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## PUBLIC UTILITIES COMMISSION

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February 13, 2012

**To:** Stakeholders in Energy Efficiency Proceeding

**From:** Energy Division Evaluation Team, Carmen Best - Supervisor

**RE:** Energy Division Responses to Comments on Upstream Lighting Impact Evaluation Plan (WO28)

Energy Division has prepared responses to the comments received on the Upstream Lighting impact evaluation (WO 28) plan. Parties are reminded that D.10-04-029 does not require point by point responses on either the plans or the studies. Energy Division and our consultants have consistently solicited and responded to comments to promote clarity in understanding the approaches and the rationale for the analyses, and in reviewing the outcomes. It is in this spirit that we provide both general and point by point detailed responses to the comments provided by stakeholders on the WO28 Evaluation Plan. We appreciate the on-going participation of stakeholders in this process.

None of the comments, while thought provoking, will result in significant changes to the draft plan but we take this opportunity to address the comments to further clarify the purpose and objective of this study activity (WO28).

- The proposed study and analysis provides critical information for improving programs and parameter estimates on a “forward looking” basis and information will be available to inform even the bridge period.
  - o The 2013-14 transition portfolio development timeline has not been finalized, but information from this study may be available as early as March 2012. Energy Division’s intent is to develop information from this study activity that will be actionable and applicable for the 2013-14 transition period and will make every effort to get that information into the hands of stakeholders and other decision makers.
  - o Even if study results are not timely enough to inform the initial designs of the 2013-14 portfolios, action can be taken at any time by the Commission or the program implementers to course correct based on new information revealed through the evaluation activities.
  
- Work Order 28 is one of multiple studies focused on lighting in the 2010-2012 portfolio, and the results and information are critical both to understand and validate the achievements of the investments and gather information to improve estimates of savings in the future.

- The first goal for EM&V, as adopted in D.09-09-047 is to measure and verify savings resulting from energy efficiency measures, programs, and portfolios. One primary focus of this study is to verify the energy savings from the upstream lighting program which still constitutes over 30% of the savings claims.

<b>Type of Upstream CFL</b>	<b>Total Portfolio Claimed Savings</b>	
	<i>NetkWh</i>	<i>NetkW</i>
Basic spiral (30 watts or less)	23%	20%
Reflector	5%	5%
A-lamp	3%	3%
Globe	1%	1%
High wattage spiral (>30 watts)	1%	0%
Dimmable	1%	0%
Three way	0%	0%
Other Specialty	0%	0%
<b>All Upstream CFLs</b>	<b>33%</b>	<b>29%</b>

- It is important to note that the upstream lighting programs are among the most cost effective in the portfolio. Not only are they providing over 30% of total portfolio savings, but they help offset more expensive programs that are not yet achieving as much savings as anticipated. Accurate and up-to-date estimates of the impacts of the upstream lighting programs are a very important factor in determining the overall cost effectiveness of the entire 2010-2012 portfolio.
- The study is appropriately focused on the technologies that make up the largest portion of the savings, in addition to other technologies that are growing in importance in the portfolio claims. Establishing new baselines or doing significant market research for new technologies is the purpose and intent of both evaluation and programmatic research efforts to develop estimates of savings conducted by the IOUs.
- In addition, several limitations to covering new technologies in the context of this evaluation exist making it incrementally difficult:
  - First, due to the upstream nature of the program, it is difficult and expensive to identify and locate customers who have purchased and are using these low-volume new/emerging products.
  - Second, as a result of limited/low adoption in the market, it is challenging to extrapolate results from “early adopters” to the general population.
  - Third, for some measures, these issues are compounded further by significant measurement challenges. A good example is dimmable CFLs.

- WO28 in concert with other studies<sup>1</sup> will provide valuable information regarding the status of the market for lighting technologies (basic and advanced) as well as shed light on consumer decisions to inform future program designs and interventions.
  - The value of the information for informing share holder incentives is secondary, though we believe it would be valuable, to the value it provides regarding the effectiveness of the program model.
- Several comments were received on the net to gross proposed methodologies and purpose. Energy Division believes that in addition to informing questions about attribution of the program, this field research allows informs our knowledge of the current market status.
- The data will be used to determine an estimate for the net to gross for this program intervention, but that is not the highest value gained from the activity.
  - The proportion of the budget that is dedicated to the net to gross analysis is still less than the whole suite of research activities that are dedicated to lighting.

Stakeholders asked multiple questions on the accounting of bulbs incentivized in prior cycles. The accounting procedures (claimed and validated) and data gathered from the evaluation used to effectuate that policy appear to need further clarification. Energy Division staff will issue a more detailed description of the accounting methods (driven by Commission policies) and data expected to be used for tracking bulbs over time as this is a policy question not strictly an evaluation question.

Several stakeholders requested development of a Project Coordination Group (PCG) dedicated to lighting. Energy Division has initiated a Project Coordination Group which will include all research in the evaluation portfolio that is currently focused on lighting. The PCG serves as a forum for exchanging information on the studies that are planned or needed to further advance improvements in lighting efficiency in the state.

Point by point responses are provided in the accompanying Excel spreadsheet for each comment received.

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<sup>1</sup> See Attachment A for a summary of other lighting analysis that is being funded through the 2010-2012 EM&V plan.

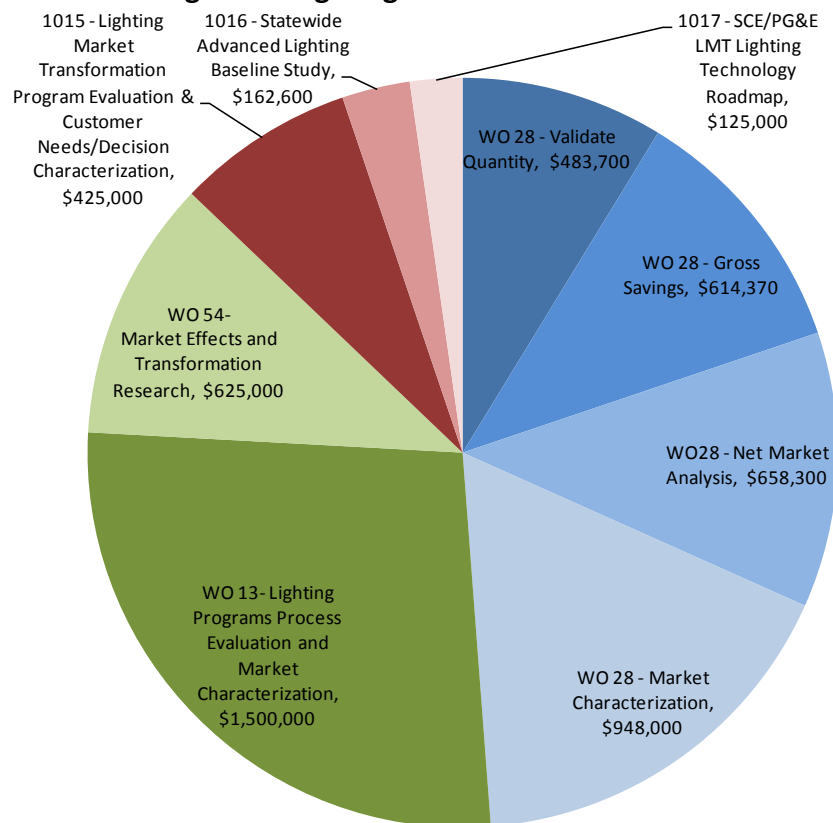
## Attachment A. Scope of Lighting Research Included in the 2010-2012 EM&V Plan

Residential lighting programs continue to represent a large portion of portfolio activity. Consequently many EM&V projects, past and present, focus on the residential lighting programs and markets for the purpose of program and portfolio planning. The budget for the IOU upstream lighting programs represents approximately 5% of the overall \$3 billion 2010-2012 portfolio budget, and are expected to account for over 30% of the IOU energy savings claims. The budget for the EM&V activities planned within WO28 is approximately \$3.25 million, or less than 3% of the overall \$125 million 2010-2012 EM&V budget.

Most of the WO28 data collection continues throughout 2012 and through Q2 2013, providing ample opportunity to modify/add/expand the scope to include new/emerging lighting products and the relevant suppliers. As currently designed we believe the initial data collection under WO28 includes lighting products that are not currently being promoted through the IOU upstream programs and the findings will be relevant to future program designs and parameter estimates. Work Order 28 does make up a large portion of the total expenditures for lighting research in the portfolio of evaluation currently underway, but several other studies (ED and IOU) will contribute to our understanding of the programs and where to intervene in markets going forward.

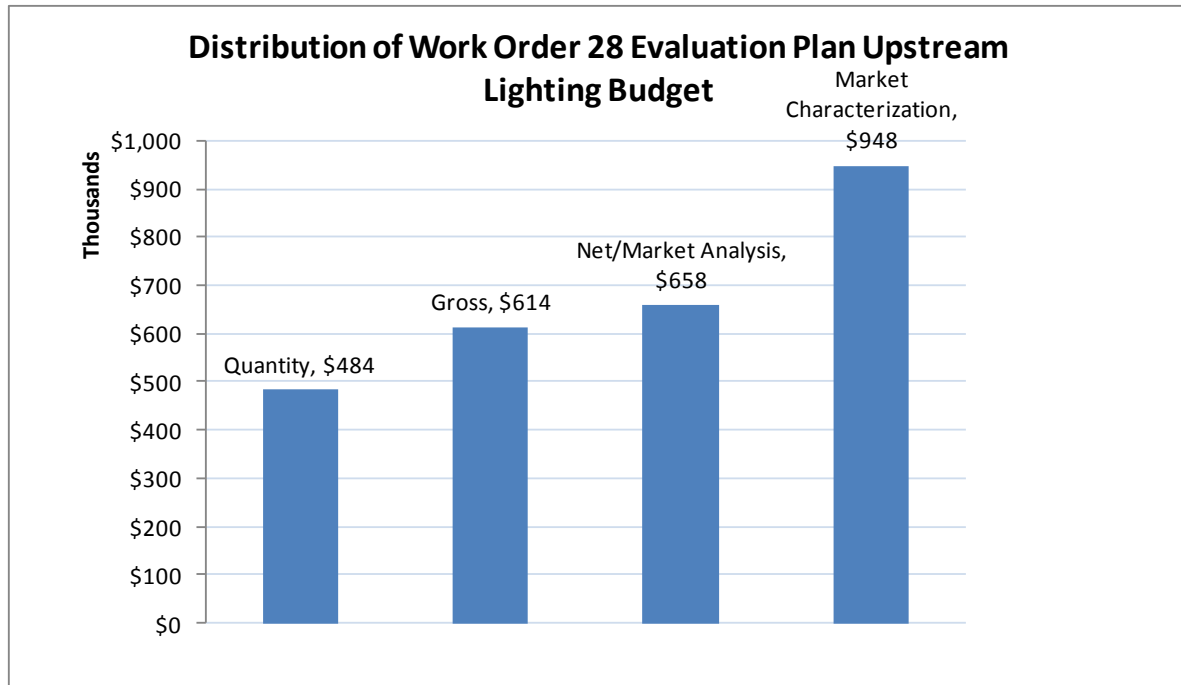
The following pie chart illustrates the distribution funds for evaluation activity currently planned and underway (three projects are not included because they are being funded outside of EM&V dollars).

**Distribution of Budgets for Lighting Research within the 2010-2012 EMV Plan**



## WO28 - Residential/Advanced/Upstream Lighting Impact Evaluation

While the core purpose of WO 28 is to validate the savings claims for the upstream lighting programs, it is also leveraging field research activity to inform the net analysis and information for market characterization that will be helpful to inform future program design.



Nine parameters need to be estimated in order to determine net impacts from the IOUs upstream lighting programs:

- Quantity of measures adjustments: (1) quantity of IOU-discounted products shipped by participating manufacturers to retailers as determined through the verification of a sample of program invoices/applications; (2) percent of IOU-discounted products not sold by the end of 2010, 2011 and 2012; (3) percent of IOU-discounted products purchased by non-IOU customers (i.e., leakage); and (4) percent of IOU-discounted products purchased by residential v. nonresidential customers.
- Gross impact parameters: (5) installation rate; (6) average daily hours-of-use (HOU); (7) average percent operating at peak (coincidence factor, or CF); and (8) wattage displaced by IOU-discounted products (delta watts).
- (9) Net-to-gross ratio, inputs for which are derived from a range of perspectives and sources, with the final estimate determined through a Delphi Panel process or some other ED-recommended method.

Estimates of these parameters need to be updated for 2010-2012 from the 2006-2008 estimates because:

- The market for CFLs was at an all-time high during the 2007-2008 timeframe. It is uncertain how the market has changed since then since we haven't collected any new data since mid-2009.
- Utility program efforts outside of California significantly expanded during the 2009-2012 program period

- The program has changed in a number of ways:
  - Manufacturers have dropped out, others have been added
  - Retailers have dropped out, others added, and distributions across channels have shifted
  - The “product mix” has shifted somewhat from >90% basic spiral-shaped CFLs to a more diversified mix of CFLs with specialty features
  - Incentive levels have changed reflecting this shift toward more expensive specialty CFLs

Prospectively, these activities will provide important input into the development of new ex ante estimates and aid with program planning, goals setting, and understanding future potential.

Field research used to inform the net to gross analysis will provide critical information to understanding the market:

- In depth interviews with ~30 lighting suppliers per wave (manufacturers, retailers, buyers, etc.) and telephone surveys with 250 retail store managers per wave (a total of 4 waves planned – Jan/Feb 2012, Jun/Jul 2012, Nov/Dec 2012, and Apr/May 2013)
  - Leverages similar interviews/surveys conducted in prior cycles to understand changes in lighting product availability, diversity, market share, sales and pricing over time
  - Provides a preliminary “piece of the puzzle” for understanding program influence from the supplier perspective, which can be used (along with data from other sources) to inform updates, as appropriate, to supplier self-reported net-to-gross estimates
- Telephone surveys with ~100 recent lighting purchasers as a subset of random sample (~800) of residential customers and a small nested sample (~70) of follow-up verification site visits (six waves of consumer surveys, with the 1<sup>st</sup> wave beginning in Q1 2012 and the final wave in Q2 2013; 3 waves of follow-up verification site visits with the 1<sup>st</sup> wave beginning Q1 2012 and the final wave in Q1 2013)
  - Leverages similar surveys conducted in prior cycles to understand how consumer attitudes, awareness and behavior have changed over time, especially with respect to new/emerging lighting technologies (e.g., specialty CFLs, LEDs, efficient incandescents, etc.)
  - Provides preliminary input for impact parameters such as installation/storage rates, self-reported HOU and delta watts, consumer self-reported net-to-gross updates
- Shelf surveys at ~200 retail stores per wave along with approximately 1,000 consumer intercept surveys per wave (4 waves total, 1<sup>st</sup> wave completed under WO13 in Oct/Nov 2011, subsequent waves planned for Mar-May 2012, Sep-Nov 2012, and Mar-May 2013)
  - Leverages past shelf survey data to provide an understanding of how product diversity and pricing changed over time
  - Leverages past consumer intercept data to assess changes in consumer preferences over time

- Consumer intercept surveys (both revealed and stated preference surveys) provide data for econometric models, the results of which provide input for determining NTG estimates

### **WO13 - Lighting Programs Process Evaluation and Market Characterization**

The ED-led lighting program process evaluations will also be providing key market information to program implementers, stakeholders and decision makers.

- Shelf Survey Report (draft report due in late Jan/early Feb 2012), which will provide a snapshot of lighting product availability and diversity in California – the first glimpse we’ve had of market status since 2009; this report, along with the next two below, will provide baseline measurements for new/emerging lighting products including LEDs and efficient incandescents
- Preliminary LED market characterization study (draft report due in late Jan/early Feb 2012), which will provide baseline measurements for LEDs and (if possible) highlight changes in LED availability in key retail channels between 2009 and 2011
- Early Effects of EISA/AB1109 on CA Lighting Market (draft report due in early Feb 2012), which will provide baseline measurements for EISA-compliant efficient incandescent and (if possible) highlight changes in availability of these products and standard 100W incandescent lamps in key retail channels between 2009 and 2011 (100W incandescent lamps were “phased out” as part of CA AB1109 starting in Jan 2011)

### **WO54- Market Effects and Transformation Research**

A portion of the Market Effects and Transformation research will be dedicated to lighting which will help set the precedent for tracking effects from program inception.

- LED Baseline Study – this study is still being scoped but it is expected to provide a comprehensive baseline characterization of the CA market for LEDs; this study will build from the preliminary study completed in WO13; this study is expected to facilitate analysis of market effects from future IOU programs designed to promote LEDs; specific elements of this study may include:
  - Market share of LED lighting products in key applications and market segments;
  - Availability of LED lighting products from distributors, installation contractors, and retailers, especially for products that can serve as direct replacements for established technologies;
  - Price of LED lighting products versus competing technologies;
  - Vendors’ perceptions of the commercial advantages and barriers to promoting, stocking, and installing LED lighting products.
  - Vendors’ perceptions of changes in product availability, features, pricing, performance.
  - Customer awareness and knowledge of LED lighting products.
  - Customer perceptions of barriers and motivations to adoption, including: price/performance versus competing technologies.

- Manufacturer perceptions of vendor and customer response to LED lighting products, in comparison to other states.

**Other ED Studies/Efforts**

- CFL Lab Test Study – we understand that preliminary results from the ED-IOU study on CFLs will be available in Jan/Feb 2012; the purpose of this study is to assess the effective useful life (EUL) of a variety of CFLs, including basic and specialty lamp types (funded separately)
- Strategic Plan – ED is currently examining ways in which the Lighting Action Plan can be streamlined to increase its efficiency and effectiveness. May include an update to lighting chapter of Strategic Plan.

