PUBLIC UTILITIES COMMISSION

505 VAN NESS AVENUE

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Date: August 1, 2016

To: Pacific Gas and Electric Company (PG&E)

From: CPUC Ex Ante Review Staff

Cc: R.12-01-005 and R.13-11-005 Service Lists

Subject: Mid-Year 2016 Efficiency Savings and Performance Incentive Ex Ante Review Performance Feedback

Pursuant to Decision (D).13-09-023, California Public Utilities Commission (CPUC) staff and consultants are providing mid-year feedback on the program administrators' (PA) respective ex ante activities for 2016. Qualitative feedback is provided per each of the metrics identified in Attachment 7 of D.13-09-023. The mid-year feedback focuses on specific issues and concerns identified in dispositions issued so far during 2016 and in ongoing workpaper and custom project ex ante reviews. CPUC staff translated the identified review issues and concerns into qualitative feedback for the specified metric to give the PAs a sense of how each can improve its respective activities.

Custom Projects

On a positive note, PG&E has made a good effort to comply with the Custom Measures and Projects Archive (CMPA) Bi-monthly list submission process that was implemented at the end of 2015. PG&E staff's use of the CPUC staff checklist has greatly reduced the issues associated with incomplete PA documentation submissions. PG&E staff continues to bring forth thoughtful discussions to the weekly check-in conference calls. CPUC staff recognize that PG&E is making efforts to identify projects with potential standard practice baseline issues and implement procedures to reduce the risk to its portfolio. PG&E has taken a lead role in developing Industry Standard Practice (ISP) assessments and is currently piloting approaches to address this issue. CPUC staff sense a greater level of cooperation and willingness on the part of some PG&E staff to make changes that have the potential to improve the PA's portfolio performance.

With regard to custom projects and measures, the eleven Ex Ante Review dispositions touched thirty-nine projects (CPUC ID number PGE-0046 pump refurbishment projects, has a total of 30 associated applications which were selected for review and are represented as a single

review point in Table 1 below) between January 1, 2016 and June 30, 2016. In early 2016 staff updated the custom project ex ante review disposition template to include a categorization of the actions that staff requires the PA to implement for the project under review. The categorization allows more specific identification of problem areas which need to be addressed by the PA. Table 1 below summarizes the results of the categorization analysis for dispositions issued between January 1, 2016 and June 30, 2016. Nine of the eleven dispositions issued in 2016 are in the updated format and are included in the summary below.

Table 1: Summary of Categorized Action Items

Action Category	Total number	% of total
Analysis assumptions	6	13.0%
Baseline	2	4.3%
Calculation method	15	32.6%
CPUC policy	1	2.2%
Eligibility	1	2.2%
ER preponderance of evidence	1	2.2%
EUL/RUL	3	6.5%
Incentive calculation	3	6.5%
M&V	4	8.7%
Measure cost	1	2.2%
Measure type	2	4.3%
Missing required information	1	2.2%
NTG	2	4.3%
Program influence	2	4.3%
Project scope unclear	1	2.2%
Revise to match CPUC savings estimate	1	2.2%
Total	46	100.0%

CPUC staff observes that PG&E staff needs to make significant effort to improve its calculation methodologies. Fifteen action items equaling 32.6% of all action items cited were related to calculation methodology issues. Some dispositions had multiple action items for this parameter. Additionally 13% of all actions (six total) were categorized as analysis assumptions actions. These two categories are related and account for almost 50% of all actions required by CPUC Staff. These two categories have direct effects on the reliability and accuracy of the savings impacts.

Another area which continues to be of concern for CPUC staff is utility's post-installation measurement and verification (M&V). Four action items equaling 8.7% of all action items cited were related to M&V issues. CPUC staff continues to find that many M&V plans are generic and do not provide adequate specificity about measurement points, measurement intervals, and how measured data will be used to derive the final ex ante savings impacts. CPUC staff have provided detailed guidance on this issue in the past but the guidance does not

seem to have penetrated very deeply into the implementation team's processes as similar observations of inadequate documentation have been made by staff for several years.

Effective useful lives/Remaining useful lives (EUL/RUL) issues and incentive calculation issues each had three action items, equaling 6.5% of all action items. The remaining action item categories individually equaled less than 5% of the total action items.

