

PUBLIC UTILITIES COMMISSION

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**To: California Energy Efficiency Program Administrators****From: Commission ex ante team****Date: November 14, 2016****Subject: 2017 Workpaper Guidance**

Staff issues this workpaper guidance for program year 2017 to help clarify expectations for program administrators' workpaper submissions. This guidance affects workpaper updates for: (1) a new non-DEER measure that is introduced to the energy efficiency portfolio in 2017 and (2) an existing non-DEER measure that is being updated, as required, to reflect the 2017 and 2018 DEER updates released on August 18, 2016¹ and other types of updates. Program Administrators are reminded that DEER assumptions, methods and data, not just updated point values, are to be used in the development and updating of non-DEER workpapers.² Updates should also be undertaken when DEER updated methods, assumptions and data indicate that the existing non-DEER workpaper methods or assumptions are likely out-of-date.³

- **Phase 1 Review for Workpaper Updates Triggered by the 2017 and 2018 DEER Update:** As per D.15-10-028, program administrators are directed to update the relevant workpapers to reflect DEER updates by January 1, 2017⁴. PAs may start submitting workpapers as early as two months prior to the Bus Stop for workpaper updates deadline but no later than January 1, 2017⁵.

¹ E-4795 Final Resolution (DEER2017+DEER2018).docx

(<http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M166/K269/166269506.PDF>)

² D.12-05-015 OP 143: "Pacific Gas and Electric Company, Southern California Edison Company, San Diego Gas & Electric Company, and Southern California Gas Company shall utilize Database for Energy Efficient Resources (DEER) assumptions, methods, and data in the development of non-DEER values whenever appropriate, and shall follow Commission Staff direction relating to the determination of appropriate application of DEER to non-DEER values."

³ D.12-05-015 OP 144 "Pacific Gas and Electric Company, Southern California Edison Company, San Diego Gas & Electric Company, and Southern California Gas Company, when adding new measures to their portfolios, shall (1) utilize due diligence when developing the proposed ex ante values such that those new ex ante values represent the expected electricity and natural gas savings, costs, and lifetime of the measure; (2) undertake research, in collaboration with Commission Staff, as required, to establish reasonable expected values; and (3) pilot promising new technologies and utilize the results of research undertaken during the piloting period to improve the ex ante values."

⁴ D.15-10-028 at 83 "Accordingly we will maintain the January 1 deadline for updates to workpapers to reflect changes in DEER values."

⁵ Ibid at 84. "[A]fter DEER updates are completed, PAs should update workpapers over a two-month span, and then submit them for review over the next two months. We encourage PAs to use this timing, but do not require it."

Updated workpapers should be submitted via the Workpaper Project Archive⁶. Deadline for Phase 1 workpaper review will be March 1, 2017 to allow enough time for PAs to produce 2017 Q1 claims.⁷ Any Phase 1 workpapers that are not reviewed by March 1, 2017 will receive “interim approval,” and are subject to prospective review⁸.

Commission staff requests the following information from each PA by December 1, 2016:

- To better plan workpaper review resources and schedules, staff directs the program administrators to submit the list of workpapers that they plan to update for 2017 and 2018 DEER by December 1, 2016.
 - Lead workpapers: the workpaper names and IDs for all workpapers that the PA is submitting for statewide adoption.
 - Participant workpapers: the workpaper names and IDs for all workpapers that the PA intends to adopt based on another PAs submission.
- **Phase 2 Review for Workpapers for the 2017 Program Year:** Staff defines Phase 2⁹ review as falling outside of the scope of a Phase 1 Review, including updates to existing and new workpapers resulting from the Baseline Working Group¹⁰. Under Phase 2 rules, if submitted workpapers are not reviewed within the directed timeline, the ex ante values in the workpapers will receive interim approval, but remain subject to prospective review and update under Phase 2 review requirements. Workpapers chosen for review will undergo a 15 day preliminary review stage followed by a 25 day detailed review as directed in the Phase 2 review requirements. Dispositions for workpapers reviewed after this period would apply on a prospective basis. Note that in either case, staff’s interpretation of existing Commission policy is that if workpapers include errors (incorrect parameter values from the current Commission-approved DEER, previous CPUC direction or existing, applicable codes or standards), “ex ante” corrections of these errors are retroactive.

