

Appendix A

Research Planning and Modification

The scope of work for the 2010-12 Custom Impact Evaluation was augmented several times during the course of the evaluation. The evaluation plan and subsequent adjustments are reported in the Custom Impact WO033 Evaluation Plan and the five addenda to that research plan.¹

This appendix briefly summarizes the major adjustments that were made to the WO033 plan during the course of the evaluation. Principal adjustments include changes to the population of projects assigned to WO033, changes to evaluation scope in terms of the number of sample points targeted, and changes to the overall budget and the per-unit M&V and LRA costs.

A.1 Changes to the WO033 Population of Projects

An initial sample frame was selected for the WO033 evaluation activities. In the course of the evaluation, additional tracking system records were incorporated within the WO033 population. Since the focus of the WO033 evaluation is non-deemed measures and since other work orders generally had not planned to address the evaluation of non-deemed records that fall within a given work order population, it was subsequently decided to re-map appropriate non-deemed records to WO033. The following work orders had non-deemed records that were re-mapped to WO033:

- WO32, Residential and Small Commercial HVAC Evaluation
- WO34, Business Consumer Electronic and Plug Load Evaluation
- WO42, Other Nonresidential Evaluation²

The resulting change to the WO033 population size, in terms of total savings, was small, with increases by savings metrics (kWh, kW, therms) well below 5 percent.

¹ <http://www.energydataweb.com/cpucFiles/pdaDocs/814/WO33%20Research%20Plan%20Final%2012%2029.pdf>

² WO042 was intended to cover claims not captured in other work orders, but was determined to not be needed and was never executed.

A.2 Changes to the WO033 Scope and Budget

The scope of the effort for the WO033 project changed several times throughout the project, as summarized next.

The original research plan-based sample sizes for the BD and AD periods, segmented by each type of sample point, are shown in Table A-1 below.

Table A-1: Original Research Plan-Based Sample Sizes for WO033

Impact Evaluation Component	Before-Decision	After-Decision**	TOTAL
M&V Points (GRR, LRA, and NTG)	200	400	600
Lower Rigor Points (Qualitative + NTG)	100	200	300
Incremental NTG-Only Points	480	480	960
TOTAL*	780	1,080	1,860

* All points incorporated NTG evaluation in addition to gross impact evaluation efforts.

** Some after-decision M&V points include pre-installation data collection performed under WO002.

The first adjustments to sample sizes for the BD and AD periods are shown in Table A-2 below.

Table A-2: First Adjustment to Sample Sizes for WO033

Impact Evaluation Component	Before-Decision	After-Decision**	TOTAL
M&V Points (Gross Realization-Rates + NTG)	200	400	600
Lower Rigor Points (Qualitative + NTG)	100	0	100
Incremental NTG-Only Points	480	680	1,160
TOTAL*	780	1,080	1,860

* All points incorporated NTG evaluation in addition to gross impact evaluation efforts.

** Some after-decision M&V points included pre-installation data collection performed under WO002.

The scope for lower rigor points was removed from the AD period in this first adjustment to the sample. The reason for this was to free-up funds for the M&V points, thereby affording a greater level of rigor for those efforts. The evaluation plan at this stage attempted to maintain the original M&V and NTG sample sizes; for NTG using a higher (than originally planned) number of NTG-only points in the AD period. At this stage 125 M&V points were targeted as overlapping points – those already addressed and affected by the WO002 ex-ante review processes and procedures. The remaining 275 M&V points were to be selected using stratified random sampling from the non-overlapping portion of the population of projects.

However, the evaluation team eventually chose to reduce the number of AD period M&V and NTG-only points for a number of reasons, as discussed in more detail below. The second set of adjustments to sample sizes for the AD period, as well as the resulting totals, is shown in Table A-3 below.

Table A-3: Second Adjustment to Sample Sizes for WO033

Impact Evaluation Component	Before-Decision	After-Decision**	Total
M&V Points (Gross Realization-Rates + NTG)	200	250	450
Lower Rigor Points (Qualitative + NTG)	100	0	100
Incremental NTG-Only Points	480	530	1,010
Total*	780	780	1,560

*All points incorporated NTG evaluation in addition to gross impact evaluation efforts.

**Some after-decision M&V points included pre-installation data collection performed under WO002.

This second scope adjustment included a 150 point reduction in the number of M&V points targeted. This consisted of 75 points that are stand-alone WO033 points that do not overlap with WO002 efforts (i.e., 275 M&V points reduced to 200 M&V points), plus an estimated reduction of 75 points in overlapping WO002/WO033 points (125 points reduced to 50 points). The number of non-overlapping M&V points was reduced due to the desire to provide high quality results in a timely fashion for earlier feedback to the IOUs and the public. The anticipated number of overlapping points (representing a census of overlapping points) was reduced, as it was hypothesized that the number of sampled WO033 projects (by the end of 2012) that overlap with WO002 would be much lower than originally planned. The number of NTG points was reduced by 300 points. The expected sampling precision was adjusted in response to these sample size reductions. Along with this reduction in sample size the evaluation also incorporated an increased effort per M&V point in an effort to increase the rigor of each ex-post gross impact result.

Ultimately the number of expected NTG-only points was further reduced. The main reason for this was a significant number of customers that had multiple projects, which resulted in customer fatigue and limited the availability of untouched customers in the sample frame. Furthermore, the total number of targeted points was considered to be more than adequate to meet all project objectives and yield results with acceptable confidence and precision levels. The final targeted sample sizes for both the BD and AD periods, and the resulting totals, for each type of sample point is shown in Table A-4 below.

Table A-4: Final Sample Sizes for WO033 Impact-Related Effort

Impact Evaluation Component	Before-Decision	After-Decision	TOTAL
M&V Points (Gross Realization Rates + NTG) ³	200	200	400
Overlapping M&V Points (GRR + NTG)	0	50	50
Lower Rigor Points (Qualitative + NTG)	100	0	100
Incremental NTG-Only Points	480	350	830
TOTAL*	780	600	1,380

* All points incorporated NTG evaluation in addition to gross impact evaluation efforts.

The resulting number of targeted NTG-only points, at 1,380, while reduced, still represents a very large net impact effort in the challenging heterogeneous custom area, with capability to support results at a somewhat detailed program level.

The number of targeted gross impact M&V points and associated scope per point represents an aggressive and significant ex-post gross impact evaluation, and was expected to yield an acceptable level of statistical confidence and accuracy.

³ Both BD and AD M&V points included LRAs, the qualitative portion associated with the Lower Rigor points.

Appendix B

Sample Disposition

An array of segmentation strategies are applied when presenting results from this custom impact evaluation. This appendix summarizes the sample disposition by segment, for the M&V, LRA and NTG samples. Table B-1 presents the number of completed sample points by segment for an array of segments. Completes are organized by:

- IOU,
- IOU-fuel and
- IOU-program or IOU-program group, and
- Cross-IOU grouping.

Some rows are repeated since programs or program groups are able to contribute to more than one organization of the segments.

Table B-1 reflects the actual distribution of completes by segment. The targeted design is discussed in Chapter 3. Gross impact M&V points were targeted as follows: PG&E electric, 100; PG&E gas, 80; SCE electric, 100; SDG&E electric, 60; and SDG&E/SCE gas, 60. A total of 1380 net impact points and 500 LRA points were also targeted. Net impact and LRA points resulted from the randomly selected M&V points; additional NTG and LRA points were randomly selected to obtain a minimum of 25 points at that level for NTG efforts and 8 points for LRA efforts at a program or program grouping level. Programs and program groups are shown in the chapters and appendices detailing those efforts.

Table B-1: WO033 Custom Impact Sample Disposition

Organization of Segments	M&V Count	NTG Count	LRA Count	M&V %	NTG %	LRA %
IOU						
PGE	230	788	252	46.5%	56.8%	47.0%
SCE	100	367	139	20.2%	26.4%	25.9%
SCG	86	74	64	12.5%	5.3%	11.9%
SDGE	79	159	81	20.8%	11.5%	15.1%
All IOUs	495	1,388	536	100.0%	100.0%	100.0%
IOU-Fuel						
PG&E Electric	139	558	155	25.9%	34.2%	28.9%
PG&E Gas	91	230	80	17.6%	8.6%	14.9%
PG&E (Electric and Gas)	0	0	17	0.0%	12.7%	3.2%
SCE Electric	100	367	139	23.3%	27.5%	25.9%
SDG&E/SCG Gas	88	108	72	16.2%	6.7%	13.4%
SDG&E Electric	77	125	73	17.1%	8.1%	13.6%
SDG&E (Electric and Gas)	0	0	0	0.0%	0.0%	0.0%

Table B-1: WO033 Custom Impact Sample Disposition (continued)

Organization of Segments	M&V Count	NTG Count	LRA Count	M&V %	NTG %	LRA %
Programs and Program Groups						
PG&E Program Groups						
PG&E Other 3P*	28	76	28	5.7%	5.5%	5.2%
PGE21011 (Core)	51	126	37	10.3%	9.1%	6.9%
PGE21021 (Core)	35	71	36	7.1%	5.1%	6.7%
PGE21031 (Core)	21	95	19	4.2%	6.8%	3.5%
PGE21035 (Core)	5	55	12	1.0%	4.0%	2.2%
PG&E New Construction*	13	26	13	2.6%	1.9%	2.4%
EE Services Oil Production	18	46	20	3.6%	3.3%	3.7%
Heavy Industry EE Program	7	39	12	1.4%	2.8%	2.2%
Refinery EE Program	12	14	14	2.4%	1.0%	2.6%
RCx	2	20	10	0.4%	1.4%	1.9%
PG&E "Energy Watch" + Rightlights Program*	11	90	14	2.2%	6.5%	2.6%
PG&E UC/CSU*	19	59	18	3.8%	4.3%	3.4%
PG&E CCC*	7	50	13	1.4%	3.6%	2.4%
SCE Program Groups						
SCE Other 3P*	17	54	25	3.4%	3.9%	4.7%
SCE-SW-002B (Core)	16	59	18	3.2%	4.3%	3.4%
SCE-SW-003B (Core)	22	39	20	4.4%	2.8%	3.7%
SCE-SW-004B (Core)	13	64	15	2.6%	4.6%	2.8%
SCE New Construction*	19	38	22	3.8%	2.7%	4.1%
SCE LG*	4	57	10	0.8%	4.1%	1.9%
SCE UC/CSU*	3	32	12	0.6%	2.3%	2.2%
SCE CCC*	5	19	11	1.0%	1.4%	2.1%
SCG Program Groups						
SCG Core*	62	72	62	123.5%	6.0%	11.6%
SCG 3P*	0	2	0	0.0%	0.2%	0.0%
SCG New Construction*	0	0	2	0.0%	0.0%	0.4%
SDG&E Program Groups						
SDG&E Core*	29	65	31	5.9%	4.7%	5.8%
SDGE New Construction*	26	17	19	5.3%	1.2%	3.5%
SDGE BID	48	77	29	9.7%	5.5%	5.4%

Table B-1: WO033 Custom Impact Sample Disposition (continued)

Organization of Segments	M&V Count	NTG Count	LRA Count	M&V %	NTG %	LRA %
Statewide Program Groups (SCE/PGE)						
State Department of Corrections*	1	10	4	0.2%	0.7%	0.7%
State Department of General Services*	1	16	10	0.2%	1.2%	1.9%
Core/Non-Core						
PG&E Core	107	292	104	21.6%	21.0%	19.4%
PG&E Non-Core	123	496	148	24.8%	35.7%	27.6%
SCE Core	51	162	53	10.3%	11.7%	9.9%
SCE Non-Core	49	205	86	9.9%	14.8%	16.0%
SCG Core*	62	72	62	12.5%	5.2%	11.6%
SCG Non-Core	0	2	2	0.0%	0.1%	0.4%
SDG&E Core*	29	65	31	5.9%	4.7%	5.8%
SDG&E Non-Core	74	94	50	14.9%	6.8%	9.3%
New Construction						
PG&E New Construction*	13	26	13	2.6%	1.9%	2.4%
SCE New Construction*	19	38	22	3.8%	2.7%	4.1%
SCG New Construction*	0	0	2	0.0%	0.0%	0.4%
SDGE New Construction*	26	17	19	5.3%	1.2%	3.5%
State Programs						
PG&E UC/CSU*	19	59	18	3.8%	4.3%	3.4%
SCE UC/CSU*	3	32	12	0.6%	2.3%	2.2%
PG&E CCC*	7	50	13	1.4%	3.6%	2.4%
SCE CCC*	5	19	11	1.0%	1.4%	2.1%
All UC/CSU	22	91	30	4.4%	6.6%	5.6%
All CCC	12	69	24	2.4%	5.0%	4.5%
State Department of Corrections*	1	10	4	0.2%	0.7%	0.7%
State Department of General Services*	1	16	10	0.2%	1.2%	1.9%
SGP	36	186	68	7.3%	13.4%	12.7%
Local Government Partnerships						
PG&E "Energy Watch" + Rightlights Program*	11	90	14	2.2%	6.5%	2.6%
SCE LG*	4	57	10	0.8%	4.1%	1.9%
Third Party Programs						
PG&E Other 3P*	28	76	28	5.7%	5.5%	5.2%
SCE Other 3P*	17	54	25	3.4%	3.9%	4.7%
SCG 3P*	0	2	0	0.0%	0.1%	0.0%
* This program group appears in more than one organization of the segments.						

Appendix C.

Additional Information on Gross Impact Results

C.1 Contents

This Appendix covers a number of areas of additional interest related to the gross impact analysis and results, and includes the following subsections.

- Domain-specific gross realization rates by time period
- Project-specific gross impact results
- Frequency of M&V points by number of tracking records
- Additional discrepancy factors
- Summary of selected projects and associated discrepancies
- Description of projects classified as extreme points
- Coordination and overlap with the ex-ante review process (WO002)Assessment of EUL claims
- Data requests for detailed project documentation
- Final site report template
- Approach for determining gross baselines

C.2 Domain-Specific Gross Realization Rates by Time Period

The tables shown in this section display both:

- changes in performance in the first two years of the evaluation cycle (2010 / 2011) and 2012, and
- differences between the lifecycle (LC) and the first year (FY) gross realization rates.

The evaluation investigated the premise that Decision D.11-07-030 in July 2011 would affect the quality and accuracy of gross savings claims and that this would manifest in higher gross realization rates. This decision, which mandated IOU conformance with dual baselines and ex-ante review was not fully implemented immediately however, and the evaluation team ultimately

decided it was best to compare 2012 projects to 2010 and 2011 projects. The BD and AD1 (2010-2011) period projects were lumped together, and compared to AD2 plus AD3 projects (2012).¹ As demonstrated in the tables in this section, only minor changes can be observed between aggregate-level 2012 gross realization rates (GRRs) versus 2010-11 projects, with the exception of SDG&E/SCG gas, where the GRR increased from 0.50 to 0.91 between these two periods. Examination of the 90 percent confidence interval indicates that this SDG&E/SCG gas difference is statistically significant. SDG&E and SCG appear to have become more conservative with regard to inputs in savings calculations and effective useful life (EUL) claims. Note also that, when extreme points are included, there is no statistical difference between these periods.

The tables in this section also compare gross realization rates for the lifecycle of the project (lifecycle ex-post savings / lifecycle ex-ante savings) to first year realization rates. Results are presented by IOU fuel domain, excluding eight 'extreme' projects removed from the PG&E electric and SDGE/SCG gas IOU fuel domains. The results in the tables primarily consist of lifecycle GRRs; the first year GRRs are only shown in the last row of each table.

Project GRRs that are most impacted by differences between LC and FY include projects where EULs for any record have changed or early replacement projects where the evaluation team estimated a remaining useful life for the existing/removed equipment or used the standard default of one-third of the EUL. In all projects sampled for M&V, IOU early retirement (ER) claims did not incorporate remaining useful life (RUL)/EUL savings estimation, which continues to be a practice that the IOUs should change, considering the requirements of D. 11-07-030.² It is important to note that large, statistically significant differences do not generally exist between LC and FY GRR results; however, LC results do tend to be somewhat lower than FY results. However, the most significant change was the change for SDG&E electric kWh, which increased from the first year GRR of 0.46 to 0.64 when considering lifecycle realization rates. Nonetheless, the reasons behind the general trend of somewhat lower LC GRR results include the following:

- Most baseline adjustments had an equivalent effect on GRR values for both LC and FY estimates. The reason for this is that several scenarios played out frequently in the sample for which this is the case.

¹ The initial design sought to differentiate the 'before-decision' (BD) and 'after-decision' (AD) periods, with the BD period defined as all of 2010 and Q1 / Q2 2011, and the AD period defined as Q3 / Q4 2011 (AD1) and all of 2012 (consisting of the AD2 period of Q1/ Q2 2012 and the AD3 period of Q3 / Q4 2012). However, these analysis periods were later adjusted by calendar year to reflect the actual start of the full execution of EAR activities in January 2012.

² The application paperwork and IOU tracking systems do not record project-, record- or measure-level RUL.

- IOU ER claims were commonly rejected by the evaluation team in favor of normal replacement retrofit treatment, involving a single ex-post baseline throughout the EUL. Since the IOUs also claim a single baseline throughout the EUL, even for ER claims, then FY and LC GRRs are not changed significantly unless dual baselines are very different and short RULs are common.
- Where there is agreement between the IOUs and the evaluation team regarding baseline treatment -- such as normal replacement (replace on burnout), add-on measure, new construction and so forth -- then FY and LC GRRs are normally equal when considering baseline treatment alone.
- The most common scenario in which differences emerge between LC and FY GRR estimates, due to baseline consideration alone, are cases in which the evaluation team applied a dual baseline (with RUL/EUL estimation) for ER projects. In such cases the resulting LC GRRs will tend to be lower than FY estimates because ex-post savings estimates are lower during the second EUL -RUL period, which typically uses a more efficient baseline. The evaluated EULs were often not different from claimed EULs. When differences were noted between claimed and evaluation EULs, there was not a clear trend of increases or decreases. However, the net difference after accounting for all changes was that the average evaluation EUL was somewhat lower than the average claimed EUL. This pushed LC GRRs lower compared with FY results.

Table C-1: PG&E kWh GRRs by Period, and LC versus FY (Extreme Points Removed)

Sampling Strata	Overall 2010-2012	Effective BD Period 2010-2011	Effective AD Period 2012
1	0.87	0.91	0.63
2	0.60	0.56	0.68
3	0.44	0.41	0.49
4	0.68	0.73	0.62
5	0.78	0.62	0.96
LC Weighted GRR	0.67	0.64	0.68
90 Percent CI	0.58 to 0.751	0.546 to 0.739	0.56 to 0.797
Relative Precision	0.13	0.15	0.17
n M&V Completes	135	90	45
N Sampling Units	6,994	4,706	2,288
ER	0.92	0.87	0.72
First Year GRR	0.68	0.65	0.75

Table C-2: PG&E kW GRRs by Period, LC versus FY (Extreme Points Removed)

Sampling Strata	Overall 2010-2012	Effective BD Period 2010-2011	Effective AD Period 2012
1	0.98	1.04	0.42
2	0.53	0.48	0.58
3	0.46	0.41	0.57
4	0.39	0.40	0.38
5	0.45	0.30	0.69
LC Weighted GRR	0.52	0.47	0.55
90 Percent CI	0.414 to 0.616	0.361 to 0.585	0.375 to 0.729
Relative Precision	0.20	0.24	0.32
n M&V Completes	115	77	38
N Sampling Units	6,248	4,210	2,038
ER	1.29	1.27	1.21
First Year GRR	0.58	0.50	0.70

Table C-3: PG&E Gas GRRs by Period, LC versus FY

Sampling Strata	Overall 2010-2012	Effective BD Period 2010-2011	Effective AD Period 2012
1	0.97	0.97	NA*
2			NA*
3	0.63	0.58	0.78
4	0.64	0.61	0.76
5	0.52	0.67	0.33
LC Weighted GRR	0.67	0.72	0.63
90 Percent CI	0.612 to 0.738	0.658 to 0.786	0.48 to 0.779
Relative Precision	0.09	0.09	0.24
n M&V Completes	91	64	27
N Sampling Units	1,270	859	411
ER	0.56	0.45	0.78
First Year GRR	0.70	0.75	0.60

* No projects were completed and/or available in strata 1 and 2.

As expected and explained above, PG&E lifecycle GRRs for the 2010-2012 period are somewhat lower than first year GRRs for kW, kWh, and therms.

Although not statistically significant, PG&E electric results generally indicate a small improvement in GRR in 2012 compared with the 2010-2011 period. PG&E gas results by time

period are inconclusive due to a lack of 2012 projects evaluated in strata 1 and 2, a smaller 2012 sample size, and widely variable strata-level results both within and across time periods.

