Appendix

2003 Building Efficiency Assessment Study

An Evaluation of the Savings By Design Program

Prepared for the following California Investor Owned Utilities:

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San Diego Gas and Electric
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Appendix A. Free-ridership and Spillover Methodology

Assessment of Free-ridership

The free-ridership was estimated by reviewing the program files and discussing the decision-making process with the participants. We used all of the available information to assess what the customer would have done in the absence of the program.

The free-ridership scoring questions are provided below along with their associated scoring. These questions were asked for each incented measure documented in the tracking database (systems approach) or identified in the project file (whole building approach). The cumulative score for each measure was compared to the maximum value of 6 to determine the degree of free-ridership. The scoring methodology is presented in more detail within the Scoring Methodology section below. It is important to note that the final measure score relies on multiple responses in the score determination. Furthermore, several key responses are followed by an open ended question requesting an explanation for the response. Finally, the results of each interview were reviewed by the project manager, along with the project file, to confirm the outcome. The final score was modified, if necessary, to reflect additional information identified in the review. The complete interview document is available for review in these appendices.

Free-ridership Scoring Questions

Q.31 How influential was the Savings By Design, including the incentives, design assistance, design analysis and interactions with SBD representatives and consultants in the implementation of [measure name]?

READ LIST

1 = Very Influential	**1 point**
2 = Somewhat Influential	**0.5**
3 = Slightly or minimally Influential	**0.25**
4 = Not at all Influential (ask why)	**0**

Q31_4.
Why?____

Q.32. How did Savings By Design influence the implementation of ***<<the measure>>*** (choose all that apply) (**maximum of 2 points**)

DO NOT PROMPT

1 = SBD had no influence on this measure	**0 points**
2 = SBD representative first suggested/introduced measure	**2**
3 = SBD performed simulations and/or design analysis	**2**
4 = SBD incentive made this measure an “easier sell”	**1**
5 = SBD incentive helped measure meet investment criteria	**2**
6 = Prior SBD projects have had success with this measure	**1**
7 = DK, Not Certain, Can’t Remember	**0**
50= other	**individually assessed**

Q32_Other: explain:____

Q.33. If you had no interaction with Savings By Design regarding this project, this measure…

READ LIST

1 = Definitely would not have been installed (ask Why)	**3 points**
2 = Probably would not have been installed (ask Why)	**2**
3 = Probably would have been installed (ask Why)	**1**
4 = Would have been installed exactly the same (ask Why)	**0**
5 = Would have been installed with less efficient equipment and/or materials	**2**
98 = DK, Not certain	**1**

Why (for each response)____

Q33_Why? (Ask for each Measure that gets a 1,2 3, or 5 for Q33)

Q33_4 Why? (Ask for each Measure that gets a 4 for Q33)

DO NOT PROMPT

As a result of what was learned through previous SBD program participation	**2**
As a result of what was learned in past utility efficiency programs,	**0**
Because it is our standard practice	**0**
Because we have had positive prior experience with the same measure	**0**
Because we would have funded design analysis through the project budget	**0**
Measure already met financial criteria without the program incentive	**0**
Other____	**(individually assessed)**

Instrument Pilot Study

The free-ridership instrument was tested on 10 participants at the beginning of this study. This test revealed the following findings:

- The multiple questions for each measure are an important feature. Conflicting responses are deciphered by reviewing all three scoring questions and the follow-up query.
- The review by the project manager is beneficial for scoring adjustments in the case of conflicting answers within the scoring questions, and for consistent interpretations by the interviewers. Each project is reviewed regardless of outcome.
- The results of this test support the methodology used. The follow-up questions (Q33) generally substantiate the measure level results.

Scoring Methodology

The free-ridership scoring methodology is based on the answers to questions Q31 through Q33. The score for each measure range from 6, which represents a measure that was completely incentive influenced, to 0, for an absolute free-rider.

Energy efficiency measures can be classified into two distinct types, dichotomous measures, those measures that are either implemented or not, such as VFDs and lighting controls, and measures with continuous or incremental efficiency ratings such as motor efficiency and glazing performance.

A copy of the database containing all of the “as surveyed” models was made after finalization of calibration and quality control. This copy was converted into a “modified” or free-ridership database. The free-ridership database consisted of adjustments of efficiency levels and removals of some dichotomous measures from the “as-surveyed” database, according to the free-ridership assessment.

Dichotomous measures were left in the models when measures had scores of 3.5 or more. The dichotomous measure was removed from the free-ridership model if the score was less than 3.5.

For measures with continuous or incremental energy efficiency ratings, a free-ridership energy rating was calculated using the following formula.

$$\frac{[(6 - Score)(BaselineRating)] + [(Score)(AsBuiltRating)]}{6} = FreeRidershipRating$$

For an example, the lighting power density (LPD) measure of one site had a free-rider score of 3.5. When asked Q31, the site contact claimed to have been somewhat influenced by the incentive, which counts 0.5 points for the free-rider score. When asked question Q32, the same site contact stated that the incentive made the measure and “easier sell”, counting one point in the free-rider scoring. The respondent answered that the measure probably would not have been installed with out the incentive in response to Q33, resulting in two points. This site had an as-built LPD of 0.94 watts per square foot. The space, which is an office, had a baseline LPD of 1.6 Watts per square foot. These values and the score were plugged into the above equation.

$$\frac{[(6-4)(1.6)] + [(4)(.94)]}{6} = 1.16$$

Therefore the free-ridership LPD for this space was 1.16 watts per square foot. In the free-rider simulation model, lighting fixtures were added until the LPD was brought up to 1.16 Watts per square foot. For sites with multiple space types, the same adjustment approach was applied to every space type.

A free-ridership rating was calculated for all continuous energy ratings to be modified, including motor efficiency, cooling EER, lighting power density, glazing U-value and shading coefficient. These were calculated on a per item basis and adjusted individually to create the free-ridership models.

For a more complex example, assume the site in the previous LPD example also was incented for VFDs on secondary chilled water pumps. When asked Q31 for the VFDs, the site contact claimed that they were not influenced by the incentive. This response counts zero points toward the free-rider score. When asked question Q33, the same site contact claimed that SBD had no influence on this measure, again counting zero points in the free-rider scoring. The respondent answered that the measure would have been installed exactly the same in response to Q33. She answered that the measure is standard practice to the follow up question. Therefore, the free-ridership score for the VFDs would be 0, indicating strong free-ridership. In this case, the VFD controls would be changed to constant volume in the free-ridership model.

Having an analogous free-rider model for every "as-surveyed" model provided a simple approach to the calculation of net program savings. The net savings were calculated using the same methodology as whole building savings for the original "as-surveyed models." The modified free-rider "as-built" run for both energy and demand was deducted from the baseline run yielding the net savings.

To determine the best estimate of net program savings, the analysis followed the following steps:

1. The *net savings* are determined for each participant at the end-use level.
2. The *program net savings estimate* is calculated by using the same MBSS methods described for the gross savings, but using the net savings estimates for each sampled site*.*
3. The *free-ridership rate* is calculated as the proportion between the *program gross* savings less the *program net savings* divided by the *program gross savings.* The net-to-gross ratio is simply 1 – *free-ridership rate* or the *program net savings* divided by the *program gross savings*.

Assessment of Spillover

The spillover was estimated by discussing the decision-making process with the non-participants. We used all of the available information to assess what the customer would have done in the absence of any influence from the new construction rep or program material.

The formal spillover survey is shown below. A prior question identified the customer's awareness of the program. The first scoring question was used to determine whether the customer had any interaction with the program rep or material on the current project. The remaining questions were asked to determine the level of influence program experience or material had on previous projects. Below, the questions are presented as they were during the decision-maker interviews.

Q23. Please rate the level of influence the new construction rep or program material had on your design and equipment choices for the building.

Significant Influence	2 points
Some influence	1
Did not influence	0

If "Definitely Influenced" What was influenced?

____
____
____
____
____

If can't answer move score down one point.

Q25. Please rate your level of interaction with Savings By Design program staff during the design and equipment selection of any previous projects before this building was designed.

Significant interaction	2 points
Some interaction	1

No interaction	0

Q26. Did the prior interaction influence the design and equipment choices of this project.

Definitely influenced	2 points
Possibly influenced	1
Did not influence	0

Scoring Methodology

Each of the questions above attempts to investigate the various ways the customer might have been influenced by previous NRNC programs or utility program staff. Similar to the free-rider analysis, the spillover analysis relies on end-use specific customer self-report methods for estimating the amount of spillover. However, unlike the participant sample where measure specific data exists (e.g., tracking data, files), there is very little readily available information on the non-participant buildings.

The difficulty that exists is trying to understand what the non-participant would have done at the end-use level had there been no previous program influences.

The questions were asked of the non-participant respondent. If the customer responded “no” to most or all questions, then there is no spillover, however if the customer responded “yes, or possibly” then there is most likely some amount of spillover. We then asked end-use level questions to try to determine where the spillover occurred within the building design.

One problem remained however; the interviewer still had no information on whether or not the end-use in discussion was truly energy efficient or whether the customer just believed it to be. Typically the on-site and subsequent DOE-2 model are unavailable at the time of the decision-maker surveys and cannot be used to inform us if any of the end-uses are energy efficient, or built more efficient than code. However, it was posed that if the decision-maker interview questions were withheld until the on-site survey and modeling tasks were completed we could use the data to inform the DM survey questions. With this information the interviewer would have more strategic information for directing end-use specific spillover questions to the respondent. This was the approach used for the non-participants. Initial contact was made with the decision-maker to explain the nature of the study and ultimately gain permission to conduct an on-site survey. Once the data collection and simulation model was complete, the decision-maker was re-contacted to complete the end-use level questions.

The spillover scoring methodology is based on the answers to questions Q23, Q25 and Q26. The score for each measure range from 0, which represents a measure that was not at all influenced by the program rep or material, up to 6, for absolute spillover. Questions Q25 and 26 inquire whether the customer’s prior interaction with the program rep or material played a role in influencing the measure since previous interaction with the program rep or program material may have influenced the design and equipment choices for the current project. The previous interaction may have had a lasting impact on the customer that would influence them to design differently than they would have without the previous interaction.

As stated in the free-ridership assessment, energy efficiency measures can be classified into two distinct types, dichotomous measures, that are either implemented or not, such as VFDs and lighting controls, and measures with continuous or incremental efficiency ratings such as motor efficiency and glazing performance.