⁶ <https://deeresources.info>

⁷ D.09-09-047 at 304 provided direction for reviewing workpapers submitted at the start of a program cycle: “The utilities shall fully cooperate with Energy Division during the course of the workpaper review so that this review and the finalization of non-DEER ex ante parameters that will be frozen for planning and program implementation purposes is completed in time for utilization in the utilities’ first quarterly reports in 2010.” More explicit direction for review was included in D.12-11-015 OP 44: “Commission staff will finalize and lock down the savings estimates associated with the energy efficiency program portfolios approved in this decision by no later than March 1, 2013, according to the procedures in Decision (D.) 10-12-054, as modified by D.11-07-030 and D.12-05-015.”

⁸ D-12-05-015 at 336. “If a large amount of non-DEER workpapers are received in the 2013-2014 portfolio applications, such that Commission Staff is unable to review them all in time for approval in the 2013-2014 portfolio applications, any workpapers that are not reviewed will receive “interim approval,” and Commission Staff may review any of these in the future and apply any adjustments on a prospective basis.”

⁹ ALJ Ruling of November 18, 2009 in A0807021, et al established the Phase 2 workpaper review process. D.12-05-015 at 337 provided further direction for reviewing Phase 2 or “mid-cycle” review.

¹⁰ D.16-08-018 OP 4 “Commission staff shall facilitate a working group process and/or utilize an existing working group such as the California Technical Forum to discuss measure-level baseline rules and documentation required to meet the “preponderance of the evidence” standard for accelerated replacement and repair eligible projects. Staff shall bring a resolution for the Commission’s consideration by January 1, 2017 with recommendations for resolving these issues.”

1. Scope and Timeline of Workpaper Review

This section provides detailed guidance on scope, submittal and timeline for Phase 1 and Phase 2 workpaper review.

A) Phase 1 reviews for 2017 and 2018

All DEER methods, assumptions and value related updates will be considered Phase 1. Phase 1 review results will be effective January 1, 2017 for 2017 DEER updates and January 1, 2018 for 2018 DEER updates. Due date for Phase 1 review is March 1, 2017. Workpapers not reviewed by this date will have “interim approval” and may be undergo prospective review at a later date.

According to the August 18, 2016 DEER Resolution, updates to program administrator programs are required to consider all updates to DEER including:

- DEER2017 revisions, developed to reflect recent code updates or to address errors in the current versions of DEER. All updates in this category are effective for program offerings starting January 1, 2017.
- DEER2018 revisions, developed to incorporate the most recently available evaluation findings. All updates in this category are effective for program offerings starting January 1, 2018.

Summaries of DEER updates, along with the staff expected workpaper updates, are provided below. Staff endeavored to identify the workpapers requiring updates, however, it is incumbent upon each Program Administrator to review its complete set of new and existing workpapers to ensure all impacted workpapers are updated and submitted for review prior to the deadline.

a) DEER2017 Updates: Phase 1

- i. Nonresidential package unitary air conditioning and air source heat pumps with capacities of 65,000 Btu/h or greater

DEER Revision Summary: DEER measure definitions were updated so that tiers include minimum EER and IEER values. Furthermore, each tier now requires that both measure ratings exceed the minimum tier levels in order to qualify within that tier. Non-DEER savings values may be interpolated between DEER tier levels based on the change in EER only.

Workpaper Updates: All workpapers for package unitary air conditioning and air source heat pumps with capacities of 65,000 Btu/h or greater must be updated. For DEER measures, workpaper submissions must include new implementation and cost records. For non-DEER measures, workpapers must include: implementations; costs; technology descriptions including proposed measure technology EER; and IEER along with the DEER measures used as the basis of the interpolation. Non-DEER measures with efficiencies higher than the values of the most efficient technologies included in DEER require the development of new performance maps and simulation results.

