

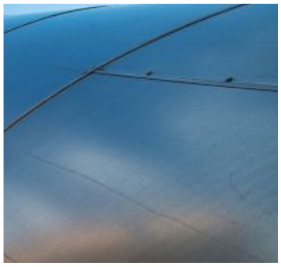


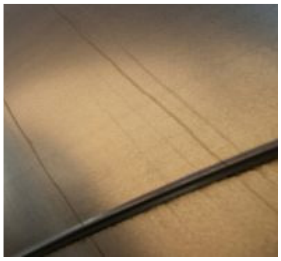

2015 CUSTOM IMPACT EVALUATION INDUSTRIAL, AGRICULTURAL, AND LARGE COMMERCIAL

Final Appendices

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May 3, 2017

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APPENDIX AA ATR DELIVERABLE

This appendix contains a set of impact evaluation result tables that are consistently reported across all CPUC 2015 impact evaluations. This provides access to comparable estimates across a range of impact studies, such as the commercial downstream lighting evaluation and the combined residential and commercial HVAC evaluation. The results presented here are for the Industrial, Agricultural and Large Commercial (IALC) 2015 Custom Impact Evaluation. There are a total of 12 tables that present impact results using various combinations of the following key statistics:

- Energy metric
  - Electric energy savings
  - Natural gas energy savings
  - Coincident peak demand savings
- Evaluation results
  - Lifecycle savings
  - First year savings
  - Gross impact results
  - Net impact results
  - Program administrator-specific and statewide results

The reader should note that the savings and realization rate values in this appendix do not exactly match those in the main body of the report. As described in Chapter 3, the findings presented in the main report are reflective of unadjusted gross savings estimates. That is, the report refers to ex-ante gross savings that are calculated as PA gross savings estimates from which the 90 percent default PA GRR is backed out (i.e., PA gross savings claim / 0.9 = gross unadjusted savings estimate). The savings and realization rates presented in this appendix are reflective of gross ex-ante claimed savings and include the default 0.9 GRR, where applicable.

Table A.1 Gross Lifecycle Savings (MWh)

PA	Standard Report Group	Ex-Ante Gross	Ex-Post Gross	GRR	% Ex-Ante Gross Pass Through	Eval GRR
PGE	PGE	2,196,797	1,147,216	0.52	0.0%	0.52
PGE	PGE - Pass Through	0	0			
PGE	**Total**	**2,196,797**	**1,147,216**	**0.52**	**0.0%**	**0.52**
SCE	SCE	1,652,307	752,133	0.46	0.0%	0.46
SCE	SCE - Pass Through	107,085	107,085	1.00	100.0%	
SCE	**Total**	**1,759,392**	**859,218**	**0.49**	**6.1%**	**0.46**
SCG	SCG	0	0			
SCG	**Total**	**0**	**0**			
SDGE	SDGE	240,374	125,522	0.52	0.0%	0.52
SDGE	SDGE - Pass Through	0	0			
SDGE	**Total**	**240,374**	**125,522**	**0.52**	**0.0%**	**0.52**
	Statewide	***4,196,564***	***2,131,956***	***0.51***	***2.6%***	***0.50***

Table A.2 Net Lifecycle Savings (MWh)

PA	Standard Report Group	Ex-Ante Net	Ex-Post Net	NRR	% Ex-Ante Net Pass Through	Ex-Ante NTG	Ex-Post NTG	Eval Ex-Ante NTG	Eval Ex-Post NTG
PGE	PGE	1,563,964	608,025	0.39	0.0%	0.71	0.53	0.71	0.53
PGE	PGE - Pass Through	0	0						
PGE	**Total**	**1,563,964**	**608,025**	**0.39**	**0.0%**	**0.71**	**0.53**	**0.71**	**0.53**
SCE	SCE	1,119,486	428,716	0.38	0.0%	0.68	0.57	0.68	0.57
SCE	SCE - Pass Through	68,621	68,621	1.00	100.0%	0.64	0.64		
SCE	**Total**	**1,188,107**	**497,336**	**0.42**	**5.8%**	**0.68**	**0.58**	**0.68**	**0.57**
SCG	SCG	0	0						
SCG	**Total**	**0**	**0**						
SDGE	SDGE	145,170	62,761	0.43	0.0%	0.60	0.50	0.60	0.50
SDGE	SDGE - Pass Through	0	0						
SDGE	**Total**	**145,170**	**62,761**	**0.43**	**0.0%**	**0.60**	**0.50**	**0.60**	**0.50**
	Statewide	***2,897,240***	***1,168,122***	***0.40***	***2.4%***	***0.69***	***0.55***	***0.69***	***0.54***

Table A.3 Gross Lifecycle Savings (MW)

PA	Standard Report Group	Ex-Ante Gross	Ex-Post Gross	GRR	% Ex-Ante Gross Pass Through	Eval GRR
PGE	PGE	308.7	171.5	0.56	0.0%	0.56
PGE	PGE - Pass Through	0.0	0.0			
PGE	**Total**	**308.7**	**171.5**	**0.56**	**0.0%**	**0.56**
SCE	SCE	257.0	114.2	0.44	0.0%	0.44
SCE	SCE - Pass Through	22.3	22.3	1.00	100.0%	
SCE	**Total**	**279.3**	**136.5**	**0.49**	**8.0%**	**0.44**
SCG	SCG	0.0	0.0			
SCG	**Total**	**0.0**	**0.0**			
SDGE	SDGE	35.3	28.6	0.81	0.0%	0.81
SDGE	SDGE - Pass Through	0.0	0.0			
SDGE	**Total**	**35.3**	**28.6**	**0.81**	**0.0%**	**0.81**
	Statewide	***623.3***	***336.6***	***0.54***	***3.6%***	***0.52***

Table A.4 Net Lifecycle Savings (MW)

PA	Standard Report Group	Ex-Ante Net	Ex-Post Net	NRR	% Ex-Ante Net Pass Through	Ex-Ante NTG	Ex-Post NTG	Eval Ex-Ante NTG	Eval Ex-Post NTG
PGE	PGE	220.1	90.9	0.41	0.0%	0.71	0.53	0.71	0.53
PGE	PGE - Pass Through	0.0	0.0						
PGE	**Total**	**220.1**	**90.9**	**0.41**	**0.0%**	**0.71**	**0.53**	**0.71**	**0.53**
SCE	SCE	173.7	65.1	0.37	0.0%	0.68	0.57	0.68	0.57
SCE	SCE - Pass Through	14.4	14.4	1.00	100.0%	0.64	0.64		
SCE	**Total**	**188.1**	**79.5**	**0.42**	**7.6%**	**0.67**	**0.58**	**0.68**	**0.57**
SCG	SCG	0.0	0.0						
SCG	**Total**	**0.0**	**0.0**						
SDGE	SDGE	21.2	14.3	0.68	0.0%	0.60	0.50	0.60	0.50
SDGE	SDGE - Pass Through	0.0	0.0						
SDGE	**Total**	**21.2**	**14.3**	**0.68**	**0.0%**	**0.60**	**0.50**	**0.60**	**0.50**
	Statewide	***429.4***	***184.7***	***0.43***	***3.3%***	***0.69***	***0.55***	***0.69***	***0.54***

Table A.5 Gross Lifecycle Savings (MTherms)

PA	Standard Report Group	Ex-Ante Gross	Ex-Post Gross	GRR	% Ex-Ante Gross Pass Through	Eval GRR
PGE	PGE	122,347	63,892	0.52	0.0%	0.52
PGE	PGE - Pass Through	0	0			
PGE	**Total**	**122,347**	**63,892**	**0.52**	**0.0%**	**0.52**
SCE	SCE	494	225	0.46	0.0%	0.46
SCE	SCE - Pass Through	0	0			
SCE	**Total**	**494**	**225**	**0.46**	**0.0%**	**0.46**
SCG	SCG	83,794	47,206	0.56	0.0%	0.56
SCG	**Total**	**83,794**	**47,206**	**0.56**	**0.0%**	**0.56**
SDGE	SDGE	16,225	8,473	0.52	0.0%	0.52
SDGE	SDGE - Pass Through	0	0			
SDGE	**Total**	**16,225**	**8,473**	**0.52**	**0.0%**	**0.52**
	Statewide	***222,860***	***119,797***	***0.54***	***0.0%***	***0.54***

Table A.6 Net Lifecycle Savings (MTherms)

PA	Standard Report Group	Ex-Ante Net	Ex-Post Net	NRR	% Ex-Ante Net Pass Through	Ex-Ante NTG	Ex-Post NTG	Eval Ex-Ante NTG	Eval Ex-Post NTG
PGE	PGE	85,174	33,863	0.40	0.0%	0.70	0.53	0.70	0.53
PGE	PGE - Pass Through	0	0						
PGE	**Total**	**85,174**	**33,863**	**0.40**	**0.0%**	**0.70**	**0.53**	**0.70**	**0.53**
SCE	SCE	222	128	0.58	0.0%	0.45	0.57	0.45	0.57
SCE	SCE - Pass Through	0	0						
SCE	**Total**	**222**	**128**	**0.58**	**0.0%**	**0.45**	**0.57**	**0.45**	**0.57**
SCG	SCG	41,519	26,908	0.65	0.0%	0.50	0.57	0.50	0.57
SCG	**Total**	**41,519**	**26,908**	**0.65**	**0.0%**	**0.50**	**0.57**	**0.50**	**0.57**
SDGE	SDGE	8,605	4,237	0.49	0.0%	0.53	0.50	0.53	0.50
SDGE	SDGE - Pass Through	0	0						
SDGE	**Total**	**8,605**	**4,237**	**0.49**	**0.0%**	**0.53**	**0.50**	**0.53**	**0.50**
	Statewide	***135,521***	***65,136***	***0.48***	***0.0%***	***0.61***	***0.54***	***0.61***	***0.54***

Table A.7 Gross First Year Savings (MWh)

PA	Standard Report Group	Ex-Ante Gross	Ex-Post Gross	GRR	% Ex-Ante Gross Pass Through	Eval GRR
PGE	PGE	181,802	109,081	0.60	0.0%	0.60
PGE	PGE - Pass Through	0	0			
PGE	**Total**	**181,802**	**109,081**	**0.60**	**0.0%**	**0.60**
SCE	SCE	138,789	84,727	0.61	0.0%	0.61
SCE	SCE - Pass Through	14,873	14,873	1.00	100.0%	
SCE	**Total**	**153,662**	**99,600**	**0.65**	**9.7%**	**0.61**
SCG	SCG	0	0			
SCG	**Total**	**0**	**0**			
SDGE	SDGE	19,637	11,127	0.57	0.0%	0.57
SDGE	SDGE - Pass Through	0	0			
SDGE	**Total**	**19,637**	**11,127**	**0.57**	**0.0%**	**0.57**
	Statewide	***355,101***	***219,808***	***0.62***	***4.2%***	***0.60***

Table A.8 Net First Year Savings (MWh)

PA	Standard Report Group	Ex-Ante Net	Ex-Post Net	NRR	% Ex-Ante Net Pass Through	Ex-Ante NTG	Ex-Post NTG	Eval Ex-Ante NTG	Eval Ex-Post NTG
PGE	PGE	131,207	57,813	0.44	0.0%	0.72	0.53	0.72	0.53
PGE	PGE - Pass Through	0	0						
PGE	**Total**	**131,207**	**57,813**	**0.44**	**0.0%**	**0.72**	**0.53**	**0.72**	**0.53**
SCE	SCE	95,321	48,294	0.51	0.0%	0.69	0.57	0.69	0.57
SCE	SCE - Pass Through	9,531	9,531	1.00	100.0%	0.64	0.64		
SCE	**Total**	**104,851**	**57,825**	**0.55**	**9.1%**	**0.68**	**0.58**	**0.69**	**0.57**
SCG	SCG	0	0						
SCG	**Total**	**0**	**0**						
SDGE	SDGE	12,033	5,564	0.46	0.0%	0.61	0.50	0.61	0.50
SDGE	SDGE - Pass Through	0	0						
SDGE	**Total**	**12,033**	**5,564**	**0.46**	**0.0%**	**0.61**	**0.50**	**0.61**	**0.50**
	Statewide	***248,092***	***121,201***	***0.49***	***3.8%***	***0.70***	***0.55***	***0.70***	***0.54***

Table A.9 Gross First Year Savings (MW)

PA	Standard Report Group	Ex-Ante Gross	Ex-Post Gross	GRR	% Ex-Ante Gross Pass Through	Eval GRR
PGE	PGE	23.6	16.8	0.71	0.0%	0.71
PGE	PGE - Pass Through	0.0	0.0			
PGE	**Total**	**23.6**	**16.8**	**0.71**	**0.0%**	**0.71**
SCE	SCE	20.7	11.5	0.56	0.0%	0.56
SCE	SCE - Pass Through	3.1	3.1	1.00	100.0%	
SCE	**Total**	**23.8**	**14.6**	**0.61**	**13.0%**	**0.56**
SCG	SCG	0.0	0.0			
SCG	**Total**	**0.0**	**0.0**			
SDGE	SDGE	2.6	2.2	0.86	0.0%	0.86
SDGE	SDGE - Pass Through	0.0	0.0			
SDGE	**Total**	**2.6**	**2.2**	**0.86**	**0.0%**	**0.86**
	Statewide	***50.0***	***33.6***	***0.67***	***6.2%***	***0.65***

Table A.10 Net First Year Savings (MW)

PA	Standard Report Group	Ex-Ante Net	Ex-Post Net	NRR	% Ex-Ante Net Pass Through	Ex-Ante NTG	Ex-Post NTG	Eval Ex-Ante NTG	Eval Ex-Post NTG
PGE	PGE	16.9	8.9	0.53	0.0%	0.72	0.53	0.72	0.53
PGE	PGE - Pass Through	0.0	0.0						
PGE	**Total**	**16.9**	**8.9**	**0.53**	**0.0%**	**0.72**	**0.53**	**0.72**	**0.53**
SCE	SCE	14.2	6.6	0.46	0.0%	0.68	0.57	0.68	0.57
SCE	SCE - Pass Through	2.0	2.0	1.00	100.0%	0.64	0.64		
SCE	**Total**	**16.2**	**8.6**	**0.53**	**12.3%**	**0.68**	**0.59**	**0.68**	**0.57**
SCG	SCG	0.0	0.0						
SCG	**Total**	**0.0**	**0.0**						
SDGE	SDGE	1.6	1.1	0.71	0.0%	0.60	0.50	0.60	0.50
SDGE	SDGE - Pass Through	0.0	0.0						
SDGE	**Total**	**1.6**	**1.1**	**0.71**	**0.0%**	**0.60**	**0.50**	**0.60**	**0.50**
	Statewide	***34.7***	***18.6***	***0.54***	***5.8%***	***0.69***	***0.55***	***0.70***	***0.54***

Table A.11 Gross First Year Savings (MTherms)

PA	Standard Report Group	Ex-Ante Gross	Ex-Post Gross	GRR	% Ex-Ante Gross Pass Through	Eval GRR
PGE	PGE	9,674	5,804	0.60	0.0%	0.60
PGE	PGE - Pass Through	0	0			
PGE	**Total**	**9,674**	**5,804**	**0.60**	**0.0%**	**0.60**
SCE	SCE	25	15	0.61	0.0%	0.61
SCE	SCE - Pass Through	0	0			
SCE	**Total**	**25**	**15**	**0.61**	**0.0%**	**0.61**
SCG	SCG	6,623	3,865	0.58	0.0%	0.58
SCG	**Total**	**6,623**	**3,865**	**0.58**	**0.0%**	**0.58**
SDGE	SDGE	1,217	690	0.57	0.0%	0.57
SDGE	SDGE - Pass Through	0	0			
SDGE	**Total**	**1,217**	**690**	**0.57**	**0.0%**	**0.57**
	Statewide	***17,539***	***10,375***	***0.59***	***0.0%***	***0.59***

Table A.12 Net First Year Savings (MTherms)

PA	Standard Report Group	Ex-Ante Net	Ex-Post Net	NRR	% Ex-Ante Net Pass Through	Ex-Ante NTG	Ex-Post NTG	Eval Ex-Ante NTG	Eval Ex-Post NTG
PGE	PGE	6,939	3,076	0.44	0.0%	0.72	0.53	0.72	0.53
PGE	PGE - Pass Through	0	0						
PGE	**Total**	**6,939**	**3,076**	**0.44**	**0.0%**	**0.72**	**0.53**	**0.72**	**0.53**
SCE	SCE	6	9	1.57	0.0%	0.22	0.57	0.22	0.57
SCE	SCE - Pass Through	0	0						
SCE	**Total**	**6**	**9**	**1.57**	**0.0%**	**0.22**	**0.57**	**0.22**	**0.57**
SCG	SCG	3,230	2,203	0.68	0.0%	0.49	0.57	0.49	0.57
SCG	**Total**	**3,230**	**2,203**	**0.68**	**0.0%**	**0.49**	**0.57**	**0.49**	**0.57**
SDGE	SDGE	651	345	0.53	0.0%	0.53	0.50	0.53	0.50
SDGE	SDGE - Pass Through	0	0						
SDGE	**Total**	**651**	**345**	**0.53**	**0.0%**	**0.53**	**0.50**	**0.53**	**0.50**
	Statewide	***10,825***	***5,633***	***0.52***	***0.0%***	***0.62***	***0.54***	***0.62***	***0.54***

APPENDIX AC RESPONSE TO RECOMMENDATIONS

EM&V Impact Study Recommendations
Study Title: 2015 Custom Impact Evaluation
Study Manager: CPUC

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
1	PG&E, SCE, SDG&E, SCG	7.1.1	Out of 148 M&V points, 30 projects, or 20 percent of the sample, had a GRR of zero or lower.	PAs should improve program eligibility requirements, manuals, training, and quality control procedures in order to screen out ineligible projects. A more thorough PA review of ex-ante documentation for eligibility and program rules is needed. Screening should focus on the following issues identified in Chapter 4: improved attention to ISP determinations and their effective dates, assurance that impacts are realized on the grid where on-site generation is present, removal of projects that involve like-for-like replacements, and demonstration that qualifying program measures exceed code-based energy efficiency requirements associated with original construction or subsequent upgrades.		
2				Regarding eligibility, the PAs should clearly document the energy efficiency action that is being performed and ensure that program rules are followed. Projects should have an identifiable and documented case for energy efficiency claims and application documentation should adequately explain how a given project saves energy.		

[1] Unique recommendations that have not appeared in previous evaluation reports are marked with a double asterisk (**).

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
3	PG&E, SCE, SDG&E, SCG	7.1.1	Out of 148 M&V points, 30 projects, or 20 percent of the sample, had a GRR of zero or lower.	PAs should screen measures for eligibility, including removal of maintenance measures and assurance that projects meet program eligibility performance thresholds.		
4				The PAs should adjust the set of qualifying measures/technologies that are eligible for incentives and annually review the list of qualifying measures for each program to eliminate eligibility for those that became standard practice.		
5				The PAs should carefully review each of the 30 FSRs listed in Section 4.4.2, Table 4-6, to identify the specific reasons that led to zero or negative savings, and use those lessons learned to improve related project practices. An array of different factors led to very low site-level GRRs, but some common reasons include: like-for-like replacement of equipment, improper application of ISP, improper application or interpretation of code requirements, baseline specifications that do not meet post-installation service requirements and conditions, calculations that include errors, lack of validation of equipment specifications and modeled performance, and failure to apply the non-regressive baseline rule.		
6				The PAs should make greater efforts to address the same types of projects that received low GRRs in this evaluation, given the significant downward effect that these projects had on the resulting lifecycle ex-post gross savings estimates.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
7	PG&E, SCE, SDG&E, SCG	7.1.1	There were a number of cases where ISP or code-based baseline determination rendered a project ineligible.	The PA's project eligibility treatment suggests that the PA's internal communication and coordination efforts for disseminating, implementing and overseeing implementation of CPUC guidance should be improved.		
8				To improve project eligibility screening the PAs should ensure that incented measures exceed the ISP / code baseline. As such, it is important that the PAs spend adequate time documenting the appropriate project type and project baseline when establishing eligibility. The PAs should examine Appendix F, which includes a list of every project where the evaluation overturned the PA specified project type or baseline type.		
9				**PAs should push participating customers to higher levels of efficiency in order to build in a savings buffer above ISP/code/non-regressive baselines and thereby have greater assurance of project eligibility and achievement of ex-ante saving claims.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
10	PG&E, SCE, SDG&E, SCG	7.1.2	For the majority of projects included in the evaluation gross impact sample the ex-post evaluation used a different model or adjusted the PA ex-ante model. Furthermore, the evaluators used different inputs and assumptions for the majority of projects in the sample. In some cases, the PA did not properly take into account key factors that may impact the savings such as weather/seasonality/production normalization. Generally, models needed to be adjusted because the PAs did not properly account for CPUC policy and guidance, previous EAR guidance, and standard evaluation practices.	PAs should continue to review and improve impact methods and models through review of evaluation results, industry best practices, and collaboration with the CPUC's ex-ante review process. The PAs and their subcontractors should review the methods and models used in this evaluation for projects that were identified as needing improvements to ex-ante calculation approaches. PAs should continue to improve their modeling approaches through systematic review and assessment of approaches developed and used internally, by third parties, by professional organizations, and by programs in other jurisdictions. CPUC guidelines should be followed, including the estimation of savings when non-IOU supplied energy sources are used, such as performing hourly net grid impact analysis. In addition, the PAs should continue to work closely and collaboratively with the CPUC's ex-ante review process to assess and agree on modeling approaches based on the results of ex-post evaluation and ongoing ex-ante review.		
11				The evaluation team recommends that the PAs provide their implementers and/or customers with the most current, standardized or CPUC-approved calculation tools. Calculations should be developed using proven tools.		
12				Further, the PAs should include in each application file the live, unlocked, non-password protected spreadsheet models. The PAs should ensure the final model is stored in each file and record key model inputs and outputs, documented using data or observed conditions.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
13	PG&E, SCE, SDG&E, SCG	7.1.2	For the majority of projects included in the evaluation gross impact sample the ex-post evaluation used a different model or adjusted the PA ex-ante model. Furthermore, the evaluators used different inputs and assumptions for the majority of projects in the sample. In some cases, the PA did not properly take into account key factors that may impact the savings such as weather/seasonality/production normalization. Generally, models needed to be adjusted because the PAs did not properly account for CPUC policy and guidance, previous EAR guidance, and standard evaluation practices.	PAs should carefully review ex-ante savings claims, inputs, and calculation methods. Ex-ante savings estimates and calculation methods should be more thoroughly reviewed and approved by PA technical staff prior to finalization of incentives and savings claims. These reviews by knowledgeable technical staff can help ensure reliable and accurate impact estimation.		
14				PAs should conduct periodic due diligence to ensure programs adhere to PA and CPUC impact estimation policies, guidelines, and best practices. Given the multitude of non-utility and utility programs, the PAs should consider interventions such as increased training and project scrutiny to ensure the most accurate savings claims consistent with eligibility, baseline and program rules. In addition, the PAs should continue to work collaboratively with the CPUC's ex-ante review process and look for ways to leverage lessons learned from that process to implement their own internal ex-ante review of third party programs.		
15				**The PAs should prioritize M&V reviews for all large projects. Based on the distribution of custom projects by size observed in 2015 a census of large projects in strata 1-3 ranges by PA from just a handful or projects to less than 50, and represents roughly 40 to 60 percent of ex-ante savings claims. The purpose would be to ensure that CPUC M&V standards are being met for the treatment and documentation of program ex-ante savings. This would reduce risk to ex-ante claims, and should focus on proper baseline documentation, appropriate eligibility screening, CPUC-approved M&V planning and implementation, and the development of robust and accurate savings estimation models and results.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
16	PG&E, SCE, SDG&E, SCG	7.1.2	For the majority of projects included in the evaluation gross impact sample the ex-post evaluation used a different model or adjusted the PA ex-ante model. Furthermore, the evaluators used different inputs and assumptions for the majority of projects in the sample. In some cases, the PA did not properly take into account key factors that may impact the savings such as weather/seasonality/production normalization. Generally, models needed to be adjusted because the PAs did not properly account for CPUC policy and guidance, previous EAR guidance, and standard evaluation practices.	**For certain applications, such as where the baseline is represented by the pre-existing equipment and pre- to post-installation conditions are stable, PA use of an IPMVP Option B or C regression model may be preferable to other calculation-based approaches. Regression models should also account for all non-routine adjustments, as facilities often undergo changes unrelated to program efficiency-based improvements, and savings estimates should be normalized for production and weather differences. It is also critical that the measure-impacted accounts be properly identified and used in regression models. Regressions may serve to better bound the savings and may also be used as a sanity check of results derived using other calculation approaches. – **Regression models should be informed by longer duration trend data whenever feasible. – **For regression models involving both energy consumption data and production data (i.e., energy intensity), a variety of models should be attempted using differing time intervals, such as daily versus hourly, in order to identify model-based estimates with the best fit regression curve. – **Where regression models are used the R squared values should be 0.70 or higher and the CV(RMSE) values should be lower than 15 to 20%.		
17				**For NRNC whole-building projects the PAs should use the non-compliance mode to estimate savings and compliance mode to demonstrate project eligibility.		
18				**The PAs should review all modeling weaknesses and areas for improvement noted in Section 4.5.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
19	PG&E, SCE, SDG&E, SCG	7.1.2	Key inputs and observations, when available, based on ex-ante field verification, installation reports and M&V, were sometimes not subsequently incorporated within the ex-ante impact models.	**The PAs should calibrate models and true-up savings based upon post-installation data, such as equipment usage profiles, equipment specifications, production records and model inputs. The PAs should also make better use of available post-installation M&V data, including measured usage data and model inputs such as temperature settings and equipment operating schedules. Metering, EMS and SCADA data should be used to confirm or derive model inputs, such as operating conditions, and to calibrate models. – **Calculated savings should be based on robust data sets representing longer-term and stable operation of equipment and systems. PAs should collect appropriate trend data that demonstrate typical operation, and ensure that M&V data used to estimate ex-ante savings estimates properly account for variation in weather, seasonality, equipment performance and production schedules/operations. Where variability is present, PAs should wait to claim savings until a more confident savings estimate, based on typical operation, has been developed. – **For pump efficiency improvement projects, historical energy usage and production data should be used to derive estimates of kWh/acre-foot and OPE. – **PAs should encourage participating customers to collect and retain data for purposes of conducting project-level M&V, especially where instrumentation is available. – **In the absence of trend data PAs should alternatively use manufacturer equipment specifications to inform calculation inputs. – **Where M&V data collection is infeasible or impractical, inputs and assumptions should be based on conservative assumptions.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
19 (cont.)	PG&E, SCE, SDG&E, SCG	7.1.2	Key inputs and observations, when available, based on ex-ante field verification, installation reports and M&V, were sometimes not subsequently incorporated within the ex-ante impact models.	– **PA models should use custom rather than deemed variables in calculations where inconsistencies exist between project conditions and assumptions that define the deemed calculation approach.		
20				Regarding peak demand analysis, adopt CPUC protocols and procedures as they relate to the DEER-based California climate zone peak period definition. Peak impact estimates should reflect loads during the California climate zone three-day period. Calibration considerations noted above apply also to peak, including the use of post-installation M&V power data that best represents the coincident peak period.		
21	PG&E, SCE, SDG&E, SCG	7.1.3	There was generally good agreement on project baseline when comparing PA and evaluator selections (72 percent agreement across all PAs and projects). However, there was less agreement surrounding project type designations (58 percent agreement), which should be used as a determining factor for proper baseline selection. Add-on, new construction and ROB projects were the most commonly overturned project types across all PAs, followed by ER.	Increase efforts to ensure conformance with CPUC baseline policies and make a greater effort to examine existing equipment RUL. The PAs should mount a concerted effort to adopt baseline specification practices in conformance with Decision 11-07-030 and CPUC policy. Conformance with these guidelines and accurate specification and documentation of project baseline type, such as early retirement, normal replacement, replace on burnout, system optimization, new construction, and add-on measures would eliminate many of these issues. The PAs should amend program rules to eliminate incentive eligibility for measures that are not more efficient than code or ISP (or what would otherwise be required to meet performance requirements). Careful consideration must be given to avoid regressive baselines (baselines that are less efficient than current operations), as well as properly validating that installed measures do not entail like-for-like replacements from an efficiency perspective. If the efficiency of the pre-existing equipment is higher than the otherwise accepted replacement equipment baseline, then the PAs should select the pre-existing equipment as the baseline.		

