Application No. A. 08-05-_____
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Witness: McKinley, Kevin C.

PREPARED DIRECT TESTIMONY OF KEVIN C. MCKINLEY ON BEHALF OF SAN DIEGO GAS & ELECTRIC COMPANY'S LOW INCOME ENERGY EFFICIENCY PROGRAM PLANS AND BUDGETS FOR PROGRAM YEARS 2009-2011

Before the Public Utilities Commission
Of the State of California

May 15, 2008

#217510

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I. OVERVIEW

The purpose of my testimony is to discuss the following topics, as they relate to San Diego Gas & Electric Company's ("SDG&E") Low Income Energy Efficiency ("LIEE") program cost effectiveness calculations:

- The cost effectiveness analysis for the proposed LIEE program for Program Years ("PY") 2009–2011, using the Utility Cost Test ("UCT"), the Modified Participant Test ("MPT"), and the Total Resource Cost ("TRC") Test;
- The 2005 LIEE Impact Evaluation report and its effect on the PYs 2009–2011 LIEE program; and
- The proposed Measurement & Evaluation ("M&E") studies including a Non-Energy Benefits Study which will examine the future application of non-energy benefits ("NEBs") to cost effectiveness calculations.

My testimony specifically requests that the Commission grant SDG&E approval of the Measurement and Evaluations studies proposed for the PY 2009-2011.

II. BACKGROUND

In Decision ("D.") 02-08-034, the California Public Utilities Commission ("Commission") instructed the large investor-owned utilities ("IOUs") [1] to evaluate the cost-effectiveness of the LIEE program measures for PY 2003 using the UCT and MPT. The tests incorporate NEBs such as comfort, health and safety as well as direct energy savings benefits to assess LIEE program cost-effectiveness. The methodology for conducting these tests and the criteria for evaluating the test results were recommended to the Commission by the Cost Effectiveness Subcommittee of the Reporting Requirements Manual Working Group and the LIEE Programs Standardization Team ("Standardization Team") in a jointly filed report in March 2002[2] and were subsequently adopted by the Commission in D. 02-08-034.

The cost effectiveness approach adopted by the Commission in D. 02-08-034 directed the application of two tests for the LIEE programs: the MPT, which assesses

[1] The large Investor-owned utilities include: SDG&E, Pacific Gas & Electric Company, Southern California Gas Company ("SoCalGas"), and Southern California Edison Company.

[2] *Final Report for LIEE Program and Measure Cost Effectiveness*, submitted to the CPUC by the Cost Effectiveness Subcommittee of the Reporting Requirements Manual ("RRM") Working Group and the LIEE Standardization Project Team, March 28, 2002.

measures from the perspective of LIEE participants;[3] and the UCT, which is calculated from the point of view of the utility. Both tests incorporate a set of NEBs, as well as direct energy-related benefits. These NEBs capture a variety of effects such as changes in comfort and reduction in hardship, which are not captured by the energy savings estimates derived from load impact billing evaluations, and are ignored in more traditional cost effectiveness approaches like the TRC Test. The NEBs developed for these tests were initially designed for use at the program level and were allocated to individual measures according to their energy savings.

Originally, the specific costs included in the MPT and UCT depended upon the application of the test results. In assessing overall program cost effectiveness, both direct measure costs and a variety of indirect costs (administration costs, outreach and training, regulatory reporting costs, etc.) were considered. In evaluating the cost effectiveness of individual measures, however, only installed measure costs were included in the benefit cost ratio. These installation costs are sometimes referred to as incremental or marginal costs. There was much discussion on this particular issue when the tests were initially developed (for example, whether to include opportunity costs, or whether to include both direct and indirect costs). In the end, the Standardization Team decided that, from an economic perspective, the cost effectiveness analysis should consider only those costs that were truly affected by the immediate decision at hand and be based on costs that are known or could be reasonably estimated. In applying the cost effectiveness framework to individual measures, then, the decision at hand was whether or not a specific measure should be retained or dropped from the program. Insofar as retaining or dropping a specific measure would have a relatively minor impact on indirect costs, these indirect costs were ignored in the application of the measure level cost effectiveness tests.

The UCT used avoided costs[4] to value energy savings, while the MPT used retail rates adjusted for low-income customers to value energy savings. To determine LIEE

[3] The Participant Test was modified to use utility LIEE program costs in order to create a benefit cost ratio, since low income customers do not incur out-of-pocket expenses to obtain LIEE measures. The CPUC Office of Rate Payer Advocates wanted to estimate and use for this test the opportunity costs incurred by low income customers in lieu of any out-of-pocket expenses incurred; however, the final Team decision was to base the benefit cost ratio on known costs (in this case, the direct costs incurred by the utilities to install the measures), hence the Modified Participant Test.

