts divided by gross load impacts, as their rationale for their definition, but this definition actually invalidates their definition as their definition yields a net-to-gross ratio equal to the difference between program sales and baseline sales (net), divided by program sales (gross), when in reality the net savings are proportional to the program sales less the *baseline sales that become part of the program*, not the total baseline.

SCE commented that the DEER team was dealing with possible correlates of NTFR, rather than NTFR itself (I.a.2). The only response that was received was that the DEER team does believe that the program affected prices, and that an SCE analyst had pointed out that survey respondents should not be asked about the affect of the program, but instead the affect of the price reduction. The SCE analyst's point was that most purchasers do not even know that they are program participants and so asking directly about how the were affected by the program, rather than asking about how the effects of the program (price reduction, product placement, etc.) affected them, is not meaningful. The crux of the original comment by SCE (not replicated in the response), was that the DEER team had identified the "key question" as

> "whether California CFL upstream rebate programs in 2009 and beyond are likely to continue to have an effect on the margin, either in terms of inducing more or 'new' market participants to buy more CFL bulbs or continuing to stimulate or at least assist the downward trend in the price of CFLs."

SCE argues that the true key question is what portion of energy savings due to bulbs sold through the program would have occurred even in the absence of the program, regardless of whether the participants are new or the price of CFLs continues to drop.

SCE commented that the DEER team was mistaken in its normalization by normalizing over all households, rather than participant households (I.a.3). As with the previous comment about how the DEER team defined participants, this comment received no response.

SCE commented on the lack of statistical validity of the interjurisdictional comparison utilized by the DEER team to estimate the NTFR (in I.b), but received no response. The point of the comment was that the DEER team posits a similarity between California and other states that do not have programs, and uses sales per household to make a conversion. But there is no way of calibrating the comparison, or even knowing how good the comparison is. SCE also received no comment about the DEER team's mischaracterization of an evaluation of a SMUD lighting program as irrelevant to upstream lighting programs (also in I.b). DEER continued to dismiss a California study that would have been a relevant data source in the DEER triangulation approach for NTG determination.

SCE commented on the much greater increase in sales rates in California than elsewhere as an invalidation of a method based on interstate comparisons of sales data (II.a). The DEER team replied that their analysis was not based on increase in sales data, but rather on total sales data for the determination of a baseline. The point is that the baseline they have identified is faulty, and they are using a bad proxy in their analysis.

SCE made a second comment about the validity of interjurisdictional comparison as a method for estimating NTFR (II.b). The DEER team made no efforts to adjust the numbers to reflect differences between California and these other states, so the comparison assumes there are no meaningful differences. The DEER team was candid in the September 24 meeting about the lack of such needed adjustments in the DEER estimation process due to time and budget constraints, but candor is not a replacement for sound methods. The response to this comment dealt with whether changes in CFL penetration would affect CFL sales and noted a lack of evidence. This is another clear example of the DEER team focusing on the way certain stimuli affect their proxy and considering that as the effect on NTFR. In reality, if a stimulus has different effects on the proxy and on NTFR, that is evidence of the unsuitability of the proxy. The whole point of the comment was that the proxy they were using was inappropriate. In various

ways, the DEER team has made it clear that they are confusing the problematic measure of a concept and the effects of essentially technical changes (like diminishing states without subsidy programs) on that problematic measure, with the measure itself.

SCE quoted the DEER team as writing "NTFR research seeks to know if customers would have bought the same measures in the absence of the program. It is possible to estimate high free rider ship levels for measures with either 8% or 80% measure saturation…" (II.c). The DEER team responded that they could not find this quote. It was in Section 3.0, 2.a.ii of DEER Team/Energy Division Staff Response to Comments on May 2, 2008 Draft DEER Net-to-Gross Update (page 5).

SCE commented that the DEER team used unproven theories of different characteristics of upstream, midstream and downstream programs (II.d). The DEER team responded that they do not "believe that NTG correlated directly to whether a program focuses on upstream, midstream or downstream delivery mechanisms." Nonetheless, they used this criterion for disregarding the results of an evaluation of the SMUD residential lighting program, incorrectly stating that the results did not apply because the program was not an upstream program (which it was).

SCE commented (in the file named "comAttach_971.doc on the Energy Data Web website) that DEER was missing 5% in its NTFR due to erroneously considering these savings "participant spillover." The Protocols state that participant spillover results from "(a) additional energy efficiency actions that program participants take outside the program as a result of having participated…" (possibilities (b) and (c) deal with non-participant spillover). This is not the situation with the SPC savings. These are savings that occur as part of the program participating project affecting the resulting energy use of the whole building. As they occur during the SPC participating project, they do not occur "outside the program" and it is not causally possible for them to occur as a result of "having participated", as that implies the participation predated the decision to undertake

the savings. The DEER team only responded that they do not include participant spillover, which, for the reasons explained above, these savings are not.

## 2. Effective Useful Lives

The NTFR update process is not the only one that has suffered. The process for updating EULs has also lacked openness and opportunity for *meaningful* feedback. In "Energy Division DEER Team EUL/RUL Comments and Responses," dated October 2008, there are multiple areas where, despite numerous previous rounds of comment by SCE, the DEER team still has not come to an adequate understanding of the data and methods it is using to determine EULs and RULs. It should be noted that this is even more serious for EULs and RULs than for some other savings parameters, such as the net-to-gross ratio. This is because there is no process set up within the 2006-2008 Impact Evaluations to "true-up" the DEER estimates. That is, while DEER is meant to be an ex-ante database of placeholders, for EULs it is the final word in terms of utility energy savings. Given this fact, it is exceedingly important that both the data and methods used in DEER EUL estimation be sound.

The ED and the DEER contractor team discuss the use of the 2005 CLASS data and compare it to only ONE of the available RASS data files (pages 4-5). The appliance age data in the CLASS that the DEER update team cites represent information on appliances that are still owned and operated by customers. The RASS data has two sets of appliance age information. The first one is similar to the CLASS in that it is for equipment that is owned and operating. The second field of RASS age information is for equipment that has been replaced or retired. This second set of age information in the RASS is what the IOUs have told the DEER team on several occasions that they have ignored. The DEER team has not explained their refusal to use this data.

A significant issue of contention has been the use of 1/3 of EUL for RULs, based solely on professional judgment of the DEER team. The DEER team response portrays

the recycled refrigerator- and freezer-RUL analysis used by the IOUs as SCE's analysis. In reality, the analysis is from a study conducted by KEMA under a SCE contract. The discussion again cites the wrong RASS age information field for working appliances and not the retired/replaced ones. Finally, the ED and their DEER team contractors failed to recognize and acknowledge the IOU argument and position that for RUL values, it is *service life* of the appliances and not the *average age at replacement* that is important. The IOUs directed the DEER update team to an ASHRAE Journal article that specifically discusses the differences.[19] Specifically, equipment service life and age at replacement are not the same thing, and service life can be demonstrated always to exceed the average age at replacement.

Perhaps the most egregious instance is the analysis that went into the CFL EUL update. Through multiple rounds of comments, SCE has provided substantive comments criticizing both the data and the methods used by the DEER team and has received little more than obfuscation and dissembling. This is not acceptable from a technical standpoint or from a policy standpoint.

In comments to the DEER team on May 22, SCE made comments to the effect that the methodology

- relied on a very small sample
- relied on data about out of date technology
- was volatile given possible permutations of data selected
- ignored the necessary joint probability of frequent use and short cycle time
- was based on selective use of the data
- had no known, but very large standard errors

[19] Hiller, Carl. "Determining Equipment Service Life." *ASHRAE Journal*, August 2000.

The DEER team responded that switching degradation exists, bulbs in residential applications have shorter cycle times than those employed in manufacturer ratings, and that the third similar bulb used by SCE to demonstrate the high volatility and selectivity of the approach had certain characteristics that were unlike bulbs in use today. SCE has never disputed the first point or the second point (and they in no way refute SCE's assertions about the shortcomings of the data or methodologies), and the third is meaningless because similar characteristics were not described within the study for the bulbs that were considered in the analysis.

In reply comments on June 6, SCE provided additional input to criticize the data and methods and to help the DEER team improve its analysis. SCE pointed out that the study from which the data were drawn was not conducted to estimate the effect of switching on bulb life, but rather to test whether it exists and pilot a possible methodology for future testing, even going so far as to state explicitly that out-of-date curves were not valid for newer technology. The bulbs are over 10 years old and thus not valid for a purely technical analysis of robustness, especially given that ENERGY STAR standards have been updated. Despite DEER team assurances to the contrary, the difference between adjusted rated bulb life and effective useful life – to which adjusted rated bulb life is a partial contributor, has been essentially set aside in the rush to implement a switching degradation factor. And the DEER team continues to confuse cycle length as a cause of degradation with the sheer effect of starts upon 1990's era CFLs. The sample used by the DEER team was small (56 bulbs split into 8 clusters), and the bulb types were selected in a way that maintained volatility within the results. The reported data (only a median was reported) introduced significant aggregation bias into the results. There was no known standard error, but the uncertainty of the result was exceedingly large. The arguments about the need to renormalize the rated life of bulbs that lasted longer than their rated life were based misunderstanding or ignorance of how the life-rating process worked. The DEER team response on July 18 was posted to the

DEEResources website, not the Energy Data Web site that had been used for comments, and no notification was sent to SCE. The response, quoted in full, was:

> "We consider the method used to estimate the EUL for residential indoor CFLs to be appropriate, given the available data. We also note that SCE has recommended use of a persistence-study based EUL of 6.3 years for CFLs rated at 10,000 hours. This estimate is almost identical to the 6.6 year DEER EUL estimate that was developed for 10,000-hour CFLs using the approach that SCE has criticized."

As is clear, there was no response to any of the concerns about data and methods. The issue of the persistence-study based estimate and the DEER estimate being similar is spurious because it ignores the precedent set by the use of a methodology that is invalid and of hopelessly flawed data. In response to SCE comments from September 3, the DEER team responded that "(1) SCE disagrees with the approach used to develop EULs for residential indoor CFL measures", which again misses the point. The issue is not one of to agree or disagree. It is an issue of challenging the fundamental validity. The methodology is a flawed way to estimate one factor in the EUL, not a way to actually estimate EUL. But given that the DEER team is committed to a flawed methodology, valid data should be used. Unfortunately, this is clearly not the case. Given this, any statement that the Energy Division has employed an open DEER update process that has been fully vetted requires a willful ignorance of what true vetting is.

The "switching degradation factor" study which is the basis for the large and consequential "EUL" adjustment, was one in which the DEER team participated with other firms and entities. The premise for the effort was that the work would provide some evidence on the sensitivity of bulbs to switching, pointing the way to better research – not that a four-case regression would be used to adjust existing DEER EUL estimates. An objective observer might wonder what would have happened had a well constructed lab rated life study with systematically varied switching regimes, or an observational study in situ, been available. Absent only the aggregation bias problem, the strong apparent relationship between switching and bulb life could not fail to have been

reduced, and the objective observer might go on to wonder what the DEER team would have done with the results.

In the presence of enormous uncertainty and disagreement and in the absence of a process to determine a true ex-post value for EULs, SCE has recommended the use of values based on studies that meet CPUC Protocol requirements. In discussions, the DEER team and members of the MECT have responded that the Protocols do not apply to DEER. Regardless, it makes sense, given the presence of official guidelines regarding what are acceptable rigor and precision, to use results that meet these levels of acceptability over those that do not. And finally, when there are significant disagreements, outside experts should be consulted who do not have a vested interest in the results of the process. These could include researchers for the Lighting Research Center at Rensselaer Polytechnic Institute, Oak Ridge National Laboratories or others not currently part of the DEER update process.

### 3. Unit Energy Savings

For the base wattage used to estimate CFL energy savings, DEER did not use the result found in the 2004-05 impact evaluation and instead used unrelated numbers from RLW's "California Statewide Lighting and Appliance Efficiency Saturation Study" to calculate one. SCE has commented multiple times about this error, but the DEER team has not provided a rationale for the elective use of an inferior result. As part of its on-site survey of residential customers, the "2004/05 Statewide Residential Retrofit Single-Family Energy Efficiency Rebate Evaluation" asked for each CFL what wattage it had replaced, and reported the change in watts for the various lumen levels. Admittedly, there is the issue of people not remembering correctly, and the need to estimate the lumen level for bulbs. But it is a true estimate of the change in wattage. Instead of using this direct result, the DEER team chose to take the average wattage of installed incandescent and divided by the average wattage of installed CFLs, invoking “self report bias” as the

rationale. This clearly has absolutely nothing to do with the change in wattage of an incremental installation of a CFL, unless the process is completely randomly distributed both throughout time and space. Given other changing characteristics, such as the hours of operation, the differential in the benefits of installation of CFLs in certain locations compared to others, and changing socket penetration, this is a terrible assumption when it is not an assumption of last resort (which it is not, given the existence of the 2004-05 data). The DEER team has never made a case for why this method is used, despite SCE's input.