**IOU Studies**

- Process and Market Studies – SCE and PG&E have recently hired Evergreen Economics/Research Into Action/D&R International to perform a process evaluation of the Upstream Lighting Programs and LMT Program along with a Characterization Study of Nonresidential Customer Needs for lighting. Sempra is also conducting a process evaluation of its residential programs, which includes the upstream lighting programs.
- Lighting Market Transformation (LMT) Program – SCE and PG&E hired The Cadmus Group to perform a review of the LMT Lighting Solutions Workbook. Results will be presented via webinar on Jan 30.
- LED Market Trials, designed specifically to provide data on how customers will respond to various pricing scenarios (we understand that the results of these trials will be used to set incentive levels for LEDs if/when introduced into the program).

1018 - LED Market Trial Study (funded by program team)
1019 - Consumer Preference Research to Support Lighting Programs
1015 - Lighting Market Transformation Program Evaluation & Customer Needs/Decision Characterization
1016 - Statewide Advanced Lighting Baseline Study
1017 - SCE/PG&E LMT Lighting Technology Roadmap



### **Attachment C. Dimmable CFL: Example of Limitations for Baseline**

Not only do dimmable CFLs currently account for ~1% of the total portfolio net kWh savings claims (and 0% of net kW), the lighting metering study from last cycle found that dimmable sockets comprise only about 10% of all sockets in CA's households. In addition, we found that very few of the newer, dimmable CFLs were being used in these sockets (meaning, people were using CFLs in dimmable sockets that weren't designed to be used in dimmable sockets). Therefore, not only is the total potential for this measure limited (currently) to only about 10% of all sockets, most people are currently using a product that does not perform well and therefore measuring patterns of how the dimming features of these CFLs are being used (and the associated power that's drawn when they are dimmed at different levels), will not be representative of how newer, dimmable CFLs will be used.

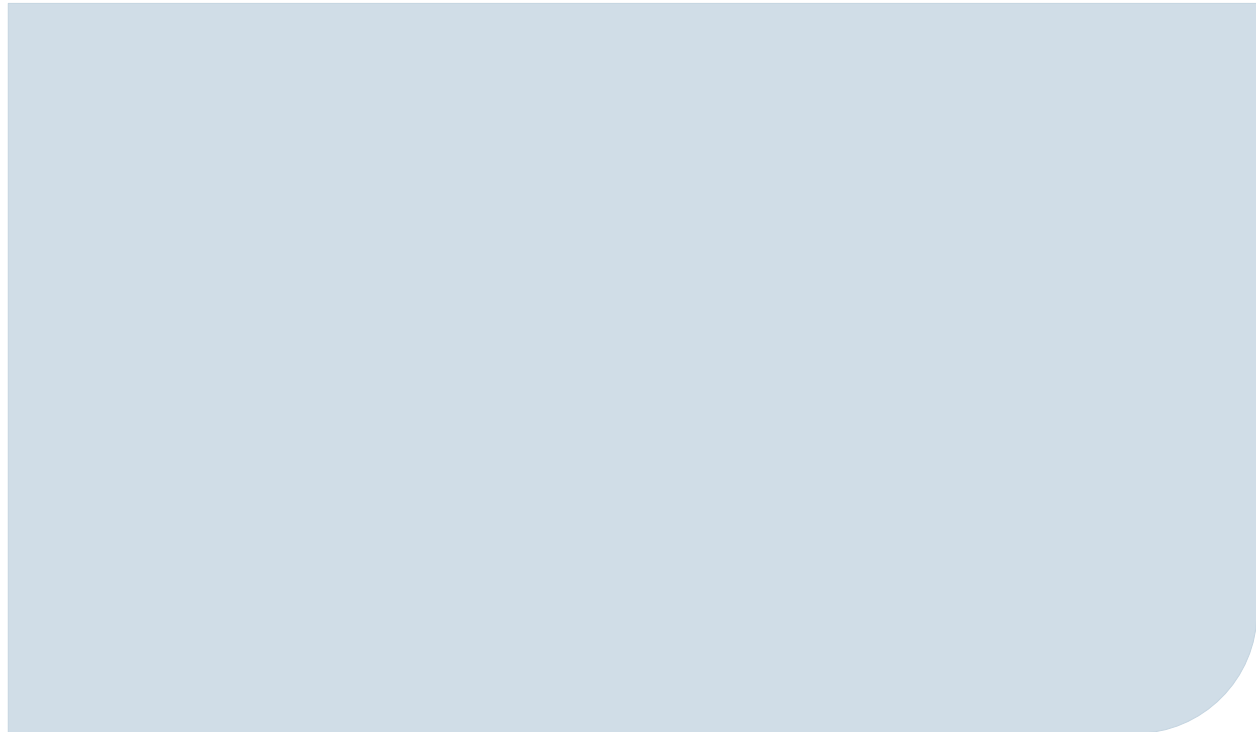
Dimmable CFLs are included in the scope of work because there is an expectation that (a) dimmable socket potential will expand as more and more homes are built/retrofit with dimmable lighting applications, and (b) the program will continue to promote this measure such that its contribution to the overall savings claims will grow in 2012 and beyond.

In addition to the challenge mentioned above (i.e., that how people are currently using non-dimmable CFLs in dimmable sockets may not represent how the general population might use dimmable CFLs in dimmable sockets in the future), there is an additional challenge in that in order to measure power draw, we'd have to hard-wire monitoring equipment for an extended period of time (e.g., 6 months) which is not only very expensive to accomplish on a large enough sample, but it is typically unacceptable and overly intrusive to most residential customers. We would also be exposed to other challenges and risks (e.g., customer complaints related to wiring, special permitting requirements related to wiring, etc.). In addition, there aren't a lot of "off the shelf" meters ready to be used for this type of random, large-sample, long-term study; we'd have to invest some effort in developing and testing equipment that would be appropriate for this type of project.



# Impact Evaluation Research Plan

Upstream and Residential Downstream Lighting (WO28)



Draft

Prepared by KEMA, Inc.

October 29, 2011

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# 1. Introduction

This document presents the Research Plan for the Upstream and Residential Downstream Lighting Impact Evaluation of the 2010-2012 investor-owned utilities' (IOU) energy efficiency programs.

This Research Plan includes the goals and objectives of the evaluation, the researchable issues, information on the upstream and residential downstream lighting programs and measure groups to be evaluated, data sources that will be used, the approach for sampling, the methods to determine gross and net impacts, how coordination and communication will occur with other related evaluation studies and how timely feedback will be provided to the IOUs and other stakeholders.

## 1.1 Evaluation Overview

This evaluation covers all lighting measures associated with upstream delivery mechanisms and all downstream lighting measures targeted at the residential sector. Similar to the 2006-2008 program cycle, upstream and residential downstream lighting measures account for a considerable portion of IOU claimed net energy savings and net peak demand impacts for the 2010 reporting period, as shown in Table 1-1.<sup>1</sup> Shown are the reported impacts by IOU, and the reported impacts expressed as a percentage of each IOU's total portfolio savings (as well as the statewide totals, and percentage of the statewide savings).

The measures covered in this evaluation fall into 29 measure groups. High impact measure (HIM) groups represent those that individually comprise at least 1% of an IOU's kWh or kW reported portfolio impacts. As shown in Table 1-2, eight HIM groups have been identified based on IOU reported accomplishments through Q1 2011. These eight measure groups, along with dimmable CFLs, form the focus of this preliminary Research Plan; modifications are expected as updated IOU program tracking data is received and analyzed.

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<sup>1</sup> Throughout this Research Plan, "IOU reported results" refer to the impacts reported by the IOUs in program tracking databases submitted quarterly through EEGA to the ED. These results do not reflect the "frozen ex ante" estimates recently approved by the Commission. Sometime toward the end of 2011, we expect the IOUs will begin incorporating these approved results as part of their quarterly program tracking data submittals to the ED.

**Table 1-1: Summary of IOU Reported Upstream and Residential Downstream Lighting Measure Savings (through Q1 2011)<sup>2</sup>**

IOU	Upstream and Residential Downstream Lighting Measures		Total IOU Portfolio		Percent of IOU Reported Net Annual GWh Savings	Percent of IOU Reported Net Peak MW Reductions
	IOU Reported Net Annual GWh Savings	IOU Reported Net Peak MW Reductions	IOU Reported Net Annual GWh Savings	IOU Reported Net Peak MW Reductions		
PG&E(a)	364	55	1,080	198	34%	28%
SCE(b)	712	122	1,546	307	46%	40%
SDG&E(c)	265	48	404	73	66%	65%
<b>Statewide</b>	<b>1,341</b>	<b>225</b>	<b>3,030</b>	<b>578</b>	<b>44%</b>	<b>39%</b>

(a) PG&E's Total IOU Portfolio reported impacts through Q1 2011 included 155 net GWh and 22 net kW for upstream lighting measures rebated during the 2006-2008 but believed to be installed through Q1 2011 (i.e., "deferred installations"). Impacts from "deferred installations" have been removed from the reported impacts shown in this table for PG&E.

(b) SCE had previously reported impacts of 118 net GWh and 20 net MW for "deferred installations." These previously reported impacts were no longer reported as part of SCE's total portfolio claim (i.e., were not included in SCE's Q1 2011 program tracking data submittal to ED). As such, impacts from "deferred installations" have been removed from the reported impacts shown in this table for SCE.

(c) SDG&E's reported impacts through Q1 2011 are much higher than what was reported through Q4 2010. For example, according to the Q4 2010 program tracking data, net reported impacts for upstream/residential downstream lighting measures totaled 63 GWh and 8 MW and, across SDG&E's total portfolio, net reported impacts totaled 180 GWh and 30 MW. We are currently investigating these discrepancies. In addition, we are investigating whether or not SDG&E's reported impacts include savings estimates for "deferred installations."

<sup>2</sup> Throughout this Research Plan, "IOU reported results" refer to the impacts reported by the IOUs in program tracking databases submitted quarterly through EEGA to the ED. These results do not reflect the "frozen ex ante" estimates recently approved by the Commission. Sometime toward the end of 2011, we expect the IOUs will begin incorporating these approved results as part of their quarterly program tracking data submittals to the ED.

**Table 1-2: Upstream and Residential Downstream Lighting High Impact Measure (HIM) Groups (through Q1 2011)**

*(High Impact Measure Groups highlighted in blue, representing more than 1% of portfolio-level impacts. Dimmable CFLs, highlighted in yellow, will be included in the evaluation despite not yet defined as HIMs.)*

Measure Group	Percent of Reported Portfolio-Level Net Annual Energy Savings			Percent of Reported Portfolio-Level Net Peak Demand Reductions		
	PG&E	SCE	SDG&E	PG&E	SCE	SDG&E
Lighting CFL -- Basic	20.7%	27.4%	53.4%	16.6%	25.0%	53.9%
Lighting CFL -- A lamp	4.1%	4.1%	5.0%	3.2%	3.6%	5.1%
Lighting CFL -- Globe	0.0%	1.7%	0.0%	0.0%	1.5%	0.0%
Lighting CFL -- Reflector	2.5%	8.3%	4.5%	1.8%	7.6%	4.8%
Lighting CFL -- Dimming	0.7%	0.4%	0.7%	0.5%	0.3%	0.6%
Lighting Indoor CFL Fixture	0.3%	1.2%	0.5%	0.2%	0.9%	0.3%
Lighting Indoor Linear Fluorescent	2.5%	0.1%	0.1%	3.0%	0.2%	0.4%
Lighting LED -- Niche	0.5%	1.3%	0.1%	0.3%	0.0%	0.0%
Lighting Outdoor CFL Fixture	0.2%	0.5%	1.2%	0.0%	0.0%	0.0%
<b>Upstream and Residential Downstream HIMs Only</b>	<b>29.8%</b>	<b>44.1%</b>	<b>64.1%</b>	<b>24.6%</b>	<b>39.0%</b>	<b>63.8%</b>
<b>All Upstream and Residential Downstream Measures</b>	<b>33.7%</b>	<b>46.1%</b>	<b>65.7%</b>	<b>27.9%</b>	<b>39.9%</b>	<b>65.4%</b>

(a) "Basic" CFLs are standard bare spiral or "twister" shaped CFLs 30 watts or less.

Section 2, Studied Measures and Programs, provides more details on the specific measures chosen for evaluation within these HIM groups. Also discussed are the programs that offer these measures, and which programs will be highlighted for study as part of the measure focused evaluations.

## 1.2 Evaluation Goals and Objectives

The overarching goal of this impact evaluation for upstream and residential downstream lighting measures and programs is to verify and validate the IOU reported energy savings and peak demand reduction claims. This will be accomplished by balancing cost, accuracy and precision in the data collection and analysis that will be conducted. Defensible gross savings, free ridership and net savings will be determined for lighting measures.



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Another important goal of the evaluation is to provide feedback to the IOUs on how well the energy efficient lighting measures are doing relative to their established program performance metrics (PPMs) and market transformation indicators (MTIs), and to provide results that will support future program design improvements and future program ex ante impact estimation. For this to be successful, evaluations must be timely in their reporting of results and feedback to allow adequate time for incorporating recommendations into future program planning and decision-making.

In order to extract the greatest value from this evaluation, the data and information collected will be leveraged with existing data from recent evaluation efforts to the greatest extent possible. Results generated from this evaluation effort will be shared across other evaluation research areas to support cost effectiveness analysis, the Database for Energy Efficiency Resources (DEER), strategic planning and future program planning.

### **1.3 Researchable Issues**

The primary research issues for this evaluation center around determining net and gross ex post impacts associated with each measure. Specific researchable issues for lighting measures delivered upstream include:

1. Verify the quantity of IOU discounted lighting measures that were shipped, sold and installed by residential and nonresidential customers within the PG&E, SCE and SDG&E service territories during the 2010-2012 program period.
2. Consistency of reported impacts with work paper values for gross and net ex ante impacts (kWh, kW, therms)
3. Estimate baseline and installed equipment wattages, operating hours, and load shapes to support the estimate of unit energy savings values.
4. Estimate participant free-ridership to support the development of net-to-gross ratios and net savings values.
5. Estimate remaining useful life values for selected measures, and potentially update effective useful life estimates where necessary.
6. Based on the above, estimate first year and lifetime gross and net ex post impacts (kWh, kW, therms) at the measure level, and at the measure and program level.

7. Utilize the above results, and the primary data collected to support these efforts, to assist with updating DEER values.

For downstream residential lighting measures, the researchable issues are nearly identical with the exception of the first issue: on-site verification will be used to confirm IOU reported measure installations.

## 1.4 Research Plan Evolution over Time

This Research Plan will guide the evaluation of the 2010-2012 Upstream and Residential Downstream Lighting measures. One of the primary inputs for supporting the development of this plan was the Q1 2011 program tracking data, which aided the selection of measures and programs, and corresponding rigor levels, analysis methods and sample sizes. This plan will continue to be reviewed and evolve over time as new program tracking data becomes available, as well as when research findings become available from other relevant studies, such as the DEER update process and IOU process evaluations. At a minimum, this plan will be thoroughly reviewed and updated annually as program tracking data become available for the remainder of 2011 and for 2012.

## 1.5 Contact Information

KEMA will serve as the IOU Prime Contractor managing this study, led by Ms. Kathleen Gaffney. The ED Project Manager for this study is Mr. Tim Drew. The following is Ms. Gaffney's contact information:

Firm	Lead	Contact Information
KEMA Inc. 155 Grand Avenue, Suite 500 Oakland, CA 94612	Kathleen Gaffney Vice President Sustainable Use Consulting	Phone: (510) 891-0446 Fax: (510) 891-0440 Email: <a href="mailto:kathleen.gaffney@kema.com">kathleen.gaffney@kema.com</a>

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## 2. Studied Measures and Programs

As mentioned above in Section 1, through Q1 2011, there are 29 upstream and residential downstream lighting measure groups, which together represent 42% of the reported statewide portfolio net annual energy impacts and 38% of the reported statewide portfolio net peak demand reduction impacts. This section summarizes IOU reported accomplishments by measure and program, and demonstrates how HIM groups were selected to be studied for this evaluation.

### 2.1 High Impact Measure Groups

Upstream and residential downstream lighting measures fall within 29 different measure groups. Table 2-1 summarizes these measure groups and presents their contribution to each IOU's reported portfolio impacts.

The measure groups that will be studied under this evaluation plan are highlighted in blue and represent measure groups that individually comprise at least 1% of an IOU's kWh or kW reported portfolio impacts. As mentioned in Section 1, a total of eight measure groups meet these criteria based on program tracking data through Q1 2011 and are thus considered HIMs:

- Lighting CFL – A lamp (PG&E, SCE and SDG&E)
- Lighting CFL – Basic (PG&E, SCE and SDG&E)
- Lighting CFL – Globe (SCE)
- Lighting CFL – Reflector (PG&E, SCE and SDG&E)
- Lighting Indoor CFL Fixture (SCE)
- Lighting Indoor Linear Fluorescent (PG&E)
- Lighting LED – Niche (SCE)
- Lighting Outdoor CFL Fixture (SDG&E)

In addition, even though they are not currently defined as HIMs, we are including dimmable CFLs in the list of measure groups that will be studied as part of this evaluation. Program accomplishments will continue to be monitored and additional measure groups may be included if they reach this threshold over time or are deemed worthy of evaluation.

**Table 2-1: Summary of Upstream and Residential Downstream Lighting Measure Groups – Expressed as a Percentage of Reported Portfolio Savings (through Q1 2011)**

(High Impact Measure Groups highlighted in blue, representing more than 1% of portfolio-level impacts. Dimmable CFLs, highlighted in yellow, will be included in the evaluation despite not yet defined as HIMs.)