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22	PG&E, SCE, SDG&E, SCG	7.1.3	There was generally good agreement on project baseline when comparing PA and evaluator selections (72 percent agreement across all PAs and projects). However, there was less agreement surrounding project type designations (58 percent agreement), which should be used as a determining factor for proper baseline selection. Add-on, new construction and ROB projects were the most commonly overturned project types across all PAs, followed by ER.	PA remaining useful life (RUL) documentation in project application files should be a continued area of focus. For appropriate selection of baseline, RUL assessment is needed for all projects except capacity expansion and new construction projects. For example, RUL assessment of add-on projects is used to examine the expected remaining life of the host equipment, for the purposes of setting EUL for the add-on measure. RUL is also needed to establish ROB and NR determination. For all early replacement (ER) projects, the PAs should provide and clearly document the RUL of the pre-existing equipment, in order to establish whether or not the removed system would fail. The PAs should carefully review the evidence collected to estimate the RUL for all early retirement applications. The PAs must also conduct appropriate due diligence to ensure that for an ER project the current removed system would be able to meet the service requirements of the newly installed program equipment and that failure of the replaced equipment is not imminent.		
23				Clearly identify project event in terms of natural replacement, replace on burnout, early replacement, new construction, add-on equipment, and system optimization, and set the appropriate baseline accordingly. Realistic baselines based on code, current industry standard practices, or pre-existing equipment (with an associated RUL) should be clearly identified, supported and documented. If a claim is made for program-induced early retirement of functioning equipment, claims should include documentation of the remaining useful life (RUL) of the equipment replaced and the baseline used for the post-RUL period.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
24	PG&E, SCE, SDG&E, SCG	7.1.3	There was generally good agreement on project baseline when comparing PA and evaluator selections (72 percent agreement across all PAs and projects). However, there was less agreement surrounding project type designations (58 percent agreement), which should be used as a determining factor for proper baseline selection. Add-on, new construction and ROB projects were the most commonly overturned project types across all PAs, followed by ER.	Disseminate information on baseline selection to ensure best practices across program staff, implementers and customers. The PAs should provide their program staff, implementers and customers with the most current industry standard practice (ISP) studies and the CPUC's guidance documentation. This will help better align the PA's baseline selection with the CPUC's directives. Furthermore, PAs should conduct independent research for the purposes of identifying project-level ISP baseline and provide a comprehensive narrative backed up by data that correctly identifies ISP.		
25				**Appropriate interpretation and application of code requirements is needed, including the need to consider and possibly examine a broad array of codes and requirements that may be relevant for a given project. During the last decade of evaluations in California, baselines have been defined using local codes, regional codes, state codes and federal codes, spanning energy-based requirements, safety requirements, and air or water/wastewater quality requirements, as well as facility service and functionality requirements. During application review the PAs should carefully consider all relevant code requirements and update ISP and other baseline determinations for relevant measures.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
26	PG&E, SCE, SDG&E, SCG	7.1.3	Choosing a proper baseline requires systematic examination of a number of factors. Evaluation efforts led to a number of cases where PA baseline selection was overturned.	The PAs need to do a better job of ensuring that baseline equipment specifications are capable of meeting post-installation operating requirements, that the baseline selected is consistent with the project type, and that regressive baseline considerations are examined. The evaluation team recommends that for all capacity expansion projects, the PAs ensure that the baseline equipment meet the post-install operating and production capacities. In-situ equipment (unless it is above code or ISP) is an invalid baseline to calculate energy savings for normal replacement (NR), replace-on-burnout (ROB), capacity expansion and new construction (NC) projects.		
27				**PAs should demonstrate the availability of selected baseline equipment when establishing ISP. Ordinarily this would include obtaining quotes for available new, less efficient, but functionally equivalent equipment (baseline). A careful examination is warranted to establish design options that are available to the customer, and to establish that the program-supported equipment solution is a legitimate high efficiency action. PAs should demonstrate that baseline equipment selected represent a feasible option, given facility constraints and production needs.		
28				**Where applicable, the PAs need to carefully investigate and document the age, condition and functionality of existing equipment and operations, and use these to establish proper baselines. Furthermore, when baseline conditions are defined by the pre-existing systems the PAs should utilize measured data to define those conditions where possible, select a representative baseline period, and thoroughly document the pre-existing conditions for the purposes of establishing baseline. This is also relevant for ER claims. For ER claims preponderance of evidence should be used to accept or reject program induced early retirement. Existing equipment efficiency levels are needed to address regressive baseline policy.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
29	PG&E, SCE, SDG&E, SCG	7.1.4	Evaluated operating conditions were often found to be different than described in program project documentation. Per evaluation guidelines, measures are evaluated as-found, and the ex-post savings analyses were performed for the as-observed/verified conditions, including back-casting where relevant to inform current operations, and did not include any forecasting. The evaluation found that all PAs did not make adequate use of ex-ante data to inform operating conditions. For SDG&E operating conditions accounted for about one-third of all downward adjustments to ex-ante claims, but was less important for the other PAs.	Increase focus on: a) accuracy of operating conditions, b) use of pre- and post-installation data and information, and c) keeping project documentation and tracking claims up to date with field information. The PAs should ensure the use of site-specific inputs whenever possible. This includes use of trend data to generate performance curves and estimate power consumption. Also, assumptions used should reflect conservative values supported by strong evidence from secondary sources. PAs should increase the use and improve incorporation of, data collection and monitoring to ensure a meaningful and accurate set of inputs or assumptions surrounding operations. Post-retrofit inspections should fully incorporate verification of measures, proper installation and operation, and any observed or otherwise known changes or deficiencies. PA staff should check that pre-installation and post-installation reports are well organized and complete, with measure counts, changes in operation, efficiency values, and operating parameters.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
30	PG&E, SCE, SDG&E, SCG	7.1.4	Evaluated operating conditions were often found to be different than described in program project documentation. Per evaluation guidelines, measures are evaluated as-found, and the ex-post savings analyses were performed for the as-observed/verified conditions, including back-casting where relevant to inform current operations, and did not include any forecasting. The evaluation found that all PAs did not make adequate use of ex-ante data to inform operating conditions. For SDG&E operating conditions accounted for about one-third of all downward adjustments to ex-ante claims, but was less important for the other PAs.	The PAs should ensure that savings calculations are based on actual equipment-use schedules and reflect any changes to the post-installation operating parameters (such as flow rates, temperatures and set points, system pressures, production rates, and power measurements). The PAs should always include a quality control check on equipment operating hours, operational parameters and production levels, and ensure that data used to derive operating profiles is adequately representative of all operating conditions. Consideration should be given to selecting an appropriate and representative time period to use for data collection and savings determination. For example, operating hours used in calculations should reflect observed conditions via verification and M&V. Additional due diligence in this area is needed when loads are variable, including projects with seasonal variation in production and operations. Increased use of selective parameter measurement using uncertainty analysis and short term monitoring is also recommended.		
31				Another key issue is that evaluators discover that the production period used in updating ex- ante savings after equipment installation is often too short (one week or less) and not typical of the production or operating variations that the equipment will be subject to over the course of a year. To help mitigate this issue, the PAs should wait for measure operation to stabilize and become typical prior to truing-up the ex-ante models and making a savings claim.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
32	PG&E, SCE, SDG&E, SCG	7.1.4	Evaluated operating conditions were often found to be different than described in program project documentation. Per evaluation guidelines, measures are evaluated as-found, and the ex-post savings analyses were performed for the as-observed/verified conditions, including back-casting where relevant to inform current operations, and did not include any forecasting. The evaluation found that all PAs did not make adequate use of ex-ante data to inform operating conditions. For SDG&E operating conditions accounted for about one-third of all downward adjustments to ex-ante claims, but was less important for the other PAs.	As stated in previous evaluation cycles, the PAs should use longer-term pre- and post-installation M&V activities and true-up the savings estimates to reflect observed measure operation. The PAs should also normalize for production fluctuations (and other variables like weather where applicable) between pre- and post-installation periods. In some cases, PAs should delay claiming energy savings for projects if the installation is not complete or if operations are very unstable or unrepresentative of expected ex-post conditions. The PAs should also ensure that savings estimates are always updated in the project documentation and tracking systems when operation conditions are found to have significantly changed. **Measures such as agricultural pumps require lengthier trend data sources, given that operations can be greatly affected by weather, including drought conditions, and water availability.		
33				For projects entailing the use of simulation models, models should be re-run after the equipment is commissioned and building loads represent steady state operation. **For new construction projects associated with either tenant improvements or new buildings, PAs should wait to file claims once the project is fully built out and occupied. A certificate of occupancy can be used to inform the timing of claims. CPUC evaluation guidance is to model savings based on the as-found conditions.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
34	PG&E, SCE, SDG&E, SCG	7.1.4	Evaluated operating conditions were often found to be different than described in program project documentation. Per evaluation guidelines, measures are evaluated as-found, and the ex-post savings analyses were performed for the as-observed/verified conditions, including back-casting where relevant to inform current operations, and did not include any forecasting. The evaluation found that all PAs did not make adequate use of ex-ante data to inform operating conditions. For SDG&E operating conditions accounted for about one-third of all downward adjustments to ex-ante claims, but was less important for the other PAs.	PAs should ensure incorporation of needed aspects of pre- and post-installation review, as specifically related to operating conditions, into program manuals by addendum and in their next revisions. PAs should delineate expectations for post-retrofit inspection paperwork and require inspectors to identify, collect and record pertinent measure operating parameters, as well as quantities in both pre-installation and post-installation efforts. PAs should consider holding multiple trainings, regularly (e.g., quarterly), with internal staff, implementers, and PA technical reviewers, to ensure improvement and enhanced documentation. Examples of thorough, complete pre- and post-installation reports could be provided in order to set standards for acceptable data collection and reporting, and thereby work to ensure comprehensive and consistent M&V practices well beyond a cursory verification that new equipment was present at a given site.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
35	PG&E, SCE, SDG&E, SCG	7.1.5	Both the Chapter 4 gross impact and Chapter 6 PPA results, including trends from recent evaluations, generally do not point to PA improvement. Project ex-ante treatment shows a lack of attention to CPUC guidance, decisions, previous evaluation results, ex-ante review-based directives, and adequate use of documentation and data-derived calculation methods and inputs. Even some of the largest projects demonstrate a lack of due diligence.	It is recommended that a statewide document, similar to the PPA form, be developed for use by all PAs for custom claims. The project practices assessment (PPA) forms developed by the evaluation team provide a very structured and methodical way of examining energy efficiency measure claims. The PAs go through a similar process but perhaps in a less systematic way, and improvements to forms and processes should have a positive outcome on results. In addition to the form itself, Appendix E provides detailed descriptions of PPA scoring criteria that will help PAs ensure they are adequately capturing and documenting the relevant information. The evaluation team believes that this approach will help PAs improve their GRRs and documentation, especially through more careful consideration of first-order factors affecting project eligibility and project baselines.		
36	PG&E, SCE, SDG&E, SCG	7.2	Program influence was low in many cases for a number of different reasons. In some cases, program claims were made on a number of projects that customers initiated primarily for non-energy savings reasons and for which no alternative was ever considered. There were also instances where incentives were provided to firms that were already very advanced in their adoptions of energy efficiency, such as water/wastewater plants, and companies with established energy efficiency procurement policies or mandates, including national chain and big box stores.	Adopt procedures to identify and affect projects with low program influence. The PAs should carefully review projects during the project development stage for potential issues associated with a high likelihood of very low program influence. This process should provide timely feedback to program implementers regarding the estimated level of program influence. This would afford implementers an opportunity to influence projects found to have low program attribution by encouraging project decision makers to adjust the project scope to higher efficiency levels, where warranted.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
37	PG&E, SCE, SDG&E, SCG	7.2	Program influence was low in many cases for a number of different reasons. In some cases, program claims were made on a number of projects that customers initiated primarily for non-energy savings reasons and for which no alternative was ever considered. There were also instances where incentives were provided to firms that were already very advanced in their adoptions of energy efficiency, such as water/wastewater plants, and companies with established energy efficiency procurement policies or mandates, including national chain and big box stores.	Adjust the set of technologies that are eligible for incentives. Periodically review the list of qualifying measures for each program and eliminate eligibility for those that have become standard practice. At a minimum, such reviews should take place annually. Measures that are already likely or very likely to be typically installed should not qualify for incentives. Although identification of such measures can be difficult in practice in the industrial sector, a number of such measures can be identified through investigation of industry practices (for example, interviews with manufacturers, distributors, retailers, and designers), analysis of sales data, and review of evaluation results. In determining which measures to retain and which to eliminate, a balance must be struck between reducing free ridership and avoiding significant lost opportunities. Ideally, sub-technology niche markets can be selected for the program that are less well established, but where substantial technical potential still lies. In addition, program implementers should actively highlight and promote technologies that are less well-adopted, cutting edge, or emerging technologies. Such measures are much less likely to be prone to high free ridership. Another option is to use a comprehensive rather than a prescriptive approach to discourage free ridership. For example, for water-wastewater plants, implementing a comprehensive new construction approach and requiring the project to reach a minimum savings threshold (such as 15 percent) is less likely to be prone to high free ridership than a measure-level approach.		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
38	PG&E, SCE, SDG&E, SCG	7.2	Program influence was low in many cases for a number of different reasons. In some cases, program claims were made on a number of projects that customers initiated primarily for non-energy savings reasons and for which no alternative was ever considered. There were also instances where incentives were provided to firms that were already very advanced in their adoptions of energy efficiency, such as water/wastewater plants, and companies with established energy efficiency procurement policies or mandates, including national chain and big box stores.	Adopt procedures to limit known free riders by upselling to higher efficiency levels, multi-measure solutions and continuous energy improvement. One way to accomplish this is to conduct screening for high free ridership on a project-by-project basis. In cases where likely high free ridership is found, the program implementer should encourage such customers to move to a higher level of efficiency or encourage a bundled retrofit to ensure deeper savings. Either of these options could result in funding a project that would not have been implemented absent the program. Another option is for the program to set the threshold for incentive eligibility higher across-the-board so that all such projects will need to meet a higher efficiency threshold to qualify. One way to assess the rate of free ridership likely on a given project is to critically examine the key reasons behind the project before the incentive is approved. For example: – Has the project already been included in the capital or operating budget? Has the equipment already been ordered or installed? – Is the measure one that the company or other comparable companies in the same industry/segment routinely installs as a standard practice? Is the measure installed in other locations, without co-funding by incentives? Is the measure potentially ISP? – Is the project being done primarily, or in part, to comply with regulatory mandates (such as environmental regulations)? – Are the project economics already compelling without incentives? Is the rebate large enough as a share of incremental costs to make a difference in whether or not the project is implemented?		

ID		Section	Conclusion	Recommendation[1]	Disposition (Accepted, Rejected, or Other)	Disposition Notes (e.g. Description of specific program change or Reason for rejection or Under further review)
38 (cont.)	PG&E, SCE, SDG&E, SCG	7.2	Program influence was low in many cases for a number of different reasons. In some cases, program claims were made on a number of projects that customers initiated primarily for non-energy savings reasons and for which no alternative was ever considered. There were also instances where incentives were provided to firms that were already very advanced in their adoptions of energy efficiency, such as water/wastewater plants, and companies with established energy efficiency procurement policies or mandates, including national chain and big box stores.	– Is the company in a market segment that is ahead of the curve on energy efficiency technology installations? Is it part of a national chain that already has a mandate to install the proposed technology? – Does the proposed measure have substantial non-energy benefits? Is it largely being considered for non-energy reasons (such as automation of a manual process, improved product quality, reduced labor costs, or increased production)? – Is there a fungible efficiency element of the project, that is, is the equipment available only at a single bundled efficiency level, e.g., as could be the case with a highly specialized piece of process equipment? Related to this, if efficiency level is a malleable attribute of the project, were the costs and benefits of different levels of efficiency considered and quantified? By conducting a brief interview regarding these issues before the incentive is approved, the implementer can better assess the likely degree of free ridership and may be able to then decide if the project should be excluded or substantially re-scoped to a higher efficiency level.		

APPENDIX B DETAILED PROGRAM ADMINISTRATOR RESULTS AND SITE SPECIFIC GRR AND NTGR RESULTS

B.1 DETAILED PROGRAM ADMINISTRATOR RESULTS

The following sections provide program administrator-specific results as a compliment to the statewide exhibits presented in Chapter 4.

B.1.1 Ex-Ante vs. Ex-Post Savings Estimates by Fuel Type and PA

Figure B-1 through Figure B-4 graphically display MMBtu-based ex-post versus ex-ante *lifecycle* savings estimates for each PAs' M&V sample points. The figures compare the ex-ante (tracking system) MMBtu estimates[1] with the ex-post evaluated MMBtu estimates for M&V sample points. Each point represents an individual project and the fuel type of each project is specified (electric, gas, or mixed fuel – electric and gas). The chart also includes a unity line, which divides the results into those in which the project-specific realization rates are above 1.0 (sites above the line) and below one (sites below the line). All 148 projects are included in the figures (PG&E = 42, SCE = 43, SDGE = 33, and SCG = 30).

[1] This figure compares "engineering estimates" for both ex-ante MMBtu and ex-post MMBtu. That is, if the PA-claimed ex-ante savings for a record include the PA RR=0.9 adjustment, that adjustment was removed for the purpose of this comparison.