CPUC staff, in its July 15, 2015 Mid-Year ESPI Feedback memo, expressed its concern to PG&E staff that " PG&E program staff and 3rd party (3P) implementers continue to set up customer satisfaction issues by setting expectations with the customer for large incentive amounts before any appropriate review is undertaken, then these expectations are not realized when the ex ante review finds that the savings and incentive are overstated due to not following program rules or non-compliance with previously issued Commission policies and directives." CPUC staff identified the same issues with CPUC ID number PGE_0005. PG&E staff must take steps to remedy this issue and clarify with its program staff and 3rd party implementers that incentive agreements are not to be signed until a project has gone through PG&E staff's internal project quality control review, or the CPUC staff's ex ante review if the project was selected for review. CPUC ID number PGE_0005 is another example of this issue. PG&E staff will develop and present, 60 days from the date of this memo, to CPUC staff for a collaborative review an upfront review process for large impact projects to avoid misunderstandings that lead to customer dissatisfaction, and to identify and remove ineligible measures early in the program application process to minimize the waste of ratepayer resources.

For CPUC ID PGE_0005, CPUC staff found that PG&E staff was working with this customer for more than 10 months before documentation was submitted for CPUC staff's review. Our review determined that the two largest savings impact measures, EEM-1 and EEM-2 were ineligible. The customer became justifiably aggravated when we questioned the project's eligibility after PG&E staff had been working with them for such a long period. CPUC staff has found similar eligibility issues with other large impact industrial projects.

For CPUC ID number PGE_0046 thirty (30) associated applications of pump refurbishment were selected for review, CPUC staff found that PG&E staff was proposing that a pump refurbishment (repair/replacement of pump impellers and pump bowls) is Retro-commissioning (RCx). Staff responded that RCx is not a Commission adopted measure type, but is a general description of an overall project process. PG&E staff further proposed that the project is a retrofit add-on (REA) measure type in order to claim the in situ baseline. CPUC staff responded that REA is a recognized measure type, but the repairs and replacements proposed in these applications do not meet the definition of REA. Staff has observed an increase in the number of applications where REA is the proposed measure type, when the proposed project does not meet the definition of REA. Staff speculates that implementation teams are using the REA measure type designation to increase the savings impact claims.

PG&E staff must instruct its reviewers to carefully assess the proposed measure types and ensure that the approved documentation reflects the correct measure type.

For CPUC ID PGE_0007, a process improvement measure at a refinery, CPUC staff found that PG&E staff failed to upload project documentation prior to the customer implementing the measure. There also were significant delays in providing project documentation. Additionally, although CPUC staff participated in a site meeting before the project was implemented, PG&E staff did not carefully consider how to integrate the discussions that occurred between the customer, PA reviewer, 3P implementer and CPUC staff during the onsite meeting. The documentation provided after the project was implemented lacked a complete and concise calculation methodology. PG&E staff has previously received guidance in this area. CPUC staff observes that incomplete and unconcise calculation methodology remains a weakness for many complex projects.

CPUC staff identified several high-level issues of concern from these projects. A summary of these issues, taken from the review findings dispositions issued, as they relate to the particular projects is provided in Table 1 in Attachment B of this memo. Table 1 in Attachment B is intended to provide PG&E staff with information as to how the issues may potentially impact upward or downward scoring movement in the ESPI scoring metric. Table 1 in Attachment B lists the CPUC ID numbers associated with each disposition. The PA may refer to the individual dispositions for more detailed descriptions of the specific actions CPUC staff required for each application. The qualitative ESPI scoring feedbacks are designated as follows:

- '+' indicates a positive scoring impact on a metric,
- '-' indicates a negative scoring impact on a metric,
- 'Yes' indicates meeting expectation; no scoring impact on a metric,
- 'No' indicates the review feedback is not applicable to a metric.

Workpapers

PG&E staff's efforts toward deemed measure development and implementation have improved over the past year. There is an increase in effort to follow CPUC staff direction for additional research and development included in workpaper dispositions and collaborative workpaper development efforts. PG&E staff's ex ante database (EADB) submissions continue to improve and the PA is typically responsive to the EAR team's requests for clarifications or corrections of EADB submissions.

In 2016, PG&E staff submitted 16 new or revised workpapers. The EAR team waived review on 14 of them, and one will be subject to an upcoming review covering screw-in LED lamps. Since December 23, 2015, PG&E staff has submitted ex ante data for 128 workpapers, and the EAR team has processed 88 of those workpapers and prepared the data for addition to the Preliminary Ex Ante Review database (PEARDB). There are two preliminary reviews, issued in 2015, that are awaiting responses from PG&E staff. There are also several areas of additional ex ante development activities that have been directed by CPUC staff.

Additional information and CPUC staff assessment of the PA's deemed ex ante development activities is provided by topic area below.