A copy of the database containing all of the “as surveyed” non-participant models was made after finalization of calibration and quality control. This copy was converted into a “modified” or spillover database. The spillover database consisted of adjustments of efficiency levels and removals of dichotomous measures from the “as-surveyed” database, according to the spillover assessment.

Dichotomous measures were left in the models when measures had scores of four or more. The dichotomous measure was removed from the spillover model if the score was three or less.

For measures with continuous or incremental energy efficiency ratings, a spillover energy rating was calculated using the following formula.

$$\frac{[(6 - Score)(BaselineRating)] + [(Score)(AsBuiltRating)]}{6} = SpilloverRating$$

For example, the lighting power density (LPD) measure of a site has a spillover score of 3. When asked question Q23, the site contact acknowledged some influence by the program rep or material on the current project, which counts one for the spillover score. When asked question Q25, the same site contact stated that there was a possibility that *prior* interaction with the program rep or material influenced the current project, counting one points in the spillover scoring. For Q25 the respondent said that the prior interaction influenced the design choices of the project. For this site, the as built LPD was 1.0 Watts per square foot. The space, which was an office, had a baseline LPD of 1.6 Watts per square foot. These values and the score were plugged into the above equation.

$$\frac{[(6-3)(1.6)] + [(3)(1.0)]}{6} = 1.3$$

Therefore the spillover LPD for this space was 1.3 watts per square foot. In the spillover model, lighting fixtures were added until the LPD was brought up to 1.3 watts per square foot. For sites with multiple space types, the same adjustment approach was applied to every space type.

A spillover rating was calculated for all continuous energy ratings to be modified, including motor efficiency, cooling EER, lighting power density, glazing U-value and shading coefficient. These were calculated on a per item basis and adjusted individually to create the spillover models.

Having an analogous spillover model for every “as-surveyed” model provided a simple approach to the calculation of spillover. The spillover savings were calculated as the difference between the gross savings and the net savings for the non-participants. The following equation shows the actual calculation that was used to compute the spillover:

$$SpilloverSavings = GrossSavings - NetSavings:$$

$$\left[Baseline - AsBuilt\right]_{\substack{As-Surveyed \\ Model}} - \left[Baseline - AsBuilt\right]_{\substack{Spillover \\ Model}}$$

Spillover was calculated for each site in the sample. MBSS ratio estimation was be used to estimate the total amount of spillover occurring in the NRNC population. The result is total spillover, and spillover at the end-use level for the population. As shown in the owner survey results chapter, the only spillover in the non-participant population was for the lighting end use.

Appendix B: Database Documentation

This is the documentation for all databases being delivered for the final statewide report for the Non-Residential New Construction (NRNC) program area covering program year 2003.

BEA Survey Data

This section describes all survey data collected for this project. The survey data are organized in an Access database named 'BEA Surveys 2003 Final Data.mdb'. The tables in the database are named as follows:

- Site Data,
- Participant Site Data,
- Participant Measures,
- Non Participant Site Data,
- Non Participant Measures,
- Weights Non Parts, and
- Weights Parts.

The data contained in each table are described in detail below.

Site Data

This table contains utility tracking data for participants and F.W. Dodge data for non-participants such as id, building type, square footage, name and location. It also contains scheduling information such as the appointment time and date, and contact information. Each site is a unique record in this table.

Participant Site Data

This table contains a unique record for each participant site included in the final sample. The table contains tracking data such as project name and location. It also contains all site-level responses to the owner, decision-maker, and screening surveys. Some of these owner responses were used in the computation of the free-ridership scores. The owner and decision-maker responses were also summarized in the process evaluation section of the final report.

Participant Measures

This table contains one record for each incented measure type for each participant site included in the final sample. It contains the site ID, a description of each measure type at the site, the quantity of each measure type, and tracking data on the kWh energy savings, kW demand reduction, and dollar savings for the measure type.

In addition to the descriptive measure information, the table also contains measure-specific responses to the owner decision-maker surveys. These owner responses were used in the computation of the free-ridership scores.

Participant Measures ALL

This table contains one record for each incented measure type for each participant site in the 2003 program. It contains the RLW site ID, the utility ID (i.e. coupon number), the utility, a description of each measure type at the site, the quantity of each measure type, and tracking data on the kWh energy savings, kW demand reduction, and dollar savings for the measure type.

Non Participant Site Data

This table contains a unique record for each non-participant site included in the final sample. The table contains data such as project name and location. It also contains all site-level responses to the owner decision-maker surveys. Some of these owner responses were used in the computation of the spillover scores. The owner decision-maker responses were also summarized in the process evaluation section of the final report.

Non Participant Measures

This table contains a unique record for each non-participant site included in the final sample. It contains the site ID and project name. It also contains end use-specific responses to the owner survey that were used in the computation of the spillover scores. The end use-specific responses are organized horizontally across each record.

Weights Parts

This table contains the participant case weights used for the gross and net savings calculations and the analysis of the survey responses. It contains the RLW ID, the utility, the program-estimated kWh energy savings, the program-estimated kW demand reduction, the sampling stratum, and the final weight.

Weights Non Parts

This table contains the non-participant case weights used for the gross and net savings calculations and the analysis of the survey responses. It contains the RLW ID, the estimated square footage, the building type, and the final weight.

1	C&I Storage
2	Grocery Store
3	General C&I Work
4	Medical/Clinical
5	Office
6	Other
7	Religious Worship, Auditorium, Convention
8	Restaurant
9	Retail and Wholesale Store
10	School
11	Theater
12	Unknown
13	Hotels/Motels
14	Fire/Police/Jails
15	Community Center
16	Gymnasium
17	Libraries

Table 1: 17 Key Title-24 Building Types

Recruiting Outcome Descriptions

RLW had an original selection of 123 sites that we wanted to sample; 87 program participants, and 36 non-participants. We had to replace 3 of the original 87 participants, resulting in a successful recruitment rate of 96.5% for program participants.

The maximum number of calls placed to survey and recruit a participant site was 15. The average number of calls placed to survey and recruit the participant sample was 3.4, with an average of 2.6 contacts per site.

The maximum number of calls placed to survey and recruit a participant site was 25, ten more than the maximum number of calls to participants. The average number of calls placed to survey and recruit the non-participant sample was 8 with an average of 4.19 contacts per site.

Throughout the course of this project, a total of 118 buildings were selected from the dodge database for non-participant recruitment. Of the 118 sites, 36 were scheduled and visited, 22 sites remain on-hold, 16 sites were dropped, 8 sites refused to participate, 2 sites were not reachable, 13 were found to be participants, 14 sites were over sampled for the non-participant building type and 7 were coded as stratum filled. Some reasons why sites were put on-hold, not reachable, dropped or refused, over sampled or stratum filled are as follows:

On-hold – Held for use in future BEA projects:

Building still under development

Unoccupied building or not built-out

Owner does not currently have time to participate in study

Dropped – Removed from call list permanently:

Project put on-hold indefinitely

Campus of buildings serves as a poor comparison

Facade renovations to old building

Serviced by a municipal utility (LADWP, SMUD)

Refused – Removed from call list permanently:

Too many parties involved to obtain approval

Containments in the building are confidential

Property Managers unwilling to reveal new owners

Corporate policy will not to participate in research or surveys

Not Reachable – Removed from call list permanently:

Insufficient contact information in dodge database on owners

Owners are not listed & name or building address not listed

Over Sampled- – Held for use in future BEA projects:

Too many schools in the non-participant sample

Stratum Filled – Held for use in future BEA projects:

- Sample requirements for stratum filled by a higher priority site

Appendix C: Industrial Process and Other Systems Site Write-ups

Table 2 shows the gross and net realization rates for the industrial projects sampled in this evaluation.

	Tracking Savings		Gross Savings		Gross RR Rate		Net Savings		Net RR Rate	
ID	kWh	kW	kWh	kW	kWh	kW	kWh	kW	kWh	kW
Industrial Sites										
D60490	132,968	7.2	132,968	7.2	100%	100%	77,565	4.2	58%	58%
D60534	1,243,000	67.4	1,243,000	67.4	100%	100%	-	-	0%	0%
P11865	201,045	152.0	206,538	4.8	103%	3%	206,538	4.8	103%	3%
P11885	4,087,468	466.0	2,843,328	443.4	70%	95%	1,658,608	258.6	41%	55%
P13092	28,590	3.3	28,590	3.3	100%	100%	28,590	3.3	100%	100%
P13092	19,540	7.6	34,210	7.8	175%	102%	-	-	0%	0%
P13092	674,429	-	674,429	-	100%	-	505,822	-	75%	-
P14073	1,042,085	253.5	1,034,905	4.8	99%	2%	689,937	3.2	66%	1%
P14073	2,703	0.7	2,703	0.7	100%	100%	1,014	0.3	38%	38%
P16060	249,464	11.1	235,409	6.0	94%	54%	235,409	6.0	94%	54%
S11164	2,323,568	3.1	886,598	197.1	38%	6358%	-	-	0%	0%
S12102	609,415	-	697,208	61.1	114%	-	29,050	2.5	5%	-
S14059	1,214,906	243.0	1,082,932	224.6	89%	92%	1,082,932	224.6	89%	92%
S14146	1,236,642	213.0	1,174,943	168.1	95%	79%	1,174,943	168.1	95%	79%
S14158	390,550	-	313,208	35.8	80%	-	52,201	6.0	13%	-
S14170	1,415,405	108.0	1,282,121	135.5	91%	125%	1,282,121	135.5	91%	125%
S15037	240,870	0.4	233,935	35.7	97%	8925%	116,968	17.9	49%	4463%
Industrial Portion of Combination Sites										
D55744	1,806,914	346.0	4,019,871	399.4	222%	115%	3,014,903	299.6	167%	87%
P13092X	911,225	60.9	28,590	3.3	3%	5%	28,590	3.3	3%	5%
P14073	1,044,788	254.2	2,703	0.7	0%	0%	1,014	0.3	0%	0%
S14044	22,657	3.4	8,103	0.9	36%	26%	338	0.0	1%	1%

Table 2: Industrial Projects Summary

D60534

CO (Carbon Monoxide) Sensors on Parking Garage Fans

Project 60534 received an incentive of $37,290 to install a CO monitoring system on exhaust fans in a five story garage. The implementation consists of eight CO sensors per floor that control twelve 15 hp motors and three 30 hp motors. The baseline for this measure is continuously running fans, which are required by municipal code in the city in question in the absence of CO sensors.

The Vulcair VA-201M CO sensors were verified as installed by the evaluation team. Motor loggers were placed on the fan motors for a period four weeks to monitor fan usage.