FIGURE B-1: PG&E EX-ANTE VS. EX-POST MMBTU-BASED SAVINGS ESTIMATES BY FUEL TYPE

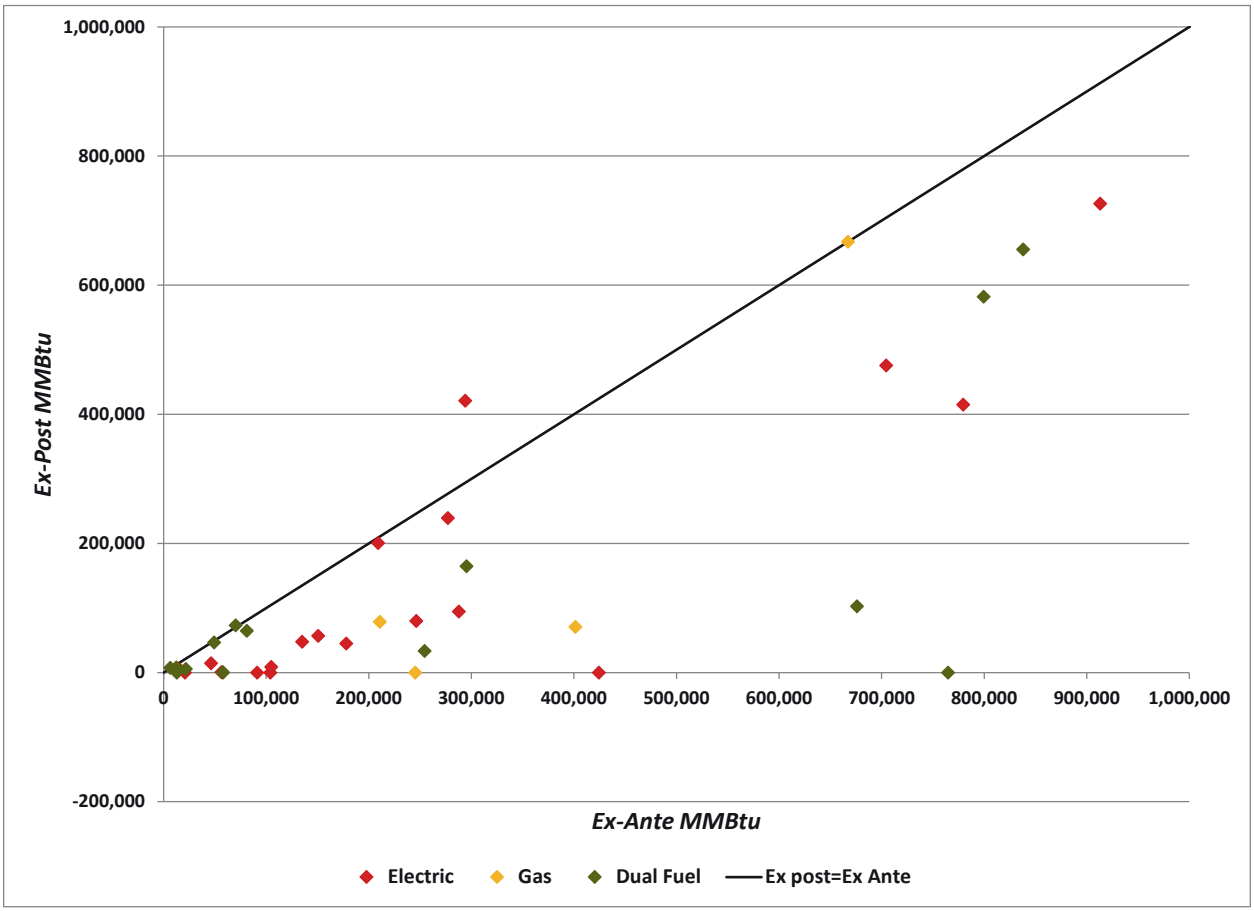


FIGURE B-2: SCE: EX-ANTE VS. EX-POST MMBTU-BASED SAVINGS ESTIMATES

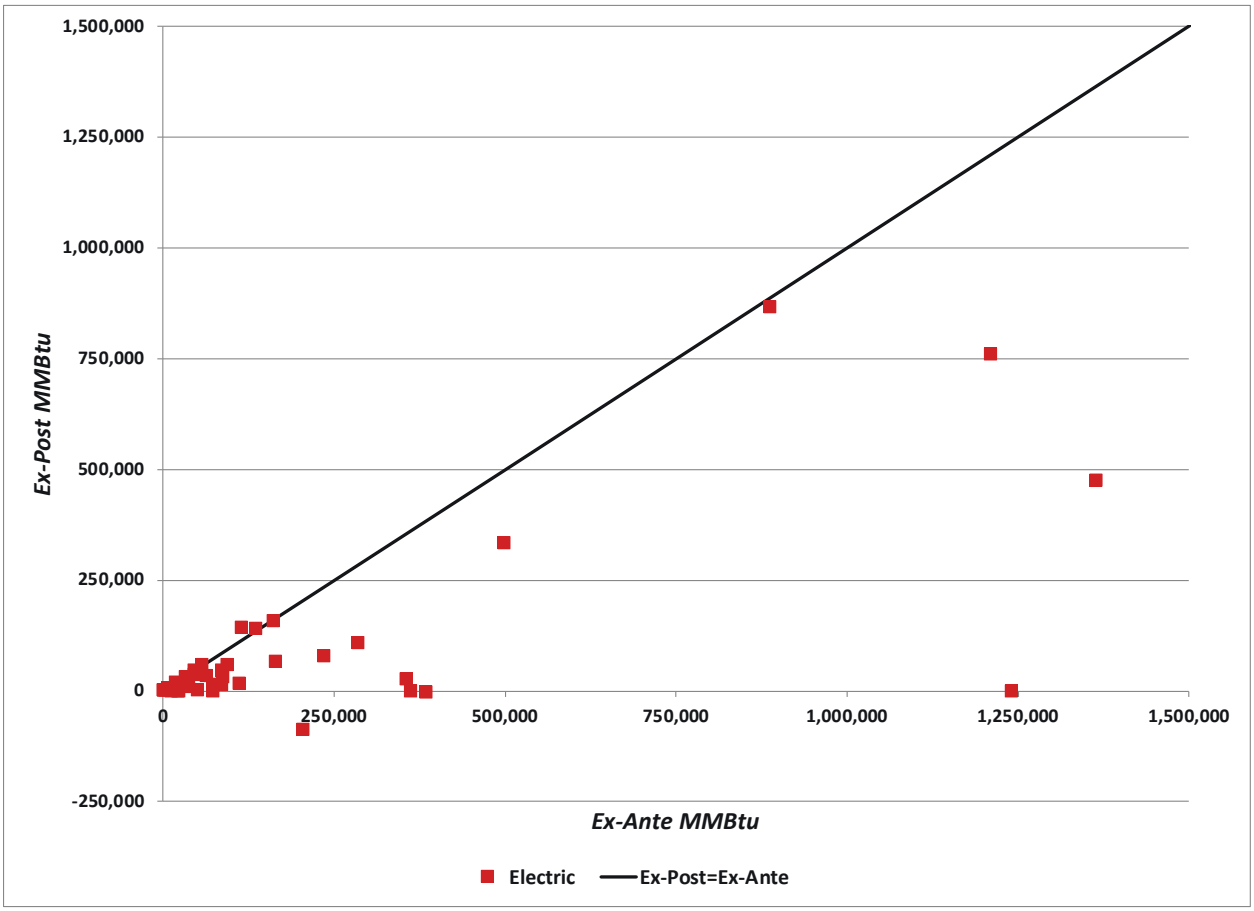


FIGURE B-3: SDG&E EX-ANTE VS. EX-POST MMBTU-BASED SAVINGS ESTIMATES BY FUEL TYPE

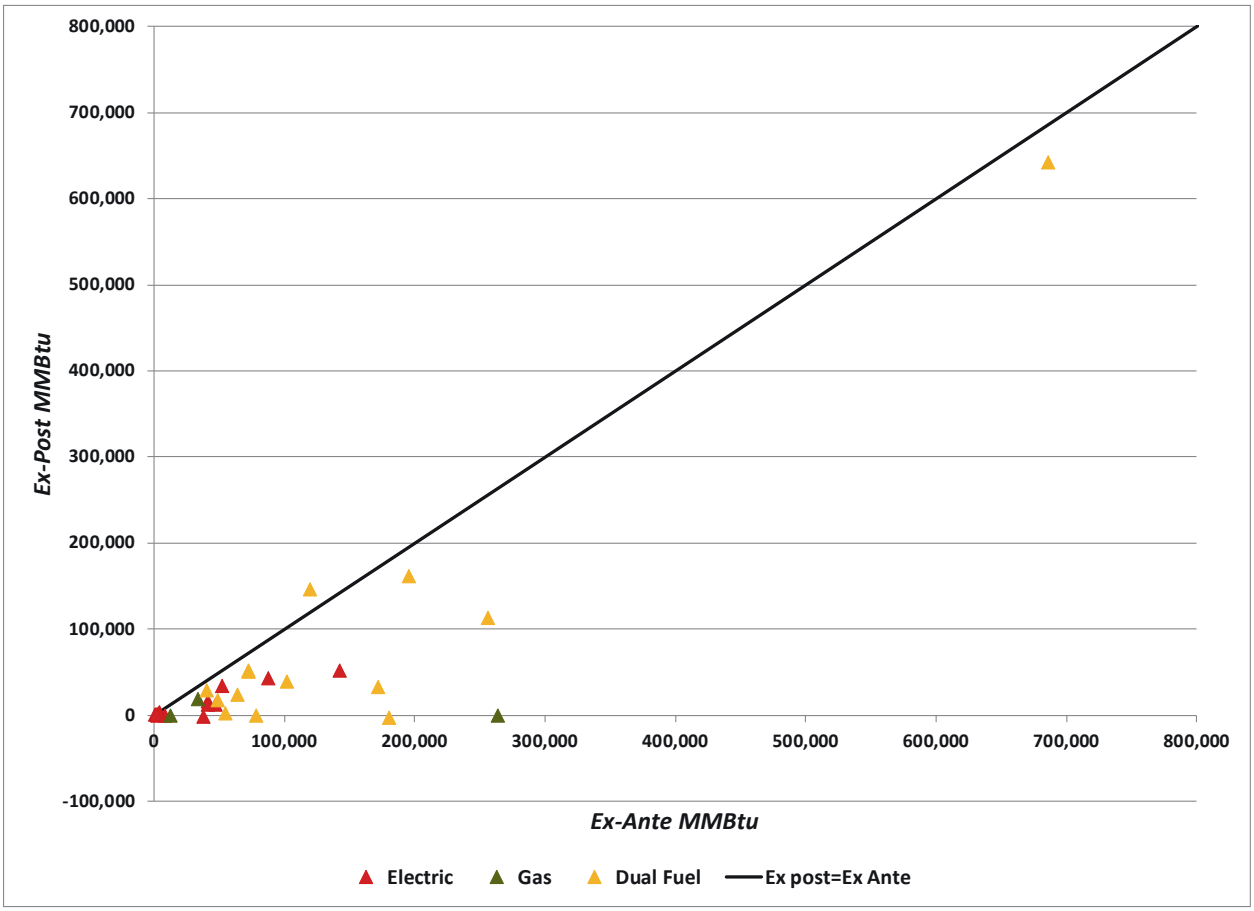
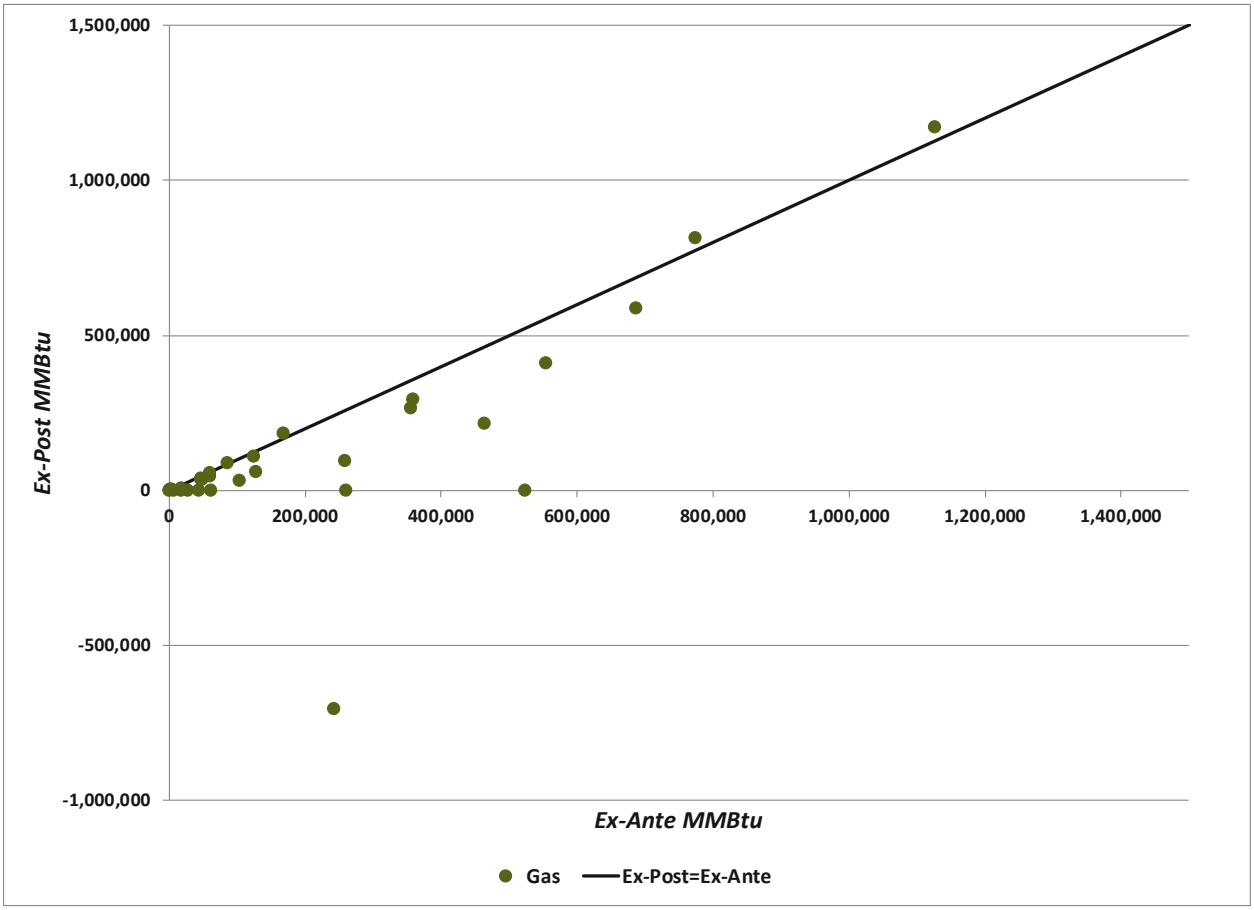


FIGURE B-4: SCG: EX-ANTE VS. EX-POST MMBTU-BASED SAVINGS ESTIMATES

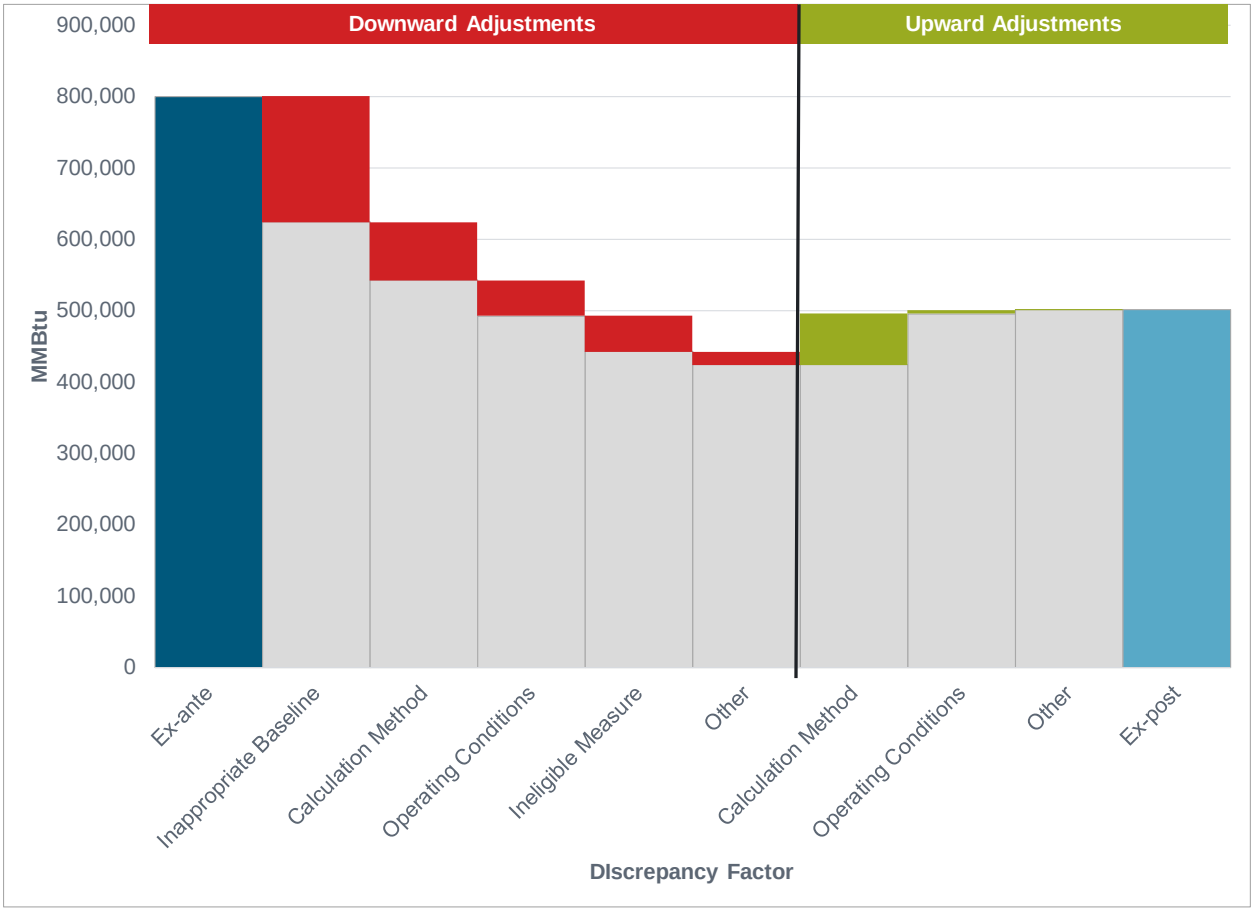


B.2 DISCREPANCY ANALYSIS

As described in Chapter 4, when ex-post gross impacts for a sampled project were found to be different than the PA ex-ante impacts, the evaluation documented the associated discrepancy factors. For some projects there was only one factor (e.g. the PA calculation method was not appropriate, and another, more appropriate method was used for evaluation) while for others there were multiple factors (e.g. ex-post operating hours observed in the field were different than the number of hours documented in project paperwork *and* the number of measures installed was also different than that reported). Ultimately, individual discrepancy factors were classified into seven categories: operating conditions, calculation method, inappropriate baseline, ineligible measure, inoperable measure, measure count, and tracking database discrepancy.

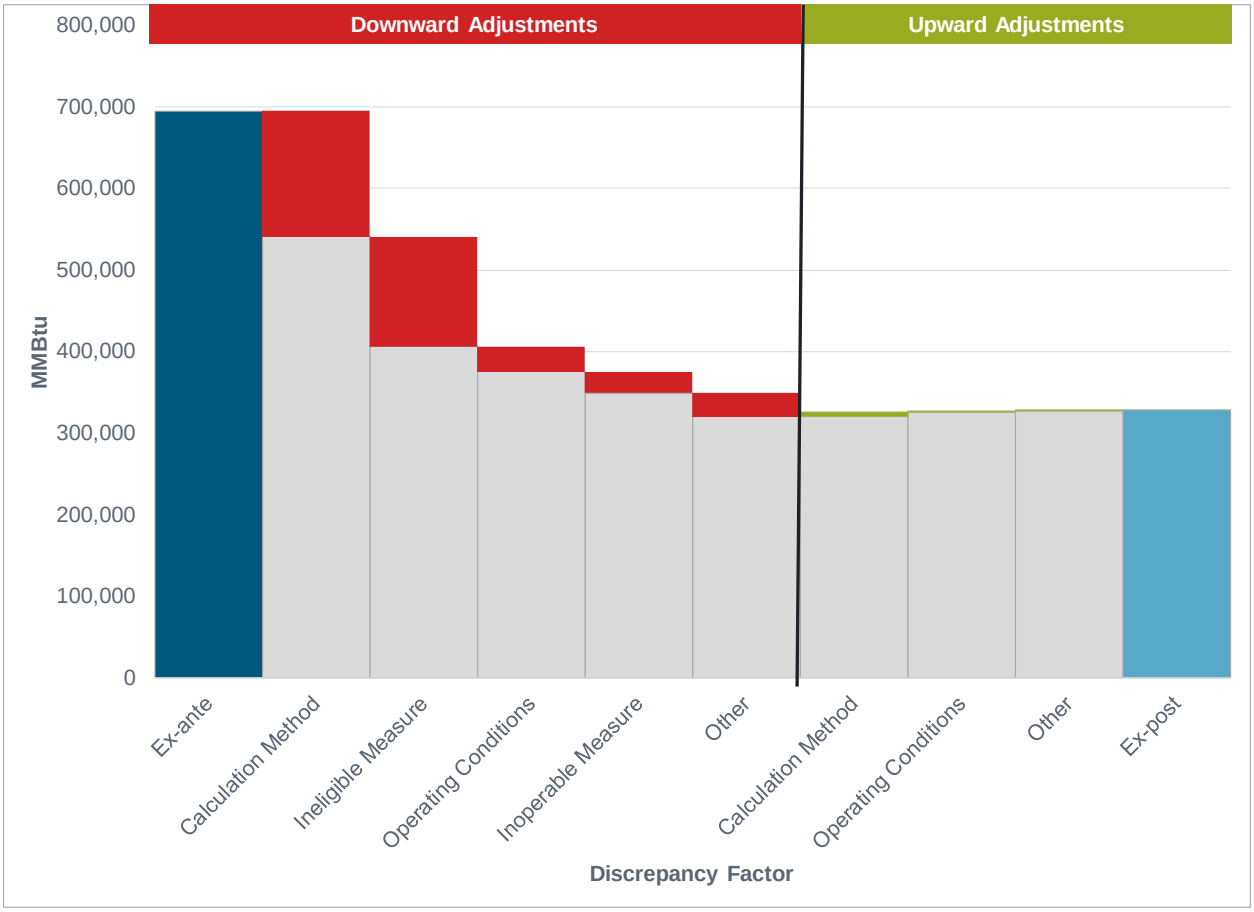
Given multiple tracking records associated with some projects, 188 records associated with the impact sample of 148 projects were examined (2.3 Million MMBtu ex-ante savings). Across all PAs, the evaluation found no discrepancies for 14 records (0.1 MMBtu ex-ante savings were not adjusted.) For the balance of 174 records and 2.2 MMBtu ex-ante savings, ex-post estimates were different from ex-ante MMBtu estimates. For some records only downward adjustments were observed, while in others only upward adjustments were observed, and in some instances both downward and upward adjustments were applied. A summary of these adjustments is presented for each PA in Figure B-5 through Figure B-8. Figure B-5 shows that the most substantial downward adjustments for sampled PG&E projects were for inappropriate baseline (-22 percent), calculation methods (-10 percent), and operating conditions (-6 percent). Altogether, the downward discrepancies for PG&E sampled projects led to a 47 percent reduction in ex-ante savings estimates, while the upward discrepancies accounted for a 10 percent boost, resulting in a net downward adjustment of 37 percent.

FIGURE B-5: EX-POST UPWARD AND DOWNWARD ADJUSTMENTS TO EX-ANTE MMBTU FOR SAMPLED PROJECTS - PG&E



For sampled SCE projects, Figure B-6 shows that the most substantial downward adjustments were for calculation methods (-22 percent), and ineligible measures (-19 percent), with the remaining issues making up a -4 percent each. The downward discrepancies for all SCE sampled projects led to a 54 percent reduction in ex-ante savings estimates, and the upward discrepancies accounted for a 1 percent increase, resulting in a net downward adjustment of 53 percent.

FIGURE B-6: EX-POST UPWARD AND DOWNWARD ADJUSTMENTS TO EX-ANTE MMBTU FOR SAMPLED PROJECTS – SCE



For SDG&E, Figure B-7 shows that the largest downward adjustments for sampled projects were for operating conditions (-21 percent), inappropriate baseline (-15 percent), and ineligible measure (-13 percent). Overall, the downward discrepancies for SDG&E sampled projects led to a 64 percent reduction in ex-ante savings estimates, and a 16 percent increase from upward discrepancies, resulting in a net downward adjustment of 48 percent.

FIGURE B-7: EX-POST UPWARD AND DOWNWARD ADJUSTMENTS TO EX-ANTE MMBTU FOR SAMPLED PROJECTS - SDG&E

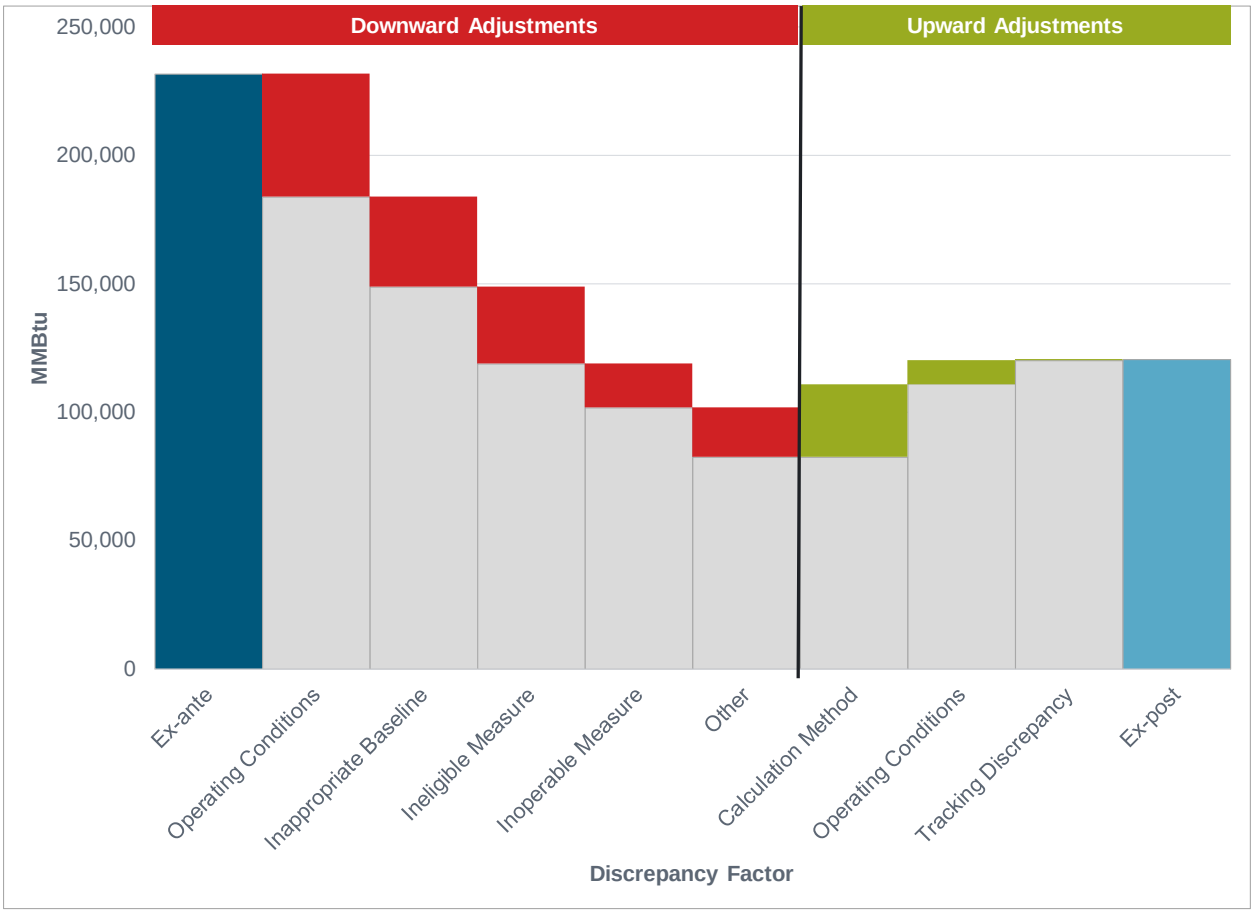
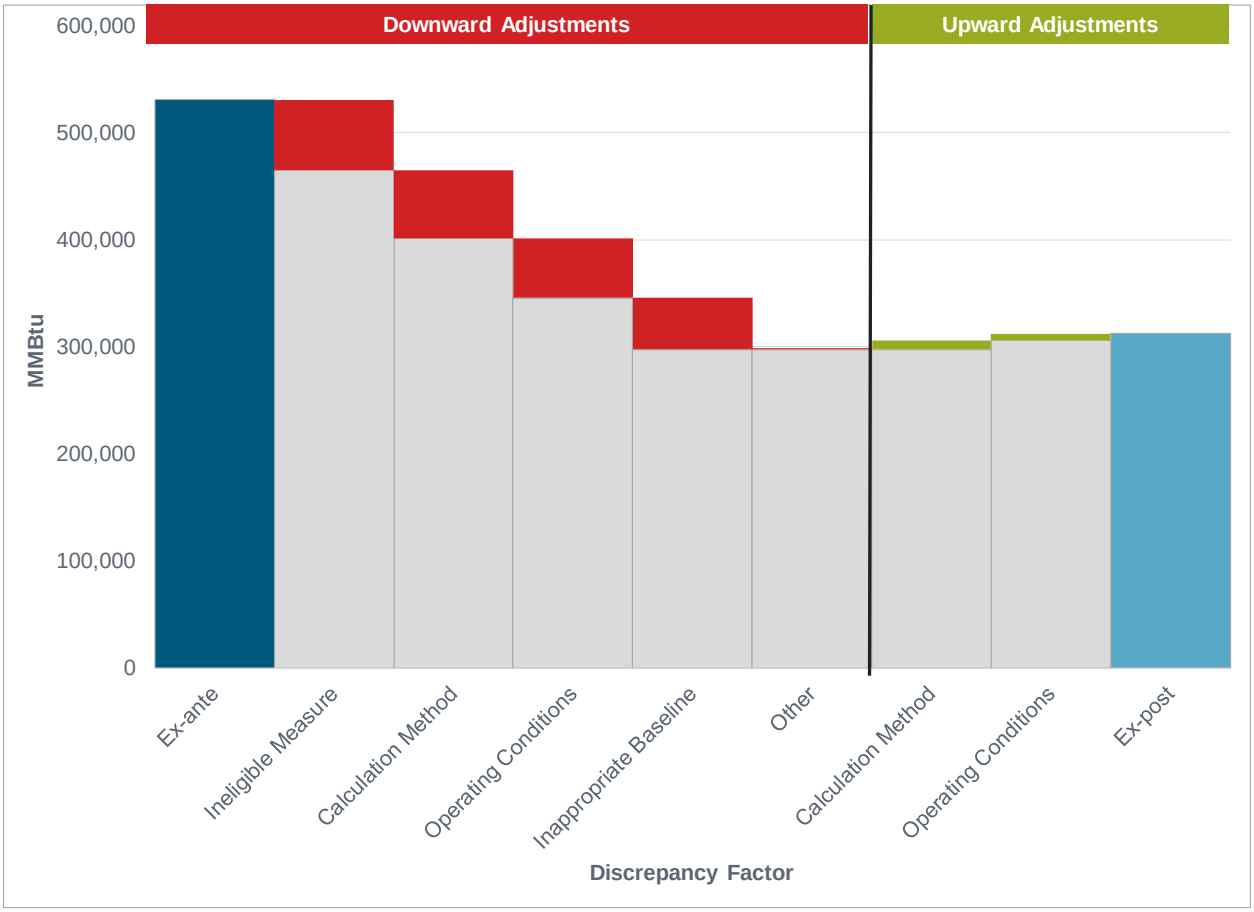


Figure B-8 shows that the most substantial downward adjustments for sampled SCG projects were for ineligible measures (-12 percent), calculation methods (-12 percent), and operating conditions (-10 percent). Altogether, the downward discrepancies for SCG sampled projects led to a 44 percent reduction in ex-ante savings estimates, while the upward discrepancies accounted for an 3 percent boost, resulting in a net downward adjustment of 41 percent.

FIGURE B-8: EX-POST UPWARD AND DOWNWARD ADJUSTMENTS TO EX-ANTE MMBTU FOR SAMPLED PROJECTS – SCG



B.3 SITE SPECIFIC GRR AND NTGR RESULTS

The site specific results in the tables below display the ex-ante and the ex-post evaluated savings estimates, both first year (FY) and lifecycle (LC) GRRs, and the project-level NTGRs for each of the 148 IALC M&V points evaluated in the 2015 Custom sample. Additionally, the table lists the PA and the associated project and claim ID numbers along with the sample stratum each M&V point was assigned (1 thru 5), where 1 or 2 represents a larger site receiving greater evaluation rigor, compared to the smaller strata sites (3-5).

First year (FY) savings are broken out by positive kW, kWh and therms, and also include the combined MMBtu values (for kWh and therm combined), which was decided as part of the 2013-14 evaluation

research plan. Although every site has an assigned FY and LC GRR (MMBtu) value, not every site has a GRR value for (kW), because some projects included only natural gas measures. Also, not every site received a NTG interview. Generally the reason an interview is not conducted is because the project champion or decision maker was unavailable or could not be reached over the course of the five-month evaluation period or refused the interview.

The tables also include an "effective EUL." This metric is equal to project level lifecycle savings divided by project level first year savings (i.e. for multi-measure projects, measure level lifecycle and first year savings are aggregated to the project level). The effective EUL calculation has the following effects:

- If there are multiple measures in a project, and those measures have different EULs, this calculation results in a weighted average EUL at the project level.
- If the project is classified as early retirement, then the lifecycle savings estimates incorporate the first and second baseline calculations. This allows the reporting of an "effective EUL" instead of an EUL plus an RUL (which may not apply the same to all the measures in the project).
- Lifecycle savings can be calculated from first year savings by simply multiplying the first year savings times the "effective EUL."