Table C-4: SCE kWh GRRs by Period, LC versus FY

Sampling Strata	Overall 2010-2012	Effective BD Period 2010-2011	Effective AD Period 2012
1	0.33	0.36	0.19
2	0.62	0.54	1.06
3	0.90	1.00	0.75
4	0.63	0.61	0.67
5	0.58	0.50	0.76
LC Weighted GRR	0.61	0.60	0.64
90 Percent CI	0.506 to 0.708	0.448 to 0.747	0.472 to 0.8
Relative Precision	0.17	0.25	0.26
n M&V Completes	100	70	30
N Sampling Units	3,052	1,737	1,315
ER	1.03	1.30	0.87
First Year GRR	0.60	0.58	0.63

Table C-5: SCE kW GRRs by Period, LC versus FY

Sampling Strata	Overall 2010-2012	Effective BD Period 2010-2011	Effective AD Period 2012
1	0.33	0.36	0.16
2	0.63	0.57	1.00
3	1.05	1.22	0.84
4	0.49	0.49	0.50
5	0.46	0.58	0.12
LC Weighted GRR	0.57	0.63	0.41
90 Percent CI	0.466 to 0.671	0.476 to 0.787	0.247 to 0.565
Relative Precision	0.18	0.25	0.39
n M&V Completes	94	66	28
N Sampling Units	2,748	1,578	1,170
ER	1.08	1.24	1.27
First Year GRR	0.61	0.67	0.42

The SCE lifecycle GRRs for the 2010-2012 period are very similar to the first year GRRs, with the LC kWh results being somewhat lower, as expected, when compared with FY results, but the kWh results demonstrating the opposite trend. Closer inspection reveals that LC kWh results increased slightly relative to FY results because of seven individual projects where the ex-post EUL was found to be longer than that listed in the ex-ante analysis. Five of the seven were in the New Construction program. In many of the cases the listed EUL for controls and other HVAC measures was less than DEER 2008. Although not statistically significant, SCE electric kWh results generally indicate a small improvement in 2012 compared with the 2010-2011 period, and the ER improved considerably, perhaps due to some points with extreme GRRs in the pre-2012 period, while SCE electric kW results show a substantial drop in 2012 and no major change in ER. SCE results by time period are inconclusive due to directional differences between kWh and kW results, a smaller 2012 sample size, and widely variable strata-level results both within and across time periods.

Table C-6: SDGE kWh GRRs by Period, LC versus FY

Sampling Strata	Overall 2010-2012	Effective BD Period 2010-2011	Effective AD Period 2012
1	0.65	0.81	0.33
2	0.76	0.63	1.07
3	0.39	0.62	0.02
4	0.82	0.50	1.53
5	0.49	0.41	0.65
LC Weighted GRR	0.64	0.60	0.78
90 Percent CI	0.521 to 0.751	0.498 to 0.709	0.543 to 1.021
Relative Precision	0.18	0.18	0.31
n M&V Completes	77	50	27
N Sampling Units	1,469	615	854
ER	0.99	0.79	0.98
First Year GRR	0.46	0.47	0.47

Table C-7: SDGE kW GRRs by Period, LC versus FY

Sampling Strata	Overall 2010-2012	Effective BD Period 2010-2011	Effective AD Period 2012
1	1.08	1.29	0.53
2	0.68	0.61	0.85
3	0.48	0.91	0.09
4	0.69	0.36	1.97
5	1.22	0.22	3.07
LC Weighted GRR	0.82	0.69	1.43
90 Percent CI	0.464 to 1.172	0.48 to 0.89	0.774 to 2.077
Relative Precision	0.43	0.30	0.46
n M&V Completes	59	40	19
N Sampling Units	790	469	321
ER	2.10	1.20	1.24
First Year GRR	0.84	0.62	1.68

For SDG&E electric kWh, the lifecycle GRRs for the 2010-2012 period are considerably higher than the first year GRRs, while electric kW LC GRRs are just slightly greater in the first 2010-2011 period only. Approximately half of the ex-post EULs were higher than the ex-ante EULs (most evident in new construction projects), which caused the lifecycle kWh GRR to be higher. SDG&E electric results by time period are inconclusive due to significant differences between kWh and kW results (and contributing sample sizes), a smaller 2012 sample size, and widely variable strata-level results both within and across time periods.

Table C-8: SDGE/SCG Gas GRRs by Period, LC versus FY (Extreme Points Removed)

Sampling Strata	Overall 2010-2012	Effective BD Period 2010-2011	Effective AD Period 2012
1	0.49	0.51	NA*
2			0.29
3	0.70	0.75	0.33
4	0.63	0.54	0.89
5	0.62	0.65	0.58
LC Weighted GRR	0.58	0.49	0.74
90 Percent CI	0.501 to 0.664	0.416 to 0.568	0.542 to 0.94
Relative Precision	0.14	0.15	0.27
n M&V Completes	84	58	26
N Sampling Units	1,077	444	633
ER	0.80	0.76	0.85
First Year GRR	0.64	0.56	0.76

* No projects were completed and/or available in strata 1.

Both SDGE and SCG gas projects had under-estimated EULs, but not enough to counteract other factors such as evaluation use of RUL/EUL estimation. After removing extreme points, the lifecycle GRR for the 2010-2012 period is somewhat smaller than the first year GRR.

SDG&E/SCG gas results by time period are inconclusive due to a lack of 2012 projects evaluated in strata 1, a smaller 2012 sample size, and variable strata-level results both within and across time periods.

C.3 Project-Specific Gross Impact Results

Table C-9 presents gross impact results for each M&V sample point. This table includes project identifiers, a brief measure and facility description, sampling strata, ex ante savings claims, the primary reason that ex-post results differ from ex-ante, gross impact realization rates for first year savings as well as lifecycle (LC) savings, a lower rigor assessment score,³ and the net-to-gross ratio (NTGR).

³ The project LRA score ranges from -3 to 3 and reflects the average of subjective ratings in the three categories examined in the LRA. A score of -3 would reflect poor treatment of all issue areas and 3 would reflect good treatment of all areas. LRA efforts are fully described in Chapter 7 and Appendix E.

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
E001	6061640	TAA0008194	Waste Heat Boiler, VFDs, and Motors / Refinery	1(g)	77	1,019,881	10,205,170	Operating Conditions	1.00	1.00	1.00	1.00	0.98	0.98	1.23	0.28
E002	5029826	2K09016091	Heat Exchanger in CRU Process / Refinery	2(g)			4,310,537	Operating Conditions					0.99	0.99	0.47	-
E003	5184780	2K08009486	Heat Reuse / Refinery	2(g)			3,321,543	Operating Conditions					0.91	0.91	0.83	0.48
E004	4401648	2K08009019	Steam to Electric Pump / Refinery	3(g)			3,253,989	Inappropriate Baseline					-0.03	-0.03	1.23	0.71
E005	5033179	NC0088735	HVAC Controls / Data Center	1(e)	1284	13,964,043	0	Operating Conditions	0.57	0.76	0.49	0.65			1.93	-
E006	5033047	2K10042682	Furnace Coating / Refinery	3(g)			2,588,024	Operating Conditions					0.99	0.53	0.30	0.59
E007	4646889	2K09027855	Bleaching Process Improvement / Chemical Manufacturer	3(g)			2,241,513	Operating Conditions					0.43	0.43	-0.90	0.87
E009	4569894	TAA0006395	VSDs, Piping Conversion, Low Pressure Systems / Gas Wellfield	1(e)	99	7460254		Inappropriate Baseline	0.00	0.00					1.20	0.60
E010	5077594	2K09020022	Hot - Cold Aisle Airflow Configuration / Data Center	1(e)	718	6,288,204		Inappropriate Baseline	0.44	0.44	0.44	0.44			0.57	0.77
E011	6061930	TAA0008203	Automate Steam Flow / Refinery	3(g)			1,040,884	Operating Conditions					0.84	0.91	0.00	0.80
E012	6050405	TAA0008165	Pressure Recovery Bypass / Refinery	1(e)	568	4,838,485		Calculation Method	1.01	1.01	0.98	0.98			0.00	0.87
E013	5191860	TAA0007266	Controls to Process Electric Heating / Manufacturer	4(g)			900,251	Operating Conditions					1.50	1.50	0.10	0.73
E014	5930530	2K10043800	Heat Recovery - Direct Feed / Refinery	4(g)			835,026	Operating Conditions					0.00	0.00	1.07	0.86
E015	5011349	2K10032673	Steam Leak Repair / Refinery	4(g)			825,413	Operating Conditions					0.69	0.69	0.17	0.77
E016	4324516	NC0057293	NC: Insulation, Heat Curtains, EE Boilers / Greenhouse	4(g)	80	372,568	678,817	Inappropriate Baseline	0.07	0.04	0.03	0.02	0.45	0.27	1.00	0.58

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
E017	4626714	2K09013224	POCs / Oilfield	1(e)	690	6,591,550		Operating Conditions	0.58	0.58	0.63	0.63			0.43	0.00
E019	4337870	NC0055313	Aeration, DO control, VSDs, Pumps / WWTP	1(e)	624	4,977,794		Operating Conditions	0.58	0.58	0.58	0.58			0.87	0.30
E020	4643702	TAA0006573	Optimize Process (and VSDs/motors) / Refinery	4(g)	37	439,818	462,008	Inappropriate Baseline	0.81	0.81	0.55	0.55	1.02	1.02	-0.33	0.28
E021	4296131	NC0086654	Whole Building / Healthcare Facility	4(g)	4	1,389,499	352,362	Equipment Specifications	1.40	1.31	78.11	73.23	0.06	0.05	0.33	0.41
E023	4819351	NC0066753	Methane Recovery from Wastewater / Winery	4(g)	46	392,316	443,902	Inappropriate Baseline	1.04	1.04	0.84	0.84	0.70	0.94	-0.37	0.68
E024	4585678	TAA0006466	New Aerators, VFD Blowers and SCADA System / WWTP	1(e)	519	4,544,688		Operating Conditions	0.80	0.27	0.80	0.27			-0.13	0.33
E025	4348453	TAA0005777	Bypass Flow to Reduce Pumping / Oilfield	1(e)	528	4,535,997		Operating Conditions	1.18	1.18	1.18	1.18			1.27	0.37
E027	4383909	2K08009499	Improved Convection Section / Refinery	4(g)			434,452	Operating Conditions					1.12	1.12	1.27	0.49
E028	4556619	TAA0006372	Improve Concentration Process / Refinery	4(g)			433,231	Operating Conditions					0.84	0.56	0.47	0.72
E030	5158577	STPB000007	Steam Traps / Refinery	4(g)			418,994	Calculation Method					0.91	0.91	-0.07	0.60
E031	5544494	NC0046731	New Motors, Pumps, Increased Pipe Size / Water Agency	1(e)	672	3,869,879		Operating Conditions	0.22	0.22	0.14	0.14			0.13	-
E032	5145156	NC0072373	New Sulfur Recovery Unit and Reactor / Refinery	4(g)			392,618	Calculation Method					1.24	1.24	1.43	0.53
E033	5547490	2K10044323	Increase Pipe Diameter / Refinery	4(g)			391,749	Operating Conditions					0.53	0.53	0.87	0.80
E034	4374283	NC0051396	POCs on New Wells / Oil Wellfield	1(e)	404	3,542,350		Operating Conditions	0.74	0.74	0.74	0.74			1.00	0.00
E036	5199669	STPB000010	Steam Traps / Refinery	4(g)			315,120	Calculation Method					0.91	0.91	0.53	-
E037	5623220	TAA0007621	Chillers & Cooling System Replacement / Manufacturer	2(e)	162	2,889,001		Operating Conditions	0.72	0.24	2.71	0.90			1.00	0.61

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
E038	4969628	NC0075773	New Greenhouse (Envelope Measures) / Nursery	4(g)			293,395	Calculation Method					1.09	0.72	1.00	0.33
E039	5327884	2K0917760C	Monitoring Based Commissioning (MBCx) / University	4(g)			288,355	Calculation Method					0.33	0.38	0.53	0.72
E040	4516269	2K10033514	Cooling Tower and Cooler Replacement / LPG Refinery	2(e)	317	2,634,793		Calculation Method	0.87	0.87	-0.13	-0.13			0.33	-
E041	5308149	TAA0007421	Compressed Air Modifications / Manufacturer	2(e)	306	2,569,728		Operating Conditions	0.01	0.01	0.01	0.01			0.43	0.72
E044	5045753	TAA0007016	VSDs on Pumps & Fans / Oil Wellfield	2(e)	278	2,389,038		Calculation Method	0.40	0.40	0.39	0.39			1.07	0.50
E045	5205481	2K08008267	POCs / Oil Wellfield	2(e)	218	2,109,227		Operating Conditions	0.53	0.53	0.55	0.55			0.63	0.00
E046	4425319	2K09016467	HVAC Retrofit / Biotech Facility	2(e)	209	1,847,623	26,779	Operating Conditions	0.99	0.99	1.08	1.08	0.87	0.74	1.60	-
E048	5317967	2K0811394C	Boiler Retrofit / Transportation Facility	4(g)			208,345	Operating Conditions					0.03	0.03	1.77	-
E049	4299783	2K09014272	Comprehensive Refrigeration Upgrades / Agricultural Processing Facility	2(e)	241	1,934,563		Calculation Method	0.94	0.94	0.00	0.00				0.68
E050	5308423	TAA0007397	Replace Blanchers / Food processor	4(g)			196,030	No Significant Discrepancies					1.00	1.00	1.13	-
E052	5972116	TAA0008053	VSDs on New Injection Pumps / Oil Wellfield	2(e)	173	1,488,091		Operating Conditions	0.92	0.92	0.92	0.92			1.00	0.62
E053	4764602	2K0701163C	MBCx / University	2(e)	144	1,355,232	8,498	Operating Conditions	0.70	0.27	0.76	0.29	6.53	2.51	-0.17	0.73
E054	4909119	NC0057936	VFD, EE Blowers, DO Control, Motors / WWTP	2(e)	144	1,360,163		Inappropriate Baseline	0.35	0.30	0.39	0.35			0.37	0.33
E055	4612027	TAA0006515	Gas Lift to Rod Beam Pumps / Oil Wellfield	3(e)	142	1,317,347		Operating Conditions	0.70	0.34	0.74	0.36			1.17	0.46
E056	5562130	2K10043908	Downsize Pump / Refinery	3(e)	143	1249133		Operating Conditions	0.00	0.00	0.00	0.00			1.43	0.88

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
E057	5023824	NC0079314	New VSD Air Compressors / Gas Wellfield	3(e)	142	1245697		Inappropriate Baseline	0.00	0.00	0.00	0.00			-0.17	-
E058	4569895	TAA0006395	New POCs / Oil Wellfield	3(e)	115	1,084,355		Operating Conditions	0.11	0.09	0.12	0.10			0.87	0.17
E059	5553670	TAA0007536	Variable Speed Drive on Submersible Pumps / Oil Wellfield	3(e)	116	1,001,971		Inappropriate Baseline	-1.40	-1.40	-1.40	-1.40			0.13	-
E060	5928993	NC0068713	New Construction / Greenhouse	5(g)			100,833	Operating Conditions					0.95	0.84	1.00	0.33
E064	4294536	TAA0005598	HVAC Retrofit, New Exhaust and Ventilation / Factory	5(g)			88,931	Operating Conditions					0.89	1.33	0.53	0.70
E065	5787531	TAA0007802	VSDs on Pumps & Fans / Oil Wellfield	3(e)	101	864,380		Operating Conditions	0.25	0.25	0.32	0.32			0.87	0.00
E066	5562100	2K1042120C	New Pool Cover with Automatic Reel / Community Pool	5(g)			82,683	Inappropriate Baseline					0.39	0.39	1.60	0.45
E068	5078812	2K09019225	Refrigeration Controls / Warehouse	3(e)		647,100		No Significant Discrepancies	1.00	1.00					1.10	0.40
E069	5308808	2K0917749C	MBCx / University Laboratories and Offices	3(e)	163	580,266	6,250	Calculation Method	1.13	0.43	2.46	0.95	0.15	0.06	1.10	0.72
E071	5176161	TAA0007215	POCs and HE Motors/ Oil Wellfield	3(e)	58	586,738		Operating Conditions	0.13	0.11	0.15	0.13			0.50	0.17
E072	4725007	NC0103353	HVAC Controls-Motors-Pipe Increase / Data Center	3(e)	27	582,508		Operating Conditions	0.30	0.30	0.72	0.72			0.50	-
E076	4298226	2K09019432	New Boilers / County Offices	4(e)	20	197895	22,735	Operating Conditions	0.00	0.00	0.00	0.00	0.55	0.55	0.70	-
E077	4896827	2K09028266	Server Virtualization / Data Center	4(e)	47	407,517		Equipment Specifications	0.99	0.16	0.99	0.16			0.37	0.22
E079	4765915	2K09020878	Constant to Variable Speed Chiller / Large Office	4(e)	62	309,324		Operating Conditions	1.55	1.55	0.89	0.89			1.77	-
E080	4471609	NC0071193	Whole Building / Community College	4(e)	259	310,491	-1,192	Equipment Specifications	0.75	0.71	0.07	0.07			1.07	0.28
E081	4588416	2K10035510	CO Sensors on Garage Fans / Office and Apartments	4(e)	45	298,335		Inappropriate Baseline	0.42	0.39	0.43	0.39			0.53	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
E082	4288482	APC009346	Rehabilitate Well Pump / Farm	4(e)	21	261,940		Operating Conditions	0.70	0.23	0.98	0.33			0.30	-
E084	4508631	2K08008206	New AHU, Packaged Units, VAV Conversion-, Retrocommissioning / Large Offices	4(e)		236607		Ineligible Measure	0.00	0.00					1.63	-
E085	4440942	NC0094413	Whole Building / Office Building	4(e)	83	194,512	4,185	Operating Conditions	1.46	1.27	0.55	0.48	0.38	0.33	1.77	-
E086	4581670	NC0107597	Whole Building / University	5(g)	-6	55,432	18,030	Operating Conditions	0.55	0.48	-1.05	-0.92	0.21	0.18	1.07	0.50
E087	4466871	APC009682	Rehabilitate Pumps / Municipal Water Agency	4(e)	25	220,366		Operating Conditions	2.19	2.19	2.63	2.63			0.83	0.25
E089	5045757	TAA0007017	Ozone Laundry Modification / Hotel	5(g)			22,051	Operating Conditions					0.12	0.12	0.20	0.83
E091	4657853	NC0046709	Whole Building /University	5(g)	278	119,590	8,937	Operating Conditions	-1.14	-0.99	-0.15	-0.13	1.52	1.33	1.20	0.30
E092	5318601	TAA0007440	Boiler Economizer & Change Operation / Manufacturer	5(g)			19,590	Ineligible Measure					0.19	0.49	0.10	0.53
E093	4453768	2K10033486	VSDs on Evap Fans / Refrigerated Storage	4(e)	21	186,610		Operating Conditions	2.54	2.54	2.01	2.01			0.70	0.33
E096	4449630	NC0051818	Whole Building / Primary School	5(g)	98	119,124	2,410	Operating Conditions	0.64	0.54	0.19	0.16	0.34	0.28	1.23	-
E097	4861846	NC0108553	VSD on Water Pumps / Farm	5(e)	68	129,344		Operating Conditions	0.67	0.67	0.80	0.80			0.53	-
E098	4282665	2K10030471	EE Boiler and VFD / Office Building	5(g)		38,564	7,728	Inappropriate Baseline	0.90	0.90			0.67	0.67	1.57	0.47
E100	6041278	2K0916265C	MBCx / University	5(e)	2	20,288	6,649	Calculation Method	0.74	0.28	0.00	0.00	0.73	0.28	-0.03	0.67
E103	4522064	NC0049673	Savings By Design / Community College	5(g)	42	52,617	2,078	Measure Count	0.44	0.48	0.34	0.37	0.36	0.39	1.07	0.59
E105	5134189	TAA0007082	Steam Condensate Heat Recovery / Food Manufacturer	5(g)			3,480	Operating Conditions					0.88	0.66	1.20	0.40
E106	4969029	2K09022364	Controls on Hot Water Pump / Office Building	5(e)	4	31,767		Operating Conditions	0.84	0.84	0.94	0.94			0.90	0.38

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
E107	5082550	TAB0007050	ECM Motors / Small Convenience Store	5(e)	2	28,750		Calculation Method	0.41	0.44	0.47	0.50			-0.07	0.52
E109	4390304	TAA0005887	ECM Motors and Fan Controller / Convenience Store	5(e)	2	23,291		Calculation Method	0.32	0.31	0.39	0.38			-0.40	-
E111	4470558	TAA0006139	ECM motors and Controllers / Grocery	5(e)	2	14,551		Measure Count	0.52	0.53	0.58	0.60			1.07	-
E113	5294949	2K10033761	HVAC EMS / Retail Store	5(g)	1	9,527	179	Inappropriate Baseline	1.17	1.17	-0.19	-0.19	5.23	5.23	0.70	0.35
E115	4422717	2K08011686	HVAC EMS / Retail Store	5(g)	1	7,735	173	Inappropriate Baseline	1.20	1.20	1.70	1.70	2.19	2.19	1.07	0.35
E116	5046026	TAA0007020	ECM motors / Small Convenience Store	5(e)	1	9,359		Calculation Method	0.41	0.41	0.50	0.50			0.80	-
E118	4347697	2K08011657	HVAC EMS / Retail Store	5(g)	2	7,497	28	Inappropriate Baseline	1.57	1.57	0.97	0.97	-0.93	-0.93	1.47	0.35
E119	5294953	2K10033761	HVAC EMS / Retail Store	5(g)	1	4,868	123	Inappropriate Baseline	1.99	1.99	1.09	1.09	0.16	0.16	1.63	0.35
E121	4351735	2K08011653	HVAC EMS / Retail Store	5(g)	1	4,214	50	Calculation Method	2.70	2.70	0.26	0.26	9.72	9.72	1.63	0.35
E122	5548894	TAB0007520	ECM Evaporator Fan Motors & Controller / Assisted Living Facility	5(e)		3,567		Calculation Method	0.53	0.51					-0.57	-
E123	4384154	2K09028337	Compressed Air Controller & Pressure Reduction / Winery	5(e)		2566		Inappropriate Baseline	0.00	0.00					0.47	0.64
E124	4765067	2K10033776	Remotely Monitored and Controlled Thermostat / Retail	5(e)		2,422		Operating Conditions	2.69	2.69					1.77	-
E200	6458706	TAA0008739	New Gas Pipeline to Gas Compressors / Gas Wellfield	1(e)	0	7162455	0	Inappropriate Baseline	0.00	0.00					-0.73	-
E201	4880555	2K10039962	HVAC Controls EMS / Dept of Corrections Facility	1(e)	138	4,787,322	0	Calculation Method	1.22	1.22	3.08	3.08			1.30	0.73
E202	5605253	NC0079073	Process Pumping VSDs and Modifications / Industrial Facility	1(e)	496	4,343,600	0	Operating Conditions	0.42	0.42	0.43	0.43			1.47	0.32
E203	4858624	2K09027827	HVAC Retrocommissioning / Manufacturing BioTech	1(e)	236	3,947,709	55,131	Operating Conditions	0.11	0.11	0.08	0.08	0.00	0.00	1.13	0.54