- ii. Nonresidential water chilling packages

DEER Revision Summary: Measure definitions were updated so that tiers include minimum full-load efficiency (EER for air-cooled and kW/ton for water-cooled units) and minimum IPLV values. Each tier requires that both measure ratings exceed the minimum tier levels in order to qualify within that tier. Non-DEER savings values may be interpolated between DEER tier levels based on the change in EER only. Furthermore, constant speed (Path A rated) and variable speed (Path B rated) units now have separate requirements. Since codes now have separate requirements for Path A versus Path B chillers, DEER no longer allows deemed measures for variable speed compared against a constant speed baseline chiller.

Workpaper Updates: All workpapers for water chilling packages. At this time, PAs only have workpapers for positive displacement (screw or scroll compressor types) chillers. For DEER measures, workpaper submissions must include new implementation and cost records. For non-DEER measures, workpapers must include: implementations; costs; technology descriptions including proposed measure technology EER; and IEER along with the DEER measures used as the basis of the interpolation. DEER does not include measures for Path B positive displacement chillers. Non-DEER measures in this category include new performance maps that represent typical of Path B chillers and simulation results that follow the revised DEER modeling methodology.

iii. Residential code vintage assumptions

DEER Revision Summary: DEER 2017 incorporates a large number of code updates for residential buildings. Energy impacts for the following measures were updated:

- Building insulation
- Package air conditioner and heat pump
- Furnace
- Duct sealing
- Interior lighting interactive effects

All baseline simulations have been recalibrated to so that heating and cooling annual energy use values are reasonably close to values published in RASS. Calibration is accomplished by adjusting and weighting together five different simulations each with a different combination of heating and cooling thermostat schedules as well as variations in exterior shading.

Workpaper Updates: Workpapers are NOT required for measures whose definitions were included in previous versions of DEER and those definitions have not been revised in DEER2017 and the most recent version of the workpaper has been correctly updated to reflect DEER current DEER methods, assumptions and values. For example package AC measures for SEER levels of 14 through 21, and these measures have identical definitions in DEER2017 and DEER2015. Therefore, workpaper updates are necessary for these measures only if there are changes in how these measures are delivered within programs, in which case new measure implementation records are required. However, a SEER 14.5 is a non-DEER that would require a workpaper since: it is a non-DEER measure; the impacts are calculated based on DEER impacts; and, the DEER impacts were updated for 2017 or subsequent to the last non-DEER workpaper update taking

into account DEER updates. Other measures for which new or revised workpapers are required include (but are not limited) to:

- New DEER2017 measures including whole house fans, appliances and newly defined insulation measures. Workpapers should only include information that is not included with the DEER update such as implementation records or technology costs.
- Non-DEER measures that are impacted by calibration updates. These are measures that result in a change in HVAC energy use. Since all DEER baseline models have been recalibrated, all non-DEER measures that are tied to these baseline energy use values must be updated. These measures include:
 - HVAC maintenance and installation measures including but not limited to: air-flow adjustments; fan motor replacements; fan time-delay relays; combined duct sealing and refrigerant charge adjustments
 - Envelope measures including window replacements, window film and cool roofs
 - Non-DEER HVAC measures such as evaporative coolers, mini-split air conditioners and heat pumps and wall furnaces

b) DEER 2018 Updates: Phase 1

i. Nonresidential Exterior Lighting – Early Retirement Second Baseline

DEER Revision Summary: The DEER 2nd baseline for early retirement exterior lighting measures was revised to be LED technologies. As a result of the change in standard practice baseline to LED technologies, all currently approved outdoor lighting measures (except screw-in CFLs) will no longer be approved for early retirement measures after December 31, 2017.

Workpaper Updates: CPUC staff acknowledge that there is a wide range of efficacy and performance in available LED products and that there may be a reasonable, standard practice LED baseline above which savings are calculated for better performing LED products. The specific baseline technologies need to be developed through workpapers or custom project supporting documentation as new exterior lighting measures are introduced into programs. PAs have expressed concern that there is not enough time for research and development of the baseline leading up to the Phase 1 submission deadline of January 1, 2017. Therefore, it is reasonable to revise measures and implementations in currently approved workpapers to be early retirement with an EUL equal to the RUL of currently approved baseline fixtures (typically high pressure sodium or pulse start metal halide technologies).

ii. Nonresidential Linear Fluorescent Lighting – Early Retirement Second Baseline

DEER Revision Summary: The DEER 2nd baseline for early retirement lighting measures with four foot, linear fluorescent lamps was revised to be assume 3rd generation linear fluorescent lamps and reduced light output electronic ballasts. This reduced 2nd baseline power input for a two-lamp fixture retrofit from 59 to 48 watts. DEER 2018 includes a limited number of early retirement linear fluorescent measures.