Additionally, the DEER team decided to re-evaluate the hours of operation found in the 2005 "CFL Metering Study." Given that the revised result is within the confidence interval of the study value, this is an artificial exercise to decrease savings from CFLs in the absence of good evidence. The DEER team has not provided a rationale for over-riding the accepted value found in that study or documented the different method used in the re-analysis.

## E. IOUs Have Significant Issues With the Quality of DEER 2008 Updates

As approved by the CPUC, DEER was originally envisioned as a database of deemed savings for measures with well known and documented savings estimates. The term "deemed" commonly refers to stipulated energy savings and demand savings that (1) have been developed from data sources and analytical methods that are widely considered acceptable for the measure and purpose, and (2) are applicable to the situation being evaluated. In developing a set of deemed savings values for the DEER 2005 update, the CPUC sought to simplify the assumptions used to project energy and peak savings per measure into a user-friendly format accessible to a wider audience. It is evident that the current update has long left the original intent of a deemed savings database vision and since then has become a source of argumentative and controversial savings update process. In this process, DEER has been turned from a source for energy efficiency data that is well-grounded in empiricism to a tool used for driving the direction of

program operations and policy, even where there are significant concerns about it. This is evident from the fact that a number of DEER NTG estimates were developed to support the ED policy direction for certain programs, including encouraging partnership programs, and discouraging CFL measures and /or certain program delivery approaches. While it is perfectly reasonable for ED to set the policy direction for the programs through means such as the Energy Policy Manual, it is absolutely beyond the intended role of DEER to assume a "dial-setting" role for directing CA energy efficiency programs through developing savings estimates in a manner that supports certain policy positions. The introduction of policy concepts into a data set that is claimed to be useful in objective planning and routinized evaluation work essentially corrupts the data set from the standpoint of that claim. In some cases, DEER 2008 has also introduced artificial savings units that are inconsistent with how programs are delivered to customers.

It is understandable that any effort to update DEER is nothing short of challenging to be useful to a wide range of programs, markets, and customer segments, These challenges were acknowledged in the 2004-05 DEER update and researched with input from a wide set of stakeholders on how future DEER update process should work. Table 14 of this report, which is included as Appendix 1, provides a set of recommendation on guidelines for use of DEER, the DEER update process, the energy savings methods in DEER, and other pertinent issues for DEER updates. In particular regard to the energy savings methods, the following recommendations were made:

- Increase the amount of evaluation-based savings estimates and data available for use in DEER. This should be enabled by the increased scope of impact evaluations planned for the 2004-2005 and 2006-2008 EM&V studies. To the extent practical, DEER should calibrate engineering equations and simulations to these updated evaluation results.
- Where evaluation results are reliable but unavailable in formats suitable for calibrated engineering or simulation models, consideration should be given to using evaluation results directly in DEER. Similarly, where evaluation can be

used more simply and transparently in engineering equations rather than simulations, consideration should be given to using the more simplified and transparent approach in cases where accuracy levels are not meaningfully compromised..

- To the extent feasible and practical, building simulation models should be expanded to reflect representative distributions of building and behavioral characteristics rather than single prototypical cases.

DEER 2008 has significantly deviated from the recommendations made in the 2004-05 DEER update through its reliance on only DOE2 building simulation models for savings estimation. While such energy building simulation based estimation method can be useful for custom site projections, for the general population estimates the approach can be limiting in its use due to the use of a small set of building prototypes to represent a population of buildings known for wide variations in both building and occupant characteristics – both across and within climate zones and building vintages. To the extent that the building simulation models technically can account for such characteristics, the method is limited to heating and cooling usage behavior via thermostat schedule setting data that needs to be taken with its own measurement and sampling errors.

In ex post evaluations, it is very often found that DOE2 or other engineering estimates contribute nothing to a statistical (regression) explanation of observed consumption in dwellings or commercial locations. Often such engineering estimates contribute unreliability to the estimation of savings as compared to specifications that simply and reliably indicate when a given type of measure has been installed. Other limitations of DOE2 modeling as it relates to assessing measure impacts include: difficulty or lack of calibration of models to actual billing consumption data, load shapes, or related baseline parameters, and failure to adequately represent climate zone, vintage, and building type categories with the naturally occurring range of building and household characteristics that are necessary to properly represent either the

program population or a projected extension of a measure's implementation to the general population.

It is due to the simulation method imperative in DEER 2008 that has led to some unreasonable decisions by the DEER team such as to redefine a large savings program and toss out any aspect of it, like the prevented use of recycled refrigerators or freezers in the counter factual of transfers, that doesn't meet the needs to simulate residential buildings. In its pursuit for modeling buildings using assumptions that can force-fit programs and measures into the simulation exercise, the DEER 2008 approach has brought in layers of false precision and a most likely large level of error propagation that is expected to have occurred in this process.

## F. DEER Updates Not Necessarily Based Upon EM&V, As Requested in D.08-01-042

EM&V information can provide valuable insight into the accuracy of the estimates contained within DEER. It was expected that the DEER update would use results from existing studies to compare with values developed for DEER. The EM&V studies were expected to both serve as inputs to DEER as well as a means of validating the DEER estimates. Many of the CPUC EM&V Protocol requirements are to improve the DEER energy and peak demand savings by reviewing and comparing the characteristics and assumptions for both the DEER based estimate and the M&E based estimate. However, it is very important that in this review and compare process, appropriate and applicable EM&V data should be identified. In the DEER update instances occurred where irrelevant EM&V data was used in DEER UES estimates.

For the base wattage used to estimate CFL energy savings, DEER did not use the result found in the 2004-05 impact evaluation and instead used unrelated numbers from RLW's "California Statewide Lighting and Appliance Efficiency Saturation Study" to calculate one. SCE has commented multiple times about this error, but the DEER team has not provided a rationale for the elective use of an inferior result. As part of its on-site survey of residential customers, the "2004/05 Statewide Residential Retrofit Single-Family Energy Efficiency Rebate Evaluation" asked for each CFL what wattage it had replaced, and reported the change in watts

for the various lumen levels. Admittedly, there is the issue of people not remembering correctly, and the need to estimate the lumen level for bulbs. But it is a true estimate of the change in wattage. Instead of using this direct result, the DEER team chose to take the average wattage of installed incandescent and divided by the average wattage of installed CFLs, invoking "self report bias" as the rationale. This clearly has absolutely nothing to do with the change in wattage of an incremental installation of a CFL, unless the process is completely randomly distributed both throughout time and space. Given other changing characteristics, such as the hours of operation, the differential in the benefits of installation of CFLs in certain locations compared to others, and changing socket penetration, this is a terrible assumption when it is not an assumption of last resort (which it is not, given the existence of the 2004-05 data). The DEER team has never made a case for why this method is used, despite SCE's input.

Additionally, the DEER team decided to re-evaluate the hours of operation found in the 2005 "CFL Metering Study." Given that the revised result is within the confidence interval of the study value, this is an artificial exercise to decrease savings from CFLs in the absence of good evidence. The DEER team has not provided a rationale for over-riding the accepted value found in that study or documented the different method used in the re-analysis.

For nonresidential CFLs, the RLW residential CFL study was utilized to substantiate the DEER UES results for CFLs. Beyond the issues with the study, the study was misapplied to the nonresidential sector, which has substantially different usage behaviors and lighting stock than do residential users**.**

The DEER treatment of the Appliance Recycling measures shows a lack of awareness about how the program works, and disregarded EM&V results. The RARP 2004-05 EM&V study pointed out that there were components of the previous version of the NTGR analysis (by KEMA) that were perhaps outside the scope of participant free ridership analysis. As presented by the ADM team, the issue was apparently understood by ED and the adjustment considered not relevant to NTFR for program participants. With this component removed, NTFR for refrigerators and for freezers was above 0.65. The RARP 04/05 gross savings analysis extended

the DOE protocol lab metering sample carefully expanded since 1998 by multiple vendors -- the extension of a treasure trove of data on the DOE protocol laboratory UEC of recycled appliances. It also provided for the first time a number of dual metering exercises -- i.e., the 2005 sample of appliances were metered in both kitchen/garage and the approved DOE laboratory setting. This allowed extension of the modeling to include a current year lab UEC estimate for freezers and refrigerators, by feature, and by utility. The dual metering allowed for the beginning of a careful approach to extending estimates to the in situ context, recognizing the contingent relationship between the lab UEC, features of the appliance and/or the in situ context (e.g. household climate zone, conditioned status, household size). The 2004-05 study also demonstrated that the relationship between lab and in situ results was in fact contingent upon a variety of factors that, was hoped at least, would be used in planning and development of ex antes, when a larger dual metering sample had been developed. Included in this estimation process were empirically based models relating in situ consumption to hourly consumption patterns for long run weather.

Fundamental to the program -- i.e., its definition, is a characterization of the measure as the removal of an appliance from either the participant household (the pickup dwelling), and the prevention of that appliance's reappearance in the grid. The evaluation approach properly characterized savings associated with appliance removal, including allowances for both potential partial use after either transfer or a move to the participant's kitchen. It also properly adjusted for the estimated probability that a transferred old appliance would be destroyed nevertheless (i.e., by a used retailer after assessment).

The DEER team chose to ignore most of the main points of the EM&V study, not to mention the nuances of the evaluation. Their documentation for re-estimation of savings for DEER is spotty but nonetheless revealing. The team confused partial use and, transfers incomprehensibly, based on what appears to be a misreading of the report and a refusal to listen to explanations made in meetings with the DEER team.

The ED/DEER team's initial interest in a lower (conceptually inappropriate) NTFR appears to have waned after the team realized that it could essentially obliterate gross savings --

this is apparent from a notation in the DEER team's NTFR documentation, and evidence that the DEER team was interested in a particular outcome rather than the validity of the estimation methods.

The DEER team, apparently because of its strong interest in expanding the purview of building simulation models over empirical approaches that have been well reasoned and which match the programs as defined and the CPUC Protocols, appears to have 'created demand' by making it necessary to (a) express savings over pickup households, (b) produce 8760 savings (which the ADM EM&V approach did more responsibly and tentatively), and (c) produce interactive savings estimates for whole houses -- conflating assumptions about proximity of thermostats to refrigerators with heroic assumptions about prototypical model homes in each climate zones. The DEER team very selectively borrowed a misunderstood regression relationship between kitchen temperature and appliance use for use in its models, insisting that DOE2 simulation was required in order to adjust for in situ consumption -- ignoring all the points made on this score in the evaluation study, especially Appendix G in the report. This regression relationship appears to have been powerfully misused in simulations contributing to DEER.

Finally, the DEER team's interest in maintaining the "DOE2 imperative", and the modeling of building savings rather than more direct approaches, meant that the team felt it necessary to redefine the Appliance Recycling Program. The DEER team made (unclear) use of a portion of the evaluation study that was unrelated to impact evaluation, in creating an eight-way "typology" of scenarios involving appliance removal <u>and</u> the next thing that the household did in terms of refrigerator/freezer. This conversion of the program into a replacement program caused obvious difficulties for the DEER team engineering this change, in that an early release was obviously short of logically possible scenarios, including the main scenario observed in the program. It is not clear where the 60.5% referring to the scenario with no savings comes from. This will have to be better documented by the DEER team, as part of an explanation for its interesting attempt to redefine the program and the measures (removals) that the program provides.

## G. Residential Interactive Effects Not Valid

Although not included in the current Draft Report, the Energy Division has recommended that residential interactive effects will be included in the Final Report. As they are also already included in DEER 2008, it appears the process for evaluating these effects is important. As such, there are key issues that should be examined related to these interactive effects.