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
E204	6471664	NC0095793	Major Renovation - HVAC / Data Center	1(e)	700	5,543,000	0	Inappropriate Baseline	2.56	6.39	2.12	5.30			1.57	0.75
E205	6559098	TAA0008881	VFDs on Pumps / Oil Wellfield	1(e)	431	3,701,952	0	Operating Conditions	0.23	0.23	0.23	0.23			-0.93	-
E208	5794010	NC0096933	New Construction - HVAC / Data Center	2(e)	559	2,965,150	0	Inappropriate Baseline	0.67	0.87	0.39	0.50			1.40	0.54
E209	6487074	2K11072468	EMS Controls / University	2(e)	0	2,936,705	269,303	Unquantified fuel impacts	0.09	0.09			0.95	0.95	-0.33	0.60
E210	3709542	2K09017363	HVAC Retrofit / University	2(e)		1,966,700	337,500	Operating Conditions	0.08	0.08			0.60	0.60	-0.03	0.70
E211	6269785	TAA0008401	VFDs on Pumps / Oil Wellfield	2(e)	169	1,447,150	0	Operating Conditions	0.35	0.35	0.34	0.34			0.20	0.27
E212	5597390	2K10044780	Refrigeration Controls / Manufacturer	2(e)	41	1,827,276	0	Operating Conditions	1.22	1.22	0.52	0.52			0.50	0.40
E216	6659455	TAA0009050	VFDs on Pumps / Oil Wellfield	3(e)	76	650,192	0	Operating Conditions	0.26	0.26	0.26	0.26			-0.20	-
E217	6715874	NC0076513	EE Motors and VFDs on Feedwater Pumps / Oil Wellfield	3(e)	92	805,833	0	Operating Conditions	1.03	1.03	1.03	1.03			0.20	0.61
E218	6324557	TAA0008567	VFDs and progressive Cavity Pump Modifications / Oil Wellfield+B163	3(e)	134	1,151,636	0	Calculation Method	0.49	0.49	0.49	0.49			-0.77	-
E219	5930537	2K11047544	Electric to Steam Pumps / Agricultural Processing	3(e)	438	1,050,969	544,619	Calculation Method	0.87	0.58	0.85	0.57	0.16	0.12	1.70	0.73
E220	5560539	2K11045092	Evap. Condenser Capacity Optimization / Cold Storage Warehouse	3(e)	40	1,103,565	0	Operating Conditions	0.73	0.58	3.22	2.62			0.97	-
E224	6722144	TAA0009186	Oil Well Pump Conversion / Oil Wellfield	4(e)	55	472,918	0	Calculation Method	0.35	0.35	0.29	0.29			-0.57	-
E225	4713094	2K10038550	Smart PDU at IT Lab / Data Center	4(e)	0	220,203	0	Equipment Specifications	0.72	0.55					0.77	0.54
E226	6267969	APC011064	Agricultural Pump Rehabilitation / Farm	4(e)	15	277,890	0	Operating Conditions	1.20	1.20	0.00	0.00			1.07	0.37
E227	5154322	2K08008682	HVAC Retrofit / Primary-Secondary School	4(e)		324,303		Operating Conditions	1.03	1.03					0.83	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
E228	4298339	2K1030442C	VSDs on HVAC Pumps and Air Handlers / Convention Center	4(e)	0	202,379	0	Operating Conditions	0.08	0.08					0.73	-
E232	6344880	TAA0008601	ECM Motors and Fan Controller / Convenience Store	5(e)	3	28,254	0	Measure Count	0.42	0.42	0.51	0.51			-1.13	-
E233	6319557	2K11068579	Pump VFD and EE Motor / Farm	5(e)	34	42,717	0	Operating Conditions	0.65	0.65	0.11	0.11			1.10	-
E234	6382588	TAA0008711	ECM Motor / Small Retail Store	5(e)	0	2408	0	Inoperable Measure	0.00	0.00	0.00	0.00			-0.30	-
E235	6681715	TAA0009103	ECM Evap Fan Motors and Fan Controller / Small Grocery	5(e)	2	14,127	0	Calculation Method	0.68	0.68	0.83	0.83			-0.67	-
E236	4727143	NC0069193	Efficient Package Units and Air Handler with VSD /Natatorium	5(e)	11	23547	-142	Inoperable Measure	0.03	0.03	0.10	0.10			-0.33	-
E237	4442337	2K1035056C	EMS Controls Coding (MCBx) / University Gym	5(g)	0	8,433	11,450	Operating Conditions	-12.59	-2.91			0.77	0.30	-1.07	-
E240	5850453	2K09016916	Install New Heat Exchanger (Stack Economizer) / Manufacturer	3(g)	0	0	1,613,418	Calculation Method					0.95	0.95	0.73	0.70
E241	6466607	TAA0008759	Higher Efficiency Catalyst for Cogeneration Units / Refinery	3(g)	0	0	1,251,722	Operating Conditions					1.15	1.15	-0.27	0.70
E242	6457565	2K07000223	New Heat Exchanger / Refinery	3(g)	0	0	1,771,998	Operating Conditions					0.72	0.72	0.83	-
E243	5850431	2K09016918	Install New Heat Exchanger (Stack Economizer) / Manufacturer	3(g)	0	0	1,712,830	Operating Conditions					0.93	0.93	0.40	0.70
E244	6194958	TAA0008362	Furnace Convection Section Cleaning / Refinery	4(g)	0	0	972,446	Ineligible Measure					0.00	0.00	0.37	-
E245	6736163	TAA0009201	Waste Heat Recovery Steam Generator / Fiberglass Manufacturer	4(g)	0	0	233,685	Inappropriate Baseline					1.52	1.52	-0.37	-
E246	6346268	2K10044403	Retrocommissioning - Waste Heat Recovery / Water Processing Plant	4(g)	0	0	307,860	Ineligible Measure					0.00	0.00	-1.07	0.33
E247	6259862	STPB000020	Steam Traps / Beverage Manufacturer	4(g)	0	0	282,042	Calculation Method					0.52	0.52	-0.33	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
E248	6278917	NC0072294	Piping Modifications / Refinery	4(g)	0	0	475,008	Operating Conditions					0.52	0.52	0.57	0.33
E252	6243158	2K11054719	Replace Blanchers / Fast Food Restaurant	5(g)	0	0	1,159	No Significant Discrepancies					1.00	0.20	0.67	0.46
E253	6265617	NC0113808	EE Griddle ./ Fast Food Restaurant	5(g)	0	0	2,518	Equipment Specifications					1.11	0.89	1.23	-
E255	4236527	NC0091373	New Whole Building Construction / Community College Outreach Facility	5(g)	27	45,559	213	Operating Conditions	0.66	0.60	0.59	0.53	3.03	2.74	1.60	-
E256	6243160	2K11054719	Replace Blanchers / Fast Food Restaurant	5(g)	0	0	392	No Significant Discrepancies					1.00	0.20	1.07	-
E301	6865006	TAA0009320	EE Blow Molder / Food Manufacturer	2(e)	708	2,520,686	0	Operating Conditions	0.73	0.55	1.00	0.75			0.77	0.05
E302	6794289	2K11073414	Install VFD on Refrigeration Compressor / Refrigerated Warehouse	2(e)	159	1,688,575	0	Operating Conditions	0.09	0.09	0.17	0.17			1.03	0.50
E303	5007995	NC0104033	Standalone Waterside Economizer / Data Center	2(e)	278	2,919,097	0	Inappropriate Baseline	0.91	0.90	-0.14	-0.57			-0.37	0.57
E304	7160952	TAA0009669	EMS Air Controls / Office	2(e)	250	1,439,025	8,730	Inappropriate Baseline	0.11	0.11	-0.05	-0.05	3.80	3.80	0.57	-
E305	7175779	TAA0009711	Compressed Air Distribution Optimization / Industrial Process	2(e)	278	2,433,415	0	Calculation Method	1.10	1.10	1.12	1.12			0.73	0.63
E306	7060195	TAA0009475	Install Rapid Close Doors / Manufacturer	3(e)	82	717,337	0	Operating Conditions	0.23	0.23	0.28	0.28			0.67	0.74
E307	7363909	TAA0009943	VFDs and Progressive Cavity Pump Modifications / Oil Wellfield	3(e)	79	677,893	0	Operating Conditions	0.70	0.70	0.70	0.70			-0.57	0.43
E308	6352042	2K09068578	Chilled Water Plant Retrofit / Large Office	3(e)	46	902,648	0	Operating Conditions	0.33	0.45	0.00	0.00			0.23	-
E309	5711733	NC0096153	Use Efficient Split Pass Configuration / Oil Wellfield	3(e)	84	695,880	0	Operating Conditions	0.65	0.65	0.63	0.63			-0.37	0.57
E310	6231746	NC0088734	NRNC / University	3(e)	177	775,643	-12,202	Operating Conditions	0.15	0.14	0.86	0.81			1.77	0.46

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
E311	6994767	TAA0009385	Refrigeration Controls Retrofit / Refrigerated Warehouse	3(e)	93	649,218	0	Operating Conditions	1.06	0.47	0.21	-0.01			1.57	-
E312	7051193	TAA0009451	Guestroom Occupancy-based Thermostats / Hospitality	3(e)	75	625,687	2,524	Calculation Method	0.17	0.20	0.13	0.13	-0.97	-1.20	0.13	0.40
E319	5669494	2K10034952	SAT Reset / Large Office	4(e)	29	234,202	10,070	Calculation Method	1.32	1.12	0.98	1.01	1.91	1.36	0.90	-
E320	6853882	NC0116246	NRNC / Grocery	4(e)	33	205,269	0	Operating Conditions	1.31	1.44	1.66	1.81			1.77	-
E321	7231222	TAA0009761	Compressed Air Modifications / Manufacturer	4(e)	49	373,451	0	Calculation Method	0.28	0.28	0.29	0.29			0.33	0.41
E322	5041901	2K09028657	Garage Exhaust DCV / Large Office	4(e)	0	407,786	0	Equipment Specifications	0.77	0.72					0.17	0.50
E323	7131930	TAA0009613	Compressed Air Modifications / Manufacturer	4(e)	49	417,549	0	Operating Conditions	0.48	0.48	0.49	0.49			0.87	-
E324	6261711	NC0114306	New Insulation on Wine Tanks / Winery	4(e)	335	494,220	0	Inappropriate Baseline	0.36	0.36	0.16	0.16			0.33	0.67
E325	7363908	TAA0009943	VSD for Steam Generator Feedwater Pump and Fan / Oil Wellfield	4(e)	31	263,101	0	Operating Conditions	0.85	0.85	0.85	0.85			0.57	0.21
E332	7418278	2K09016800	MCBX Measures / Community College	5(g)	0	53,128	4,930	Equipment Specifications	0.90	0.69			1.00	0.77	1.03	-
E333	6446784	2K11054947	VAV Conversion / Large Office	5(g)	0	17665	3,298	Inappropriate Baseline	0.00	0.00			0.00	0.00	-0.93	-
E334	4714581	NC0105833	High Efficiency DX HVAC / Lab	5(g)	56	148,086	754	Operating Conditions	0.57	0.57	0.61	0.61	-15.84	-15.84	1.80	-
E336	7295090	TAA0009826	New Boiler and Steam System Retrofit, Pump VFDs / Paper Manufacturer	4(g)	4	27,500	201,580	Operating Conditions	0.67	0.90	0.68	0.90	0.79	0.79	-0.73	0.46
E337	7217489	TAA0009727	ECM on Evaporator Fans / Convenience Store	5(e)	0	2,633	0	Calculation Method	1.16	1.16	1.40	1.40			-0.90	-
E338	7105670	TAA0009558	ECM on Evaporator Fans / Convenience Store	5(e)	1	5,984	0	Calculation Method	0.99	0.99	1.10	1.10			-0.73	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
E339	7212999	TAA0009718	New Cooling Towers, VFDs / Large Office Building	5(e)	19	83,840	0	Operating Conditions	1.75	2.63	0.72	1.08			1.13	-
E340	7217431	TAB0009727	ECM on Evaporator Fans / Convenience Store	5(e)	1	5,745	0	Calculation Method	0.79	0.79	0.91	0.91			-0.57	-
E341	7004346	TAA0009409	ECM on Evaporator Fans / Convenience Store	5(e)	0	3,949	0	Calculation Method	0.82	0.82	0.91	0.91			-0.70	-
E342	6794327	TAA0009259	ECM on Evaporator Fans / Convenience Store	5(e)	0	3,949	0	Operating Conditions	0.38	0.38	0.44	0.44			-1.10	0.51
E343	5617984	NC0088213	NRNC / Community College	5(g)	33	59,849	321	Operating Conditions	1.27	1.19	2.21	2.07	15.75	14.76	0.20	-
E348	7122157	STPA001625	Replace Steam Traps / Manufacturer	5(g)	0	0	15,835	Calculation Method					0.69	0.69	-0.17	-
E349	7395984	2K09020146	Gas Dehydrator / Food Processor	5(g)	0	0	4,176	Measure not installed					0.00	0.00	0.60	-
E350	5836939	2K1039898C	Replace Water Heater / Correctional Facility	5(g)	0	0	4,061	Operating Conditions					1.09	1.09	0.33	0.35
E351	6605886	2K1173080C	Pool Covers / University	5(g)	0	0	93,848	Inappropriate Baseline					0.00	0.00	-0.50	0.53
E352	7297552	TAA0009831	High Pressure Condensate Recovery System / Paper Manufacturer	4(g)	0	0	407,610	Inappropriate Baseline					0.94	0.94	-0.77	-
E401	PGE8407243	NC0108695	MODIFY PROCESS / Greenhouse	1(e)	-13	4,450,709	0	Inappropriate Baseline	0.89	0.89	1.02	1.02			1.23	0.42
E402	PGE6121129	2K11051183	HVAC VSDs and Controls / Office	1(e)	521	4,566,411	0	Operating Conditions	0.83	0.17	0.83	0.17			1.07	-
E404	PGE7528407	TAA0010116	Low Temperature Refrigeration / Food Processing Plant	1(e)	266	3,551,365	0	Operating Conditions	0.95	0.89	1.00	0.94			1.37	0.63
E408	PGE8368614	TAA0010609	Process Compressed Air Controls / Manufacturer	2(e)	256	2,243,458	0	Calculation Method	1.12	1.12	1.12	1.12			0.03	0.79
E409	PGE8196539	TAA0010357	Pump VFDs on New Steam Generators / Oil Wellfield	2(e)	238	1,870,201	0	Calculation Method	0.26	0.26	0.43	0.43			-0.20	-
E413	PGE8626485	2K09015331	Retrocommissioning Measures / High Tech Office	3(e)	32	611,801	21,958	Calculation Method	0.84	0.46	1.48	1.19	-0.25	-0.18	0.53	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
E414	PGE8946109	NC0087173	NRNC / University	3(e)	133	594,122	131,818	Inappropriate Baseline	1.19	1.19	1.05	1.05	0.25	0.25	1.43	-
E419	PGE8562806	TAA0010810	Exhaust Fan VFD / Hospitality	4(e)	0	383,102	0	Operating Conditions	0.38	0.38					0.43	-
E420	PGE8458957	UAA0007125	Pump Rehabilitation / Farm	4(e)	32	240,868	0	Calculation Method	0.53	0.48	0.19	0.17			0.40	0.36
E425	PGE8416598	UAA0006971	Pump Rehabilitation / Farm	5(e)	1	15,384	0	Calculation Method	1.52	1.38	3.12	2.83			0.73	-
E426	PGE6117666	2K10035114	Retrocommissioning HVAC / Offices	5(e)	11	69,234	1,480	Operating Conditions	-0.94	-1.87	-2.10	-2.29	-0.36	-0.33	1.60	-
E430	PGE6719086	2K10044664	Process Heat Recovery with Crude Oil Heat Exchanger / Refinery	3(g)	0	0	2,330,718	Operating Conditions					1.12	1.12	1.73	-
E431	PGE7528407	TAA0010116	Efficient MVR Juice Evaporator / Agricultural Processor	4(g)	0	0	879,574	Operating Conditions					0.68	0.68	1.20	-
E432	PGE8946259	TAA0011050	MBCx / University	4(g)	0	408,915	199,118	Operating Conditions	1.86	0.72			0.20	0.08	0.90	-
E433	PGE8633954	TAA0011028	Steam Driven Power Traps and Equalization Line for Condensate Recovery / Refinery	4(g)	0	0	246,113	Operating Conditions					1.08	1.08	0.33	-
E434	PGE8945685	2K0917936C	HVAC: Economizer Addition, Pump VFDs, Retrocommissioning / Large Office	4(g)	369	1,846,674	261,147	Operating Conditions	0.85	0.79	0.89	1.04	0.99	1.92	1.97	-
E435	PGE8368614	TAA0010609	Heat Exchanger, Flash Tank, Steam Nozzle / Food Manufacturing	4(g)	-19	-30,878	527,741	Operating Conditions					0.27	0.27	0.07	0.64
E441	PGE8626485	2K09015331	Smart Thermostat Installation / Retail Store	5(g)	0	12803	54	Ineligible Measure	0.00	0.00			0.00	0.00	-0.33	0.43
E442	PGE8946109	NC0087173	New Efficient Blow Molding Machines & Cooling Tower VSDs / Beverage manufacturing	5(g)	0	0	70,652	Operating Conditions					0.83	0.83	1.57	-
E443	TAA0010738	TAA0010738	Fan Wall Units / Large Office	5(g)	69	151,868	46,796	Inappropriate Baseline	0.65	0.65	0.31	0.31	-0.06	-0.06	0.97	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
E444	PGE7436819	TAA0010066	Install EMS, VFDs, Smaller Fans, Three Way Valves / Health Care Offices	5(g)	0	37,700	2,130	Ineligible Measure	0.80	0.80			0.00	0.00	-0.50	0.59
E450	PGE6121129	2K11051183	Use Additional AGO and Reconfigure Cooling Circuit / Refinery	2(g)	0	0	2,722,520	Operating Conditions					0.48	0.48	1.23	-
F001	SCE2010_1120294		VSDs for Water Injection Pumps / Oil Wellfield	1(e)	1293	11324444		Operating Conditions	0.00	0.00	0.00	0.00			0.63	-
F002	SCE2010_1120249	SPCX-09-000354-03-17	Process MVR blower Fan VFD / Dairy	1(e)	1,050	9,193,590		Calculation Method	0.97	0.97	0.99	0.99			-0.33	0.52
F004	SCE2010_1120081		VFDs for Boiler Draft and Combustion Fans / Manufacturer	1(e)	871	7,630,769		Operating Conditions	0.26	0.26	0.26	0.26			1.23	-
F005	SCE2010_1138772	21143	VFDs and Process Measures (New Construction) / WWTP	1(e)	692	5,843,780		Operating Conditions	0.58	0.58	0.59	0.59			0.87	0.44
F006	SCE2010_1138744	19002	New IMM and Blow Molder / Plastics Manufacturer	1(e)	1404	5,808,802		Equipment Specifications	0.62	0.46	0.67	0.50			1.03	-
F007	SCE2010_1120112		VFD on HVAC Fan / Industrial	1(e)	564	5,005,471		Inappropriate Baseline	0.41	0.41	0.42	0.42			1.43	-
F008	SCE2011_1059641		New Large Pump Retrofits / Oil Wellfield	1(e)	595	4,546,568		Inappropriate Baseline	0.26	0.26	0.23	0.23			0.87	-
F009	SCE2011_1062579	19008	EE Motors, VFDs, New Blower (New Construction) / WWTP	1(e)	374	3,821,945		Operating Conditions	0.73	0.73	0.86	0.86			0.37	-
F011	SCE2010_1138674	30020	New HVAC AHUs, Chillers, VSDs / Data Center	2(e)	79	3,704,210		Calculation Method	1.05	1.05	3.19	3.19			1.07	-
F012	SCE2010_1138735	19006	Blower and VFDs (New Construction) / WWTP	2(e)	475	3,667,795		Operating Conditions	0.34	0.34	0.23	0.23				-
F013	SCE2010_1000676		HVAC Retrofit/Laboratory	2(e)	620	3,436,500		Inappropriate Baseline	0.66	0.66	0.37	0.37			0.70	0.67
F014	SCE2010_1120109		More Efficient Water Distillation / Industrial Plant	2(e)	507	3,305,874		Inappropriate Baseline	0.68	0.68	0.43	0.43			1.17	0.28
F015	SCE2010_1000477		Blower and VFDs (New Construction) / WWTP	2(e)	366	3,206,225		Operating Conditions	0.52	0.52	0.56	0.56			0.10	0.57