Workpaper Updates: Workpaper updates are required for all early retirement lighting measures with four foot, linear fluorescent lamps. At a minimum, new implementation records are required the reference any DEER 2018 measures. Any early retirement measures included in currently approved workpapers must be removed.

iii. Residential Refrigerant Charge Measures

DEER Revision Summary: Refrigerant charge adjustment and Refrigerant charge plus duct loss adjustment measures were revised based on the most recent evaluation field data.

Workpaper Updates: Implementation updates are required that reference the revised DEER measure IDs.

B) Phase 2 reviews for 2017

- a) All non-DEER workpaper reviews will be subject to the Phase 2 review process if not included in the scope of the Phase 1 review. This includes:
- i) **All updates to existing workpapers not included in the scope of the August 18, 2016 DEER Resolution.** An exception will be for updates outside of the scope of Phase 1 that are submitted by January 1, 2017. Staff will consider such updates together with Phase 1 updates.
 - ii) **EM&V results not included in DEER.** Staff directs program administrators to develop a proposal for any workpaper updates that they consider to be appropriate in response to available EM&V study results which were not incorporated in the DEER update. Any proposal(s) should include an explanation of why the workpaper update is needed and how it will be executed, including an explanation of any modeling tools that would be used. These proposals will be vetted during ongoing EAR Team meetings prior to making workpaper updates.¹¹ Given that many of the EM&V studies do not have explicit unit energy savings (or other specific ex ante parameter) results that easily transfer to a workpaper update, staff recommends that the program administrators target EM&V results for workpapers with a significant impact (i.e., cases in which a 20% or greater change in ex ante values would be expected).
 - iii) **New measures/ updates to existing measures resulting from the Baseline Working Group.** D. 16-08-019 OP 3 states that the baseline policy begins January 1, 2017. However, PAs cannot claim savings without an approved workpaper for affected measures. Due to the uncertainty in the timing and scope of the staff Resolution for the baseline policy, staff will be reviewing updates to and new workpapers as part of Phase 2 review.
- b) **Phase 2 workpapers will be considered submitted on the first or third Monday of the month.**¹² All 2017 Phase 2 workpaper reviews will be subject to the review process described in previous Commission decisions. That is, once workpapers are submitted with a complete dataset that is in accordance with the Ex Ante Database specification, Commission staff has 25 days to review the workpaper before the ex ante values are considered accepted and available for reporting. Any workpaper review conducted after 25 days will be prospective (note, though, that staff's interpretation of existing Commission policy is that if workpapers include errors such as

¹¹ PAs should also leverage the CalTF for developing methods, with the understanding that it should not replace staff approval of methods.

¹² D.15-10-028 Ordering Paragraph 21

incorrect parameter values from the current Commission-approved DEER or existing, applicable codes or standards, then ex ante corrections of these errors are retroactive)

2. Details of Submission Content for 2017, Phases 1 and 2

This section includes guidance for program administrators to determine content of workpaper submissions. The goal of this guidance is to limited “busy-work” and re-submission of repeated information.