					First Year Project-Level Ex-Ante				FY GRR Project Level		Effective EUL		Lifecycle GRR Project Level		
PA	ItronID	Application or ProjectID	Associated ClaimIDs	SampleStratum	GrosskWPositive	GrosskWh	GrossTherms	GrossMBtuPositive	FY GRR MBtu	FY GRR kW	Ex Ante	Ex Post	LC GRR MMBtu	LC GRR kW	NTGR
PGE	E50001	NC0116028	PGE-6657226	2	29.80	261,237.00	483,057.00	50,980.51	0.00	0.00	15.0		0.00	0.00	-
PGE	E50002	EI00006788	PGE-28360667, PGE-28360668	2	0.00	0.00	490,276.40	49,027.64	0.00		5.0		0.00		-
PGE	E50003	2K12112027	PGE-28248223, PGE-8365529	2	186.38	1,632,695.50	305,735.10	47,290.68	0.43	1.35	14.3	5.0	0.15	0.52	0.55
PGE	E50005	EI00008045	PGE-28437580	2	0.00	0.00	333,611.00	33,361.10	1.00		20.0	20.0	1.00		0.15
PGE	E50006	EI00007284	PGE-28397787	3	0.00	0.00	267,557.53	26,755.75	0.53		15.0	5.0	0.18		0.63
PGE	E50007	EI00002822	PGE-28121151, PGE-28121150, PGE-28121152, PGE-28121153	3	238.59	2,090,325.00	0.00	21,402.84	2.81	-0.27	13.7	7.0	1.43	-0.14	0.85
PGE	E50009	EI00002346	PGE-28035689	3	186.71	1,602,902.00	0.00	16,412.11	0.32	0.36	15.0	15.0	0.32	0.36	0.38
PGE	E50010	2K12135923	PGE-8937694	3	0.00	0.00	150,497.10	15,049.71	0.37		14.0	14.0	0.37		0.55
PGE	E50011	EI00002806	PGE-28120673	3	158.56	1,361,216.00	0.00	13,937.49	0.96	0.94	15.0	15.0	0.96	0.94	0.00
PGE	E50014	EI00003243	PGE-28166135	4	76.25	1,159,279.00	0.00	11,869.86	0.19	0.83	15.0	20.0	0.25	1.11	0.23
PGE	E50016	EI00004120	PGE-28232378	4	114.29	981,174.00	0.00	10,046.24	0.38	0.51	15.0	15.0	0.38	0.51	0.38
PGE	E50020	EI00003103	PGE-28154767	4	186.82	845,808.40	0.00	8,660.23	0.00	0.07	12.0	2.0	0.00	0.01	0.56
PGE	E50037	EI00004308	PGE-28241965, PGE-28241966	4	0.00	1,808.00	53,488.00	5,367.31	0.02		10.8	5.0	0.01		0.53
PGE	E50042	UAA0046727	PGE-28053227	4	29.17	498,666.70	0.00	5,105.85	0.03	0.47	11.0	4.0	0.01	0.17	0.53
PGE	E50112	UAA0045441	PGE-28016485	5	10.19	184,245.70	0.00	1,886.49	0.00	0.00	11.0		0.00	0.00	-
PGE	E50151	UAA0051846	PGE-28164173	5	30.70	137,626.70	0.00	1,409.16	1.07	1.55	11.0	3.3	0.32	0.47	0.80
PGE	E50245	EI00006293	PGE-28342637, PGE-28342638	5	4.00	36,959.00	3,371.00	715.52	0.72	4.02	17.4	15.7	0.65	4.02	0.13
PGE	E50599	NC0128787	PGE-27107319	5	7.90	6,293.00	0.00	64.43	-0.07	-0.02	15.0	15.0	-0.07	-0.02	0.57
PGE	E50624	EI00006251	PGE-28336816	5	2.74	4,115.00	0.00	42.13	0.35	0.17	15.0	15.0	0.35	0.17	0.49
PGE	E50801	EI00007866	PGE-28425153	3	289.20	1,255,759.00	55,923.00	18,450.02	0.56	0.53	16.0	16.0	0.56	0.53	0.40
PGE	E50806	NC0122647	PGE-8637947	4	102.20	533,836.00	-3,950.00	5,070.95	1.26	0.97	16.0	10.1	0.79	0.61	-
PGE	E55001	110328 - NC010785	PGE-NC0107855-CHA61-357, PGE-NC0107855-CHC21-358	2	613.07	8,917,583.00	0.00	91,307.13	0.80	0.94	10.0	10.0	0.80	0.94	-
PGE	E55002	121058 - NC012037	PGE-NC0120373-CPH50-362	2	20.90	182,704.00	539,983.00	55,869.01	0.78	0.16	15.0	15.0	0.78	0.16	0.50
PGE	E55004	EI00009326	PGE-28501784	2	24.60	215,674.00	510,873.00	53,295.59	0.73	0.38	15.0	15.0	0.73	0.38	0.50
PGE	E55006	1445-13-1447	PGE-1445-13-1447-CPD10-56133, PGE-1445-13-1447-CPD30-56143	2	579.37	5,075,315.80	0.00	51,966.16	1.12	1.12	15.0	7.1	0.53	0.53	0.70
PGE	E55012	EI00008642	PGE-28465591	3	474.75	2,762,819.00	0.00	28,288.50	0.00	0.00	15.0		0.00	0.00	-
PGE	E55014	EI00008568	PGE-28462225	3	0.00	2,707,163.00	0.00	27,718.64	0.77		10.0	11.2	0.86		0.57
PGE	E55019	2K1354364C	PGE-2K1354364C-CCD10-55806, PGE-2K1354364C-CCD20-55805	3	302.00	1,440,384.00	48,203.00	19,568.39	0.34	0.73	13.0	5.0	0.13	0.28	0.62
PGE	E55020	1086-07	PGE-1086-07-CPM40-75697	3	226.24	1,874,214.00	0.00	19,190.08	0.98	0.80	15.0	5.0	0.33	0.27	0.66
PGE	E55033	EI00009409	PGE-28507053	4	0.00	744,568.00	39,368.00	11,560.43	0.00		5.0		0.00		-
PGE	E55043	TAA0015704	PGE-28559647, PGE-28559648	4	148.70	931,483.00	0.00	9,537.45	0.27	0.19	11.0	3.3	0.08	0.06	0.95
PGE	E55047	2K13143750	PGE-2K13143750-CHD13-270	4	97.10	393,523.00	41,369.00	8,166.18	0.46	0.78	6.0	12.3	0.95	1.93	0.36
PGE	E55076	1090-07	PGE-CPM40:1090-07	4	95.18	593,919.00	0.00	6,081.14	0.00	0.00	15.0		0.00	0.00	-
PGE	E55080	IRCx 066	PGE-IRCx066CCC40	4	133.40	563,386.00	0.00	5,768.51	0.84	0.31	8.0	3.0	0.32	0.12	0.70
PGE	E55100	TAA0015869	PGE-28629029	5	23.00	124,074.00	30,564.00	4,326.79	0.26	1.13	5.0	5.0	0.26	1.13	0.54
PGE	E55126	EI00009064	PGE-28492590	5	31.46	298,653.00	0.00	3,057.91	0.35	0.00	15.0	15.0	0.35	0.00	0.69
PGE	E55141	TAA0015789	PGE-28572555	5	0.00	231,854.00	2,031.00	2,577.05	0.00		5.0		0.00		-
PGE	E55185	CORCXPGE13-006	PGE-CORCXPGE13-006453-CCB12-07471, PGE-CORCXPGE13-006453-CCB10-07478	5	32.90	100,986.00	2,615.00	1,295.50	1.13	0.00	5.0	5.0	1.13	0.00	-
PGE	E55268	COCRIPGE13-010	PGE-COCRIPGE13-010189-CHE32-10692	5	12.00	72,407.00	0.00	741.38	0.03	0.99	10.0	6.7	0.02	0.66	0.67
PGE	E55901	EI00008525	PGE-28460507	2	378.75	4,299,753.00	0.00	44,025.17	0.81	0.80	16.0	13.4	0.68	0.67	0.60
PGE	E55904	130634 - NC013170	PGE-NC0131707-CIA10-120	4	79.20	824,119.00	0.00	8,438.15	0.93	1.23	16.0	6.1	0.35	0.47	0.90
PGE	E55906	129833 - NC013052	PGE-NC0130526-CIA10-37	5	89.63	472,864.00	-4,609.00	4,380.75	1.17	0.95	16.0	14.3	1.04	0.85	-

					First Year Project-Level Ex-Ante				FY GRR Project Level		Effective EUL		Lifecycle GRR Project Level		
PA	ItronID	Application or ProjectID	Associated ClaimIDs	SampleStratum	GrosskWPositive	GrosskWh	GrossTherms	GrossMBtuPositive	FY GRR MBtu	FY GRR kW	Ex Ante	Ex Post	LC GRR MMBtu	LC GRR kW	NTGR
NTGR-Only Completes															
PGE	E50004	2K11050209		2	0.00	0.00	357,945.00	35,794.50							0.70
PGE	E50008	2K1318600C		3	120.47	1,446,181.00	48,910.00	19,698.45							0.90
PGE	E50015	EI00004793		4	110.48	1,016,514.60	0.00	10,408.09							0.27
PGE	E50021	2K13182291		4	52.38	477,220.00	35,299.00	8,416.16							0.63
PGE	E50029	EI00008223		4	133.20	649,255.00	0.00	6,647.72							0.56
PGE	E50039	EI00004804		4	70.46	519,984.80	0.00	5,324.12							0.27
PGE	E50047	2K13191979		5	0.00	449,823.00	0.00	4,605.74							0.60
PGE	E50103a	TAA0015191		5	0.00	40,696.00	1,042.00	520.89							0.73
PGE	E50186	UAA0046725		5	9.90	99,122.07	0.00	1,014.91							0.00
PGE	E50284	EI00006259		5	0.00	58,056.00	0.00	594.44							0.39
PGE	E50436	UAA0049266		5	2.91	24,064.33	0.00	246.39							0.60
PGE	E50616	EI00003364		5	2.82	4,572.00	0.00	46.81							0.16
PGE	E50814	NC0128967		5	75.30	214,883.00	3,582.00	2,558.39							0.58
PGE	E55003	EI00009328		2	22.70	198,913.00	528,105.00	54,847.17							0.50
PGE	E55005	117912 - NC0116988		2	29.60	259,136.00	494,323.00	52,085.59							0.50
PGE	E55007	EI00008705		2	24.40	213,707.00	463,736.00	48,561.75							0.50
PGE	E55010	1275-06		2	0.00	0.00	344,155.00	34,415.50							0.53
PGE	E55022	TAA0015909		3	30.00	666,412.00	101,801.00	17,003.49							0.68
PGE	E55058	EI00009286		4	58.42	444,648.00	27,724.00	7,325.15							0.36
PGE	E55084	TAA0015838		4	71.30	531,741.00	0.00	5,444.50							0.95
PGE	E55090	2K09021979		4	36.30	462,722.00	0.00	4,737.81							0.10
PGE	E55902	123311 - NC0123006		3	336.94	2,720,883.00	498.00	27,908.92							0.60
PGE	E55912	121854 - NC0121330		5	101.10	195,120.00	5,737.00	2,571.53							0.28
SCE	F50001	500555867	SCE2015_Q3_0171132	1	1,002.12	7,879,163.00	0.00	80,674.75	0.63	0.61	15.0	15.0	0.63	0.61	0.85
SCE	F50002	500408722	SCE2015_Q3_0171145	1	533.92	5,775,802.00	0.00	59,138.44	0.98	1.00	15.0	15.0	0.98	1.00	1.00
SCE	F50003	500186138	SCE2015_Q2_0001682	1	569.92	4,695,101.10	0.00	48,073.14	-0.02	-0.02	8.0	3.0	-0.01	-0.01	0.70
SCE	F50004	500530264	SCE2015_Q3_0148080, SCE2015_Q3_0148078	1	380.80	4,088,615.70	0.00	41,863.34	0.63	0.79	11.9	12.6	0.67	1.12	0.53
SCE	F50005	500392336	SCE2015_Q3_0171150	2	272.79	2,356,942.90	0.00	24,132.74	0.00	0.00	15.0		0.00	0.00	-
SCE	F50006	500603543	SCE2015_Q1_0072777	2	298.27	2,147,544.00	0.00	21,988.70	0.37	0.42	13.0	13.0	0.37	0.42	0.75
SCE	F50011	500562277	SCE2015_Q3_0135746, SCE2015_Q3_0135749, SCE2015_Q3_0135751, SCE2015_Q3_0135750, SCE2015_Q3_0135752	2	162.21	1,501,112.00	0.00	15,369.89	1.00	0.99	15.4	5.1	0.33	0.33	0.60
SCE	F50012	500600388	SCE2015_Q1_0072776	2	190.25	1,369,800.00	0.00	14,025.38	0.13	0.14	8.0	8.0	0.13	0.14	0.75
SCE	F50013	500203669	SCE2015_Q1_0072775	3	123.06	1,077,977.00	0.00	11,037.41	0.93	0.92	8.0	3.0	0.35	0.35	0.73
SCE	F50016	500339633	SCE2015_Q1_0072716, SCE2015_Q1_0072715	3	32.11	557,383.70	0.00	5,707.05	0.44	1.14	15.0	5.0	0.15	0.38	0.50
SCE	F50017	500398065	SCE2015_Q1_0069558	3	99.00	917,384.00	0.00	9,393.09	0.62	1.02	10.0	10.0	0.62	1.02	0.63
SCE	F50019	500462854	SCE2015_Q2_0001859	3	75.00	801,941.00	0.00	8,211.07	0.39	1.12	20.0	20.0	0.39	1.12	-
SCE	F50029	ERCX-14-000016	SCE2015_Q1_0077473, SCE2015_Q1_0077471	4	17.71	413,065.90	0.00	4,229.38	1.13	-0.16	8.0	6.5	0.92	-0.06	1.00
SCE	F50030	500586998	SCE2015_Q1_0069457	4	39.33	527,967.10	0.00	5,405.86	0.68	1.25	15.0	3.8	0.17	0.32	0.20
SCE	F50034	500553902	SCE2015_Q3_0135743	4	58.67	470,586.30	0.00	4,818.33	0.94	0.92	12.0	13.0	1.02	1.00	0.85
SCE	F50069	500345193	SCE2015_Q2_0008917	4	28.16	206,811.30	0.00	2,117.54	0.55	0.55	15.0	6.6	0.24	0.24	0.36
SCE	F50244	500344528	SCE2015_Q3_0171149	5	4.67	40,072.40	0.00	410.30	1.16	1.16	10.0	3.3	0.38	0.38	0.75
SCE	F50259	500591942	SCE2015_Q1_0072536, SCE2015_Q1_0072661	5	7.16	23,760.80	0.00	243.29	0.19	0.31	15.0	5.0	0.06	0.10	-
SCE	F50355	MBCX-14-000153	SCE2015_Q3_0171237, SCE2015_Q3_0171236	5	1.80	9,958.50	0.00	101.97	0.77	1.92	8.0	10.0	0.96	2.40	0.33
SCE	F50383	500617061	SCE2015_Q2_0001579	5	0.80	7,008.00	0.00	71.75	0.60	0.60	12.0	12.0	0.60	0.60	-
SCE	F50801	500517829	SCE2015_Q1_0070134	3	63.71	888,520.00	0.00	9,097.56	1.07	1.59	15.0	14.4	1.03	1.52	0.08
SCE	F50803	500566692	SCE2015_Q2_0095630	4	33.54	234,234.00	6,444.00	3,042.72	1.05	1.03	15.0	11.7	0.82	0.81	0.53
SCE	F55001	500569573	SCE2015_Q4_0000342, SCE2015_Q4_0000341	1	1,954.10	10,980,019.00	0.00	112,424.41	0.63	0.70	12.1	6.7	0.35	0.39	0.53
SCE	F55002	500578423	SCE2015_Q4_0000411	1	922.80	8,083,728.20	0.00	82,769.29	0.00	0.00	15.0		0.00	0.00	-
SCE	F55003	500169057	SCE2015_Q4_0000021	2	274.50	2,322,097.00	0.00	23,775.95	0.07	0.15	15.0	15.0	0.07	0.15	0.00

					First Year Project-Level Ex-Ante				FY GRR Project Level		Effective EUL		Lifecycle GRR Project Level		
PA	ItronID	Application or ProjectID	Associated ClaimIDs	SampleStratum	GrosskWPositive	GrosskWh	GrossTherms	GrossMBtuPositive	FY GRR MBtu	FY GRR kW	Ex Ante	Ex Post	LC GRR MMBtu	LC GRR kW	NTGR
SCE	F55005	500712241	SCE2015_Q4_0000806, SCE2015_Q4_0000695, SCE2015_Q4_0000811	2	136.28	1,246,728.00	0.00	12,765.25	0.59	0.52	5.0	4.4	0.52	0.58	0.90
SCE	F55006	500352693	SCE2015_Q4_0000071	2	166.34	1,437,300.00	0.00	14,716.51	0.00	0.00	5.0		0.00	0.00	-
SCE	F55007	500463400	SCE2015_Q4_0000187, SCE2015_Q4_0000188	2	150.37	1,336,035.60	0.00	13,679.67	-0.65	-1.33	15.0	10.0	-0.43	-0.89	0.57
SCE	F55012	500397837	SCE2015_Q4_0156882	3	213.99	980,131.30	0.00	10,035.56	0.90	1.33	8.6	5.0	0.52	0.65	0.50
SCE	F55013	500272053	SCE2015_Q4_0000030, SCE2015_Q4_0000031	3	104.52	902,121.00	0.00	9,236.82	0.97	0.98	5.0	5.0	0.97	0.98	0.64
SCE	F55016	500420736	SCE2015_Q4_0000119	3	190.03	752,326.80	0.00	7,703.07	1.24	0.71	15.0	15.0	1.24	0.71	-
SCE	F55019	500345212	SCE2015_Q4_0000057, SCE2015_Q4_0000010	3	49.99	442,942.00	0.00	4,535.28	0.00	0.00	5.0		0.00	0.00	-
SCE	F55024	500605248	SCE2015_Q4_0000452, SCE2015_Q4_0000451	4	3.26	468,279.80	0.00	4,794.72	0.78	1.01	8.0	5.0	0.49	0.63	-
SCE	F55026	500719176	SCE2015_Q4_0000855, SCE2015_Q4_0000858	4	34.48	428,436.00	0.00	4,386.76	-0.08	1.72	5.4	5.0	-0.07	1.07	0.75
SCE	F55033	500666356	SCE2015_Q4_0000397	4	21.97	371,811.00	0.00	3,806.97	1.00	-0.22	5.0	5.0	1.00	-0.22	0.53
SCE	F55039	500569361	SCE2015_Q4_0000329	4	45.00	326,294.00	0.00	3,340.92	0.09	0.12	15.0	5.0	0.03	0.04	-
SCE	F55080	500592237	SCE2015_Q4_0000433	5	18.74	107,860.70	0.00	1,104.39	0.77	0.00	6.8	3.3	0.38	0.00	0.70
SCE	F55101	500251885	SCE2015_Q4_0000009, SCE2015_Q4_0000028	5	31.61	79,731.60	10.60	817.43	0.00	0.00	15.0		0.00	0.00	-
SCE	F55154	500619706	SCE2015_Q4_0000533	5	7.32	20,037.00	0.00	205.16	0.20	0.00	15.0	15.0	0.20	0.00	-
SCE	F55233	500619720	SCE2015_Q4_0000543	5	1.09	7,131.00	0.00	73.01	1.41	1.00	12.0	12.0	1.41	1.00	-
SCE	F55901	500514915	SCE2015_Q4_0000205	3	133.11	1,057,255.00	0.00	10,825.23	1.04	1.02	15.0	14.0	0.97	0.95	0.20
SCE	F55906	500593565	SCE2015_Q4_0000436	4	103.30	422,291.00	2,673.00	4,591.14	0.15	-0.22	16.0	16.6	0.16	-0.23	-
SCE	F55915	500386461	SCE2015_Q4_0000013	5	21.30	40,320.00	297.00	442.54	1.12	1.14	16.0	15.0	1.05	1.07	-

					First Year Project-Level Ex-Ante				FY GRR Project Level		Effective EUL		Lifecycle GRR Project Level		
PA	ItronID	Application or ProjectID	Associated ClaimIDs	SampleStratum	GrosskWPositive	GrosskWh	GrossTherms	GrossMBtuPositive	FY GRR MBtu	FY GRR kW	Ex Ante	Ex Post	LC GRR MMBtu	LC GRR kW	NTGR
NTGR-Only Completes															
SCE	F50007	500649380		2	211.10	1,928,252.60	0.00	19,743.38							0.51
SCE	F50014	500339188		3	164.15	1,060,299.00	0.00	10,856.40							0.42
SCE	F50024	500571723		3	74.50	639,799.70	0.00	6,550.91							0.43
SCE	F50060	500355380		4	19.45	255,452.50	0.00	2,615.58							0.20
SCE	F50068	500541099		4	23.53	208,023.60	0.00	2,129.95							0.10
SCE	F50070	500196283		4	15.60	205,227.00	0.00	2,101.32							0.47
SCE	F50087	500630385		5	25.95	173,243.00	0.00	1,773.84							0.51
SCE	F50092	500484850		5	32.83	162,857.00	0.00	1,667.49							0.43
SCE	F50095	500564098		5	32.22	160,083.30	0.00	1,639.09							0.53
SCE	F50111	500662290		5	29.88	124,693.00	0.00	1,276.73							0.50
SCE	F50184	500711231		5	10.60	65,773.00	0.00	673.45							0.05
SCE	F50196	500592520		5	6.51	57,025.40	0.00	583.88							0.43
SCE	F50366	MBCX-14-000152		5	1.61	8,572.30	0.00	87.77							0.33
SCE	F50835	500497260		5	10.30	19,743.00	58.00	207.95							0.68
SCE	F55004	500522232		2	711.20	2,056,130.00	0.00	21,052.72							0.65
SCE	F55015	500605004		3	88.80	756,641.00	0.00	7,747.25							0.95
SCE	F55020	500595587		3	20.03	573,331.60	0.00	5,870.34							0.68
SCE	F55021	500655318		3	78.53	565,408.00	0.00	5,789.21							0.46
SCE	F55025	500671721		4	47.49	507,082.90	0.00	5,192.02							0.40
SCE	F55034	500473465		4	40.60	371,600.00	0.00	3,804.81							0.27
SCE	F55081	500664713		5	25.00	102,677.00	500.00	1,101.31							0.67
SCE	F55090	500592352		5	10.90	88,776.40	0.00	908.98							0.75
SCE	F55098	500687962		5	7.57	81,259.40	0.00	832.01							0.25
SCE	F55908	500308783		4	29.40	261,525.00	9,052.00	3,582.95							0.62
SCE	F55911	500538192		5	17.37	124,414.00	1,030.00	1,376.87							0.55
SCE	F55914	500000261		5	98.20	65,423.00	0.00	669.87							0.10

					First Year Project-Level Ex-Ante				FY GRR Project Level		Effective EUL		Lifecycle GRR Project Level		
PA	ItronID	Application or ProjectID	Associated ClaimIDs	SampleStratum	GrosskWPositive	GrosskWh	GrossTherms	GrossMBtuPositive	FY GRR MBtu	FY GRR kW	Ex Ante	Ex Post	LC GRR MMBtu	LC GRR kW	NTGR
SCG	G50001	5001183129	2013*SCG3715*5001183129*10	2	0.00	0.00	764,511.00	76,451.10	0.81		4.7	4.7	0.81		0.38
SCG	G50002	5001169193	2013*SCG3710*5001169193*10	2	0.00	0.00	655,199.00	65,519.90	0.00		8.0		0.00		-
SCG	G50003	5001169042	2013*SCG3719*5001169042*10	2	0.00	0.00	507,863.00	50,786.30	0.75		7.0	7.0	0.75		0.62
SCG	G50004	5001232891	2013*SCG3715*5001232891*10	3	0.00	0.00	277,395.00	27,739.50	0.98		20.0	15.0	0.74		-
SCG	G50005	5001182668	2013*SCG3710*5001182668*10	3	0.00	0.00	184,533.00	18,453.30	0.36		14.0	14.0	0.36		0.47
SCG	G50008	10237357	2013*SCG3757*10237357*1033892	4	0.00	0.00	88,030.00	8,803.00	0.00		7.0		0.00		-
SCG	G50009	5001172948	2013*SCG3715*5001172948*10	4	0.00	0.00	65,657.00	6,565.70	0.70		9.0	10.0	0.78		0.37
SCG	G50010	5001175655	2013*SCG3710*5001175655*10	4	0.00	0.00	62,396.00	6,239.60	1.22		20.0	14.2	0.87		0.75
SCG	G50011	5001234970	2013*SCG3710*5001234970*10	4	0.00	0.00	51,670.00	5,167.00	0.31		20.0	20.0	0.31		0.18
SCG	G50013	5001252127	2013*SCG3719*5001252127*10, 2013*SCG3719*5001252127*20	4	0.00	0.00	47,946.00	4,794.60	0.39		9.7	18.3	0.73		0.52
SCG	G50018	5001229018	2013*SCG3715*5001229018*10	5	0.00	0.00	43,281.00	4,328.10	0.00		10.0		0.00		-
SCG	G50021	5001187759	2013*SCG3710*5001187759*10	5	0.00	0.00	31,835.00	3,183.50	0.80		15.0	15.0	0.80		0.95
SCG	G50025	5001254003	2013*SCG3710*5001254003*10	5	0.00	0.00	13,440.00	1,344.00	0.06		20.0	14.0	0.04		0.75
SCG	G50029	5001253922	2013*SCG3710*5001253922*10	5	0.00	0.00	9,750.00	975.00	0.00		6.0		0.00		-
SCG	G50042	10492639	2013*SCG3757*10492639*885499	5	0.00	0.00	3,116.00	311.60	0.74		11.0	6.6	0.44		0.08
SCG	G55001	5001196806	2013*SCG3715*5001196806*10	2	0.00	0.00	563,204.00	56,320.40	1.04		20.0	20.0	1.04		0.73
SCG	G55002	5001178646	2013*SCG3715*5001178646*10	2	0.00	0.00	387,211.00	38,721.10	1.05		20.0	20.0	1.05		0.70
SCG	G55003	5001173293	2013*SCG3710*5001173293*10, 2013*SCG3710*5001173293*20	2	0.00	0.00	343,225.00	34,322.50	0.86		20.0	20.0	0.86		0.59
SCG	G55004	5001231929	2013*SCG3715*5001231929*10	2	0.00	0.00	331,445.00	33,144.50	0.65		14.0	10.0	0.46		0.85
SCG	G55005	5001243258	2013*SCG3715*5001243258*10	3	0.00	0.00	211,116.00	21,111.60	1.09		8.0	8.0	1.09		0.85
SCG	G55008	5001211481	2013*SCG3715*5001211481*10, 2013*SCG3715*5001211481*20	3	0.00	0.00	173,445.00	17,344.50	0.00		15.0		0.00		-
SCG	G55009	5001185569	2013*SCG3715*5001185569*10	3	0.00	0.00	161,983.00	16,198.30	-2.18		15.0	20.0	-2.90		0.40
SCG	G55010	5001170922	2013*SCG3710*5001170922*10	4	0.00	0.00	85,695.00	8,569.50	0.69		10.0	15.0	1.04		0.85
SCG	G55011	10484032	2013*SCG3757*10484032*869431	4	0.00	0.00	84,712.00	8,471.20	1.00		7.0	6.7	0.95		0.13
SCG	G55013	5001255174	2013*SCG3715*5001255174*10	4	0.00	0.00	69,503.00	6,950.30	0.55		7.0	9.0	0.71		-
SCG	G55015	5001194012	2013*SCG3715*5001194012*10	4	0.00	0.00	63,647.00	6,364.70	0.47		20.0	20.0	0.47		-
SCG	G55032	5001226954	2013*SCG3710*5001226954*10	5	0.00	0.00	12,073.00	1,207.30	0.28		15.0	15.0	0.28		-
SCG	G55033	5001235169	2013*SCG3710*5001235169*10	5	0.00	0.00	11,514.00	1,151.40	0.07		15.0	15.0	0.07		-
SCG	G55059	5001174581	2013*SCG3710*5001174581*10	5	0.00	0.00	2,049.00	204.90	0.83		11.4	12.0	0.87		0.75
SCG	G55107	10765865	2013*SCG3710*10765865*1320706	5	0.00	0.00	397.00	39.70	-0.61		15.0	10.0	-0.41		-

					First Year Project-Level Ex-Ante				FY GRR Project Level		Effective EUL		Lifecycle GRR Project Level		
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NTGR-Only Completes															
SCG	G50006	5001175853		4	0.00	0.00	93,897.00	9,389.70							0.80
SCG	G50007	10240544		4	0.00	0.00	91,065.00	9,106.50							0.39
SCG	G50012	5001182703		4	0.00	0.00	50,056.00	5,005.60							0.50
SCG	G50020	5001236415		5	0.00	0.00	38,374.00	3,837.40							0.05
SCG	G50024	5001253028		5	0.00	0.00	18,285.00	1,828.50							0.34
SCG	G50026	5001254109		5	0.00	0.00	12,103.00	1,210.30							0.60
SCG	G50028	5001253379		5	0.00	0.00	11,196.00	1,119.60							0.63
SCG	G50071	5001235285		5	0.00	0.00	1,460.00	146.00							0.35
SCG	G55006	5001256414		3	0.00	0.00	195,564.00	19,556.40							0.77
SCG	G55007	5001170821		3	0.00	0.00	177,770.00	17,777.00							0.65
SCG	G55017	10240547		4	0.00	0.00	55,706.00	5,570.60							0.10
SCG	G55020	5001235112		4	0.00	0.00	47,833.00	4,783.30							0.22
SCG	G55022	10227829		5	0.00	0.00	35,143.00	3,514.30							0.10
SCG	G55024	5001255450		5	0.00	0.00	28,911.00	2,891.10							0.75
SCG	G55028	5001253616		5	0.00	0.00	17,848.00	1,784.80							0.47
SCG	G55034	10764014		5	0.00	0.00	11,490.00	1,149.00							0.33
SCG	G55036	5001189864		5	0.00	0.00	9,941.00	994.10							0.50
SCG	G55037	10764657		5	0.00	0.00	8,868.00	886.80							0.37
SCG	G55040	5001176828		5	0.00	0.00	7,346.00	734.60							0.75
SCG	G55057	5001133618		5	0.00	0.00	2,049.00	204.90							0.75
SCG	G55058	5001173402		5	0.00	0.00	2,049.00	204.90							0.75
SCG	G55060	5001175820		5	0.00	0.00	2,049.00	204.90							0.75
SCG	G55061	5001176784		5	0.00	0.00	2,049.00	204.90							0.75
SCG	G55062	5001177565		5	0.00	0.00	2,049.00	204.90							0.75
SCG	G55070	5001181315		5	0.00	0.00	2,049.00	204.90							0.75
SCG	G55071	5001181436		5	0.00	0.00	2,049.00	204.90							0.75
SCG	G55072	5001181472		5	0.00	0.00	2,049.00	204.90							0.75
SCG	G55075	5001182019		5	0.00	0.00	2,049.00	204.90							0.75
SCG	G55080	5001175422		5	0.00	0.00	1,899.00	189.90							0.75
SCG	G55082	5001175793		5	0.00	0.00	1,899.00	189.90							0.75
SCG	G55083	5001177453		5	0.00	0.00	1,899.00	189.90							0.75
SCG	G55086	5001178940		5	0.00	0.00	1,899.00	189.90							0.75
SCG	G55087	5001179052		5	0.00	0.00	1,899.00	189.90							0.75
SCG	G55088	5001179076		5	0.00	0.00	1,899.00	189.90							0.75
SCG	G55089	5001181437		5	0.00	0.00	1,899.00	189.90							0.75
SCG	G55104	5001235165		5	0.00	0.00	519.00	51.90							0.27
SCG	G55110	10242137		5	0.00	0.00	318.00	31.80							0.03