- **Incorporation of Previous Direction (shows improvement)**
  CPUC staff highlights that PG&E has begun to show progress on several ex ante development activities that have been previously directed either in workpaper dispositions, previous CPUC decisions or from collaborative workpaper development efforts. For example, PG&E met disposition and advice letter requirements for continued research related to the Retail Products Platform workpaper. There are, however, still areas which need improvement. There does not appear to be much progress on standard practice research for food service equipment, uniform statewide costs for screw-in LEDs, or performance and baseline information for certain package HVAC measures. More information on PG&E's activities addressing previous direction can be found in Table 6 of Attachment B.
- **Workpaper Reviews**
  PG&E staff submitted 16 workpapers in 2016. CPUC staff waived review of 14 submissions which now have interim approved status. Below are some sample CPUC staff observations, based on PA's submission notes, for interim approved workpapers submitted in 2016 along with how these observations might impact a final ESPI score:
    - Cost updates for several workpapers were provided utilizing revised costs from either the DEER2016 update or CPUC Work Order 17 cost study (neutral to positive ESPI score impact).
    - PGECOHVC145 and PGECOHVC147 cover residential high efficiency furnaces and include additional savings for inclusion of high efficiency fan motors. However, a scan of the workpapers indicates that the electric savings may not have been calculated according to the disposition covering HVAC

maintenance measures that was issued at the beginning of the 2013-2014 cycle (negative ESPI score impact).

- PGECOLTG179 is PG&E's "flagship" workpaper for high efficiency LED fixtures and retrofit kits. The recent submission increases efficiency and performance requirements showing PG&E's efforts to ensure that measures offered are at the top end of performance and efficiency (positive ESPI score impact).

CPUC staff recently completed a comprehensive review of all workpapers submitted by SCE and PG&E staff that cover LED lamps and fixtures for workpapers which utilize the DEER wattage reduction ratio (WRR) approach to calculate energy. CPUC staff have some concerns with the savings developments, and one major concern with the formatting of the ex ante data. These concerns have been addressed through a comprehensive disposition. CPUC staff's assessment is that these workpapers show minimal acceptable quality, but CPUC staff expects that all concerns will be easily addressed by PG&E staff in future submissions.

A summary of 2016 PG&E workpaper submissions is provided in Table 2 and a summary of workpaper detailed review is provided in Table 3, both in Attachment B.

- **Ex Ante Database Submittals**
  PG&E staff has shown progress and improvement in their understanding of the EADB structure and required format for submittals. When CPUC staff identified issues where additional information was required for resolution, PG&E staff was generally responsive in providing additional information. In some cases, the issues resolved required PG&E staff to implement internal programming changes, which caused delays on a limited number of workpaper datasets. Many data submissions for screw-in lighting (CFLs and LEDs) were incorrect. PG&E staff submitted the same measure and implementation definitions for both residential and nonresidential sectors. The CPUC staff believes that this issue can be resolved by PG&E staff review of the data and CPUC staff revisions and utilizing those revisions as a guide for future submissions. A summary of data submissions that have been reviewed by CPUC staff so as to allow upload to the PEARdb is provided in Table 5 of Attachment B.

In accordance with D.13-09-023, CPUC staff and consultants will schedule a conference call meeting with PG&E staff to discuss the mid-year feedback. CPUC staff will send a Doodle Poll to find an available day and time. If you have any questions or comments in the meantime, please contact Peter Lai (Peter.lai@cpuc.ca.gov).

Metric No.	Metric Description
1a	Timeliness of action in the implementation of ordered ex ante requirements in the pre-submittal/implementation phase: Timing of disclosure in relation to reporting.
1b	Timeliness of action in the implementation of ordered ex ante requirements in the post-submittal/implementation phase: Timing of responses to requests for additional information.
2	Breadth of response of activities that show an intention to operationalize and streamline the ex ante review process.
3	Comprehensiveness of submittals.
4	Efforts to bring high profile, high impact, or existing (with data gaps) projects and/or measures to Commission staff in the formative stage for collaboration or input.
5	Quality and appropriateness of project documentation (e.g., shows incorporation of Commission policy directives).
6a	Depth of IOU quality control and technical review of ex ante submittals: Third party oversight.
6b	Depth of IOU quality control and technical review of ex ante submittals: Clarity of submittals and change in savings from IOU-proposed values not related to M&V.
7	Use of recent and relevant data sources that reflect current knowledge on a topic for industry standard practice studies and parameter development that reflects professional care, expertise, and experience.
8	Thoughtful consideration, and incorporation, of CPUC comments/inputs. In lieu of incorporation of comments/input, feedback on why comments/input were not incorporated.
9	Professional care and expertise in the use and application of adopted DEER values and DEER methods.
10	Ongoing effort to incorporate cumulative experience from past activities (including prior Commission staff reviews and recommendations) into current and future work products.