- A) **Statewide Workpapers:** Only one workpaper may be submitted for each set of programs/measures which are adopted by more than 1 program administrator; such workpapers have been termed “statewide workpapers” and program administrators have been directed to collaborate on such efforts. Per the July 2015 data and reporting team meeting in San Francisco, the ex ante data submitted for a statewide workpaper must include measures, energy impacts, and technology costs which are valid for all relevant service territories. Program administrators who adopt statewide workpapers (e.g. participating program administrators) shall submit a “short form” workpaper which acknowledges communicates and justifies any changes from the statewide workpaper. SDG&E has recently provided an example “short form” workpaper for the purpose of adopting a statewide workpaper. This example is a helpful illustration and we attach it to this guidance as Appendix A. This format is an acceptable way to adopt a statewide workpaper.
- B) **No Submission Unless PA Changes Program or Measures:** Program Administrators shall abbreviate their submissions to include only the information which (a) is created by the program administrator rather than adopted by Commission and (b) which has changed since the last workpaper submission. In other words, if program changes are limited to incorporating DEER updates made on August 18, 2016, then full workpaper submissions are neither required nor desired. Instead, we direct the program administrators to submit the following to the Workpaper Project Archive:
- a) A letter confirming the list of workpapers affected by DEER2017 and DEER2018 and stating that the PA will claim the savings associated with the updated values.
 - b) A Measure Catalog table for any records which are not already available in the ex ante database or the PEARdb¹³.
 - c) A technology cost table, if required, to support Measure Catalog records. See the section below, Additional Workpaper Supporting Data Guidance, for examples.

3. Additional Workpaper Supporting Data Guidance

This section provides additional guidance for data submissions to the ex ante database. Workpaper data submittals must be in the ex ante database specification released April 1, 2014. Data submittals that are not in the correct format will be rejected until the program administrator submits the data in the correct specification. For workpapers updates (DEER or otherwise), supporting documentation (traditionally the Microsoft Word document portion of the workpaper) should include a description of any changes to

¹³ If values are available in the PEARdb but have a status of “proposed”, then program administrators shall either confirm that the records are acceptable or shall provide new records which are intended to replace the existing records. If resubmitting replacement records, the program administrator shall first download the existing records and then make changes to the proposed PEARdb values to illustrate what updates or errors are indicated. This is the only case in which downloading and resubmitting data from the ex ante database is indicated.

savings calculation methods employed to accommodate the update unless those changes are merely adoptions of DEER measures.

A) **Data May Not Be Downloaded and Re-Submitted.** Data which exists within the Ex Ante Database as of November 18th, 2016 may not be re-submitted. Instead, it must be referenced by the submitted data using the existing record's ID.

- i) For example, a PA may have changes to their delivery types for lighting measures which were updated as part DEER and/or the July 2016 LED disposition¹⁴. For such updates, the PA shall submit the Implementation table with appropriate references to measure IDs. Also, pursuant to the July 2016 LED disposition, it is possible that the TechnologyCosts will also need to be submitted. However, in many cases, the measure and EnergyImpacts table may not be submitted. Submitted measures and energy impacts shall be limited to work that is newly developed by the PA and not included in the ex ante database. The exception to this case is data with a Status of "proposed" which is located in the PEARdb and which the program administrator wishes to update or correct.¹⁵

B) **Cost Records to Follow Ex Ante Measure Cost Specification.** PAs shall review the Ex Ante Measure Cost Specification and ensure that all submitted cost records correctly report the technology costs developed in the workpapers¹⁶.

- i) For example, using Workorder 17 (WO17) to develop cost records results in Material Cost only. Since WO17 does not include labor, it is incorrect to assign the costs from WO17 equations to the General Cost parameter; they must be assigned to the Material Cost parameter. In these cases, program administrators shall develop labor costs, describe this development within their workpapers, and follow the cost guidance document when preparing data submissions. The Cost Guidance document provides additional details about the options available to PAs to develop and assign labor costs.

C) **Source Description Include Workpaper ID and revision.** Ex ante team is considering using the parameter SourceDesc (which stands for Source Description) to link claims to ex ante database records. Therefore, it is important that the Implementation (or Measure Catalog) SourceDesc continue to include work paper identification information. Nearly all submissions correctly reference the workpaper that they are submitted with. Going forward, staff directs PAs to ensure that the

¹⁴ The 2016 LED disposition is available at DEEResources.com as the following URL: <http://deeresources.com/index.php/non-deer-workpapers>. The disposition is for LED Lamps and Fixtures that use Wattage Reduction Ratio (WRR) savings methods.