It is unclear what level of study has been undertaken to support the utilization of residential interactive effects. These potential interactive impacts have been less researched in residences than commercial buildings and are readily mitigated by occupant behavior as it relates to adjustments to the HVAC set points (HVAC systems being turned on and off) and natural ventilation (windows open in the fall and spring). A Canadian Study[20] attempted to capture the overall net impacts of energy-efficient compact fluorescent lighting in residential housing. The study suggested that the reduction in lighting energy use was almost offset by an increase in the space heating requirements due to installing CFLs. Although the study did provide informative results, the data is inconclusive as the study tested homes in a colder dominated region of the world. As a result, it is very difficult to conclude that warmer regional climates, such as California, would have the same behavioral and net impact results.

Furthermore, the study attempted to determine the overall net impact of CFL lighting compared to conventional incandescent lighting in homes located in thirty-three different climates using computer simulations. The computer simulation results illustrated the interactive effects for installing CFL lighting reduces the overall net savings in colder regions and increases the overall net savings in warmer regions. Although conceptually this may be true, the simulations are based on either small sample sizes or assumptions that cannot be substantiated. On the contrary, fully vetted EM&V studies, with larger statistical sample sizes and where

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[20] Parekh, Ani. "Benchmarking of Energy Savings Associated with Compact Fluorescent Lighting in Homes". CANMET Energy Technology Centre, Natural Resources Canada.

human behavior is taken into consideration, would minimize the error bands and uncertainties of any one computer simulation.

A CEC study[21] also attempted to estimate the net savings from residential CFL replacements using computer simulations. The study defined net savings as energy cost savings, which accounts for changes in cooling, heating and fan energy due to less heat generated from the CFL bulb. The computer simulations modeled the net savings assuming lighting schedules. The study indicated that it was not possible to replicate the lighting schedule exactly used in DEER because partial lighting wattages could not be entered into the simulation. Due to the complexity of how the DEER models account for interactive effects, where other computer simulations have a difficult time replicating lighting schedules reinforces the fact that the process for evaluating the assumptions that go into the DEER simulation models and how interactive effects are quantified is required.

Similar to the Canadian study, the weakness of this study is that the projected net savings are based on a single computer simulation and uses an assumed lighting schedule. Consequently, with such a small sample size and where human behavior is not considered, the net savings associated with a single computer simulation is suspect. Because the assumptions going into the simulation cannot be substantiated, the error band and uncertainty of the net saving results is inconclusive at best. The implementation of fully vetted EM&V studies would account for human behavior and would reduce the error band and uncertainty by providing verifiable assumptions that can be used in the computer simulation models.

Another key issue is how the occupant behavior has been corroborated with the DOE2.2 modeling. The only relevant discussion relates to a series of five thermostat schedules, but this does not indicate if there is seasonality to these set points or if there are periods when the units are turned off and the "windows" are open. The simulation models appear to have a natural ventilation schedule, but this is not documented. The DEER documentation doesn't provide any

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[21] "Net Savings from Residential CFL Replacement". California Energy Commission, October 2008.

explanation as to how this was done. Since the calibration results appear to have only been calibrated to cooling energy, how were the other end uses relevant to this analysis treated?

Currently, there is no plan to true-up residential savings in the same manner that has been proposed for commercial facilities, which would help quantify the realized impact from the residential interactive effects. Due to the likely low level of these interactive effects, a detailed study would need to be used to ascertain what portion of the interactive effect impacts the HVAC load and what portion is vented.

Interactive effects of CFLs with the HVAC system in a residence should not be modeled until an M&V study is performed that shows that it is measurable and that there is indeed an interactive effect. For these reasons, including the extremely high level of uncertainty, interactive effects should be included only for nonresidential applications in the Final Report.

## H. DEER Filled With Too Much Uncertainty

While some of the studies used in the Draft Report often indicate sampling uncertainty, most of the engineering data used from these studies and assumptions has no uncertainty associated with the results – an unanswered request from PG&E requested error bars on the DEER data. Uncertainty analysis is a standard engineering process that can readily be applied to simple calculations and/or individual data to calculate the uncertainty of the overall result. By not including or looking at the uncertainty used in this analysis, the Draft Report implicitly purports the following:

- All data used achieves an acceptable level of uncertainty
- All data used has a similar level of uncertainty

It is clear from the data sources supplied for much of the analysis used both for DEER and the interpretation of study results for this report that there is a wide disparity in the level of uncertainty of data used. This issue brings into question whether some of the data that is being used for savings evaluation has a low enough uncertainty level to be used for this report. There is no discussion of uncertainty in the report, so the obvious conclusion is that there are no criteria

for data uncertainty used for inclusion in the verification process. Due to the significant impact that the data used in this analysis has, there should be a minimal level of uncertainty assigned to data sources used and applied consistently for selecting the data to use.

A related issue is the process by which the assumption used in the DEER DOE 2.2 simulations is calibrated. While the documentation for DEER indicates the calibration of the cooling end use results to the CLASS Study for the residential sector, it does not clarify how other end uses and/or sectors are calibrated. This raises the question as to how these results were calibrated.

The impact of calibrations for simulation models can have large unintended impacts on the end use results, even if overall values are calibrated well. In all cases, the calibration process introduces additional uncertainties in the results that should be acknowledged.

## I. SCE Contests the General Modeling Assumptions in DEER

While the use of simulations for DEER can be a useful tool to simplify the process of claiming measure savings, the current process also introduces a number of simplifications that could significantly impact savings that in turn could greatly impact the values used in this report.

While SCE supports improved techniques to evaluate energy savings, it should be noted that these savings will be trued up as part of impact evaluation process. Therefore it is critical that these updates are actually updating the ex ante savings projections to be closer to the actual savings, which will likely be trued-up as part of the ex post evaluation. There are several examples where some of the latest ex ante savings projections are not moving in the same direction as the ex post savings assumptions will likely be realized. This ultimately could complicate the current verification process further if the ex post evaluations contradict the ex ante projections to a large extent. These examples include:

- Ignoring Title 20 code and the "lumen mapping" method for projecting lighting savings. Since code governs lighting installations and consumers typically buy lighting to match existing lighting levels ("lumen mapping"),

except for explicit de-lamping measures, ignoring this process and assigning lighting savings based upon studies that may no longer be relevant will lead to inaccurate savings levels.

- For refrigerant charge adjustment, the latest SCE data seem to indicate that there is limited savings from overcharged units and units with less than 20% undercharge. The DEER data tells a completely different story than this. If SCE uses the current DEER data now and then are penalized three years later for accepting this, the program results will be jeopardized and monies that could have been better spent on other measures will be lost.
- The baseline values for some measures such as lighting and chillers use "new" code values that do not always adequately represent older equipment (chillers with an efficiency of 1.0 kW/ton or T12 lighting) that still exists in the field.

There are also a large number of assumptions that need to be made as part of the modeling process. During the course of the development of this process (using standardized building shapes, types, and vintages that don't all vary as might be observed in the field) has there been a parametric analysis of the relative impact of these items? If so, was there a differential savings level above which the simplifications were not used? For example, is the assumption of the building type likely to impact savings by more than 50% if common variations of a "small office" type were used to model the building? It seems that many of these issues could be minimized by using a population-weighted random set of variant building characteristics rather than a single or handful of fixed prototype(s) per building, zone, and vintage.

The simulation model DOE2.2, developed by J.J. Hirsch and Associates, has not been ASHRAE-certified as a whole building energy modeling tool. This is of special concern in regards to modeling duct's heat transfer and leakage, refrigeration (DOE2.2R), and refrigerant charge as none of these features are in DOE2.1e, the original simulation tool developed by U.S.D.O.E. and tested by engineers' world wide. SCE is concerned that the values input into and

calculated by DOE2.2 have not been fully vetted in a public forum and may not be appropriate or accurate for this application.

One of the issues with using simulation models is how they calculate "unmet loads." In other words, "unmet" loads are the number of hours of the year in which the modeled residence HVAC system fails to maintain comfort conditions. These "unmet" hours are impacted by the assumed sizing of equipment, the loads and thus the savings. If large "unmet loads" are present, then there are significant savings that may not be accounted for in the simulation. SCE needs to know how "unmet loads" can be found using the output from MISer so we can check base case conditions to new conditions.

The peak demand savings reported in MISer in the "Annual Impacts" row for each measure are different from the total demand savings shown in the "Annual Impacts by End Use" field. Adequate documentation explaining how the calculation were done to convert the End-Use value to the Annual Impact number is not available.

## J. DEER 2008 Bias Is Evident In Calculating Unfavorable Results

The goal of the DEER and Draft Report process is to presumably calculate objective, reasonable, and representative results, there appears to be numerous examples in the report that point to a negative bias in assuming. For example:

- As indicated for the Appliance Recycling program, the default assumption was a mix of measures that were not representative of the program and yielded lower savings.
- For the process used to evaluate climate zones, when data was not present, the assumed zone is the default 'system' zone which is the lowest weather zone in terms of the application of the avoided costs stream.
- In the application of the gross realization rate for customized programs, it was noted that the calculations often did not match the stated logic and in all cases

when there was an inconsistency, it was always lower than the stated methodology would imply.

## K. Incorrect Evaluation of Appliance Recycling Program

In the DEER estimates for appliance recycling measures, the use of incorrect data and a redefinition of the program led to incorrect results. A number of assumptions were used to take data from the RLW CLASS study to incorporate it into a simulation model that was used to extrapolate both direct and interactive impacts. Some of these assumptions and DEER processes were questioned previously, but either were not responded or responded incompletely and unsatisfactorily. Hence, SCE repeats below the issues found in the DEER documentation for the savings estimates for this program:

As reported in the Home Energy online article cited in the DEER technical summary document,[22] these space measurements are one-time measurements of temperature by technicians installing sub-meters. How this relates to the development of the chart is unclear. Considerably better analysis on the on the determinants of consumption in-situ may be found in the later 1990's work for PG&E by Proctor, et. al., and the 2004-2005 EM&V study by ADM.

Note that in the chart for temperature vs savings at 90 °F (the DOE protocol lab temperature), the ratio of actual/lab rating is 1.17. This is a concern because it is almost certainly an estimate outside the bounds of observed temperature measurements (meaning kitchen with temperatures 90 °F), and also clearly undermines the argument that the ratio is a simple function of temperature (as the DEER technical summary indicates "…both expected and observed."). Note also that the energy use/rated energy use ratio is 1.0 at 82 °F. One wonders why this is so, given a lab test temperature of 90 °F, and whether the simulation approach has captured the importance of appliance door openings (a function of household size that is explicitly built into the 2004-2005 ADM evaluation study).

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[22] "PG&E Refrigerator Field Metering Project" cited on page 10, Figure 5 of 2008 DEER Update – Summary of Measure Energy Analysis Revision, May 2008.

Even if there are no other issues with this data set, the data is from 1991 and many of the assumptions built into the analysis will have likely changed in the last 17 years due to improvements in the unit efficiencies.

The following are specific observations concerning the DEER building simulation methodology employed for these measures:

- Rather than examining the measure as it was defined (removing an appliance from continued use as "keeper" or a transfer in California), the DEER Update opted for simulation scenarios that are unnecessary and don't cover prevented transfers of old, inefficient refrigerators. Thus, the results don't relate to the recycling program.
- The DEER does not appear to have sanity check its estimate when using data sources for consumption (CLASS data) that have no relevance to the consumption of recycled units, especially given the fact that these are appliances that are largely un-saleable through retail market channels, and have high energy consumption.
- The functional relationship between the ratio of in-situ use/as-new lab rating is shown as a linear relationship on page 12 of the DEER technical summary documentation. This chart is drawn from a final report on the first of two PG&E refrigerator metering reports ("PG&E Refrigerator Field Metering Project," Final Report 1991, Proctor Engineering Group). The study is only available by request to Proctor Engineering. The DEER technical summary document refers the reader to an issue of Home Energy Magazine in which there are many refrigerator-related articles available on-line, but none with the specific chart that shown in the DEER technical summary document. It is important to note that the Proctor study was an early report on the field research itself with small sample, and that later work, which involved this field work and other larger metering projects conducted after that included

analysts like Andrew Goett and Michael Blasnik,[23] would not have produced graphs that do not acknowledge the actual spread observed, and the small number of cases (20) in the 1991 field metering project. It is troublesome that this chart, extracted from an early and relatively crude analysis, has been used in the DOE-2 simulation models for these measures. Additional issues with this chart are:

- The line chart illustrates the relationship between "temperature" and the use/rated use ratio. It shows no spread about an actual line, i.e., data scatter that is expected in field monitored results. This leads one to surmise that it may be based on an assumed linear regression, and the points were generated from that assumed linearity. It is inconceivable that this relationship would have been found in the later studies and articles that followed from this initial field study (for example, "Pacific Gas and Electric Company Refrigerator Metering," September, 1994, Proctor Engineering with HBRS, and Barakat and Chamberlin, as well as several follow-on articles).
- The chart and the underlying analysis say nothing about other factors influencing consumption, or interacting with temperature to produce consumption variation.
- As reported in the Home Energy online article cited in the DEER technical summary document, these space measurements are one-time measurements of temperature by technicians installing sub-meters. How this relates to the development of the chart is unclear. Considerably better analysis on the on the determinants of consumption in-situ may be found

[23] "Large Scale Residential Refrigerator Field Metering" G. Dutt, J Proctor, M Balsnik, A Goett, E Galawish, D Quigley: Proceedings of the ACEEE 1994 Summer Study on Energy Efficiency in Buildings, Asilomar CA 1994.

in the later 1990's work for PG&E by Proctor, et. al., and the 2004-2005 EM&V study by ADM.