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
F017	SCE2010_1007489		Replace Centrifuges for Sludge / Wastewater Treatment Plant	2(e)	362	3,101,616		Operating Conditions	0.82	0.82	0.77	0.77				0.23
F018	SCE2011_1456772		Compressed Air Modifications / Manufacturer	2(e)	413	3,013,722		Ineligible Measure	0.80	0.80	0.83	0.83			-0.53	-
F019	SCE2010_1120132		New Large Fan Wheel / Cement Manufacturer	2(e)	375	3,011,250		Operating Conditions	0.78	0.78	1.23	1.23			-0.03	-
F020	SCE2010_1120145		Replaced a Plastic Recycling Densifier with a New Shredder / Industrial	2(e)	598	2,736,000		Operating Conditions	1.11	1.11	0.96	0.96				0.75
F022	SCE2010_1120277		Compressed Air Modifications / Manufacturer	2(e)	309	2,449,621		Operating Conditions	0.16	0.11	0.16	0.11			-1.23	-
F023	SCE2010_1120100		Expanded Cooling Tower / Food Manufacturer	2(e)	165	2,362,563		Calculation Method	0.27	0.09	0.39	0.13			0.83	0.75
F024	SCE2010_1120307		Compressed Air Modifications / Manufacturer	2(e)	257	2,237,120		Calculation Method	0.21	0.16	0.19	0.14			-0.63	-
F026	SCE2011_1456769		Compressed Air Modifications / Manufacturer	3(e)	208	1,794,597		Ineligible Measure	0.58	0.58	0.58	0.58			-0.30	-
F027	SCE2010_1000569		Retrocommissioning / Hospital	3(e)	22	1,581,332		Operating Conditions	0.95	0.95	4.36	4.36			-0.03	0.83
F028	SCE2010_1120121		Compressed Air Modifications / Manufacturer	3(e)	173	1,463,446		Operating Conditions	0.00	0.00	0.00	0.00			0.73	-
F029	SCE2010_1120129		Compressed Air Modifications / Manufacturer	3(e)	159	1,372,623		Operating Conditions	0.00	0.00	0.01	0.00			0.70	-
F030	SCE2011_1454201		Pump Overhaul / Water Municipal Agency	3(e)	115	1,233,142		Equipment Specifications	0.47	0.15	0.58	0.16			0.10	0.37
F032	SCE2010_1000562		Central Plant Upgrade / Community College	3(e)	560	1,029,793	269	Inappropriate Baseline	0.65	0.87	1.70	2.26				-
F035	SCE2010_1120252		VFDs on Process Chilled Water / Manufacturer	3(e)	98	855,661		Operating Conditions	0.35	0.35	0.46	0.46			0.47	-
F036	SCE2010_1007690		Wet Bulb controls on CT, VFD on AHUs / Light Industrial	3(e)	110	850,631		Calculation Method	1.75	2.18	1.44	1.80			-0.17	-
F040	SCE2010_1000439		Retrocommissioning-Reduce Lighting Schedule / Office	3(e)		776,449		Operating Conditions	1.06	0.50						0.59

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
F041	SCE2010_1120329		Process Compressed Air- 200hp VSD Compressor / Manufacturing	4(e)	83	728,888		Operating Conditions	0.52	0.52	0.66	0.66				0.22
F042	SCE2011_1061076		Pump Rehabilitation / Farm	4(e)		717,959		Inappropriate Baseline	0.38	0.38					1.60	0.33
F044	SCE2010_1000546		HVAC Demand Controlled Ventilation / Community College	4(e)		646,418		Operating Conditions	0.50	0.75					1.57	0.63
F049	SCE2010_1138689	20219	Refrigeration System Expansion / Warehouse	4(e)	49	465,273		Calculation Method	0.86	0.86	0.61	0.61				-
F050	SCE2011_1453324		Compressed Air Modifications / Manufacturer	4(e)	28	322,253		No Significant Discrepancies	1.00	1.00	1.00	1.00			1.27	-
F051	SCE2010_1120086		Chiller Replacement / Office Building	4(e)	89	285,100		Inappropriate Baseline	0.72	0.96	0.45	0.59				0.60
F052	SCE2010_1000548		HVAC Controls Upgrade / community College	4(e)	52	272,723		Operating Conditions	0.90	1.03	0.41	0.48			0.90	-
F053	SCE2010_1006680		Pump Overhaul - Municipal Water Agency	4(e)	41	270,333		Operating Conditions	0.37	0.12	0.28	0.09			1.27	0.53
F054	SCE2011_1062527	21186	New Construction / High School	4(e)	156	257,388	299	Operating Conditions	0.46	0.52	0.18	0.21			-0.20	-
F056	SCE2010_1138727	20140	Whole Building New Construction, Refrigeration System / Grocery Store	5(e)	34	183,182	6,931	Operating Conditions	1.19	0.90	1.16	0.87				-
F057	SCE2011_1001433		Compressed Air Modifications / Manufacturer	5(e)	14	120,284		Operating Conditions	0.38	0.29	0.49	0.37			0.73	0.34
F058	SCE2010_1007647		Anti-Fog Film / Supermarket	5(e)	10	86164		Operating Conditions	0.00	0.00	0.00	0.00			0.10	0.60
F059	SCE2010_1006593		Pump Rehabilitation / Farm	5(e)	11	71,132		Operating Conditions	1.06	1.06	1.74	1.74			1.60	0.54
F061	SCE2010_1006715		Pump Rehabilitation / Farm	5(e)	11	50996		Inoperable Measure	0.00	0.00	0.00	0.00				-
F062	SCE2010_1138645	18127	Variable Speed Drives on Cooling Tower fan and Hot Water Pump / Hospital	5(e)	0	26835	1,241	Inappropriate Baseline	0.00	0.00	0.00	0.00			0.17	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
F063	SCE2010_1007057		Demand Controlled Ventilation on Rooftop Air Handling Units / Retail-Large	5(e)	71	36,825		Calculation Method	0.64	0.64	0.62	0.62			0.73	-
F064	SCE2010_1007167		ECM Motors / Supermarket	5(e)	4	34,366		Measure Count	0.80	0.80	0.80	0.80			-0.10	0.60
F066	SCE2010_1006691		Pump Rehabilitation / Farm	5(e)	6	22,774		Operating Conditions	0.76	0.76	0.00	0.00			1.60	0.51
F069	SCE2011_1454193		Pump Rehabilitation / Farm	5(e)	2	5,016		Operating Conditions	1.01	1.01	1.06	1.06			1.60	0.53
F070	SCE2011_1001292		Premium Efficiency Motors; High Efficiency Boilers / Education-Community College	5(e)	1	2,812		Calculation Method	1.08	1.08	0.10	0.10			-0.07	-
F200	SCE2011_1681494	SBDX-09-021226	EE Process Air Compressors & Pump VSDs (New Construction) / Wastewater Treatment Plant	1(e)	484	5,537,028	0	Inappropriate Baseline	-0.11	-0.11	-0.14	-0.14			1.10	-
F201	SCE2011_1681492	SBDX-09-021225	EE Process Air Compressors & Pump VSDs (New Construction) / Wastewater Treatment Plant	1(e)	480	5509952	0	Inappropriate Baseline	0.00	0.00	0.00	0.00			-0.93	-
F202	SCE2011_1675459		Efficient Process - Install New Air Separation Unit and Liquefaction Equipment / Processing Plant	1(e)	2633	23,065,168	0	Inappropriate Baseline	0.34	0.25	0.25	0.18			-0.60	-
F203	SCE2011_1555768	160-11-0500002088	Efficient Chillers / Data Center	1(e)	625	3,910,000	0	Equipment Specifications	1.09	1.09	0.78	0.78			1.40	0.37
F204	SCE2011_1675461		Fine Bubble Aeration System / Wastewater Treatment Plant	2(e)	287	2,518,412	0	Inappropriate Baseline	0.50	0.17	0.50	0.17			-0.57	-
F205	SCE2011_1555470		Multiple MCBx Measures / University Research Facility	2(e)	323	2,767,175	205,841	Calculation Method	0.48	0.10	1.00	0.20			0.90	0.63
F206	SCE2011_1684185		Selectively Perforated Casing / Oil Wellfield	2(e)	328	2,812,845	0	Operating Conditions	0.98	0.98	0.98	0.98			0.67	0.50
F207	SCE2011_1561038		EE Electric Submersible Pumps / Oil Wellfield	2(e)	437	3776054	0	Ineligible Measure	0.00	0.00	0.00	0.00			0.40	-
F208	SCE2011_1557742		Compressed Air Recovery System / Manufacturer	2(e)	315	2,642,539	0	Operating Conditions	0.46	0.46	0.94	0.94			-0.23	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
F213	SCE2011_1681597	SBDX-11-031059	Water Booster Modifications / Water Treatment Plant	3(e)	143	1,048,492	0	Operating Conditions	0.06	0.06	0.05	0.05			0.37	0.49
F214	SCE2011_1561040		Water Shutoff Controls / Oil Wellfield	3(e)	108	926,306	0	Operating Conditions	0.95	0.95	0.95	0.95			0.33	0.50
F215	SCE2011_1555983	SPCX-09-000789	Compressed Air Recovery System / Manufacturer	3(e)	94	787,840	0	Operating Conditions	0.74	0.74	0.70	0.70			0.83	-
F216	SCE2011_1681589	SBDX-11-031048	EE HVAC (New Construction) / Data Center	3(e)	41	1,450,210	0	Operating Conditions	1.36	5.11	4.45	16.69			-0.37	0.63
F219	SCE2011_1678928	IDSM-10-000910	VSD on Process Chilled Water Pump / Manufacturer	4(e)	65	567,021	0	Operating Conditions	0.70	0.70	0.70	0.70			1.00	-
F220	SCE2011_1684165		Compressed Air System Repair (Retrocommissioning) / Manufacturer	4(e)	45	382,356	0	Calculation Method	0.54	0.16	0.52	0.16			-0.33	0.60
F222	SCE2011_1681484	SBDX-09-021097	NRNC / Community College	4(e)	76	318,664	3,842	Inappropriate Baseline	0.75	0.80	0.82	0.88			1.03	0.43
F223	SCE2011_1680229	IDSM-11-001170	Pump Overhaul / Agriculture	4(e)	36	276,113	0	Operating Conditions	0.84	0.17	1.09	0.22			0.37	-
F225	SCE2011_1675283	IDSM-10-002479	PC Replacement with Thin Client Servers / Large Office	5(e)	23	123,752	0	Calculation Method	0.51	0.13	1.06	0.26			-0.23	0.49
F227	SCE2011_1555958	IDSM-10-007191	LED Lighting in Refrigerated Cases / Convenience Store	5(e)	2	17,782	0	Calculation Method	1.49	0.60	0.93	0.39			-0.70	-
F228	SCE2011_1410314		VFD on Pump / Recreation	5(e)	1	18,183	0	Operating Conditions	1.03	1.03	1.06	1.06			2.00	0.21
F229	SCE2010_1007352		Programmable Thermostats / High School	5(e)	0	468	0	Measure Count	0.00	0.00					-0.37	-
F301	SCE2012_1149741	NMMP-11-000107	Ventilation Fan & AHU VFDs / Mineral Manufacturer	3(e)	130	1,074,897	0	Calculation Method	0.95	0.95	0.99	0.99			1.03	0.63
F302	SCE2012_1143702	500114422	Constant air volume to variable air volume conversions / Offices	3(e)	36	804,174	0	Ineligible Measure	0.51	0.51	0.74	0.74			-0.03	-
F303	SCE2012_1149726	500161867	Air Compressor Retrofit / Manufacturer	3(e)	122	757,309	0	Calculation Method	0.48	0.48	0.81	0.81			0.47	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
F304	SCE2012_1149740	NMMP-11-000087	Replace Standard Bag House Air Filter with EE Low Pressure System / Manufacturer	3(e)	221	1,813,317	0	Operating Conditions	0.72	0.72	0.70	0.70			0.73	-
F306	SCE2012_1162096	500097424	Blower VSD / Wastewater Treatment Plant	3(e)	95	928,587	0	Inappropriate Baseline	1.21	1.21	1.37	1.37			-0.23	0.37
F307	SCE2012_1149736	NMMP-11-000064	Vacuum Pumping System Upgrade / Manufacturer	3(e)	153	1269955	0	Inoperable Measure	0.00	0.00	0.00	0.00			-1.30	0.63
F313	SCE2012_1091550	NMMP-11-000102	VFDs on AHUs and Ventilation Fans / Manufacturer	4(e)	34	310,111	0	Operating Conditions	0.64	0.64	0.91	0.91			1.20	0.63
F314	SCE2012_1149738	NMMP-11-000068	Retrofit and Right Size Dust Collection Fan / Manufacturer	4(e)	0	257,271	0	Operating Conditions	0.92	0.92					0.73	-
F315	SCE2012_1089224	500120863	Agricultural Pump Overhaul / Farm	4(e)	56	421,831	0	Operating Conditions (kWh)	1.06	1.06	0.14	0.14			1.10	0.45
F316	SCE2012_1088461	500001961	Air Compressor Retrofit / Manufacturer	4(e)	29	251792	0	Ineligible Measure	0.00	0.00	0.00	0.00			0.27	-
F317	SCE2012_1091551	NMMP-11-000108	VFDs on AHUs and Cooling Tower / Manufacturer	4(e)	39	307,426	0	No Significant Discrepancies	1.00	1.00	0.84	0.84			1.20	0.63
F322	SCE2012_1090809	500000550	NRNC / Small Office	5(e)	3	10,549	0	Operating Conditions	0.75	0.69	1.06	0.98			1.03	0.67
F323	SCE2012_1085563	500101029	Install Occupancy and Temperature Sensors / Motel	5(e)	0	51,621	0	Operating Conditions	0.52	0.52					0.03	-
F324	SCE2012_1161919	500082542	Agricultural Pump Overhaul / Farm	5(e)	8	21,283	0	Operating Conditions	1.47	1.47	0.00	0.00			1.43	-
F325	SCE2012_1161923	500101238	Agricultural Pump Overhaul / Farm	5(e)	21	29,695	0	Operating Conditions	1.10	1.10	-0.01	-0.01			1.23	-
F326	SCE2012_1089214	500002153	Agricultural Pump Overhaul / Farm	5(e)	24	127,597	0	Operating Conditions	0.92	0.92	0.00	0.00			1.43	-
F353	SCE2012_1149731	500185271	Replace Large Chiller with Two Smaller VFD Chillers / Large Office	1(e)	473	4,491,744	0	Inappropriate Baseline	0.23	0.23	0.12	0.12			-0.07	0.63
F357	SCE2012_1090839	500111337	Major Renovation / Data Center	2(e)	61	2,175,315	0	Inappropriate Baseline	0.91	3.41	2.97	11.12			-0.43	0.73

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
F405	SCE2012_1564383		New Construction / Offices	2(e)	460	3150323	0	Operating Conditions	0.00	0.00	0.00	0.00			0.00	0.30
F406	SCE2012_1415451		Retrocommissioning Measures / University	2(e)	436	3,117,234	41,375	Calculation Method	0.68	0.41	1.05	0.63			-0.50	0.71
F411	SCE2012_1564380		Steam Trap / Refinery	3(e)	185	1,177,157	0	Operating Conditions	0.81	0.81	0.87	0.87			1.60	0.47
F412	SCE2012_1562844		Efficient Chiller / Industrial	3(e)	60	1,024,276	0	Operating Conditions	0.37	0.35	0.75	0.69			-0.20	0.54
F417	SCE2012_1566471		Vacuum System Optimization / Manufacturer	4(e)	73	550,000	0	Operating Conditions	0.88	0.88	1.09	1.09			0.87	-
F422	SCE2012_1262146		Agricultural Pump System Overhaul / Farm	5(e)	6	74,268	0	Calculation Method	1.21	0.40	0.70	0.23			0.93	0.40
F423	SCE2012_1258079		Agricultural Pump System Overhaul / Farm	5(e)	6	29,697	0	Calculation Method	1.34	0.44	1.16	0.38			1.43	-
F428	SCE2012_1566436		Process Equipment Insulation / Manufacturer	4(e)	72	388268	0	Inappropriate Baseline	0.00	0.00	0.00	0.00			0.77	0.35
F429	SCE2012_1564388		New Construction Air-Cooled Package AC / Offices	1(e)	589	5148032	0	Operating Conditions	0.00	0.00	0.00	0.00			1.07	0.55
F430	SCE2012_1566443		Compressed Air System Repair and Retrocommissioning / Manufacturer	1(e)	535	4,689,525	0	Operating Conditions	0.36	0.36	0.36	0.36			-0.27	-
FX112	SCE2012_1088450	500000890	Floating Suction Pressure Controls / Refrigerated Warehouse	3(e)	217	1,508,491	0	Calculation Method	1.57	1.47	1.41	1.32			0.37	-
FX380	SCE2012_1143659	PCCC-10-000124	Desktop Upgrades and Virtualization / Commercial Government (ECC)	5(e)	2	18,949	0	Measure Count	0.94	0.94	1.00	1.00			0.57	0.32
G001	2010_3611_5000939282_10	5000939282	New - Reconfigured Heat Exchangers / Refinery	1(g)			4,790,381	Operating Conditions					0.44	0.33	0.33	0.13
G002	2010_3611_5000947687_10	5000947687	Preheat Purge Air in Boiler Heat Exchanger / Manufacturer	2(g)			1,117,955	Operating Conditions					1.22	1.22	0.73	-
G003	2010_3611_5000849771_10	5000849771	New Reboilers - Reconfigured Heat Exchangers / Refinery	2(g)			796,840	Operating Conditions					0.74	0.74	0.47	0.70

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
G004	2010_3611_5000858938_10	5000858938	EE Juice Evaporator / Beverage Manufacturer	3(g)			583,312	Inappropriate Baseline					0.21	0.21	0.50	-
G005	2010_3611_5000933748_10	5000933748	Replace 2 Furnaces with RTO / Can Manufacturer	3(g)			461,343	Operating Conditions					0.86	0.86	0.57	-
G007	2010_3611_5000864900_10	5000864900	Insulation and Dryer Mixer Efficiency Upgrade / Asphalt Plant	3(g)			332,584	Operating Conditions					0.80	0.80	0.33	-
G008	2010_3607_5000915207_20	5000915207	Retrocommissioning / Hospital	3(g)			290,306	Operating Conditions					2.74	1.83	0.90	-
G009	2010_3611_5000877496_10	5000877496	Combustion Controls / Refinery	3(g)			270,894	Operating Conditions					0.86	0.65	1.40	0.50
G010	2010_3611_5000900661_10	5000900661	Insulation of Pipes and Surfaces / Refinery	3(g)			242,998	Ineligible Measure					0.00	0.00	-0.07	-
G011	2010_3611_5000846427_10	5000846427	New Boiler with Economizer / Food Manufacturer	3(g)			212,440	Calculation Method					0.81	1.16	-0.33	0.87
G012	2010_3611_5000884654_10	5000884654	Four New Furnaces / Metal Manufacturer	4(g)			182,862	Measure Count					0.12	0.12	0.33	-
G013	2010_3607_5000864812_10	5000864812	Efficient Hot Water Boiler, Insulation, Automatic Backwash, Pool Cover / Community College	4(g)			177,939	Ineligible Measure					0.00	0.00	-1.23	-
G016	2010_3611_5000837332_10	5000837332	New Silo with Better than Standard Practice Insulation / Asphalt Plant	4(g)			116,254	Inappropriate Baseline					0.35	0.35	0.33	0.33
G017	2010_3611_5000963908_10	5000963908	Ozone Laundry / Textile Manufacturer	4(g)			112,698	Calculation Method					0.83	0.41	0.10	0.73
G021	2010_3602_5000842309_10	5000842309	Heat Exchanger / Food Processor	4(g)			99,516	Operating Conditions					0.00	0.00		-
G022	2010_3611_5000879660_10	5000879660	New Boilers and EMS / Large Contractor	4(g)			98,257	Calculation Method					0.64	0.86	0.57	-
G024	2010_3607_5000963587_10	5000963587	Supervisory Control Retrofit / Community College	4(g)			86,113	Inappropriate Baseline					0.00	0.00		-
G026	2010_3607_5000842636_20	5000842636	Boiler Efficiency Upgrades / Industrial	4(g)			81,348	Inappropriate Baseline					0.47	0.56	-0.40	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
G027	2010_3611_5000845917_10	5000845917	Process Equipment (Expanders & Press) / Foam Products Mfr	4(g)			66,113	Calculation Method					0.17	0.17	0.13	-
G029	2010_3607_5000966401_10	5000966401	HVAC Controls Upgrade / Community College	5(g)			21,831	Operating Conditions					1.32	1.32	-0.73	0.27
G030	2010_3611_5000841542_10	5000841542	Controls for Process Hot Water / Food Manufacturer	5(g)			21,440	Calculation Method					3.19	2.12		-
G032	2010_3602_5000984369_10	5000984369	Envelope Measure / Greenhouse	5(g)			11,912	Inappropriate baseline					0.63	0.84		0.39
G038	2010_3611_5000935476_10	5000935476	Install Furnace Door Seals / Tank Manufacturer	5(g)			2,647	Inappropriate Baseline					0.00	0.00	-1.80	0.54
G039	2010_3607_5000980493_10	5000980493	Install Flow Control, Aeration Devices / Hospital	5(g)			2,058	Operating Conditions					1.55	1.03	1.07	-
G040	2010_3607_5000962801_10	5000962801	Domestic Hot Water Controller / Restaurant	5(g)			1,859	Calculation Method					0.91	0.91		-
G200	2010*3611*5000874564*10		Retrofit Paper Drying Hood / Manufacturer	2(g)	0	0	795,939	No Significant Discrepancies					1.00	1.00	1.27	0.50
G201	2010*3611*5000877319*10		Replace RTO System / Manufacturer	2(g)	0	0	752,801	Baseline Type and Capacity					0.00	0.00	0.33	0.64
G202	2010*3601*5000994478*10		EE Measures (New Construction) / Greenhouse	2(g)	0	0	3,180,347	Inappropriate Baseline					0.28	0.07	0.57	-
G203	2010*3611*5000858154*10		EE Air Compressor / Manufacturer	2(g)	0	0	1,612,540	Inappropriate Baseline					0.00	0.00	-1.80	0.75
G204	2010*3611*5000898559*10		Automate Steam Valve / Refinery	3(g)	0	0	588,864	Operating Conditions					0.76	0.76	0.20	0.59
G205	2010*3611*5001003967*10		Boiler Controls, RO System, Burner, Economizer / Paper Manufacturer	3(g)	0	0	437,576	Calculation Method					0.44	0.44	-0.33	0.51
G206	2010*3607*5000946013*10		Efficient Boilers / Large Office	3(g)	0	0	220,980	Inappropriate Baseline					0.32	0.43	-0.37	0.55
G207	2010*3607*5001062405*10		Efficient Boilers / Multi-Family	3(g)	0	0	345,322	Equipment Specifications					1.28	1.71	-0.07	0.35
G211	2010*3611*5000898642*10		New Heat Exchanger / Refinery	4(g)	0	0	206,742	Equipment Specifications					0.52	0.52	-0.20	0.60