Measure Group	Percent of Reported Portfolio-Level Net Annual Energy Savings			Percent of Reported Portfolio-Level Net Peak Demand Reductions		
	PG&E	SCE	SDG&E	PG&E	SCE	SDG&E
Lighting CFL - > 30 Watts	0.0%	0.6%	0.1%	0.0%	0.5%	0.2%
Lighting CFL - 3 way	0.0%	0.2%	0.0%	0.0%	0.2%	0.0%
Lighting CFL - A lamp	4.1%	4.1%	5.0%	3.2%	3.6%	5.1%
Lighting CFL – Basic	20.7%	27.4%	53.4%	16.6%	25.0%	53.9%
Lighting CFL – Dimming	0.7%	0.4%	0.7%	0.5%	0.3%	0.6%
Lighting CFL – Globe	0.0%	1.7%	0.0%	0.0%	1.5%	0.0%
Lighting CFL – Reflector	2.5%	8.3%	4.5%	1.8%	7.6%	4.8%
Lighting CFL – Specialty	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Cold Cathode	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Indoor CFL Fixture	0.3%	1.2%	0.5%	0.2%	0.9%	0.3%
Lighting Indoor Controls Daylighting	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Indoor Controls Occupancy Sensor	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%
Lighting Indoor Controls Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Indoor HID	0.5%	0.0%	0.0%	0.7%	0.0%	0.0%
Lighting Indoor High Bay Fluorescent	0.1%	0.0%	0.0%	0.2%	0.0%	0.0%
Lighting Indoor Linear Fluorescent	2.5%	0.1%	0.1%	3.0%	0.2%	0.4%
Lighting Indoor Linear Fluorescent De-lamping	0.7%	0.0%	0.0%	0.9%	0.0%	0.0%
Lighting Indoor Other	0.3%	0.0%	0.0%	0.3%	0.0%	0.0%
Lighting Induction	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting LED - Exit Sign	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%
Lighting LED - Holiday	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting LED – Niche	0.5%	1.3%	0.1%	0.3%	0.0%	0.0%
Lighting LED - Task/Ambient	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Outdoor CFL Fixture	0.2%	0.5%	1.2%	0.0%	0.0%	0.0%
Lighting Outdoor Control Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Outdoor Control Photocell	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Outdoor Control Time clock	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Outdoor HID	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Outdoor Other	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%
<b>All Upstream and Residential Downstream Measure Groups</b>	<b>33.7%</b>	<b>46.1%</b>	<b>65.7%</b>	<b>27.9%</b>	<b>39.9%</b>	<b>65.4%</b>

Table 2-2 presents the distribution of IOU reported impacts savings across these studied measures, as a percentage of all upstream and residential downstream lighting measures within each IOU. These highlighted measure groups account for the vast majority of the reported impacts from all upstream and residential downstream lighting measures through Q1 2011.

**Table 2-2: Summary of Upstream and Residential Downstream Lighting Measure Groups – Expressed as a Percentage of Reported Upstream/Residential Downstream Lighting Measure Savings (through Q1 2011)**

*(High Impact Measure Groups highlighted in blue, representing more than 1% of portfolio-level impacts. Dimmable CFLs, highlighted in yellow, will be included in the evaluation despite not yet defined as HIMs.)*

Measure Group	Percent of Reported Net Annual Energy Savings for All Upstream/Residential Downstream Lighting Measures			Percent of Reported Net Peak Demand Reductions for All Upstream/Residential Downstream Lighting Measures		
	PG&E	SCE	SDG&E	PG&E	SCE	SDG&E
Lighting CFL - > 30 Watts	0.1%	1.4%	0.2%	0.1%	1.2%	0.2%
Lighting CFL - 3 way	0.0%	0.5%	0.0%	0.0%	0.5%	0.0%
Lighting CFL - A lamp	12.1%	8.8%	7.7%	11.6%	9.1%	7.7%
Lighting CFL - Basic	61.6%	59.5%	81.2%	59.4%	62.7%	82.5%
Lighting CFL - Dimming	2.1%	0.8%	1.0%	2.0%	0.8%	1.0%
Lighting CFL - Globe	0.0%	3.8%	0.0%	0.0%	3.9%	0.0%
Lighting CFL - Reflector	7.4%	18.1%	6.9%	6.3%	19.1%	7.3%
Lighting CFL - Specialty	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Cold Cathode	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%
Lighting Indoor CFL Fixture	0.8%	2.6%	0.8%	0.7%	2.2%	0.5%
Lighting Indoor Controls Daylighting	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Indoor Controls Occupancy Sensor	0.2%	0.0%	0.0%	0.2%	0.0%	0.0%
Lighting Indoor Controls Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Indoor HID	1.6%	0.0%	0.0%	2.6%	0.0%	0.0%
Lighting Indoor High Bay Fluorescent	0.4%	0.0%	0.0%	0.6%	0.0%	0.0%
Lighting Indoor Linear Fluorescent	7.5%	0.3%	0.1%	10.8%	0.5%	0.6%
Lighting Indoor Linear Fluorescent De-lamping	2.0%	0.0%	0.0%	3.1%	0.0%	0.0%
Lighting Indoor Other	0.8%	0.0%	0.0%	0.9%	0.0%	0.0%
Lighting Induction	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting LED - Exit Sign	0.4%	0.1%	0.0%	0.3%	0.0%	0.0%
Lighting LED - Holiday	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting LED - Niche	1.4%	2.8%	0.1%	1.0%	0.0%	0.0%
Lighting LED - Task/Ambient	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Outdoor CFL Fixture	0.5%	1.2%	1.8%	0.0%	0.0%	0.0%
Lighting Outdoor Control Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Outdoor Control Photocell	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Outdoor Control Time clock	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Outdoor HID	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Outdoor Other	0.5%	0.0%	0.0%	0.1%	0.0%	0.0%
<b>All High Impact Upstream and Residential Downstream Measure Groups</b>	88.6%	95.7%	97.6%	88.2%	94.8%	97.6%

## 2.2 Programs to be Evaluated

### 2.2.1 Upstream Lighting Programs

Upstream lighting measures dominate the HIMs to be evaluated through this Work Order, representing 91.4% of the reported net annual energy savings and 91.8% of the reported net peak demand reductions statewide. Across the total IOU portfolio, upstream lighting programs account for 40.4% of reported net annual energy savings and 35.8% of reported net peak demand reductions. The specific IOU programs associated with upstream lighting measures are shown in Table 2-3.

**Table 2-3: Summary of IOU Upstream Lighting Programs (through Q1 2011)**

IOU	Program Name	Percent of All Upstream/Residential Downstream Lighting Measures		Percent of Total Portfolio	
		Net Annual Energy Savings	Net Peak Demand Reductions	Net Annual Energy Savings	Net Peak Demand Reductions
PG&E	Commercial Programs – Deemed	15.0%	17.1%	5.1%	4.8%
	Residential Programs - Advanced Lighting	18.1%	15.8%	6.1%	4.4%
	Residential Programs - Basic CFL Lighting	48.4%	44.0%	16.3%	12.3%
	<b>All PG&amp;E Upstream Lighting Programs</b>	<b>81.4%</b>	<b>76.8%</b>	<b>27.4%</b>	<b>21.4%</b>
SCE	Residential Energy Efficiency Program: Advanced Consumer Lighting Program (Nonres)	12.2%	14.0%	5.6%	5.6%
	Residential Energy Efficiency Program: Residential Lighting Incentive Program for Basic CFLs (Nonres)	22.2%	26.1%	10.2%	10.4%
	Residential Energy Efficiency Program: Advanced Consumer Lighting Program (Res)	23.9%	20.7%	11.0%	8.3%
	Residential Energy Efficiency Program: Residential Lighting Incentive Program for Basic CFLs (Res)	35.6%	35.3%	16.4%	14.1%
	<b>All SCE Upstream Lighting Programs</b>	<b>94.0%</b>	<b>96.1%</b>	<b>43.3%</b>	<b>38.3%</b>
SDG&E	SW-ResA - Residential Basic Lighting	80.8%	82.3%	53.1%	53.8%
	SW-ResB - Advanced Consumer Lighting	17.1%	15.8%	11.3%	10.3%
	<b>All SDG&amp;E Upstream Lighting Programs</b>	<b>98.0%</b>	<b>98.1%</b>	<b>64.4%</b>	<b>64.1%</b>
<b>Statewide - All Upstream Lighting Programs</b>		<b>91.4%</b>	<b>91.8%</b>	<b>40.4%</b>	<b>35.8%</b>

#### 2.2.1.1 Residential v. Nonresidential “Split”

PG&E and SCE both claim a certain portion of the lighting measures discounted through upstream channels will be installed in nonresidential applications. SDG&E assumes that all lighting measures will be installed in residential applications.

In terms of quantity of lighting products discounted, PG&E’s accomplishments through Q1 2011 indicate that 5% of all upstream lighting measures are expected to be installed in nonresidential

applications. In terms of impacts, these nonresidential, upstream measures are expected to contribute 18% of net annual energy and 22% of net peak demand reduction impacts from all upstream lighting measures, which is fairly consistent with what was determined through the impact evaluation of PG&E’s 2006-2008 Upstream Lighting Program.<sup>3</sup>

SCE reported 9% of all lighting products discounted through upstream channels would be installed in nonresidential applications, resulting in 37% of net annual energy and 42% of net demand reduction impacts from all upstream lighting measures. This expectation is about twice as high as what was determined through the impact evaluation of SCE’s 2006-2008 Upstream Lighting Program.<sup>4</sup>

### 2.2.1.2 “Advanced” v. Basic Upstream Programs

Statewide, about 30-31% of the upstream lighting program reported impacts are associated with the Advanced Consumer Lighting Program, and 69-70% are associated with the Basic CFL Lighting Program. Differences by IOU are shown in

Table 2-4.

**Table 2-4: Advanced v. Basic Lighting Programs as Percent of Upstream Lighting Program**

IOU	Upstream Lighting Program Name	Percent of Net Annual Energy Savings from Upstream Lighting Program	Percent of Net Peak Demand Reductions from Upstream Lighting Program
PG&E	Advanced Consumer Lighting Program	27%	26%
	Basic CFL Lighting Program	73%	74%
SCE	Advanced Consumer Lighting Program	38%	36%
	Basic CFL Lighting Program	62%	64%
SDG&E	Advanced Consumer Lighting Program	17%	16%
	Basic CFL Lighting Program	83%	84%
Statewide	<b>Advanced Consumer Lighting Program</b>	31%	30%
	<b>Basic CFL Lighting Program</b>	69%	70%

<sup>3</sup> See Table 1, page xiii, of Volume 1: Final Evaluation Report: Upstream Lighting Program, KEMA, February 8, 2010.

<sup>4</sup> See Table 1, page xiii, of Volume 1: Final Evaluation Report: Upstream Lighting Program, KEMA, February 8, 2010.

## 2.2.2 Residential Downstream Lighting Programs

### 2.2.2.1 PG&E's Residential Downstream Lighting Programs

As shown in Table 2-5, PG&E has 27 programs reporting impacts from lighting measures delivered to residential customers through downstream mechanisms.<sup>5</sup> Overall, these programs account for about 6% of PG&E's reported portfolio impacts. Many of these programs are local government partnership programs (e.g., Energy Watch). Individually, only three programs account for more than 1% of PG&E's reported portfolio impacts: East Bay Energy Watch, Rightlights and San Francisco Energy Watch. Lighting measures installed through PG&E's multifamily energy efficiency rebate program account for less than 0.5% of reported portfolio impacts.

**Table 2-5: PG&E's Residential Downstream Lighting Programs**

PG&E Program Name	Percent of Net Annual Energy Savings from Residential Downstream Lighting Programs	Percent of Net Peak Demand Reductions from Residential Downstream Lighting Programs	Percent of Portfolio Net Annual Energy Savings	Percent of Portfolio Net Peak Demand Reductions
ASSOCIATION OF MONTEREY BAY AREA GOVERNMENTS (AMBAG) ENERGY WATCH	2.0%	1.4%	0.1%	0.1%
California Preschool Energy Efficiency Program	0.7%	0.1%	0.0%	0.0%
DEPARTMENT OF CORRECTIONS AND REHABILITATION	0.0%	0.0%	0.0%	0.0%
Direct Install for Manufactured and Mobile Homes	1.4%	0.6%	0.1%	0.0%
EAST BAY ENERGY WATCH	26.2%	33.0%	1.6%	2.1%
Energy Savers	2.9%	3.5%	0.2%	0.2%
Energy-Efficient Parking Garage	1.0%	0.6%	0.1%	0.0%
FRESNO COUNTY ENERGY WATCH	2.8%	3.3%	0.2%	0.2%
KERN COUNTY ENERGY WATCH	3.4%	3.3%	0.2%	0.2%
Light Exchange Program	1.7%	0.0%	0.1%	0.0%
LOCAL GOVERNMENT ENERGY ACTION RESOURCES (LGEAR)	1.5%	1.8%	0.1%	0.1%
MADERA COUNTY ENERGY WATCH	0.2%	0.3%	0.0%	0.0%
MARIN COUNTY ENERGY WATCH	1.7%	2.1%	0.1%	0.1%
MENDOCINO COUNTY ENERGY WATCH	0.1%	0.1%	0.0%	0.0%
NAPA COUNTY ENERGY WATCH	0.0%	0.0%	0.0%	0.0%

<sup>5</sup> We are currently developing a data request to verify the residential designation in PG&E's program tracking database.



PG&E Program Name	Percent of Net Annual Energy Savings from Residential Downstream Lighting Programs	Percent of Net Peak Demand Reductions from Residential Downstream Lighting Programs	Percent of Portfolio Net Annual Energy Savings	Percent of Portfolio Net Peak Demand Reductions
REDWOOD COAST ENERGY WATCH	2.4%	2.9%	0.2%	0.2%
Residential Programs - Multifamily	6.1%	3.2%	0.4%	0.2%
RightLights	15.7%	15.7%	1.0%	1.0%
SAN FRANCISCO ENERGY WATCH	18.4%	16.0%	1.1%	1.0%
SAN JOAQUIN COUNTY ENERGY WATCH	1.1%	1.1%	0.1%	0.1%
SAN LUIS OBISPO COUNTY ENERGY WATCH	0.9%	0.8%	0.1%	0.1%
SAN MATEO COUNTY ENERGY WATCH	1.9%	1.9%	0.1%	0.1%
SANTA BARBARA COUNTY ENERGY WATCH	1.4%	1.3%	0.1%	0.1%
SIERRA NEVADA ENERGY WATCH	3.8%	4.1%	0.2%	0.3%
SILICON VALLEY ENERGY WATCH	2.3%	2.4%	0.1%	0.2%
SONOMA COUNTY ENERGY WATCH	0.3%	0.4%	0.0%	0.0%
WHOLE HOUSE PERFORMANCE PROGRAM	0.0%	0.0%	0.0%	0.0%
<b>All PG&amp;E Residential Downstream Lighting Programs</b>	<b>100.0%</b>	<b>100.0%</b>	<b>6.2%</b>	<b>6.5%</b>

### 2.2.2.2 SCE's Residential Downstream Lighting Programs

As shown in

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Table 2-6, SCE has 10 programs reporting impacts from lighting measures delivered to residential customers through downstream mechanisms. Overall, these programs account for about 3% of SCE's reported portfolio net energy savings and less than 2% of reported portfolio net peak demand reductions. Some of these programs are local government partnership programs (e.g., Energy Leader Partnership Program). Individually, only one program accounts for more than 1% of SCE's reported portfolio impacts: the multifamily energy efficiency rebate program.

**Table 2-6: SCE’s Residential Downstream Lighting Programs**

SCE Program Name		Percent of Net Annual Energy Savings from Residential Downstream Lighting Programs	Percent of Net Peak Demand Reductions from Residential Downstream Lighting Programs	Percent of Portfolio Net Annual Energy Savings	Percent of Portfolio Net Peak Demand Reductions
Coin Operated Laundry Program		0.3%	0.0%	0.0%	0.0%
Comprehensive Manufactured Home Program		15.5%	13.4%	0.4%	0.2%
Energy Leader Partnership Program	City of Santa Ana Energy Leader Partnership	0.0%	0.0%	0.0%	0.0%
	Palm Desert Demonstration Partnership	1.6%	1.3%	0.0%	0.0%
	San Joaquin Valley Energy Leader Partnership	0.0%	0.0%	0.0%	0.0%
New Construction Program	California Advanced Homes	0.0%	0.0%	0.0%	0.0%
Residential Energy Efficiency Program	Advanced Consumer Lighting Program	6.6%	6.5%	0.2%	0.1%
	Home Energy Efficiency Survey Program	13.7%	14.9%	0.4%	0.2%
	Multifamily Energy Efficiency Rebate Program	56.5%	55.2%	1.6%	0.9%
SW Workforce Education & Training	WE&T Connections	5.7%	8.8%	0.2%	0.1%
<b>All SCE Residential Downstream Lighting Programs</b>		<b>100.0%</b>	<b>100.0%</b>	<b>2.8%</b>	<b>1.5%</b>

**2.2.2.3 SDG&E’s Residential Downstream Lighting Programs**

As shown in Table 2-7, SDG&E has 4 programs reporting impacts from lighting measures delivered to residential customers through downstream mechanisms. Overall, these programs account for about 1% of SDG&E’s reported portfolio impacts. Individually, none of these programs account for more than 1% of SDG&E’s reported portfolio impacts.

**Table 2-7: SDG&E's Residential Downstream Lighting Programs**

SDG&E Program Name	Percent of Net Annual Energy Savings from Residential Downstream Lighting Programs	Percent of Net Peak Demand Reductions from Residential Downstream Lighting Programs	Percent of Portfolio Net Annual Energy Savings	Percent of Portfolio Net Peak Demand Reductions
3P-Res02 - Comprehensive Mobile Home	22.2%	20.2%	0.3%	0.2%
SW-ResA - Residential Basic Lighting	3.9%	3.1%	0.1%	0.0%
SW-ResB - Advanced Consumer Lighting	19.9%	13.8%	0.3%	0.2%
SW-ResC - Multi-Family	54.0%	62.9%	0.7%	0.8%
Grand Total	100.0%	100.0%	1.3%	1.2%

## 2.3 Related Evaluation Activities

Evaluation of the California IOUs' 2010-2012 energy efficiency programs is broader than the efforts described in this Research Plan. There are numerous teams involved in additional facets of lighting program evaluation, including those working on process evaluations, market research studies, residential and nonresidential onsite studies, market share tracking work, measure cost studies, effective useful life studies, and others. During the course of the work described in this Research Plan, the evaluation team will coordinate with other lighting-related EM&V activities to share details on research activities and timing, to address any possible overlaps in sampling (e.g., in the event that other EM&V teams will be drawing sample from the same populations as those described herein), to ensure consistent use of standardized questionnaire batteries (such as those developed for demographics/firmographics), and to address any other issues that may arise in relation to research regarding lighting programs and markets. These coordination activities are described in greater detail below (in Section 4).