- The basis for the chart appears to be the 20-case Proctor field metering study. This is the same study that resulted in the graph shown in the Home Energy Online article "What's Wrong with Refrigerator Energy Ratings," Home Energy Online, Jan/Feb 1993. That article provides an example of the analysis and graphing that apparently followed directly on the field metering study of 1991, prior to the better analytical work that Proctor, et. al.[24] produced later. The following Figure 1 is an example from the article. The regression lines provided are apparently based on a regression of consumption on ambient (outdoor) temperature. Note that the regression is explained incorrectly, as a function of an intercept, temperature, and the coefficient of determination (otherwise known as "RSquare"). This is either a problem that contributed directly to DEER's Figure 5, or is symptomatic of the general analysis level.

[24] Ibid

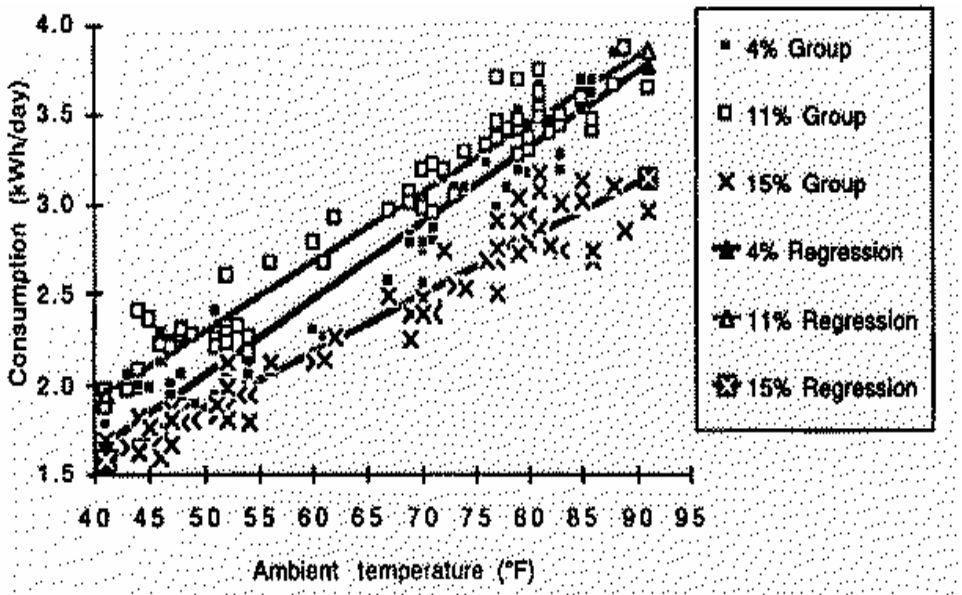


**Figure 1. Refrigerator Energy Consumption versus Outside Temperature**

Note: For regression lines, estimated daily consumption = constant + outside temperatures × coefficient of determination (R = .9).

- Even if there were not all of the above-mentioned problems, the relationship between kitchen or garage temperature variation and appliance consumption, e.g., as estimated in a pooled time series regression, is unlikely to be the same as was estimated for 20 new appliances in 1991. The ability of appliances to maintain a given room temperature-internal temperature gradient, and the sensitivity of the appliance to the difference between laboratory and in-home temperatures has improved since 1991, due to significant improvements in appliance construction, components, and insulation.

- For refrigerator replacement programs, DEER has used the regression line as a basis for ratcheting over 8760 hours (one hopes) both the replaced appliance's consumption (or the code standard appliance) and the measure. This was done in order to capture the impacts to the HVAC system, and to reinforce the idea that savings have to be simulated for "typical" households to satisfy the needs of planners and implementers. In this regard, some specific issues are:

- The RLW CLASS data provide the "AS NEW"-rated consumption of appliances that RLW was able to match to the CEC appliance database (not including efforts with other sources that are available), and thus capitalize on periodicity in match availability that was fixed by the CEC after contact from the ADM team for the 2004-05 EM&V study. Even if there were not a matching bias and other issues in the CLASS study, note that there is a built-in bias in terms of using the RLW data as representative of the population of appliances that are likely to be replacement-worthy.
- Note 3 following Table 5 (page 12) indicates that "Measure UEC is 15% less than Code Baseline UEC." This is inconsistent with what is elsewhere suggested, and also does not match what is found in the table itself.

- Regarding the recycling measures, the DEER description is an obvious case of trying to force all measures to be the purview of building simulation modeling at the expense of other valid analysis techniques. The removal of an appliance from the homes or secondary market is the measure. Inventing four measure categories that fit within the DOE-2 simulation approach neither properly nor completely represent the Appliance Recycling program. The program is removing appliances from the participating households and preventing the transfer of those appliances to other households (perhaps as primary appliances, perhaps not; perhaps in the same climate zone, perhaps not). The replacement appliance's consumption is unrelated to the measure being incented. The adjustments based on temperature, to the slight extent that they are documented in the summary, are misleading and far inferior to the program of empirical, cumulative lab/in situ research that the 2004-2005

EM&V study performed and that Quantec is now contributing to in the 2006-2008 evaluation cycle.

### L. New Energy Star Refrigerator Measures

The use of the performance relationship shown in Figure 5 of the DEER technical summary document for new Energy Star Refrigerators is not justified. The chart is based on a limited number of old vintage refrigerators, likely close to 20 years old compared to the appliances this measure covers. Improvements since 1991 have surely modified the depicted chart's performance relationship. During the planning of the 2009-2011 programs, SCE noticed that the deemed annual energy savings practically tripled and the deemed demand reduction values increased by a factor close to 38. With the follow-up analysis and critique presented for the appliance recycling measures, we believe that the dramatic increase in savings for Energy Star Refrigerators are not justified in the DEER updates need to return to the simple approach used in the DEER 2005.

## VI.

## TECHNICAL COMMENTS: OVERALL DRAFT REPORT

The Draft Report has extensive technical problems, including lack of technical transparency, technical errors within the VRT, and omission of program savings.

### A. Lack of Technical Transparency in Draft Report

The Draft Report is riddled with a lack of transparency. A number of the items in the technical sections of the Draft Report made it difficult to follow the methodology used for the individual program evaluations and also to evaluate the final results. In general, there is a lack of detailed information that can be used to QC the results and ascertain the basis of the calculations. In other cases, the discussion and references are unclear. As indicated below with specific examples, much of this has been requested previously by all of the IOUs. The following indicates numerous examples where requested data was not provided or provided in such a

minimal manner that it could effectively not be used to evaluate the basis of the calculations and assumptions. In addition, where detailed information was received, it was not made available on the November 15 revised due date for the Draft Report. Such information was received on a later date, thus limiting the review time of the information. In other cases, raw data has been provided but the re-analysis that was used for the simulations has not (e.g. basis for the CFL base savings or the hours of operation). Since this all should be publicly available information and is a key part of the Draft Report recommendations, it is not clear why it has not been made readily available. A lack of this sufficient information destroys the value of the Draft Report.

### 1. Lack of Sufficient Documentation

Since the DEER 2008 database is the basis for most of the ex ante values used in the Draft Report, the assumptions and transparency of the data used to drive the models as well as the modeling assumptions used are critical to have a clear understanding of the savings basis used in the report. While numerous requests have been made to provide a concise summary of the key assumptions used in this process, much of this has not been clearly addressed. The values used for the DEER modeling inputs are still somewhat unclear and are not clearly referenced on the DEER website or in the Draft Report. The examples below indicate key items which are still not readily transparent to SCE:

- Base Measure Assumptions – There is no single document that explains where the data came from (e.g. CFLs, RCA), how it was analyzed, and how it was input into the simulation model.
- Peak Load Diversity/Load Share Factors – There is no spreadsheet that shows the raw data values, how they were adjusted, and how the base measure savings were adjusted.
- Modeling of Residential HVAC Loads – There is no document that indicates what was modeled, what are the operational hours, and how occupant use was indicated (ventilation/ system on and off operation).

A DOE 2.2 input deck does not answer many of these questions since it does not include calibration analysis or any pre-processing of the input data that was performed.

- Operating Hours – While a summary table is supplied for operating hours, the leap from the studies to the input value is unclear. However, there is no spreadsheet that shows the raw data values, how they were adjusted, and how the base measure savings were adjusted.
- Residential Assumptions For Ventilation – The modeling for natural ventilation is listed in DOE 2.2 as "DEER Natural Ventilation." The general algorithm for this is not documented.
- Building Vintage Weights – There is no reference that identifies how the building vintage weights were derived.
- DOE 2 Curve Fits – It is difficult to understand most of the modeled changes in DEER without knowing the internal fits for the DOE2.2 simulation models used. These system modeling parameters include part load curves, EIR for the high-efficiency A/C systems of varying SEER ratings and for all the refrigerant charge models. There is no clear reference for these values.

## 2. SCE Has Asked For Information That Has Still Not Been Received

The Joint IOUs have issued data requests to the Energy Division previously to obtain information surrounding the assumptions contained in DEER 2008. An October 16 response from one such request provided references to many Decisions and documents. However, most of these references are not clear or misleading at best. These observations include:

- "The final DEER update numbers were posted on October 10, 2008." (page 2) However, DEER was again later updated on October 20.

- "The written responses to unit energy savings will be posted in the next few days." (page 3) Despite this, SCE has been unable to locate any posted documentation after August related to energy savings at all.
- "Energy savings assumptions are provided at www.deeresources.com" There is one document, "Summary of Energy Analysis Methods Changes in 2006-2007 DEER draft ex ante updates versus 2005 DEER", for the 2006-07 ex ante DEER, with an August date, however, it does not clarify the following points:
    - Residential thermostat set points are explained in section II. However, the operational hours/seasons of the HVAC/windows are not. It is unclear how these set points were developed, especially as they change by building vintage. The set points for cooling appear to be extremely unrealistic.
    - Section III discusses the nominal values for CFL power. However, the nominal model values are different and no explanation is provided.
    - Section III also discusses refrigerant charge adjustment. However, no direct reference is given for the assumptions used.
    - Section IV discusses building operational hours. A table is provided and there is general reference to the draft Express Study, which says "do not cite", the data is not clearly referenced nor is the re-analysis provided.

The response indicates how the baseline savings for CFLs are calculated, but does not include adjustments for diversity effects/load share factors. Diversity effects are mentioned and it indicates that the DEER MISer can be used to look at load shapes; however, it does not explain how the load shapes were developed. It is also unclear how

a load shape for a single building can be used to create a diversity factor. If this is not the process, then it needs to be clarified in the write-up.

In several parts of the response, a "webinar" has been referenced for documentation of the UES analysis; however, there is no posting of the webinar presentation for those who did not attend. Thus this cannot readily be considered a true reference if it was never properly documented.

The document also references www.energydataweb.com/cpuc/home.aspx for unpublished studies and information. However, they could not be located on this site.