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
G212	2010*3611*500 1004737*10		Steam Pipe Insulation / Manufacturer	4(g)	0	0	137,316	Operating Conditions					0.74	0.74	1.07	-
G213	2010*3611*500 0881191*10		Furnace Refractory Replacement / Manufacturer	4(g)	0	0	195,746	Operating Conditions					1.49	1.49	1.27	0.95
G214	2010*3611*500 1003845*10		Kiln Burner and Seal Replacement / Manufacturer	4(g)	0	0	179,797	Calculation Method					1.00	1.00	0.60	0.47
G218	2010*3607*500 1011866*10		Boiler Retrofit / Community College	5(g)	0	0	551	Calculation Method					0.98	1.31	-0.27	0.44
G219	2010*3607*500 1029360*10		Water Flow Control Devices / Hospital	5(g)	0	0	2,091	Operating Conditions					0.65	0.39	-0.37	0.25
G220	2010*3611*500 1029596*10		Process Curing Oven / Manufacturer	5(g)	0	0	9,767	Calculation Method					1.10	0.13	0.33	0.25
G221	2010*3607*500 1056456*10		Furnace Burner Controls / Industrial	5(g)	0	0	9,759	Operating Conditions					0.61	0.44	-0.27	0.57
G301	2010*3611*500 0874493*10	5000874493	New RTO and Heat Recovery Measures / Manufacturer	3(g)	0	0	292,439	Inappropriate Baseline					0.15	0.15	-0.40	-
G302	2010*3611*500 1049359*30	5001049359	New Metal Melting Furnace / Manufacturer	3(g)	0	0	288,722	Inappropriate Baseline					1.59	1.59	-0.03	0.43
G305	2010*3612*500 1101012*10	5001101012	Steam Trap Replacement / Refinery	2(g)	0	0	868,414	Operating Conditions					0.85	0.85	-0.40	-
G307	2010*3612*500 0974201*10	5000974201	Steam Trap Replacement / Refinery	4(g)	0	0	145,438	Calculation Method					2.60	2.60	0.00	0.48
G308	2010*3611*500 0841561*10	5000841561	CO Control to Improve Boiler Efficiency / Manufacturer	4(g)	0	0	93,182	Measure not installed					0.00	0.00	1.17	-
G309	2010*3612*500 0922717*20	5000922717	Steam Trap Replacement and New Boiler / Manufacturer	4(g)	0	0	145,438	Calculation Method					0.69	0.69	-0.73	-
G312	2010*3611*500 0864780*10	5000864780	Efficient Boilers / Process	5(g)	0	0	42,307	Operating Conditions					0.32	0.32	0.93	-
G313	2010*3612*500 0843202*10	5000843202	Steam Trap Replacement and New Boiler / Manufacturer	5(g)	0	0	4,216	Ineligible Measure					0.00	0.00	-0.70	-
G318	2010*3612*500 1069103*10	5001069103	Steam Trap Replacement and New Boiler / Manufacturer	2(g)	0	0	758,808	Calculation Method					0.28	0.28	-0.57	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
G401	5000904289	0	Preheat Boiler Feedwater / Refinery	2(g)	0	0	739,566	Operating Conditions					1.02	1.02	0.17	-
G402	5001116593	0	Install Waste Heat Boiler on SRU / Refinery	2(g)	0	0	791,530	Calculation Method					1.24	1.24	1.27	-
G403	5001050382	0	Install Waste Heat Boiler on SRU / Refinery	2(g)	0	0	2,176,580	Operating Conditions					0.97	0.97	1.40	0.70
G404	5000998674	0	New Boiler Feedwater Preheat System / Snack Food Manufacturer	3(g)	0	0	248,467	Operating Conditions					1.04	1.04	1.73	0.70
G405	5001102746	0	Heat Exchangers and Insulation in District Heating System / University Campus	3(g)	0	0	337,225	Operating Conditions					0.57	0.57	-1.07	-
G406	5001073618	0	New Furnace with Better Refractory and Reduced Excess Air (New Construction) / Metal Manufacturer	3(g)	0	0	267,286	Operating Conditions					1.04	0.52	0.73	0.43
G407	5001008505	0	Juice Extractor, Heat Recovery Measures (New Construction) / Beverage Processing	3(g)	0	0	367,985	Inappropriate Baseline					0.69	0.69	0.73	0.40
G411	5001101479	0	Install Water Extractors / Garment Manufacturer	4(g)	0	0	76,545	Operating Conditions					0.21	0.21	0.77	-
G412	5001024120	0	New Batch Washer / Laundry	4(g)	0	0	198,247	Operating Conditions					0.68	0.68	0.73	-
G417	5001080933	0	DCV, VSDs, Economizer, Heating Lockout / Offices	5(g)	0	0	6,605	Inappropriate Baseline					0.94	0.94	1.07	-
G418	5001094091	0	Steam Traps, Insulation, Condensate Recovery / Food Processing	5(g)	0	0	10,342	Baseline Type and Capacity					-1.13	-0.75	-0.73	-
G419	5001125712	0	Steam Traps, Insulation, Condensate Recovery / Food Processing	5(g)	0	0	16,193	Operating Conditions					1.06	1.06	1.27	-
H001	2010_3118_5000866767_30	5000866767	Economizer / Heat Recovery (Process) / Laundry	2(g)			708,450	Operating Conditions					0.67	0.67	0.83	0.35
H002	2010_3118_5000973772_20	5000973772	New Construction Whole Building / Refrigerated Warehouse	1(e)	482	3,025,412		Operating Conditions	1.10	1.42	1.48	1.92			0.87	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
H003	2010_3117_4572-1_1	4572-1	Chilled Water Plant Retrofit / Biotechnology Facility	1(e)	333	2,921,066		Operating Conditions	1.49	2.43	2.42	3.96			1.77	0.45
H004	2010_3117_4679-2_1	4679-2	Rooftop Unit Retrofit / Lodging-Hotel	1(e)	298	2,897,610		Calculation Method	0.20	0.20	1.54	1.54			0.17	0.45
H005	2010_3117_4205-2_1	4205-2	Refrigeration Control / Refrigerated Warehouse	1(e)	359	2,798,474		Calculation Method	0.49	1.48	0.52	1.55			-0.37	-
H006	2010_3117_4585-2_1	4585-2	Steam Traps - Pipe Insulation / Large Manufacturer	3(g)			268,811	Tracking data discrepancy					0.70	0.41	1.43	-
H007	2010_3117_4674-1_1	4674-1	Central Plant Optimization / Community College	1(e)	160	2,233,885	11,773	Ineligible Measure	0.11	0.14	0.13	0.13	0.22	0.65	-0.57	0.61
H008	2010_3118_500942288_50	5000942288	Whole Building Savings By Design / Hospital	1(e)	419	1837042	-1,111	Unqualified Fuel Impacts	0.00	0.00	0.00	0.00			0.00	0.05
H009	2010_3117_4396-2_1	4396-2	Central Plant Overhaul / Government Facility	2(e)	132	1,813,208		Operating Conditions	1.31	1.29	2.36	2.26			-0.73	-
H010	2010_3117_4246-1_1	4246-1	HVAC Controls / University	4(g)	180	718,292	111,552	Operating Conditions	0.59	0.27	0.65	0.29	0.67	0.30		0.61
H012	2010_3117_4210-1_1	4210-1	Sever Virtualization / Commercial Building	2(e)	191	1,345,253		Inappropriate Baseline	0.16	0.22	0.18	0.24				-
H013	2010_3117_4530-1_1	4530-1	CO Sensors on Garage Fans / Office and Apartments	2(e)	108	1,084,611		Program Rules	0.00	0.00	0.00	0.00			-0.27	-
H014	2010_3117_4717-1_1	4717-1	HVAC Retrofit / Government Facility	2(e)	148	994,600		Operating Conditions	0.36	0.59	0.66	1.08			1.23	0.63
H015	2010_3117_4306-1_1	4306-1	MBCx Project- VFDs on CHWP, CWP and Chiller Optimization / Light Manufacturing	2(e)	71	912,446		Calculation Method	0.73	1.09	0.70	1.05			1.97	0.46
H016	2010_3105_500849791_10	5000849791	New Refrigeration Compressors and Evaporators / Cold Storage facility	2(e)	230	911,900		Operating Conditions	0.93	2.79	0.21	0.62			0.47	0.53
H017	2010_3117_4210-2_1	4210-2	Sever Virtualization / Commercial Building	2(e)	104	883,605		Inappropriate Baseline	0.16	0.22	0.18	0.24			-0.57	-
H020	2010_3117_4718-1_1	4718-1	Air Distribution System Retrofit / Commercial Building	3(e)		426,911	17,999	Calculation Method	0.95	1.06			0.00	0.00	1.23	0.63

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
H023	2010_3117_100057_1	100057	Freezer Retrofit / University	3(e)	27	541,442		Operating Conditions	0.95	2.29	3.82	9.16				0.77
H024	2010_3105_5000953528_10	5000953528	HVAC Retrofit / Laboratory	3(e)	24	412,288	13,101	Ineligible Measure	0.23	0.35	0.46	0.69			-1.23	0.59
H025	2010_3117_4774-1_1	4774-1	Central Plant Optimization / Bio-Tech Facility	3(e)	53	473,241	4,986	Operating Conditions	0.35	0.45	0.00	0.00	0.28	0.28		0.42
H026	2010_3117_4665-1_1	4665-1	HVAC Retrofit / Office Building	4(e)	108	185,040	33,026	Calculation Method	0.13	0.19	0.00	0.00	26.59	39.89	-0.90	0.40
H027	2010_3105_5000919361_10	5000919361	HVAC Chiller, HVAC VFD / University	3(e)	145	492,440		Ineligible Measure	1.07	0.41	0.79	0.31			1.03	0.43
H028	2010_3105_5000845744_10	5000845744	HVAC Upgrade / Secondary School	4(e)		350,668	4,790	Calculation Method	0.69	0.38						-
H029	2010_3117_4485-1_1	4485-1	CO Sensors on Garage Fans / Office and Apartments	3(e)	39	394,404		Ineligible Measure	0.00	0.00	0.00	0.00			1.07	-
H031	2010_3118_5000966563_20	5000966563	New Construction - Whole Building / Supermarket	3(e)	48	412,625	-2,793	Operating Conditions	1.14	1.14	1.28	1.28			1.20	0.50
H032	2010_3118_5000873965_30	5000873965	New Construction / Large Office	3(e)		373,012	21	Operating Conditions	1.06	0.96			42.38	46.05	0.87	-
H034	2010_3118_5000889944_20	5000889944	New Construction / Hospital	4(e)		338,528		Operating Conditions	0.59	0.61					0.87	-
H035	2010_3117_120001_2	120001	Insulation and Blowdown Heat Recovery / Prison	5(g)			31,542	Inoperable Measure					0.07	0.05	1.23	-
H036	2010_3109_5000866919_10	5000866919	Server Virtualization / Data Center	4(e)	35	302,454		Measure Count	0.00	0.00	0.00	0.00			-1.00	0.35
H037	2010_3105_5000840441_10	5000840441	VFDs on Filter Pumps / Water Park	4(e)	31	274,476		Inappropriate Baseline	0.23	0.23	0.24	0.24			0.33	0.40
H039	2010_3105_5000866144_10	5000866144	Server Virtualization / Commercial Building	4(e)	24	207,607		Equipment Specifications	0.11	0.07	0.11	0.07			-0.53	-
H040	2010_3117_4759-1_1	4759-1	Chiller Replacement / Bio-Tech Facility	4(e)		191,925		Ineligible Measure	0.00	0.00					-0.23	0.36
H042	2010_3117_4551-1_1	4551-1	Demand Controlled Ventilation / Garage	5(e)	10	98,601		Operating Conditions	0.61	0.61	0.70	0.70			-0.23	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
H044	2010_3117_438 2-1_1	4382-1	Night Covers for Display Cases / Supermarket	5(e)	9	82,321		Operating Conditions	0.30	0.30	0.00	0.00			0.13	-
H045	2010_3117_479 3-2_1	4793-1	ECMs for Evaporative Fan Motors / Supermarket	5(e)	6	50,340		Calculation Method	0.73	0.73	0.73	0.73				0.50
H046	2010_3118_500 0873518_40	5000873518	New Construction / Multistory Residential	5(e)	19	39,130	620	Inappropriate Baseline	0.08	0.07	-0.11	-0.11	0.07	0.07	1.40	-
H047	2010_3109_500 0845788_10	5000845788	Server Virtualization / Commercial Building	5(e)	4	33261		Ineligible Measure	0.00	0.00	0.00	0.00				0.50
H048	2010_3118_500 0798332_20	5000798332	New Construction / Assembly Hall	5(g)	15	26,006	12	Operating Conditions	0.08	0.10	0.11	0.14	0.00	0.00	1.40	-
H051	2010_3117_480 0-1_2	4800-1	ECMs for Evaporative Fan Motors / Supermarket	5(e)	2	15,244		Calculation Method	0.80	2.40	0.80	2.40			-0.60	0.50
H200	2010*3118*500 1049061*70		Whole Building NRNC, DHW / BioTech	1(e)	400	2,066,519	143,653	Operating Conditions	0.98	1.03	1.24	1.44	0.66	0.88	0.63	-
H201	2010*3117*467 4-2*1		Central Plant Optimization / Community College	1(e)	544	5,154,277	6,872	Tracking Data Discrepancy	0.11	0.14	0.13	0.13	0.22	0.65	1.07	-
H202	2010*3117*100 008*1		Central Plant, AHU, and Hot Water Loop Retrofits / University	1(e)	350	3,842,759	215,563	Unquantified fuel impacts	0.81	1.15	1.61	2.45	0.00	0.00	0.50	0.70
H203	2010*3118*500 0898094*10		Refrigeration and HVAC Retrofits (Absorption Chiller) / Supermarket	2(e)	56	664,057	7,543	Unquantified fuel impacts	0.00	0.00	0.00	0.00	0.00	0.00	-0.33	-
H205	2010*3105*500 1010929*10		Guestroom Occupancy-based Thermostats / Hospitality	2(e)	0	1,431,728	16,960	Calculation Method	0.13	0.13			0.17	0.09	0.03	-
H206	2010*3117*480 7-1*1		Variable Speed Chiller / Manufacturer	2(e)	52	983,831	0	Inappropriate Baseline	0.11	0.11	0.18	0.18			0.43	0.39
H207	2010*3105*500 0975138*10		Server Virtualization / Data Center	3(e)	47	410,478	0	Inappropriate Baseline	0.00	0.00	0.00	0.00			1.20	0.19
H208	2010*3117*484 8-1*1		VAV Conversion / Assembly & Recreation	3(e)	0	584,790	92,991	Inappropriate Baseline	0.00	0.00			0.23	0.19	-0.23	0.61
H209	2010*3117*467 8-1*1		Optimize BAS System / Laboratory	3(e)	27	476,290	3,997	Inoperable Measure	0.00	0.00	0.00	0.00	0.00	0.00	0.23	-
H213	2010*3105*500 1032242*10		Parking Garage Exhaust Fan DCV / Large Office	4(e)	21	184,199	0	Operating Conditions	0.99	1.97	0.98	1.97			1.43	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
H214	2010*3117*100046*1		CAV to VAV Conversion / Recreation Center	4(e)	37	267,545	9,323	Equipment Specifications	0.82	1.12	0.83	1.13	-0.77	-1.05	0.37	0.77
H215	2010*3109*5001010925*10		Efficient Chiller / Commercial	4(e)	0	222,463	0	Calculation Method	0.63	0.63					-1.30	-
H218	2010*3105*5001025514*10		Occupancy Sensing Thermostats / Hotel	5(e)	0	26,988	0	Calculation Method	0.91	0.91					1.97	0.44
H220	2010*3105*5000847765*20		Efficient Packaged DX / Small Office	5(e)	0	4,349	0	Ineligible Measure	0.00	0.00					-0.53	-
H301	2010*3105*5001110745*10	5001110745	Chilled Water Plant Retrofit / Lab	1(e)	189	2,350,453	0	Inappropriate Baseline	0.17	0.59	0.45	1.56			-1.80	0.25
H302	2010*3117*5001096565*10	5001096565	HVAC / Commercial Building	2(e)	288	1,147,867	0	Inappropriate Baseline	0.18	0.32	0.13	0.23			-0.20	-
H303	2010*3100*5000849625*10	5000849625	Air Compressor Interconnection / Manufacturer	2(e)	69	723,203	0	Tracking Data Discrepancy	1.04	2.50	1.23	2.96			0.17	0.47
H305	2010*3109*5000963981*10	5000963981	HVAC Chiller / Commercial Building	1(e)	189	2,350,453	0	Ineligible Measure	0.00	0.00	0.00	0.00			-1.43	0.25
H307	2010*3117*5001098940*10	5001098940	Variable Speed Chiller Plant Replacement / Manufacturer	1(e)	229	1,856,403	0	Inappropriate Baseline	0.11	0.11	0.18	0.18			0.70	0.39
H308	2010*3118*5000908288*90	5000908288	Enhanced Building Commissioning / Commercial Building	3(e)	96	481,226	-2,182	Operating Conditions	-0.53	-0.54	0.09	0.11			0.40	-
H310	2010*3105*5001017577*10	5001017577	Replace Rectifiers/ Data & Telecommunication Center	3(e)	71	625,044	0	Inappropriate Baseline	0.0001	0.0004	0.0001	0.0004			-0.20	-
H311	2010*3118*5000908134*90	5000908134	NRNC / Large Office	3(e)	129	549,256	-3,464	Operating Conditions	-0.14	-0.14	-0.21	-0.21			-0.20	-
H316	2010*3105*5001047870*10	5001047870	CV to VAV Replacement / Telecom Building	4(e)	0	170,531	0	Inappropriate Baseline	0.41	1.23					-0.47	-
H317	2010*3118*5000773442*90	5000773442	Enhanced Building Commissioning / Commercial Building	4(e)	35	239,558	1,705	Operating Conditions	0.57	0.57	1.74	1.74	0.48	0.48	1.53	-
H321	2010*3105*5000953652*10	5000953652	Install Heat Pump for Jacket Heating / Municipal Commercial Facility	5(e)	3	19,053	0	Calculation Method	0.77	0.77	0.48	0.48			0.87	0.62
H322	2010*3117*5001112224*10	5001112224	ECM Evaporator Fan Controller / Convenience Store	5(e)	0	1,931	0	Calculation Method	1.93	3.71	0.00	0.00			0.00	-

Table C-9: List of M&V Projects, Identifying Numbers, Ex-Ante and Ex-Post Savings (continued)