<u>Gross Savings</u>

Program tracking savings were calculated comparing constant fan usage with CO sensor controlled fans assuming a 0.90 control fraction. The control fraction of 0.90 proposed by the program agrees with the logged site data and is acceptable for this application.

		Gross Savings	Gross RR	Net Savings
kW	67.4	67.4	100%	0
kWh	1,243,000	1,243,000	100%	0

Table 3: Gross and Net Savings

Net Savings

Correspondence in the program tracking file notes that the project decision makers sought incentives after they had *already installed* the CO monitoring system. Therefore, the program had no influence in the implementation of this measure and subsequently there are no net savings.

D60490

CO (Carbon Monoxide) Sensors on Parking Garage Fans

Project 60490 received an incentive of $3,626 to install CO sensors on two 10HP garage fans parking garage fans. The baseline for this measure is continuously running fans, which are required by municipal code in the absence of CO sensors. The CO sensors were verified on site by the evaluation team and motor loggers were installed on fan motors for four weeks.

Gross Savings

Program tracking savings were calculated comparing constant fan usage with CO sensor controlled fans assuming a 0.90 control fraction. The energy savings fraction of 0.90 proposed by the program agrees with the logged site data and is reasonable for this application.

Net Savings

During the owner survey, the facility owner indicated that the program was somewhat influential in the implementation of this measure. The Savings by Design incentive did help the measure meet the investment criteria. The respondent indicated that they were already aware of the technology, but the incentive made the “payback on efficiency good.” The respondent stated that the measure would have probably been installed absent any contact with the program. For our net savings evaluation, this combination of answers yields a partial free-ridership score of 3.5 out of 6, or 42% free-ridership. According, the net savings are evaluated as 58% of the gross savings as summarized below.

	Tracking Savings	Gross Savings	Gross RR	Net Savings	Net RR
kW	67.4	7.2	100%	4.2	58%
kWh	1,243,000	132,968	100%	77,565	58%

Table 4: Savings Verification Summary

P15778

Reduced Pipe Friction and Pump VSD

Project 15778 received an incentive of $75,000 to install a VSD at a pumping station and a minimum head loss pipeline with enlarged pipe diameter. The new pipeline is used to divert approximately half of the effluent from a nearby city’s wastewater treatment plant to a remote steam field. The city is under contract to provide 4 billion gallons of water per year, or an average of 11 million gallons per day (MGD). The design water delivery schedule is a seasonal range from 9.0-12.1 MGD, which was also used to estimate savings for the proposed design. The evaluation team verified the head loss calculations, the delivery schedule, and the savings impact of the as-built design compared to baseline.

To verify the head loss calculations, onsite measurements were used to back out the Hazen-Williams constant for pipe friction. The value calculated was within 1.5%; therefore the calculations in the Program energy savings report are acceptable.

As of RLW's onsite visit in November 2004, the pumping station was 251 Million Gallons behind schedule. The plant is run at higher flowrates than scheduled to make up for a 20 day shutdown in September, due to the wildfires. The actual flowrate delivered for each day was used to calculate the energy consumption of the baseline scenario and the as-built pumping system. Flows below 5 MGD were taken as partial days at the scheduled flowrate.

Calculation Methodology

The following equations were developed to describe the power consumption as a function of flowrate.

Baseline:

The baseline chosen in the Program energy savings report and used in the evaluation team's calculations describes a scenario (Appendix A, Scenario 2) where two CV Floway 16DKH pumps each with 800 HP motors are throttled equally to control flow output of the pump station.

$$\text{Power (kW)} = 676.14 \times \text{Flowrate (MGD)}^{0.2048}$$

Another scenario (Scenario 3) is presented in tabular format (Table A5), but is not explained in the report. This scenario throttles the pumps unequally, which would follow the proposed control strategy of bringing the second pump online only when demand is greater than each pump's capacity. This would minimize the energy wasted by throttling, especially when the required flow is greater than the design range of 9.0-12.1, which was observed onsite. Table A3 of the report summarizes the power consumption associated with equal throttling of all three pumps.

As-Built:

The program energy savings report described the control strategy, which is to run the VSD pump up to its capacity and then bring the CV pump online and provide the remaining flow with the VSD pump. The CV pump can deliver 6.5 MGD at its Best Efficiency Point (BEP). The flowrate of the VSD pump at full-speed was measured to be 12.4 MGD.

$$\text{Power (kW)} = 19.889 \times \text{Flowrate (MGD)}^{1.4863} \quad \text{, for Flowrate} \le 12.4 \text{ MGD}$$

$$\text{Power (kW)} = 630 + 19.889 \times [\text{Flowrate (MGD)} - 6.5]^{1.4863} \quad \text{, for Flowrate} > 12.4 \text{ MGD}$$

Gross Savings

As seen in Table 5, when the flowrate is below this range the savings gained from the application of the VSD are maximized. When the flowrate is greater than the maximum for the VSD pump, 12.4 MGD, the savings are reduced since two pumps are required to achieve these flows.

Month	Avg. MGD	Savings (kWh)	Note
January	12.4	201,960	
February	12.1	222,059	
March	12	239,488	
April	9.4	312,267	3 Days Off
May	9.1	396,098	
June	10.2	329,336	
July	8.2	400,583	2 Days Off
August	8	432,493	
September	11.6	65,529	20 Days Off
October	14.2	92,087	
November	14.5	74,493	

December	14.5	76,936	

Table 5: Flow Schedule and Monthly Energy Savings

Net Savings

The facility owner indicated that the program was somewhat influential in the implementation of these measures. The Savings by Design representative influenced the project by providing input in the design process that first introduced the measure. However, the respondent indicated that the measures probably would have been installed without any interaction with the SBD representative. For our net savings evaluation, this combination of answers yields a partial free-ridership score of 3.5 out of 6, or 58% free ridership. Therefore the net savings are evaluated as 58% of the gross savings as summarized below.

	Baseline Usage	Tracking Savings	As-Built Usage	Gross Savings	Gross Realization Rate	Net Savings	Net Realization Rate
kW	623.6	466	180.2	443.4	95%	258.7	55%
Annual kWh	6,120,512	4,087,468	3,277,184	2,843,328*	70%	1,658,608	41%

Table 6: Savings Verification Summary

S15027

Well Pump: PE Motor and VFD control

Project 15027 is a drinking water production facility that received an incentive of $2,660 to install a premium efficiency (0.95) motor and associated VSD controls on a 100 hp well pump. The evaluation team logged the pump motor for this application and the savings associated with the system will be verified. The report estimates 240,870 kWh savings from the PE motor and VSD on the 100HP deep well turbine pump.

Program Savings

The baseline was assumed to be a high efficiency (EPACT) motor (0.945), with a constant speed motor using bypass to dissipate the excess power. An assumed load profile and annual operating hours were supplied by the facility operator and the tracking savings were estimated using these estimates. The incentive was capped at 50% of the incremental cost, $2,660. The application has a seasonal change in operation, that is, the pump is used more often in summer than seasons.

Evaluation

The pump motor was logged for three weeks in October/November 2004. During operation, the pumping system power draw was 33.4 kW, and somewhat constant. Discussion with facility management determined that the logged power draw was consistent with annual operation. The logged run time hours were not annualized due to the seasonality issue, instead the operator estimated were used.

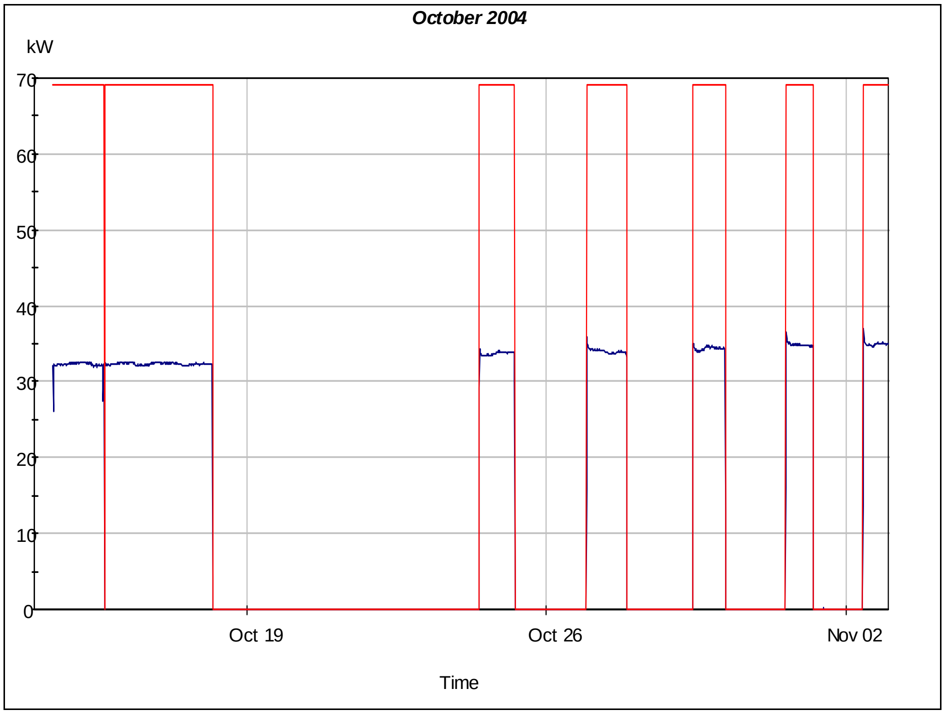

Figure 1: Monitored Pump System Power Draw

Gross Savings

Using the average power reduction of 35.7 kW and the operator estimated operating hours of 6552 hours per year. The evaluation estimate savings are 233,935 kWh per year. Due to nearly constant operation during the summer months, the 35.7 kW demand savings are expected to coincide with peak conditions. The program only claims savings for PE Motors, not VSD savings even though industrial VSD savings are not weather dependent. Hence the high realization rate for peak savings (*).

Net Savings

During the owner survey, the facility owner indicated that the program was very influential in the implementation of these measures since the program "caused us to look into the technology". However, he believed that the measure would have been installed with the exact same measures in the absence of the program. Although the sequence of statements is unusual, the owners' reasoning was that they would have looked into the technology eventually and would have come to the same conclusions. For our net savings evaluation, this combination of answers yields a partial free-ridership score of 3 out of 6, or 50% free ridership. Therefore the net savings are evaluated as 50% of the gross savings as summarized below.