Other ED-managed EM&V activities related to lighting include:

- **Lighting process evaluation and market research – Work Order (WO) 13.** Several research activities to be completed under WO13 – including 200 fast-track lighting retail store shelf surveys to be completed in October 2011 – will include data collection from the same sources as data that may be collected through Upstream and Residential Downstream Lighting Impact Evaluation.
- **Residential on-site saturation survey (CLASS) – WO21.** The WO21 team has proposed to collect a complete lighting inventory as part of the onsite survey, and will

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look to the WO28 team for guidance regarding specific priorities for the lighting-related survey effort.

- **Commercial saturation survey (CSS) – WO24.** WO24 will include an assessment of lighting technology saturation
- **Codes and standards impact evaluation – WO31.** WO31 has substantial research needs related to lighting, including an assessment of products available on retail shelves (in close coordination with WO13) and possible onsite assessment of lighting products currently installed in California homes and businesses (in close coordination with WO21).
- **Measure cost study – WO17.** WO17 will be relying on much of the data collected through this evaluation to assess incremental measure costs for upstream and residential downstream lighting measures.
- **EM&V guidance – WO48.** WO48 will be providing guidance regarding sample design, NTG assessment, baseline, determination of EUL/RUL, and other over-arching EM&V elements.
- **On-site metering guidance – WO70.** The WO70 team will be providing guidance to impact evaluation teams regarding methodologies and instrumentation related to onsite metering and measurements.

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## 3. Data Sources

This section of the Research Plan outlines key primary and secondary sources of information addressed in this evaluation. Section 6, Evaluation Methodology, also discusses how the approaches and methodologies will utilize these data sources.

### 3.1 Primary Data Sources

Primary data sources are listed briefly below and discussed in more detail in Section 5 (Sample Design) and Section 6 (Evaluation Methodology).

- **Program tracking data.** Program tracking data will be provided and uploaded by each of the four IOUs onto a centralized server. These separate data sets will be analyzed, cleaned, re-categorized, reformatted, and merged into one program tracking database. For upstream lighting measures, a sample will be drawn for conducting the invoice verification task, as well as in-depth interviews with lighting suppliers (i.e., manufacturers, buyers and high-volume retailers) and telephone surveys with retail store managers. For the residential downstream lighting measures, a sample will be drawn for conducting customer surveys and site visits.
- **Program invoices/application review.** The objective of this task is to verify the quantity of IOU-discounted products shipped by participating manufacturers to retailers. This will be determined through the verification of a sample of program invoices/applications against information contained in program tracking databases. **In-depth interviews with lighting suppliers.** The evaluation team will conduct in-depth interviews with lighting suppliers (representatives of manufacturers, retail buyers, and retail store managers) that sell products discounted by the IOUs' upstream programs. The interview will elicit supplier perspectives on free ridership (i.e., the percentage of IOU-discounted lighting products that would have been sold in the absence of the IOUs' programs), and evaluators will use the interview results to determine NTG estimates by channel. This data collection effort will be closely coordinated with related supplier efforts under consideration as part of WO13 (lighting process evaluation and market research).
- **Telephone surveys with retail store managers.** Telephone surveys will be conducted with retail store managers to provide additional information on NTG issues as well as confirm the percentage of 2010-2012 IOU-discounted products that were sold through by the end of each calendar year. Store managers will also be asked to report their

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estimate of residential v. nonresidential sales. Surveys with retail store managers will be designed to cover all types of IOU-discounted products (i.e., basic CFLs, specialty CFLs, CF fixtures, LEDs, etc.). This data collection effort will also be closely coordinated with related supplier efforts under consideration as part of WO13 (lighting process evaluation and market research).

- **Telephone and onsite surveys with residential customers.** Similar to the effort implemented during 2008-2009, surveys with residential customers, including recent purchasers and non-purchasers, will be conducted in phases, or “waves,” throughout 2011-2013 to enable continued monitoring of purchase, installation, and storage rates over time along with monitoring for changes in baseline and NTG assumptions over time. Follow-up onsite surveys will also be completed with a nested sample of telephone survey respondents to verify self-reported data regarding lighting purchases.
- **Comprehensive onsite surveys with residential and nonresidential customers.** As mentioned above, an onsite survey effort will be conducted as part of WO21 (residential) and WO24 (nonresidential). Onsite interviews will also be conducted with a subset of respondents. At this time, we are not proposing any additional time-of-use metering. However, if such metering becomes necessary, the effort would be coordinated with the residential and/or nonresidential ongoing onsite saturation surveys.
- **Optional onsite surveys with prior research study participants.** We propose an optional effort is to revisit the sample of 1,200 households who participated in the onsite survey effort as part of the 2006-2008 impact evaluation. The goal of these surveys is to monitor changes in household lighting inventories over time.
- **Telephone surveys with nonresidential customers.** We will leverage the general population nonresidential data collected as part of WO24, and add an additional module to assess nonresidential purchases through upstream channels.
- **In-store consumer intercept and shelf surveys.** Similar to the method used for the 2006-2008 program evaluation, we will conduct both revealed and stated preference consumer intercept surveys, as well as full retail lighting shelf inventories. The goal of the intercepts is to support analyses of NTG and related customer choice issues, and the shelf surveys provide valuable data used for product availability and measure cost assessments.

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## 3.2 Secondary Data Sources

The activities described in this Research Plan will also leverage numerous secondary data sources, as listed below and described in more detail in Section 6.

- **DEER Update.** We are currently working as part of the DEER team to update unit energy savings estimates for many of the lighting measures included in this Research Plan. We expect these updates to be available in early 2012.
- **2008-2009 Residential and Nonresidential Lighting Inventory and Metering Datasets.**
  - **Residential.** As part of the 2006-2008 impact evaluation, a random sample of 1,232 households were surveyed during 2008-2009 to collect complete lighting inventories. In addition, metered data was collected and analyzed for the purpose of estimating average daily hours-of-use and peak coincidence factors. This dataset provides valuable baseline information for assessing impacts from the lighting measures installed in 2010 and 2011.
  - **Nonresidential.** A similar dataset is available from the 2006-2008 impact evaluation of nonresidential lighting measures. We will work closely with Itron to leverage the data available from this prior study.



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## 4. Evaluation Coordination

This section of the Research Plan outlines the coordination and communication approach that the Upstream and Residential Downstream Lighting evaluation team will follow in order to ensure compliance with evaluation-wide requirements, to contribute to key information flow, to ensure sample and study coordination, and share data and results.

### 4.1 Progress Reporting to CPUC-ED/DMQC

Four principal systems will be used to report on progress to the CPUC and DMQC:

1. Monthly progress reports will accompany invoices sent to CPUC-ED/DMQC.
2. Weekly reports of accomplishments, planned activities for the following week, and issues needing resolution will be posted using the PSR each week.
3. A tracking database will be used to track planned on-site activities using the OTS database.
4. Regularly scheduled meetings will be held to discuss accomplishments, plans and pending activities and decisions.

### 4.2 Coordination of Methods and Approaches

There are a number of coordination and working group teams that have been established to ensure communication across all impact work orders. The primary objectives of these overarching groups are to provide guidance, coordination, oversight and a dispute resolution process for all impact related activities. The following are the various working groups with which the Upstream and Residential Downstream Lighting impact evaluation team will likely coordinate.

#### 4.2.1 Impact Team

The Impact Team provides overall guidance and oversight with respect to all impact related work orders. This team will also ensure coordination among all the impact WOs as well as between the impact and non-impact WOs. A subset of this team will serve as a dispute resolution team to resolve any issues and disputes that arise during the course of the impact evaluations, with final authority on all such decisions resting with Energy Division management.

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As discussed below, a number of other working groups have been developed that will focus on providing guidance and technical support on cross cutting issues. The Impact Team will oversee the activities of these working groups and hold weekly status meetings with these team members. As part of this weekly meeting, any issues that need resolution (or are in dispute) will be discussed.

#### **4.2.2 Net-to-Gross Guidance Working Group**

The Net-to-Gross (NTG) Guidance team provides guidance, oversight and technical support for all NTG activities. This team will produce an overarching NTG Guidance Document and related support documents that will provide guidelines for conducting NTG analysis for each of the impact WOs. The team will also develop generic survey questionnaires and specify related survey dataset content to gather data to support NTG estimation, and develop NTG algorithms that use the self report survey responses. This team will also ensure consistency in methods across all impact related WOs, and approve any divergence from the guidelines. The team will work directly with the impact WO teams to support the development of their work order-specific NTG algorithms and survey instruments. This team will ensure coordination in data collection activities across all impact and non-impact WOs. This team will also coordinate with the Baseline Guidance team, as these two activities are very interrelated. The NTG Guidance team will provide weekly status updates to the Impact Team, and will use the dispute resolution process to resolve any issues that may arise during the course of the development of the guidelines or divergences from the guidelines.

#### **4.2.3 Baseline Guidance Working Group**

The Baseline Guidance team provides guidance, oversight and technical support for all baseline development activities. This team will produce a Baseline Development Guidance Document that will provide guidelines for developing baselines for impact estimation for each of the impact WOs. This team will also ensure consistency in methods across all impact related WOs, and approve any divergence from the guidelines. This team will ensure coordination in data collection activities across all impact and non-impact WOs for data sources that will support the development of baselines. This team will coordinate with the ex ante/custom project review team as well as the NTG Guidance team, as these activities are very interrelated. The Baseline Guidance team will provide weekly status updates to the Impact Team, and will use the dispute resolution process to resolve any issues that may arise during the course of the development of the guidelines or divergences from the guidelines.

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#### **4.2.4 Sampling Guidance Working Group**

The Sampling Guidance team provides guidance, oversight and technical support for all sampling related activities. This team will produce a Sampling Guidance Document that will provide guidelines for sampling related activities for each of the impact WOs, such as setting minimum precision levels, primary and secondary objectives, minimum sample sizes for reporting results, how to handle complex issues such as sample migration, etc. This team will review each WO's sampling plan to ensure consistency in sampling methods across all impact related WOs, and approve any divergence from the guidelines. Team members will make themselves available to consult with each WO's staff to assist with the development of sampling plans. This team will oversee cross-cutting sampling issues, such as estimating program level precision levels for programs that have measures being studied across multiple work orders. A tool will be developed that summarizes the sample sizes for each work order by measure and program for each data source, and relate it to the parameters the data will be used to estimate (e.g., telephone surveys to estimate NTG). This will allow the team to determine at what reporting level results can be reliably generated (e.g., at a measure-program level, overall program level, IOU-measure level, etc.), and identify where gaps exist for any measures or programs of considerable interest. This team will provide weekly status updates to the Impact Team, and will use the dispute resolution process to resolve any issues that may arise during the course of the development of the guidelines or divergences from the guidelines.

#### **4.2.5 M&V Guidance Working Group**

The M&V Guidance team provides guidance, oversight and technical support for all monitoring and verification field activities. This team will produce an M&V Guidance Document that will provide guidelines and basic procedures for carrying out M&V activities. This team will also ensure consistency in methods across all impact related WOs, and approve any divergence from the guidelines. The M&V Guidance team will provide weekly status updates to the Impact Team, and will use the dispute resolution process to resolve any issues that may arise during the course of the development of the guidelines or divergences from the guidelines.

#### **4.2.6 Lighting Technical Working Group**

Careful coordination must also occur between the Nonresidential Downstream, and Residential and Upstream Lighting evaluations. Therefore, a Lighting Technical working group has been formed composed of members from each of these two work orders to ensure consistency in analysis approaches and coordination among data collection activities. Furthermore, this team

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will also coordinate with the Codes and Standards evaluation team, as it is expected that there will be similar measures evaluated for that program as well.

#### **4.2.7 Coordination with Process Evaluations**

The Upstream and Residential Downstream Lighting team is also coordinating with the Lighting Process/Market Evaluation team (WO13), as well as the IOU's lighting related process and market studies teams. There are opportunities for each study to collect data that can be utilized for the other study. It is also important to ensure that the same market actors and end-use customers are not being contacted for multiple data collection efforts. This is discussed in more detail below.

#### **4.2.8 Cross-Study Sample Coordination**

To ensure that customers are not being over-contacted, all studies will submit their sample frames to a centralized database that can track who is being contacted. In cases when multiple studies are attempting to sample from the same customer segment which may be limited in population, those studies will coordinate ahead of time to allocate the sample frame as needed. This is not expected to be a significant concern for the upstream and residential downstream lighting team, as the participant population is relatively large.

#### **4.2.9 Coordination with the DEER Team**

The DEER lighting technology leads are members of the Upstream and Residential Downstream Lighting team, so there has been close coordination between these two studies as it relates to lighting. These two teams will continue to work closely to support the DEER efforts on an ongoing basis.

#### **4.2.10 Communication of Early Feedback to the IOUs**

The IOUs and other stakeholders will be provided with the opportunity to review and provide comments on this draft research plan. The timeline for this research plan has incorporated the delivery of interim findings to provide early feedback to the IOUs. It is also planned to have ongoing meetings and discussions with the IOUs to solicit feedback on approaches and the need for interim results to support the IOUs' needs. Through this process, the Upstream and Residential Downstream Lighting team will attempt to meet the need of the IOUs, with respect to providing timely and useful interim results.

## 5. Sample Design

Table 5-1 provides a high-level summary of the types of primary data collection planned for the 2010-2012 evaluation effort. Additional detail is provided in Section 6.

**Table 5-1: Summary of Data Collection Activities and Sample Sizes**

Data Collection Activity	Sample Size	Data Collection Period
Invoice/Application Verification	50 per IOU (initial sample)	Fall 2011
Indepth interviews with manufacturers, retail buyers and high-volume retail chain representatives	30 per wave	Fall 2011, Spring 2012, Fall 2012, Spring 2013
Telephone surveys with retail store managers	250 per wave	Fall 2011, Spring 2012, Fall 2012, Spring 2013
Telephone surveys with residential and nonresidential customers	800 per wave (100 purchasers, 700 non-purchasers)	7 waves, October 2011 through April 2013
Follow-up onsite surveys with residential and nonresidential customers	70 per wave	4 waves, October 2011 through April 2013
Residential and nonresidential onsite surveys	Coordinated with CLASS, CSS	Dec 2011 - Dec 2012 (TBD)
Optional onsite surveys with residential customers	600 (from sample of 1,200 households surveyed in 2008-2009)	Spring 2012
Intercept Surveys	800 revealed preference and 1,600 stated preference surveys per wave	Spring 2012, Fall 2012, Spring 2013
Shelf Surveys	200 retail stores per wave	Fall 2011 (WO13), Spring 2012, Fall 2012, Spring 2013

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## 6. Evaluation Methodology

### 6.1 Upstream Lighting

There are three primary objectives for the impact evaluation of upstream lighting measures:

- Verify the quantity of lighting products that were shipped, sold and installed by residential and nonresidential customers within the PG&E, SCE and SDG&E service territories during the 2010-2012 program period,
- Estimate the gross energy and peak coincident demand impacts from these measures, and
- Determine an appropriate net-to-gross ratio for estimating net energy and demand impacts.

As such, there are three primary components to the evaluation approach:

1. **Adjustments to Quantity of Measures Rebated**, which includes a verification assessment of a sample of program invoices/applications, an assessment of the percent of IOU-discounted products not sold by the end of 2012, an assessment of the percent of IOU-discounted products purchased by non-IOU customers (i.e., leakage), and an assessment of the percent of IOU-discounted products purchased by residential v. nonresidential customers.
2. **Development of Gross Savings Inputs**, which includes an assessment of the percent of IOU-discounted products installed at the end of 2012 (installation rate), estimates of the average daily hours-of-use (HOU), estimates of the average percent operating at peak (coincident factor, CF), estimates of the wattage displaced by IOU-discounted products (delta watts), and calculation of unit energy savings (UES) estimates (kWh/year and peak kW).
3. **Development of Net Savings Inputs**, which included estimates of the net-to-gross ratio (NTGR).

This section presents a discussion of the methodology for each of the three main components of the evaluation.

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## 6.1.1 Quantity of Measures Adjustments

This section discusses four adjustments that will be made to the quantity of rebated measures claimed by the IOUs as having been sold to IOU residential and nonresidential customers during 2010-2012. These four adjustments include:

- Quantity of IOU-discounted products shipped by participating manufacturers to retailers as determined through the verification of a sample of program invoices/applications;
- Percent of IOU-discounted products not sold by the end of 2010, 2011 and 2012;
- Percent of IOU-discounted products purchased by non-IOU customers (i.e., leakage); and
- Percent of IOU-discounted products purchased by residential v. nonresidential customers.

### 6.1.1.1 Invoice/Application Verification

The objective of this task is to verify the quantity of IOU-discounted products shipped by participating manufacturers to retailers. This will be determined through the verification of a sample of program invoices/applications against information contained in program tracking databases.

Shipment trends by IOU will be analyzed to select the appropriate sample of invoices/applications. Total shipments as well as average shipments will be analyzed by distribution channel (e.g., discount, drug store, etc.) and by store type (e.g., chain v. independent).

For each invoice/application, we will compare program tracking data to what was provided in either paper or electronic form. In addition to quantity of IOU-discounted products shipped, we will verify the following key metrics:

- Manufacturer name
- Measure name
- Product type
- Retailer name and location

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- Per unit rebate
  - Total rebate paid
  - Shipment and sales dates

We will also document and assess the quality of the various sources of information used to verify each metric.

For the ex-post energy savings and peak demand impact calculations, the quantity claimed will be compared to the quantity that could be verified in the invoice/application documentation provided. Additional adjustments may be made based on verification of product type, retailer location and overall document quality.

We plan to conduct an initial invoice/application verification activity in November/December 2011 based on an initial sample of 30-50 applications per IOU. An optional, more comprehensive verification may be conducted in late 2012 or early 2013 if warranted based on the results of this initial activity.