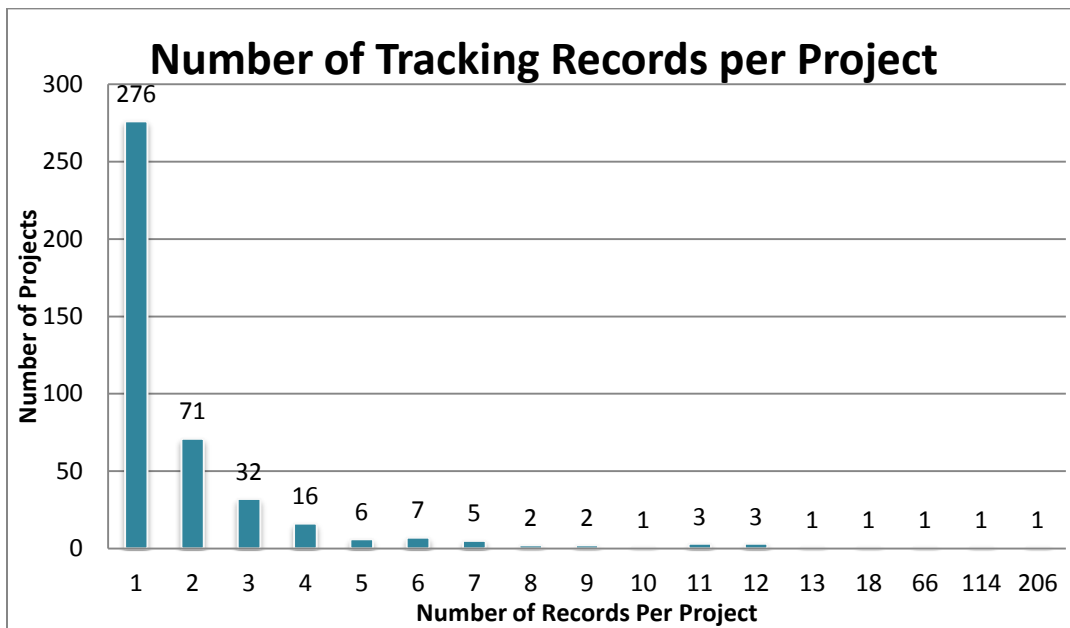
Itron SiteID	ED Claim ID	IOU Application Code	Measure / Site Type	Strata/Fuel Type	Ex-ante kW Savings	Ex-ante kWh Savings	Ex-ante Therm Savings	Primary Reason for Discrepancy	First Yr RR kWh	LC RR kWh	First Yr RR kW	LC RR kW	First Yr RR Therms	LC RR Therms	LRA	NTGR
H328	2010*3105*5001058023*10	5001058023	Power Supply Upgrade/ Cable Stations	5(e)	0	1,149	0	Ineligible Measure	0.00	0.00					0.33	-
H329	2010*3105*5001058126*10	5001058126	Power Supply Upgrade/ Cable Stations	5(e)	0	1,149	0	Ineligible Measure	0.00	0.00					0.33	-
H330	2010*3105*5001058342*10	5001058342	Power Supply Upgrade / Cable Stations	5(e)	0	1,149	0	Ineligible Measure	0.00	0.00					0.33	-
H332	2010*3118*5000866762*10	5000866762	HVAC Systems / Light Industrial	3(g)	16	50,381	227,579	Operating Conditions	1.84	1.84	5.87	5.87	0.48	0.52	-0.03	-
H401	5000824145	0	NRNC / Hospital	1(e)	592	4,125,674	-5,394	Tracking Data Discrepancy	0.40	0.47	0.43	0.51	45.13	52.65	0.10	-
H402	5001140883	0	EMS Controls / University	2(e)	0	1,686,234	68,550	Unquantified fuel impacts	0.88	1.21			0.00	0.00	0.53	0.73
H404	5001158791	0	Efficient Servers / Data Center	2(e)	45	810,376	0	Inappropriate Baseline	0.14	0.14	0.32	0.32			-0.03	-
H406	5000996306	0	New Construction / Supermarket	2(e)	85	671,314	-8,107	Measure Count	0.97	0.97	0.89	0.89			1.77	-
H409	5001106802	0	WSHP VSDs / Large Office	3(e)	0	520,083	0	Calculation Method	0.22	0.22					0.90	-
H410	5001130708	0	VFDs on Pumps / Hotel	3(e)	130	600,025	0	Inappropriate Baseline	0.52	0.52	0.50	0.50			0.63	-
H415	5001060208	0	New HVAC Control System for Air Flow / Office	4(e)	0	247,259	14,550	Calculation Method	0.80	2.39			1.00	0.75	1.43	0.33
H416	5000835295	0	NRNC / Government Office	4(e)	26	108,974	3,307	Operating Conditions	1.04	1.11	2.19	2.32	1.19	1.27	1.37	0.27
H421	5001129784	0	CO Sensors on Garage Fans / Office and Apartments	5(e)	42	364,797	0	Ineligible Measure	0.00	0.00	0.00	0.00			-0.30	-
H423	5001124591	0	WSHP / Light Industrial	5(e)	1	2,530	0	Calculation Method	0.12	0.37	0.10	0.30			0.00	0.43
H427	5001154970	0	Heat Exchanger Retrofit - Electric / Industrial	2(g)	0	251,924	956,551	Unquantified fuel impacts	0.81	2.27			0.00	0.00	2.33	0.73

C.4 Frequency of M&V Points by Number of Tracking Records

Figure C-1 graphically presents the number of tracking system records per project. The projects with the largest number of records (>15) are all steam trap projects. Many new construction projects have between 3 and 12 records. Records within a project can entail the same measure or very different measures. Note that 276 of the 495 projects (about 60 percent) are single record projects.

This graphic illustrates that the sample frame developed for this project consists of “projects” that are aggregates of tracking records. It is also noteworthy that realization rates reported by the evaluation team are site-level, not record-level.

Figure C-1: Frequency of Projects by Number of Tracking Records



C.5 Additional Discrepancy Factors

The primary sources of discrepancy between the claimed ex-ante savings and the verified ex-post savings were found to be related to baseline issues, operating conditions, and calculation methods. A number of additional discrepancy factors arose as less frequently, and with smaller aggregate effects on gross impact results. Often, there are primary and secondary causes for discrepancy in any given project. These additional discrepancy factors are:

- Equipment specifications
- Ineligible measure
- Measure count
- Tracking database discrepancy
- Other factors
 - Inoperable measure
 - Program rule compliance
 - Measure not installed
 - Unquantified fuel impacts

Table C-10 presents the percent change in gross impact claims associated with discrepancy factors; first from the top three, primary reasons for discrepancy, and then from all discrepancy issues, including the additional factors noted above. The majority of change (to ex-ante impact claims) is associated with the top three factors and the additional factors have a limited effect on claims, with one exception. A fairly large source of discrepancy occurs for some SDG&E electric projects; these projects are ineligible based on program rules.

Table C-10: Change in Gross Impact Claims, Effect of Primary and Additional Factors (kWh)

Fuel Domain	Percent Change to Ex-Ante Savings Claim Due to Baseline, Operations, and Calculations	Percent Change to Ex-Ante Savings Claim Due to All Factors	Percent Change to Ex-Ante Savings Claim Due to Non-primary Additional Factors
	kWh	kWh	kWh
PG&E Electric	-30%	-33%	-3%
SCE Electric	-42%	-47%	-5%
SDG&E Electric	-21%	-41%	-20%
All IOUs - Electric	-34%	-40%	-6%

Table C-11 presents a similar assessment of change in savings claims due to discrepancy factors, but with respect to gas therm savings. The results are similar to kWh; the less frequent discrepancy factors account for small effects of less than five percent. The exception is for SDG&E gas projects, in which gas claims related to a cogeneration system were found to be ineligible.

Table C-11: Change in Gross Impact Claims, Effect of Primary and Additional Factors (Therms)

Fuel Domain	Percent Change to Ex-Ante Savings Claim Due to Baseline, Operations, and Calculations	Percent Change to Ex-Ante Savings Claim Due to All Factors	Percent Change to Ex-Ante Savings Claim Due to Non-primary Additional Factors
	Therms	Therms	Therms
PG&E Gas	-22%	-25%	-2%
SCG Gas	-33%	-34%	-1%
SDG&E Gas	-16%	-65%	-49%
All IOUs - Gas	-26%	-30%	-2%

C.6 Summary of Selected Projects and Associated Discrepancies

Short descriptions for selected projects are provided below. These summaries are illustrative of the types of projects sampled and the evaluation issues and challenges that were encountered. These project examples also serve to highlight situations that affect the ex-post gross impact estimates for a given project, including the influence of associated discrepancy factors.

Project ID: E004

Strata: 3(g)

Project Description: Replace Steam Driven with Electric Driven Pumps at a Refinery

Therms Gross Realization Rate: -0.03

The project involved the installation of an electric motor driven pump to reduce 600 psig steam usage in steam turbine driven pumps at a refinery. The main reason for the discrepancy factor, accounting for differences is ex-post versus ex-ante savings estimates, was improper baseline specification. The implementer calculated savings assuming that the 40 psig steam output (after the 600 psig steam input passes through the turbine releasing energy) was excess, would not be reused, and would be wasted or vented to the atmosphere. The verified normal operation by the evaluation team was that the 40 psig steam is not wasted and is used for other processes and so much less energy was saved. The Btu equivalent of the electric motor usage led to the gas savings not materializing and in fact becoming an energy penalty. The resulting savings are negative for this fuel substitution project.

Project ID: E009, E200

Strata: 1(e)

Project Description: VSDs, Piping Conversion, Low Pressure Systems at a Gas Field

KWh Gross Realization Rate: 0.00

The evaluation team determined that the measure, which involves the tie-in of existing wells into a low pressure collection system, occurred as part of standard operations, since the wellhead gas does not need an interstitial pass through the screw compressors due to high wellhead discharge pressures. The evaluation team determined that the project is not an energy efficiency measure, but rather was a standard operating procedure for the facility. For this reason, ex-post gross savings were set equal to zero.

Project ID: E204

Strata: 1(e)

Project Description: HVAC Retrofit at a Data Center

KW Gross Realization Rate: 5.30

KWh Gross Realization Rate: 6.39

This is a major renovation project in which the customer implemented various improved HVAC systems and controls and claimed savings of 5,543,000 kWh and 699 kW. The ex-post savings for this project are 35,423,948 kWh and 3,606 kW. These differences in saving estimates are

primarily due to two reasons: (1) inappropriate baseline modeling and (2) incorrectly defined ex-ante chiller performance. Although multiple parameters were changed in the baseline model, the foremost issue had to do with airside equipment sizing. Per the baseline document, the airside systems are to be sized such that they can meet the design facility load with a safety factor (presumably the same 20 percent safety factor utilized for the plant side equipment). Additionally, for facilities with a design load up to 220 watts/sf, the air side delta-T and total static pressure drop for the baseline CRAC systems should be 10 degrees F and 1.9 inches respectively. For this facility, the baseline airflow therefore should have been specified as 2,991,837 CFM instead of 1,785,000 CFM as it was in the ex-ante model. Furthermore, the TSP drop should have been 0.3 inches greater than specified in the ex-ante model. These changes were the predominant factors that increased the baseline model's ventilation energy use. Outside of adjusting the baseline model, changing the chiller performance curves had the greatest impact on increasing savings. While the IOU's consultant properly generated two of the three custom curves necessary to specify a chiller in eQuest, they either made a mistake in generating the third curve or made a typographical error in inputting the third curve into the model. For the ex-post analysis, revised curves were generated—two of which were nearly identical to the correct curves used by the IOU's consultant. Changing the third curve resulted in another significant increase in savings.

Project ID: E209

Strata: 2(e)

Project Description: HVAC Retrofit in a University Building

Therms Gross Realization Rate: 0.95

KWh Gross Realization Rate: 0.09

A five-story science building built in 1991 and containing 104,000 sf of laboratory and office spaces was retrofitted. The project retrofitted all pre-existing VAV boxes with modulating venturi-style Phoenix pressure independent air valves; converted the constant speed supply fan and exhaust fan of AHU-1 into variable speed; implemented DCV in high occupancy spaces such as lecture halls and conference rooms by installing CO2 sensors; implemented supply air temperature reset on AHU-1, AHU-2, AHU-3, and AHU-4; installed a VFD and a bypass damper to lower the exhaust air flow rate while maintaining the minimum velocity from the stack; and installed a CO sensor to control the exhaust airflow at the loading dock. This project claimed savings of 2,936,705 kWh and 296,303 therms. The evaluated savings were 250,716 kWh and 255,042 therms. The customer purchases power and all chilled water and steam from a third party cogeneration plant instead of from the IOU. According to 15-min interval electricity meter data in 2011 and 2012, the customer only purchased power from the IOU for 474 hours in 2011 and for 1,195 hours in 2012. During those periods when cogeneration was supplying all of the customer's electricity, electrical savings from the installed measures reduced the energy needs from the cogeneration system, creating a reduction in natural gas fuel use. Because this system uses IOU purchased natural gas, the fuel reduction during those periods was calculated

and credited using the effective heat rate of the cogeneration system. The IOU improperly identified electrical savings and paid electric incentives for this project that largely saved gas usage.

Project ID: E218

Strata: 3(e)

Project Description: VSDs on Progressing Cavity Pumps (PCPs) at an Oil Field

KWh Gross Realization Rate: 0.49

KW Gross Realization Rate: 0.49

The evaluation team determined that the installation of VSDs on progressing cavity pumps (PCPs) is industry standard practice. The WO002 EAR team conducted a detailed ISP assessment study and determined that installation of VSDs on new and recently drilled electric submersible pumps (ESPs) and PCPs is ISP, and therefore considered to be baseline equipment. The savings from the conversion of rod beam pumps to PCPs was accepted, but additional savings for VSDs was disallowed.

Project ID: E305

Strata: 2(e)

Project Description: Compressed Air Optimization in an Industrial Plant

KW Gross Realization Rate: 1.12

KWh Gross Realization Rate: 1.10

The project involved redistribution of air through supply piping, the addition of a 7,000 gallon storage tank and head pressure reduction. To take advantage of the control buffer created by the newly added storage (which reduces the rate of header pressure decay) and to reduce artificial demand, the pressure set points of the facility's two demand expanders were reduced. The net impact of these changes was a reduction in discharge pressures across all compressors (yielding increased compressor efficiency). The ex-ante savings claimed for this project were 2,433,415 kWh and 277.8 kW whereas the calculated ex-post savings are 2,680,486 kWh and 311.7 kW. This project performed better than expected. The ex-post analysis calculated a 0.88 percent power reduction for a 1 psig pressure drop whereas the IOU estimated a 0.5 percent power reduction for a 1 psig drop.

Project ID: E334

Strata: 5(g)

Project Description: High Efficiency HVAC Units at a Lab Building

KW Gross Realization Rate: 0.61

KWh Gross Realization Rate: 0.57

Therms Gross Realization Rate: -15.84

This project at a lab building installed four high efficiency DX cooling units (AC-1 to AC-4) with evaporative cooled condensers and implemented unoccupied zone temperature setbacks. The ex-ante savings claimed for this project was 148,086 kWh; 56 kW; and 754 therms. The ex-post analysis determined a savings of 84,822 kWh; 34 kW; and -11,941 therms. This discrepancy is due primarily to changes in modeled operating conditions, but is also due to differences in equipment specification and an inaccurate measure count.

Project ID: F006

Strata: 1(e)

Project Description: New Hydraulic Injection Molding Machine and Blow Molder

KW Gross Realization Rate: 0.50

KWh Gross Realization Rate: 0.46

The project entailed the installation of a new hydraulic injection molding machine (IMM) and a blow molder as part of facility upgrades. The ex-ante analysis used a hydraulic IMM as the baseline, but the evaluation team verified that two of the existing electric/hydraulic IMM (on the same manufacturing lines) at the facility had the same capabilities of the newly installed machine and were used for manufacturing the same 500 ml. pre-forms. Therefore, the evaluation team revised the baseline for the new IMM measure to the existing electric/hydraulic IMM instead of the ex-ante specified hydraulic IMM, which resulted in lower ex-post savings.

Project ID: F009

Strata: 1(e)

Project Description: Wastewater Treatment Plant Expansion

KW Gross Realization Rate: 0.86

KWh Gross Realization Rate: 0.73

This project is a wastewater treatment plant expansion involving multiple measures including blowers, diffusers and VSDs on process pumps. For the blower measure, the ex-ante calculations used a multi-stage centrifugal blower from one manufacturer as the baseline. However, the evaluation team verified that multi-stage centrifugal blowers from a different manufacturer with better capabilities than the IOU baseline blowers were installed at the existing portion of the facility. As a result, the evaluation team revised the baseline for the blowers to the existing blowers and not the ex-ante specified blowers, which resulted in lower ex-post savings for that measure. The diffusers and VSD measures yielded savings, but these savings were adjusted to reflect the actual post-installation operating data. The savings discrepancy for this project is due to both improper baseline and changed operating conditions.

Project ID: F202

Strata: 1(e)

Project Description: Higher Efficiency Components for Air Separation Unit (ASU)

KW Gross Realization Rate: 0.18

KWh Gross Realization Rate: 0.25

Multiple components of a gas separation and liquefaction process were replaced with more efficient units. This retrofit project included the air separation unit (ASU) and liquefier; the water and carbon dioxide removal system; the distillation column; the main vaporizer and main heat exchanger; the expansion turbines; and the feed and recycle compressors. The ex-ante savings estimated were 23,065,168 kWh and 2,633 kW. The calculated ex-post savings were 5,825,172 kWh and 485 kW. The reason behind this large discrepancy is that the IOU calculations assumed that the entire new plant capacity was eligible. In the ex-post M&V, the difference between the new plant efficiency and the efficiency of the plant that was replaced was applied to the original production throughput, as the facility qualified as early replacement. The difference between the new plant efficiency and ISP was applicable to the production expansion. However, the efficiency of the new facility did not exceed ISP. Therefore, the evaluation only included savings for production levels associated with the pre-existing plant capacity. This reduced energy savings by 51 percent and demand savings by 58 percent. Additionally, the IOU baseline was derived based on the efficiency associated with the old plant. However, after discussions with the customer, it was determined that the air separation unit had not operated since 1996 and needed to be refurbished. The refurbished plant would have been about 8 percent more efficient than the old plant. Therefore, the evaluation reduced the baseline energy by 8 percent, which resulted in reduced energy savings of 15.4 percent and reduced demand savings of 17.5 percent.

Project ID: F203

Strata: 1(e)

Project Description: HVAC Retrofit at a Data Center

KW Gross Realization Rate: 0.78

KWh Gross Realization Rate: 1.09

A 150,000 sf data center underwent a central plant retrofit. The project consisted of replacing eight (8) 300 ton York YCAS0300 air cooled screw chillers with eight (8) 300 ton Smardt SAX105 air cooled frictionless centrifugal chillers. The ex-ante savings claimed were 3,910,000 kWh and 625 kW whereas the calculated ex-post savings were 4,260,969 kWh and 489 kW. The higher kWh savings were due to an increase in the annual average chiller efficiency differential between the ex-ante estimate and ex-post values. In the ex-ante analysis, the average annual efficiencies of the baseline and installed chillers used are 0.927 kW/ton and 0.414 kW/ton respectively; by contrast, in the ex-post analysis, the average annual efficiencies of the baseline and installed chillers were 1.062 kW/ton and 0.437 kW/ton respectively. Manufacturer's chiller

performance data for the installed chillers (as a function of part load, ambient dry bulb temperature, and leaving chilled water temperature) were utilized to generate an as-built chiller performance curve. The same baseline chiller performance curves utilized in the ex-ante eQUEST model were used in the ex post analysis except the full load COP used in the ex post analysis for the baseline chillers was decreased to 2.33 (from 2.82 in the ex-ante analysis) such that the baseline chillers meet the minimum IPLV specified by Title 24.

Project ID: H209

Strata: 3(e)

Project Description: Garage CO Monitoring System for Exhaust Fan Control

KW Gross Realization Rate: 0.00

KWh Gross Realization Rate: 0.00

Therms Gross Realization Rate: 0.00

The measure involved replacing a non-working parking garage carbon monoxide (CO) monitoring system. During the ex-post review, it was evident that the original parking garage CO monitoring system had been non-operational at the time of the pre-installation site inspection. According to the program rules and documentation, the equipment which is being replaced cannot be “broken” and must be in operation. Therefore, this measure was not eligible for incentives under the program. This reclassification to an ineligible measure claim resulted in zero energy and demand savings.

Project ID: H206, H307

Strata: 2(e), 1(e)

Project Description: Chiller Replacement and VSD Installation

KW Gross Realization Rate: 0.18

KWh Gross Realization Rate: 0.11

The projects installed VSDs on condenser water pump motors and an existing chiller, replaced an existing ice-making chiller with a new 400-ton variable speed chiller, and installed pumping controls. The IOU baseline claim of ‘system optimization’ for the chiller was found to be invalid. The evaluation team noted during the site visit that the existing chilled water system was over 30 years old and had exceeded the useful life of the system. The customer stated during the site visit that they had not been using the ice building features of the system for over five years prior to the installation of the retrofit system. The evaluators recalculated the savings with the adjusted baseline type as normal replacement, and used Title 24 baseline efficiency for the new 400-ton variable speed chiller. This discrepancy in baseline selection resulted in reduced energy and demand savings.

Project ID: H207

Strata: 3(e)

Project Description: Server Virtualization

KW Gross Realization Rate: 0.00

KWh Gross Realization Rate: 0.00

The project replaced 78 existing servers with 12 new servers through virtualization. The IOU baseline claim of ‘early replacement’ was found to be invalid. The evaluation team noted during the site visit that only 7 of the 77 servers had remaining useful life at the time of the replacement. The customer stated that these seven servers were added as a “stop gap” measure to meet system demand in the two to three year period before the virtualization project began. During the site inspection, the customer also stated energy efficiency was not a driver in the replacement of the existing servers and the new system does not exceed industry standard practice. This discrepancy in baseline selection resulted in no energy and demand savings.

Project ID: H220

Strata: 5(e)

Project Description: Replacement of Two 2.5 Ton Rooftop AC units

KWh Gross Realization Rate: 0.00

This project involved replacing two 2.5 ton rooftop units with high efficiency units with claimed annual energy savings of 4,349 kWh. The ex-post analysis found the measure to be ineligible and therefore the energy savings to be zero for this project. According to the program rules, packaged or split system air conditioning units and heat pumps with a capacity less than 63.3 tons are ineligible energy efficiency measures and are not qualified to receive incentives.

Project ID: H311

Strata: 3(e)

Project Description: Office Building New Construction Project

KW Gross Realization Rate: -0.21

KWh Gross Realization Rate: -0.14

The building includes a number of energy efficient design elements including: better than code LPD; low-SHGC glazing; a cool roof; two efficient 85,000 cfm AHUs; and two energy efficient 1,800 MBH boilers. The building is fed chilled water from a new 2,700 ton campus chilled water plant that serves multiple new buildings. The ex-ante savings claimed were 559,256 kWh, 129 kW and -3,464 therms. This project does not save energy because the building is currently operated in an inefficient manner. Two factors cause the building to unnecessarily waste energy. First, and most critically, the building uses a fixed supply air (cold deck) set point of 55 F during daytime (occupied) hours. Second, because of the building’s current minimum static pressure set point, the supply air fans never drop below approximately 60 percent speed and a minimum of approximately 50% flow during unoccupied hours, the supply fans are also generating

substantial negative savings. Together, these factors cause the building to use an excessive amount of reheat to avoid overcooling.