	Baseline Usage	Tracking Savings	As-Built Usage	Gross Savings	Gross Realization Rate	Net Savings	Net Realization Rate
kW	69.1	0.4	33.4	35.7	8926%*	17.9	4463%
Annual kWh	452,764	240,870	218,829	233,935	97%	116,968	49%

Table 7: Project Summary

S11163

Water Injection Well VFD

Project 11163 received an incentive of $11,717 to install a VSD on the positive displacement water injection pump for an oil pumping operation. The evaluation team verified the installation of the injection pump system during a site visit. The evaluation team compared the tracking savings with the utility billing data to verify energy savings. The tracking savings analysis estimates 390,550 kWh savings from the VSD on the 100HP positive displacement water injection pump.

Gross Savings

The application has a dedicated meter. Utility billing data for the meter was used to calculate annual energy consumption and peak demand savings. The daily energy consumption (kWh) was then applied to all weekdays and weekends respectively and compared to the baseline profile.

The proposed design is based on a normal operating flowrate of 26.25 GPM for 19 hours per day with a demand of 21.6 kW and an increased flowrate of 96.25 GPM for 5 hours per day with a demand of 107.32 kW. The actual demand fluctuated between 38.4 kW and 48 kW. This demand was compared to the assumed baseline power draw, 80.4 kW, and actual annual hours of operation were applied to both. There is a 35.8 kW peak load demand reduction associated with this application in addition to the energy savings, though the program does not claim demand savings for VSD applications.

Net Savings

The facility owner indicated that the program was not at all influential in the implementation of this measure. The Savings by Design incentive made this measure an “easier sell”, but the VSD would have been installed exactly the same without any interaction with SBD. Installing VSD for similar applications is standard practice for this firm. For our net savings evaluation, this combination of answers yields a partial free-ridership score of 1 out of 6, or 83.3% free ridership. Therefore, the net savings are evaluated as 16.7% of the gross savings as summarized below.

	Tracking Savings	Gross Savings	Gross Realization Rate	Net Savings	Net Realization Rate
Peak kW	0	35.8		6.0	-
Annual kWh	313,208	390,550	80.2%	52,201	13.4%

Table 8: Savings Comparison

S11163

Process Motors: Premium Efficiency and VSD

Project S11163 received an incentive of $69,707 to install 18 premium efficiency motors and 6 VSDs at a waste water treatment plant. Program tracking information indicates an assumed baseline of high efficiency motors and constant speed pumps that dissipate excess power via bypass. Projected operating hours and VSD load profiles were used to generate project tracking savings estimates.

Evaluation Activities

The installation premium efficiency motors and VSD systems were verified during the on-site visit. The evaluation team logged motor usage on 5 of the 6 VSDs applications for three weeks.

Gross Savings

A weekday and weekend load profile was generated from the logger data for each motor and both were compared to the baseline hourly kW to estimate the savings for each VSD application. A constant value for baseline was assumed during operation of the pump motors to generate baseline. These profiles were annualized to estimate annual energy usage and peak demand savings

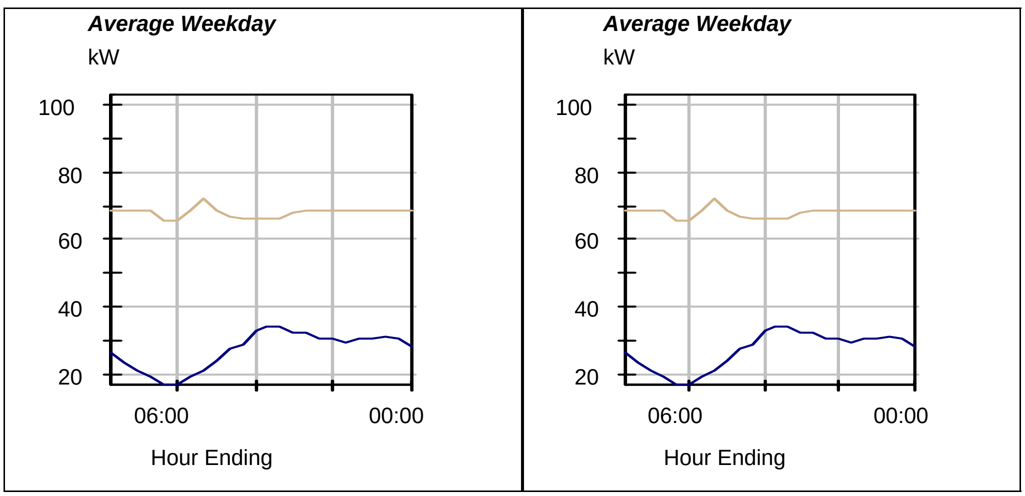

Figure 2: As-built and Baseline Average Profiles

The evaluation of savings for each pump is presented below.

Pump	HP	HRS	Baseline eff	Installed eff	Tracking kW saved	Tracking kWh Savings	VFD	Evaluated kW	Evaluated kWh
3-ME-16	6.5	4000	0.875	0.882	0.04	135		0.04	135
3-ME-17	6.5	4000	0.875	0.882	0.04	135		0.04	135
3-ME-18	6.5	4000	0.875	0.882	0.04	135		0.04	135
3-ME-19	6.5	4000	0.875	0.882	0.04	135		0.04	135
3-ME-20	6.5	4000	0.875	0.882	0.04	135		0.04	135
3-ME-21	6.5	4000	0.875	0.882	0.04	135		0.04	135
3-ME-22	6.5	4000	0.875	0.882	0.04	135		0.04	135
3-ME-23	6.5	4000	0.875	0.882	0.04	135		0.04	135
8-ME-9	3	1040	0.875	0.911	0.10	83		0.10	83
8-ME-9	3	1040	0.875	0.911	0.10	83		0.10	83
14.1-ME-12	9	8700	0.895	0.9	0.04	292		0.04	292
14.1-ME-13	9	8700	0.895	0.9	0.04	292		0.04	292
14.1-ME-20	9	8700	0.895	0.9	0.04	292		0.04	292
14.1-ME-21	9	8700	0.895	0.9	0.04	292		0.04	292
6-P-9	30	8700	0.91	0.936	0.68	5062		0.68	5062
6-P-10	30	8700	0.91	0.936	0.68	5062		0.68	5062
11-P-1	130	8700	0.936	0.94	0.44	961733	y	74.90	472,603
11-P-2	130	8700	0.936	0.94	0.44	961733	y	Included w/P-1	
16-P-1	25	8700	0.924	0.917		106540	y	4.63	106,540
16-P-3	25	8700	0.924	0.917		132730	y	0.92	132,730
17-P-1	56	8700	0.917	0.905		148283	y	17.48	148,283
17-P-2	56	8700	0.917	0.905	Included w/P-1		y	Included w/P-1	
18-P-4	5	8700	0.875	0.902	0.13	876		0.13	876
Totals					3.1	2,323,568		100.1	886,598

Table 9 Pump Evaluation Summary

The program projected 8700 operating hours and 958,359 kWh savings for each of two 130 HP Submersible Influent Pumps, 11-P-1and 11-P-2. There is also an identical third pump on standby to provide redundancy. According to facility staff, only one of the pumps runs at any given time, which verified by the monitored data. The over prediction of usage for these large pump is main reason for the low realization rate for this site.

The total savings of the as-built system is 886,598 kWh including the premium efficiency motors. The proposed total savings was 2,323,568 kWh yielding a gross realization rate of 38% for energy savings. The peak demand reduction of 3.10 kW is all accounted for by the premium efficiency motors which were verified on-site. The logged VSD applications that were monitored account for a 97.0 kW demand reduction, which are not claimed by the program.

Net Savings

When surveyed, the engineer that designed the system indicated that is was the policy of the water district to have premium efficiency motors and VSDs for these applications. He stated that the program has no effect on the implementation of these measures and that the exact same equipment would have been installed absent any interaction with the program. Therefore, there are no net savings for this project.

	Tracking Savings	Gross Savings	Gross Realization Rate	Net Savings	Net Realization Rate
kW	3.1	100.1	3229%*	0	0%
Annual kWh	240,870	2,323,568	38%	0	0%

Table 10 Project Summary

S12102

VSD on pump, Premium Efficiency Motors

Project S12102 received an incentive of $18,282 to install premium efficiency motors and VSDs for a ground water production well and a booster pumping station that will serve two new 8.0 million gallon reservoirs. The new pumping facilities include one deep well vertical turbine pump and four vertical turbine booster pumps, with one booster pump as backup. The well pump, which will run continuously until the two reservoirs are filled, received a premium efficiency motor only. The four booster pumps received premium efficiency motors and VSD's and are planned to operate continuously from 6:00 AM to 10:00 PM in a load-sharing mode to maintain constant discharge pressure.

Evaluation

The evaluation team logged motor usage for the three operating booster pumps. The evaluation period lasted three weeks.

Gross Savings

A weekdays and weekends load profile was generated from each motor logger and both were compared to the baseline hourly kW to estimate the savings for each VSD application. A constant value for baseline was assumed during operation of the pump motors to generate baseline and these profiles were annualized to estimate annual energy usage and peak demand savings.

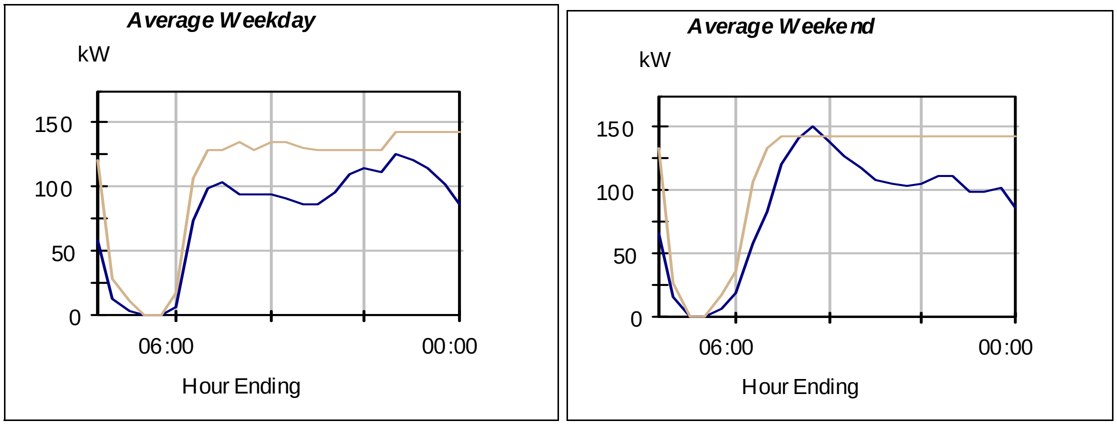

Figure 3: -Built (Blue) and Baseline (Brown) Average Profiles

The summarized results for each pump are tabulated below.