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SDGE	H50001	3125_83	2013*SDGE3117E*5001228445*20, 2013*SDGE3117E*5001228445*10	1	14.00	1,913,526.00	261,388.00	45,731.39	0.94	7.04	15.0	15.0	0.94	7.04	0.73
SDGE	H50002	5001230752	2013*SDGE3222*5001230752*10	2	0.00	0.00	263,640.00	26,364.00	0.00		10.0		0.00		-
SDGE	H50003	3125_80	2013*SDGE3117E*5001229812*10	3	34.00	418,820.00	87,233.00	13,011.60	0.83	7.04	15.0	15.0	0.83	7.04	0.73
SDGE	H50004	3125_81	2013*SDGE3117E*5001229814*10	3	0.00	123,905.00	107,828.00	12,051.46	-0.01		15.0	15.0	-0.01		0.73
SDGE	H50005	3125_103	2013*SDGE3220*5001229299*20, 2013*SDGE3220*5001229299*10	4	29.10	149,647.00	37,153.00	5,247.54	0.00	0.00	15.0		0.00	0.00	0.70
SDGE	H50007	5818	2013*SDGE3220*5001235694*10	4	38.63	338,396.00	0.00	3,464.84	0.67	0.67	15.0	15.0	0.67	0.67	-
SDGE	H50008	5841	2013*SDGE3220*5001240349*10, 2013*SDGE3220*5001240349*20	4	0.00	0.00	17,034.00	1,703.40	0.55		20.0	20.0	0.55		0.57
SDGE	H50009	4876	2013*SDGE3220*5001161066*30, 2013*SDGE3220*5001161066*40	4	30.40	248,400.00	0.00	2,543.37	-0.03	-0.03	15.0	14.0	-0.03	-0.03	-
SDGE	H50011	5692	2013*SDGE3220*5001224997*10	4	4.89	270,224.00	0.00	2,766.82	1.23	1.00	15.0	5.0	0.41	0.33	-
SDGE	H50018	3125_123	2013*SDGE3220*5001253367*10	5	0.00	0.00	12,916.60	1,291.66	0.00		10.0		0.00		-
SDGE	H50021	5074	2013*SDGE3220*5001128919*10	5	0.00	86,833.00	0.00	889.08	0.10		10.0	4.0	0.04		0.25
SDGE	H50026	5866	2013*SDGE3220*5001249002*10	5	0.43	18,632.00	0.00	190.77	0.72	0.00	12.0	12.0	0.72	0.00	0.43
SDGE	H50027	4760	2013*SDGE3220*5001253646*10	5	7.85	18,012.20	0.00	184.43	0.00	0.00	15.0		0.00	0.00	-
SDGE	H50035	5755	2013*SDGE3220*5001231035*10	5	1.93	3,732.00	0.00	38.21	1.08	1.81	15.0	15.0	1.08	1.81	0.18
SDGE	H50801	5001092276	2013*SDGE3222*5001092276*70, 2013*SDGE3222*5001092276*20, 2013*SDGE3222*5001092276*50, 2013*SDGE3222*5001092276*30, 2013*SDGE3222*5001092276*80, 2013*SDGE3222*5001092276*10, 2013*SDGE3222*5001092276*40, 2013*SDGE3222*5001092276*60, 2013*SDGE3222*5001092276*90	3	252.60	485,296.00	64,867.00	11,455.65	0.16	0.30	15.0	18.3	0.19	0.37	0.57
SDGE	H50802	5001175507	2013*SDGE3222*5001175507*40, 2013*SDGE3222*5001175507*90, 2013*SDGE3222*5001175507*30, 2013*SDGE3222*5001175507*20, 2013*SDGE3222*5001175507*60, 2013*SDGE3222*5001175507*10, 2013*SDGE3222*5001175507*120, 2013*SDGE3222*5001175507*130, 2013*SDGE3222*5001175507*50, 2013*SDGE3222*5001175507*70, 2013*SDGE3222*5001175507*80, 2013*SDGE3222*5001175507*140	4	11.80	382,150.00	8,977.00	4,810.53	0.67	8.40	15.0	16.2	0.72	9.07	0.42
SDGE	H55001	5001073456	2013*SDGE3222*5001225908*20, 2013*SDGE3222*5001225908*30, 2013*SDGE3222*5001225908*10	2	211.10	2,075,763.00	757.00	21,329.44	0.44	0.59	12.0	12.0	0.44	0.47	0.05
SDGE	H55002	5853	2013*SDGE3220*10311834*1021241	2	356.00	1,922,789.00	0.00	19,687.44	0.13	0.14	7.2	20.0	0.36	0.37	0.18
SDGE	H55004	10360993	2013*SDGE3221*10360993*1149985, 2013*SDGE3221*10360993*1139299	3	0.00	579,342.14	42,705.70	10,202.45	0.77		10.0	5.0	0.39		0.42
SDGE	H55006	10360879	2013*SDGE3221*10360879*1138936	3	0.00	855,103.00	0.00	8,755.40	0.98		10.0	5.0	0.49		1.00
SDGE	H55007	10361004	2013*SDGE3221*10361004*1149995, 2013*SDGE3221*10361004*1149994	3	19.04	215,233.61	32,595.80	5,463.36	0.10	0.32	10.0	5.0	0.05	0.16	-
SDGE	H55010	10360999	2013*SDGE3221*10360999*1139309, 2013*SDGE3221*10360999*1149991, 2013*SDGE3221*10360999*1149990, 2013*SDGE3221*10360999*1139311, 2013*SDGE3221*10360999*1139308	3	19.09	629,559.04	0.00	6,446.05	0.42	2.11	7.3	4.8	0.27	1.12	0.59
SDGE	H55011	5001073456	2013*SDGE3222*5001165517*20, 2013*SDGE3222*5001165517*30	4	0.00	458,472.00	1,567.00	4,850.99	0.86		15.0	12.1	0.70		0.42
SDGE	H55013	5001073456	2013*SDGE3222*5001255620*30, 2013*SDGE3222*5001255620*20, 2013*SDGE3222*5001255620*10	4	82.80	158,678.00	20,475.00	3,672.20	0.74	1.00	11.0	11.0	0.74	1.00	0.42
SDGE	H55014	10311175	2013*SDGE3220*10311175*1020325	4	0.00	39,216.30	28,812.00	3,282.74	1.00		15.0	5.2	0.35		0.57
SDGE	H55015	10311959	2013*SDGE3231*10311959*1021404	4	36.30	269,055.31	0.00	2,754.86	0.30	0.26	15.0	15.0	0.30	0.26	0.49
SDGE	H55028	5001073456	2013*SDGE3222*5001233244*20	5	0.00	36,937.00	0.00	378.20	0.79		12.0	12.0	0.79		0.15

					First Year Project-Level Ex-Ante				FY GRR Project Level		Effective EUL		Lifecycle GRR Project Level		
PA	ItronID	Application or ProjectID	Associated ClaimIDs	SampleStratum	GrosskWPositive	GrosskWh	GrossTherms	GrossMBtuPositive	FY GRR MBtu	FY GRR kW	Ex Ante	Ex Post	LC GRR MMBtu	LC GRR kW	NTGR
SDGE	H55029	5001073456	2013*SDGE3222*5001233246*20, 2013*SDGE3222*5001233246*10	5	9.20	29,553.00	0.00	302.59	0.77	0.96	12.0	12.0	0.77	0.96	0.15
SDGE	H55030	5001073456	2013*SDGE3222*5001252241*20, 2013*SDGE3222*5001252241*10, 2013*SDGE3222*5001252241*60, 2013*SDGE3222*5001252241*70	5	17.80	28,670.00	0.00	293.55	0.14	0.00	13.9	15.0	0.15	0.00	-
SDGE	H55033	10311682	2013*SDGE3220*10311682*1021034	5	0.00	18,041.00	0.00	184.72	0.78		10.0	5.0	0.39		0.75
SDGE	H55901	5001073456	2013*SDGE3222*5001196548*70, 2013*SDGE3222*5001196548*40, 2013*SDGE3222*5001196548*20, 2013*SDGE3222*5001196548*50, 2013*SDGE3222*5001196548*60, 2013*SDGE3222*5001196548*10, 2013*SDGE3222*5001196548*30, 2013*SDGE3222*5001196548*80, 2013*SDGE3222*5001196548*90	3	164.90	927,809.00	-15,270.00	7,972.84	1.17	0.60	15.0	15.7	1.23	0.63	0.39
SDGE	H55903	5001073456	2013*SDGE3222*5001230834*40, 2013*SDGE3222*5001230834*10, 2013*SDGE3222*5001230834*60, 2013*SDGE3222*5001230834*30, 2013*SDGE3222*5001230834*20, 2013*SDGE3222*5001230834*50	4	158.90	346,844.00	7,001.00	4,251.44	0.50	0.13	15.0	11.4	0.38	0.10	0.33
SDGE	H55908	5001073456	2013*SDGE3222*5001165094*30, 2013*SDGE3222*5001165094*10, 2013*SDGE3222*5001165094*20, 2013*SDGE3222*5001165094*60, 2013*SDGE3222*5001165094*40, 2013*SDGE3222*5001165094*50	5	9.00	22,816.00	56.00	239.21	0.65	0.37	15.0	12.8	0.55	0.31	0.28
NTGR-Only Completes															
SDGE	H50017	5001217772		5	0.00	127,318.00	0.00	1,303.61							0.20
SDGE	H50024	4866		5	0.00	21,340.00	0.00	218.50							0.25
SDGE	H50028	4867		5	0.00	13,987.00	0.00	143.21							0.25
SDGE	H50037	4757		5	0.00	1,764.00	0.00	18.06							0.25
SDGE	H50811	5001254174		5	12.90	43,841.00	1,547.00	603.59							0.21
SDGE	H55003	10311963		3	0.00	1,020,488.00	0.00	10,448.78							0.63
SDGE	H55005	10311981		3	20.58	247,241.00	71,726.00	9,704.10							0.41
SDGE	H55008	10360997		3	24.78	819,557.70	0.00	8,391.45							0.59
SDGE	H55012	10360941		4	0.00	346,229.65	6,447.25	4,189.77							0.54
SDGE	H55016	10364738		4	34.89	164,793.13	7,705.99	2,457.92							0.54
SDGE	H55017	10364739		5	6.72	96,478.40	11,251.45	2,112.99							0.54
SDGE	H55021	5615		5	0.00	115,747.00	0.00	1,185.13							0.44
SDGE	H55022	5780		5	36.34	94,087.00	-1.00	963.26							0.10
SDGE	H55023	5800		5	0.00	9,472.90	7,916.70	888.66							0.57
SDGE	H55024	10325626		5	21.00	74,222.00	0.00	759.96							0.10
SDGE	H55026	10311499		5	0.00	50,487.80	0.00	516.94							0.59
SDGE	H55027	5001073456		5	11.70	38,053.00	0.00	389.62							0.15
SDGE	H55032	10311500		5	0.00	26,670.70	0.00	273.08							0.59
SDGE	H55034	10332181		5	0.00	16,769.00	0.00	171.70							0.03

APPENDIX C CUSTOM IMPACT EM&V PROCEDURES & PROTOCOLS

The Custom Impact Evaluation Procedures and Protocols document that comprises Appendix C was developed as a stand-alone reference document for all evaluation staff working on the project and conducting EM&V activities (whether Itron employees or our engineering subcontractors). The document provides key information about all aspects of the project, such as schedule, M&V rigor levels, application review procedures, data collection protocols, M&V plan development, QA-QC processes, and guidelines for completing the PPA section of the FSR, among other information. The Procedures and Protocols document is included in this Appendix in its original form, including the cover page and table of contents, for the reader's convenient reference.

Itron
Knowledge to Shape Your Future

Electric | Gas | Water
information collection, analysis and application

2013-2014 IALC Custom Impact Evaluation

Procedures for Site-Specific Impact Analysis

Submitted to:

Energy Division
California Public Utilities Commission
505 Van Ness Ave.
San Francisco, CA 94102

Submitted by:

Itron, Inc.
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Oakland, CA 94607
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Custom Impact Evaluation Procedures and Protocols

This impact evaluation for the 2013-2014 program years focuses on custom non-deemed energy efficiency projects in the industrial, agricultural and large commercial sectors. The evaluation effort includes an ex-post (i.e., post-installation) assessment of energy savings for a sample of 339 projects (189 for 2013 evaluation effort plus 150 for the 2014 effort). The objective of this evaluation is to compare and contrast the ex-ante (reported and claimed) energy impact estimates found in the IOU-supplied project tracking systems and financial incentive applications to the independent evaluation findings (i.e., the ex-post energy impact findings). In this process, we will employ detailed application review; on-site measurement and verification; data collection from multiple sources; and revisions to ex-ante (or completely independent) calculations. Additionally, we will collect other project specific information deemed relevant to the research plan.

The overall goal of the evaluation is to obtain unbiased, reliable estimates of program/sector level energy savings and kW demand reduction over the life of the measure and the expected net impacts. In addition to the energy impact analysis task that is the focus of this document, Itron will be conducting several other tasks as part of the overall evaluation. These tasks include interviews with utility program managers, energy efficiency service providers (EESPs), and program participants; a small number of program non-participants may also be interviewed. These interviews will allow estimation of the program net-to-gross ratio (NTGR) and inform net–to-gross (NTG) findings. It is particularly important to note that a separate team will conduct NTG-related in depth interviews (or CATI surveys) with each of the end users included in the impact evaluation sample. **These interviews will be conducted by telephone and will be coordinated with the on-site work conducted by the engineering team. The engineering gross impact team is responsible for knowing the current status of the NTG efforts and must also inform the project contacts of the timing of these efforts, if not already conducted.**

Engineering team members should refer to the *Research Plan* and the *Research Plan Addendum*[1] submitted to the CPUC for more information on specific tasks and overall project objectives.

[1] http://www.energydataweb.com/cpuc/deliverableView.aspx?did=1133&uid=0&tid=0&cid=
http://www.energydataweb.com/cpucFiles/pdaDocs/1307/IALC%20Research%20Plan%20AddendumPY2014_June2015_Final.pdf

Contact information for lead project staff will be provided and updated as necessary. However**, subcontractors should contact Itron staff on project-related issues, and SHOULD NOT contact CPUC staff or IOU staff directly, unless specifically instructed to do so.**

Note that Itron may request changes to this procedures manual at the CPUC's directions at any time.

1.1 Project Schedule

Measurement and verification (M&V) planning, data collection and analysis for the site-specific impact evaluations are expected to begin in 2014 and are scheduled to be completed in 2015. The overall evaluation effort will be split between 2013 and 2014 claim years. The 2013 claim year schedule requires 40 to 45 project evaluations to be completed per month. Exact timing will be dependent on the provision of complete application data from the IOUs. Work on the projects in the 2013 claim year began in September 2014 and completed in early January 2015 with analysis and report writing planned for completion in mid-March. Work on the Q1-Q2 2014 projects is expected to begin in March 2015. More detailed schedule information, particularly for the projects in the 2014 claim year, will be provided in the work authorizations for each subcontractor.

1.2 Useful Definitions

California Public Utilities Commission's Energy Division (*CPUC-ED*). The CPUC is the end client for this evaluation study. CPUC ED staff is responsible for overseeing the delivery of the evaluations.

Investor Owned Utilities (**IOUs**). The impact evaluation will be focused on energy efficiency programs administered by the four California Investor Owned Utilities (**IOUs**): Pacific Gas and Electric (PG&E), Southern California Edison (SCE), Southern California Gas Co., and San Diego Gas and Electric (SDG&E).

Customer. A customer is a unique company or corporation which purchases energy from one of the California IOUs.

Application. An application for financial incentives is received from (or on behalf of) a customer entity which participates in an energy efficiency program (by way of the installation of program qualifying energy efficiency measures) at one or more sites. A customer may have prepared a single incentive application to cover either multiple measures or multiple sites or both; an application may also involve a single measure at a single site.

Project Sponsor. A project sponsor is the entity that executes and submits the application to the IOU. Customers can serve as their own sponsor or may elect to have a third party (such as an ESCO, a lighting contractor, or an HVAC contractor, collectively referred to as ***energy efficiency service providers*** or ***EESPs***) execute the agreement on their behalf. The project sponsor may receive the incentive payment if the customer directs the IOU to pass it onto the sponsor.

Tracking System. Each IOU has its own ***tracking system***, a database configured to track various pertinent parameters of the application process. The tracking system is periodically updated. Itron will receive this data periodically from the IOUs and maintain its own statewide tracking system to support this evaluation. The relevant project data will be passed on to the assigned evaluation team member or subcontractor.

For a given application, there can be multiple measures (such as high efficiency AC packaged units and the installation of a VFD on a chiller) in one end use. Note that multiple tracking system records may be created when a given IOU tracks either multiple measures or multiple applications for a given customer. Each project evaluation covers only one tracking system project; these may however, include multiple records or tracking system 'line items' (entries).

Reviewer. The IOU incentive program includes a review process. The "**reviewer**" may be IOU staff or may be an outside contractor hired by the IOU to review and approve the projects, calculations, and accompanying incentive applications.

Impact Evaluation. Itron and its subcontractors are performing a ***"gross impact evaluation"*** for the 2013- 2014 Industrial, Agricultural and Large Commercial Custom Energy Efficiency programs. This evaluation is designed to yield accurate estimates of energy savings that actually result from these programs.

Ex-ante savings / ex-ante calculations. The "***ex-ante***" (i.e., forward-looking) savings estimates and calculations are included in the application documents. The ex-ante savings are reported by the IOUs as the estimated savings in the IOU tracking systems and form the savings basis for the projects in this evaluation effort.

Ex-post savings / ex-post calculations. The "***ex-post***" (after the fact) savings estimates are the evaluation results after revised figures or calculation methodologies are applied by the evaluation team to adjust the energy savings or demand reduction estimates. In a few cases, where operating reports supplement installation reports, the IOUs may have also conducted some post installation measurements and recalculations (which typically results in an adjustment to the tracking system and revised ex-post figures).

Evaluator. The "***evaluator***" is the individual responsible for the project-specific impact investigation.

Evaluation Team. The ***"evaluation team"*** is composed of all individuals and firms involved in a specific project review. The evaluation team will review the ex-ante calculations and other information included in the application documents; prepare M&V plans; perform site specific M&V and data collection; calculate ex-post energy savings and/or demand reduction estimates; prepare final site reports to submit project results; and conduct program practices assessments (PPAs) after the final site reports for program comparison efforts. The PPA is described later in this document and is similar to the lower rigor assessment (LRA) performed for the PY2010-12 custom impact WO033 effort. Both subcontractors and Itron will maintain and employ, as part of the evaluation team, assigned quality control staff to review each project.

Gross Realization Rate (GRR). The ratio of the ex-post savings to the ex-ante savings is the ***"gross realization rate***". If the ex-post evaluation effort confirms that energy savings are realized from the measure under investigation, the GRR is positive and greater than, equal to, or less than 1.00 (100%). If the measure increases energy use, the GRR is negative. If zero energy savings are attributed to the measure, the GRR is zero.

Strata/ Stratum. Itron identified a statistically valid sample of projects within five individual ***"stratum"*** for this evaluation; these ***strata*** refer to the quantity of claimed energy savings. There are five strata for each IOU, with electric and gas savings combined on an MMBtu basis for utilities with both electric and gas savings. This stratification is required to capture the influence of the few projects which represent the majority of savings for the programs. Each stratum is assigned a weight to scale the savings from the sample results to the entire population in order to obtain program/sector/population results. Sample points in the large-project strata have a small sample weight and sample points in the small-project strata have a larger sample weight, thus; the sample points in the large-project strata may represent only the sampled project for a few larger projects whereas the sample points in the small-project strata represent the savings from a large number of other projects.

Rigor Levels. Sites are classified in this evaluation according to two **"rigor levels"** depending on the level of complexity of the measures and the likely degree of analysis and on-site work required. The stratum assigned to the project is a factor in determining the rigor level for particular sampled projects. Table 1.1 below provides an overview of the expected project M&V tasks for each rigor level. All activities during this evaluation are expected to fall into either Level 1 (called larger strata 1or 2 projects) or Level 2 (smaller strata 3, 4, or 5 projects). Projects will be assigned to evaluation teams in groups with a maximum allowable evaluation budget that allows costs not spent on less complex projects to be applied to larger, more complex projects. In order to allow this reallocation, each team should work as efficiently as possible to provide the maximum value to the entire evaluation effort. Note that project costs are a "not to exceed" cost and include M&V expenses, travel expenses, and travel time. Evaluation teams are urged to consolidate site visits

and minimize costs to maximize product quality. Each project evaluation may include multiple reviews and evaluation teams need to budget for that eventuality.

CMPA DEERESOURCES.INFO EM&V Portal. All project documentation including IOU data and responses to data requests, Itron and its subcontractors' project evaluation files, etc. will be stored on a secure web platform administered by the CPUC. Each point of contact from the evaluation team will receive access to this web portal. The CMPA EM&V portal facilitates review back-and-forth efforts to be carried out using the respective project location.

M&V Description for Proposed Engineering Rigor Levels

Level 1
Large or relatively complex projects (strata 1 & 2). Detailed application review, PPA, on-site verification, collection of data on key parameters, billing/interval data analysis, engineering models, spot measurements, short-term post monitoring, and baseline verification. Expected maximum effort: 40 hrs/project; Maximum allowable cost: $7,000 per project.
Level 2
Smaller, simpler projects (strata 3, 4 &5). Desk review, PPA, baseline verification, on-site verification, collection of data on key parameters, revised engineering calculations, billing data analysis, and possible spot measurements. Expected maximum effort: 20 to 25 hours per project; Maximum allowable cost: $4,000 per project.

1.3 Procedures and Protocols

1.3.1 Application Review

Each site specific evaluation will begin with the evaluator commencing review of the ex-ante documentation and tracking details for each project provided by Itron. The materials to be reviewed are obtained from the IOUs and may include electronic application records, utility bills, tracking system data, customer contact information, etc.

An Itron-generated and pre-populated MS Excel form will be used to create the three primary components of the site evaluation including the Program Practices Assessment (PPA), Site-Specific Measurement and Evaluation Plan (SSMVP), and Final Site Report (FSR) for each site in the assigned M&V sample. Note: This differs from previous years when MS Word documents were used. This will make completing forms more straightforward than the multiple documents used during the previous evaluations. This single Excel form is called the Site Reporting Form.

1.3.2 Co-ordination with Ex-ante Review (EAR) Team

For each assigned project, the evaluation team will coordinate with their assigned Itron QC reviewer and with the EAR team in guiding baseline selection and savings calculations for similar projects or measures where there is precedence set as part of the EAR process. For the sample points which overlap with the EAR points, the evaluation team (including the Itron QC reviewer) will plan for appropriate level of ex-post analysis based on the EAR findings.

Tracking data extracts will be posted to CMPA for each of the M&V sample points that include information on any ISP guidance or related EAR projects that may provide guidance, list issues, or describe evaluation methodologies. The Itron QC reviewers will assist thee evaluation team in obtaining or locating these documents on the CMPA EM&V portal.

1.4 Site Visit Setup

This section provides guidance for establishing initial customer contact and securing consent to visit the site for conducting measurement and verification (M&V). Customer approval to visit the site is a pre-requisite for developing the site-specific measurement and verification plan (SSMVP). The SSMVP should not be prepared until the participant has agreed to allow access to perform on-site M&V activities. Contact Itron's project manager or your Itron QC reviewer if the facility fails to return calls or refuses to allow site access so that additional resources can be called upon to facilitate customer cooperation or so that a backup site can be assigned. For difficult-to-recruit large strata sites, or where a back-up may not be available, Itron staff will work with IOU and CPUC staff to assist the evaluation team in the customer recruitment process.

1.4.1 Utility Representative Contact

Itron will provide the contact information for each customer's utility account executive/ representative or the local program coordinator. **Before contacting the customer** the evaluator should contact the customer's utility account executive/representative or the local program coordinator to inform them of the intent to contact the customer in two business days regarding the evaluation. If possible, the utility account representative should be asked to confirm the site contact information, telephone number, email addresses, cellular numbers, and alternate contact information. The utility account representative should also be asked to alert the customer of the names of the individuals and firms conducting the evaluation for Itron. The most efficient approach is generally by email with the evaluation authorization letter from the CPUC attached, and followed immediately by a telephone call to both office and cellular lines that day and the following business day. Itron will assist, if needed, with templates of account executive and customer notification emails (these notifications follow those used in the preceding 2010 -2012 evaluation).

If any difficulties are encountered contacting the utility account representative within one to two calendar days, the evaluation team will notify their Itron QA reviewer immediately to provide assistance. Tracking data may contain outdated or inaccurate contact information; the IOU evaluation leads can provide updates through Itron.

1.4.2 Initial Customer Contact

The evaluation team may contact the customer on the second business day after alerting the IOU representative. The team should briefly review the application documents provided by Itron to assist in an understanding of the project scope, the formulation of the M&V plan, and site visit activities. The evaluator may wish to contact (via Itron) the utility reviewer or reviewing firm at this stage for clarifications on the application paperwork and request any follow-up site data if needed.

Prompt customer contact to allow for maximum scheduling flexibility and is key to ensure timely project completion.

Itron will provide each evaluation team with site contact information based on program tracking system records and contact information provided by the IOU. **If any difficulties are encountered contacting the customer, inform Itron immediately for assistance.** Tracking data will, in some instances, contain outdated or inaccurate contact information. Itron will contact the IOU to obtain updates, as needed.

Site recruiting and scheduling appointments are the responsibility of the evaluator assigned to a given project.

The evaluation includes a phone interview of the program participants as part of NTG assessment efforts. The survey targets the project decision-maker who may be the same person involved with facilitating the on-site evaluation work. If the NTG interview occurs first, Itron's phone interviewer will inform the customer that they will be contacted by evaluators for a separate on-site evaluation visit. Interviewers on the NTG team will attempt to verify the site contact information before conducting the telephone survey. If customer contact is first made by the gross impact evaluation team, that team member will inform the customer of the pending net-to-gross phone interview and should attempt to identify the most appropriate individual for this interview and to obtain their contact information. Your Itron QA reviewer should be informed when each customer has been alerted and when a site visit has been approved, including the date.

Again, efficient contact is usually performed through a combination of alerting emails and phone contact (via voice and cellular lines) to schedule visits.

When contacting the customer, it is important to identify yourself as a consultant acting on behalf of the CPUC (regardless of your employer affiliation), explain the purpose of the project to the customer, offer to connect them with our CPUC project manager to answer any questions, and inform them that you would like to schedule a site visit. The customer should be informed that the evaluation report will not reference their company name or the name of any site representative contacted and that they are participating anonymously. It is useful to stress that there are no changes in the incentive monies and no penalties associated with this review. If the customer contact person expresses reservation or refuses to allow the on-site visit, to the reviewer should press for cooperation with the terms of the project application which stipulates as a condition of receiving the incentive to facilitate post-installation site visits. Permission to visit the site for post-implementation review is a requirement under CPUC guidelines included on the program application agreement that the customer executed to participate in the incentive program.

It is often helpful to offer some specific details about the project you are evaluating to increase your credibility. An example would be a statement such as "your company participated in the 2013 PG&E Heavy Industrial Energy Efficiency Program and received a $50,300 incentive for the replacement of five plastic injection molding machines with higher efficiency machines."