### 3. ED Implemented Unproven Assumptions in the Draft Report

The Draft Report opines that a 90/10 percentage allocation between residential and nonresidential retail sales utilized in the Upstream Lighting (SCE2501) programs is unreasonable. The Draft Report claims to "compromise" at a 95/5 percentage allocation. All of the findings cited, including the analysis by SCE of "bounce-back" cards from a 1990's CFL manufacturer's rebate program, either lend support to a split of 90/10 (or less), or are irrelevant. Among the former are the bounce-back results, recent upstream interview results, and two findings that 7% of purchases by householders are destined for non-residential locations. Note that the 7% of purchases are coming from residential customers, which does include the small businesses which constitute a sizeable share of big box store patronage. The irrelevant findings cited by the Draft Report include a citation of a commercial customer survey for 2004-2005, which does not provide appropriate information (percentage of sales destined for commercial locations). In short, all of the results discussed are consistent with a 90/10 or lesser split, and none support 95/5. As to a recent comment by the DEER team that the utilities should refer to recent potential studies to somehow "back out" an understanding of how unreasonable a 10% non-residential purchase share would be, even a cursory read of the recent ITRON non-residential potential study indicates that in fact lighting is a major player in non-

residential potential, and CFL's a major component of lighting potential – for both energy and demand. Whether one considers the best available direct evidence (as cited by the DEER team), or inconclusive and conceptually inappropriate other "evidence," the results argue for a minimum split of 90/10. The Draft Report is incorrect in its "compromise." The Draft Report is utterly flawed in this respect and must be fixed.

## B. The VRT Is Systematically and Technically Flawed

The Verification Reporting Template (VRT) has a significant amount of errors that bring into question the validity of both the software tool and the Draft Report itself. The Energy Division did not inform SCE ahead of time about the VRT's software requirements, much less check to see if the software access was granted by SCE's IT department. In addition, the manual provided on the VRT is unclearly written and in most cases, unusable. The manual contained only high level functional components of the VRT and nothing that is needed to conduct a thorough review. No explanation or examples were given on how the tool utilizes calculations and how data is manipulated. What appeared to be the main verification table was completed by contractors, however, appears to have been hastily assembled without proper quality control. Again, ED did not make any attempt to address the technical limitations of the tool until days before SCE's comments were due. SCE was left in the dark and had to start from square one to dissect the tool. The way this tool was thrust upon SCE without proper documentation, explanation, or assistance in a document as visible and important as the Draft Report was not an effective way to engage review and collaboration. The errors are extensive and are laid out in detail below.

### 1. The VRT Uses the Incorrect Version of the E3 Calculator

The Draft Report is using a version of the E3 Calculator that contains a systemic flaw. The E3 Calculator, specifically version 4b, removes any savings or benefits associated with energy-efficient measures with an effective useful life of less than one. For example, a CFL installed in a Hotel or Medical Clinic would obtain a EUL of 0.9

according to DEER 2005 and therefore due to the error in the E3 Calculator not receive any credit. This error was communicated to the Energy Division, its chief consultant, and Energy and Environmental Economics, Inc. (E3) months ago. The error was fixed in the 2009-2011 version of the E3 Calculator; however, it remains in the current version. It should be pointed out that the E3 Calculator, version 4a, does not contain this error and is what SCE uses to report is savings and cost-effectiveness to the Commission.

### 2. The VRT Does Not Properly Report the Costs Associated With SCE's 2006-2007 Claim

The VRT used in the Draft Report incorrectly accounts for expenditures incurred in 2006-2007 by SCE. Total expenditures are a key element of cost-effectiveness and therefore the PEB. In fact, the VRT miscalculates SCE's program expenditures in every program that the Draft Report updated, totaling nearly $1.5 million. The table below illustrates the dollar variance by program identified in the Draft Report:

| Program | ED Verification Dollars | IOU Filed E3 Dollars | Variance |
|---|---|---|---|
| SCE2501 | $66,299,284.05 | $67,724,174.26 | $(1,424,890.21) |
| SCE2511 | $58,262,990.19 | $58,315,987.38 | $ (52,997.19) |
| SCE2517 | $62,903,207.31 | $62,903,321.31 | $ (114.00) |
| **Total** | **$187,465,481.55** | **$188,943,482.95** | **$(1,478,001.40)** |

The ED Verification Dollars amount was derived from Option 3 of the verification table of the VRT databases. The IOU Filed E3 Dollars represent the total derived from the E3 Calculators filed with the Commission for the 2007 4th Quarter Report in March, 2008. The variance column shows the discrepancy between the derived values. There is a substantial variance that calls into question the ability of the VRT to accurately determine the savings, cost-effectiveness, or earnings for SCE.

### 3. IOU Tracking Systems Were Incorrectly Imported To VRT

The Draft Verification Report is inconsistent and inaccurate when it comes to presenting a proper representation of SCE's unit counts in 2006-2007. For example, when one compares SCE's ex ante unit counts and the VRT's indication of SCE's ex ante unit counts, they are grossly different. According to the VRT's definition fields and the methodology provided by the ED, these important fields should match exactly. They do not. This calls into question the integrity of the VRT tool and the entire Draft Report because ED improperly followed its own methodologies. Some examples are presented below and are contained fully in Appendix 2:

- SCE's Residential Energy Efficiency Incentive program (SCE2501) is one such example of this irregularity. When looking at the unit count that ED derived from SCE's database versus the actual unit count in the submitted tracking database, there were 174,798 units missing from the VRT. This proves to be a significant undercounting of energy savings and PEB that were left out of the Draft Report. The breakdown is as follows:
  - Upstream Lighting was missing 96,019 units. The majority of upstream lighting discrepancy stems from an error on ED's part when doing the 95/5 re-allocation. ED applied the re-allocation to non-screw-in CFL units that should not have been adjusted and therefore undercounted SCE's achievements in these measures by 5% Examples of measure categories include LEDs and fixtures. This alone, accounted for 95,927 units in the discrepancy.
  - Single Family rebates had a discrepancy of 78,779 units that was contained in the following four measure types:

| Measure | Units |
|---|---|
| Energy Star Room AC, 5,000 to 18,000 BTU | 59,415 |
| Energy Star Refrigerator | 15,756 |
| Whole House Fan | 3,604 |
| Pool Pump - Single Speed | 4 |

- The Lightwise program had 8,911 units that appear to be inadvertently lumped together with Upstream Lighting. This brought forth issues of NTG as these units should be assigned the default rate of 80%, not the 60% Upstream NTG.

- Similar issues were found in the Express Efficiency program (SCE2517). A similar comparison was made and it appears that the following unit counts were missing from the VRT:

| Measure | Units |
|---|---|
| Screw-in Compact Fluorescent Lamp, 14-26 watts | 3 |
| Solid Cooler Door Gaskets | 41 |

### 4. The VRT Incorrectly Applies the Recommended Verification Rates From The Contractor Verification Reports Into the Databases

It is apparent that the Interim Database and the VRT incorrectly applies the verification rates produced in the studies. The lack of transparency, readability, and functionality of the Interim Database hampers the review of the application of the verification rates. However, a substantial number of inconsistencies and errors are evident. The following table illustrates the discrepancies found between the Residential Retrofit Contract Group First Draft Verification Report completed by the Cadmus Group and the Interim Database:

| Program | Measure Type | Verification Rate from the Contractor Report | Verification Rate from the VRT |
|---|---|---|---|
| SCE2501 (STAPLE) | Lighting Exchange | 92.60% | 81.89% |
| SCE2501 (HEER) | Evaporative Coolers | 100.00% | 31% to 99% |
| SCE2501 (HEER) | Room ACs | 96.50% | 96% to 100% |
| SCE2501 (HEER) | Whole House Fans | 100.00% | 99.36% |

In the Draft Report's adjustment in the Nonresidential Direct Installation program (SCE2511), a comparison was made between not only the units but the savings as well. This comparison was done based on units and savings because verification rates were shown for both values and also to check the consistency of applied rates. Appendix 3

illustrates that 24 of the 38 measures have a verification rate discrepancy. Of the 24 measures, 18 received a verification rate update in the VRT that the contractor's Verification Report indicated was either 100% verified or not included. When it came to energy savings analysis, 25 of the 38 measures had a discrepancy. From the count of measure changes alone, it can be seen that there was no consistency in the application of the verification rates. The comparison shows that some measures were scaled down twice with the same rate, while others were not. In many cases wrong values were used and no clear method of where verification rates came from can be derived from the Draft Report. Again, Appendix 3 contains a full comparison of the programs savings and units.

In SCE's Standard Performance Contract program (SCE2517), there is absolutely no clarity to how units were converted from SCE tracking system to the VRT. Also, ED did not supply any documentation for the conversion so it was not possible to do a unit or verification rate comparison analysis.

## 5. The VRT Contains FALSE Errors Which Incorrectly Count SCE's Benefits

The VRT application incorrectly merges the Interim Database into the E3 Calculator in order to calculate energy savings, demand reduction, cost-effectiveness, and PEB. The E3 Calculator contains a validation field by which the climate zone, building type, and load shape must be in functional agreement with each other or a 'FALSE' error is assigned. If a 'FALSE' error is assigned then the energy savings and benefit stream for that measure is zeroed out, thereby undercounting the MPS and PEB. This error is found in the VRT and systematically under represents the performance of SCE in 2006-2007. It should be pointed out that SCE 4th Quarter 2007 submission contained no 'FALSE' errors. The fact that the Draft Report contains these errors points to a fundamentally flawed system of the report's quality control. A listing of the errors is found below:

| VRT Run Number | ED Case ID Number | Measure Name |
|---|---|---|
| Run1 | M03715 | Screw-in Compact Fluorescent Lamp, 14-26 watts |

| | | |
|---|---|---|
| Run1 | M07102 | Insulated Holding Cabinets, Full Size <= 0.4 KW |
| Run1 | M06725 | Screw-in Compact Fluorescent Lamp, 14-26 watts |
| Run1 | M07683 | Screw-in Compact Fluorescent Lamp, 14-26 watts |
| Run2 | M07284 | Screw-in Compact Fluorescent Lamp, 14-26 watts |
| Run4 | M10536 | Fan Blade |
| Run5 | M11138 | Air Cooled, Single System Heat Pump |
| Run5 | M11261 | Motors Project (Process) |
| Run5 | M11022 | T-Stat Occupancy Sensors |
| Run5 | M10955 | T-Stat Occupancy Sensors |
| Run8 | M03319 | 7.5 hp motor |
| Run8 | M03267 | Screw-in Compact Fluorescent Lamp, 14-26 watts |
| Run9 | M04128 | T-8 or T-5 Lamp and Electronic, 4-foot lamp removed |
| Run9 | M07202 | Screw-in Compact Fluorescent Lamp, 14-26 watts |
| Run9 | M03582 | T-8 or T-5 Lamp and Electronic, 4-foot lamp removed |
| Run9 | M03926 | T-8 or T-5 Lamp and Electronic, 4-foot lamp removed |
| Run11 | M05787 | T-8 or T-5 Lamp and Electronic, 4-foot lamp removed |

## 6. The VRT Incorrectly Applies its Climate Zone Mapping to SCE

One of the greatest draw backs of the VRT process is its heavy reliance on the zip code mapping of the program tracking data to DEER climate zones. While zip codes do not always map correctly to climate zones, as compared to GIS based methods which remove uncertainties due to climate zone boundaries splitting existing zip code boundaries, and the ongoing change in USPS zips, both utilities and ED appear wed to this correspondence table approach. SCE has zip code-climate zone mappings that the CPUC does not, and vice versa. In the verification effort, the DEER team refers the received zip code to its own (CPUC) lookup table. If the zip code is unknown to this table, or the table mistakenly assigns a building to a climate zone not thought to be part of the SCE territory, the climate zone assignment by SCE is ignored, and no attempt to research the missing assignment is made. Instead, the building and its measure are assigned to "system." "System" does not refer to an average temperature climate zone (e.g. climate zone 9 in SCE territory), or to a synthetic average of climate zone TMY for the territory. It is assigned to climate zone 08, with generally negative estimated benefits consequences. The point is not that whether this happens frequently or infrequently, but

that it is not good practice to use the easily-remedied failings of one's own correspondence table to introduce bias. There was not enough attention given to this issue in the VRT process of utility zip-climate zone assignments. Below is a table that contains the cases in the Interim Database that were inappropriately mapped to the 'System' climate zone.

| EDCaseID | IOUE3ClimateZone | EDUpdatedClimateZone |
|---|---|---|
| M03700 | 5 | System |
| M04039 | 5 | System |
| M04476 | 5 | System |
| M04791 | 5 | System |
| M05599 | 5 | System |
| M06346 | 5 | System |
| M06347 | 5 | System |
| M07032 | 5 | System |
| M08216 | 5 | System |
| M08217 | 5 | System |
| M08218 | 5 | System |
| M09285 | 5 | System |
| M09286 | 5 | System |
| M09612 | 5 | System |
| M10231 | 5 | System |
| M10480 | 5 | System |
| M10993 | 5 | System |
| M11164 | 5 | System |
| M11217 | 5 | System |
| M11465 | 5 | System |

## C. ED Omitted Program Savings From 2004-05 and Incorrectly Calculated the Proposed Ex-Post Savings of Others

A significant number of SCE's 2004-2005 programs that were omitted from the Draft Report. While SCE strongly feels that the ED sidestepped Commission policy by including 2004-2005 results in the 2006-2007 MPS (see Section IV, Part B above), the Draft Report did not correctly follow its own stated methodology for including results from 2004-2005. This methodology is partly laid out in Appendixes C and D of the Draft Report. SCE has determined multiple categories of programs that were excluded from the Draft Report: Missing 2004-2005

IDEEA programs, missing 2004-2005 Summer Initiative programs, programs that received an improper realization rate, and improper accounting of commitments from these years.