¹⁵ The PEARdb may be viewed using the READI tool. The tool is available at DEEResources.com as the following URL: <http://deeresources.com/index.php/ex-ante-database>. The latest version of the tool is 2.4.7. To view the PEARdb, you must use version 2.4.3 or later.

¹⁶ The Ex Ante Measure Cost Specification, also referred to as the "cost guidance document", is available from DEEResources.com at the following URL: <http://deeresources.com/index.php/ex-ante-database/ex-ante-guidance/20-specifying-cost-data>. To find the document from the main menu, select Ex Ante Database and then Guidance for creating and claiming against Ex Ante Data. The resulting table includes a document called Specifying Cost Data in the Ex Ante Database.

workpaper is referenced in the SourceDesc parameter of the Implementation / Measure Catalog table.

4. Communication of Review Status

Commission staff will provide the PAs with a Phase 1 review status summary by March 1, 2017. Approved and unreviewed (or interim approved) workpapers will be uploaded to the Workpaper Archive Tool at <http://deeresources.net/workpapers>. The site will be updated periodically during the Phase 1 review period as workpapers are approved or waived.

5. Support for workpaper development and updates

PAs should leverage regular check-in meetings with Commission staff and ex ante team to clarify questions regarding 2017 workpaper updates and new workpapers. PAs shall also leverage the California Technical Forum (CalTF) resources as desired.

6. 2018 Workpaper Plan

D.15-10-028 (at 84) required staff and PAs to develop a workpaper plan and to consider stakeholder input. Staff requests the PAs to develop a proposed plan for 2018 and to submit this plan no later than 30 days after the 2019 DEER Resolution is published.

If program administrators have any questions regarding the contents of this memo, please contact Paula Gruending (paula.gruending@cpuc.ca.gov).

Appendix A. Example short form workpaper for program administrators adopting (i.e. “participating in”), statewide workpapers

The following document is provided as an example workpaper submission which may be used to adopt an existing, statewide workpaper. Note that the title page is not reproduced below. Additionally, some information specific to SDG&E has been removed for brevity. Additionally, this submission shall be accompanied by ex ante data as described in the workpaper guidance, above.

SDG&E LED REFRIGERATION CASE LIGHTING

INTRODUCTION

This short form workpaper documents (WP) the values adopted from PGE’s WP entitled “LED Refrigeration Case Lighting” (PGECOLTG174 R2 LED Ref Case Lighting). SDG&E adopts all of the values in PGECOLTG174 R2 LED Ref Case Lighting, with the following exceptions:

1. SDG&E use different measure wattage ranges, which creates only 4 implementations versus PGE’s 14.
2. SDG&E does not include HVAC interactive effects.

DOCUMENT REVISION HISTORY

Rev	Date	Author	Summary of Changes
1			
1.1			
2	10/18/2016	SDG&E Workpaper Team	Utilized base wattage and refrigeration compressor savings values from PG&E’s LED workpaper of the same name (PGECOLTG174, Revision 2) to generate SDG&E specific measure saving.

MEASURE SUMMARY

Table 1: Measure Summary Table

Section	Value
Summary & Purpose	<p>This short form workpaper documents ex-ante load impacts and cost-effectiveness values for Refrigeration LED Case Lighting. The base wattage and refrigeration compressor savings values from PG&E’s LED workpaper of the same name (PGECOLTG174, Revision 2). Since SDG&E’s measure offering is different than that of PG&E, SDG&E’s measure wattage is substituted to compute the wattage differential (delta watts). SDG&E’s measures are offered in either 5-foot or 6-foot. SDG&E used PG&E’s per foot values and converted to its respective length. Energy and load impact savings are based on the delta watts multiplied by the DEER 2016 “Building Occupancy Sensor” operating hours and coincident demand factor for the grocery (GRO) building type. Similar to PGE’s workpaper, because Grocery (GRO) is the dominant building type for these measures, the default Com building type will use the operating hours for GRO building type. Any Upstream savings calculated using the Com default building type will be based on GRO operating hours.</p>
1.1 Measure & Baseline Data	<p>Measure:</p> <p>402270 - LED Refrigeration Case Lighting - Premium Tier 5' Case Door</p> <p>402273 - LED Refrigeration Case Lighting - Standard Tier 5' Case Door</p> <p>402271 - LED Refrigeration Case Lighting - Premium Tier 6' Case Door</p> <p>402274 - LED Refrigeration Case Lighting - Standard Tier 6' Case Door</p> <p>Baseline: Linear fluorescent T12/T8 refrigeration case lighting.</p>
1.2 Technical Description	
Measures	See Requirements
Code for All Measures	See PGECOLTG174, Revision 2 at Page 6. These measures do not fall under Title 20 [2015], are not required by Title 24 (2013) except for controls, and are not addressed as a specific technology for refrigerated cases in the Federal Standards.