Pump	Baseline Energy (kWh)	As-Built Energy (kWh)	Gross Energy Savings (kWh)	Baseline Demand (kW)	As-Built Demand (kW)	Gross Demand Savings (kW)
P-1	942,160	701,518	240,642	128.4	96.5	31.9
P-2	497,809	285,763	212,046	33.7	16.3	17.4
P-3	348,509	103,989	244,521	16.8	4.9	11.8
Total	1,788,478	1,091,269	697,208	178.8	117.7	61.1

Table 11: Logged Results for Booster Pumps with VSD's

The total savings of the as-built system is 697,208 kWh including the premium efficiency motors. The proposed total savings was 609,415 kWh yielding an overall realization rate of 114%. The logged VSD applications that were monitored account for a 61.1 kW demand reduction, which are not claimed by the program.

Net Savings

During the decision maker survey, the facility designer indicated that the program was minimally influential in the implementation of these measures. He said, "SBD had minimal influence by providing a secondary design review, but did not consider this design assistance nor did SBD influence design. (The) installed design was the initial design." For our net savings evaluation, this combination of answers yields a partial free-ridership score of 0.25 out of 6, or 96% free ridership. Therefore, the net savings are evaluated as 4% of the gross savings as summarized below.

	Baseline Usage	Tracking Savings	As-Built Usage	Gross Savings	Gross Realization Rate	Net Savings	Net Realization Rate
kW	178.8	0.0	117.7	61.1	N/A	2.55	N/A
Annual kWh	1,788,478	609,415	1,091,269	697,208	114%	29,050	4.6%

Table 12: Savings Verification Summary

P11865

Refrigerated Warehouse

Project P11865 received an incentive of $14,073 for a new refrigerated warehouse facility, with approximately 35,000 S.F. of gross area. The energy efficiency measures included for the program included:

- Efficient Condenser
- Floating Head Pressure and Variable Setpoint
- Condenser Variable Speed Control
- Air Unit Variable Speed Drives
- Premium Efficiency Compressor Motor

Program tracking energy and demand savings for the project were estimated using the DOE-2.3 building energy simulation program. DOE-2.3 is the refrigeration version of the DOE-2 simulation program, which provides the capability to model industrial refrigeration applications and refrigerated warehouses. A base case model and proposed saving model, incorporating installed measures, were created as a basis for estimating the project tracking savings. Since the refrigerated warehouses are not covered under Title 24, the Savings By Design Refrigerated warehouse program baseline assumptions were used to develop the base case model. A summary of the measures and baseline model attributes is shown below in Table 13.

Building Attribute	Baseline	Proposed Model
Condenser specific efficiency	330 BTU/Watt	387 Btu/Watt evap cooled
Minimum condensing temperature	85°F SCT	70°F SCT
Condenser control	Fan cycling with fixed condensing pressure setpoint	VSD on condenser fans, wet bulb offset control
Zone control	Fixed setpoint	Floating Head Pressure, Variable Setpoint
Air Unit control	Fan cycling with fixed setpoint	VSD on Air Unit Fans
Compressor Motor Efficiency	93.6%	94.1%
Evaporator fan control	Full time 100% operation	VSD, modulate based on zone load

Table 13: Refrigerated Warehouse - Baseline and Measure Parameters

An onsite survey of the project was conducted and the surveyor collected information about the design and operation of the warehouse expansion project. The site visit included equipment and operational characteristic verification, installed lighting survey and acquisition of actual facility load.

The program savings DOE-2.3 models were obtained from the program consultant, and the proposed savings model was modified to reflect as-built conditions. This was achieved by inputting actual lighting power as surveyed at the zone level, as well as altering the projected product load to actual load.

Gross Savings

A comparison of the tracking and evaluation savings estimates is shown below in Table 14. According to the revised simulation model, refrigeration system energy savings were close to those reported. The total realization rates were 103% on energy and 3% on demand.

	Total kWh	Demand (kW)
Tracking	201,045	152.0
Verified	206,538	4.8
Realization Rate	103%	3%

Table 14: Gross Realization Rates - Energy and Demand

Net Savings

During the decision maker survey, owner representative stated that the program was very influential for all measures. He indicated that absent the program, the measures definitely would not have been installed. The respondent noted that the incentive helped the measure meet investment criteria, specifically saying, “They probably wouldn't have been able to justify the increased cost.” (without the incentive) For our net savings evaluation, this combination of answers yields a free-ridership score of 6 out of 6, or 0% free ridership. Therefore, the net savings are evaluated as 100% of the gross savings as summarized below.

Tracking Savings	201,045	152.0
Net Savings	206,538	4.8
Net Realization Rate	103%	3%

Table 15: Net Realization Rates - Energy and Demand

P16060

Refrigerated Warehouse

Project P16060 received an incentive of $19,957 for a 12,000 S.F. expansion of a grape cooling and refrigerated storage facility. The energy efficiency measures analyzed for the program included:

- Efficient Condenser
- Floating Head Pressure, Variable Condenser Speed Control, and Variable Setpoint
- Air Unit Variable Speed Control
- Premium Efficiency Compressor Motor

Program tracking energy and demand savings for the project were estimated using the DOE-2.3 building energy simulation program. DOE-2.3 is the refrigeration version of the DOE-2 simulation program, which provides the capability to model industrial refrigeration applications and refrigerated warehouses. A base case model and proposed saving model, incorporating installed measures, were created as a basis for estimating the project tracking savings. Since the refrigerated warehouses are not covered under Title 24, the Savings By Design Refrigerated warehouse program baseline assumptions were used to develop the base case model A summary of the measures and baseline model attributes is shown below in Table 16.

Building Attribute	Baseline	As-Built
Condenser specific efficiency	330 BTU/Watt	332 Btu/Watt evap cooled
Minimum condensing temperature	85°F SCT	70°F SCT
Condenser control	Fan cycling with fixed condensing pressure setpoint	VSD on condenser fans, wet bulb offset control
Zone control	Fixed setpoint	Floating Head Pressure, Variable Setpoint
Air Unit control	Fan cycling with fixed setpoint	VSD on Air Unit Fans
Compressor Motor Efficiency	93.6%	94.1%
Evaporator fan control	Full time 100% operation	VSD, modulate based on zone load
Lighting Power Density (C&I Storage)	Storage: 0.6 W/SF	Storage: 0.6 W/SF

Table 16: Refrigerated Warehouse - Baseline and As-built Parameters

An onsite survey of the project was conducted and the surveyor collected information about the design and operation of the warehouse expansion project. The site visit included equipment and operational characteristic verification, installed lighting survey and acquisition of actual facility load.

The program savings DOE-2.3 baseline models were obtained from the program consultant, and the proposed savings model was modified to reflect as-built conditions. This was achieved by inputting actual lighting power as surveyed at the zone level. The actual load for this model was not altered as the forecasted load was similar to actual facility project load.

Gross Savings

A comparison of the tracking and evaluation savings estimates is shown below in Table 17. According to the revised simulation model, refrigeration system energy savings were close to those reported. The total realization rates were 94% on energy and 54% on demand.

	Total kWh	Demand (kW)
Tracking	249,464	11.1
Verified	235,409	6.0
Realization Rate	94%	54%

Table 17: Gross Realization Rates - Energy and Demand

Net Savings

During the decision maker survey, it was indicated that the program was very influential for all measures. He indicated that absent the program, the measures definitely would not have been installed. The respondent noted that the incentive helped the measure meet investment criteria, specifically saying, “the capital costs would have been too high without the SBD incentive.” For our net savings evaluation, this combination of answers yields a free-ridership score of 6 out of 6, or 0% free ridership. Therefore, the net savings are evaluated as 100% of the gross savings as summarized below.

Tracking Savings	249,464	11.1
Net Savings	235,409	6.0
Net Realization Rate	94%	54%

Table 18: Net Realization Rates - Energy and Demand

S14059

Refrigerated Warehouse

Project S14059 received an incentive of $97,192 for an expansion and retrofit of their refrigerated warehouse facility, with a 61,500 S.F. expansion, 35,891 S.F. of existing warehouse, and 46,400 S.F. of unconditioned dry storage. The energy efficiency measures analyzed for the program included:

- Central Plant Refrigeration including three large screw compressors, a large condenser with close approach, and hot gas defrost
- Floating Head Pressure, Variable Setpoint Control, and Condenser Variable Speed Control
- Floating Suction Pressure
- Freezer Air Unit Variable Speed Drives
- Skylights and Lighting Control

Program tracking energy and demand savings for the project were estimated using the DOE-2.3 building energy simulation program. DOE-2.3 is the refrigeration version of the DOE-2 simulation program, which provides the capability to model industrial refrigeration applications and refrigerated warehouses. A base case model and proposed saving model, incorporating installed measures, were created as a basis for estimating the project tracking savings. Since the refrigerated warehouses are not covered under Title 24, the Savings By Design Refrigerated warehouse program baseline assumptions were used to develop the base case model. A summary of the measures and baseline model attributes is shown below in Table 19.

Building Attribute	Baseline	As-Built
Minimum condensing temperature	85°F SCT	70°F SCT
Condenser control	Fan cycling with fixed condensing pressure setpoint	VSD on condenser fans, wet bulb offset control
Zone control	Fixed setpoint	Floating Suction Pressure, Floating Head Pressure, Variable Setpoint
Freezer Air Unit control	Fan cycling with fixed setpoint	VSD on Air Units
Evaporator fan control	Full time 100% operation	VSD, modulate based on zone load

Lighting Power Density (C&I Storage)	0.6 W/SF	Two stage stepped control with adjustable photocell: 0.6 or 0.3 W/SF

Table 19: Refrigerated Warehouse - Baseline and Proposed Parameters

An onsite survey of the project was conducted and the surveyor collected information about the design and operation of the warehouse expansion project. The site visit included equipment and operational characteristic verification, installed lighting survey and acquisition of actual facility load.

The program savings DOE-2.3 models were obtained from the program consultant, and the proposed savings model was modified to reflect as-built conditions. This was achieved by inputting actual lighting power as surveyed at the zone level, as well as altering the projected product load to actual load.

<u>Gross Savings</u>

A comparison of the tracking and evaluation savings estimates is shown below in Table 20. According to the revised simulation model, refrigeration system energy savings were close to those reported. The total realization rates were 89% on energy and 92% on demand.