### 1. Missing Programs: 2004-05 IDEEA Programs

SCE implemented 13 programs as part of its IDEEA solicitation in the 2004-2005 program cycle. The programs were procurement-funded and did receive a final impact evaluation, which was posted on www.calmac.org. The evaluation is as titled: Southern California Edison 2004-2005 IDEEA Constituent Program Evaluations (Study ID - SCE0234.01)

In ED's review of SCE's 2004-2005 programs, these programs were mistakenly left off of the list. This mistake undervalued SCE's achievements by over 37 million kWh and nearly 5 MW. A listing of these programs as well as the final evaluated energy savings and demand reduction is contained in Appendix 4 – Section 1.

### 2. Missing Programs: 2005 Summer Initiative Programs

SCE conducted six programs as part of its Summer Initiative efforts in 2005. These programs were approved in D.05-05-012. It appears as only one, SCE's Appliance Recycling Program Summer Initiative received a final Impact Evaluation that was included in ED's summary of SCE's 2004-2005 program achievements. The remainder were not and are identified in Appendix 4 – Section 2. This error underestimated SCE's achievements by over 178 million kWh and nearly 48 MW. Written below is the methodology SCE used to estimate a realization rate for its Summer Initiative programs.

Because these programs were never formally evaluated in the 2004-05 Impact Evaluations, SCE has estimated net realization rates for these programs based on parameters found through the Protocol-approved studies, re-weighting to match the characteristics of the programs as they were implemented.

The SPC/Express Efficiency Summer Initiative (SI) focused on lighting measures for nonresidential customers. While similar to Express Efficiency and SPC, it was its

own program a unique set of program rules. It was similar to the Express Efficiency program in that it included deemed measure savings and allowed customers under 200 kW, but was closer to SPC in its heavy verification requirement. Each and every site had to be inspected shortly after the installation to verify not only the presence and number of the measures, but also the exact type of lamp and fixture; lighting controls and screw-in CFLs were not included. In addition to the incentive for energy savings, there was an additional "kicker" for demand reduction. Because the program was unique, the SPC and Express Efficiency realization rates do not apply. SCE decided to use the net-to-gross ratios for lighting, the engineering realization rates from the Express Efficiency evaluation, and the verification rate found in the SPC evaluation. Specific verification rates were not available in the SPC report, so the results in the Express Efficiency report were used instead. These were deemed reasonable because they were relatively close to 1, as would be expected in a program with such stringent verification controls. But were also deemed conservative as they do not reflect additional energy saving and demand reduction impacts that happened as part of the program at participant sites, but were not rebated because demand for the program exceeded the available funds. The gross ex-ante energy savings and demand reduction were used to weight the verification rates and engineering realization rates, while the net-to-gross was reported for lighting as a whole. The Express Efficiency evaluation reported the verification rates and engineering rates for T8s and lighting by facility type. For the verification rates, those facility types that were not specified in the report (Industrial, Non-refrigerated Warehouses, Other – Agricultural, Other – Commercial, Other – Other and Refrigerated Warehouses) were assumed to be a verification rate similar to offices (0.93) as this was a relatively low rate given the 100% inspection in order to be conservative. For the engineering realization rates of kWh, those that were not specified (the same as for verification) were estimated to be 0.90, as this was roughly a mean value and seemed reasonable. The reported values ranged from roughly 2 to roughly 0.5. The ex-post lighting net to gross ratio of 0.77 was

used for all savings. Based on the distribution of facilities, SCE estimates a net realization rate of 1.030 for kW and 0.801 for kWh. The reason that the kW net realization rate is slightly over 1.0 is that the ex-ante NTG for the program was lower than the evaluation study-based result.

The Single-Family Home Energy Efficiency Rebate Summer Initiative was much more similar to the mainstream program implemented throughout the program cycle. Whereas the SPC/Express SI had its own set of program rules and procedures, the Single Family program was different only in its incentive levels and the measures it offered: it offered higher incentive level on only a subset of the measures delivered through the larger program. Because of the similarity, it was only necessary to re-weight the results based on the distribution of measures. The net realization rates estimated in the 2004-2005 Single Family Energy Efficiency Rebate Evaluation for the Home Energy Efficiency Rebate measures for SCE were weighted based on the net ex-ante savings. This yielded net realization rates of 0.719 for kWh and 0.711 for kW. These results are much higher than those for the program as a whole primarily because the program relied heavily upon programmable thermostats, which has a very low realization rate.

### 3. Programs Missing Impact Evaluations: Application of Realization Rates

For the programs that were not included in a final impact evaluation, ED took the realization rates and applied them to the ex ante results as posted in EEGA. However, SCE's final results for the 2004-2005 program cycle were reported to the CPUC in its 2006 Energy Efficiency Annual Report. At the time, there was no requirement to post this report on the Energy Efficiency Groupware Application (EEGA), nor reconcile this report to the monthly report workbooks that were contained in EEGA. Applying a realization rate to the EEGA-posted results is not the correct way to measure SCE's 2004-2005 programs. In one case, a realization rate was applied to a PIP version of the Single Family Rebate program. This PIP modification workbook contained results

through June 2005, not through December 2005. Regardless, to obtain the final results from programs that did not receive an impact evaluation, the results from the 2006 EE Annual Report need to be used. This error miscalculated SCE's program impacts by nearly 47 million kWh and nearly 4 MW. This information is provided in Appendix 4 – Section 3.

### 4. 2004-2005 Impact Evaluations Did Not Properly Account For Commitments That Are To Be Included In the 2004-2005 Recorded Results

The Draft Report does not properly account for the energy savings and demand reduction impacts from SCE' s 2004–2005 energy efficiency programs. Specifically, committed energy savings from SCE's California New Homes Program and Savings By Design programs paid after 2005 appear not to be included in the Draft Report. The Draft Report, in section 5.2.3, describes how energy savings from 2004–2005 commitments paid after 2005 are accounted for. Subsequently, Table 9 contains a list of programs that were included in this analysis. For SCE, the aforementioned programs were not included in the table and as a result of their omission the Draft Report severely undercounts program impacts for SCE. The Draft Report must be corrected to include all of SCE's savings impacts.

In sum, the disregard of SCE's complete, evaluated, and reported portfolio in 2004-2005 severely underreported SCE's achievements by over 225 million kWh and nearly 52 MW. The gravity of this error constitutes roughly 10% of the energy savings and demand reduction that the Draft Report calculated for SCE in the 2004-2007 period.

## VII.

## TECHNICAL COMMENTS: VERIFICATION REPORT ISSUES

The Verification Reports are troubling in the way they were implemented. They did not conform to EM&V Protocols regarding verification. They utilize flawed sampling and insufficient sample sizes, leading to a lack of precision. They lack transparency.

## A. ED's Draft Report Is Outside the Guidelines Approved in the EM&V Protocols

As mentioned above, the Draft Report does not conform to the protocols established and approved by the Commission guiding the development and implementation of this report. SCE has identified three overarching issues that were found to be prevalent across the program verification reports: flaws in the verification approach; flaws in the installation rate determination; and incorrect verification reports for upstream programs. These issues, brought forth in detail below, raise the question of whether the program verification reports met the CPUC verification requirements:

### 1. The Verification Approach Utilized is Flawed

The Energy Division published a guidance document that outlines the Verification Report's requirements. This document[25] cites how the Verification Report plays an important role in the RRIM:

> "The Verification Reports are used to true-up the ex ante estimates of GWh, MW and MTherm savings and PEB with respect to the number and type of measures installed, and the associated program costs. They do not, however, provide all the update information on parameters that go into the calculation of GWh, MW and MTherm savings and PEB."

It is under the above CPUC requirements that the Verification Reports are expected to be produced. However, it is evident that the Verification Reports have not been limited to the measure or unit installation verification as required in the CPUC directive cited above.

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[25] EvaluationPlansCoverLetter_zap_121807_v05_WAttachments.pdf

For instance, in SCE's Upstream Lighting Program, the proportion of business customer purchases among the types of customer purchases is a parameter of interest in determining UES values for bulbs used for such business applications. Such parameters, as rightly stated in the Draft Report need further investigation. SCE believes these types of issues should be left to the more rigorous impact evaluation process.

Similarly, in the Code and Standards program, the Contractor Verification Report relied on the Heschong Mahon Group Savings Estimation Spreadsheet (SES) and took the approach that the verification rate for this program means estimating the first element in the SES analysis. Element 1 in SES is as follows:

- Statewide gross savings, by year, for each of the standards, based on unit energy savings and total units/buildings affected.

The verification activity then went ahead to "true-up" the total units/buildings by using permit construction lags and building starts data. The "true up" was then based on contacting five building department officials for their best estimate of construction activity. Despite the fact that none of the five building departments contacted were from the SCE service territory, the problem with such a verification approach is that it is meaningless until the remainder of the gross savings elements are evaluated in the more rigorous ex post impact evaluation activities that are currently underway. Hence, it is not surprising that the verification report highlights that the report findings are preliminary and based on limited analysis.

In the case of PG&E2000 Single Family Program, both wall and attic insulation unit installation rates were based on re-assessing efficiency baselines at the installation sites and included this analysis in determining the per unit installation rate. Again, such parameters are part of the impact evaluation process that assesses the average baseline efficiencies for all participating customers in the savings estimation for the measure and the program. This type of analysis should not be part of the Verification Report.

In the PG&E 2000 HVAC Incentive Program Verification Report, the verification methodology involved assessing failure rates based on re-performing diagnostics tests to determine pass-fail criteria that are used for UES calculation. Additionally, the Verification Report says that it went beyond the techniques used by the maintenance service implementers. Such measurements, while an essential input useful for the impact evaluation that addresses and adjusts for changes in site conditions for estimating UES values, cannot and should not be used to determine the verification rate of measure installation. Moreover, such verification methodology was inconsistent with the verification approach used for the same measures in SCE's Comprehensive Mobile Home program where telephone surveys followed by on-site visits were used to verify the receipt of such measures by program participants.

## 2. The Installation Rates Determined By the Draft Report Are Incorrect

The Energy Division's guidance document to its contractors outlining the verification of installations explicitly defines (page 15, section 5.3) the approach to be taken for installation rate verification:

> "Evaluators should take the following approach to the verification of installations:
>
> - If based on the telephone/on-site investigation, the measure was not installed or a non-program qualified measure was installed, then the verified installation rate would be set to zero (footnote 17).
> - If based on the telephone/on-site investigation, a program-qualified measure was installed but with an efficiency level other than indicated in the program-tracking database, the evaluator should identify for the ED and future more rigorous impact evaluations those cases in which a recalculation of savings appears to be necessary.
> - For DEER measures, verify that the correct DEER savings values were used by the IOUs. To do this, the evaluator should collect, as necessary, for each measure the building type, vintage, climate zone.

- For non-DEER measures, if data are available, the evaluator should work to assess the accuracy of the unit savings for sampled measures selected. The evaluator shall review IOU work papers to determine whether the savings algorithms and associated assumptions conform to documented evaluation and measurement studies, engineering principles, or current DEER methodologies. If they do not, evaluators shall document their concerns and identify for the ED and later impact evaluations those cases in which a recalculation of savings is recommended. For measures which are similar to DEER measures, evaluators shall confirm the use of or apply current DEER methodologies to developing measure impact estimates. If proper methods are not being used, evaluators shall document their concerns for later analysis as part of the more rigorous impact studies."

- Footnote 17 – Note that we would ignore situations in which the measure was installed but later removed since this is already captured in the EUL.