2016 Ex Ante Review Interim ESPI Performance Feedback — PG&E

Table 1 - Summary of PG&E Mid-Year 2016 Custom Project Review Results

CPUC ID	Metric 1a	Metric 1b	Metric 2	Metric 3	Metric 4	Metric 5	Metric 6a	Metric 6b	Metric 7	Metric 8	Metric 9	Metric 10	COMMENTS
PGE_0004	**No**	**+**	**-**	**+**	**No**	**-**	**-**	**-**	**-**	**No**	**No**	**-**	M1b: The PA quickly responded to the disposition and participated in a discussion with staff. M2: Staff feels the PA focused on the savings impacts only and did not consider that the proposed baseline is unrealistic and that there is little evidence of program influence. M3: Submittals were detailed. M5, M6a, M6b, M7, M10: The PA proposed that the existing mechanical aeration system be used as the project baseline. The existing system is more than 20 years old and CPUC staff reject that its performance can be considered the baseline for this Normal Replacement project. CPUC staff investigation determined that the customer has a Request for Proposal (RFP) out for a 1 MW photovoltaic (PV) system, with an option for an additional 200 kW capacity. Staff feels the PA missed several key issues in its review of this project.
PGE_0005_1	**-**	**No**	**-**	**+**	**-**	**-**	**-**	**-**	**-**	**No**	**No**	**-**	M1a, M2, M4: CPUC staff selected the project for review on 1/5/2015. The PA did not upload any documents to the CMPA for staff review until 7/21/15 (over 7 months later). Staff learned that the PA review contractor had been working closely with the customer since November 2014 to develop the pre-installation documentation for this project. Staff noted that the PA continues to delay providing documentation on large complex projects until at a point where customer expectations are established before CPUC staff review is performed. M3: Submittals were detailed. M5, M6a, M6b, M7, M10: Staff identified significant issues with the project and disqualified two of the four measures. The customer was justified in expressing their dissatisfaction that the project was being questioned at such a late point in its development. This was primarily due to the PA not providing project documentation to staff at an earlier stage of the project. Staff notes that this issue has occurred on several large savings impact projects.

PGE_0005_2	**No**	**+**	**Yes**	**Yes**	**No**	**-**	**No**	**-**	**No**	**-**	**No**	**Yes**	M5, M6a, M8: Submitted documents do incorporate previous guidance on EUL/RUL and measure types. The documentation did not, however, address some concerns from the previous EAR regarding accounting for the process sensitivity to ambient temperature and using the improved process efficiency associated with EEM-1 and EEM-2 as the baseline for EEM-3 and EEM-4. The PA still does not understand that CPUC staff found that there were no higher cost, higher efficiency options for these measures considered by the customer and, therefore, concluded that the proposed measures were the only alternatives that met the customer's technical requirements for the project. The in situ baseline cannot be used for capacity expansion measures since the in situ cannot meet the new capacity requirement. This is an important point which the PA should carefully consider as it relates to many other projects that Commission staff identified problems with.
PGE_0007	**-**	**-**	**-**	**Yes**	**No**	**-**	**Yes**	**No**	**No**	**-**	**No**	**-**	M1a: The PA failed to upload project documentation prior to the customer implementing the measure. M1b: The first PA documentation upload was on 10/27/15. CPUC staff noted that the upload did not include the PA technical review. The PA technical review was not uploaded until 3/29/16. M2: Significant delays in providing project documentation. M3: Documents are reasonably comprehensive although missing some key information and concepts. M5: The PA did not carefully consider how to integrate the discussions that occurred between the customer, PA reviewer, 3P implementer and CPUC staff during the onsite meeting in August 2015 into the project documentation and analysis. M6a: The PA reviewer made a reasonable effort to review the 3P implementer's analysis but missed some key items discussed in August 2015. M8: The PA did not carefully consider how to integrate the discussions that occurred between the customer, PA reviewer, 3P implementer and CPUC staff during the onsite meeting in August 2015 into the project documentation and analysis. M10: CPUC staff informed the PA that rigorous analysis and M&V is required for this measure. The documentation provided lacks a complete and concise calculation methodology. The PA previously received guidance in this area. This remains a weakness for many projects.