[4] The term "avoided costs" refers to a variety of costs avoided by society as a result of reduced energy demand, either electricity or gas.

measure cost effectiveness, the measure-specific benefit-cost ratio was compared to the overall program benefit-cost ratio. For a measure to "pass" and be considered cost effective, its measure-specific benefit-cost ratio must have been at least as high as the overall program ratio for either the UCT or the MPT.

The analysis of measure cost effectiveness was conducted at a fairly disaggregated level. For all measures, cost effectiveness ratios were developed by residence type and (where applicable) fuel type. For measures with weather-sensitive effects, the analysis was also conducted by climate zone. This disaggregated approach was designed to recognize the variation in benefits and costs across specific applications of the measures in question. However, it also yielded situations in which measures were cost effective in some applications (for some utilities, residence types, some climate zones, or one fuel) but not others. In these cases, the Subcommittee developed a set of consistent rules to determine whether or not a measure should be included in the LIEE program.[5]

In June 2003, the Subcommittee filed a report describing the analysis and results of the measure cost effectiveness assessment for the 2003 LIEE Program.[6] This report included recommendations for keeping or dropping measures in the LIEE Program based on their cost effectiveness results.

III. LIEE COST EFFECTIVENESS TESTING FOR PY 2009-2011

For the PY 2009-2011, the Commission instructed the large IOUs to provide program level and measure level benefit cost ratios using the UCT, the MPT, and the TRC tests.[7] Because the measure level benefit cost ratios produced for this Application are to assess the cost effectiveness of the program as a whole, indirect costs were included in the analysis, unlike the previous analysis completed for the 2003 programs described above. In addition, because significant changes have been made since 2003 in the way avoided costs are included in energy efficiency analyses, the E3- Calculator for PY 2009-2011 planning[8] ("E3 Calculator") was used in this analysis to measure avoided

[5] These are documented in the final report cited later in this section.
[6] *LIEE Measure Cost Effectiveness*, submitted to the CPUC by the Cost Effectiveness Subcommittee of the RRM Working Group and the LIEE Standardization Project Team, June 2, 2003.
[7] *Assigned Commissioner's Ruling Providing Guidance for Low-Income Energy Efficiency 2009-2011 Budget Applications*; Rulemaking 07-01-042, April 1, 2008.
[8] SDG&E Tool 5c (800) downloaded from http://www.ethree.com/cpuc_cee_tools.html on 04/21/08.

cost benefits. The steps involved in conducting the cost effectiveness tests for the PY 2009-2011 LIEE programs are summarized as follows.

The MPT was conducted using the methodology approved by the Commission for the PY 2003 evaluation. The model used in that evaluation was updated with the proposed values for PY 2009-2011 as follows:

- The estimated number of participant households was entered by measure type, housing type, fuel type and climate zone where applicable.
- The estimated program costs were entered as measure-specific installation costs and overall program indirect costs.
- Estimated energy saving impacts were entered as therms, kWh related to non-cooling measures, kWh related to cooling measures, and kW impacts where they were available. [9]

The benefit cost ratio for the MPT test consists of the NPV of energy savings and NEBs for the participant in the numerator, and the cost of the program (both measure installation and indirect costs) in the denominator. For measure level benefit cost ratios, the indirect costs were allocated based on the energy savings of the measure.

The UCT was conducted in two stages. First, the NEBs model used in the PY 2003 evaluation was used to calculate program level NEBs, similar to the analysis for the MPT but with utility-specific NEBs specified rather than participant-specific NEBs.[10] Second, the E3 Calculator was used to derive the avoided cost benefits. The E3 Calculator was populated with the proposed measure installation quantities, proposed program costs, and the energy savings impacts described above for the MPT. The benefit cost ratio for the UCT test consists of the NPV of avoided cost savings for the utility plus the utility NEBs in the numerator, and the cost of the program (both measure installation and indirect costs) in the denominator. For measure level benefit cost ratios, the indirect costs were allocated based on the energy savings of the measure.

[9] Most of the impacts used in the analysis were taken from the 2005 Impact Evaluation conducted by West Hill Energy & Computing described later in this testimony. Where impacts were not provided in this study, they were taken from the Database for Energy Efficiency Resources ("DEER"), workpapers, or the impacts used in the"Preliminary Report on the Assessment of Proposed New LIEE Measures," Itron, March 2005.