Success in this project depends upon establishing credibility with the customer from the first telephone contact. The evaluation team should work to maintain credibility during the first on-site meeting and any subsequent site visits, phone calls, data requests, and other correspondence with the customer. During recruitment, in addition to discussing the scope of the evaluation, the evaluator must also discuss the availability of pertinent data from the customer's energy management system (EMS) or supervisory control and data acquisition (SCADA) machines, the potential of installation of metering or monitoring equipment, photographing the measure(s) and site visit needs (personal protective equipment or PPE, clothing requirements, onsite meeting logistics for time and location, etc.).

Itron should be notified immediately following the scheduling of any visit to any customer site. This should be done on both an individual basis and summarized in any project meetings. If time permits the on-site visit should be scheduled 1 to 2 weeks in advance to allow time for the Itron QA reviewer to review the SSMVP, as discussed later.

1.4.3 Letter of Introduction

Letters from Itron (on CPUC letterhead) and picture identification should be carried by evaluation personnel conducting site visits. The on-site evaluator should offer to connect the customer representative with our CPUC contract manager if there are any questions. The site or company contact may call the applicable CPUC representative identified on the letter or Itron to verify the purpose of our study or to address other concerns. If site access is refused after arriving at the site,

after carefully probing the customer's reason for refusal and removing yourself to a safe location, contact your Itron QA reviewer for assistance.

1.4.4 Reminder Calls

Always contact the site representative during the week of any scheduled travel and the day before the scheduled site visit to ensure the facility is prepared to accommodate your arrival. Reminder calls the day prior to a given appointment help ensure that no conflicts have arisen that would impact the site visit or data collection activities.

1.5 Site Report Form

Itron will upload a pre-populated form (an MS Excel workbook) for each assigned M&V point on the CMPA EM&V portal under the proper folder each identified with the Itron ID. The form is called a Site Report Form.

This workbook includes templates for the PPA, SSMVP, and the Final Site Report (FSR) sections. Please use the site-specific PPA electronic form for all reports so that there is consistency in the format of the evaluation. The form is pre-populated with data from the IOU tracking database specific to each sample point.

The site report form is designed for use in conducting initial desk reviews to identify issues with the tracking data, eligibility, baseline, costs, and calculation methods. The site report form includes the M&V plan is a requirement for conducting post-installation M&V as part of the custom project ex-post impact evaluation and is filled out only after securing facility consent for a site visit (recruitment). The SSMVP section of the form must **be submitted to Itron one week prior to conducting on-site work**. The FSR sections of the form will be completed upon commencing final ex-post savings analysis.

Relevant notes on completing the Site Report Form (including the PPAs, SSMVPs and FSRs) are as follows:

1.5.1 Project and Site Visit Info - Worksheet #1

- Most of the data needed for worksheet #1 (Project & Site Visit Info) is found in the IOU tracking database.
- It is important to note that all customers and IOUs are participating anonymously in the evaluation. The reports should not reference any customer name, account numbers, location or other information that could allow identification of the customer. There should not be any way to identify the customer or location in the report. This requirement applies equally to all tables, figures, and spreadsheets that are provided or are pasted into the

document. Itron distributed data handling and confidentiality agreements and requirements to the evaluation teams and these will be updated as revisions become available.

- The Itron Project ID is a six-character string that starts with the letter E, F, G or H, followed by a "3" (for 2013) or a "4" (for 2014), and then four numbers identified over the IOU population of ex-post projects (0001 up to 9999, as needed). Please preserve any leading zeroes in the ItronID and do **not** use any hyphens when the ItronID appears in any emails, site report notes or other correspondence.

1.5.2 Baseline & Costs, Project Eligibility, and Calculation Methods Worksheets 2 through 4

- The three –worksheet tabs labeled "Baseline & Costs," "Project Eligibility," and "Calculation Methods" are the repository of the key data for the PPA and SSMVP. The SSMVP sections of these worksheets need to be completed prior to 1) developing the M&V plan, and 2) conducting the field work. The FSR sections of these three worksheets need to be completed after the site visit and included with delivery of the final FSR product.
- The "Baseline and Costs" worksheet collects and detail information on replaced equipment related to effective useful life (EUL) and remaining useful life (RUL). Record information about periodic equipment maintenance and repairs in the "Additional Comments" tab. Evaluators should review the embedded EUL/RUL Guidance document in the Reference Documents section of this document because CPUC requirements are changing and will affect the approach to calculating initial and lifetime savings.
- The "Baseline & Costs" worksheet provides fields for recording the cost estimate for the selected energy efficiency measure(s). These data should be collected either on-site or from the application documentation for the measure(s)/project(s) reported in the application. Also provide a statement in the "Baseline & Costs" worksheet supporting your assessment of your perceived accuracy of the cost estimate. Special attention should be given as to whether the tracking system costs and the incentive cap calculations show the full cost of the measure or the incremental cost of the measure. The evaluator should assess the appropriateness of this/these cost basis(es) in light of the program and CPUC baseline requirements, definitions, and other evaluation guidance.

1.5.3 Site Specific M&V Analysis – Worksheet #5

- For the first phase of the M&V plan complete the "As Planned" column of the "Site Specific M&V Analysis" worksheet (tab 5).
- The evaluator should use "N/A" only for fields that are not applicable to the evaluated project and measure. All other fields should be filled out with relevant information or the reasons for missing data. In some cases specifying "Unknown" is acceptable such as when

data is applicable but was not provided by the IOU or is infeasible to be obtained within the scope and budget of the evaluation effort.

- For the FSR phase of the project, complete the last column in tab 5 labeled "Final Ex-post Analysis (As Implemented or Found)". This column should be filled out with any updates or corrections. The form updated with ex-post evaluation findings shall be submitted as the draft Final Site Report (FSR) **within two weeks after the site visit.** Use "Same" for the "As Implemented or Found" column if the data has not changed.

1.5.4 Savings Calculation Method, Impact Results, and Reasons for Discrepancy – Worksheets #6 through 8

- The Excel worksheet tabs 6 thru 8 labeled " Ex-post Savings Calculation", "Impact Results", and "Reasons for Discrepancy" are to be filled out while completing the ex-post analysis. The information includes the summary of the ex-post results, installation verification, and scope of the impact assessment.
- These data also identify and provide further details on the key reasons for discrepancy between claimed and evaluated savings. Any change in the measure realization rate is expressed as a percentage of the difference from 100% of ex-ante savings estimates and is attributed to the appropriate reason for discrepancy. For example: a project with a gross realization rate of 60% has a total discrepancy of –40% (this is the adjustment in savings as compared to 100% of ex-ante savings estimates). For the same example project, the changes in operating conditions may be contributing to a 30% reduction in savings and the remaining 10% could be the resultant of incorrect baseline application. These savings reductions collectively combine to form the 40% reduction (or the –40% discrepancy) for the project. The percentages and reasons for savings discrepancies for multiple measure projects are reported separately for each of the evaluated measure.
- The Site Reporting Form, your analysis (external calculation spreadsheets are acceptable), and all associated data files (logger data, SCADA data, photos, etc.) must be submitted to Itron for review. Note: Eight of the ten tabs (the first eight) should be completed prior to sending for Itron QC review.

1.5.5 Additional Comments – Worksheet #9

- Worksheet tab 9 (Additional Comments), discusses, from the customer's perspective, the non-energy benefits of the measure(s). Possibilities include, but are not limited to: Replaced aging equipment that was maintenance-intensive, reduced need for regular maintenance / repairs, increased capacity or production, increased comfort, higher quality energy service, reduced emissions, water savings, increased security, etc. In some instances, customers will indicate that there are no perceived non-energy benefits; this should also be noted.

- Also part of the Additional Comments worksheet are fields to discuss if the customer has any planned changes in the operation of the primary measure that will impact the energy savings or demand reduction in the future. For instance, a customer may have retrofitted a compressed air system and is aware that one of the devices that consumes compressed air is going to be permanently removed from service. Since this would change the hours of operation compared to historical patterns, this will change the energy savings. The timing of these changes is important if verifiable, as this information can be used to adjust savings figures in the life-cycle (LC) GRR calculation.
- The Additional Comments worksheet can also be used to describe any spillover measures observed during the course of the evaluation. Although spillover is a measure of energy savings, the California evaluation framework does not recognize spillover as valid energy savings for IOU savings claims.

1.5.6 Net-to-Gross Review – Worksheet #10

- The Net-to-Gross Review worksheet is completed by Itron's Net-to-Gross team after they complete their decision-maker interview. This worksheet also the team to communicate with field engineers regarding the resolution of baseline issues.
- Please enter any other project pertinent details obtained from the site such as customer standard practice, problems with verification or access, equipment maintenance issues, standby operation, problems with the measure, other large changes at the plant affecting equipment operation, etc., into worksheet tab 9 (Additional Comments).

1.6 Itron Review of the SSMVP

Assigned Itron QC reviewers will review the Site-Specific Measurement and Evaluation Plan (SSMVP) upon submittal by each evaluation team. The subcontractor's point of contact (POC) will ensure that each draft report has been peer reviewed for accuracy, clarity and adherence to the reporting requirements outlined in this document before the document is forwarded to Itron for review. Professional level writing that clearly and accurately describes the impacts of the project is required.

The SSMVP should be submitted at least three days before the site visit to maintain the project schedule, to enable timely review, to allow required M&V equipment collection, and for efficient site visit scheduling. Itron's project manager or QC reviewer will provide guidance for specific situations, including technical details, potential scheduling difficulties, conflicts of interest, or ineligibility for various programs. Each subcontractor is encouraged to engage in active discussions with Itron, particularly at the beginning of the project. This will help reduce wasted time and effort and provide for a better work product.

The SSMVP will be submitted to the CPUC for review after Itron has reviewed the document and made needed modifications. Once the SSMVP is provided to the CPUC for further review, each evaluator will proceed with the remainder of the tasks (confirm site visit date, conduct site visit, perform data collection and analysis, draft the FSR, etc.). The Itron reviewer is responsible for relaying any comments on the evaluation plan to the field engineer.

1.7 Use of CMPA/ EM&V Portal to Transfer Files

Itron and all subcontractors will be using the CMPA/ EM&V portal to transfer files between members of the evaluation team for this impact evaluation. Each subcontractor will have access to their assigned gross M&V sample points on this site. Electronic files should be uploaded to CMPA/EM&V portal under the appropriate project directory. All files related to a particular project will be saved in the folder for that project as they are completed. Itron will provide training on the use of the CMPA/ EM&V portal on an as-needed basis.

For all issues related to file transfer and the CMPA. EM&V portal, please notify your Itron QC reviewer.

1.8 On-Site M&V Visits and Sampling within a Site

1.8.1 Measure Installation Verification

The objectives of measure installation verification are to confirm that:

- the measures were actually installed,
- the installation meets reasonable quality standards,
- the measures are operating correctly, and
- the measures have the potential to generate the predicted savings.

Measure, make, model number, and capacity data should be collected and compared to the documentation contained in the application. As-built construction documents may be used to verify measures where access is difficult or impossible.

For multiple measure projects (whether a large or small stratum site) the evaluator will be verifying only the top "x" measures that comprise at least 75 percent of ex-ante savings claim values. Note that the top measures may not be the first numerically listed measures, e.g. Itron ID H40501-001 may have lower savings than H40501-002. The Site Report Form for each of these multiple measure projects will identify and pre-populate information available from the tracking database for the two relevant measures at each site. It must be noted that for a few projects, there may be more than two measures. Itron will provide specific guidance for such projects.

1.8.2 Data Collection, Monitoring, and Sampling

On-site data collection should be completed in a manner consistent with the SSMVP developed for the site, within reason. Opportunities to enhance the original plan should be pursued as appropriate, given the project conditions, schedule and budgeted level of effort. Contact your Itron QC Reviewer if the site refuses access to the facility or any specific measure, if any measure is found to have been removed, or if the approach described in the M&V Plan is not feasible due to access restrictions, safety, time constraints, or unforeseen circumstances.

The engineer may elect to employ a sample of the installed measures within a site for projects involving quantities of widgets too numerous to evaluate with the available resources. Itron will work with each evaluation team to develop a sampling plan as part of the SSMVP prior to the engineer arriving on-site. However, in some situations, sampling decisions will need to be made on site. The assigned engineer should attempt to contact the Itron QC reviewer to discuss on-site sampling strategies prior to implementing the revised plan.

Monitoring shall be performed in a manner which avoids the potential for bias in the results. For example, it is not acceptable to monitor on equipment that is convenient to monitor while treating differently other equipment that is out-of-reach or somewhat more difficult to monitor. Random sampling and stratified sampling (see Chapter 13 of the California Evaluation Framework Study) shall be employed as appropriate to preserve sampling integrity. Evaluation team members should also review the measure sampling discussion in Chapter 7 – Measurement and Verification, pp. 193 and 194, of the California Evaluation Framework Study.[2]

1.8.3 Photographs

With the customer's consent, photographs should be taken at each site visited. Photographs should focus on items relevant to the evaluation. Take notes to identify the subject of each photograph. Photographs should be taken to document all measurement points showing the instrument used and where the measurement is taken. Photographs should not be included in the final site reports, but should be submitted in a separate electronic zipped file (with separate jpeg files) to Itron. Clear photos that include site identification details (Itron ID number), facility equipment coding (SF-3, IMM-13, etc.), equipment nameplate, and pertinent operator interface control "screen shots", which show a date/time stamp, are preferred. Confirm that each photograph taken is in-focus and legible by viewing the image and "zooming in" to inspect the clarity and readability. Digital photos should be saved in the smallest resolution possible without sacrificing clarity. Only relevant photographs should be provided, and each photograph should be clearly labelled with Itron ID and subject. Photographs that support the evaluation findings should be detailed in the Final Site

[2] The California Evaluation Framework Study, Tec Market Works.

Reports. If a building simulation is proposed, photographs pertinent to the building model, such as exterior exposures, typical spaces, and mechanical equipment can be included.

1.8.4 Obtain Other Documentation

In many instances, it may prove useful to obtain data from manufacturers' representatives, manufacturer's contact information (telephone number and location), and service provider information. Note that this contact information or serial numbers that may reveal the location of the project should **not** be included in the FSR.

1.8.5 Considerations for Safety

Evaluators are required to review appropriate OSHA/NFPA guidelines and rulings, and all other applicable codes and standards regarding electrical and workplace safety. Evaluators should ensure that all personnel working on this project have received appropriate training on topics including, but not limited to, the proper use of equipment, safety considerations for all conditions under which work will be performed, and the use of proper safety equipment (electrical safety gloves, protective eyewear, earplugs, appropriate footwear and clothing, etc.).

It is envisioned that the site evaluation effort will involve the placement of data loggers, use of spot measuring equipment such as clamp-on ammeters, placement of vibration sensors on rotating equipment, installation of current transformers (CTs) and potential transformers (PTs), opening electrical panels and other control panels, and the placement and removal of other monitoring and metering equipment.

In general, the monitoring function will be accomplished utilizing the equipment supplied by the evaluation team. In some cases, measurements may be obtained utilizing instrumentation in place at the site. Also, in rare instances, the customer may allow use of their own short or long term monitoring equipment. Hand-held measurement devices meeting sufficient accuracy requirements should be used to verify equipment operating conditions with spot readings of voltage, amperage, power factor, or kW.

When possible, instrument installation, placement, and removal tasks should be performed by personnel employed by the customer at the facility being evaluated. The safest and most secure arrangement for installation should be planned prior to the site visit, documented, and then re-assessed during the field visit. In the planning and evaluation process, the use of site equipment or personnel, and their cooperation/timely response should not be presumed at any point of the evaluation process. Each evaluator is responsible for the labor and costs associated with the safe and proper placement, installation, and safe removal of monitoring and data acquisition equipment as outlined in the SSMVP, both as submitted and as adjusted for field conditions.

In addition to electrical safety gear, any persons planning to visit a site shall be prepared to comply with the customer's safety requirements for visitors and should have their individual personal safety glasses, ear plugs, hard hat, electrically insulated rubber-soled boots (steel or reinforced toe as required by the site) and other required PPE available for use at each site visit where required. Field staff should be informed of and be prepared to provide documentation of all required safety training prior to visiting the site.

1.9 Impact Analysis and Final Site Report

The FSR will be prepared following the completion of site work and data collection, and will entail the following activities.

1.9.1 Ex-post Analysis

The Site Report spreadsheet utilizes protection to ensure the integrity of data entry and to prevent accidental changes. Any external ex-post calculation and analysis spreadsheets should never be attached to or embedded in the Site Report Forms. All supporting documents should be uploaded separately but simultaneously alongside the Site Report Form.

The ex-post evaluation should segregate the analysis and documentation of the targeted measure(s) in the project or application. For applications with multiple measures or end uses, the evaluator must review the application to determine the site(s), measure(s), cost, energy savings and other parameters associated with the assigned measure, which Itron will help identify.

As described in previous sections, the installation of all evaluated measures in a project should be verified during the site visit and the efforts should be documented within the verification section of the report. The evaluators should contact Itron for clarification if there is any question about the scope of the ex-post evaluation.

Describe clearly the calculation parameters and methodologies in worksheet #6, Savings Calculation Method.

Within the Site Report From workbook (the Impact Results and Reasons for Discrepancy worksheet #7 and 8) the evaluation team is expected to provide a clear, concise and well-written summary of the ex-post evaluation including the project description, methodology and calculations. Text box cells should contain a brief description, with a reference to additional project details. Discussion of the basis of the calculations (such as measured data, assumptions, extrapolations, estimates, formulae, etc.) must be provided. It is vital to define the baseline type and level of efficiency of the baseline and installed measures and to provide sufficient written explanation to ensure that these have been defined according to the program guidelines and industry standard practice or code. Any modifications and deviations from the SSMVP during the

site visit and analysis must be discussed. A brief description of the approach used, pertinent information about the facility and its production process, and relevant information obtained from the site representatives are required. Verification results are summarized in tabular format. The installation verification requires an installation realization rate which is the ratio of the as-found equipment quantities divided by the ex-ante claimed quantities.

The effective useful life (EUL) will be supported, as necessary, by the Database for Energy Efficiency Resources (DEER) recommendations.

All inputs and formulae used to calculate the ex-post savings will need to be clearly identified in the analysis spreadsheets to facilitate peer review. The Itron QC lead needs site reporting forms and calculations demonstrate a clear understanding of the approach used with sufficient detail to re-create any customized calculations. All inputs to simulation models that are not otherwise documented should be described in tabular form in a separate document.

The factors relating to the differences between the ex-ante results and the ex-post results, and any comments on shortcomings identified with the ex-ante approach, should be identified in the Reasons for Discrepancy worksheet #8. Additionally, the realization rate and the detailed reasons for discrepancy in ex-ante vs. ex-post savings estimates should also be discussed and the differences summarized.

1.9.2 Building Simulations

Where required, building simulations performed for the evaluation will use DOE 2.2 (latest version) or DOE2-R (refrigeration). The interface provided by eQUEST or EnergyPro may be the most effective method to achieve reliable results. Simulations will be calibrated to utility bills and weather, when applicable, using IPMVP Option D for guidance. Simulations should be calibrated to both actual energy and demand. Utility billing data should be normalized using actual weather obtained from NOAA or other reliable sources for the baseline (pre-retrofit) or as-built (new construction) conditions. Calibration may be based upon on site data collection. Simulations should then be run using NOAA actual weather data for site specific impacts (to determine the model validity) and CEC climate zone weather data for pre and post-installation periods to estimate typical impacts at the climate zone level for the project. Savings and demand reduction impact results will be reported for the weather data applicable to the CEC climate zone and for the appropriate peak demand period.

1.9.3 Compressed Air Simulations

Simulations for compressed air systems will use AIRMaster + (1.27, or latest version), which can be downloaded from:

https://www1.eere.energy.gov/manufacturing/tech_assistance/softwaretoolregistration.asp?product=1

The simulation shall be calibrated to field measured data. Complex flow measurements may be available from site instrumentation or vendor / installer provided instrumentation (such as during a start-up or commissioning exercise). The validity of this information should be confirmed before using this information in savings estimations. In all cases, expected accuracy of the values should be indicated.

1.9.4 Annual Hours of Operation

All calculations should standardize the number of annual hours to be 365 days/year x 24 hours/day (8,760 annual hours). Calculations should accurately account for weekends, holidays and actual hours of operation (determined from the customer representative interview).

1.9.5 Coincident Peak Demand Reduction / Reported Demand Reduction

Coincident peak demand impacts are generally the reduction in demand from the incentivized measures estimated in a manner consistent with the guidance for peak demand as defined in DEER. The coincident peak demand period is defined as;

> ***"The average grid level impact for a measure between 2 pm and 5 pm 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.

These may be found in Section 6.2 of the DEER2014 Update.[3] While this definition of kW does not explicitly segregate weather sensitive measures and non-weather sensitive measures, the peak load kW impact for a non-weather sensitive measure would be expected to correspond to the average kW reduction on a typical summer weekday (June through September) between 2 pm and 5 pm. For weather-dependent measures, the peak load kW impact for a non-weather sensitive measure would be expected to correspond to the average kW reduction on the hottest summer weekdays (June through September) between 2 pm and 5 pm (with climatic conditions that are typical of the weather data sets for that climate zone).

When building simulations are performed, the reporting of peak kW can be calculated accurately by using the days DEER defined peak kW days. For other measures, monitoring should be conducted during (or modeling should be performed using) climatic conditions similar to those

[3] http://www.deeresources.com/files/DEER2013codeUpdate/download/DEER2014UpdateDocumentation_2-12-2014.pdf

contained in the weather data sets. If the monitored period contains the DEER identified three day period, peak kW impacts should also be reported at these time periods.

Peak demand impacts are only valid for measures and processes known to be in operation during the peak demand period. When it is not possible to measure the energy consumption of the measure during this peak demand period, a suitable alternative time period will be measured. The validity of the measured demand reduction should be discussed in terms of the relationship between the measured time period and the CA peak coincident demand period and any potential bias introduced into the calculation of savings.

1.9.6 Increases in Production

For industrial measures, changes in production between the pre-installation and post-installation periods must be considered in a manner consistent across this evaluation. Changes in production have a direct impact on total energy usage and energy savings. In order to adjust the baseline, an industrial process application must clearly elaborate how an increase in production between the base case and the improved case is traceable to market conditions and not to production improvements due to the implementation of the incentivized measures. If the causes for production increases are not adequately described then load impacts shall be calculated using the production prior to the installation of the measures to prevent subsidization of equipment purchased for enhancing production rates alone rather than energy efficiency.

For example, a baseline condition may have resulted in 4,000 hours per year of equipment use for 100 units of production. Efficiency increases may have reduced the necessary use to 3,000 hours for the same 100 units. Shift schedules, however, resulted in 4,000 hours of use in which 120 units were produced. If the efficiency improvement also increases the rate of production as a side-effect of the measure and induced the customer to increase the production, then the baseline and post retrofit energy use should be calculated on the original 100 units of production. However, if market conditions required 120 units of production, and shift hours would have been increased to produce these 120 units with the original equipment, then the baseline should be adjusted for the 120 units. The determination of whether market conditions caused the actual change should be investigated through interviews with the customer during the site visit or with written documentation from the initial application file.

There are also cases in which the production has decreased and the measure did not cause the change in output. In such cases the post retrofit equipment and pre retrofit equipment should be evaluated using the post retrofit production levels. Thus, if production decreased from 100 to 80 units due to market conditions, the baseline should be adjusted for the 80 units. In the unlikely event that the output of 80 units was due to the change in process or equipment, the post retrofit energy use should be adjusted for the pre retrofit production of 100 units. The intent is to

incentivize the increase in production efficiency independent of changes in market and customer demand.

Decisions on whether adjustments are made for changes in productivity must be clearly described in the site report form and reviewed and approved by Itron if there is any uncertainty as to the appropriateness of the adjustment.

1.9.7 HVAC Interactive Effects

The evaluation protocols require that all measure impacts be estimated net of interactive effects due to non-incentivized measures. When the interactive effects are large relative to overall energy or costs savings (10% or greater), evaluators should make an especially clear note of this in the SSMVP and incorporate procedures and measurements to account for the interactive effects.

Note that DEER prescribes cooling and heating load interaction factors for certain building types and climate zones. When building simulations are performed, the load impacts should be included with the end use designated for that application, e.g., VFD energy savings for a chilled water recirculation loop will usually appear in the cooling energy savings end use category.

1.9.8 Non-HVAC Interactive Effects

This would include assessing any "direct" interactive effects that would impact gross savings. This category includes, for example, a process equipment retrofit that reduced space temperatures and, as an interactive result, compressor energy use for space cooling.

1.10 Itron Review of the Final Ex-post Analysis and Site Report Forms

Each evaluation subcontractor team has an assigned Itron QC reviewer who reviews the completed Final Ex-post Analysis, Site Report Form (PPA, SSMVP, and FSR), and all other pertinent site info including logger data files, equipment specification sheets, photos, production record logs, etc. As FSRs are completed, the Site Reporting Form should be labeled as DRAFT versions and the electronic file naming convention for this project (provided by Itron) should be used. The subcontractor is responsible for implementing quality control procedures for each site and application review. At a minimum, each subcontractor's POC will ensure that each draft report has been reviewed internally for accuracy, baseline consistency, clarity, and adherence to the reporting requirements outlined in this document before the document is forwarded to Itron for review. The peer reviewer is usually the point of contact for that evaluation team.

Professional level writing is expected for this project. All tables, exhibits, etc. will be numbered and referenced in the text of the report in the format required. Reports are expected to be concise and written at a level that can be comprehended by an energy efficiency industry professional who may not have an engineering background but who has a conceptual understanding of the technical

aspects of the profession. Itron expects to receive documentation that is clear, concise, and error-free.

Each report will be tracked from inception through completion in worksheet #1 of the Site Report Form (Project & Site Visit Info) that identifies the project and the first and last name of the project evaluation engineer. After in-house quality control review, the Site Report Form and associated supporting calculations, photographs and collected data should be promptly submitted to Itron for review and approval. **The first project FSR submissions should occur within two weeks of the final project on-site visit.** A zip file containing photographs pertinent to the site report should be provided. All spreadsheets used for calculations should be delivered with all cells active and linked to facilitate reviewed. Savings analysis results should be summarized per measure on a single worksheet and table with cells referencing any other analysis contained in other worksheets or workbooks.

Timely review is meant to allow appropriate inputs and speedy resolution of omissions or errors. **Itron reviewers will complete review in three working days of FSR submission. Evaluation teams must provide responses to FSR modification requests within three working days.** This will enable projects to meet high technical standards while remaining on schedule.

1.10.1 Data Products and Project Output

All final data products – collected site data, SCADA/ EMS files, production records, logger files, equipment spec sheets, interview notes, photos, etc. –should be enumerated in the site report form along with the specified in the evaluation methodology and plan and provided in electronic format to Itron via the CMPA/ EM&V portal. These data products should be referenced to the goals and objectives of the project and include a specification of the data formats and engineering units. For example, a suitable description will be that "a DENT ElitePro logger will provide five minute interval data for kW, amps and volts and power factor. The kWh value is computed in the project analysis spreadsheet".

1.10.2 M&V Protocol

The M&V protocol chosen for the project should be described in the Site Report workbook on the Site Specific M&V Analysis worksheet #5. In general, option A, B, or D will be used. Option C, entailing aggregate facility energy usage and billing history, could be used when the energy savings are significant relative to the total metered energy use (typically by more than 10%) and when the underlying drivers affecting energy use remain relatively constant with readily quantifiable changes. Otherwise, whole facility energy usage variations may not be able to capture the true effects of the energy retrofit. Interval data on 15-minute intervals for electric demand may be useful in determining peak demand savings for all evaluations and should be considered. Interval data is available for over 90% of customers larger than 200 kW in California. Many of these interval meters have been installed relatively recently. Itron will attempt to obtain billing

information for all customers, and will request pre- and post-installation interval data from the IOUs for selected customers. Unlike monthly billing data, interval data can be extremely valuable for estimation of peak demand savings and for model calibration. To obtain these data the site evaluation team submits a request for utility billing usage data to the Itron QC lead who will coordinate delivery of the data through the CMPA M&V portal website.