Project ID: H410

Strata: 3(e)

Project Description: Replace Standard with High Efficiency Motors and VSDs

KW Gross Realization Rate: 0.50

KWh Gross Realization Rate: 0.52

The project upgraded 29 standard efficiency process motors to high efficiency motors with VFD capability. The IOU baseline claim of an 'early replacement' was found to be invalid. The evaluation team noted during the site visit that existing equipment was past its effective useful life, operating poorly, and was overdue for replacement. The evaluation team revised the baseline to normal replacement and used CA Title 24 motor efficiencies as baseline to calculate the revised energy savings. Some of the services with two pumps were found to only have one pump operational by the IOU during their pre-inspection site visit. There were smaller discrepancy changes due to hours of use and post-retrofit handheld meter readings.

C.7 Description of Projects Classified as Extreme Points

Gross realization rates and summary statistics were calculated with and without extreme points. Results were developed without extreme points to more accurately describe the behavior of the typical population and remove the situation in which a few projects with large negative or positive realization rates might drive domain- or segment-level results. It is noteworthy that four "extreme" projects are in the PG&E electric domain, three are SDG&E gas projects and one is an SCG gas project. These eight projects classified as extreme points are described in this section.

Project ID: E059

Strata: 3(e)

Project Description: Install Variable Speed Drives on Two Electric Pumps

KW Gross Realization Rate: -1.40

KWh Gross Realization Rate: -1.40

The IOU implementer's baseline claim of an 'add on measure' or 'system optimization' for VSDs on electric submersible pumps (ESP) was found to be invalid. During the site visit the evaluation team noted that pre-retrofit pumps were of the rod beam type with throttling control inherent to the use of internal combustion (IC) gas engines. The gas used in the IC engine was produced onsite and was not IOU-supplied natural gas. The team also determined that the existing equipment had remaining useful life (RUL) and this retrofit should use an early replacement baseline. The IOU baseline of the ESPs without VSDs – fixed speed pumps - is not a technically feasible solution. Because the evaluators determined the project baseline to be an early replacement, an energy penalty and negative savings was assigned (as actual load on the electric grid increased, and IOU supplied natural gas was not displaced).

Project ID: E091

Strata: 5(g)

Project Description: Whole Building Retrofit at a University

KW Gross Realization Rate: -0.13

KWh Gross Realization Rate: -0.99

Therms Gross Realization Rate: 1.33

This whole building retrofit involved: (1) occupancy sensors; (2) high efficiency lighting fixtures; (3) VFDs on fans and pumps; (4) premium efficiency motors; (5) low-e glazing; (6) a high efficiency boiler; (7) built-up VAV systems; and (8) a dual duct system with indirect evaporative cooling. The main reason for the difference in ex-ante versus ex-post savings estimates is due to operating conditions, namely the operation schedule and control set points. The major drivers behind realization rates less than zero are higher installed LPD and higher AHU fan power. Although the evaporative cooler saved cooling load by 44,938 ton-hours per year, the AHU fans consumed additional fan power that exceeded the chiller kWh savings. No on-peak demand reduction due to cooling load reduction was realized, since chilled water was supplied from a chilled water storage tank energized from the central plant during off-peak

hours. The ex-post gas savings increased compared to the ex-ante savings. The major reasons included longer schedules (the facility needs to run very late when the heating load is high) and improved glazing performance from original specifications over large glazing areas.

Project ID: H026

Strata: 4(e)

Project Description: Conversion to Variable Air Volume System with VSDs

KWh Gross Realization Rate: 0.19

Therms Gross Realization Rate: 39.89 (after adjusting for split payment)

This project converted the existing constant volume (CV) HVAC system to a variable air volume (VAV) system with the addition of variable frequency drives (VFDs) on the supply and return fans of the air handling units (AHUs). The discrepancies between the ex-ante and ex-post savings can be explained in large part due to differences in the calculation method. The IOU utilized eQUEST to estimate the savings as a result of the constant volume to variable air volume retrofit. However, the evaluation team estimated savings using a spreadsheet analysis since the IOU eQUEST model was not made available. Multiple data requests were submitted to obtain the original eQUEST data, but the eQUEST model used to estimate ex-ante savings and historical trend data was not available. Performing a spreadsheet analysis rather than building a new eQUEST model was a more cost effective approach and believed to be less likely to introduce errors for this specific project with no eQUEST model available.

Project ID: E237

Strata: 5(g)

Project Description: Retrocommissioning Project at Gymnasium

KWh Gross Realization Rate: -2.91

Therms Gross Realization Rate: 0.30

This gymnasium MBCx project involved: (1) minimizing fan speed per duct static pressure feedback, (2) repairing and replacing leaking and faulty chilled, hot water, and steam valves, (3) calibrating system temperature sensors, (4) maximizing unoccupied mode heating hot water (HHW) set point turndown, and (5) tuning the chilled water (CHW) loop. The evaluation team found many short comings and inconsistencies in the ex-ante savings estimates. The ex-ante analysis was difficult to follow because there was no documentation for many of the implemented measures to clarify baseline operation and as-built modification. Although the ex-ante CHW models showed a higher CHW usage, these results were not reported as negative electric savings. It was evident from the building level electric meter that the post-MBCx electric usage went up, but the project report did not address the reasons for increased electricity usage. The evaluation team interviewed campus facility staff and confirmed that the building loads unrelated to the MBCx project did not increase over this period. Therefore, the negative kWh GRR and low therm GRR determined from the ex-post model results was supported by the actual on-site energy usage following project implementation.

Project ID: E426

Strata: 5(e)

Project Description: Retro-commissioning HVAC

KW Gross Realization Rate: -2.29

KWh Gross Realization Rate: -1.87

Therms Gross Realization Rate: -0.33

The primary reason for discrepancy between the ex-ante and the ex-post savings is that economizer operation was not observed in the ex-post trend data. The ex-ante pre-retrofit baseline incorporated economizer operation. The ex-ante post-retrofit data showed improved economizer operation. The ex-post data clearly showed that the economizer was not operating because the mixed air temperature was the same as the return air temperature. The supply air temperature set point reset also caused an energy usage increase. After the retrofit, the supply air set point was reset from 63 F to 55 F. The data showed that, due to lowering the supply air set point, the HVAC systems actually ended up providing additional cooling to the space. In the pre-retrofit baseline condition, the supply air temperature was constant at 63 F. It was also noted from the data that the EMS system experiences very frequent overrides and changes.

Project ID: H214

Strata: 4(e)

Project Description: Convert Four Constant to Variable Air Volume Reheat Systems

KW Gross Realization Rate: 1.13

KWh Gross Realization Rate: 1.12

Therms Gross Realization Rate: -1.05

The customer operates a 76,000 square foot recreation center and installed a DART control system to convert the four constant volume systems to variable air volume reheat systems. The project significantly reduced average air flow, thereby causing significant heating and cooling savings in addition to the fan savings. The discrepancy in the ex-ante and ex-post kWh impact estimates can be explained in part by a decrease in fan kW demand at 100 percent speed. The ex-ante calculations used 48 total kW, but spot measurements taken on site show total fan kW demand of 39 kW at 100 percent speed, which was verified by on-site personnel. The incorrect baseline kW also accounted for the increase in the kWh savings. The discrepancies between ex-ante and ex-post therm savings can be explained by the faulty gas billing analysis performed by the IOU and the omission of supply fan heat gain in the ex-ante calculations.

Project ID: G418

Strata: 5(g)

Project Description: Install Two Efficient Boilers

Therms Gross Realization Rate: -0.75

This project involved replacing two existing boilers with two new, larger refurbished boilers that would supply the original capacity as well as support a 25% production capacity expansion. The principal reason for the discrepancy in savings and the negative realization rate for this project is that the program incented boiler efficiency level was less than the existing baseline boilers that were removed and also less efficient than a typical new standard boiler in this size and pressure range. The ex-post baseline efficiency is the weighted average efficiency of the 800 HP existing boilers operating at original loading and a new boiler operating at loading needed for the expansion. The existing boilers had a measured combustion efficiency of 83.3 percent. The efficiency for new standard boilers was estimated to be equal to the Cleaver Brooks Model CBR 800 efficiency of 82.5 percent. This boiler was used for comparison purposes because it is the same manufacturer and size as the installed boiler and is available on the market. Because the baseline efficiency is greater than the newly incented unit efficiency of 81.9%, the resulting impacts are negative. The boiler used as the ex-ante baseline was a Cleaver Brooks CBEX model 400-800. However, it appears that the ex-ante baseline may have used the efficiency of a low pressure boiler operating at 15 psig instead of one operating at the actual pressure of 130 psig.

Project ID: H401

Strata: 1(e)

Project Description: High Efficiency Envelope, Lighting and HVAC Systems

KW Gross Realization Rate: 0.51

KWh Gross Realization Rate: 0.47

Therms Gross Realization Rate: 52.65 (excluding negative gas claims)

The customer installed various high efficiency measures, including envelope, lighting and HVAC measures. The facility is a hospital. All proposed energy efficiency measures were implemented as described with the following exceptions:

- The verified installed LPD was 0.905 W/ft²,
- AHU1 to AHU10 return fans were equipped with fan wall systems, and
- All AHU supply and return fans were equipped with VFDs but fan speed was fixed. The flow rates were lower than design values.

The submitted ex-ante model was created with EnergyPro v4.4. The IOU conducted a T-24 2005 compliance run to estimate ex-ante savings. The proposed system type for AHU 1 to 10 was built-up VAV with CAV box with reheat. The proposed system type for AHU 11 to 14 was built-up single zone with CAV box with reheat. All electrical/mechanical rooms were

conditioned by four pipe fan coil (FPFC) systems. The IOU tracking data indicate that the savings for this project were 4,125,674 kWh; 592 kW; and -5,394 therms. Of the total electrical energy savings, 4,271,774 kWh was contributed by high efficiency lighting. The evaluator could open the ex-ante model with EnergyPro v4.4, but could not run this model. Therefore, the evaluator converted the V4.4 model into a V5.1 model and all assemblies in the V5.1 model were modified to be consistent with the V4.4 model. The evaluator conducted a T-24 2005 compliance run with EnergyPro 5.1 and the energy savings were 1,619,017 kWh; 487 kW; and 14,300 therms. It was noted that the lighting savings dropped to 1,869,950 kWh. This is because the ex-ante allowed LPD was 1.6 W/ft², but the correct one should be 1.2 W/ft². The baseline model was created automatically by EnergyPro 4.4. Both the baseline and post-retrofit models used CA T-24 hour schedules and set points.

Although the project is an electric sample point, it was classified as an extreme point because of the therm GRR of 52.65. The difference between allowed LPD and installed LPD has decreased from the ex-ante value of 0.809 W/ft² (1.6-0.791=0.809) to the ex-post value of 0.295 W/ft² (1.2-0.905=0.295). The annual savings due to high efficiency lighting decreased from the ex-ante claim of 3,980,812 kWh to the ex-post evaluated value of 1,562,556 kWh. The huge drop in baseline LPD from 1.6 to 1.2 W/ft² increased the ex-post baseline heating usage which in turn increased the building therm savings substantially.

The poor gross realization rates for kWh and kW was also due to the HVAC savings. The cooling tower fan power was significantly overestimated in the ex-ante model. The ex-ante design power was 120 hp for each of two CT fans. The verified design power was 30 hp for CT-1, 66.7 hp for CT-2, and 69 hp for CT-3. The ex-post savings from electrical heat recovery is actually an energy penalty (-78,292 kWh) because the cooling tower ran very hard to provide the coolest possible condenser water for chillers. Additionally, the exhaust fan power of 114 BHP was ignored in the ex-ante post-retrofit model. There are 15 general exhaust fans installed in the building to maintain air balance. The calculated total exhaust airflow was 232,780 cfm and the total estimated fan BHP was 114. These exhaust fans were not defined in the ex-ante model. Both baseline and post-retrofit AHU supply fan power were significantly overestimated. The ex-ante fan power annual consumption was 12 million kWh, while the ex-post was 5.8 million kWh.

Project ID: H032

Strata: 3(e)

Project Description: High Efficiency Envelope, Lighting and HVAC Systems

KWh Gross Realization Rate: 0.96

Therms Gross Realization Rate: 46.05 (excluding negative gas claims)

The customer installed various high efficiency measures, including envelope, lighting and HVAC measures. The actual operation hours are lower than the ex-ante default schedule. The actual relief fan power is much lower than the ex ante value and the ex post U-factor of the

glazing is lower than the ex ante values. Additionally, it was observed that the building cooling demand has been reduced. Despite this, electric ex-post savings aligned with ex-ante claimed savings. However, gas savings were included at a minimal level in the claimed savings, and were dramatically understated.

C.8 Coordination and Overlap with the Ex-Ante Review Process (WO002)

Projects previously selected for ex-ante review (EAR) were selected for ex-post gross impact evaluation (M&V points) and analyzed separately in order to isolate the effects of the EAR process. The overlap projects were examined to better understand how these projects were implemented and how savings were claimed.⁴ The WO002 and the WO033 teams coordinated efforts to isolate overlapping points and incorporate WO002 documentation and findings in all relevant WO033 assignments.

Overlapping sample points selected for WO033 are the same projects examined under WO002 as an EAR point. In order to be confirmed as true overlap points these projects needed to be at the same location, for the same measure, and for the same phase. The EAR also needed to be completed and the savings or approach “frozen.” A review of EAR findings and conclusions was completed for each point prior to the start of M&V activities. Gross impact evaluation activities were similar for other WO033 points, except that a simple verification was often all that was needed in support of GRR estimation (in one case, EX037, only a desk review was required). In order to streamline this process, minimize transfer of knowledge about specific projects, and reduce costs, it was useful and prudent to assign the same engineer for both the EAR and WO033 phases, whenever possible.

It was hypothesized that the findings from the ex-ante determination of savings in the EAR phase (the freezing of savings) might carry through to the M&V efforts in WO033; it was thought that the ex-ante claims and the ex-post evaluated savings should be equal (or very similar) and the project gross realization rate might be expected to be 100 percent. However, this was not always the case.

Only ten confirmed overlap sites were selected as gross impact (M&V) sample points for the WO033 impact evaluation. Of the ten projects detailed in Table C-12, five of these were determined to have 100 percent gross realization rates with no adjustments needed to the savings claim. For four of these cases – EX061, EX083, EX132, and HX017 - pre-installation and post-installation measurement was performed by the IOU (and in two of these cases required by the CPUC in the EAR process). This observation, although based on only a few observations, may be significant, in that it correlates with findings in both the LRA and the gross impact efforts that indicate that measurements and documentation by the IOU before and after the retrofit, accompanied by the adjustment of claimed savings using those sources, is an important way to reduce discrepancies between ex-ante claims and ex-post evaluation results.

⁴ WO002 activities include a ‘prospective review’ after EE projects are submitted; overlap points included only those points that had been selected in their project development phase and received full EAR treatment.

Three projects – EX024, EX037, and EX093 – resulted in zero savings. Two projects were determined to have zero savings due to measure ineligibility. An oil well field electric submersible pump VSD installation project – EX093 - has an improper baseline (this project involved savings that were determined to be zero in the EAR process but claimed anyway, possibly due to prior approvals by IOU staff to participating customers). The IOUs may intend to claim only incentives in the tracking system in this case, but savings were not zeroed out. Savings from these ineligible measures should not have been claimed.

EX024 involves a new transformer in a university data center that does not meet standard practice for minimum efficiencies. According to input from the IOU, this project was declined but was mistakenly claimed by the IOU. For E037, the project originally submitted as an EAR project was disallowed by the EAR team. The project was resubmitted as a much smaller temperature reset project with the same identifying number. This drastically reduced project, and associated relatively small savings claim, involved a HVAC set point change of 0.6°F. This project was waived by the EAR review team. In the review work by the WO033 team, the gross impact was set at zero due to measure ineligibility. This control change could have been implemented using the existing pre-retrofit equipment.

In two cases, savings were less than 100 percent of EAR ‘frozen’ savings. Project EX026 involves a university with a cogeneration system; the project claimed electrical savings but should have discounted the savings due to minimal electric purchases over just two or three months of the year. The additional electrical savings actually offsets gas use in the cogeneration plant. All pertinent information, including the existence / operation of the cogeneration plant and electric billing records, was not disclosed and/or thought relevant by the IOU in the EAR documentation process. The GRR is 0.12; without the cogeneration system, E026 would have had a small adjustment due to operating conditions and calculation method, and a resulting GRR of 0.90, as the measure was technically appropriate.

The other project with a GRR less than 100 percent – EX132 - involves a refinery with a boiler feed water heat exchangers (EX046) for which operating conditions changed; this was discovered during the WO033 site visit. The GRR for this project is 0.89.

Of the projects with a realization rate of 1.00, projects EX061 and EX132 involve savings claims adjusted by the IOU after post-installation data collection. For EX083, EX418 and HX017, evaluation savings were not adjusted from EAR frozen claims.

Table C-12 details the types of EAR overlap projects and the disposition for each project.

Table C-12: Description of EAR Summary Points

Site ID	Strata (Fuel)	IOU Application ID	Measure / Site Type / Facility Description (Sanitized)	kW GRR Realization Rate	kWh GRR Realization Rate	Therms GRR Realization Rate	Program	Industry Standard Practice (ISP) used for Ex-Post Baseline	Primary Reason for Discrepancy	Primary Reason for Discrepancy - Percent Difference in Savings (+/-%)	Expanded Reasons for Discrepancy
EX024	5(e)	2K1153551C	Efficient Transformer / University Data Center	0.00	0.00		PGE 21261 (CCC)	Yes	Ineligible Measure	-100.0%	Replacement transformer efficiency does not exceed ISP.
EX093	1(e)	TAA0009654	VFDs / Oil Wellfield		0.00		PGE2222 (Energy Efficiency Services for Oil and Gas Production)	Yes	Inappropriate Baseline	-100.0%	Per the findings from the recent ISP study, installation of VSDs on ESPs, is considered ISP for retrofit and new construction.
EX061	3(e)	2K12078508	DCV for Garage Exhaust Fans / Office	1.00	1.00		PGE 21011 (Commercial Calculated Incentives)	No	No Significant Discrepancies	NA	None – CO sensors on garage fans operated as expected
EX132	4(e)	2K12085717	New Compressed Air System / Dairy Products Processing	1.00	1.00		PGE 21031 (Agricultural Calculated Incentives)	No	No Significant Discrepancies	NA	None – compressors and actual control schemes were captured by the IOU.
EX037	5(e)	NC0108695	HVAC Controls Project / College		0.00		PGE 21261 (CCC)	No	Ineligible Measure	-100.0%	Set point adjustment ineligible; involves wireless thermostat.

Table C-12: Description of EAR Summary Points (continued)

Site ID	Strata (Fuel)	IOU Application ID	Measure / Site Type / Facility Description (Sanitized)	kW GRR Realization Rate	kWh GRR Realization Rate	Therms GRR Realization Rate	Program	Industry Standard Practice (ISP) used for Ex-Post Baseline	Primary Reason for Discrepancy	Primary Reason for Discrepancy - Percent Difference in Savings (+/-%)	Expanded Reasons for Discrepancy
EX046	2 (g)	2K11051183	Process Heat Recovery / Refinery			0.89	PGE 21021 (Industrial Calculated Incentives)	No	Operating Conditions	-11.0%	12 months of SCADA data was used for ex-post calculations, versus 14 days in ex-ante calculations.
EX026	5(e)	TAA0010120	HVAC Modifications / University Data Center	0.00	0.12		PGE 21011 (Commercial Calculated Incentives)	Yes	Unquantified Fuel Impacts (Operating Conditions)	-80%	Most of the electrical savings were converted into gas savings; the customer purchases power from a cogeneration plant during most of the year.
EX083	5(e)	NC0117448	Retro-commissioning HVAC / Office	1.00	1.00		PGE 21011 (Commercial Calculated Incentives)	No	No Significant Discrepancies	NA	Wireless thermostats for better HVAC control; savings were frozen.
EX418	4 (g)	2K12092893	Steam Trap Replacement / Refinery			1.00	PGE 21021 (Industrial Calculated Incentives)	No	No Significant Discrepancies	NA	This EAR sample point had savings frozen; the impact evaluation yielded similar savings and no adjustments are needed.
HX017	5(e)	SDGE2010* 3105* 5001089545 (4816-11)	VFD on Pool Pumps / Public Pool	1.00	1.00		SDGE 3105 (SW-ComA-Calculated)	Yes	No Significant Discrepancies	NA	No discrepancies with the savings calculations.

This analysis indicates that the EAR process does affect savings claims. However, it appears that some projects will benefit from further ex-post review and on-site M&V activities after the completion of EAR activities (which may also include on-site M&V activities); this is especially true for large projects or facilities, or for those projects for which operating conditions might be expected to change. In addition to further review by the IOUs and the evaluation team, the tracking databases for project savings need to be monitored for the proper transfer of EAR findings, including the rejection of projects and zero savings as well as the determination of EAR project savings.

Only a small number of true overlap EAR projects were analyzed, however, and the process is newly developed. As such, no conclusion regarding the effectiveness of the EAR process in affecting GRR results is warranted at this time. Unfortunately, there are fewer true overlap points between WO002 and WO033 than expected. Original expectations for 125 overlap points were reduced to 50 overlap points. Only 10 points materialized in the intersection of WO002 and WO033 as true overlaps, possibly due to protracted project timelines. The continuation of EAR efforts in 2013 and 2014 (and possibly in later years) will allow greater insight into the effects of the EAR process on IOU claims. Of particular interest is any effect that EAR is having on project submittals outside of the EAR sample. Perhaps the combination of EAR and ex-ante and ex-post ESPI performance assessments will drive improvements in IOU engineering and quality assurance for custom projects. Ultimately these efforts seek to improve IOU GRR results for custom projects and continuation of these activities should yield improvements with time.