[10] Examples of utility-specific NEBs include reduced carrying costs on arrearages, fewer shutoffs, fewer reconnects, fewer customer calls; examples of participant-specific NEBs include water/sewer savings, fewer fires, property value benefits, fewer illnesses, comfort, and reduced hardship.

The TRC test was conducted using the E3 Calculator. As with the UCT, the E3 Calculator was populated with the proposed measure installation quantities, proposed program costs, and the energy savings impacts described above for the MPT. The E3 Calculator provides program level results and measure-specific results with indirect costs allocated based on the energy savings of the measure. The TRC test [11] does not include NEBs, so in this respect it is not comparable to the results of the MPT and the UCT.

In general for this analysis, it is important to note that allocating indirect costs across measures according to energy savings in many cases skews the cost effectiveness results for some measures, making them appear to be less cost effective or more cost effective than they really are. The reason for this is that indirect costs are not directly related to the amount of energy a measure might save. The result of allocating indirect costs by energy savings is that measures that contribute more energy savings to the portfolio bear a greater portion of these costs than measures that contribute less energy savings. For example, according to the most recent impact study discussed below, 78% of the statewide electric LIEE energy savings is attributable to refrigerators. Thus, although the number of units installed is relatively low compared to other measures, they bear a large portion of the allocated indirect costs and this drives the benefit cost ratio for this measure down.

The program level results of the cost effectiveness tests are presented in Table 1.

Table 1: Program Level Cost Effectiveness Ratios

UCT	MPT	TRC
0.60	0.86	0.51

The measure level results of the cost effectiveness tests are provided in Attachments to the Application -- Attachments A-5, A-6 and A-7. These results are presented by housing type, fuel type, and climate zone where applicable.

IV. LIEE 2005 IMPACT EVALUATION

D.02-12-019 directed the utilities to conduct a load impact evaluation for the LIEE program bi-annually in accordance with the Measurement and Evaluation protocols

[11] The TRC test is used for determining the cost-effectiveness of program portfolios offered under the Energy Efficiency programs. The portfolio of programs must result in a TRC of 1 or greater to be deemed cost-effective. Historically, the Commission has not required LIEE programs to meet the TRC threshold because the programs served other Commission equity objectives.

and the provisions[12] described in D.03-10-041. Following this direction, the 2005 Program was evaluated by West Hill Energy & Computing, Inc.[13] The primary purpose of the 2005 evaluation was to estimate the first year energy savings for the measures offered under the LIEE program at the program and measure level. In addition, the 2005 evaluation was designed to provide additional information for certain key measures, i.e., lighting, cooling, and low-flow showerheads. The study also assessed the effectiveness of the energy education component of the Program on a qualitative basis and provided recommendations for improving the Program.

The study incorporated a regression analysis to estimate impacts. The results of the regression analysis were then compared to estimates from previous evaluations, external studies, and other data collected through the showerhead and the on-site surveys in an effort to triangulate and improve the estimates of the energy impacts. Table 2 and Table 3 below present a summary of these results for the LIEE program's electric and gas measures.

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[12] *Protocols and Procedures for the Verification of Costs, Benefits, and Shareholder Earning from Demand-Side Management Programs, as adopted by the Commission*, Revised June 1999.
[13] Westhill Energy & Computing, Inc. *Impact Evaluation of the 2005 California Low Income Energy Efficiency Program Final Report*, December 19, 2007.

Table 2: Summary of Savings for Electric Measures

Measure	Regression Result	Showerhead/ On-site Estimate	DEER/ External Studies	Previous LIEE Evaluations	Source of PY 2005 Savings Estimate
Lighting (per CFL)	11 kWh	22 kWh	21 – 60 kWh	22 - 43 kWh	Adjusted to be between regression and on-site estimate, at 90% upper confidence bound of regression result
Refrigerators	755 kWh	None	None	645 - 795 kWh	Electric regression model
Attic Insulation (heating)	257 kWh	None	180 kWh (2005)	35 - 288 kWh	Electric regression model
Attic Insulation (cooling)	70 kWh	None	None	44 - 208 kWh	Electric regression model
Domestic Hot Water ("DHW") Package	Not estimated	171 kWh (showerhead)	78 - 608 kWh (2001)	30 - 240 kWh	Convert savings from gas regression model
Evaporative Coolers	245 kWh	None	333 – 5056 kWh (2001)	98 - 571 kWh	Electric regression model
Efficient Room A/C	97 kWh	None	None	80 - 571 kWh	Electric regression model
Air Sealing/ Envelope measures	Not estimated	None	None	10 - 56 kWh	Convert savings from gas regression model