SCE has found a number of cases in the Verification Reports where the verification rate is not based on quantities reported by programs to be received and installed by end-use customers, but are based on if found to be still operating despite early removals or breakage. The following list of programs verified installation rate need to be revisited to ensure that any installation rate calculation does not include early removals and breakage of installed measures:

- Upstream CFL Program
- Multifamily Rebate Program
- Small Commercial Contract group(multiple programs)
- Major Commercial Contract group (multiple programs)

SCE specially notes the inconsistencies in verification approaches and installation rate determination across similar programs. The CPUC EM&V Protocols for measurement and verification requires onsite verification of installations for both basic and enhanced rigor levels. The verification of installation rate for the high impact Upstream Lighting Program was based only on telephone surveys that unlike other

programs did not get a nested sample of on-site verification of telephone data. In general, such nested on-site samples when appropriately planned and implemented could be very useful for reliability purposes. However, there is a larger concern on the installation rate determination for this program that is expressed further below.

### 3. Incorrect Verification Reports for Upstream Programs

The applicability of EM&V Protocols for the determination of the installation rate for the Upstream Lighting Program is unknown and could be problematic for the purpose of a Verification Report. Currently, the protocols do not address the process to verify programs that are delivered upstream to the marketplace. Specifically, SCE strongly feels that problems linger within the methodology for estimating the installation rate for CFLs promoted through the Upstream Lighting Program. The problems include the update of previous values, the confusion of non-installation and removal, and the time-dependent nature of storage and installation.

In its calculations of savings from the 2004-05 programs, the ED used the realization rates found in the 2004-05 impact evaluation. The realization rates include both engineering realization related to the assumptions used for the savings parameters, as well as a verification rate related to the installation. Without updating these values, SCE does not receive credit for the CFLs that were not installed at the time of the evaluation, but have been installed since then and currently provide energy savings and demand reduction. This lack of inclusion in the Draft Report seriously undercounts SCE's progress towards the Commission's energy savings and demand reduction goals.

The Verification Report for this program has calculated the installation rate formulaically as one minus all the bulbs that are not currently in use. This is an incorrect method. The true installation rate is the proportion of CFLs purchased through the program that have been installed. Some number of the bulbs breaks or burn out early, which is why the EUL is estimated based on survival analysis. The EUL builds on the

fact that some have short savings lives and others have very long savings lives. Treating early-removal and early burn-out as non-installation double-penalizes the program for the bulb because that adjustment is already built into the EUL. The installation rate should thus include bulbs that have burned out or been removed. This flaw in the Verification Report was also propagated in the 2004-2005 results as well.

For most energy-efficient measures, an installation rate as a snapshot makes sense because there is no clear rationale for storage. One would not store an extra refrigerator, air conditioner, or chiller. However, with CFLs this concept lacks the nuance necessary to deal with how end-users actually behave. SCE fully expects residential customers to store a certain number of CFLs so that they can install them when existing bulbs burn out, but this does not fit neatly with instantaneous estimates of installation that serve as static values. Something more dynamic must be developed for CFLs promoted through the Upstream CFL program. Although SCE doesn't have a firm position on the correct disposition of this issue, the current measure installation verification results are problematic, and SCE hopes that the 2006-2008 impact evaluations will include a helpful exploration of the storage issue.

Given the irregularities and inconsistencies identified above in the Verification Reports, SCE urgently requests that Energy Division re-assess its reports and issue a Final Report that strictly conforms to the Commission directives for the Verification Reports. Such results should also be based on appropriate and applicable Measurement and Verification Protocols for providing verification of the utility claimed accomplishments.

## B. Flawed Sample Design

The work plan for the Cadmus study for the Residential Retrofit Contract Group requires that a "90/10" sampling error criterion would be met in all phases of verification. Noting first that sampling error is a source of unreliability distinct from measurement error or bias, SCE

observes that very often this criterion is not met, or there is no basis for determining whether it has been met in the verification studies contributing to the Draft Report. Furthermore, as is pointed in comments on the verification studies, and for both the Evaluation Framework and the Evaluation Protocols[26], the "criterion of 90 percent confidence in a 10 percent interval about the expected value" is of little worth when compared to thinking through the needed precision in absolute terms. And it is particularly meaningless when "pass/fail" proportions are the variables of interest. For example, consider a sample of size 170 applied to a program in which the pass rate turns out to be 91 percent. The standard error for this estimate, given the sample size, is approximately 2.9%, and for the 90% confidence interval approximately +/- 4.7% (or hundreds of thousands of dollars in some program contexts). More to the point, though, is that most quality assurance estimates refer to the error rate (in this case estimated at 100-91= 9%). While the relative precision as compared to the success rate of 91% is approximately (1.645 * (0.91/1.00) * (1/√170) or a comforting 5.2 percent, the relative precision for the all-important error rate is an essentially useless (1.645* (0.09/1.00) * (/√170) or 52.7%.

Additionally, the sample design should be done with respect to enhancing variance in key variables like climate dwelling type/size, and utility, rather than following the imprudent approach to statewide evaluation that allocates proportional to population of customers, participants, etc.

## C. Insufficient Sample Size

The sample sizes used in the various verification studies are inadequate to obtain 90/10 precision on the failure rate. Taking the example of Appliance Recycling Program and assuming a 4% failure rate had been achieved, the relative precision of this estimate would have been nearly 54% for the refrigerator sample -- far worse than the 10% relative precision required by the EM&V protocols. By comparison, the success rate calculation is 2.1% relative precision –

[26] See comments posted by John Peterson, Athens Research on the energy data website reference file comAttach_595.doc

which ignores the importance of every percentage point in terms of return on energy-efficient investment. For freezers, the relative precision is even more questionable, given the protocols. This is just one example of the study (along with the Evaluation Framework and the Protocols) ignoring a fundamental flaw in the sampling protocol – the sloppy reliance on relative precision for guidance.

| Measures | Number | Relative Precision (Pass -96%) | Relative Precision (Fail -4%) |
|---|---|---|---|
| Refrigerators | 232 | 2.10% | 53.90% |
| Freezers | 89 | 3.28% | 93.90% |

Another issue that recurs in the verification studies involves sample point allocation that doesn't appear to follow a rationale related to either precision or cost. In the RARP example, there is no justification given for the 232/89 sample size split given the large size of each population, there is no obvious rationale for either (a) risking inaccuracy for freezers, or (b) wasting evaluation resources on 232-89 or 143 excess refrigerator surveys. Note that we are pretending the failure rate in the population is 4%. In fact, this sample produced almost perfect "passes" but the point is being made with an actual sample and of course there have been failures.

## D. Lack Of Sample Precision

There are occasions in the verification studies where either the precision level required is not reached by any twist of the numbers, or is not well enough documented to be able to determine. Following is an account of the above data collection issues that were identified in the Verification Report reviews of specific SCE programs:

### 1. SCE2501 Residential Incentive Program

The general comments made above regarding the inadequacy of sample sizes with respect to the relative precision requirement for the failure rate apply here, particularly for whole house fans, evaporative coolers, and lighting exchange measures.

Additionally, all measures, including room ACs, would seem to require more reliable verification (i.e. M&V protocol-required on-site visits), and perhaps fewer surveys – recognizing, however, that fewer surveys would worsen the study with respect to the sloppy relative precision requirement of the Protocols.

Further, the verification effort confuses effective useful life (retention of installed measures) with installation. For room ACs, at least five "failures" actually involve installations that were subsequently removed. More than half of lighting exchange units were also "measure deaths" rather than installation failures. Relative precisions for the observed failure rates are, predictably, very large (i.e. poor in terms of the Protocols):

| Measure | Number | Failure Percentage | Relative Precision (Pass) | Relative Precision (Fail) |
|---|---|---|---|---|
| Room AC | 424 | 3.50% | 1.48% | 43.28% |
| Lighting Exchange | 149 | 7.40% | 3.82% | 47.89% |

## 2. SCE2502 Multifamily Energy Efficiency Rebates

The Team chose to verify indoor and outdoor lighting measures, completing visits to 70 and 62 complexes, respectively (with some complexes serving for verification of both measures). Indoor and outdoor tracking counts were 14,599 and 4,151 measures respectively.

There is limited hard data provided on what alleged failures were observed over this small number of complexes. The narrative by Cadmus suggests that a large number of failures were installations that had been subsequently removed due to customer preferences or lamp failure – once again confusing installation and retention issues:

> At most of the sites with less than 100 percent verification, rebated lamps were replaced due to lamp failure (p 48).

There is no recognition of the fact that this is essentially cluster sampling, less efficient than simple random or stratified random sampling. The sample sizes of 70 and 62 complexes are inadequate for estimation of a very consequential failure rate, and there is no description of the sampling of secondary units (apartments, sections of common

areas, etc.). This, combined with the confusion of retention and verification of installation that has occurred in the MFR program work, makes the verification suspect.

### 3. SCE2502 Comprehensive Manufactured/Mobile Home Program

For this program, duct test and seal, and AC diagnostic tune-ups were regarded as high impact. Per the Verification team, "data collection to verify these measures was based upon sample sizes selected to yield verification results for the measure group with 10-percent precision at the 90-percent confidence level at the program level, and with a research and data collection process designed to minimize any potential biases." This effort boiled down to 90 duct and seal telephone calls, and 150 AC diagnostic surveys. It is not clear why these target counts were selected – in particular why the measures were unequally sampled. Within each telephone survey sample, small samples of site visits were "nested." The telephone surveys appear to have verified the activity in all but one case for each sample, and the on-site visits are verified in all cases. It is not clear how a 100% verification rate was determined, given that the phone survey results are not statistically different and may be due to the unreliability of telephone surveys. This is of course not of much consequence for this program, but the problem of how to properly handle nested on-site visits is more critical for other utilities' residential programs, and it is to be noted that in general those results show on-site visits yielding up higher verification rates than the larger set of phone surveys.

### 4. SCE2511 Nonresidential Direct Install Program

The report's third chapter -- "Verification Sampling and Methodology" – cites CPUC directive D.05-04-051 that indicates that "*performance be evaluated based on overall portfolio achievements, rather than on the performance of each individual program (p. 3-1).*" Chapter 3 is less clear than might be hoped – it is demonstrably easy to get confused about what the contractor considers the particular population that a confidence/precision level refers to, whether confidence/precision is calculated assuming

a binomial approach to measure presence/absence, or an approach that is oriented to savings variance, and even whether or not cluster sampling is taking place. For example, while the vendor reported in meeting with the utilities that there was no cluster sampling occurring, "whenever possible the field verification efforts comprised a census of the measures installed" – which means that the probability of Measure B being surveyed is entangled with the characteristics of its site affecting the probability of initial selection of Measure B's site based on stratifying on (it seems) Measure A size.

In the end, a total of 35 site visits are reported to have been made for interior lighting measures, and 17 for interior screw lighting. The program delivered interior lighting to roughly 92,000 sites, and interior screw lighting to 40,000 sites, through 2007. The approach seems to have involved a de facto cluster sampling approach in that if Measure A was the basis for selection of Site S, the probability of all measure B's at the site being selected apparently became one.

Beyond whatever unreliability and/or bias that is brought into the study via the on-site inspection, which is only lightly documented, the sampling precision for both of these estimates is guaranteed to be very poor, due to a sort of de facto clustering. The only way to achieve an estimate of the sampling precision, given the approach to small commercial verification, is through a bootstrap approach which treats the sites as sample points, and repeatedly calculates the kWh and kW weighted estimates from the replication sample. This reveals the precision of these estimates is highly likely to be very poor.

Note also that when the verification extends to include removals due to either product failure or customer preference, as in the case of the lighting measures in the SCE NRDI program, the issues of verified installation and measure retention are conflated, biasing downward the total savings estimates.

## 5. SCE2517 Major Commercial Program

There are a number of issues in this Verification Report. Page 29 of the report does not clearly indicate whether the tracking system correction mentioned by SBW will lead to a corrected failure rate, and how, where, when the correction will be applied. SCE2517 covers SCE programs that are run quite differently. It is hard to understand why the verification rate should apply to all programs, given that only one program has been the basis for sampling, and that delivery strategy is presumably quite strongly related to presence and/or quality of installation.