Any proposed deviations or modifications from the IPMVP options within the proposed protocol should be noted. The *California Energy Efficiency Evaluation Protocols*[4] and *The California Evaluation Framework* should be used as resources and may be referenced as appropriate.

1.11 Program Practices Assessment (PPA)

The PPA process will provide additional insight into utility practices applied in deriving custom project impact claims. As with the SSMVPs and FSRs, concise responses to the parameters of interest are required. The Site Report Forms will be updated for the PPAs and SSMVPs during or immediately after the site analysis and FSR sections are completed.

1.12 Additional Evaluation Findings

The Site Report Form includes a worksheet (#9) for any additional notes regarding the evaluation, which can include additional discussion of the uncertainty associated with the ex-post results and how to reduce uncertainty for future similar ex-post evaluations are examples of additional useful information. The economic parameters for the project could also be included, limited confined to the primary two measure(s) evaluated / assigned for the project.

See Section 1.4.5 (Additional Comments - Tab) for additional findings or comments that could be included in the FSR.

1.13 Reference Documents

The website hyperlinks for the files below will be made available when they are posted to the CPUC public website.

- Evaluation Guidance for Site Specific Analysis_2014_0918_Update.xlsx[5]

[4] The referenced evaluation protocols can be found at: http://www.calmac.org/events/EvaluatorsProtocols_Final_AdoptedviaRuling_06-19-2006.pdf

[5] Industrial, Ag and Large Commercial Evaluation Guidance available at www.energydataweb.com/cpuc/. Select the search tab, and from the drop down menus, select Portfolio Cycle 2013-2014 and Work Order (ED_I_IAL_2-Itron) 1314 IALC Impact. Direct link:

- IALC 2013 - EAR Overlap and ISP Guidance.xlsx[6]
- ProjectBasis_EULRUL_Evidencev1July172014.pdf[7]

http://energydataweb.com/cpucFiles/pdaDocs/1256/Evaluation%20Guidance%20Questions%20for%20Site%20Specific%20Analysis_2014_0918.pdf

6 Appendix D of this report

7 http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5325

APPENDIX D EAR GUIDANCE

The tables below show a list of all 148 EM&V sample points and identifies ex- ante review (EAR) guidance that might apply to the measures or project being evaluated. The purpose of this table was to inform the EM&V field engineer about relevant CPUC guidance on similar measures or perhaps identifies a matching exact EAR project, in which CPUC staff has already reviewed and provided a disposition or directives to the Program Administrators (PAs). In this way, CPUC evaluators were able to utilize consistent interpretation, analysis and guidance across all EM&V sample points.

When a project is an exact EAR match, then it is anticipated that less time may be required to conduct field M&V than would normally be required. CPUC's ex ante review (EAR) process may have directed significant pre- and post-install M&V by the PAs. For similar measures, the CPUC's evaluation contractors can detect and apply policy guidance appropriately and reliably.

ItronID	ItronRecordID	Any EAR Overlap (Yes/No)	EAR Guidance Applicability	All EAR Overlap Project IDs
E50001	E50001-001	Yes	Similar measures, different customer/facility	X477, X274
E50002	E50002-001	No	0	0
E50002	E50002-002	No	0	0
E50003	E50003-001	No	0	0
E50003	E50003-002	No	0	0
E50005	E50005-001	No	0	0
E50006	E50006-001	No	0	0
E50007	E50007-001	No	0	0
E50007	E50007-002	No	0	0
E50007	E50007-003	No	0	0
E50007	E50007-004	No	0	0
E50009	E50009-001	Yes	Same customer, same facility	X364
E50010	E50010-001	Yes	Same measure, different customer/facility	X018
E50011	E50011-001	No	0	0
E50014	E50014-001	No	0	0
E50016	E50016-001	Yes	Exact match	X364
E50020	E50020-001	Yes	Similar measure, different customer	X248
E50037	E50037-001	Yes	Same customer, different measure	X419
E50037	E50037-002	Yes	Same customer, different measure	X419
E50042	E50042-001	No	0	0
E50112	E50112-001	No	0	0
E50151	E50151-001	No	0	0
E50245	E50245-001	No	0	0
E50245	E50245-002	No	0	0
E50599	E50599-001	No	0	0
E50624	E50624-001	No	0	0
E50801	E50801-001	No	0	0
E50806	E50806-001	Yes	Same customer, same facility, differnet measure	X260A
E55001	E55001-001	No	0	0
E55001	E55001-002	No	0	0
E55002	E55002-001	No	0	0
E55004	E55004-001	No	0	0
E55006	E55006-001	No	0	0
E55006	E55006-002	No	0	0
E55012	E55012-001	No	0	0
E55014	E55014-001	No	0	0
E55019	E55019-001	No	0	0
E55019	E55019-002	No	0	0
E55020	E55020-001	Yes	Exact Match	X268
E55033	E55033-001	Yes	Same measure, different customer/facility	X419
E55043	E55043-001	No	0	0
E55043	E55043-002	No	0	0
E55047	E55047-001	No	0	0
E55076	E55076-001	No	0	0
E55080	E55080-001	Yes	Same measure, different customer/facility	X518
E55100	E55100-001	Yes	Same measure, different customer/facility	PGE-15-T-C-0008_AERCx403+Multiple_HVAC
E55126	E55126-001	No	0	0
E55141	E55141-001	No	0	0
E55185	E55185-001	No	0	0
E55185	E55185-002	No	0	0
E55185	E55185-003	No	0	0
E55185	E55185-004	No	0	0
E55268	E55268-001	No	0	0
E55901	E55901-001	No	0	0

ItronID	ItronRecordID	Any EAR Overlap (Yes/No)	EAR Guidance Applicability	All EAR Overlap Project IDs
E55904	E55904-001	No	0	0
E55906	E55906-001	No	0	0
F50001	F50001-001	No	0	0
F50002	F50002-001	No	0	0
F50003	F50003-001	Yes	Similar engineered gasket measure, similar industry	X111
F50004	F50004-001	No	0	0
F50004	F50004-002	No	0	0
F50004	F50004-003	No	0	0
F50004	F50004-004	No	0	0
F50004	F50004-005	No	0	0
F50005	F50005-001	No	0	0
F50006	F50006-001	No	0	0
F50011	F50011-001	No	0	0
F50011	F50011-002	No	0	0
F50011	F50011-003	No	0	0
F50011	F50011-004	No	0	0
F50011	F50011-005	No	0	0
F50012	F50012-001	No	0	0
F50013	F50013-001	Yes	Exact match (X057)	X057, X277 (PGE), X241 (PGE)
F50016	F50016-001	No	0	0
F50016	F50016-002	No	0	0
F50016	F50016-003	No	0	0
F50016	F50016-004	No	0	0
F50017	F50017-001	Yes	Same measure at similar lab-type facility	X451
F50019	F50019-001	No	0	0
F50029	F50029-001	No	0	0
F50029	F50029-002	No	0	0
F50029	F50029-003	No	0	0
F50029	F50029-004	No	0	0
F50029	F50029-005	No	0	0
F50030	F50030-001	No	0	0
F50034	F50034-001	No	0	0
F50069	F50069-001	No	0	0
F50244	F50244-001	No	0	0
F50259	F50259-001	No	0	0
F50259	F50259-002	No	0	0
F50259	F50259-003	No	0	0
F50259	F50259-004	No	0	0
F50355	F50355-001	No	0	0
F50355	F50355-002	No	0	0
F50383	F50383-001	No	0	0
F50801	F50801-001	No	0	0
F50803	F50803-001	No	0	0
F55001	F55001-001	No	0	0
F55001	F55001-002	No	0	0
F55002	F55002-001	No	0	0
F55003	F55003-001	No	0	0
F55005	F55005-001	Yes	Same measure, different customer/facility	X370, X402
F55005	F55005-002	Yes	Same measure, different customer/facility	X370, X402
F55005	F55005-003	No	0	0
F55005	F55005-004	No	0	0
F55005	F55005-005	No	0	0
F55005	F55005-006	No	0	0
F55005	F55005-007	No	0	0

ItronID	ItronRecordID	Any EAR Overlap (Yes/No)	EAR Guidance Applicability	All EAR Overlap Project IDs
F55006	F55006-001	Yes	Same customer, same measure, same facility, different project	X129, X453
F55007	F55007-001	No	0	0
F55007	F55007-002	No	0	0
F55012	F55012-001	No	0	0
F55013	F55013-001	No	0	0
F55013	F55013-002	No	0	0
F55016	F55016-001	No	0	0
F55019	F55019-001	No	0	0
F55019	F55019-002	No	0	0
F55019	F55019-003	No	0	0
F55019	F55019-004	No	0	0
F55019	F55019-005	No	0	0
F55019	F55019-006	No	0	0
F55024	F55024-001	Yes	Exact match	X536
F55024	F55024-002	Yes	Exact match	X536
F55024	F55024-003	Yes	Exact match	X536
F55026	F55026-001	No	0	0
F55026	F55026-002	No	0	0
F55026	F55026-003	No	0	0
F55026	F55026-004	No	0	0
F55026	F55026-005	No	0	0
F55033	F55033-001	Yes	Same measure, different customer/facility	X115 & X363
F55039	F55039-001	Yes	Same measure, different customer/facility	X370
F55080	F55080-001	No	0	0
F55101	F55101-001	No	0	0
F55101	F55101-002	No	0	0
F55154	F55154-001	No	0	0
F55233	F55233-001	Yes	Same customer, same measure, different facility	X044, X311
F55901	F55901-001	No	0	0
F55906	F55906-001	No	0	0
F55915	F55915-001	No	0	0
G50001	G50001-001	Yes	Exact match	X423
G50002	G50002-001	No	0	0
G50003	G50003-001	Yes	Exact match	X290
G50004	G50004-001	No	0	0
G50005	G50005-001	Yes	Same measure, different customer/facility	X456
G50008	G50008-001	No	0	0
G50009	G50009-001	Yes	Similar measure, different customer/facility	X010 (SDGE)
G50010	G50010-001	No	0	0
G50011	G50011-001	No	0	0
G50013	G50013-001	No	0	0
G50013	G50013-002	No	0	0
G50018	G50018-001	No	0	0
G50021	G50021-001	No	0	0
G50025	G50025-001	No	0	0
G50029	G50029-001	Yes	Similar measure, different customer/facility	X329, X375, and X497
G50042	G50042-001	No	0	0
G55001	G55001-001	No	0	0
G55002	G55002-001	No	0	0
G55003	G55003-001	No	0	0
G55003	G55003-002	No	0	0
G55004	G55004-001	No	0	0
G55005	G55005-001	No	0	0
G55008	G55008-001	Yes	Same measure, different customer/facility	X312

ItronID	ItronRecordID	Any EAR Overlap (Yes/No)	EAR Guidance Applicability	All EAR Overlap Project IDs
G55008	G55008-002	Yes	Same measure, different customer/facility	X312
G55009	G55009-001	No	0	0
G55010	G55010-001	No	0	0
G55011	G55011-001	No	0	0
G55013	G55013-001	No	0	0
G55015	G55015-001	No	0	0
G55032	G55032-001	Yes	Same measure, different customer/facility	X370, X402
G55033	G55033-001	No	0	0
G55059	G55059-001	Yes	Exact Match	X044
G55107	G55107-001	Yes	Same measures, different customer/facility	X237, X096, X066
H50001	H50001-001	No	0	0
H50001	H50001-002	No	0	0
H50002	H50002-001	Yes	Similar measure, different customer/facility	X539
H50003	H50003-001	No	0	0
H50004	H50004-001	No	0	0
H50005	H50005-001	Yes	Campus MBCx, elec savings	X098
H50005	H50005-002	Yes	Campus MBCx, gas savings	X098
H50007	H50007-001	No	0	0
H50008	H50008-001	Yes	Hot water boiler retrofit	X070
H50008	H50008-002	Yes	Hot water boiler retrofit	X070
H50008	H50008-003	Yes	Hot water boiler retrofit	X070
H50008	H50008-004	Yes	Hot water boiler retrofit	X070
H50008	H50008-005	Yes	Hot water boiler retrofit	X070
H50009	H50009-001	No	0	0
H50009	H50009-002	No	0	0
H50009	H50009-003	No	0	0
H50009	H50009-004	No	0	0
H50011	H50011-001	No	0	0
H50018	H50018-001	No	0	0
H50021	H50021-001	Yes	Similar measure, same customer	X529, X012
H50026	H50026-001	No	0	0
H50027	H50027-001	Yes	Similar measure, different customer/facility	X027
H50035	H50035-001	No	0	0
H50801	H50801-001	No	0	0
H50801	H50801-002	No	0	0
H50802	H50802-001	No	0	0
H50802	H50802-002	No	0	0
H55001	H55001-001	No	0	0
H55001	H55001-002	No	0	0
H55001	H55001-003	No	0	0
H55002	H55002-001	Yes	CPUC directives for preponderance of evidence.	N/A
H55004	H55004-001	Yes	Same measure, different customer/facility	X419
H55004	H55004-002	Yes	Same measure, different customer/facility	X419
H55006	H55006-001	No	0	0
H55007	H55007-001	No	0	0
H55007	H55007-002	No	0	0
H55007	H55007-003	No	0	0
H55007	H55007-004	No	0	0
H55007	H55007-005	No	0	0
H55007	H55007-006	No	0	0
H55007	H55007-007	No	0	0
H55007	H55007-008	No	0	0
H55010	H55010-001	Yes	Same customer, same measure, similar facility	X526
H55010	H55010-002	Yes	Same customer, same measure, similar facility	X526

ItronID	ItronRecordID	Any EAR Overlap (Yes/No)	EAR Guidance Applicability	All EAR Overlap Project IDs
H55010	H55010-003	Yes	Same customer, same measure, similar facility	X526
H55010	H55010-004	Yes	Same customer, same measure, similar facility	X526
H55010	H55010-005	Yes	Same customer, same measure, similar facility	X526
H55011	H55011-001	No	0	0
H55011	H55011-002	No	0	0
H55011	H55011-003	No	0	0
H55013	H55013-001	No	0	0
H55013	H55013-002	No	0	0
H55013	H55013-003	No	0	0
H55014	H55014-001	No	0	0
H55015	H55015-001	No	0	0
H55028	H55028-001	No	0	0
H55029	H55029-001	No	0	0
H55029	H55029-002	No	0	0
H55029	H55029-003	No	0	0
H55030	H55030-001	No	0	0
H55030	H55030-002	No	0	0
H55030	H55030-003	No	0	0
H55030	H55030-004	No	0	0
H55033	H55033-001	No	0	0
H55901	H55901-001	No	0	0
H55901	H55901-002	No	0	0
H55901	H55901-003	No	0	0
H55901	H55901-004	No	0	0
H55901	H55901-005	No	0	0
H55901	H55901-006	No	0	0
H55901	H55901-007	No	0	0
H55901	H55901-008	No	0	0
H55901	H55901-009	No	0	0
H55903	H55903-001	No	0	0
H55903	H55903-002	No	0	0
H55903	H55903-003	No	0	0
H55903	H55903-004	No	0	0
H55903	H55903-005	No	0	0
H55903	H55903-006	No	0	0
H55908	H55908-001	No	0	0
H55908	H55908-002	No	0	0
H55908	H55908-003	No	0	0
H55908	H55908-004	No	0	0
H55908	H55908-005	No	0	0
H55908	H55908-006	No	0	0

APPENDIX E PPA SCORING GUIDELINES FOR SITE REPORTING FORMS

Each of the 148 EM&V sample points has a Site Reporting Form that contains project information, a site specific measurement and verification plan (SSMVP), a project practices assessment (PPA), and a final site report (FSR). The SSMVP provides the evaluator's plan for conducting the onsite field work. The FSR component is comprised of as-found conditions, analysis methods, impact results, discrepancies with ex ante claims, GRRs, NTG information, and suggestions to improve ex ante savings claim estimates.

The PPA section of the Site Reporting Form contains 12 individual ratings provided by the evaluation team for each project addressing three broad areas: baseline, calculation methodology, and inputs/assumptions. Within these three areas the PPA contains specific ex post observations on the PA provided *project documentation, descriptions, quality, accuracy and appropriateness. It also includes* related topics such as PA treatment of EUL, RUL and incentives relative to baseline selection. This appendix highlights the instructions for scoring each component of the PPA within the baseline, calculation methods, and inputs/assumptions sections of the Site Reporting Form.

E.1 BASELINE RATING

Quality of Baseline Documentation Rating

For early replacement, add-on measure (REA), or system optimization projects:

1. No documentation or discussion included to support the baseline. For example, no information about age, condition and RUL assessment of the existing equipment provided for ER; IOU influence not documented.
2. Age, condition and RUL assessment of the existing equipment provided; IOU influence not documented.
3. Age, condition, RUL assessment, capability of performance through RUL of the existing equipment provided, IOU influence not documented.
4. Age, condition, RUL assessment, capability of performance through RUL, maintenance records, normal facility practices / standard industry practices information provided; minimal IOU influence documentation.
5. Age, condition, RUL assessment, capability of performance through RUL, maintenance records, normal facility practices / standard industry practices information provided; IOU influence fully documented.

For new construction, capacity expansion and major renovation projects:

1. No documentation or discussion included to support the baseline.
2. Code/ISP mentioned, but the documentation/explanation about baseline selection is not included.

3. Code/ISP review conducted, capability of baseline equipment meeting facility requirements has been assessed, efficiency levels of the baseline equipment provided; the baseline rationale is briefly documented.
4. Code/ISP review conducted, capability of baseline equipment meeting facility requirements has been assessed, and efficiency levels of the baseline equipment provided; the baseline rationale is narrated with partial supporting documents.
5. Code/ISP review conducted, capability of baseline equipment meeting facility requirements has been assessed, efficiency levels of the baseline equipment provided; the baseline rationale is narrated with full supporting documentation

For natural replacement and ROB projects:

1. No documentation or discussion included to support the baseline.
2. Age, condition and RUL assessment of the existing equipment and evidence of functionality of the existing system provided; code/ISP review cited briefly. Normal replacement and upgrade practices quoted. Capability of baseline equipment to meet functional requirement not provided. Regressive baseline selected without consideration.
3. Age, condition and RUL assessment of the existing equipment and evidence of functionality of the existing system provided; code/ISP review provided as a narrative. Normal replacement and upgrade practices described in detail but evidence not included. Capability of baseline equipment to meet functional requirement provided. Applicability and use of non-regressive baseline explained.
4. Age, condition and RUL assessment of the existing equipment and evidence of functionality of the existing system provided; code/ISP review provided as a narrative with referencing documentation. Normal replacement and upgrade practices described in detail with evidence included. Capability of baseline equipment to meet functional requirement provided. Applicability and use of non-regressive baseline explained with analysis.
5. Age, condition and RUL assessment of the existing equipment and evidence of functionality of the existing system provided; code/ISP review provided as a narrative referencing documentation. Normal replacement and upgrade practices described in detail with evidence included. Capability of baseline equipment to meet functional requirement provided. Applicability and use of non-regressive baseline explained with analysis. Additional research conducted to support baseline determination for the majority of the previously mentioned factors.

Rate EUL Documentation

Projects that use DEER EULs do not need special documentation; only a properly assigned EUL is necessary.

1. EUL has not been assigned in project documentation.
2. EUL assigned in the project documentation does not match with the EUL (DEER or otherwise) or EUL is found to be incorrectly claimed or EUL does not match the IOU tracking database value.
3. EUL from project documentation matches the DEER EUL. And the EUL may or may not match the IOU tracking database value.

4. EUL provided for measures for which DEER EUL is not available. One or more reliable source of EUL is used. And the EUL matches the IOU tracking database value.
5. EUL provided for measures for which DEER EUL is not available. The EUL claim is supported by additional research when other sources were not reliable. And the EUL matches the IOU tracking database value.

Rate RUL Documentation for ER projects

1. RUL estimate has not been provided in the project documentation.
2. RUL estimate provided in project documentation is inaccurate.
3. RUL in the project documentation is accurately assigned as the default RUL, i.e., one-third of EUL
4. RUL is not the default values, and plausible arguments have been presented to support the RUL assignment.
5. RUL is not the default value, plausible arguments have been presented to support the RUL assignment, and the RUL estimate is supported with additional sources such as customer interviews, maintenance records, research about facility requirements, and market research for similar equipment type.

Project Baseline Appropriateness Rating

For existing equipment (aka "in situ") equipment baseline

1. In situ equipment assumed as technical equipment baseline does not match the selected project baseline type (for instance, ROB, NR, NC, Capacity Expansion, or Major Renovation). For ER projects, the second baseline (for the EUL-RUL period) not identified.
2. In situ equipment assumed as technical equipment baseline does not match the selected project baseline type (for instance, ROB, NR, NC, Capacity Expansion, or Major Renovation). However, for ER projects, the second baseline is identified in project documentation.
3. In situ equipment appropriately selected as the technical equipment baseline for a proper ER, REA, or system optimization baseline type. For ER projects, the second baseline is accurately identified in project documentation and some narrative is provided.
4. In situ equipment appropriately selected as the technical equipment baseline for a proper ER, REA, or system optimization baseline type; baseline is supported with a minimum of two weeks of pre-retrofit M&V system data for key parameters and production. For ER projects, the second baseline is accurately identified in project documentation, and narrative and supporting documentation are provided.
5. In situ equipment appropriately selected as the technical equipment baseline for a proper ER, REA, or system optimization baseline type; baseline is supported with a full year of pre-retrofit M&V system data for ALL key system parameters and production. For ER projects, the second baseline is accurately identified in project documentation, and a narrative and supporting documentation with additional research are provided.

For industry standard practice (ISP) equipment baseline

1. ISP specified as baseline, but documentation states that there is no ISP baseline for this industry OR neglects to identify what the proper ISP is OR assumes that the customer's in situ equipment is the proper ISP.
2. ISP specified as baseline; baseline equipment described has not been approved or accepted by CPUC as an appropriate technical baseline.
3. ISP specified as baseline; proper new (non-degraded) equipment and efficiency levels described and supported by market research.
4. ISP specified as baseline; proper equipment baseline selected from a previous CPUC-approved ISP baseline study, and the ISP application properly adjusted the baseline equipment and consumption.
5. ISP specified as baseline; proper equipment baseline selected from a previous CPUC-approved ISP baseline study and includes a narrative on ISP and non-regressive baseline.

For T-24, T-20, Federal regulations, building code compliant baseline selection (such as OSHPD), local code requirements, such as AQMD, Cal-OSHA, city or county codes, or environmental compliance

1. Identified the wrong code or improper jurisdiction.
2. Identified the proper code jurisdiction but identified incorrect or predecessor code.
3. Identified the proper code and applicable code year version for code compliance.
4. Identified the proper code and applicable code year version for code compliance; provided an excerpt of code, requirement or regulation.
5. Identified the proper code and applicable code year version for code compliance; provided an excerpt from the code, requirement or regulation and included narrative on research for determining the proper jurisdiction and version.

For customer or facility standard practice equipment baseline selection:

1. Measure described as customer standard practice; neglected to provide background narrative.
2. Baseline identified as a customer standard practice, but the narrative provided is incorrect or unsupported.
3. Baseline identified as a customer standard practice, and narrative provided explaining why measure is customer standard practice in comparison to their competitors' standard practice or industry standard practice (ISP).
4. Baseline identified as a customer standard practice, and narrative provided explaining why measure is customer standard practice in comparison to their competitors' standard practice or industry standard practice (ISP), and includes hierarchy of efficiency levels.
5. Baseline identified as a customer standard practice, and narrative provided explaining why measure is customer standard practice in comparison to their competitors' standard practice or industry standard practices (or ISP), and includes hierarchy of efficiency levels along with market research and dates of customer's corporate decision making.

Baseline Description (Equipment/Efficiency) Rating

1. Neither baseline equipment nor efficiency level was described in project documentation. Wrong baseline equipment selected for non-ER projects; wrong baseline equipment described for both baselines (RUL and EUL-RUL) for ER projects.
2. Baseline equipment inferred (in calculations), partially described, or baseline provided with no efficiency levels included in project documentation. For ER projects, wrong baseline described for one of the two baselines.
3. Baseline equipment fully described and accurately identified in project documentation.
4. Baseline equipment fully described and accurately identified in project documentation; baseline efficiency levels identified.
5. Baseline equipment fully described and accurately identified; baseline efficiency levels identified; and fully described in project documentation.

Incentive Appropriateness Rating

1. Incentives incorrectly calculated, incorrect cap applied, or tracking data incentives do not match project documentation.
2. Incentives correctly calculated but incorrect incentive cap applied or tracking data incentives do not match project documentation.
3. Incentive and cap correctly calculated but tracking data incentives do not match project documentation.
4. Incentives correctly calculated, appropriate cap used and the tracking data incentives match the project calculations.
5. Incentives correctly calculated, appropriate cap used and the tracking data incentives match the project calculations for both full and incremental measure costs for an ER measure.

E.2 PROJECT CALCULATION METHODS RATING

Rate appropriateness of the model applied

1. Calculation model is not suitable for the project.
2. Calculation model is appropriate, but does not consider key factors that impact the savings (e.g., weather, production or seasonal adjustments not performed).
3. Calculation model is appropriate and considers key factors that impact the savings (e.g., weather, production or seasonal adjustments performed).
4. Calculation model considers key factors that impact the savings (e.g., weather, production or seasonal adjustments performed) and includes extensive M&V data collection in support of the model.
5. Calculation model considers the factors that impact the savings (e.g., weather, production or seasonal adjustments performed) and includes extensive pre- and post-installation M&V data

collection in support of the model, and alternative methods are used to check reasonableness of savings.

Rate quality of the model documentation

1. Documentation not provided to explain the calculation model or model cannot be used by evaluator because it was locked, protected or provided in PDF format, or the model is missing input or output files.
2. Documentation provided is insufficient (minimal) to explain the calculation model. For example, post installation calculation model is well documented showing parameter relationships, but baseline calculation model lacks clarity.
3. Documentation provided is sufficient to explain calculation model for pre- and post-installation conditions.
4. Documentation provided is sufficient to explain calculation model for pre- and post-installation conditions, M&V data has been integrated when applicable, and special treatment of unusual data has been explained.
5. Documentation provided is sufficient to explain calculation model for pre- and post-installation conditions, M&V data has been integrated when applicable, and special treatment of unusual data has been explained. Additionally, the model has been validated or calibrated.

Rate accuracy of the model

1. Calculation model is not verifiable, is invalid or is unacceptable.
2. Calculation model does not use site-specific values for key parameters/variables or reliable typical input values (such as, flow rates, pressures, temperatures, weather data, production data, etc.)
3. Calculation model uses site-specific values and reliable typical input values (such as flow rates, pressures, temperatures, weather data, production data, etc.)
4. Calculation model uses site-specific values supported by M&V, trend logs, SCADA, and production data as applicable; the model uses reliable typical input values (such as flow rates, pressures, temperatures, weather, production data, etc.)
5. Calculation model uses site-specific values which are reliable and supported by M&V, trend logs, SCADA, production data as applicable.

E.3 INPUTS AND ASSUMPTIONS RATING

Rate Comprehensiveness of the Inputs and Assumptions

1. Inputs and assumptions used in the calculations are not verifiable or missing.
2. Calculation model does not include all relevant inputs (e.g., load factor, efficiency, flow, power factor, etc.) and assumptions (e.g., weather, production or seasonal adjustments, etc.)
3. Calculation model includes most relevant inputs (e.g., load factor, efficiency, flow, power factor, etc.) and assumptions (e.g., weather, production or seasonal adjustments, etc.)
4. Calculation model includes all relevant inputs (e.g., load factor, efficiency, flow, power factor, etc.) and assumptions (e.g., weather, production or seasonal adjustments, etc.)

5. Calculation model includes all relevant inputs (e.g., load factor, efficiency, flow, power factor, etc.) and assumptions (e.g., weather, production or seasonal adjustments performed, etc.), and are clearly described within the documents or models.