Table 3: Summary of Savings for Gas Measures

Measure	Regression Result (Therms)	Showerhead/ On-site Estimate	DEER/ External Studies	Previous LIEE Evaluations	Source of PY 2005 Savings Estimate
Air sealing/envelope	6.1	None	None	3 – 11 therms	Gas regression model
Attic Insulation	47.2	None	41 therms	10 – 59 therms	Gas regression model
Heating System Repair/Replace	2.4	None	None	Increased Use to 147 therms	Gas regression model
DHW Package	13.5	7.3 therms (showerhead)	20 – 26 therms	10 - 20 therms	Gas regression model
DHW Replacement	12.1	None	None	9 – 19 therms	Gas regression model

Table 4 below presents a summary of the electric savings by end use reported by the study.

Table 4: Electric Savings by End Use

End Use	Energy Savings (MWh)	% of Total	Coincident Peak Demand Savings (KW)	% of Total
Refrigerators	37,011	78%	6,293	75%
Lighting	7,558	16%	717	9%
Cooling	1,165	2%	410	5%
Electric DHW Conservation	1,083	2%	927	11%
Electric Space Heat	534	1%	0	0%
Totals	47,319		8,309	

The study included the following recommendations for improving the program and future evaluations:

- Focus energy education on actions with higher savings and lower acceptance, such as drawing shades to reduce cooling;
- Improve the quality of the CFL lamps and ensure their installation to raise retention rates from the 65% found in the on-site survey;
- Provide additional instruction on the appropriate use of evaporative coolers and air conditioning systems;
- Consider changes to the refrigerator replacement protocols;
- Focus on non-energy benefits (e.g., improvements in health and safety) in the next evaluation; and
- Consider adding efficient clothes washers to the program and how to claim savings for reduced water pumping from low flow devices and other water-savings measures.

This study provided valuable information for program planning and reporting. Primarily, the estimated savings will be used for regulatory reporting and for cost effectiveness testing. In addition, a number of findings informed LIEE program design for 2009-2011. For example, according to the results reported from this study, energy savings for key measures are significantly higher in high consumption households. Consistent with this finding, SDG&E's proposed program design focuses primarily on those customers/homes who are the highest energy consumers, without excluding those potentially eligible customers who have lower energy consumption. SDG&E is also proposing to add high efficiency clothes washers to its PY 2009-2011 portfolio of

measures. In addition, potential changes to refrigerator replacement protocols (i.e., age of refrigerator) will be evaluated as part of the proposed Refrigerator Degradation Study described below.

V PROPOSED STUDIES

SDG&E proposes that its LIEE program be evaluated through the following four statewide studies to be conducted during PY 2009-2011:

- A process evaluation,
- An impact evaluation,
- A refrigerator degradation study, and
- A non-energy benefits study.

Each of these is discussed below and in more detail in Attachments A-10.3, 10.4, 10.5, and 10.6.

A. LIEE Process Evaluation

A Statewide Process Evaluation is planned for 2009. The objectives of this study are to assess the effectiveness of the program components, including outreach, delivery, data tracking, customer satisfaction, etc. and to provide recommendations for improving the program. In addition, the study will evaluate the low-income customers' attitudes toward energy efficiency opportunities, in particular their willingness to participate in low-income programs and to engage in energy saving behaviors. The study will likely utilize customer surveys, focus groups, and ride-alongs with program contractors in addition to secondary data sources to provide a comprehensive assessment.

B. LIEE Impact Evaluation

A Statewide Impact Evaluation is planned for the PY 2010 LIEE program. The primary objective of this study is to estimate the first year energy savings for the LIEE program by utility and at the measure level. In addition, the study will provide information on participant consumption and characteristics. The study will focus on new measures in this Program cycle, although impacts for all program measures will be estimated. It is anticipated that the analysis will consist of a statistical regression analysis of consumption records, although some data may also be collected from customer onsite surveys.

Historically, impact evaluations have been conducted every two years, and the most recent study was completed for the 2005 Program. West Hill Energy & Computing Inc., the study consultant, recommended that the joint utilities forgo a PY 2007 load impact study and conduct a study on the PY 2008 because the PY 2005 evaluation had just been completed. As such, the joint utilities in each of their respective applications, are requesting approval to defer and conduct the next impact evaluation on the 2008 program. D.06-12-038 authorized funding to conduct the PY 2007 load impact evaluation. SDG&E proposes to carryover these unspent funds to the PY 2009-2011 cycle. Therefore, SDG&E is not requesting any additional funds to conduct the PY 2008 load impact evaluation. Assuming the two-year study cycle remains in place,[14] the next study would be conducted on the 2010 program, for which SDG&E is requesting approval of a pro rata share of the total projected study cost.