Section	Value
Requirements	<ul style="list-style-type: none"> • Only complete, new Linear LED strips or fixtures qualify • LED tubes do not qualify • Must replace existing fluorescent lighting • Qualifying fixtures must be listed on one of the following lists <p>Energy Star: https://www.energystar.gov/productfinder/product/certified-light-fixtures/results https://www.energystar.gov/products/lighting_fans/light_bulbs</p> <p>DLC: http://www.designlights.org/QPL and Appendix E: Table of Approved LED Lighting & Utility Approval Process (xls)</p>
1.3 Installation Type and Delivery Mechanisms	
Installation Type	Replace on Burn-out (ROB)
Delivery Mechanisms	<p>Downstream Rebate – Deemed</p> <p>NOTE: Measures are offered in the SDG&E Direct Install program yet require a customer co-pay and are treated as downstream deemed.</p>
1.4.1 DEER Data	
Net-to-Gross Ratio	Com-Default>2yrs
Effective and Remaining Useful Life	GrocDisp-FixtLtg-LED
Section 2. Calculation Methodology	DEER 2016
Energy Savings/Peak Demand Reduction – All Measures	<p>Base wattage is based on PG&E’s Tier 2 (≤ 5-foot = 10.45 watts/foot & > 5-foot = 24.96 watts/foot). The Refrigeration Compressor Savings Factor = 1.374 for PG&E’s workpaper at page 9, Section 2.01.</p> <p>Energy and load impact were computed using DEER 2016 “Building Occupancy Sensor” operating hours and coincident demand factor for the grocery (GRO) building type (5,390 & 0.886, respectively)</p>
Section 3. Load Shapes	DEER:Com:Indoor_Non-CFL_Ltg
Section 4. Costs	

Section	Value
Section 4.1 Base and Measure Costs	
Base Cost	
402270/402273	\$3.14/foot x 5 feet = \$15.70 (PG&E LB07)
402271/402274	7.01/foot x 6 feet = \$42.06 (PG&E LB09)
Measure Cost	\$24.84/foot (PG&E LB07 & LB09)
402270/402273	24.84/foot x 5 feet =\$124.2
402271/402274	24.84/foot x 6 feet =\$149.04

SAVINGS CALCULATION METHODOLOGY

SDG&E does not accept the HVAC interactive effects since the refrigerated cases are considered self-contained and any interactive effect is absorbed by the refrigeration compressor, not the HVAC system.

- Measure Unit = Case Door (Door)
- Compressor Savings Factor = 1.374 (Section 2 above)
- $\Delta\text{Watts/door} = (\text{Base Case Watts/door} - \text{Measure Case Watts/door}) \times \text{Compressor Savings Factor}$

As an example, SDG&E product code 402270 assumes a 5 door refrigerated display case. 5 foot lamps (52.25W per lamp, per PG&E), which has a fixture wattage of 62.7W per door.

- Annual Electric Savings [kWh/door] = $(\Delta\text{Watts/door}) \times (\text{DEER 2016 Annual Hours of Operation}) / (1,000 \text{ Watts} / \text{kW})$
- Demand Reduction [kW/door] = $(\Delta\text{Watts/door}) \times (\text{DEER 2016 Lighting Coincident Demand}) / (1,000 \text{ Watts/kW})$

(See calculation workbook for specific computations)

SAVINGS CALCULATION WORKBOOK

<insert embedded document to document all savings calculations proposed for workpaper>