PGE_0044	**No**	**No**	**+**	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**No**	**No**	**Yes**	**No**	A relatively simple project, reasonably explained and documented. Minor comments on the M&V plan were provided. The PA technical reviewer name was not included in the technical review document. The PA correctly estimated the EUL for the REA measure.
PGE_0045	**+**	**No**	**Yes**	**-**	**No**	**-**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**-**	M3, M5, M10:PA did not limit the EUL of the chiller VFD control additions to the RUL of the chiller equipment. PA has been told in prior dispositions for multiple projects and in meetings that for REA measure types, the EUL shall be limited to either the appropriate DEER RUL for the host equipment or the PA must provide adequate support the RUL of the existing equipment. Initial documentation submitted within a reasonable timeframe. Missing chiller performance specs. Derivation of the chilled water loop loads not clearly explained. Missing the PA approved savings workbook in the initial upload but PA provided it quickly upon CPUC staff's follow-up CMPA message request. Economizers are not mentioned and may not be accounted for in the baseline. Measure costs are not clear with savings workbook having a value of about half of the vendor quote. PA Technical Review did disqualify two measures from the Third Party original scope appropriately. Used an adequate approach in the bin impact calculations to account for the DEER peak demand period definition. Incentive calculations are not fully documented and contradiction between $/kWh rates in the savings workbook and the PA review.
PGE_0046	**No**	**No**	**-**	**Yes**	**No**	**Yes**	**-**	**-**	**No**	**No**	**No**	**-**	M2, M6a, M6b, M10: The PA technical reviewer does not understand that refurbishing pumps is not an REA measure type, and that RCx is not a measure type. The reviewer's lack of understanding of this fundamental issue leads to numerous errors including the incorrect assignment of baseline, and errors with the calculation methodology. M5: Documentation is adequate.

PGE_0047	**No**	**No**	**Yes**	**Yes**	**No**	**Yes**	**-**	**-**	**No**	**No**	**No**	**-**	M3: Submittals are comprehensive, though contradictory and lack some details. M5: Most key areas of CPUC staff concern are addressed, although not correctly in all cases in the documents. M6a, 6b: The PA technical reviewer did a good job of reviewing the savings analysis and also determined that the floating head pressure controls measure was ineligible since the customer already had that control capability. Unfortunately, the PA technical reviewer missed the fact that EEM-1 is a normal replacement measure type and not an REA measure type, and this makes the baseline used in the savings analysis incorrect and will likely result in a significant reduction in the savings and incentive for this project. Additionally, the PA QC reviewer did identify that the measure type for EEM-1 was incorrect but did not require the documentation to be revised to reflect this fact. There are also some troubling details regarding the sequencing of events for this project which lead CPUC staff to question how the 3P EE program influenced the customer's decision to move ahead with this project. M10: The PA technical reviewer missed the fact that EEM-1 is a normal replacmeent measure type and not an REA measure type, and this makes the baseline used in the savings analysis incorrect.
PGE_0054	**No**	**No**	**Yes**	**+**	**No**	**Yes**	**+**	**+**	**No**	**No**	**Yes**	**Yes**	M2, M5, M6a, M6b, M9, M10: Reasonably complete submittal addressing most of the required areas. PA tech review is thoughtful and comprehensive. Main issue is basing the analysis on assumptions without an M&V approach defined to eliminate the uncertainty associated with the key assumptions.
PGE_X361	**No**	**No**	**No**	**No**	**No**	**-**	**-**	**No**	**-**	**No**	**No**	**-**	**M5**: M&V analysis lacks sufficient depth and did not recognize that the measurement data did not match up to the stated implemented measure in the post-implementation report. **M6a**: The PA failed to properly scrutinize the submitted 3rd party eQuest model against the supplied post-implementation M&V data. **M7**: The PA's Technical Review and the 3rd party implementer failed to exercise adequate care to reflect the post-implementation measurement data and address simulation modeling errors. **M10**: The PA did not address shortcomings in the simulation models making the savings estimates unreliable. In addition, the PA program policies do not reflect CPUC policy to affect and pursue deep savings by allowing this project to only implement low or no costs measures.