C. Refrigerator Degradation Study

This Statewide study, planned for 2009, will examine the efficiency degradation over the useful life of refrigerators. Refrigerator replacements provide a significant portion of the energy savings for the LIEE Program. Currently, the Program replaces only refrigerators manufactured prior to 1993. The results of this study will provide valuable information in determining potential energy savings for replacing newer models. The analysis for this study will examine laboratory testing data along with refrigerator consumption data. *See* Attachment A-10.5.

D. NEBs Study

The role of NEBs as currently used in the methodology for LIEE cost-effectiveness needs to be reexamined. The current methodology for evaluating the cost-effectiveness of LIEE measures was established in 2001 and many of the values used to calculate NEBs are outdated and inappropriate for the current program. In addition, the original theories used to determine whether or not NEBs and which NEB should be included in the cost-effective calculations remain controversial and need to be re-examined.

The large IOUs, in Attachment A-10.6 describe a NEBs study that could be used to update the NEBs' purpose. This study, among other things, would examine and report

[14] Established in D.02-12-019.

on studies that have been completed nationwide on NEBs including studies that have attempted to measure NEBs. Once this information is gathered and summarized a more informed decision could be made on the appropriateness of including NEBs in the LIEE cost-effectiveness tests.

If it is determined that NEBs should continue to be included in the LIEE program and measure cost-effectiveness calculations there are two possible paths that could be taken:

1) Attempt to measure NEBs in detail as currently used in the Low Income Public Purpose Test ("LIPPT") model. This would require an extensive study focused on examining NEBs nationwide, determining which values should stay and which should be eliminated; then determining new values for the NEBs being retained; or
2) Develop a factor (e.g. 25%) which would be used to inflate the energy benefits of the LIEE program to account for the NEBs. This factor could be developed through a lower cost study and would still give a boost to the cost benefit ratios to account for variables not represented by the energy benefits.

It could be that the most appropriate path would be to examine NEBs in detail once every 3 to 5 years. Then in the interim years develop a factor based on those values that would be used to inflate the energy benefits to account for NEBs.

SDG&E is very interested in assuring that all appropriate benefits are accrued to the LIEE programs. It is apparent that the current cost effectiveness methodology with regard to NEBs needs revision. SDG&E would encourage the Commission to grant funding for an evaluation to ensure that NEBs are handled properly in the cost-effectiveness calculations for LIEE programs.

SDG&E's estimated three-year total funding requirement for M&E studies is shown in Table 5 below.

Table 5: 2009 to 2011 Measurement & Evaluation Proposed Budget*

Statewide Study	Total Cost	SDG&E Share	SDG&E Cost
Impact Evaluation of the 2010 LIEE Program	$600,000	15%	$90,000
Process Evaluation of the 2009 LIEE Program	$250,000	15%	$37,500
Non-Energy Benefits Study	$300,000	15%	$45,000
Refrigerator Degradation EUL Study	$200,000	33.33%	$66,660
Total	$1,350,000		$239,160

* The proposed impact evaluation of the 2010 LIEE program will begin in 2011 and conclude in 2012. SDG&E is requesting full funding of the evaluation in this program cycle and any unspent funds authorized for this study will be expended in 2012.

STATEMENT OF QUALIFICATIONS

KEVIN C. MCKINLEY

My name is Kevin C. McKinley. My business address is 8335 Century Park Court, San Diego CA. 92123. I am currently employed at SDG&E as the Supervisor of Measurement and Evaluation.

I originally joined SDG&E in 1978 and held a variety of management positions in financial analysis, customer forecasting, fuel planning and marketing. During the 1990s I was the Manager of Marketing Analysis for SDG&E where my responsibilities were related to: Demand Side Management ("DSM") forecasting, DSM earnings claims, and program measurement studies. I was heavily involved in the development of the original Protocols used for measurement and evaluation in California during the 1990s. I was also Chairman of the California Demand Side Management Advisor Committee during part of this period.

In late 1998, I left SDG&E and consulted in the measurement and evaluation areas for the next several years. I rejoined SDG&E in April 2005. My current responsibilities include the Measurement and Evaluation of programs for both SDG&E and SoCalGas for Energy Efficiency, Demand Response, and Low Income programs. I am also a part-time instructor and have taught at several colleges in the San Diego area including San Diego State University, the University of San Diego, University of Redlands and the University of Phoenix. I hold two masters degrees, one in Economics and the other in Latin American studies, both from San Diego State University and a Bachelors degree in Business Administration from Gonzaga University.

I have testified previously before this Commission.