	Total kWh	**Demand (kW)**
Tracking	1,214,906	243.0
Verified	1,082,932	224.6
Realization Rate	89%	92%

Table 20: Gross Realization Rates - Energy and Demand

Net Savings

A decision maker survey was administered to a former facility employee who was involved in all design decisions. He indicated the program was very influential for all measures and that the measures would not have been installed absent the program. The decision maker said, “In absence of the program we would have complied with local codes and standards. SBD demonstrated savings on each measure and how to achieve our return on investment.” For our net savings evaluation, this combination of answers yields a free-ridership score of 6 out of 6, or 0% free ridership. Therefore, the net savings are evaluated as 100% of the gross savings as summarized below.

Tracking Savings	1,214,906	243.0
Net Savings	1,082,932	224.6
Net Realization Rate	89%	92%

Table 21: Net Realization Rates - Energy and Demand

S14146

Refrigerated Warehouse

Project S14146 received an incentive of $74,199 for an expansion and retrofit of their refrigerated warehouse facility, totaling 146,400 S.F. A dry storage area is being converted into a refrigerated cooler. The energy efficiency measures analyzed for the program included:

- Efficient Evaporative Condenser
- Floating Head Pressure, Variable Setpoint Control

- Condenser Fan Variable Speed Drive with Floating Head Pressure and Variable Setpoint
- High Efficiency Air Unit Motors
- Skylights and Lighting Control

Program tracking energy and demand savings for the project were estimated using the DOE-2.3 building energy simulation program. DOE-2.3 is the refrigeration version of the DOE-2 simulation program, which provides the capability to model industrial refrigeration applications and refrigerated warehouses. A base case model and proposed saving model, incorporating installed measures, were created as a basis for estimating the project tracking savings. Since the refrigerated warehouses are not covered under Title 24, the Savings By Design Refrigerated warehouse program baseline assumptions were used to develop the base case model. A summary of the measures and baseline model attributes is shown below in Table 22.

Building Attribute	**Baseline**	**As-Built**
Cooler Ceiling	R = 23	23
Cooler Walls	R = 20	20
Refrigerant type	R-717	R-717
Condenser Type	Evap cooled condenser	Evap cooled condenser
Condenser specific efficiency	330 BTU/Watt	338 Btu/Watt evap cooled
Minimum condensing temperature	85°F SCT	70°F SCT
Condenser control	Fan cycling with fixed condensing pressure setpoint	VSD on condenser fans, wet bulb offset control
Zone control	Fixed setpoint	Floating Head Pressure, Variable Setpoint
Air Unit Motor Efficiency	Fan cycling with fixed setpoint	Variable Air Unit Runtime Strategy
Evaporator fan control	Full time 100% operation	VSD, modulate based on zone load
Lighting Power Density (C&I Storage)	Storage: 0.6 W/SF Industrial Work (High Bay): 1.2 W/SF	Storage: 0.9 W/SF Industrial Work (High Bay): 1.12 W/SF

Table 22: Refrigerated Warehouse - Baseline and As-built Parameters

An onsite survey of the project was conducted and the surveyor collected information about the design and operation of the warehouse expansion project. The site visit included equipment and operational characteristic verification, installed lighting survey and acquisition of actual facility load.

The program savings DOE-2.3 models were obtained from the program consultant, and the proposed savings model was modified to reflect as-built conditions. This was achieved by inputting actual lighting power as surveyed at the zone level, as well as altering the projected setpoints in some of the zones to as operated condition.

Gross Savings

A comparison of the tracking and evaluation savings estimates is shown below in Table 23. According to the revised simulation model, refrigeration system energy savings were close to those reported. The total realization rates were 95% on energy and 79% on demand.

	Total kWh	Demand (kW)
Tracking	1,236,642	213.0
Verified	1,174,943	168.1
Realization Rate	95%	79%

Table 23: Gross Realization Rates - Energy and Demand

Net Savings

A decision maker survey was administered to a former facility employee who was involved in all design decisions. He indicated the program was very influential for most measures and that most measures would not have been installed absent the program. For our net savings evaluation, this combination of answers yields a free-ridership score of 6 out of 6, or 0% free-ridership. Therefore, the net savings are evaluated as 100% of the gross savings as summarized below.

Tracking Savings	1,236,642	213.0
Net Savings	1,174,943	168.1
Net Realization Rate	95%	79%

Table 24: Net Realization Rates - Energy and Demand

S14170

Refrigerated Warehouse

Project S14170 received an incentive of $84,924 for an expansion of their refrigerated warehouse facility, where an existing 20,000 S.F. dry storage area is being converted into a refrigerated cooler. The energy efficiency measures analyzed for the program included:

- Piping Freezer 8 to North Engine Room
- Floating Head Pressure, Variable Condenser Speed Control, and Variable Setpoint
- Floating Suction Pressure Control
- Bi-level Lighting in USDA cooler
- Increased Insulation in USDA cooler

Program tracking energy and demand savings for the project were estimated using the DOE-2.3 building energy simulation program. DOE-2.3 is the refrigeration version of the DOE-2 simulation program, which provides the capability to model industrial refrigeration applications and refrigerated warehouses. A base case model and proposed saving model, incorporating installed measures, were created as a basis for estimating the project tracking savings. Since the refrigerated warehouses are not covered under Title 24, the Savings By Design Refrigerated warehouse program baseline assumptions were used to develop the base case model. A summary of the measures and baseline model attributes is shown below in Table 25.

Building Attribute	Baseline	As-Built

Condenser Type	Evap cooled condenser	Evap cooled condenser
Minimum condensing temperature	85°F SCT	70°F SCT Min.
Condenser control	Tow-speed fan cycling with fixed condensing pressure setpoint	VSD on condenser fans, wet bulb offset control
Zone control	Fixed setpoint	Floating Suction Pressure
Condenser Motor Efficiencies	30HP, 92.4% 15HP, 91.0% 5HP, 87.5%	30HP, 94.1% 15HP, 92.4% 5HP, 90.2%
Lighting Power Density (C&I Storage)	Storage: 0.6 W/SF	Storage: 0.58 W/SF

Table 25: Refrigerated Warehouse - Baseline and As-built Parameters

An onsite survey of the project was conducted and the surveyor collected information about the design and operation of the warehouse expansion project. The site visit included equipment and operational characteristic verification, installed lighting survey and acquisition of actual facility load.

The program savings DOE-2.3 models were obtained from the program consultant, and the proposed savings model was modified to reflect as-built conditions. This was achieved by inputting actual lighting power as surveyed at the zone level, as well as altering the projected changing setpoints in some of the zones to as operated condition.

Gross Savings

A comparison of the tracking and evaluation savings estimates is shown below in Table 26. According to the revised simulation model, refrigeration system energy savings were close to those reported. The total realization rates were 91% on energy and 125% on demand.

	Total kWh	**Demand (kW)**
Tracking	1,415,405	108.0
Verified	1,282,121	135.5
Realization Rate	91%	125%

Table 26: Gross Realization Rates - Energy and Demand

Net Savings

A decision maker survey was administered to a former facility employee who was involved in all design decisions. He indicated the program was very influential for most measures and that most measures would not have been installed absent the program. For our net savings evaluation, this combination of answers yields a freeridership score of 6 out of 6, or 0% free ridership. Therefore, the net savings are evaluated as 100% of the gross savings as summarized below.

Tracking Savings	1,415,405	108.0
Net Savings	1,282,121	135.5
Net Realization Rate	91%	125%

Table 27: Net Realization Rates – Energy and Demand

P13092x

High Efficiency Lighting

Daylighting Controls

Milk Pump VFD's, Dairy Operation

Refrigeration System, Dairy Operation

Project P13092x is a dairy facility that received $55,130 in incentives for energy efficient measures implemented for the lighting and dairy refrigeration systems. The majority of the incentive, $40,465, was paid for the high efficiency interior lighting system which was reported to save 674,429 kWh annually. In addition to the efficient lighting system daylighting controls were installed in the milking parlor and reported to save 19,450 kWh annually. The custom built refrigeration system for the dairy operation is reported to save 188,666 kWh and received an incentive of $13,206. VFD controls on 5 hp milk pumps are reported to save 28,950 kWh and received $13,206 in incentives. In combination these measures are reported to save 911,225 kWh annually. The evaluation team did not install monitoring equipment; instead the team verified installation of the refrigeration equipment and control settings, verified operation of the daylighting controls and high efficiency lighting system, and obtained facility operation hours.

<u>Program Savings</u>

The high efficiency interior lighting system incorporating 320 Watt pulse start technology metal halide fixtures is installed in the cow confinement areas. Two large 132,000 square foot freestall barns with an installed LPD of 0.12 W/SF, one smaller 88,000 square foot freestall barn with an installed LPD of 0.15 W/SF, and a 8,000 square foot sorting pen with an LPD of 0.27 W/SF operating eleven hours a day were reported to save 675,604 kWh annually. PG&E's Dairy Baseline Study provides a lighting energy consumption standard for cow confinement areas and the recommended luminance for these areas equates to an LPD of 0.6 W/SF. The milking parlor, which includes the milking pits and support areas within a building, had an installed LPD exceeding baseline based on area category approach to lighting compliance thus lowering overall lighting savings to from 675, 604 kWh to 674,429 kWh annually. There weren't reported kW savings since the lights are only used during nighttime non-peak hours.

The daylighting controls were installed on 320 Watt pulse start metal halides in the milking barn and reported to save 19,450 kWh annually and peak demand savings of 7.6 kW. The reported savings is lower than preliminary estimate, because only half of the milking barn is being utilized, and the verifying engineer was unable to locate the final NCCalc report documenting the final savings attributed to the daylighting controls.

The custom built refrigeration system incorporated several equipment selections and control strategies to achieve the reported energy savings of 188,666 kWh and demand reduction of 50.0 kW. Specifically, the system has a ground water cooled shell and tube heat exchanger coupled to (2) 50 HP Trane screw compressor utilizing glycol as the refrigerant. The heat exchangers permit the system to use well water as the condenser for heat rejection. Also implemented are (2) two stage plate and frame heat exchangers coupled to well water to pre-cool the milk prior to a chilled water pass. Control strategies include an 8 degree glycol approach temperature, refrigerant temp of approximately 10 degrees, saturated suction temperature of 20 degrees, and a process temperature of 29 degrees.