Table 2 - Summary of PG&E Mid-Year 2016 Workpaper Submissions

WP ID	Revision	Title	Date Submitted	PA Stated Scope of Submission	Submission Status
PGECOHVC126	6	Packaged and Split Air- Cooled Commercial Air Conditioner and Heat Pump Units, less than 65k Btu/h	5/2/2016	Updated NTG; Revised savings for two measures	Review waived – Interim approval
PGECOREF109	5	Evaporator Fan Motors	2/1/2016	Mapped from SCE13RN011-R1	Review waived – Interim approval
PGECOALL101	5	Occupancy Sensor Plug Load	4/18/2016	Added measure codes, savings estimates pulled from existing SCE measure codes	
PGECOHVC145	2	High Efficiency Gas Furnace 95% AFUE (1.04 HIR) - Residential	5/2/2016	Updated impact electric savings based on RQm; updated costs from WO017	Review waived – Interim approval
PGECOHVC146	3	High Efficiency Gas Furnace 95% AFUE (1.04 HIR) - Nonresidential	5/2/2016	Updated costs from WO017, Added NC implementation	Review waived – Interim approval
PGECOHVC147	2	High Efficiency Furnace 97 AFUE (1.02 HIR) - Residential	5/2/2016	Updated impact electric savings based on RQm; updated costs from WO017	Review waived – Interim approval
PGECOHVC148	3	High Efficiency Gas Furnace 97% AFUE (1.02 HIR) - Nonresidential	5/2/2016	Updated costs from WO017	Review waived – Interim approval
PGECOHVC162	3	Water Source Heat Pumps	5/2/2016	Revised cost; NTG update; Therm changes to DEER value	Review waived – Interim approval
PGECOPRO101	4	Process Boiler	6/6/2016	Added Title 20, Added midstream delivery, updated savings	Review waived – Interim approval
PGECOPRO106	4	Direct Contact Water Heater	6/6/2016	Updated ex ante format, added midstream delivery, updated cost to match SoCal Gas	Review waived – Interim approval
PGECOAGR111	6	Sprinkler to Drip Irrigation	6/6/2016	Updated costs	Review waived – Interim approval
PGECOLTG179	2	LED Ambient Commercial Fixtures and Retrofit Kits	6/6/2016	Added DLC Premium Tier requirement, removed 12 measures below requirement, updated costs	Review waived – Interim approval
PGECOLTG141	6	LED PAR20, PAR30 and PAR38 Lamps	6/20/2016	PAR16 measure codes added	Subject to upcoming LED disposition

WP ID	Revision	Title	Date Submitted	PA Stated Scope of Submission	Submission Status
PGECOHVC143	2	Enhanced Ventilation for Packaged HVAC Units with Gas Heating and Packaged Heat Pumps	7/4/2016	Ex Ante Data formatting update	Review waived – Interim approval
PGECOAGR119	2	Variable Frequency Drives on Agricultural Pumps	7/4/2016	Ex Ante Data formatting update	Review waived – Interim approval
PGECOHVC101	5	Space Heating Boiler	7/4/2016	Added delivery type to midstream	Review waived – Interim approval

Table 3 - Summary of Mid-Year 2016 Workpaper Detailed Reviews

WP ID	Revision	Title	Date Issued	Summary of Issues
PGECOLTG165	2	LED A-Lamps	7/22/2016	Main problem with all workpapers is the use of the same measure and implementation ID for residential and nonresidential applications. This is not allowed since res and nonres are required to use different energy impacts record sets that have different IDs. Fixtures (PGECOLTG139) assume a WRR without consideration for Title 24 efficacy requirements nor the likelihood that standard practice may include some fraction of high efficacy installations.
PGECOLTG177	3	LED BR/R Lamps	7/22/2016	
PGECOLTG163	4	LED Candelabra Replacements	7/22/2016	
PGECOLTG164	4	LED Globe Lamps	7/22/2016	
PGECOLTG140	5	LED MR-16	7/22/2016	
PGECOLTG141	5	LED PAR20, PAR30 and PAR38 Lamps	7/22/2016	
PGECOLTG175	2	LED Residential Recessed Downlight	7/22/2016	
PGECOLTG141	6	LED PAR20, PAR30 and PAR38 Lamps	7/22/2016	
PGECOLTG139	8	LED Surface, Pendant, Track, Accent, and Recessed Downlight	7/22/2016	

Table 4 – Summary of PG&E Mid-Year 2016 Workpaper Unresolved Preliminary Reviews

WP ID	Revision	Title	Date Issued	Scope of 2015 Submission	Review Status	Other EAR Notes
PGECOPRO111		Industrial Blower Replacing Air Compressor	5/8/2015	Phase 2 submittal	Preliminary Review - Incomplete	No response from PG&E. Not clear if measure is currently being offered.
PGECOHVC165		Residential HVAC To Code	9/1/2015	Added new measures HV288 for refrigerant charge only and HV289 for duct test and seal only. Changed GSIA. Updated costs using Work Order 17.	Not Reviewed - Not Approved	No response from PG&E. Not clear if measure is currently being offered.