#### **6.1.1.2 Shipments v. Sales**

Program tracking data includes information on the quantity of lighting products rebated by the IOUs and then shipped from participating manufacturers to retailers, but it does not provide information on the actual sales of these products. Sales of the products rebated through the upstream programs may continue to occur well after the products were shipped. Of particular interest in the 2010-2012 evaluation are IOU-discounted products that were shipped in 2010-2012 and claimed by the IOUs as resulting in energy savings during 2010-2012, but which did not actually sell during 2010-2012 (i.e., sales may continue after 2012).

The approach used to adjust for shipments v. sales during the 2006-2008 evaluation relied on interviews with participating manufacturers, high-level retail buyers and retail store managers. We plan to use a similar approach for 2010-2012. Specifically, manufacturers, retail buyers and retail store managers will be asked to estimate the percentage of 2010-2012 IOU-discounted products that were sold through by the end of each calendar year.

Results will be used to adjust the quantity of IOU-discounted products verified as shipped in 2010-2012 to better reflect actual annual sales as well as sales through December 31, 2012. Market actors will be asked these questions about all IOU-discounted lighting products, including basic and specialty CFLs, energy efficient fixtures and LEDs.



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We plan to conduct four rounds of in-depth interviews with manufacturers, retail buyers and representatives from high-volume retail chains, as well as telephone surveys with retail store managers. This research will be conducted during Fall 2011, Spring 2012, Fall 2012 and Spring 2013. Approximately 30 in-depth interviews with manufacturers, retail buyers and high-volume retailers and 250 retail store manager telephone surveys will be conducted during each round.

### **6.1.1.3 Leakage**

Leakage is defined as the purchase of IOU-discounted lighting products by non-IOU customers. For 2006-2008, data from in-store consumer intercept research was analyzed to estimate the percentage of IOU-discounted lighting products that were sold to non-IOU customers. A similar approach is proposed for 2010-2012.

### **6.1.1.4 Residential v. Nonresidential**

PG&E and SCE assume that a portion of the lighting products rebated through the upstream programs are installed in nonresidential locations, whereas SDG&E assumes that 100% are installed in residential locations. This residential v. nonresidential “split” will be verified through several methods.

First, results from telephone surveys will determine the proportion of IOU-discounted CFLs that were purchased by residential customers for installation in nonresidential locations. This includes telephone surveys with both residential and nonresidential customers.

Second, onsite data will be used to estimate the quantity of IOU-discounted CFLs installed in residential v. nonresidential locations. Manufacturer and model numbers will be collected for a sample of the efficient lighting products observed onsite and then compared to the manufacturer/model information contained in the program tracking data. Extrapolation techniques can then be used to estimate the total number of IOU-discounted lighting products installed in residential and nonresidential locations.

Finally, through the consumer intercept surveys, we can collect data to determine the proportion of IOU-discounted CFLs that were purchased for installation in residential v. nonresidential locations.

For the 2006-2008 impact evaluation, we relied solely on the results from the onsite data collection; however, given the wider variety of lighting products rebated in 2010-2012, we feel no one method of data collection and analysis will likely yield a reliable estimate of the

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residential v. nonresidential “split” for all product types. As such, we will utilize all relevant data to make recommendations for the final estimates.

## **6.1.2 Gross Impacts Analysis**

This section describes the methodology for conducting gross impacts analysis. There are five primary analysis elements:

1. Installation rate
2. Average daily hours-of-use (HOU)
3. Average percent operating at peak (coincidence factor, or CF)
4. Wattage displaced by IOU-discounted products (delta watts)
5. Unit energy savings (UES) estimates (kWh/year and peak kW)

### **6.1.2.1 Installation Rate**

The installation rate for the 2010-2012 upstream programs is defined as the proportion of IOU-discounted lighting products sold during 2010-2012 that are estimated to be installed by December 31, 2012. As was done for the 2006-2008 impact evaluation, the evaluation team will determine installation rates through telephone surveys conducted in several waves.

Conducting these surveys in waves enables the evaluation team to collect the same type of data collection for several samples at different points in time, thus enabling a large overall sample to be collected without a massive data collection effort at any one point in time. In addition, the wave approach provides a series of snapshots for tracking changes over time. Continuing the same data collection through successive evaluation periods can provide further insights into changes over time, as well as expanding the overall dataset available for analysis.

The survey instrument used for the 2006-2008 impact evaluation will be leveraged for this effort. This will enable continued monitoring of purchase, installation, and storage rates over time along with monitoring for changes in baseline and NTG assumptions over time.

The team will modify the survey instrument based on current research needs – for example, the team will add questions to address the issue of deferred lamp installations as well as “like for like” replacements. For example, we will include questions to assess when products in storage get installed, what lamp wattage is ultimately displaced when these products are installed, what HOU/CF should be assumed for these deferred installations when they are installed, and

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whether the NTG ratio for a deferred installation should be the same as an immediate installation or whether it should differ.

The evaluation team will conduct seven waves of surveys between November 2011 and May 2013, including approximately 800 surveys per wave for 5,600 total surveys. Based on experience conducting similar surveys during 2008-2009, we will set a minimum quota of 100 recent purchasers per wave and, assuming a similar 7:1 incidence rate, this will yield 700 non-purchasers per wave.

Our plan is to conduct both residential and nonresidential telephone surveys and split the sample 50/50. We will revisit this plan once we have the results from the initial wave. To save costs, at least one of the waves (e.g., January 2012) will be added on as an incremental effort to the recruitment activities being conducted for WO21 (CLASS) and WO24 (CSS).

#### **6.1.2.2 Hours-of-Use (HOU)**

There are several phases to the development of hours-of-use (HOU) estimates for the lighting products distributed through the 2010-2012 upstream lighting programs.

The first phase involves using data from the telephone and follow-up onsite surveys beginning in November 2011 to determine where program measures have been installed (i.e., location/space type as well as fixture type). Data from the 2008-2009 residential and nonresidential lighting inventory and metering studies will then be mined to determine the most appropriate HOU estimate for program measures. These HOU estimates will be used to produce preliminary updates for interim reporting purposes.

The second phase involves using data from the CLASS and CSS onsite saturation surveys (data collection expected to begin toward the end of 2011, and finish toward the middle of 2012) to more comprehensively assess where program measures are installed, making comparisons between program and non-program measures as appropriate. Early results from the CLASS and CSS surveys will be analyzed to determine changes in CFL saturation – overall, as well as by room/space type and fixture type. If CFL saturation patterns have not changed significantly over time, HOU data from the 2008-2009 study can be mined to determine HOU estimates for

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program measures. If we see significant shifts in CFL saturation, and lighting usage patterns in general, additional metering may be required.<sup>6</sup>

The third phase is optional as it relies on data collected from surveys of the 2008-2009 lighting inventory and metering study participants. If implemented, this survey effort will determine the extent to which CFLs installed prior to 2010 have shifted from their original locations and what effect, if any, that might now have on the HOU estimates previously generated for those measures. HOU estimates will also be determined for CFLs added since 2010.

#### **6.1.2.3 Coincidence Factor (CF)**

Coincidence factors (CF) will be estimated using a similarly phased effort as described above for HOU. Telephone and follow-up onsite surveys will be used to generate preliminary updates for 2010-2012 program measures (and used for interim reporting purposes), the CLASS and CSS survey data will be used to more comprehensively determine where program measures are installed, and the surveys with participants from the 2008-2009 lighting inventory and metering study will determine changes in pre- and post-2010 CFL usage patterns.

#### **6.1.2.4 Displaced Wattage**

Similar to what has been described above for HOU and CF, there are several ways in which we plan to produce estimates of displaced wattage:

- Telephone and follow-up onsite surveys – occupants will be asked (and skilled researchers will attempt to verify) the wattage of bulbs/fixtures replaced by program measures. We have used this approach in the past and while it is not possible to 100% verify these types of self-reports, it is a reasonable approach and will be used to provide preliminary estimates for interim reporting purposes.
- CLASS/CSS surveys – baseline wattage data collected in 2008-2009 will be compared to preliminary data available from CLASS/CSS surveys beginning at year-end 2011 and finalized in 2012 once the full analysis of these large-scale survey efforts is complete.

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<sup>6</sup> At this time, no time-of-use metering is proposed as part of this Research Plan. We will work closely with ED and its consultants and make the final determination regarding the need for time-of-use metering sometime during the summer 2012.

- Optional surveys with participants from the 2008-2009 lighting inventory and metering study – as an option, we could repeat the full lighting inventory and determine the extent to which baseline wattage levels have shifted from 2008-2009 and what effect, if any, that might now have on the baseline wattage estimates for measures added since 2010.

#### 6.1.2.5 Unit Energy Savings Calculation

Unit energy savings (UES) estimates are the average gross energy (kWh per year) and peak demand (kW) impacts per measure. UES calculations will be computed as follows for measures rebated through the upstream programs:

- UES (kWh/year):  $IR_p \times HOU_p \times \Delta W_p / 100$ , where:
  - $IR_p$  = installation rate for IOU-discounted product  $p$
  - $HOU_p$  = annual average hours of use for IOU-discounted product  $p$
  - $\Delta W_p$  = average displaced wattage for IOU-discounted product  $p$
- UES (peak kW):  $IR_p \times CF_p \times \Delta W_p / 100$ , where:
  - $IR_p$  = installation rate for IOU-discounted product  $p$
  - $CF_p$  = average percent on at peak for IOU-discounted product  $p$
  - $\Delta W_p$  = average displaced wattage for IOU-discounted product  $p$

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### 6.1.3 Net Savings Analysis

Net savings analysis will be conducted to assess the fraction of IOU-discounted lighting products that would not have been shipped, purchased or installed had it not been for the program. Net-to-gross (NTG) ratios will be developed using three distinct analysis methodologies:

- (1) Supplier and consumer self-report methods,
- (2) Econometric models (e.g., revealed preference purchase models, stated preference purchaser elasticity models)
- (3) Total sales (market-based) approach

We will then use a Delphi Panel approach to help determine which (if any) of the NTG ratios developed from the various NTG research activities is most accurate for the IOUs' 2010-2012 upstream lighting programs.

The remainder of this section provides details on the analysis methodologies described above.

#### 6.1.3.1 Self-Report Methods

There are two different self-report methods that will be employed to produce NTG estimates. The first involves interviews and surveys with suppliers (e.g., manufacturers, retail buyers, retail store managers), and the second involves interviews with consumers. Each self-report method is described below.

##### 6.1.3.1.1 Supplier Self-Report

The supplier self-report NTG estimation method relies on information collected from in-depth telephone interviews with lighting manufacturers, retail buyers, and high-volume retail store managers who sold IOU-discounted lighting products through the 2010-2012 upstream programs. The NTG estimate is based on the manufacturer and retail representatives' responses to a series of questions designed to estimate what lighting product sales would have been in absence of the programs.

Interviewers will attempt a census of all supplier representatives to yield responses that ultimately represent the greatest possible proportion of lighting products discounted through the upstream programs. The interviews will represent CFL manufacturers and retail chains that sell

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CFLs. The retail buyers and store managers will represent eight retail channels including discount, drug, grocery, large home improvement, mass merchandise, membership club, small hardware, and lighting and electronics chains. Interviewers will query respondents separately regarding basic CFLs and four categories of specialty CFLs (a-lamps, globes, reflectors, and “other” specialty lamp types).<sup>7</sup>

The KEMA team will analyze the results of these interviews to produce channel-specific NTG estimates for basic CFLs and each of the three specialty CFL categories. The channel- and product-level NTG ratios will be based on the average component NTG ratios weighted by the number of program-discounted lamps shipped by the IOUs. For example, if five lighting manufacturers each suggest that sales of basic CFLs through the grocery channel would decline in the absence of the program, the overall NTG estimate would be the sum-product of each estimate and the underlying volume of basic CFLs shipped through the 2010-2012 upstream program represented by each estimate.

At this time, this task does not include estimation of NTG ratios for LED replacement lamps (because LED lamp sales volumes through the upstream programs are minimal). As such, the task does not include interviews with LED manufacturers specifically; however, as WO13 – Lighting Process Evaluation and Market Research may include a rapid-feedback task involving interviews with LED suppliers, the WO28 team will coordinate closely with the WO13 team on the questionnaire design to examine the possibility of providing insights into possible NTG ratios for LED lamps in future program periods.

#### **6.1.3.1.2 Consumer Self-Report**

Consumer self-report methods will utilize data collected from three sources: telephone surveys, onsite surveys and intercept surveys.

##### **6.1.3.1.2.1 Telephone Surveys**

Similar to the approach used in 2006-2008, telephone surveys will be conducted with residential and nonresidential customers. Questions about the factors influencing the purchase decision will be added to the surveys to estimate self-reported NTG ratios. While these types of

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<sup>7</sup> Note that as of Q1 2011, CFL a-lamps, globes, and reflectors are the only specialty CFLs designated as HIMs. We have included this fourth, “other” category in anticipation that other types of specialty CFLs may be more heavily promoted in the latter part of 2011 and 2012.

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questions were included in the surveys conducted for the 2006-2008 impact evaluation, the results were never used for generating NTG estimates because too much time had passed since the purchase decision and the results were not considered as reliable as those generated using other methods. Since we plan to conduct telephone surveys beginning in November 2011 and quarterly thereafter, we feel it will be worthwhile to include consumer self-reported NTG estimates in the scope of this effort.

#### **6.1.3.1.2.2 Onsite Surveys**

Interviews with residential and nonresidential customers will be conducted onsite to assess willingness to pay. Combined with data from the shelf surveys, the NTG ratio is generated as a result of elasticity analysis which determines the impact of the IOU discount on respondents' willingness to purchase lighting products at different price points. Questions will be asked of recent purchasers (i.e., from each of 7 waves of the telephone and follow-up onsite surveys), as well as the general population (i.e., CLASS and CSS sample).

#### **6.1.3.1.2.3 Intercept Surveys**

As part of the stated preference surveys, consumers will be asked to make a decision regarding a hypothetical lamp purchase and then asked a brief series of questions about that decision. For example, stated preference respondents who select a CFL in their hypothetical purchase decision will be asked whether or not they would still select a CFL at various price points. A simple approach to analyzing this self-reported data was developed as part of the 2006-2008 impact evaluation. Essentially, respondents who indicate that they would still select a CFL at twice the price will be considered free riders (NTG=0) and respondents who indicate that they would not select a CFL at twice the price will be assigned a NTG estimate of 1. We can then generate channel-specific average NTG estimates as well a shipment-weighted average NTG ratios for each IOU.

#### **6.1.3.2 Econometric Models**

We will implement a revealed preference purchase model (similar to that used for the 2006-2008 impact evaluation) to produce econometric estimates of NTG for the 2010-2012 programs.

As part of the revealed preference surveys, field researchers will intercept consumers after they have made a lamp purchasing decision (i.e., after s/he has placed the lamp package[s] in his or her shopping cart or basket and begun to leave the lighting area). Researchers will ask these consumers a series of questions regarding their purchasing decisions. Purchasers who select



CFLs will be asked to indicate whether or not they would still select a CFL at various prices (e.g., five times the price, double the price and half of the price) and if so, whether their purchase quantities would change at various price points. We also record how many CFLs they did purchase and at what price based upon what they had in their cart at the time of the intercept. Purchasers of non-CFLs will be asked whether or not they would have bought a CFL at half the shelf price and at one quarter of the shelf price.

The responses from both the CFL and non-CFL purchase and price batteries will be used to estimate a pricing function model. These models will be evaluated at the full price and program discounted price per bulb. The impact of the discount is determined by analyzing the difference in quantity that would be purchased between the modeled full price (MFP) and the quantity at the modeled discount price (MDP). In effect, this quantity represents how many more lamps have been purchased as a result of the IOU discount, which is then computed as a percent of CFL purchases that are theorized to have been program-induced (i.e., the NTG ratio).

### **6.1.3.3 Total Sales (Market Based) Approach**

The recent 2010 Massachusetts ENERGY STAR Lighting Program Evaluation report<sup>8</sup> relied on a multi-state modeling approach to assess the net impact of the Massachusetts CFL program on CFL purchases in the state. The model relied upon “household-level data collected from different geographic areas across the United States, in 1,495 randomly selected households (150 of them in Massachusetts and another 93 in South Dakota...).”<sup>9</sup> The model produced estimates of per-household CFL purchases in the presence of the program and in its absence. By subtracting the latter from the former and dividing the result by the number of CFLs for which the program provided incentives per household, evaluators generated a NTG estimate.

The research team will work with NMR (the primary author of the Massachusetts study) to identify the appropriate inputs to the multi-state model based on the data collection activities planned as part of this work order. Once the data collection is complete, we will generate the necessary inputs to be plugged into the model by NMR staff. After running the model, NMR will provide an additional 2010 NTG estimate for comparison with those generated by the other net

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<sup>8</sup> NMR Group, Inc.; KEMA, Inc.; Cadmus Group, Inc.; and Tetra Tech, 2011. Massachusetts ENERGY STAR Lighting Program: 2010 Annual Report. Prepared for the Energy Efficiency Advisory Council Consultants, Cape Light Compact (CLC), NSTAR, National Grid (NGRID), Unitil, Western Massachusetts Electric (WMECo). June 2011.

<sup>9</sup> *Ibid.*, page 14.

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savings approaches described above. We will also work with NMR to assess the possibility of forecasting how NTG results may change by the end of 2012 based on this method.

#### **6.1.4 Delphi Panel**

A Delphi Panel approach involves a panel of experts – in this case, experts on upstream lighting programs – that are queried in a structured format to bring about judgment on a particular issue. The first step under this activity is to develop a list of candidates for the panel, allowing for stakeholder input as appropriate, and consult with the ED project manager to recruit the final list of panelists.

Delphi approaches typically involve two or more “rounds” of interviews with panelists. The first round focuses on communicating the issues and obtaining structured feedback from each panelist. Subsequent rounds typically involve sharing key points of consensus from previous rounds as well as points of contention with a focus on reaching a shared understanding or perspective on the issues.