Regarding follow-up communication, the custom impact evaluation team should always inform the EAR team of evaluation-based M&V determination. Likewise the EAR team should reciprocate. Two-way communication is needed to ensure consistency in implementation of evaluation and EAR practices, processes and procedures. This has been effectively implemented with the communication of industry standard practice (ISP) studies with effective dates and sunset dates for measure eligibility. This process should be expanded to better include EAR and evaluation team guidance on estimation approaches, measure eligibility, baseline treatment and other details of M&V and review. Strong and regular communication between IOUs, CPUC ED staff, their consultants, and the evaluation community will allow the dissemination and adoption of all relevant EAR and evaluation guidance.

C.9 Assessment of EUL Claims

IOU EUL claims were examined by the evaluation team to determine how differences in the EUL affected the lifecycle gross realization rates, and to analyze how often changes were made by the evaluation team to IOU claims. Overall, a total of 1,215 records distributed across 495 projects were assessed. IOU EUL estimates were updated by the evaluation team for 287 of 1,215 records, and associated with that 146 of 495 projects. The adjustments by the evaluation team across all projects sampled resulted in project EULs that are, on average, 0.4 years lower than the IOU-claimed EULs. In 146 of the records, the evaluation EUL was lower by an average of 4.6 years (with a range of 0.5 to 15 years). In 141 of the records, the average EUL adjustment was upwards by 5.7 years (with a range of 0.5 to 12.5 years).

There appears to be considerable variability across projects and IOUs. Greenhouse and new construction projects that contain a number of discrete measures with different EULs often listed an EUL based on only one measure, even when ex-ante savings were broken out by measure. Other projects with a single measure (e.g., VSDs) generally claimed the proper EUL.

While the evaluation-based increases and decreases to the IOU EUL counteracted each other, considerable variation was observed at the project level, which increases the error ratio and uncertainty in the accuracy of ex-post LC energy savings. These variations can have considerable impacts on LC savings and also on cost effectiveness analyses for measures, programs, and IOU portfolios.

C.10 Data Requests for Detailed Project Documentation

Initial application documentation data request letters were sent to the IOUs following sample selection. The letters described the items needed to conduct the gross impact evaluation and perform each project analysis. Evaluation effectiveness, efficiency, and accuracy are improved when supported by complete submission of all relevant data. The IOUs maintain project records and were asked to deliver data and other supporting documentation in order for the evaluation team to completely understand each project and the associated project savings.

Unfortunately, many important pieces of data were missing from the IOU project documentation data provided, even after multiple requests. Common lapses are described at the end of this section, following the complete list below.

Each initial project documentation data request letter contained project lists with identifying numbers and asked for “all available application data including but not limited to the following information:”

- Final incentive application
- Copy of paid invoices
- Pre-retrofit energy audit reports, M&V plans, reports, and verification reports
- Pre-installation inspection report
- Post-installation inspection report
- Any evaluation or third party reports or benchmarking study
- Raw data archives and logs (such as logger or EMS data) in their original and readable formats
- Any spreadsheets or simulation models in their original unlocked formats, e.g., eQuest or EnergyPro input / output files, etc.
- Preliminary and final savings calculations and supporting data with documentation to ensure replicability
- Manufacturer’s cut sheets/specifications when available, indicating their use in estimating ante savings or when needed to ensure replicability
- Documentation for any deemed, stipulated or estimated components of ex-ante impact calculations of savings, such as hours of use, measure life / effective useful life (EUL), remaining useful life (RUL), and incremental / installed costs (including any analysis or source), and the equation or tool used to determine savings if no ‘live’ functional spreadsheet is available
- Documentation to support baseline type assignment (code or standard requirement, early retirement, retrofit, replace on burnout, industry standard practice, CPUC policy, etc.)

- Pre-existing system controls and operating schedule and status description
- Pre-existing system output capacities – current output and maximum/design capacity
- Proposed construction or modifications with drawings, schematics, and equipment specifications, as applicable
- Fuel switching considerations and any required analysis per CPUC policy regarding fuel switching or cogeneration projects (see Energy Efficiency Policy Manual)
- Other fuel savings and/or load increases resulting from the project
- Heating, Ventilation, and Air Conditioning (HVAC) interactive effects values and methods used to develop those values, when measures cause a change in HVAC system loads
- Interactions between multiple measures or other upgrades that act to increase or decrease savings relative to a measure's savings estimate, independent of other measures, or which impact the pre or post monitoring period
- For industrial projects, provide pre/post production output data when used in savings calculations and the source of such records
- Billing history: one-year pre installation, with interval data when available (with corresponding billing histories required if ex-ante estimated values rely upon a per-unit-production changes based on multi-year production data)

The IOUs should use this data collection list as a guide to detail the information needed for evaluators to fully understand the projects (including their interactive effects and system boundaries), and in order to accurately determine LC energy savings and true cost-effectiveness. For approximately 15% of the projects, additional requests for data were required, and for about 2% of the projects, three or more data requests for a specific project were required.

In general, IOU application forms, project descriptions, invoices, photographs, and calculations (including models or spreadsheets) were provided. Monthly and interval bills were provided to a cross-work order data management team. However, many project descriptions were incomplete or vague, photographs were blurred or lacked description, invoices were not tied to full or incremental costs, and calculations / models were provided in a locked form or pdf file and underlying values or equations were not apparent.

Often, a complete description of the pre-retrofit operating conditions and pre- / post-retrofit production records (for industrial projects) were not provided. Incremental costs, RUL, and energy savings were rarely provided where applicable. Also, for larger more complex projects where such considerations apply, drawings / schematics and full explanations of system boundaries, interactive effects and non-energy benefits were also lacking.

C.11 Final Site Report Template

The following is a sample form used to develop the Site Specific Measurement and Verification Plan (SSMVP) as well as the Final Site Report (FSR). The example shows the combined form used for both steps during the “After Decision” (AD) phase of the project. Instructions are given in the form of footnotes; these are removed from the final report submissions.

1.1 Custom Measure M&V Plan⁵

Table 1-1: Project Information⁶

	SSMVP ⁷	FSR ⁸
IOU		
Application ID		
Application Date		
Program ID		
Program Name		
Program Year		
Itron Project ID		
IOU Claim ID(s)		
Project Description		
Incentive Amount		
DEER Building Type (if applicable)		
Sample Stratum (electric &/or gas)	TBD ⁹	
Sample Weight (electric &/or gas)	TBD	
ED Ex-Ante Review Status		
ED Measure Name or Group		
Date of SSMVP and FSR		
Field Engineer/Firm		
Supervisor/Reviewer		

⁵ This combined SSMVP & FSR template is designed for use in conducting pre- or post-installation M&V as part of the custom project ex-ante review process and/or ex-post impact evaluation and is to be filled out after securing facility cooperation (recruitment)

⁶ Most of the data in this Table 1-1 is found in the IOU data (CMPA) for pre-installation M&V (EAR) or from the IOU Tracker (SPTdb) data for ex-post impact evaluation. This table matches Table 1-1 in the Lower Rigor Assessment form and data may be copied from the LRA onto this form.

⁷ For the site visit, only the "plan" column should be filled out and is to be submitted to the DMQC prior to conducting on-site work. A week after the site visit, the "as implemented" column should be filled out with any updates or corrections. The revised form may be submitted with the Final Site Report (FSR). Use "same" for the "as implemented" column if the data has not changed.

⁸ The "FSR" column is to be filled out upon completing the ex-post analysis and savings calculations and submitted to the DMQC for review.

⁹ Use "TBD" for values which will be determined at the next stage of the evaluation process.

Type of M&V Plan [Pre-Installation M&V, Post-Installation M&V (post-EAR), Post-Installation M&V (ex-post impact evaluation only), Pre-Installation Verification, or Post-Installation verification] ¹⁰		N/A ¹¹
Type of M&V (Basic or Enhanced)		
Type of M&V (Pre/Post or Post Only)		

Table 1-2: Site Data ¹²

Contact Name (filled in only on initial submission to Itron later removed or provided in separate documents for Itron and NTG team)	
Contact Title (filled in only on initial submission to Itron later removed or provided in separate documents for Itron and NTG team)	
Contact Phone Number (filled in only on initial submission to Itron later removed or provided in separate documents for Itron and NTG team)	
IOU Representative Name	
IOU Representative Phone #	
Site Visit Consent Granted Y/N (Consent required before completing SSMVP) ¹³	
Date of First On-Site Visit (scheduled or actual)	
Date of Second On-Site Visit (if applicable)	

¹⁰ This will be "Post-EAR" for projects which participated in the Early Application Review process.

¹¹ Use "N/A" for data which is not applicable to the SSMVP or the FSR.

¹² This Table 1-2 is the only place where customer confidential information may be recorded on this form. After submitting this form for review prior to the on-site visit, the customer name, contact number, and any other confidential information should be removed to prevent inadvertent disclosures.

¹³ Consent to visit the site is a pre-requisite for developing the M&V plan. A site-specific M&V plan should not be prepared unless the participant has agreed to allow access to perform on-site M&V. Contact the project manager 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.

Table 1-3: Summary of M&V Findings & Results¹⁴

Description	IOU Proposed Ex-Ante Data or Frozen Ex-Ante Data	As Implemented or As Found
Project Baseline Type (Early Replacement, Normal Replacement, Replace on Burnout, Capacity Expansion, New Construction, Major Renovation, Add-on Measure, System optimization)		
Project Baseline Efficiency (in situ, Title 24 (specify year), Other Code (specify), Industry Standard Practice)		
Project Cost Basis (Full Cost, Incremental Cost)		
Measure Quantity		
RUL (required for early retirement projects only, otherwise n/a)		
EUL		
First Year kWh Savings		
First Year Peak Demand Reduction (kW)		
First Year Therms Savings		
Annual kWh Savings (RUL Period)		
Peak Demand Reduction (kW) (RUL Period) ¹⁵		
Annual Therms Impact (RUL Period)		
Annual kWh Savings (EUL – RUL Period)		
Peak Demand Reduction (kW) (EUL – RUL Period)		
Annual Therms Savings (EUL – RUL Period)		
Annual Non-IOU Fuel Impact (RUL Period)		
Annual Non-IOU Fuel Impact (EUL – RUL Period)		
Net-to-Gross Ratio		
Installation Rate	100%	

¹⁴ The data in this Table 1-3 is in the same format as Table 1-3 in the Lower Rigor Assessment form. Suggest updating the LRA form with final assessments prior to copy-pasting the "as implemented" or FSR results.

¹⁵ Since the RUL does not apply to New Construction projects, the totals here would be lifecycle savings for NC projects. The total savings fields should net out the non-IOU fuel impacts from direct measure savings.

Description	IOU Proposed Ex-Ante Data or Frozen Ex-Ante Data	As Implemented or As Found
Gross Realization Rate (kWh)	90%	
Gross Realization Rate (kW)	90%	
Gross Realization Rate (Therms)	90%	

Table 1-4: M&V Plan Summary

Parameter	Plan	As Implemented or Found
Measure Type		
Operation		
Site Data Dependency		
M&V Scope		
Quantity Verification (Full/Sample) ¹⁶		
IPMVP Option		
Measurement ¹⁷		
Specification Verification		
Eligibility Verification		
Project Cost Verification		
Billing History/PPP Status Verification ¹⁸		
Fuel Switching Analysis ¹⁹		
RUL Assessment ²⁰		
Code or Industry Standard Practice Determination ²¹		
HVAC Interactive Effects		
Non-HVAC Interactive Effects ²²		

¹⁶ When using sampling for verification, briefly describe the sampling method.

¹⁷ Explain the reasons for selecting the above mentioned IPMVP option and how this relates to the primary uncertainties for this project, if known.

¹⁸ Non new construction participant must have a 12-month billing history and must be paying into PPP funds. Additional details have been described in the guidance document.

¹⁹ Fuel switching projects must provide a "3-Prong Test." This field is for identifying the activities which are required for verifying the data found on the three-prong test.

²⁰ Coordinate with the NTG group to verify pre-existing conditions and the presence of sufficient program influence to justify the Early Retirement claim.

²¹ Briefly describe the research needed identify the appropriate "minimum code requirement" and/or "industry standard practice" for the project, if applicable. Or refer to an existing document which defines the code or ISP.

²² This would include assessing any "direct" multiple-measure interactive effects that would impact gross savings.

Table 1-5: Savings Calculation Method

	Plan	As Implemented
Engineering Calculations ²³		
Energy Use Modeling Tool ²⁴ (eQuest, DOE2, EnergyPro, or other ED-approved software)		
DOE Software (Insulation, AirMaster+, Fan Systems, Pumping Systems)		
ED-Approved Custom Model		
8760 Load Shape Development Method (not required for gas)		

Table 1-6: Uncertainty Analysis²⁵

Variable (Important Savings Determinants)	Value in Reducing Uncertainty (High/Medium/Low)	Estimated Value	Accuracy	Min, Max	Distribution Type
Tracking Data Discrepancy					
Ineligible Measure					
Measure Count					
Project Baseline Type and Efficiency					
Operating Conditions -- Power (kW)					
Operating Conditions – Use (hrs/yr)					
Building Occupancy					
Calculation Method					
Interactive Effects					
Unquantified Fuel Impacts					

²³ Basic engineering calculation formulas should be described in a few words here and discussed in more detail in Section 1.3 if necessary. If the ex-ante and/or proposed ex-post method(s) cannot be determined, they may be included with the updated SSMVP shortly after the on-site visit is complete. In this case, do not wait to submit the "as implemented" SSMVP form with the Final Site Report; instead submit this form with the proposed calculation formulae within a week of completing the first on-site visit.

²⁴ Specify eQuest, DOE2, EnergyPro or other ED-approved software, if proposed (or actually) used to calculate ex-post savings.

²⁵ Present your best estimate of ex-ante of uncertainty for each source, (if applicable) and expected reduction in uncertainty. Add additional rows as needed for variables specific to this project.

Table 1-7: Field Data Collection Plan²⁶

Parameter to Verify/Measure (delete non-applicable rows)	Parameter Range	M&V Equipment Brand and Model	M&V Instrument Qty	Rated Full Scale Accuracy	Accuracy of Expected Measurement	Planned Metering Duration	Planned Metering Interval
Operating Hours ²⁷							
Fluid Temperature							
Surface Temperature							
Ambient air temperature							
Exhaust Gas Temperature							
Amperage							
Power Factor							
Voltage							
True Power							
Air Pressure							
Flow ²⁸							
Humidity							
Leakage							
Supply Air Temperature							
Mixed Air Temperature							
Return Air Temperature							
Thermostat Setpoint Temperature							
Other (Specify)							

²⁶ Include only those rows/values which are applicable for this project and delete the unused/unnecessary rows.

²⁷ For lighting projects, specify if data collection is proposed to involve panel-level measurement, CT logging and/or light loggers.

²⁸ Specify if air, steam, or fluid flows are to be measured.

1.2 Site M&V Cost Estimate²⁹

Item	Estimated Hours	Estimated Cost	Actual Hours	Actual Cost
Site Contact				
M&V Plan Preparation				
Instrument Charge				
Site Work (including Travel Time)				
Travel Costs				
Data Collection and Analysis				
Site Specific Reporting				
Total				

1.3 Ex-Ante Engineering Calculation (Additional Details)

Place additional details here.

1.4 Desk Review Findings, Questions and Data for Site Visit³⁰

Place additional details and questions here.

²⁹ Show line item hours and cost by billing category for M&V plan preparation, instrument charge, data collection, and data analysis and site-specific reporting. Update the estimated hours/costs and submit with the initial SSMVP if the initial budget provided is insufficient for further consideration. Provide the actual hours/costs column after completing the site analysis savings calculations and submit with the Final Site Report.

³⁰ Describe your understanding or lack of understanding of the project based on all of the documents provided, describe any discrepancies, missing information, problems or issues observed with project or analysis, including final IOU application energy savings, costs and incentives, and any inconsistencies that must be addressed during the on-site visit. The Lower Rigor Assessment form should be consulted to inform this paragraph.

2.1 Site-Specific Ex-Post M&V Results³¹

This section of the document is to be completed after the On-site visit is completed.

Table 2-1: Detailed M&V Findings³²

Reviewed Parameter	Analysis
Project Eligibility	IOU Proposal:
	ED Assessment:
Measure Specification and Quantity	IOU Description and Quantity
	As-Found Description and Quantity
Measure Operation	IOU-Documented Operation
	As-Found Operation
Project Gross Savings Baseline (for early retirement projects only, include RUL through EUL baseline)	IOU Assignment:
	ED Assessment:
Project Cost Review (for early retirement projects only, include RUL through EUL cost basis treatment)	IOU Documented Cost:
	ED Assessment:

³¹ Provide a description of confirmed major shortcomings in energy savings methods and adherence to program rules, including specific program eligibility issues or baseline issues after referring to the appropriate Program Manuals. Include recommendations for a standard practice (ISP) baseline study if needed. You may wish to first update the Lower Rigor Assessment form prior to copying the relevant information here.

³² The format of this Table 2-3 is similar, but not exactly the same as the Table 1-4 in the LRA form. Suggest updating the LRA form with final assessments/findings prior to copying to this form.

Reviewed Parameter	Analysis
RUL (required for early retirement projects only, otherwise n/a)	IOU Assignment:
	ED Assessment:
EUL	IOU Assignment:
	ED Assessment:
Input Assumptions for Savings Calculations	IOU Assumptions:
	ED Assessment:
Calculation Method³³	IOU Method:
	ED Method:
Pre- and/or Post-Installation M&V	IOU M&V:
	ED's M&V Results:
Net-to-Gross Review	IOU Assignment:
	ED Assessment:

³³ Include (do not embed) the savings calculation spreadsheet and reference the filename here. If not submitted with this document, include the URL of the document on the SharePoint site or other approved, secure location.

Table 2-2: Discrepancy Analysis³⁴

The following table presents adjustments made to the claimed project savings on account of various discrepancies found during the M&V effort. These adjustments are shown as positive or negative impact (quantities and percent of claim) on the IOU-claimed savings. This table does **not** need be filled out during the lower rigor assessment/SSMVP phase.

Discrepancy Factor	kWh Impact	KW Impact	Therms Impact
Tracking Data Discrepancy			
Ineligible Measure			
Measure Count			
Inappropriate Baseline			
Equipment Specifications			
Operating Conditions			
Calculation Method			
Un-quantified Fuel Impacts			

2.2 Additional description of project (if needed)

Describe any changes to the project scope or measure discovered during the M&V effort, if not adequately addressed elsewhere in this document.

2.3 Reasons for Discrepancy

The following reasons are noted for the discrepancy between claimed and evaluated savings.

³⁴ Show the difference for each component of the uncertainty as a positive or negative adjustment (value and percent) to the ex-ante claimed savings.

C.12 Approach to Determining Gross Baselines

A challenge that occurs in a number of industrial projects is how to define the evaluation's baseline for gross savings with respect to program requirements that reference "industry standard practice" as the basis for the baseline. In some cases, the availability of efficiency options above the industry standard practice baseline may leave room for further savings adjustment due to partial free ridership. In other cases, there may be few or no efficiency options above the industry standard practice baseline, the result of which may be low or zero gross savings. Evaluators' choices of baselines may differ from those selected by program administrators for a number of reasons as discussed in the remainder of this subsection.

Below are several principles that the evaluation project team used as guidance for determining the appropriate baseline to be used in calculating the gross savings for projects:

Code or market baselines were used for replace-on-burnout and 'normal replacement'

In situ baselines were only used for the remaining useful life (RUL) of the pre-existing equipment that was eliminated due to the program. Consideration was given to the specifics of the application with respect to the remaining life, if any, of the pre-existing equipment when selecting the baseline including:

- In-situ equipment was used as the gross baseline only when the existing equipment was not at the end of its useful life and there was compelling evidence that the pre-existing equipment had a remaining useful life
- Code requirements or industry standard practice baselines were used for replace-on-burnout or natural turnover situations
- Care was taken when the industry standard practice baseline was used to maintain consistency with the net to gross analysis.

CPUC policy rules and IOU program eligibility rules governed the baseline

Careful review of utility and third-party program and CPUC policy rules were made and adjustments were applied to both gross and net savings. The adjustments were applied to gross savings when there was clear evidence from program or policy rules that savings claims could not be made nor rebates paid for the case in question. Program rules also came into play with respect to gross baseline requirements, e.g., specifying a given efficiency level or percentage above code. In situations where program or policy rules were in question, the case was reviewed by the project management team, ED's consultants, and ED, with ED making the final judgment on whether rules were violated and whether associated corrections were required in the baseline determination or measure qualification.

Minimum production or energy service requirements govern the baseline

In some situations, a measure for which savings were claimed was determined to be the only acceptable equipment for an application. In such cases, the baseline was set at the minimum needed to meet the requirements. Care was taken to ensure that the changes in production or energy service requirements were not merely preferences but were fundamentally required. An example would be an industrial process where only a variable-speed drive pumping system could meet the production requirements.

For situations where the baseline conditions were changed (such as production levels), the baseline equipment was defined as the minimum equipment needed to meet the revised conditions. This could result in changes in gross savings if claimed savings were set at pre-installation requirements.

Evaluate early replacement RULs and program inducement

The engineering team responsible for gross savings estimates determined whether there was evidence that early replacement actually occurred, that is, that there was remaining life on the equipment replaced. If so, an estimate was made of the associated RUL. The net to gross team, in consultation with the engineering team, was responsible for determining whether the early replacement was program induced. If the early replacement was not program induced, the gross baseline was set based on the replace on burnout/normal replacement guidelines.

The decision tree used as guidance for determining the baseline for gross savings can be found in Figure C-2. The application of site specific baselines, gross and net baseline approaches were reviewed by ED and its consultants.

Figure C-2: Baseline Guidance

Guidance for Determination of Baseline for Gross Savings

Take Most Efficient of All Applicable Cases