Table 5 - Summary of PG&E Mid-Year 2016 Workpaper Reviewed Ex Ante Data

WP ID	Revision	Title	PEARdb Ready?	Reason	Uploaded to EADB?	Ready for upload?	Date Submitted
PGE3PHVC149	2	PTAC/PTHP/Split AC Controller	Yes	Review waived – Interim approval	Yes		12/23/2015
PGE3PLTG171	2	LED Lighting in Walk-in Coolers and Freezers	Yes	Review waived – Interim approval	Yes		12/23/2015
PGE3PLTG173	4	Compact Fluorescent Direct Install	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOHVC128	6	Unitary Air-Cooled Commercial Air Conditioners and Heat Pumps >=65 kBtu/h	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOHVC166	2	Upstream Residential HVAC	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOLTG107	8	Residential Upstream Compact Fluorescent Lighting	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOLTG109	6	Compact Fluorescent Exterior Fixture	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOLTG110	6	Energy Star Interior CF Fixture	Yes	Review waived – Interim approval	Yes		12/23/2015

Attachment B: Custom and Workpaper Performance Feedback

WP ID	Revision	Title	PEARdb Ready?	Reason	Uploaded to EADB?	Ready for upload?	Date Submitted
PGECOLTG111	8	Nonresidential Upstream Compact Fluorescent Lighting	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOLTG113	6	Interior Induction Fixtures	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOLTG114	7	Non Residential Interior High Performance Linear Fluorescent Fixtures with NEMA Premium HE Ballast	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOLTG116	7	Low or Reduced Wattage T8 Systems (28 & 25 Watt)	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOLTG151	5	LED Outdoor Street and Area Lighting	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOLTG158	5	Exterior Induction Fixtures	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOLTG162	4	Upstream Interior 3-way Compact Fluorescent Lamps	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOLTG174	2	LED Refrigeration Case Lighting	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOLTG178	2	LED High-Bay and Low-Bay Fixtures	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOLTG179	1	LED Ambient Commercial Fixtures and Retrofit Kits	Yes	Review waived – Interim approval	Yes		12/23/2015
PGECOREF111	5	Vending Machine Controller	Yes	Review waived – Interim approval	Yes		12/23/2015
PGE3PAGR113	2	Scroll Compressor	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PAGR115	2	Compressor Heat Recovery Unit - Electric and Gas Water Heaters	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PAGR117	7	Agricultural Ventilation Fans	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PMOT102	2	California Climate Air Conditioner Upgrade – Brushless Fan Motor with Enhanced Time Delay	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016

Attachment B: Custom and Workpaper Performance Feedback

WP ID	Revision	Title	PEARdb Ready?	Reason	Uploaded to EADB?	Ready for upload?	Date Submitted
PGE3PPRO108	2	Glycol Pump Motor VFD	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PREF114	2	Chilled Glycol Pipe Insulation	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PREF115	2	Chilled Glycol Tank Insulation	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PREF116	2	Add Doors to Open, Medium-Temperature Cases	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PREF117	3	Refrigeration Case Compressor Retrofit	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PREF118	3	Refrigerated Case Evap Cooled Condenser	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PREF119	3	Efficient Condenser Multiplex	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PREF120	3	Refrigeration Case SCT Control	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PREF122	4	Refrigeration Coffin Retrofit – Low Temperature Coffin to High Efficiency Reach-In	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PREF124	3	Display Case ECM Motor Retrofit	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PREF126	2	ECM for Walk-In Evaporator with Fan Controller	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PREF127	4	Add Doors to Open Walk-in Cooler	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGE3PREF128	3	Medium Temperature Open Case Retrofit	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016

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PGE3PREF129	3	Floating Head Pressure - Single Compressors	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOAGR111	5	Sprinkler to Drip Irrigation	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOAPP123	5	Ozone Laundry Nonresidential	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOAPP124	2	Energy Efficient Refrigerators	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOAPP128	0	Retail Products Platform (plug load)	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOAPP129	1	Energy Star Clothes Dryers	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECODHW101	6	Large Domestic Water Heater	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECODHW104	5	Gas Storage Water Heater >0.67 EF<75 kBtu/h input, Condensing Instantaneous (tankless) >0.85 EF	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECODHW114	6	Central System Natural Gas Boilers Multifamily	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECODHW115	3	Boiler Controller	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECODHW122	2	Instantaneous Gas Hot Water Heater	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECODHW124	1	High efficiency DHW Boiler (>75 MBTU/hr)	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOFST100	6	Commercial Combination Oven-Electric and Gas	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016

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PGECOFST101	6	Commercial Convection Oven-Electric and Gas	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOFST102	6	Commercial Fryer-Electric and Gas	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOFST103	7	Commercial Griddle- Electric and Gas	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOFST104	6	Commercial Steam Cooker-Electric and Gas	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOFST105	5	Insulated Holding Cabinet-Electric	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOFST108	5	Commercial Ice Machines	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOFST117	6	Commercial Conveyor Oven-Gas	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOFST125	1	Low-Flow Pre-Rinse Spray Valves	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOHVC106	5	Variable Frequency Drives (VFDs) for HVAC Fans	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOHVC125	5	Replacement Multiple-speed Brushless Blower Motors Nonresidential	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOHVC143	2	Enhanced Ventilation and VFD for Packaged HVAC Units with Gas Heating and Packaged Heat Pumps	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOHVC168	1	Demand Controlled Ventilation for Single Zone Packaged HVAC	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOPRO103	6	Tank Insulation	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016