<u>Evaluation</u>

A discussion with the facility manager provided current operation hours of the facility, refrigeration control strategies, and quantity of cattle processed each day. The lighting systems were verified as installed according to the program documentation. The verifying engineer verified that the lighting fixture technology, quantities, and hours of operation were practically identical to the reported values. Verified hours of operation also were identical to the reported hours of operation used to calculate program savings. Daylighting controls for (27) 320 W pulse start metal halide fixtures lights in the milking barn were verified as operational by changing the luminance setting on the control panel to simulate a darker condition. While the controlled lights were off prior to this adjustment, after the luminance setting was adjusted to simulate a darker condition the controlled lights turned on. The daylighting control measure was simulated using Survey-It.

Two Alfa-Laval heat exchangers and (2) 50 HP glycol screw chillers that are the basis of the custom refrigeration system were verified as installed. The verifying engineer also verified the control settings that are required for the custom refrigeration system to operate at the expected efficiency. The glycol chiller approach of 8 degrees was verified by collecting the compressor suction temperature and saturated evaporation temperature and calculating the difference:

Approach temp = compressor suction temp (19.6) - saturated evaporation temp (10.9) = 8.7

A verified saturated evaporation temperature of 10.9 degrees coincides with the control strategy of maintaining a refrigerant temperature of approximately 10 degrees. The saturated suction temperature of 20 degrees indicated as a control measure was verified to be 19.6 degrees. With all refrigeration equipment and control strategies to be verified as installed and operating properly, the proposed DOE2 model incorporating recommended refrigeration energy efficient measures used by the utility consultant to estimate savings was also used as the verified model.

Gross Savings

As Table 28 shows, the gross savings for the high efficiency lighting system, milk pump VFD controls, and refrigeration system are evaluated to be equal to the reported savings. Gross savings for daylighting controls are verified to be 34,210 kWh resulting in 175% realization rate. The verified 7.77 kW demand reduction is relatively the same as the reported demand savings of 7.60 kW.

Measure	**Tracking kW Savings**	**Tracking KWh Savings**	**Evaluated kW Savings**	**Evaluated KWh savings**	**KW RR**	**KWh RR**
Daylighting	7.6	19,540	7.8	34,210	102%	175%
Interior Lighting	0.0	674,429	0.0	674,429	100%	100%
Other Systems	3.3	28,590	3.3	28,590	100%	100%
Total	**10.9**	**722559**	**11.1**	**737229**	**102%**	**102%**

Table 28: Gross Savings Summary

Net Savings

During the decision maker survey, the owner indicated that daylighting control were standard practice, so there are no net savings associated with that measure. Alternatively, the program was definitely influential on the refrigeration and VSD measures, which probably would not have been installed in the absence of this influence. Therefore, there is no free-ridership with the other systems measures. With regards to the high efficient lighting system, the program probably influenced the installation of the measure by introducing the measure, although the owner believes the measure probably would have been installed in the absence of the program. This combination of answers yields 4.5 out of 6, or 25% free-ridership in our net savings protocol. The results of the net savings are shown below.

Measure	**Tracking kW Savings**	**Tracking KWh Savings**	**Net kW Savings**	**Net KWh savings**	**Net kW RR**	**kWh RR**
Daylighting	7.6	19,540	0.0	0	0%	0%
Interior Lighting	0.0	674,429	0.0	505,822	100%	75%
Other Systems	3.3	28,590	3.3	28,590	100%	100%
Total	**10.9**	**722,559**	**3.3**	**534412**	**30%**	**74%**

Table 29: Net Savings Summary

Appendix D: Survey Instruments

BEA Recruiting & Decision Maker Survey

Contact and Project Info	Owner Info
Site ID: «RLW_ID»	*Owner Company: «Owner_Company»*
Contact Person: «Owner_contact»	Owner Address: «Owner_Address», «Owner_City»
Business Name: «PROJECT_NAME»	Contact Email: «Contact_email»
Address: «ADDRESS», «CITY»	Contact Fax: «Contact_Fax»
Phone: «Phone»	Bldg Type: «Bldg_Type»
Program Delivery Type: «Approach»	Sample: «Sample»
Square Footage: «SQFT_Orig» **(VERIFY)**	

Contact Log

	Date	Time	By	Who	Result	Comment
1						
2						
3						
4						
5						
6						
7						

 # Calls ______________ & # Contacts:______________

Call contact (owner or site manager first) and identify yourself.

Describe the survey project

"We are an independent research organization working on a project funded by the California Public Utilities Commission to perform a research study to understand how new buildings are built. Neither I nor anyone else connected with this study will attempt to sell you anything, and your name and responses will not be used for any purpose other than this study."

Screener

Q1. Are you the owner or the owner's representative of the building at «ADDRESS»*?*

01 Yes
02 No (Get contact info) Name:______________________
98 DK (Get contact info) Phone:______________________

99 Refused (Thank and terminate)

Q2. Was there a new construction, gut renovation or remodel project at «ADDRESS» that was completed and occupied during 2003?

01 Yes
02 No (Confirm, Thank and Terminate)
98 DK (Get contact info) Name:_____________________
99 Refused (Thank and Terminate) Phone:_____________________

Q3. Our information shows that this building is a(n) «Bldg_Type» , is this correct?

01 Yes
02 No

(If no, Ask what type of building and primary occupancy type)

If mixed Occupancy please describe: ____
____

Q4. How would you describe the project at «ADDRESS», is it a…….

01 New building (brand new construction)
02 First Tenant improvement or newly conditioned space in an existing shell building
03 Renovation or remodel of an existing building
04 Addition to an existing building (Go to Q4a)
05 Renovation and addition (Go to Q4a)
06 Gut Rehabilitation of existing building
98 DK (Get contact info) Name: ______________________
99 Refused (Get contact info) Phone: ______________________

Q4a. Where in the building was the addition built? (Describe)
____
____
____
______

Q5. When was the building completed and opened for occupancy? (Month and Year)

Completed: ______________

Opened for Occupancy: _______________ (If different from completed date)

Q6. Is the building completely built out?

01 Yes (Skip to Q8)
02 If No, **% Complete**________ **Expected Completion Date**_________

Q7. What type of work remains uncompleted?

Explain:____
____
____
____
____

If less than 80% ask if we can call them back once the building is completely built-out and occupied. Explain the on-site and the report they may get in return for participating. If non-participant we will call them back after the on-site for some follow up questions.

Q8. Is the building completely occupied?

01 Yes
02 If No, **% Occupied**________

With your permission we would like to send an engineer/surveyor to your facility. The purpose of the on-site visit is to collect information and data that is required to build a computer simulation model of your building. This information will be used to better understand non-residential new construction in California. The on-site survey usually begins with a meeting between our engineer/surveyor and your facility manager. During this meeting information such as building schedules and control schemes will be discussed and documented. The engineer/surveyor will then ask to review building plans, if available, and conduct a walk through of the facility to obtain specific measurements and equipment inventories needed for the model. The on-site visit is non-intrusive and normally takes between 3 and 8 hours, depending upon the size and complexity of the building. The on-site can be scheduled at your convenience, when would be a good time for you?

- ❑ Appointment Date and Time____
- ❑ Refused

Q9. Do you have as-built building plans available at the site for review?

01 Yes
02 No
98 DK
99 Refused

Building Classification

Q10. Was this building constructed and owned by a private company or a public agency?

01 Private company
02 Public agency
DK
Refused

Q11. Was this building constructed to be occupied by the owner of the building, or built by a developer with the intent to lease space?

01 Built to be Owner Occupied
02 Built by a developer with the intent to lease space
03 Built and occupied by developer with intent to lease remaining space
98 DK
99 Refused

Q12. How would you describe the level of importance of energy efficiency when your company built this building?

01 Very important
02 Somewhat important
03 Neither important nor unimportant
04 Somewhat unimportant
05 Very unimportant
98 DK
99 Refused

Q13. When this building was being designed and constructed, what was the most important financial criterion used to make energy efficient investments?

01 Lowest first cost
02 Lowest lifecycle cost
03 Simple Payback
04 Return on Investment
05 Net Present Value
06 None
07 Multiple________________
50 Other_________________
98 DK
99 Refused

Design and Construction Practices

Q14. Did you ask the members of your design team to consider energy efficiency above and beyond Title 24 requirements? (If yes then explain)

01 Yes (Explain/why)
02 No
98 DK
99 Refused

Q14a.Explanation:____
____
____

Q15. Over the life of this project, were initial energy-efficiency features down graded through value engineering, substitutions or competitive bidding?

01 Yes (Explain)
02 No
98 DK
99 Refused

Q15a.Explain:____
____
____

Energy Performance

Q16. As part of this project, were you involved in decisions surrounding Title 24 compliance?

01 Yes
02 No
03 Somewhat
04 Can't Remember
98 DK
99 Refused

Q17. When this building was built, would you say it

01 Was just efficient enough to comply with Title 24 energy code
02 Was a little better than required by Title 24 energy code
03 Was much better than required by Title 24 energy code
98 DK
99 Refused

Q18. How would you describe the energy performance of this building?

01 It could be much more efficient than it is
02 It could be somewhat more efficient than it is
03 The building is about as efficient as it can be
04 This building is an example of energy efficiency for others to follow
98 DK
99 Refused

Participant

Building Owner Questions

Q19. Are you familiar with Savings By Design?

01 Yes
02 No (Get contact info)
98 DK (Get contact info) Name: ______________________
99 Refused (Thank and Terminate) Phone: ______________________

If not yes, explain. *"Savings By Design" is the name of an energy efficiency program run by your utility company. It aims to improve the energy efficiency of nonresidential new construction projects."*

Our records show that your company received a Savings By Design incentive from «utility»

Q20. Is this correct?

01 Yes
02 No (Confirm Building Address, ask for someone else, Thank and Terminate)
98 DK (Get contact info)
99 Refused (Thank and Terminate)

Name: ______________________

Phone: ______________________

Q21. How did you first become aware of the SBD program, services, and owner incentives that were available to you?

Utility Representative
Previous Utility Program Participation
Marketing Material
Architect
Engineer
Web Site
Manufacturer Rep.
Construction Manager
Energy Manager
Previous Tenant
Utility Seminar PEC Center or SCE
50 Other: ___________
98 DK
Refused

Q22. Did you work directly with the Savings By Design representative or consultant on this project?