In this case, the WO28 team will share the results of the six NTG estimation methods described above with the panelists and ask for their perspectives regarding which method may be most reliable and how they would assign weights to the relative reliability of the estimates. These perspectives will be compiled and circulated back to the panelists for round two, giving panelists an opportunity to review their original responses against those of the other panelists, to make changes to their original responses (if necessary), and to provide their rationale for retaining or altering their responses. Based on these exchanges, panelists will then be asked to provide their own NTG estimates for basic CFLs and the four specialty lamp categories (a-lamp, globe, reflector, other).

The aforementioned 2010 Massachusetts Lighting Evaluation report relied upon a Delphi approach to estimate NTG ratios. Their approach relied on 20 panelists who were “experts regarding CFL markets or programs.”<sup>10</sup> We will work closely with ED and its consultants to make a final determination on the number and composition of the panelists.

The Massachusetts study authors report that they planned to recommend the evaluation’s final NTG ratios based on the results of the Delphi approach “unless the results seemed

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<sup>10</sup> NMR *et al.*, 2010. Page 22.

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unreasonable.”<sup>11</sup> Similarly, we would propose that the Delphi approach be used to generate the final recommended NTG estimates for the 2010-2012 programs unless the results were deemed unreasonable.

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<sup>11</sup> *Ibid.*, page 23

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## 7. Timeline

At a high-level, we expect to deliver interim as well as final results from the evaluation activities described above at three distinct intervals:

1. **2010-2011 Interim Results.** Report will cover 2010 through Q2 2011 program activity. Draft report will be available in January 2012 and final report expected in March 2012.
2. **2010-2012 Interim Results.** Report will cover 2010 through Q2 2012 program activity. Draft report will be available in January 2013 and final report expected in March 2013.
3. **2010-2012 Final Results.** Report will cover 2010-2012 program activity. Draft report will be available in June 2013 and final report expected in August 2013.

In addition, early feedback memos will be generated throughout the evaluation period as new/preliminary information becomes available from the various data collection and analysis activities.

**Table 7-1: WO28 - Preliminary Schedule for Data Collection, Analysis and Reporting Activities**

	SCHEDULE																										
	2011			2012												2013											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Results Reporting</b>																											
2010-2011 Interim Results																											
2010-2012 Interim Results																											
2010-2012 Final Results																											
<b>Data Collection &amp; Analysis Activities</b>																											
Invoice/Application Verification																											
Indepth interviews with manufacturers, retail buyers and high-volume retail chain representatives																											
Telephone surveys with retail store managers																											
Telephone surveys with residential and nonresidential customers																											
Follow-up onsite surveys with residential and nonresidential customers																											
Residential and nonresidential onsite surveys																											
Optional onsite surveys with residential customers																											
Intercept Surveys																											
Shelf Surveys																											

## 8. Work Plan and Budget

Table 8-1 presents the high-level, preliminary budget for the data collection, analysis and reporting activities described in this draft Research Plan. We will finalize the budget, and provide a detailed description of the tasks and staffing plans, once we have general agreement on the scope of work described above.

**Table 8-1: Preliminary WO28 Budget**

Results Reporting			High Level, Preliminary Budget	Lead Firm
2010-2011 Interim Results	Report will cover 2010 through Q2 2011 program activity.	Draft report will be available in January 2012 and final report expected in March 2012.	\$50,000	KEMA
2010-2012 Interim Results	Report will cover 2010 through Q2 2012 program activity.	Draft report will be available in January 2013 and final report expected in March 2013.	\$50,000	KEMA
2010-2012 Final Results	Report will cover 2010-2012 program activity.	Draft report will be available in June 2013 and final report expected in August 2013.	\$150,000	KEMA
<b>Data Collection &amp; Analysis Activities</b>				
<b>Data Collection Activity</b>	<b>Sample Size</b>	<b>Data Collection Period</b>		
Invoice/Application Verification	50 per IOU (initial sample)	Fall 2011	\$50,000	KEMA
Indepth interviews with manufacturers, retail buyers and high-volume retail chain representatives	30 per wave	Fall 2011, Spring 2012, Fall 2012, Spring 2013	\$100,000	KEMA
Telephone surveys with retail store managers	250 per wave	Fall 2011, Spring 2012, Fall 2012, Spring 2013	\$125,000	KEMA and subcontractor
Telephone surveys with residential and nonresidential customers	800 per wave (100 purchasers, 700 non-purchasers)	7 waves, November through May 2013	\$750,000	KEMA and subcontractor
Follow-up onsite surveys with residential and nonresidential customers	70 per wave	4 waves, December through June 2013	TBD	KEMA
Residential and nonresidential onsite surveys	Coordinated with CLASS, CSS	Dec 2011 - Dec 2012 (TBD)	TBD	KEMA, Itron
Optional onsite surveys with residential customers	600 (from sample of 1,200 households surveyed in 2008-2009)	Spring 2012	\$350,000	KEMA
Intercept Surveys	800 revealed preference and 1,600 stated preference surveys per wave	Spring 2012, Fall 2012, Spring 2013	\$900,000	KEMA or Subcontractor
Shelf Surveys	200 retail stores per wave	Fall 2011 (WO13), Spring 2012, Fall 2012, Spring 2013		

Comment Author	Topic	Comment	ED Response
PG&E	Deferred Installations	1.1 Evaluation Overview - Re: issue of accounting for savings: Table 1-1 reports that "deferred installations" have not been included in their summary of reported upstream and downstream lighting measure savings thru Q1 2011. Please confirm that deferred installations WILL be counted toward goals.	The focus of the evaluation will be on the 2010-2012 bulbs. We will also be evaluating where the bulbs from the previous programs are in the market. Accounting and methods to attribute savings from previous cycles to the 2010-2012 cycle will be based on the policies that are in place to count those savings and the purpose for which the savings are being counted (i.e. achieving goals, replacing decay, determining incentives, etc.)
PG&E	List Of Measures	1.1 Evaluation Overview – Measure groups to be studied – While we understand the desire to only evaluate HIMs, as program emphasis shifts away from basic, general service lighting, newer and more advanced types of lamps and fixtures will become more prominent in the portfolio. This study affords an opportunity to establish current levels of sales, installations, performance and savings for those measures, which will then become the basis for future program measures and savings estimates. We recommend that the list of measures to be studied be expanded beyond HIMs for this purpose.	As technologies become a larger portion of the savings claim we will continue to expand the evaluations to capture these technologies. We have added Dimmable CFLs to the measure list, and will add other if necessary as the evaluation progresses if other technologies can be reasonably evaluated.
PG&E	Controls	1.1 Evaluation Overview – Study does not address controls (dimmers, occupancy sensors). These are important measures for codes and standards, which began requiring their use in certain residential applications in the 2005 Title 24 code. While limited to new construction, which has been slow in this economy, these measures are expected to become increasingly important as they take hold in the market. Can this study address their sales and penetration (and savings, if possible), if only to establish a baseline for tracking their progress over time? If not, could you identify the WO where these will be studied?	Controls are not measures promoted through the upstream lighting programs and, thus, are not called out as a measure to be studied through this evaluation. We will be looking at control types in the CLASS study, and the C&S impact evaluation may address lighting controls.
PG&E	Spillover	1.2 Evaluation Goals and Objectives, 1.3 Researchable Issues - Study will measure gross savings, free ridership and net savings. We recommend that it's time to start measuring spillover as well, especially for such important measures. This should be an explicit goal of the study. NOTE: By spillover, we are <u>not</u> referring to installations of pre-2010 IOU-discounted that were deferred (those must be counted in any case), but influences from other program activities and prior years' programs that have increased product availability, made consumers aware of product benefits, and increased awareness of energy efficiency.	CPUC policy directed the evaluation team NOT to count spillover in 2006-2008 due to its speculative nature (see Finding of Fact 27 of D. 05-04-051). In D.07-10-032 ED was directed to assess whether market effects should be counted in 2009-2011, but the CFL market effects study from the 2006-2008 cycle demonstrated that market effects could not be quantified without better initial tracking of the market. This is one reason some of the initial LED and EISA research that's being done as part of WO13 (and potentially work being done by the IOUs in their process evaluations and their LMT assessments) is setting baselines for new technologies that may be helpful in demonstrating spillover/market effects impacts in the future. In addition, WO54, the ED managed Market Transformation/Market Effects work order, is initiating a more comprehensive study of the market for LEDs, which among other things will include an assessment of IOU program efforts.
PG&E	Total Lighting energy use	2.3 Related Evaluation Activities and 3.2 Secondary Data Sources – Installed wattages and operating hours per widget is of limited use, unless the total wattages, operating hours and energy use for the entire residence are also reported. For example, if there are more fixtures being installed in homes, is the total lighting energy use going up, down or staying the same? This question should be addressed separately for indoor and for outdoor residential lighting. It appears that the 2006-2008 household survey did this, and that Residential on-site saturation survey – WO21 will also be doing some of this. Please explain how the data to be collected in this study (WO28) will inform that study for this	From a programmatic, ex post impact evaluation perspective, total energy consumption from lighting is not on its own a relevant parameter. Installed wattage and operating hours are relevant parameters for energy savings calculations. That said, we agree that indicators such as lighting power density (W/sqft), as well as indoor and outdoor saturations overtime, will be calculated as part of the work being done in WO21/CLASS and possibly work done through the C&S impact evaluation. These estimates can be compared to what was found in 2008-2009, 2005, 2000, etc. Proposed market transformation indicators for lighting have also been considering lighting power density or other metrics that could be informed by these studies and tracked over time.
PG&E	State Wide Goals	2.3 Related Evaluation Activities – The Strategic Plan goal is to transform the entire lighting market, and the Huffman bill (AB 1109) goal is to reduce total lighting consumption. It also asks for a 2007 baseline study of total lighting energy use. We realize that this study (WO28) is focused more narrowly on widgets, but it will be looking at a great deal of data that could be used to inform progress toward those broader goals. Please address how this study, or related studies, will do that.	The onsite surveys conducted in 2008-2009 to support the 2006-2008 impact evaluation of the Upstream Lighting Program, as well as the most recent RASS study, provided estimates of total lighting consumption (which can be compared to estimates from prior RASS and CLASS studies). The upcoming CLASS study and C&S impact evaluations will provide updated estimates of total lighting consumption for comparative purposes. Aggregate reports on lighting in the residential and commercial sectors will also provide an opportunity to "tell the whole story" from multiple points of research underway.

Comment Author	Topic	Comment	ED Response
PG&E	Storage	3.1 Primary Data Sources – Please explain how the concept of “storage rates” will change with time. This should primarily be a first-year phenomenon – e.g., if a customer buys lamps and stores 30% of them, and two years later is found to still be storing 30% of that year’s purchases, the new stored lamps must be replacing the old stored lamps as they were installed. In other words, stored lamps become installed lamps as other lamps burn out. To assume otherwise would mean that after a few years the customer would have a closet full of lamps (30% of each years’ purchases piled up).	The 30% storage rate is across the entire population. We agree with the assumption that stored lamps become installed lamps and actually run on the "first in first out" assumption that the first bulb bought will be the first bulb installed. The storage and installation model we use is at the population level, not the household level.
PG&E	Deferred Installations	6.1.1 Quantity of Measures Adjustments– What is to be done with the IOU-discounted measures from 2006-2008 that were sold in later years? Ditto for measured sold in 2006-2008, but not installed until later years? Those must be counted as well, and credited to the program in the current cycle.	The 2006-2008 and 2010-2012 evaluations were designed to track the flow of lighting products in the market - from shipment through to installation to removal. The accounting of net energy savings from products discounted in one period but affecting savings in another period (and count toward goals) is based on policy direction to count products that are installed and operating in any given year. Energy Division relies on evaluations to help inform the estimates, as was the case in the risk reward incentive claims for 2009, and follow Commission policy.
PG&E	Deferred Installations	6.1.1.2 Shipments v. Sales – Section discusses shipments in 2010-2012, and plans to adjust downward for sales not occurring before end of 2012. What about shipments in the prior program cycle that sold in the current cycle? Those must be accounted for as well.	The 2006-2008 and 2010-2012 evaluations were designed to track the flow of lighting products in the market - from shipment through to installation to removal. The accounting of net energy savings from products discounted in one period but affecting savings in another period (and count toward goals) is based on policy direction to count products that are installed and operating in any given year. Energy Division relies on evaluations to help inform the estimates, as was the case in the risk reward incentive claims for 2009, and follow Commission policy.
PG&E	Deferred Installations	6.1.2.1 Installation Rate – It is not sufficient to limit the installations to products sold during 2010-2012. IOU-discounted measures sold in preceding years that are finally installed in 2010-2012 must be counted as well.	The 2006-2008 and 2010-2012 evaluations were designed to track the flow of lighting products in the market - from shipment through to installation to removal. The accounting of net energy savings from products discounted in one period but affecting savings in another period (and count toward goals) is based on policy direction to count products that are installed and operating in any given year. Energy Division relies on evaluations to help inform the estimates, as was the case in the risk reward incentive claims for 2009, and follow Commission policy.
PG&E	Deferred Installations	6.1.2.1 Installation Rate – fourth paragraph speculates that the NTG ratio for deferred installations may be different. This is an important question. The 2006-2008 study treated those deferred installations as part of a reduced NTG. Counting them now should make up for that penalty, and the NTG should reflect the fact that the prior penalty exists. Applying another NTG penalty would be a form of double jeopardy for those measures. Would it be appropriate to apply a NTG of 1.0 for those measures, because the NTG penalty was already applied?	The research plan introduces the idea that different NTG rate estimates may be appropriate for immediately installed v. deferred installations; however, the research plan does not yet indicate how those differences, if they are real and can be estimated reliably, will be accounted for. Energy Division intends to engage IOUs and stakeholders in these discussions once preliminary data has been collected and analyzed.
PG&E	Coincidence Factor	(6.1.2.3) – This section does not define what a coincidence factor is, so the section does not clarify what the evaluation is going to do with the CF. Please explain. (from 6.1.2.5, it appears that CF is the average percent on-peak, which presumably means how many on-peak hours the measure actually on, divided by the total on-peak hours... still not too clearly defined, as the definition says nothing of the units used to derive the CF ratio.)	definition for peak, as it applies to the evaluation effort, was established. The order essentially establishes peak as it is currently defined in DEER. DEER defines peak kW as the average grid-level impact for a measure between 2 p.m. and 5 p.m. during the three consecutive weekday periods containing the weekday with the hottest temperature of the year. DEER identifies these three contiguous peak kW days for each of the 16 California climate zones, based on the weather data sets developed for the California Title 24 Building Energy Efficiency Standards." Using this definition of peak we calculate the CF using these steps: 1. CF calculation for each logger:
PG&E	Delta Wattage, Baseline	(6.1.2.4) – What is done when one IOU-discounted lamp is replaced-on-burnout with a new IOU-discounted lamp? Is this treated as a zero wattage saving, or as a continuation of the previous wattage saving? If the first, then you’d be saying that the program only gets to count savings for one measure life per socket, and should therefore not support any measure installations on an on-going basis. If the latter, then you are saying that the program should be supporting the continued installation of energy efficient measures until such time that the market for the measure is deemed to have been transformed. Please explain which approach you will apply.	"CFLs replacing CFLs" will be studied through this evaluation from both perspectives. That is, we will measure the changing baseline through CLASS and evaluate consumer decision-making as part of the NTG analysis. As more and more efficient lamps are installed, the baseline will be reduced, reducing the overall potential for gross energy savings. As the NTG rate falls for specific measures like CFLs, the program focus on CFLs may need to change. The CPUC goals policies have encouraged the IOUs to demonstrate the transformative effect of their programs by reaching a situation where CFLs are replacing CFLs, or even more efficient technologies without discounted bulbs, evidence of this through this evaluation would be an encouraging sign that savings will persist.