WP ID	Revision	Title	PEARdb Ready?	Reason	Uploaded to EADB?	Ready for upload?	Date Submitted
PGECOPRO105	3	Commercial Pool Heaters	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOPRO107	5	Mid Stream Boiler Tune-Up for Drycleaners	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOPUM102	6	Residential Variable Speed Pool Pump	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOREF104	6	New Refrigeration Display Cases with Doors	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOREF124	1	Advanced Refrigeration Control for Walk-In Cooler and Walk-In Freezer	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/24/2016
PGECOPRO101	4	Process Boiler	Yes	Previously waived or reviewed and approved workpaper	No	Yes	6/6/2016
PGECOPRO106	4	Direct Contact Water Heater	Yes	Previously waived or reviewed and approved workpaper	No	Yes	6/6/2016
PGECOHVC145	2	High Efficiency Gas Furnace 95% AFUE (1.04 HIR) - Residential	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/2/2016
PGECOHVC146	3	High Efficiency Gas Furnace 95% AFUE (1.04 HIR) - Nonresidential	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/2/2016
PGECOHVC147	2	High Efficiency Furnace 97 AFUE (1.02 HIR) - Residential	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/2/2016
PGECOHVC148	3	High Efficiency Gas Furnace 97% AFUE (1.02 HIR) - Nonresidential	Yes	Previously waived or reviewed and approved workpaper	No	Yes	5/2/2016
PGECOAPP119	6	Refrigerator or Freezer Recycling	Yes	Previously waived or reviewed and approved workpaper	No	Yes	1/4/2016
PGECOAPP127	2	Clothes Washers	Yes	Previously waived or reviewed and approved workpaper	No	Yes	1/4/2016
PGECOHVC101	4	Space Heating Boiler	Yes	Previously waived or reviewed and approved workpaper	No	Yes	1/4/2016

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PGECOHVC104	7	Pipe Insulation	Yes	Previously waived or reviewed and approved workpaper	No	Yes	1/4/2016
PGECOHVC142	1	Variable Refrigerant Flow Nonresidential Systems	Yes	Previously waived or reviewed and approved workpaper	No	Yes	1/4/2016

Table 6 - Summary of PG&E Mid-Year 2016 Workpaper Additional Ex Ante Activities

WP ID	Description	Summary	Progress
Several Workpapers	Food service and commercial cooking workpapers	11-07-030 directed industry standard practice research.	CPUC staff and EAR team not aware of any PA initiated work in this area.
Statewide	Variable refrigerant flow commercial systems	CPUC staff directed industry standard practice research for both ROB/NR/NC as well as "three pronged test" fuel switching baselines	Draft survey provided to CPUC staff and EAR team for review on 5/4/2016. Comments and recommendations provided on 5/12/2016. No further updates from PG&E
PGECOAPP128	Retail Products Platform	As a condition of approval, CPUC staff directed follow-on research to be completed, along with a workpaper update, by the end of 2016 that addressed key data gaps in the ex ante development.	To date, PG&E has provided updates on all research and appears to be moving forward with all required secondary and primary research objectives. The EAR team expects to be able to review the submitted work over the next several weeks.
Statewide (Several Workpapers)	Screw-in and MR-16 LED lamps; LED recessed and surface fixtures, pendants and downlights.	2012 LED disposition directed PAs to develop uniform statewide costs.	CPUC staff and EAR team not aware of any statewide efforts to update LED costs or develop flexible cost modeling approaches for these products.

WP ID	Description	Summary	Progress
Statewide (Several Workpapers)	Commercial package HVAC <65 kBtuh split and rooftop high SEER equipment	Develop performance maps for units with SEER > 15. Previous workpapers had "mapped" commercial savings over 15 SEER to similar measures in residential. EAR review rejected this approach for 2016 and directed PAs to develop new performance maps.	CPUC staff and EAR team not aware of any PA initiated work in this area.
Statewide	Commercial ductless mini-split heat pumps and air conditioners	Industry standard practice and performance map research. EAR team directed ISP research (and possible fuel switching research) similar to VRF research. Additionally, preliminary review direected the development of performance maps. Previous workpapers had "mapped" savings to conventional package HVAC results. EAR review rejected this approach for 2016 and directed PAs to develop performance maps.	CPUC staff and EAR team not aware of any PA initiated work in this area.