The very small site sample is rationalized based on a stratification-by-size approach that is supported by the California Evaluation Protocols. However in light of the very small sample size, it behooves both utilities and Energy Division to verify the reasonableness of the precision claimed for this sample, using, for example, sample replication methods. This is particularly important given that this is an instance of cluster sampling there is clearly a significant amount of intra-site sampling occurring: in other words, measure A's size and a specified sampling rate for that size lead to Site S, at which point, if Measure A is "really big," an undocumented sampling approach is taken, in which portions of the site or specific physical measures may be seen as secondary sampling units. This is a quiet and probably very significant contribution to imprecision, which is recognized.

Also note that the relative precision that is claimed for kW and kWh doesn't meet the requirement of 10%. It is still less likely to be the case if the sampling within large facilities is considered. As in other studies, lamp burnout is cited as a contributor to C&I Interior Lighting "failure" for SCE (page 31). This seems to conflate retention and installation issues.

## E. Lack Of Transparency In Verification Reports

The CPUC Evaluation Contract Groups represented by the high impact combinations include:

- Residential Retrofit Contract Group
- Small Commercial Contract Group
- Major Commercial Contract Group
- PG&E Industrial Programs Contract Group
- Local Government Partnerships

Because these Contract Groups accounted for such a large fraction of the energy savings and demand reduction for SCE, the Energy Division assigned verification tasks to only these Contract Groups. The Codes & Standards and New Construction Evaluation Contract Group were not included in this list. A Codes & Standards Advocacy report is included as one of the Appendices, but was not listed in Section 3.1.21. There was not a separate verification report for New Construction.

The list of measure groups analyzed in the Verification Report is shown in Table 2 of the Draft Report. In both residential and commercial measure groups, a measure titled "Whole building and custom" is listed, but none of the verification reports list CA Energy Star® New Homes, Sustainable Communities, or Savings By Design as reviewed programs. Similarly, in the Appendix G database, changes were not noted to the values used for the new construction programs. There is significant lack of transparency in the overall Draft Report.

## VIII.

## TECHNICAL COMMENTS: MISAPPLICATION OF DEER 2008

In many cases, DEER was not applied to the VRT in the correct manner. These includes unit energy savings, net-to-gross ratios, effective useful lives and incremental measure costs.

### A. Incorrect Mapping of DEER UES Assumptions

The Draft Report contains numerous examples where DEER 2008 and related assumptions were improperly mapped to the SCE's program measures. In all cases, the result

was to incorrectly discount measure savings and undercount SCE's MPS and PEB achievements. There are five examples identified below:

### 1. Example 1: Improper Building Type Mapping

The Draft Report incorrectly mapped SCE's building types and therefore assigned incorrect DEER 2008 values to the impacted measures. For example, installations conducted in Medical Clinics were mapped using the DEER 2008 values for Small Office for a T12 to T8 measure. This error was prominent in the Nonresidential Direct Installation (SCE2511) program and the Express Efficiency (SCE2517) program. The Medical Clinic building type should have been mapped to a more similar Nursing Home building type contained in DEER 2008 or the 2005 DEER Medical Clinic building type should have been included in DEER 2008. Small Office buildings have significantly less operating hours than Medical Clinics and therefore SCE is being improperly penalized. Appendix 5 – Section 1 contains a more detailed summary of the impact.

### 2. Example 2: Upstream CFLs Received a Double Verification Rate

The Draft Report incorrectly applied an installation rate twice on CFL measures that were "passed though." This error occurred with CFLs found in SCE's Upstream Lighting (SCE2501) program that were purposely not mapped to DEER 2008. In these cases, SCE had already in its ex ante accomplishment reporting applied a non-installation factor of 10%. The Draft Report then subsequently applied an additional non-installation rate of 33% to those same measures. SCE's assumptions were fully documented, reported, and available to the ED and its consultants, however, it appears that due diligence was not followed in understanding the programs and measures that SCE offers. Had the workpaper been properly accounted for in the analysis, the energy impacts in these cases should have been increased by 10%. However, because the Draft Report was hastily assembled without proper review or quality control, this error propagated itself through the report. Appendix 5 – Section 2 contains an excerpt of the work paper that

indicates the 10% installation rate that SCE applies to its CFLs delivered through SCE's upstream program.

### 3. Example 3: Energy Savings Irregularities

The Draft Report contains cases where the source of the savings value used cannot be ascertained for a specific CFL measure. For example, in Appendix 5 – Section 3 there are two different ED-updated ex ante gross unit savings values shown for the same lamp. In the VRT database, the 204.65 kWh value is designated for a 20 watt CFL along with a value of 221.83 kWh for the same CFL. In another example, SCE has a building type mapping of Miscellaneous Commercial. These values should have been "passed through" in the VRT database according to the Draft Report's defined methodology. However, they received an update based off a representative building type that was not consistently applied. In SCE2517, the linear fluorescent update received a value of 755.905 kWh in some cases and 789.072 kWh in other cases. The randomness and lack of quality control in the Draft Report is concerning.

### 4. Example 4: Draft Report Misinterprets Appliance Recycling Program

The Draft Report misrepresents the Appliance Recycling Program (SCE2500). It appears that this program would have been drastically de-rated by 80% had the analysis completed in section 6.2.4 of the Appendix J of the Draft Report been applied to the VRT calculations. It appears as though the program was mapped incorrectly to DEER 2008, given the nature of the program. For example the program implements the removal of an appliance to prevent a resurfacing of that appliance on the grid. The program is not a replacement program as partially indicated in the Draft Report. Instead of mapping the measures directly to DEER as would be logically assumed and proposed by the Draft Report itself, Summit Blue improperly weighted the program based on their false interpretation of the 2004-2005 Statewide Residential Recycling Program Evaluation Study.

### 5. Example 5: Customized Programs Incorrectly Accounted For

In the Draft Report, SCE's customized program, Standard Performance Contract (SCE2517) was applied a 79% gross realization rate. However this 79% realization rate was incorrectly applied in some cases as the final measure values in the VRT are substantially less than 79% of the ex ante value. Furthermore it is unclear if a double realization rate adjustment was made in this program, as SCE already uses a realization rate of 89% The following table illustrates the measure-level discrepancies found in the VRT where it appears a realization rate greater than 21% is being used:

| Measure Name | ED VRT Updated Ex-Ante Gross Savings (kWh) | SCE Ex Ante Gross Savings (kWh) x 79% | Variance |
|---|---|---|---|
| Commercial Customized Process | 14,531,745 | 14,556,453 | (24,708) |
| Commercial Indoor Lighting System Replacement | 11,285,791 | 11,375,896 | (90,105) |
| Commercial Indoor System Replacement | 22,485,991 | 22,653,899 | (167,908) |
| Industrial Customized Process | 79,774,473 | 79,927,168 | (152,695) |
| Industrial Customized Pumping | 15,159,751 | 15,451,540 | (291,789) |
| Industrial Indoor Lighting System Replacement | 16,487,338 | 18,979,662 | (2,492,324) |
| Industrial Adjustable Speed Drives | 12,551,685 | 12,597,113 | (45,428) |

## B. Incorrect Mapping of DEER NTG

The Draft Report contains many errors in the application of the DEER 2008 net to gross ratios to SCE's portfolio. The errors are always made to the detriment of SCE's accomplishments. It appears as though the quality control processes in place were not sufficient in order to ensure the accuracy of assessing SCE's portfolio using DEER 2008. The following table indicates the errors made in the propagation of net to gross ratios in SCE's portfolio:

| SCE Program | Measure | VRT Value | DEER 2008 Value | Notes |
|---|---|---|---|---|
| SCE2501 (Upstream Lighting) | Specialty CFLs | 60% | 85% | Includes Globe, Reflector, and Dimmable CFLs |
| SCE2501 (LightWise) | Screw-in CFL | 60% | 80% | LightWise program is a give-away program that was partially and incorrectly mapped to SCE's Upstream Lighting Program |
| SCE2501 (STAPLE) | CFL Fixtures | 80% | 85% | |
| SCE2517 (Express Efficiency) | Occupancy Sensors | 77% | 84% | |
| SCE2511 (Nonresidential Direct Install) | All Direct Install Refrigeration Measures | Range - 46% to 80% | 85% | Measures were given NTGs assigned for downstream prescriptive rebates instead of the correct direct install NTG |

These errors must be rectified, because as is, they misrepresent SCE's accomplishments as being lower than what they should be.

## C. Incorrect Mapping of DEER EUL

The Draft Report contains many blunders and inconsistencies in the application of DEER 2008's effective useful lives into SCE's 2006-2007 portfolio results. Beyond a series of errors, the Draft Report inconsistently applies the DEER 2008 EUL updates. For example, the EULs for the Nonresidential Direct Installation (SCE2511) program were not updated; despite the fact the 2008 DEER included updated EULs for measures in this program, as it did for UES and NTG estimates, which were updated in the Draft Report. As a rule, the EULs in DEER 2008 tend to be higher for nonresidential CFLs and linear fluorescent measures delivered for this program; the latter by roughly four years greater than the ex ante EUL that SCE has been claiming. These updates were not made. In the Express Efficiency (SCE2517) program, several building types did not receive a consistent update. For instance, in virtually every lighting application, those installed in the Small Retail, Industrial, and Hotel building types were only partially updated. Some were updated to the higher values and some were left unchanged. These types of inconsistencies, in addition to the blatant errors contained in the table below bring into question the methodologies established to create, implement, and review the Draft Report.

| SCE Program | Measure | VRT Value | DEER 2008 Value | Notes |
|---|---|---|---|---|
| SCE2501 (STAPLE) | LED Night Light | 8 | 16 | |
| SCE2501 (STAPLE) | Torchiere | 9 | 16 | A single measure was updated from 9 to 12, which is the Nonresidential CFL Fixture EUL. The Residential CFL Fixture EUL is 16. |
| SCE2517 (Express Efficiency) | Linear Fluorescents | Various | Various | The DEER 2008 EUL formula was not applied in all cases; for instance, a Small Retail 8 foot T8 lamp received an EUL of 11 years in one case and the proper 15 years in another case |

## D. Incorrect Incremental Cost Assumptions

The DEER 2008 update for 2006-2007 does not include an update for incremental cost. Specifically the DEER website says "Technology and Measure Cost Data Cost Values will be available at a later date." In spite of this, the Draft Report contains numerous updates to the incremental measures that are incorrect and beyond the scope of the methodology outlined in the Draft Report.

For example, the Draft Report made a significant error by updating the incremental costs in the Upstream Lighting (SCE2501) program. It appears as though the updates were values that were obtained from the program tracking system; however, the data fields in the tracking system are used to validate distributor/vendor compliance to program guidelines. By no means is this field any indication of incremental measure costs. Examples of incremental costs for CFLs in the VRT range upwards to $29.84 for a single CFL. The gravity of this error is enormous as a $1 rebate subtracted from a supposed measure cost of $29.84 artificially and astronomically inflates the participant cost. Specifically, a 9W screw-in CFL was assigned an IMC value $12.59, when SCE's E3 and workpaper has a value of $4.40 and DEER 2008 for 2009-2011 had a planning value of $2.57. The magnitude of this error is significant and must be removed from the Draft Report.

In addition, there are significant errors contained in the Nonresidential Direct Installation (SCE2511) program. The program installs energy-efficient measures at a business location at no cost to the customer. Hence the participant cost is zero. The program is delivered to customers by two contractors who have set rates to implement the program; these rates are captured in

SCE's E3 Calculator for the program. However, the ED updated the gross measure costs in what appears to be 94% of the entire program. This incorrect and arbitrary update caused positive and negative participant cost values alike, when by rule that value should be zero. This creates a grossly distorted representation of SCE's cost-effectiveness and PEB.

## IX.

## CONCLUSION

Through the leadership of the Commission, California has established aggressive energy efficiency goals for investor owned utilities – and innovative policies to ensure those goals are met. One such policy was an innovative and groundbreaking energy efficiency risk reward incentive mechanism that was intended to allow utilities to generate earnings for shareholders by achieving significant levels of energy savings through energy efficiency. This elevated energy efficiency to a principle utility resource to not only secure California's future energy environment but also to combat global warming. The Draft Report released by the Energy Division seeks to unravel that progress. As the circumstances described above demonstrate, the Draft Report misapplies verification results and measurement studies, miscalculates SCE's earnings amount, and completely misrepresents SCE's accomplishments. SCE continues to support energy efficiency as the cornerstone of California's environmental leadership and remains dedicated to working with the Commission on addressing the concerns regarding the Draft Report and the overall risk reward incentive mechanism process.

Respectfully submitted,

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