Rate Documentation Quality for Inputs and Assumptions

1. No supporting sources provided for inputs and assumptions used in the calculations.
2. Supporting sources provided for some inputs and assumptions used in the calculations.
3. Supporting sources provided for all critical inputs and assumptions (parameters that have high impacts on savings) used in the calculations.
4. Supporting sources provided for all inputs and used conservative assumptions used in the calculations
5. Supporting sources provided for all inputs conservative assumptions used in the calculations; includes research for assumptions.

Rate Accuracy of the Inputs and Assumptions

1. Inputs and assumptions used in the calculations are not verifiable or inaccurate for all of the parameters.
2. Inputs and assumptions are inaccurate for some of the parameters used in the calculations.
3. Inputs and assumptions are accurate for all the parameters used in the calculations.
4. Inputs and assumptions are accurate and conservative for all the parameters used in the calculations.
5. Inputs are accurate and research was conducted and documented to develop conservative assumptions used in the calculations.

APPENDIX F ADDITIONAL PROJECT PRACTICES ASSESSMENT FINDINGS

F.1 INTRODUCTION

As described in Chapter 6, Project Practices Assessments (PPAs) are structured site-specific reviews of Program Administrator (PA)[1] application files and calculations that systematically examine and record the evaluation team's conclusions surrounding PA treatment of energy efficiency measure installations. The PPA process provides impact-oriented findings and feedback to the PAs. The PPA process was conducted on all sampled gross impact points.

This Appendix provides additional PA-specific results and supporting evidence for the bigger picture results and findings conveyed in Chapter 6. These additional results are focused on the Project Type Assessment and the Project Baseline Assessment.

F.2 PROJECT TYPE ASSESSMENT

As discussed in Chapter 6, PA-specified project types were often overturned by the evaluator. For all PAs combined, there has been a steady decline in the number of project types which matched over the last three program years. PG&E saw a 28 percent decrease from PY2013 in the number of projects which matched, and a 21 percent decrease from PY2014. SCE also saw a decrease from PY2013, but an increase from PY2014, for an overall decrease of 6 percent of projects which matched. SDG&E and SCG's projects which matched decreased 4 percent from PY2014 but 12 percent since PY2013, and SCG decreased 11 percent from PY2014 and 16 percent since PY2013.

Table F-1 through Table F-4 present PA-specific results detailing ex-ante versus ex-post project type designations. The green shaded cells along the diagonal indicate the number of measures that showed agreement between the PA and ex-post evaluation. Values in the red shaded cells are measures where the project type was reassigned by the evaluator. The most commonly overturned project types by PA are as follows:

- PG&E: System optimization, replace on burnout, and early replacement
- SCE: Replace on burnout, multiple project types, and early replacement
- SCG: Natural replacement, replace on burnout, early replacement, and new construction
- SDG&E: Early replacement, multiple project types, and new construction

[1] California energy efficiency program administrators include PG&E, SCE, SCG, SDG&E, Marin Clean Energy, the Bay Area Regional Energy Network (REN), and the Southern California REN. However, this evaluation only addresses programs under the administration of PG&E, SCE, SCG and SDG&E.

TABLE F-1: PA VS. EVALUATION SPECIFIED PROJECT TYPE– PG&E

			PG&E-Specified Project Type								
			Add-on	Capacity Expansion	Early Replacement	Major Renovation	New Construction	Natural Replacement	Replace on Burnout	System Optimization	Multiple
Number of measures evaluated (n)			50								
Frequency of PA-Specified Measure Type (n)			5	0	3	0	19	0	12	10	1
Evaluation-Specified Project Type	Frequency of Measure-Level Obs.	(n)									
	Add-on	16	5	0	1	0	1	0	3	6	0
	Capacity Expansion	1	0	0	0	0	1	0	0	0	0
	Early Replacement	6	0	0	2	0	0	0	4	0	0
	Major Renovation	2	0	0	0	0	1	0	0	1	0
	New Construction	16	0	0	0	0	16	0	0	0	0
	Natural Replacement	4	0	0	0	0	0	0	2	2	0
	Replace on Burnout	2	0	0	0	0	0	0	2	0	0
	System Optimization	1	0	0	0	0	0	0	1	0	0
	Multiple	2	0	0	0	0	0	0	0	1	1

TABLE F-2: PA VS. EVALUATION SPECIFIED PROJECT TYPE– SCE

			SCE-Specified Project Type								
			Add-on	Capacity Expansion	Early Replacement	Major Renovation	New Construction	Natural Replacement	Replace on Burnout	System Optimization	Multiple
Number of measures evaluated (n)			57								
Frequency of PA-Specified Measure Type (n)			35	0	7	0	10	0	3	0	2
Evaluation-Specified Project Type	Frequency of Measure-Level Obs.	(n)									
	Add-on	31	29	0	0	0	1	0	0	0	1
	Capacity Expansion	2	0	0	0	0	1	0	0	0	1
	Early Replacement	6	2	0	2	0	1	0	1	0	0
	Major Renovation	2	0	0	0	0	2	0	0	0	0
	New Construction	6	1	0	0	0	5	0	0	0	0
	Natural Replacement	8	2	0	4	0	0	0	2	0	0
	Replace on Burnout	1	0	0	1	0	0	0	0	0	0
	System Optimization	0	0	0	0	0	0	0	0	0	0
	Multiple	1	1	0	0	0	0	0	0	0	0

TABLE F-3: PA VS. EVALUATION SPECIFIED PROJECT TYPE– SCG

			SCG-Specified Project Type								
			Add-on	Capacity Expansion	Early Replacement	Major Renovation	New Construction	Natural Replacement	Replace on Burnout	System Optimization	Multiple
Number of measures evaluated (n)			33								
Frequency of PA-Specified Measure Type (n)			23	0	2	0	4	2	2	0	0
Evaluation-Specified Project Type	Frequency of Measure-Level Obs.	(n)									
	Add-on	15	15	0	0	0	0	0	0	0	0
	Capacity Expansion	3	0	0	0	0	1	2	0	0	0
	Early Replacement	1	0	0	1	0	0	0	0	0	0
	Major Renovation	4	2	0	0	0	0	0	2	0	0
	New Construction	2	0	0	0	0	2	0	0	0	0
	Natural Replacement	2	1	0	1	0	0	0	0	0	0
	Replace on Burnout	1	1	0	0	0	0	0	0	0	0
	System Optimization	1	1	0	0	0	0	0	0	0	0
	Multiple	4	3	0	0	0	1	0	0	0	0

TABLE F-4: PA VS. EVALUATION SPECIFIED PROJECT TYPE– SDG&E

			SDG&E-Specified Project Type								
			Add-on	Capacity Expansion	Early Replacement	Major Renovation	New Construction	Natural Replacement	Replace on Burnout	System Optimization	Multiple
Number of measures evaluated (n)			43								
Frequency of PA-Specified Measure Type (n)			16	0	6	0	16	0	4	0	1
Evaluation-Specified Project Type	Frequency of Measure-Level Obs.	(n)									
	Add-on	15	12	0	2	0	1	0	0	0	0
	Capacity Expansion	1	0	0	1	0	0	0	0	0	0
	Early Replacement	1	1	0	0	0	0	0	0	0	0
	Major Renovation	4	0	0	0	0	4	0	0	0	0
	New Construction	11	0	0	0	0	11	0	0	0	0
	Natural Replacement	1	0	0	1	0	0	0	0	0	0
	Replace on Burnout	4	0	0	0	0	0	0	4	0	0
	System Optimization	4	1	0	2	0	0	0	0	0	1
	Multiple	2	2	0	0	0	0	0	0	0	0

Table F-5 through Table F-8 provides a list of all 76 records in which the PA-specified project type was overturned by the evaluators. The PAs are encouraged to examine individual final site reports (FSRs) to better understand why project types were overturned.

TABLE F-5: LIST OF PG&E RECORDS WITH OVERTURNED PROJECT TYPES

Itron Measure ID	PA Project Type	Ex-post Project Type
E50002-001	System Optimization	Major Renovation
E50002-002	System Optimization	Normal Replacement
E50003-001	Replace on Burnout	Add-On
E50003-002	Replace on Burnout	Add-On
E50006-001	Replace on Burnout	Normal Replacement
E50010-001	Replace on Burnout	Normal Replacement
E50037-001	System Optimization	Add-On
E50037-002	System Optimization	Normal Replacement
E50042-001	Replace on Burnout	Early Replacement
E50112-001	Replace on Burnout	Early Replacement
E50151-001	Replace on Burnout	Early Replacement
E50806-001	New Construction	Major Renovation
E55012-001	New Construction	Capacity Expansion
E55019-001	System Optimization	Add-On
E55019-002	System Optimization	Add-On
E55033-001	System Optimization	Add-On
E55043-001	Replace on Burnout	Early Replacement
E55047-001	Early Replacement	Add-On
E55080-001	System Optimization	Multiple
E55100-001	Replace on Burnout	Add-On
E55126-001	New Construction	Add-On
E55141-001	Replace on Burnout	System Optimization
E55185-001	System Optimization	Add-On
E55185-002	System Optimization	Add-On

TABLE F-6: LIST OF SCE RECORDS WITH OVERTURNED PROJECT TYPES

Itron Measure ID	PA Project Type	Ex-post Project Type
F50001-001	New Construction	Add-On
F50002-001	Replace on Burnout	Early Replacement
F50004-002	Replace on Burnout	Normal Replacement
F50005-001	Early Replacement	Normal Replacement
F50006-001	Multiple	Add-On
F50019-001	Early Replacement	Normal Replacement
F50030-001	Add-On	Early Replacement
F50034-001	Early Replacement	Replace on Burnout
F50801-001	Multiple	Capacity Expansion
F50803-001	New Construction	Major Renovation
F55005-001	Add-On	Normal Replacement
F55005-002	Add-On	Multiple
F55006-001	Early Replacement	Normal Replacement
F55007-001	New Construction	Early Replacement
F55007-002	Early Replacement	Normal Replacement
F55016-001	New Construction	Capacity Expansion
F55039-001	Add-On	Normal Replacement
F55080-001	Add-On	Early Replacement
F55154-001	Add-On	New Construction
F55233-001	Replace on Burnout	Normal Replacement
F55915-001	New Construction	Major Renovation

TABLE F-7: LIST OF SCG RECORDS WITH OVERTURNED PROJECT TYPES

Itron Measure ID	PA Project Type	Ex-post Project Type
G50005-001	Add-On	Multiple
G50008-001	Add-On	System Optimization
G50010-001	Add-On	Major Renovation
G50013-001	Replace on Burnout	Major Renovation
G50013-002	Replace on Burnout	Major Renovation
G50018-001	Add-On	Replace on Burnout
G55003-001	Add-On	Multiple
G55003-002	Add-On	Multiple
G55008-001	Normal Replacement	Capacity Expansion
G55008-002	Normal Replacement	Capacity Expansion
G55010-001	Add-On	Major Renovation
G55015-001	New Construction	Capacity Expansion
G55033-001	Add-On	Normal Replacement
G55059-001	Early Replacement	Normal Replacement
G55107-001	New Construction	Multiple

TABLE F-8: LIST OF SDG&E RECORDS WITH OVERTURNED PROJECT TYPES

Itron Measure ID	PA Project Type	Ex-post Project Type
H50002-001	New Construction	Add-On
H50005-001	Add-On	Multiple
H50005-002	Add-On	Multiple
H50018-001	Early Replacement	Normal Replacement
H50021-001	Add-On	Early Replacement
H50027-001	Add-On	System Optimization
H55002-001	Early Replacement	Capacity Expansion
H55004-001	Early Replacement	System Optimization
H55004-002	Early Replacement	System Optimization
H55006-001	Early Replacement	Add-On
H55007-002	Early Replacement	Add-On
H55010-001 through -005	Multiple	System Optimization
H55028-001	New Construction	Major Renovation
H55029-001	New Construction	Major Renovation
H55029-002	New Construction	Major Renovation
H55903-001 through H55903-006	New Construction	Major Renovation

F.3 PROJECT BASELINE ASSESSMENT

As discussed in Chapter 6, PA-specified baselines were also often overturned by the evaluator. Across all PAs, there is a decline in the accuracy of project baseline selection over the last three program years. SDG&E was the only PA to show an increase in the percent of project baselines which matched, over the three program years, starting at 75 percent in PY2013 up to 88 percent in PY2015. PG&E saw a 17 percent drop in matches between PY2013/PY2014 and PY2015. SCE saw a 5 percent drop from PY2013, but a 12 percent increase from PY2014, and SCG showed a 2 percent drop from PY2013 and an 8 percent drop from PY2014.

Table F-9 through Table F-12 present PA-specific results detailing ex-ante versus ex-post project baseline designations. The green shaded cells along the diagonal indicate the number of measures that showed agreement between the PA and ex-post evaluation. Values in the red shaded cells are measures where the project baseline was reassigned by the evaluator. For all PAs, existing equipment baselines were frequently overturned.

TABLE F-9: PA VS. EVALUATION SPECIFIED PROJECT BASELINE– PG&E

			PG&E-Specified Project Baseline								
			Existing Equipment	Title 24	Industry Standard Practice	Title 20	Customer / Facility Std. Prac.	Local AQMD/ Other Code	Federal Regulations	Other	Multiple
Number of measures evaluated (n)			50								
Frequency of PA Specified Baseline (n)			25	4	8	0	0	0	0	4	9
Evaluation-Specified Project Baseline	Frequency of Measure-Level Obs.	(n)									
	Existing equipment	16	15	0	1	0	0	0	0	0	0
	Title 24	8	2	4	0	0	0	0	0	0	2
	Industry standard practice	12	1	0	6	0	0	0	0	2	3
	Title 20	0	0	0	0	0	0	0	0	0	0
	Customer/facility std.	0	0	0	0	0	0	0	0	0	0
	Local AQMD/other code	0	0	0	0	0	0	0	0	0	0
	Federal regulations	2	2	0	0	0	0	0	0	0	0
	Other	3	1	0	0	0	0	0	0	1	1
	Multiple	9	4	0	1	0	0	0	0	1	3

TABLE F-10: PA VS. EVALUATION SPECIFIED PROJECT BASELINE– SCE

			SCE-Specified Project Baseline								
			Existing Equipment	Title 24	Industry Standard Practice	Title 20	Customer / Facility Std. Prac.	Local AQMD/ Other Code	Federal Regulations	Other	Multiple
Number of measures evaluated (n)			57								
Frequency of PA Specified Baseline (n)			44	4	2	0	1	0	0	0	6
Evaluation-Specified Project Baseline	Frequency of Measure-Level Obs.	(n)									
	Existing equipment	36	35	0	1	0	0	0	0	0	0
	Title 24	7	2	4	0	0	0	0	0	0	1
	Industry standard practice	7	4	0	1	0	1	0	0	0	1
	Title 20	0	0	0	0	0	0	0	0	0	0
	Customer/facility std.	0	0	0	0	0	0	0	0	0	0
	Local AQMD/other code	0	0	0	0	0	0	0	0	0	0
	Federal regulations	0	0	0	0	0	0	0	0	0	0
	Other	4	3	0	0	0	0	0	0	0	1
	Multiple	3	0	0	0	0	0	0	0	0	3

TABLE F-11: PA VS. EVALUATION SPECIFIED PROJECT BASELINE– SCG

			SCG-Specified Project Baseline								
			Existing Equipment	Title 24	Industry Standard Practice	Title 20	Customer / Facility Std. Prac.	Local AQMD/ Other Code	Federal Regulations	Other	Multiple
Number of measures evaluated (n)			33								
Frequency of PA Specified Baseline (n)			23	0	6	1	0	0	0	0	3
Evaluation-Specified Project Baseline	Frequency of Measure-Level Obs.	(n)									
	Existing equipment	20	16	0	4	0	0	0	0	0	0
	Title 24	1	1	0	0	0	0	0	0	0	0
	Industry standard practice	3	1	0	2	0	0	0	0	0	0
	Title 20	1	0	0	0	1	0	0	0	0	0
	Customer/facility std.	0	0	0	0	0	0	0	0	0	0
	Local AQMD/other code	1	1	0	0	0	0	0	0	0	0
	Federal regulations	0	0	0	0	0	0	0	0	0	0
	Other	3	3	0	0	0	0	0	0	0	0
	Multiple	4	1	0	0	0	0	0	0	0	3

TABLE F-12: PA VS. EVALUATION SPECIFIED PROJECT BASELINE– SDG&E

			SDG&E-Specified Project Baseline								
			Existing Equipment	Title 24	Industry Standard Practice	Title 20	Customer / Facility Std. Prac.	Local AQMD/ Other Code	Federal Regulations	Other	Multiple
Number of measures evaluated (n)			43								
Frequency of PA Specified Baseline (n)			23	14	1	2	0	0	0	1	2
Evaluation-Specified Project Baseline	Frequency of Measure-Level Obs.	(n)									
	Existing equipment	22	21	0	0	0	0	0	0	0	1
	Title 24	15	0	14	0	0	0	0	0	0	1
	Industry standard practice	2	0	0	1	0	0	0	0	1	0
	Title 20	2	0	0	0	2	0	0	0	0	0
	Customer/facility std.	0	0	0	0	0	0	0	0	0	0
	Local AQMD/other code	1	1	0	0	0	0	0	0	0	0
	Federal regulations	0	0	0	0	0	0	0	0	0	0
	Other	0	0	0	0	0	0	0	0	0	0
	Multiple	1	1	0	0	0	0	0	0	0	0

Table F-13 through Table F-16 provides a list of all 51 records in which the PA-specified project baseline was overturned by the evaluators. The PAs are encouraged to examine individual FSRs to better understand why project baselines were overturned.

TABLE F-13: LIST OF PG&E RECORDS WITH OVERTURNED PROJECT BASELINES

Itron Measure ID	PA Project Baseline	Ex-post Project Baseline
E50001-001	Multiple	Industry Standard Practice
E50002-001	Existing equipment	Federal regulations
E50002-002	Existing equipment	Federal regulations
E50006-001	Industry Standard Practice	Existing equipment
E50009-001	Multiple	Industry Standard Practice
E50010-001	Existing equipment	Other
E50016-001	Multiple	Industry Standard Practice
E50037-001	Existing equipment	Multiple
E50037-002	Existing equipment	Title 24
E55001-001	Industry Standard Practice	Multiple
E55002-001	Other	Industry Standard Practice
E55004-001	Other	Industry Standard Practice
E55014-001	Other	Multiple
E55019-001	Existing equipment	Multiple
E55019-002	Existing equipment	Multiple
E55033-001	Existing equipment	Multiple
E55043-001	Multiple	Other
E55076-001	Existing equipment	Industry Standard Practice
E55141-001	Existing equipment	Title 24
E55904-001	Multiple	Title 24
E55906-001	Multiple	Title 24

TABLE F-14: LIST OF SCE RECORDS WITH OVERTURNED PROJECT BASELINES

Itron Measure ID	PA Project Baseline	Ex-post Project Baseline
F50005-001	Existing equipment	Industry Standard Practice
F50019-001	Existing equipment	Title 24
F55003-001	Multiple	Other
F55005-001	Existing equipment	Other
F55005-002	Existing equipment	Other
F55006-001	Existing equipment	Industry Standard Practice
F55007-001	Industry Standard Practice	Existing equipment
F55007-002	Existing equipment	Industry Standard Practice
F55026-001	Existing equipment	Title 24
F55026-002	Existing equipment	Other
F55101-001	Multiple	Title 24
F55154-001	Existing equipment	Industry Standard Practice
F55233-001	Customer/facility standard practice	Industry Standard Practice
F55901-001	Multiple	Industry Standard Practice

TABLE F-15: LIST OF SCG RECORDS WITH OVERTURNED PROJECT BASELINES

Itron Measure ID	PA Project Baseline	Ex-post Project Baseline
G50001-001	Existing equipment	Multiple
G50008-001	Existing equipment	Local AQMD/other code
G50013-001	Industry Standard Practice	Existing equipment
G50013-002	Industry Standard Practice	Existing equipment
G50018-001	Existing equipment	Other
G50025-001	Existing equipment	Other
G50029-001	Existing equipment	Industry Standard Practice
G55008-001	Industry Standard Practice	Existing equipment
G55008-002	Industry Standard Practice	Existing equipment
G55033-001	Existing equipment	Title 24
G55059-001	Existing equipment	Other

TABLE F-16: LIST OF SDG&E RECORDS WITH OVERTURNED PROJECT BASELINES

Itron Measure ID	PA Project Baseline	Ex-post Project Baseline
H50005-001	Existing equipment	Multiple
H50007-001	Existing equipment	Local AQMD/other code
H50018-001	Multiple	Existing equipment
H55001-001 - 003	Multiple	Title 24
H55013-002 & H55013-003	Other	Industry Standard Practice

APPENDIX G GLOSSARY

Add-on Retrofit (REA)* (*Definitions obtained from Appendix 3 - Project Basis (RET, ROB, etc.), EUL/RUL Definitions & Preponderance of Evidence) **-** The Add-on Retrofit project type category includes situations where new equipment has been installed onto an existing system as either an integral additional component or a substitution of a pre-existing component whose primary purpose is to improve overall efficiency of the system. Such a component must not be able to operate on its own nor be used to increase equipment capacity. Truly retro-commissioning type measures where no additional equipment is purchased or measures where a variable speed drive is added to an existing motor drive process will fall under this category. The life of REA measures are typically capped at the RUL of the pre-existing equipment when the measure is attached to the equipment or is required by code. A single baseline energy savings calculation, full measure cost, and a measure EUL with justification is required for this installation type.

Confidence Interval (CI) – A confidence interval is a measure of uncertainty of a sample statistic (e.g. the sample mean) where the interval given is likely to contain the true but unknown population parameter. Confidence intervals are presented at a given confidence level. For instance, a confidence interval given at 95 percent means that if the same population were sampled multiple times and confidence intervals are provided each time for the same sample statistic, the resulting intervals would include the true population parameter 95 percent of the time.

Custom Projects - Custom projects are those where the energy savings are calculated specifically for the individual project (D.11-07- 030 page 31); deemed measures have designated savings that apply to various categories of projects and are not calculated specifically for each site.

Early Retirement (ER or RET)* - The Early Retirement project type category includes measure installations where there is a preponderance of evidence that an energy efficiency program activity induced or accelerated equipment replacement. Early retirement measures must provide justification that the existing equipment being replaced would have continued to function and perform its original design intent for a period of time in absence of the replacement. This period of time is either the RUL (of not less than one year) based on actual existing equipment installation dates or the DEER default RUL. An installation date based RUL by itself will not be acceptable unless evidence of functionality to support that claim is provided. If existing equipment installation dates cannot be obtained justification of continued equipment operation for the duration of the DEER default RUL must be provided. Thus, the burden of proof to claim program-induced early retirement is not merely the need to demonstrate RUL of at least one year. A dual baseline energy savings calculation, full measure cost, incremental measure cost for the second baseline, a measure EUL with justification, existing equipment installation dates (if not using DEER default RUL), and an existing measure RUL with justification is required for this installation type. The

second baseline for early retirement measures is the known code that will be in existence when the second baseline becomes effective. The second baseline will become effective after the initial RUL period is exhausted, which could be one or more years after project installation is completed. In some cases the second baseline will not become effective until many years from now where the future governing code may not be defined. In these instances, use the latest completed code for the second baseline calculations (for example, 2013 Title 24 until a later version is completed).

Effective Useful Life (EUL)* - The Effective Useful Life (EUL) is an estimate of the median number of years that the measures installed under the program are still in place and operable. EUL values are for new equipment and are provided as years.

Error Ratio – The error ratio is the square root of the variance, where the variance is defined as the mean sum of squares. This terminology is consistent with that introduced in Chapter 13 of the Evaluation Framework Study.[1]

Ex-ante Savings – Ex-ante savings are estimates of project savings developed by the PA during the project application and approval process.

Ex-post Savings – Ex-post savings are estimates of project savings developed by the evaluator during the program evaluation.

First Year Gross Realization Rate (FY GRR) – The First Year Gross Realization Rate is the evaluation estimated gross impacts divided by the PA savings claims in the first year after measure implementation.

Gross Impacts – Gross impacts are the total evaluated savings (kWh, kW, or therms) realized from a given project.

Gross Realization Rate (GRR) – The Gross Realization Rate is the evaluation estimated gross impacts divided by the PA savings claims.

Industry Standard Practice (ISP) - For purposes of establishing a baseline for energy savings, industry standard practice is a choice that represents the typical equipment or commonly-used practice in that industry (not necessarily the predominantly used practice). In other words, Industry standard practice baselines are established to reflect typical actions absent the program.

[1] http://www.calmac.org/publications/California_Evaluation_Framework_June_2004.pdf

Lifecycle Gross Realization Rate (LC GRR) – The Lifecycle Gross Realization Rate is the evaluation estimated gross impacts divided by the PA savings claims over the lifetime of the measure.

MMBtu - MMBtu is a measurement of energy that means one million British Thermal Units (Btus) and is a way of expressing total energy from both the electric and gas savings. 1 MMBtu =1,000,000 Btu, 1 Therm = 100,000 Btu source energy, 1 kWh = 10,239 Btu source energy. Conversion rates obtained from "2001 Energy Efficiency Standards for Residential and Non-residential Buildings, California Energy Commission," June 2001.

Net Impacts – Net impacts are the total evaluated savings (kWh, kW, or therms) realized from a given project and then adjusted by the net to gross ratio (NTGR) to account for savings attributable to the program.

Net to Gross Ratio (NTGR) - Net to Gross ratios are used to estimate and describe the "free ridership" that may be occurring within energy efficiency programs, that is, the degree to which customers would have installed the program measure or equipment even without the financial incentive (e.g., rebate) provided by the program.

New Construction (NC)* - The New Construction project type category includes new equipment that has been installed in a newly constructed area, in an area that has been subject to a major-renovation involving complete multi-system replacement or area re-construction, or equipment installed to increase the capacity of existing systems due to existing or anticipated new load handling requirements. A single baseline energy savings calculation, incremental measure cost, and a measure EUL with justification is required for this installation type.

Normal Replacement (NR)* - The Normal Replacement project type category includes measure installations where the existing equipment is still functional but does not qualify for early retirement. Normal replacement also applies when the new or replacement equipment has been installed due to normal remodeling or upgrading or replacement activities which are expected and undertaken in the normal course of business or ownership. In general, existing equipment that is still functional but has exceeded the proposed EUL, either from DEER or other sources, fall into this category. Normal replacement is also referred to as normal/natural turnover (note that some of the IOUs include NR in the ROB category above). A single baseline energy savings calculation, incremental measure cost, and a measure EUL with justification is required for this installation type.

Program Administrator (PA) - California energy efficiency program administrators include PG&E, SCE, SCG, SDG&E, Marin Clean Energy, the Bay Area Regional Energy Network (REN), and the Southern California REN. However, this evaluation only addresses programs under the administration of PG&E, SCE, SCG and SDG&E.

Relative Precision – Relative precision is the ratio of the precision of a given parameter value and the parameter value itself.

Remaining Useful Life (RUL)* - The Remaining Useful Life (RUL) is an estimate of the median number of years that equipment being replaced under the program would have remained in place and operable had the program intervention not caused the replacement. No EM&V studies have been conducted to determine this estimate. For calculated measures RUL is typically calculated by obtaining existing equipment installation dates to determine the age of the equipment, then subtracting this age from the estimated EUL from DEER. When existing equipment installation dates are not available the RUL of the existing equipment may be approximated as 1/3 of the newly proposed measure EUL (DEER default RUL = EUL / 3). For dual baseline measures, the remaining useful life period is also referred to as the first baseline period.

Replace on Burnout (ROB)* - The Replace on Burnout project type category includes situations when new or replacement equipment has been installed due to imminent or actual failure of pre-existing equipment. A single baseline energy savings calculation, incremental measure cost, and a measure EUL with justification is required for this installation type.

Second Baseline* - For dual baseline measures the Effective Useful Life minus Remaining Useful Life period is also referred to as the second baseline period.

*Definitions obtained from Appendix 3 - Project Basis (RET, ROB, etc.), EUL/RUL Definitions & Preponderance of Evidence