Comment Author	Topic	Comment	ED Response
PG&E	NTG	(6.1.3.2.3) – The revealed preference approach incorrectly assumes that the customer would have had the choice to purchase the same product at 3x or 5x the current price. This assumption ignores the fact that many retailers would not stock the product at all at the higher prices (or would have devoted much less shelf space and promotional energy). It also fails to acknowledge the role of prior program efforts to make these products available for customers to choose. Because of these assumptions, the econometric models will produce results that are downward biased toward lower NTG values. Please explain how the modeling will compensate for this negative bias.	We agree that, if the current and/or prior programs have influenced product stocking as well as pricing, results from the econometric models may not accurately reflect the choices consumers could have made in the absence of the program. This is why the econometric models are only one of the methods will be used to estimate NTG rates.
PG&E	NTG	(6.1.3.2) – the CPUC evaluation protocols require more than one NTG estimation method be used, to triangulate on a more defensible final estimate. We understand (perhaps inaccurately) that, in the 2006-2008 study, there were substantial discrepancies among the methods used to estimate NTG values, and that the evaluators ultimately discarded all but one of the answers. The rationale for the choice was not clearly explained. This research plan describes three different NTG estimation approaches (with several sub-estimates) that will be applied, but does not set forth a method for combining or choosing between the results. Please describe how this will be done, and what will be done if the different methods produce contradictory results.	Please review the final report from 2006-2008 Impact Evaluation of the Upstream Lighting Program; while there was a wide range of NTG results produced from various sources/analysis methods, the final recommended NTG results were based on more than one source. See Section 3.3, beginning on page 49 and specifically review Section 3.3.1. With respect to the proposed NTG methods for the 2010-2012 program cycle, the evaluation will use similar methods, improved by lessons learned from 2006-2008, as well as a delphi panel approach. All methods and sources will be revealed in the final reports including variation across different approaches that are used for final values or range estimates of NTG.
PG&E	NTG	There are numerous influences from other IOU and CPUC programs on consumer lighting purchase behavior (Flex Your Power, bill inserts, home energy reports, audits, etc.) There are prior years' program influences that have helped to drive down CFL prices, and to increase shoppers' awareness of CFL availability and features. And, of course, there are installations in this cycle that are a direct result of the prior cycle expenditures. Will the NTG evaluation approaches treat these influences as positive, negative or neutral in estimating NTG values?	We agree there are many potential influences on consumer lighting purchase behavior. The evaluation seeks to estimate the level of influence the 2010-2012 Basic CFL and Advanced Lighting Programs have had on that behavior during the 2010-2012 time period.
PG&E	Cost Effectiveness	The RP does not explain how the research findings will be used to determine the cost effectiveness of the program. In addition to the parameters that will be estimated in the RP, this would entail other factors such as incremental measure cost and unit energy savings. Will this report produce a cost effectiveness analysis, and if so where will the additional factors come from?	Cost-effectiveness is not in the scope of the impact evaluation, however it will be carried out by Energy Division in producing aggregate reports. Unit energy savings estimates will be developed through this impact evaluation, as indicated in Section 6.1.2.5. The study of incremental measure costs will be added to the scope of this evaluation; a draft scope of work for this aspect of the study is being developed and will be available for review in early 2012. All other parameters that are not updated by evaluation activities will be based on utility claims as has been the case in all prior cycles.
PG&E	2009 Study	Throughout this RP, comparisons are made between the 2006-2008 evaluation and the 2010-2012 study. The RP plans, as with our comments, do not specifically address what went on with the 2009 study. Is there anything by way of precedent or practice from that study that IS pertinent to this RP, which should be highlighted?	No evaluation was conducted in 2009. Values that were included in the final Energy Division evaluation report were based on the 2006-2008 evaluation and applied to the 2009 savings claims as directed by the Commission.
PG&E	PRG	(4.2.10) – Communication of Early Feedback to the IOUs – in the research plan review teleconference on October 7 <sup>th</sup> , it was agreed that there would be a formally-constituted PRG for this study. Please acknowledge this in the Research Plan	ED will formally set up a Project Coordination Group (PCG) with the IOUs. Coordination on this research plan has been conducted to date on an ad hoc basis or through periodic updates at the "Joint Team" meetings on Residential topics (which has been a proxy for a PCG).
PG&E	Interim Results	We note that the interim results are meant to provide useful and timely feedback to program managers. We also note that the schedule will produce no interim results until the middle of the third year of this three-year program cycle. Because the study is only now getting started, the time remaining to conduct the study is necessarily compressed, which will strain evaluator resources. Can you provide assurance that there remains sufficient time, and that there are sufficient resources, to carry out this research plan within the available time?	ED is confident that the evaluation team can provide sufficient resources to carry out the evaluation according to the updated schedule discussed in Section 7.
SCE	Overarching Goal	Page 3 states that “The overarching goal of this impact evaluation for upstream and residential downstream lighting measures and programs is to verify and validate the IOU reported energy savings and peak demand reduction claims” (emphasis added). This seems to imply that the savings claims from the utilities are null hypotheses that will be tested, rather than that the goal is to estimate savings starting from a blank slate. Is this true?	This evaluation - like the 2006-2008 impact evaluation - will produce independent ex-post energy and peak demand impact estimates for the 2010-2012 program cycle as well as realization rates which compare the ex-post estimates to the ex-ante estimates (based on variations in parameter assumptions in either case).

Comment Author	Topic	Comment	ED Response
SCE	Specific data needs	The top of page 4 discusses the use of this study's results in other efforts. We agree that this is a good idea, but suggest that in order to maintain the focus and cost effectiveness of this study, the study should seek to meet specific data needs identified in the current DEER update process and not additional amorphously defined data wants.	We agree that -- in addition to developing final, independent ex-post energy and peak demand impact estimates for the 2010-2012 program cycle - the focus of this study is to provide evidence to confirm or update assumptions developed through the latest DEER update process.
SCE	consistency of impacts/ERT process?	Regarding researchable issue 2., why is consistency of impacts an impact evaluation issue, as opposed to an issue for the ERT process? Is this once again implying a statistical test on an estimate as opposed to our ex-ante null hypothesis? A more relevant question may be consistency at the parameter level (i.e. parameters that are used in estimating the impacts), rather than at the impact level.	The intent of researchable issue number 2 was to note that we will be reviewing ex-ante estimates when designing and evaluating on an ex-post basis. A better word perhaps would be transparency in understanding the new information that is gathered through the evaluation to compare and update the ex-ante estimates, rather than consistency of the impacts.
SCE	NTG	Regarding researchable issue 4., it is important to construct the correct counterfactual market in the absence of the program, and from there to establish program participants' purchase and installation decision-making in that counterfactual market. It is not enough to consider whether someone would still have bought a CFL if the price were twice as high; to do it correctly, it is not even enough to consider whether someone would still have bought at CFL if the price were at the level of the counterfactual. The counterfactual must include pricing, availability, promotional material and messaging, and anything else that has an impact on participants' decisions.	Agreed, and as stated above, this is why we have used and plan to continue using both supply-side and consumer-side evidence in the assessment of NTG.
SCE	EUL	Regarding researchable issue 5., do you mean the remaining useful life of the base-case measures, or the measures at various stage of their life? Is EUL part of the scope for the evaluation?	What we mean by "Estimate remaining useful life values for selected measures, and potentially update effective useful life estimates where necessary." is that we'll work with DMQC to develop updated EUL estimates for measures promoted through the program, which may include additional analysis and/or data mining. We will remove the reference to "remaining useful life" since that is not relevant for the upstream lighting programs.
SCE	Deer values updating	Regarding researchable issue 7., what DEER values will be updated? Will savings values be updated, or just inputs for a simulation that will separately estimate impacts?	DEER inputs as well as energy savings estimates may be updated as a result of the findings from this evaluation.
SCE	On site info for estimating installation rates?	Regarding the researchable questions for the downstream measures, you indicate the question of installation rates is different and "on-site verification will be used to confirm IOU reported measures installations." Will on-site survey information not be used for estimating upstream installation rates?	Since measures are subsidized upstream, it is not possible to do the same type of onsite verification as one typically does for downstream measures. However, onsite data collection will be used to support the installation rate analysis; for example, the onsite data collection planned for CLASS will provide updated estimates of efficient lighting saturation and storage levels, which are key parameters in the installation rate model developed as part of the 2006-2008 program evaluation.
SCE	Measure List	Not including dimming lamps on the list of measures evaluated (per page 6) will leave a significant data holes for important measure going forward. The 1% of portfolio criterion for a measure to be high impact, and thus worthy of evaluation, does not consider what information is most useful or how data needs in a dynamic market can be met by the relatively infrequent evaluation cycle.	See Section 2.1 of revised Research Plan; dimmable CFLs, although not currently defined as HIMs, will be included in the evaluation scope. Also note that the Research Plan indicates that "program accomplishments will continue to be monitored and additional measure groups may be included if they reach this [HIM] threshold over time or are deemed worthy of evaluation." Utilities are also permitted to design and implement studies to anticipate future data needs through their evaluation and <del>management activities to refine savings estimates.</del>
SCE	Measure List	Page 14 mentions coordinating research activities with other studies to minimize costs and promote comprehensive evaluation. A corollary to that is that while on sight, valuable information about non-HIM lighting measures could be collected for a low marginal cost.	We will be collecting data about ALL measure in a home while onsite (CLASS), and ALL measure available in stores during shelf surveys. In addition, the consumer surveys ask about awareness and purchase behavior for a wide range of lighting measures (e.g., all types of CFLs, LEDs and emerging EISA-compliant lamps).
SCE	IOU managed activities	The bottom of page 14 mentions other ED-managed activities, but IOUs are also active in these activities. For example, the lighting process evaluation is IOU-managed.	IOU-managed studies will be added to the list of all relevant studies and will be included in the Project Coordination Group.
SCE	Invoice verification	Page 16 discusses program invoice/application review. Will this be coordinated with financial audits?	Currently, the invoice/application verification activity in WO28 is not expected to produce information that can be directly used by the team conducting the financial audit (WO18). However, if the results of the invoice/application verification activity produce results that are relevant to the work being done under WO18, we will share the results with this team.

Comment Author	Topic	Comment	ED Response
SCE	Free ridership double-dinging	Below that is a discussion of in-depth interviews with lighting suppliers that mentions eliciting perspectives on free ridership. This is an example of how there needs to be not only a robust specification of a counterfactual market, but also a correct understanding of the real-world market. There needs to be a correct causal link between the various market actors to ensure that various types of free ridership are combined correctly, avoiding "double-dinging".	Agreed, and as stated above, this is why we have used and plan to continue using both supply-side and consumer-side evidence in the assessment of NTG. We assess all factors that may influence a particular purchase and installation decision, including the consumer perspective.
SCE	retail store manager survey	In talking about the telephone surveys with retail store managers, it states that surveys with managers will cover all types of products. Does this include types of products that are not sold by that retailer? How will results be associated correctly with the relevant product types?	We do not plan to ask retail store managers detailed questions about products they do not sell. That said, there will be high-level questions about why certain products are stocked and others aren't, as well as changes in these patterns over time. Stocking decisions are not always 100% driven by retail store managers (i.e., large chain buyers often control these decisions) so this will need to be taken into account when analyzing and reporting results from these types of questions for these types of retailers.
SCE	residential survey "waves"	In using "waves" of surveys with residential customers during 2011-2013, how will you ensure validity of results for 2010 (especially regarding installation)?	Similar to what has been done in previous evaluations going back to the 1990s, we are faced with having to ask consumers as well as suppliers about decisions made in prior years. Consumers are asked about purchases and installations made since January 1, 2010 and suppliers are asked about shipments and sales since January 1, 2010. We also have similar data collected from the 2006-2008 program evaluation to help validate these estimates. More importantly, 1200 onsite surveys provided reliable CFL saturations and storage rates during the 2008-2009 time frame for even more validation. In short, as will many prior evaluations completed for these programs since the late 1990s, we plan to use data from multiple sources to estimate sales and installation rates.
SCE	Dimmable power usage patterns	If dimming lamps are added to the list of evaluated measures, as we hope they will be, there would need to some sort of metering or other assessment of their power usage patterns in order to estimate their energy usage, unlike current plans, per page 17.	Whether or not metering will be required to improve parameter estimates for specific measures, such as dimmable CFLs, will be considered and determined in mid-2012. Ideally, such a metering study would be conducted as part of a larger more comprehensive effort, again to be determined in mid-2012 when the preliminary results from CLASS have been analyzed.
SCE	general-population distribution focus of WO24 to ULP	Telephone survey results for non-residential customers from WO24 are planned to be used for lighting as well. Care should be taken to ensure that the general-population distribution focus of WO24 reflects the distribution of geographies, firmographics, etc. demonstrated by the non-residential participants in the upstream lighting program.	Agree, it is important to ensure that results from the nonresidential surveys conducted as part of WO24/CSS are representative of the types of nonresidential customers who have purchased IOU discounted products. As was done for the 2006-2008 program evaluation, the nonresidential surveys ask specific questions to identify customers who have made IOU discounted product purchases and only the results from those customers are used in the analysis of impacts for the Upstream Lighting Program.
SCE	DEER empirical data	Page 18 mentions DEER as a source of secondary data for the ex-post impact evaluation. What empirical data will be coming from DEER?	The most recent DEER update included an assessment of the available data for parameters such as delta watts, HOU, CF and NTG. The 2010-2012 evaluation will pick up where that effort left off and potentially expand some of the data mining and analysis with existing as well as newly collected primary data.
SCE	formal PCG with regularly scheduled meetings?	Section 4.2.10 on page 22 mentions ongoing meetings and discussions with IOUs. Will there be a formal PCG with regularly scheduled meetings to ensure timely sharing of feedback and planning?	Energy Division will start a Project Coordination Group (PCG) with the IOUs for all lighting research projects underway.
SCE	Quantity of Measures Adjustments	The intro to the Quantity of Measures Adjustments section on page 25 mentions a number of adjustments. How will the evaluation track products unsold at the end of 2010? How will "leakage" be assessed, and from what unit of analysis? Will the distribution of residential vs. nonresidential customers also be assessed on a yearly basis, or just for the cycle?	In short, these adjustments will be analyzed on a year-by-year basis if the data is available and reliable. However, adjustments have been and will continue to be calculated as (weighted, if possible) averages across the 2010-2012 cycle.

Comment Author	Topic	Comment	ED Response	
SCE	Methodology adjustments for accounting approach	When reviewing the published 2008-2008 lighting impact evaluation, we have noticed that KEMA and team took an accounting approach to counting energy savings from the ULP lighting program. This approach included several key adjustments to the energy savings including un-sold light bulbs in the channel. This approach, which is similar to FIFO (i.e., first-in first-out) is acceptable, as long as it is consistently applied for each evaluation period. This would mean before the proposed adjustment can be applied, especially for unsold inventory, the methodology must allow for flow-through of the adjustments taken for 2006-2008 report (i.e., add in the adjustment for 2006-2008 period). For any unsold "old inventory", the 2010-2012 impact evaluation would account for them as they attempt to estimate unsold inventory again. If this methodology is not consistently applied, the impact evaluation will have the effect of unfairly and negatively applying adjustments. We notice this adjustment was nearly 10% for the 2006-2008 energy savings so it is substantial and worthy of doing it right for all concerned.	Essentially, the 2006-2008 and 2010-2012 program evaluations have been designed to track the flow of lighting products in the market - from shipment through to installation to removal. The installation rate model takes into account (a) shipments from one cycle that do not get introduced into the market until the next cycle, (b) bulbs installed during a cycle as well as bulbs held in storage at the end of one cycle that presumably get installed during the next cycle, and (c) bulbs that never get installed. Energy Division has and will continue to use this model to understand which bulbs are installed and operating in any given year consistent with CPUC policy.	
SCE	shipments vs. sales	In the assessment of shipments vs. sales on page 26, reliance on interviews with retailers and manufacturers means that appropriate sampling will be critical. It must take into account how stocks move by retailer or retailer type to capture the variation in sell-through estimates.	We agree and given our history of interviewing many of these same suppliers we have developed an indepth understanding of differences in shipment/stocking/sell-through patterns by retailer.	
SCE	extrapolation combining techniques	We are concerned that the application of extrapolation techniques, mentioned with regard to the residential vs. nonresidential distribution on page 27, is much more complicated and nuanced than indicated in this document, and could easily lead to less reliable results. When combining these results with customer intercept surveys, how will these data be combined?	Both the residential and nonresidential telephone and onsite surveys are essentially random sample surveys such that extrapolation to the general population is a fairly straight-forward process. The consumer intercept survey results are not random and we do not attempt to extrapolate these results to the general population. As a result, the results from the intercepts are not our preferred data source for determining the residential v. nonresidential "split." That said, and as mentioned on p. 27, we may need to consider evidence from multiple sources given the wide variety of products included in the evaluation scope.	
SCE	extrapolation combining techniques #2	This same question applies to all cases where multiple methodologies will be at play: how will they be combined/compared/reconciled?	We hope to engage in more specific and detailed discussions about approaches for combining and reconciling results from multiple data sources as part of the PCG process.	
SCE	Program impacts ULP vs. CLASS/CSS	In using the results from CLASS/CSS, it is important to understand the distinction in purpose between those efforts and the impact evaluation's goal of estimating net impacts of the measures delivered by the program. The average lighting stock is not the same as the marginal stock introduced by the program.	We agree. Keep in mind that we have estimates of the "average stock" plus "marginal stock induced" from the 2008-2009 data collection activities completed for the 2006-2008 program evaluations (both residential and nonresidential). We will compare these estimates to new estimates developed from the 2012 data collection activities planned for CLASS and CSS.	
SCE	Program impacts ULP vs. CLASS/CSS # 2	One way to that could be used to estimate the displaced wattage would be to run an experiment where you offer a lamp, in its original packaging with the usual information purchasers would have, and see where people put it and what wattage it displaces.	This could work, but it raises logistical questions (i.e., are you thinking of going door-to-door or recruiting people for this study?) as well as numerous quesitons of potential bias. Our plan to monitor the changing baseline level of installed lighting allows for both time-series as well as cross-sectional analyses across the general population.	
SCE	Delphi Panel Approach	As mentioned in the call on October 7, we recommend caution in using a Delphi Panel approach, as outline on page 31. We also recommend that you clearly set out how the panel's input will be used and what its function is.	We hope to engage in more specific and detailed discussions about approaches for developing and managing the Delphi Panel process as part of the PCG, including considering not using it at all.	
SCE	variance of the NTG inputs	How will the variance of the NTG inputs from supplier and manufacturer interviews be assessed? How will NTG be assessed in telephone surveys of residential customers? Intercept surveys for NTG estimation need to consider the full effect of the program, not just a 50% reduction in price on a single lamp. At the very least, they need to reflect the effect of the full price decrease on the number of lamps purchased. During the last program, the average cost reduction was to around 1/3, not to 1/2.	The 2006-2008 impact evaluation provided detailed descriptions of how the variance between retail supplier and manufacture sales estimates was reconciled; we plan to use similar methods for the 2010-2012 program cycle. Assessing NTG from consumer telephone surveys is challenging given the upstream nature of the program but, as in prior efforts, we include questions designed to identify consumers who have purchased IOU-discounted products as well as consumers who have purchased non-IOU discounted products. We ask questions about the factors influencing their purchase decisions and make comparisons between these two groups. The intercept surveys ask about the influence of price on the quantity of lamps purchased.	
SCE	Number of CFL purchased	Other methods as well need to consider the effect on number of CFLs purchased, not just whether one would be purchased.	Questions about the influence of the program (on shipments, stocking decisions, sales/purchase behavior, etc.) take into account volume/quantity.	

Comment Author	Topic	Comment	ED Response
SCE	ask people about prices for CFLs	Why not ask people about prices for CFLs, rather than about multiples of the price?	During the intercept survey, we are trying to relate questions to specific products purchased (revealed preference) or specific products selected for hypothetical purchases (state preferences). Given the variation in prices, as well as differences in prices per package v. per bulb, it is easier to ensure consistency in the way questions are asked (as well as in the analysis of results) if we frame the questions as multiples (e.g., 2x, 5x, etc.).
SCE	program savings estimation methods	In assessing the impact of the program on net savings using the econometric methods, the models should not be evaluated only at the (average) full and (average) discounted prices. These effects are not likely to be linear operators, and so estimation only at the means will not yield the correct mean effect. The effect should be assessed at the program distribution of price changes and	The econometric modeling will attempt to look at multiple different pricing scenarios and assess the effects of price changes in many different ways, it will not just assume a linear relationship.
SCE	Pages 36 and 37 vague	The description of the total sales approach on pages 36 and 37 is still very vague, when more information is available, we look forward to providing more input.	We have an agreement with The NMR Group to leverage the Multi-state model that was done in 2010 with new data collected in California during this cycle.
SDG&E	do not contact policy	1) Section 4.2.8 – Cross-Study Sample Coordination - In addition to EE, customers are being sampled for other IOU programs/research/directives/etc. This has been an issue with our current Non-res Process Evaluations as we need to be out of the field by Nov. 1 for a variety of internal reasons. We also needed to “scrub” our sample points for AE’s/do not call lists/recently contacted (internal policy is only talk to customers every 6 months)/etc. I agree for this evaluation it probably isn’t an issue, but be aware that this is bigger than just EE	Understood; the research plan lays out a high-level schedule for when we plan to conduct surveys and interviews with customers as well as market actors. Through the PCG as well as other means we will inform IOUs of the more exact dates we’re planning to be in the field.
SDG&E	Deferred Installations	2) Section 6.1 Quantity of Measures Adjustments – I don’t see where previous cycle purchases that were installation delayed into this cycle are counted.	The 2006-2008 and 2010-2012 evaluations were designed to track the flow of lighting products in the market - from shipment through to installation to removal. The accounting of net energy savings from products discounted in one period but affecting savings in another period (and count toward goals) is based on policy direction to count products that are installed and operating in any given year. Energy Division relies on evaluations to help inform the estimates, as was the case in the risk reward incentive claims for 2009, and follow Commission policy.
SDG&E	account for store shelf space due to the program?	3) Section 6.3 Net Savings Analysis – is there some way to account for store shelf space due to the program? The point is that the program is “buying” shelf space and without the program, the choices of CFL & others wouldn’t be there, so if the customer can’t find it, he can’t buy it, so it’s irrelevant that the customer says he’d gladly buy it at higher cost. The program managers have been making this point for years and I still don’t see it addressed.	Shelf surveys collect data on the amount of space allocated to IOU-discounted products. To address the concern that consumers are not the only “voice” to be considered in the NTG assessment, we agree and that is why we have used and plan to continue using both supply-side and consumer-side evidence. We assess all factors that may influence a particular purchase and installation decision, including shelf space and stocking decisions that are not necessarily linked to consumer behavior or preferences (although these factors are not completely disconnected, either).
NRDC	Go “beyond basic CFLs”	Overall, this study appears to largely replicate and expand upon the 2006-08 upstream lighting study. The focus is almost entirely on estimation of parameters for standard CFLs for the 2010-12 programs that have, for the most part, already been implemented.	The focus of the 2010-2012 evaluation plan goes beyond “standard CFLs” and includes each of the specific types of CFLs promoted through the 2010-2012 program. In addition, it should be noted that parameter updates developed through the 2006-2008 impact evaluation have not yet been implemented -- while the most recent DEER update provided revised parameters, these were not available until recently and were not incorporated in the IOU ex-ante estimates. Finally, additional parameters (e.g., adjustments to the quantity of measures claimed due to issues such as leakage, sales post-2012, the residential v. nonresidential “split”, as well as the installation rate parameter) need to be estimated for the 2010-2012 period and the recent DEER updates for parameters such as HOU, CF, delta watts and NTG need to be validated or re-estimated for the 2010-2012 period as well given both the size of the claims for this programmatic activity and the potential changes in the market in this cycle.
NRDC	Go “beyond basic CFLs”	These estimates are not needed for determining utility earnings and are unlikely to be of much value for design of the 2015 programs.	Utility incentive earnings have not been approved by the Commission. However, updated information about energy savings parameters could inform utility earnings, and will provide critical market and parameter level information to the Energy Division for to guide design of 2015 programs. Interim reports provided in early 2012 and early 2013 are included in the scope, as well as a final report in mid-2013.

Comment Author	Topic	Comment	ED Response
NRDC	NTG	In addition, the evaluation approach fails to address (or even mention) the numerous problems with the net savings inputs and installation rate analyses from the 2006-08 study, other than to increase survey sample sizes.	Energy Division and their consultants have responded to all comments that were provided during the finalization of the 2006-2008 program impact evaluation report including issues with net to gross estimates. This study adopts a strategy of multiple approaches to understanding the influence of the programs and develop an estimate of net to gross while collecting market information. The "increased sample sizes" reflected in this study are largely due to the fact that we are evaluating the program before it ends, so we have time to collect more data over a longer period of time than we did last cycle.
NRDC	Go "beyond basic CFLs"	NRDC recommends that the proposed evaluation be largely scrapped, as the study is unlikely to produce much information of real value. NRDC proposes that the evaluation instead be largely limited to verification of invoices/applications. The proposed revision of existing estimates of leakage, installation rate, and res/non-res split will provide little to no additional value for program planning relative to the current estimates. And the net savings inputs are of no value at all given the threats to validity of the proposed methodologies and the focus on standard CFLs which, by the time this study is completed, will account for an increasingly small share of program spending.	Please refer to the cover memo for the comments to illustrate the value and importance of this study and it's role in a bigger lighting research portfolio. The evaluation is not focused on "standard CFLs" and the NTG analysis, in particular, will be explicitly focus on specialty lighting products - including LEDs - many of which are not yet significant measures in the current program. For example, replacement LED lamps have yet to be introduced into the program and specialty CFLs (e.g., a-lamp shaped CFLs, dimmable CFLs, reflector-shaped CFLs, etc.) are reportedly contributing about 30% of the savings from all lighting distributed through upstream channels.
NRDC	Go "beyond basic CFLs"	The significant staff and budget that would be required to complete this study should instead be focused on forward-looking issues that can provide guidance to future program design, rather than a largely retrospective and problematic effort to revise parameters for already-implemented programs.	Energy Division believes that the staff and budget allocated to this study is an appropriate reflection of the effort needed to validate the claims and provide important 'forward looking' information on lighting markets in general and in concert with other planned studies. The budget for this evaluation is half what it was for the 2006-2008 evaluation effort, largely due to the elimination of the comprehensive lighting metering study. Through WO13, ED currently has more than \$500,000 set aside for exploratory and forward-looking lighting market studies. Through WO21, ED will be collecting an updated whole-house lighting inventory (incremental budget approximately \$500,000). Finally, the IOUs have proposed and/or conducted lighting-related process evaluation and market research studies totalling approximately \$1.5 million.
TURN	Go "beyond basic CFLs"	The lighting market and IOU lighting programs are undergoing significant changes that require new field data on a variety of lighting products beyond basic screw-in CFLs. TURN finds little in the draft research plan addressing lighting measures beyond basic CFLs.	While it is true that the evaluation plan includes data collection and analysis for basic CFLs, which contribute roughly 20-30% of total reported IOU portfolio savings through Q2 2011, it also includes data collection and analysis for 5 types of specialty CFLs and LEDs. In addition, WO13 includes research studies focused on the LED market and on supplier & consumer behavior related to EISA/AB1109 implementation. The IOUs are also conducting \$1.5 million in more forward-looking lighting-related process evaluation and market studies on lighting.
TURN	Go "beyond basic CFLs"	In addition, Section 2.3 Related Evaluation Studies (pp. 15-16) lists seven ED-managed EM&V activities related to lighting, none of which TURN understands to be contributing to information and data on existing lighting measures beyond basic CFLs or the development of additional lighting measures.	The seven studies listed in Section 2.3 specifically go "beyond basic CFLs"; in fact, the first study focuses exclusively on non-CFL technologies (e.g., LED and EISA-compliant incandescents). WO21 and WO24 will collect data on all lighting products currently installed in residential and non-residential applications, WO31 will address code-related issues pertaining to lighting measures, and WO17 will initially provide updates for basic and specialty CFLs but may be expanded to include other products as they are introduced into the portfolio.
TURN	LEDs	For instance, while LEDs are often touted as being significantly more energy efficient than incandescents, we have little if any field data as to what light bulbs LEDs are replacing now, and what they will most likely replace, if sales / saturation of LEDs increase significantly. This is critical because if LEDs are mostly replacing / displacing CFLs, the level of incremental savings will be minimal. This raises the question as to whether it make sense for IOUs to discount LEDs just to replace CFLs, after so many hundreds of millions has been spent discounting CFLs.	Consumer surveys, both telephone and onsite will address the extent to which LEDs are being purchased and installed, as well as the extent to which they are replacing CFLs.

Comment Author	Topic	Comment	ED Response
TURN	Timeliness of results	These and other important lighting matters need to be researched and evaluated now to allow for meaningful bridge year and beyond market strategies and program designs. Otherwise the evaluation will not lead to progress, remaining always one or two EE program cycles behind.	We do not anticipate the results from these studies "being one or two EE program cycles" behind; on the contrary, WO13 studies will be complete before the 2010-2012 cycle is complete and WO28 will provide interim results in early 2012 and early 2013. IOU studies will also produce results in time to influence the design of the next portfolio. The Commission and the utilities also have discretion to make changes to program design during the course of implementation of the programs if new information becomes available.
TURN	Go "beyond basic CFLs"	Focusing on basic CFLs when already two-thirds through the current program cycle that (2) is to phase out of basic CFLs with (3) ex ante data frozen for performance toward goals and shareholder earnings is for TURN, very low on a burgeoning list of ED's priorities. We do not see this as a productive use of ED's time.	Keeping in mind that CFLs contribute 20-30% of the total reported IOU portfolio impacts through Q2 2011, the focus of the 2010-2012 evaluation plan goes beyond "basic CFLs" and includes 5 specific types of specialty CFLs and LEDs. In addition, it should be noted that CFL parameter updates developed through the 2006-2008 impact evaluation have not yet been implemented -- these updated parameters were not incorporated in the IOU ex ante estimates nor were some of them incorporated in the latest DEER update.
TURN	Metering	It is TURN's understanding that the existing field data is from the 2006-08 program cycle, with little if any additional in-situ data points from 2009.	The existing residential lighting and metering database contains detailed information from over 1200 homes and over 7000 meter data points. Data was collected during 2008 and 2009, with more than half of the effort reflecting 2009 household and lighting usage characteristics. Therefore, we feel the 2008-2009 residential lighting and metering database is the most comprehensive resource for estimating how various types of lighting is used in residential applications -- CFLs and non-CFLs, indoor and outdoor, specific types of lamps in specific types of fixtures in specific types of locations, etc.
TURN	Metering	Regardless, one of the strengths of California's massive EM&V efforts was to field measurement data. TURN is very disappointed to learn that no additional field measurement data of basic CFL and other lighting measures is being collected / conducted on an ongoing basis. Given the fact that CFL installation rates and hours of use are sensitive to (1) the location of the lighting socket which a CFL or other higher efficiency lamp is installed (i.e. living room, kitchen, bathroom, bedroom, closet), and (2) the high CFL storage rates from the 2006-08 EM&V work, TURN believes it critical that current years' data be gathered and compared to past year(s).	Through consumer telephone and onsite surveys, we plan to monitor changes in residential lighting usage patterns. As saturations of different types of efficient lamps change over time, we will document those changes through the ongoing telephone and onsite surveys. As stated in TURN's comments, as well as in Section 6.1.2.2 of the evaluation plan: "If CFL saturation patterns have not changed over time, HOU data from the 2008-2009 study can be mined to determine HOU estimates for program measures. If we see significant shifts in CFL saturation, and lighting usage patterns in general, additional metering may be required" and in footnote 6 on page 31: "At this time, no time-of-use metering is proposed as part of this Research Plan. We will work closely with ED and the consultants and make a final determination regarding the need for time-of-use metering sometime during the summer 2012." We see no value in conducting a similarly expensive metering study until we have evidence to suggest that the underlying patterns of lighting usage have significantly changed. In addition, it is important to note that as part of the 2006-2008 impact evaluation planning effort, ED made the forward-looking decision to include data collection and monitoring for all lighting measures -- not just CFLs, despite the fact that in 2006-2008, much like 2010-2012, basic spiral CFLs were the most significant contributor to the overall portfolio claims. It is because of that forward-looking planning that we had and continue to have such a rich, comprehensive database upon which to make year-upon-year comparisons such as those suggested by TURN.
TURN	NTG	The NTG analysis relies heavily on "supplier self-reports" which essentially queries the buyer or store manager (such as Walmart or Costco) as to what customers would have purchased if the utility incentive program had not been there. This assumes that retail buyers / store managers in fact know how consumers shop relative to lighting products, and understanding lighting buying behavior for not only their stores but across other retail channels.	First, the NTG analysis described in the draft evaluation plan does NOT rely heavily on supplier self-reports; this source of data is but one of many that will be feeding the development of NTG estimates. While it is true, the interviews with suppliers do include questions about the influence of the IOU programs on sales, which is something both suppliers <u>and</u> consumers need to be asked, the interviews are also designed to collect data on other important inputs to the net savings analyses - including estimates of program and non-program sales, which for certain channels plays a major role in setting the context for assessing validity of supplier v. consumer self-reports. While research has shown that retail buyers and store managers DO know how their customers shop for lighting products, we always include consumer evidence to balance/validate results from both sides. Finally, we do NOT rely on supplier self-reports for "understanding lighting buyer behavior ... across other retail channels" as suggested by TURN. That said, suppliers can answer questions about "channel shift" - i.e., the effect that sales in one channel may have on sales in their particular store, especially in those cases where, absent the program, the program has had a significant influence on directly sales to particular channel.

Comment Author	Topic	Comment	ED Response
TURN	NTG	In addition, the self-report method assumes that consumers' shopping patterns are independent across retail channels (big box, home improvement, grocery, drug stores, etc., when in fact the majority of shoppers shop at multiple stores, often on a weekly basis. Thus, almost everyone had the opportunity to buy inexpensive CFLs via one the major retailers.	We agree that consumers have choices in terms of where to shop and where to purchase efficient lighting products. We plan to more explicitly and comprehensively assess "channel shift" as part of the current evaluation effort.
TURN	NTG	Also, the self-report method as currently practiced introduces bias by interjecting leading program information into the question indicating how the retail buyers / store managers could respond to best preserve utility subsidies. The evaluators might as well simply ask "Do you like the free money from the IOUs' upstream lighting program? Should we give you the money anymore? If we don't give you the money, wouldn't your customers do the same thing?" A more reasonable approach to the NTG analysis would be to expand the proposed Intercept Surveys (Section 6.1.3.1.2.3, p. 35) that interact directly with the with customers buying (or after buying) the higher efficiency lighting products. TURN understands that as part of the 2006-08 M&V work, evaluators went into over 1000 homes to determine what sockets CFLs were installed in, but did not ask consumers one question	We assume TURN meant to say "bias" is introduced through supplier interviews. We refer them to Sections 2.3.1.1 and 8.8 of the 2006-2008 Upstream Lighting Program Impact Evaluation where we addressed threats to validity such as the potential for supplier bias. TURN refers to a "more reasonable approach" which would be an expanded consumer intercept effort. It should be noted that a key input to the 2006-2008 program NTG results was the econometric model results which used similar intercept surveys. The current evaluation plan includes a similar modeling effort. We are not sure what TURN would like to see expanded. Finally, TURN appears to be recommending that onsite surveys include questions about decision-making and purchase rates. We agree and have included a customer interview as part of the onsite surveys being conducted as part of the WO21 CLASS effort. However, it should be noted that typically these types of questions are more cost-effectively asked via telephone surveys, which we conducted for the 2006-2008 evaluation and plan to do again for this evaluation. It is difficult to identify large samples of CFLs purchased during the 2010-2012 program cycle in random population onsite surveys, such as the WO21 CLASS effort.
TURN	NTG	TURN does not support the proposed Delphi Panel method at Section 6.1.4, p. 37 as it appears to be an invitation to bring a purported group of experts together to debate and potentially argue the NTG matter, when more and better empirical data is what is most needed.	We hope to engage in more specific and detailed discussions about approaches for developing and managing the Delphi Panel process as part of the PCG, including considering not using it.
TURN	Budget	The proposed budget (Section 8, p. 41) of a minimum of \$2.5 million with "TBD" unspecified contingencies is excessive for the level of rigor proposed and very small sample sizes for the survey work.	Energy Division believes that the overall budget estimate is reasonable given the scope-of-work proposed and the value of the information and results that will be made available through this overall effort to support ex-post as well as future-cycle planning. Energy Division is responsible for overseeing and managing the budget for this study, including any contingencies as appropriate. The budget for the evaluation is 2% of the total IOU budget for the program.
DRA	Link study to provide feedback on MTIs	This Research Plan should be synchronized with the development of market transformation indicators, since one of the objectives of the Research Plan is to provide "feedback" on how well lighting measures are doing relative to these MTIs.	Information collected through this evaluation will be made available for MTI tracking analysis.
DRA	Defining market segments	First, the Research Plan should define each of the appropriate market segments as the primary step to evaluating upstream and residential downstream lighting...	We agree in principal with DRA's comments and desires to evaluate the effectiveness of program impacts for specific, market and customer segments. We note that analysis of prior program impacts for specific segments has to some extent been completed. However, the Upstream Lighting Program (2010-2012) has NOT been designed to target specific segments differently. While the program targets specific supplier (manufacturer, retailers) channels differently, which could then manifest itself in terms of different impacts for different customer segments, the program itself is NOT targeted at customer segments and, other than through promotions of specific types of lighting technologies, the Upstream Lighting Programs certainly are not designed to target specific types of lighting applications and characteristics (e.g., bulb performance, color quality, etc.). Therefore, we disagree that the "definition of market segments should be the primary step to evaluating the upstream programs," rather we recommend that subsequent analysis of results by market and customer segments to help inform and refine future program targeting strategies and designs.
DRA	Defining market segments	This should result in several market segments, each defined in a manner that meets each of the following definitional attributes: (1) a set of actual or potential customers, (2) for a given set of products or services, (3) who have a common set of needs and wants, and (4) who reference each other when making buying decisions.	We agree this is a reasonable way to define market segments and should be helpful in understanding and/or explaining why we see different results for different segments. But we would need to focus on a smaller set of market segments that are expected to have different results, because of the broad/comprehensive nature of the current programs.