01 Yes
02 No **(**Get name and contact info)
98 DK
99 Refused (Thank and Terminate)

Name: _____________________

Phone: ____________________

Q23. At which stage of the design and construction process did you become actively involved with the Savings By Design Representative? **(READ LIST)**

01 Project Conception
02 Project Development Phase
03 Schematic Design Phase
04 Design Development Phase
05 Construction Documents Phase
06 During Construction
07 Following Completion of Construction
08 Following Facility Occupancy
50 Other: ___________
98 DK
99 Refused

Q24. Which member of your project team, including yourself, was the single biggest advocate for participating in the program? **DO NOT PROMPT, ACCEPT ONLY ONE RESPONSE**

01 Owner/Developer
02 Architect

03 Lighting Designer
04 Electrical Engineer
05 Mechanical Engineer
06 Energy Manager
07 Manufacturer Rep.
06 Construction Manager
50 Other: ___________
98 DK
99 Refused

Q25. How important was the dollar incentive paid to the owner, in motivating the organization to participate in the SBD program?

01 Very important
02 Somewhat important
03 Neither important nor unimportant
04 Somewhat unimportant
05 Very unimportant
98 DK
99 Refused

Design assistance is available to building owners and their design teams and typically includes recommendations for efficient equipment and consultation on enhanced design strategies. Design analysis is typically computer simulations to estimate building energy savings for energy conservation measures being considered. A goal of design assistance is to provide building owners with the tools and skills to apply on future projects

Q26. How important was the design assistance and design analysis provided by SBD in motivating your organization to participate in the SBD program?

01 Very important
02 Somewhat important
03 Neither important nor unimportant
04 Somewhat Unimportant
05 Very Unimportant
98 DK
99 Refused

Q27. Has participation in any component of SBD influenced you to change your standard building practice that would lead to more energy efficient buildings in the future?

01 Yes
02 No, Why? (Skip to Q29)

98 DK (Skip to Q29 and ask who would know and get their name and phone)
Name:_____________________
99 Refused (Skip to Q29) **Phone:**_____________________

Why:____

Q28. What changes have you made, or do you foresee making, to your standard practice that would lead to a more energy efficient building design?

Record Answer Verbatim:____

Q29. On a scale of 1 to 5, with 1 being very valuable and 5 being not at all valuable, how would you rate the value of the following SBD components for this project?

	Rating	DK	NA (Not Provided)	
a. Incentive	1 2 3 4 5	98	99	100
b. Design Assistance	1 2 3 4 5	98	99	100
c. Design Analysis	1 2 3 4 5	98	99	100

Read:

"Either you or another member of the design team can answer the next questions. As I read through these questions, If you feel someone else is more qualified to respond please specify whom that person is."

Q30. Did this building use a set of prototype plans?

01 Yes (Skip to Prototype Module)
02 No
98 DK
99 Refused

The following questions address the influence of the Savings By Design program on specific measures. Please bear in mind that when we refer to Savings By Design, we mean all aspects of the program; financial incentives, design assistance, design analysis or any other interaction with SBD representatives or consultants.

ASK THESE 3 QUESTIONS FOR EACH MEASURE LISTED, RECORD RESPONSES ON THE BELOW MATRIX

Q31. How influential was the Savings By Design, including the incentives, design assistance, design analysis and interactions with SBD representatives and consultants in the implementation of «MeasDesc1»?

READ LIST

1 = Very Influential 1 point

2 = Somewhat Influential 0.5 point

3 = Slightly or minimally Influential 0.25 point

4 = Not at all Influential 0 point

Q31.1 Measure#( )
Q31_4____

Q31.1 Measure#( )
Q31_4____

Q31.1 Measure#( )
Q31_4____

Q31.1 Measure#( )
Q31_4____

Q31.1 Measure#( )
Q31_4____

Q31.1 Measure#( )
Q31_4____

Q31.1 Measure#( )
Q31_4____

Q32. How did Savings By Design influence the implementation of ***<<the measure>>*** (choose all that apply) (**maximum of 2 points**)

DO NOT PROMPT

1 = SBD had no influence on this measure **0 point**

2 = SBD representative first suggested/introduced measure **2 points**

3 = SBD performed simulations and/or design analysis **2 points**

4 = SBD incentive made this measure an "easier sell" **1 point**

5 = SBD incentive helped the measure meet investment criteria **2 points**

6 = Prior SBD projects have had success with this measure **1 points**

7 = DK, Not Certain, Can't Remember **0 points**

50= other **individually assessed**

Q32_50____

Q32_50____

Q32_50____

Q33. If you had no interaction with Savings By Design regarding this project, ***<<the measure>>….***

READ LIST

1 = Definitely would not have been installed (ask Why)

3 points

2 = Probably would not have been installed (ask Why)

2 points

3 = Probably would have been installed (ask Why)

1 point

4 = Would have been installed exactly the same (ask Why)

0 points

5 = Would have been installed with less efficient equipment and/or materials (ask Why)

2 points

98 = DK, Not certain

1 point

#	**Measure**	**Q31**	Error! Reference source not found.	Error! Reference source not found.	Error! Reference source not found.**=4, Why?**
1	«MeasDesc1» ---- «MeasDetail1»				
2	«MeasDesc2» ---- «MeasDetail2»				
3	«MeasDesc3» **----** «MeasDetail3»				
4	«MeasDesc4» **----** «MeasDetail4»				
5	«MeasDesc5» **----** «MeasDetail5»				
6	«MeasDesc6» **----** «MeasDesc6»				
7	«MeasDesc7» **----** «MeasDetail7»				
8	«MeasDesc8» **----** «MeasDetail8»				
9	«MeasDesc9» **----**				

	«MeasDetail9»				
10	«MeasDesc10» **----** «MeasDetail10»				

Q33_Why? (Ask for each Measure that gets a 1,2 3, or 5 for** Error! Reference source not found.**)

Why? (Ask for each Measure that gets a 1,2 3, or 5 for** Error! Reference source not found.**)

Measure#(__)____ ______________________Measure#(__)_____________________________________ ____Measure#(__)________________ ____Measur e#(__)____ ________________

Q33_4 Why? (Ask for each Measure that gets a 4 for Error! Reference source not found.**)**

DO NOT PROMPT

1. *As a result of what was learned through previous SBD program participation **(2 points)***
2. *As a result of what was learned in past utility efficiency programs, (0 points)*
3. *Because it is our standard practice (0 points)*
4. *Because we have had positive prior experience with the same measure (0 points)*
5. *Because we would have funded design analysis through the project budget (0 points)*
6. *Measure already met financial criteria without the program incentive (0 points)*
7. *Other____(individually assessed)*

Q34. Mitigating factors scoring documented by surveyor, or project file reviewer.

Measure#(__) FR Score ____; Surveyor or Project file reviewer ______; Project Manager _______; Date _____

Explanation:

____ ___________

____ ______________________

Measure#(__) FR Score ____; Surveyor or Project file reviewer ______; Project Manager _______; Date _____

Explanation:

____ ___________

____ ______________________

Measure#(__) FR Score ____; Surveyor or Project file reviewer ______; Project Manager _______; Date _____

Explanation:

____
____

____
____

Measure#(__) FR Score ____; Surveyor or Project file reviewer ______; Project Manager _______; Date _____

Explanation:

____
____

____
____

Q35. If any, what recommendations would you have to change the SBD program to improve its delivery to customers such as yourself?

01 No changes needed
02 Utility reps need to present benefits more clearly
03 Increase incentives
04 More marketing to increase awareness of program
05 Review and response from utility needs to be more timely
06 More interaction with design team
07 Utilities should try to get involved earlier in projects
08 Less paperwork and red tape
09 Increase post project feedback, better “closure”
50 Other: ____
98 DK
99 Refused

Ask following question only if respondent could not answer any of the measures questions above.

Q36. Could you give me the name and number of the following members of the project design team? **Please indicate who the lead was on the project*. Thank you, this concludes our interview. Do you have any questions before we finish?***

Construction Manager Name:_________________________

Company: _________________________ Phone**: (_____)**________**-**___________

Architect Name:________________

Company: ________________ Phone**: (_____)**________**-**___________

Engineer Name: _________________________ Company: _________________________

Phone**: (_____)**________**-**___________

Additional Notes:

PROTOTYPE MODULE

Q37. At any time, was Savings by Design actively involved with design assistance or design analysis in the development, refinement and/or enhancement of the prototype plans used for this project?

01 Yes, Subjective check
02 No
98 DK Get Name/number of the person who would:

Name___________________________ Phone_________________________

Q38. Were future SBD incentives an important consideration in the development, refinement and/or enhancement of the prototype plans used for this project? (Subjective check)

01 Yes
02 No
98 DK Get Name/number of the person who would:

Name___________________________ Phone__________________________

The following questions address the influence of the Savings by Design program on specific measures. Please bear in mind that when we refer to Savings by Design, we mean all aspects of the program; financial incentives, design assistance, design analysis or any other interaction with SBD representatives or consultants.

ASK THESE 3 QUESTIONS FOR EACH MEASURE LISTED, RECORD RESPONSES ON THE BELOW MATRIX

Q39. How influential was the Savings by Design program in the inclusion of ***<<the measure>>*** in the prototype plans

1 = Very Influential 1 points
2 = Somewhat Influential .5 point
3 = Slightly or minimally Influential .25 points
4 = Not at all Influential 0 points

Q40. How did Savings by Design influence the implementation of ***<<the measure>>*** in the prototype plans (choose all that apply) (**maximum 2 points**)

1 = SBD had no influence on this measure 0 points
2 = SBD representative first suggested/introduced measure 2 points
3 = SBD performed simulations and/or design analysis 2 points
4 = SBD incentive made this measure an "easier sell" 1 points
5 = SBD incentive helped the measure meet investment criteria 2 points
6 = Prior SBD projects have had success with this measure 1 points
7 = DK/Not Sure (Are we talking to right person?) 0 points
50 = other____ Individually assessed

Q41. If you had no interaction on this project, or on previous projects with Savings by Design regarding these prototype plans**_<<the measure>>_**

1 = Definitely would not have been included in the prototype plans (ask why) 3 points

2 = Probably would not have been installed (ask why) 2 points

3 = Probably would have been installed (ask why) 1 points

4 = Would have been installed exactly the same (ask why) 0 points

5 =Would have been included but with less efficient equipment and/or materials (ask why) 2 points

98 = DK, Not certain 1 points

#	Measure	Q39	Q40	Q41	Q41= 4,Why?
1	«MeasDesc1» ---- «MeasDetail1»				
2	«MeasDesc2» ---- «MeasDetail2»				
3	«MeasDesc3» ---- «MeasDetail3»				
4	«MeasDesc4» ---- «MeasDetail4»				
5	«MeasDesc6» ---- «MeasDetail5»				
6	«MeasDesc6» ---- «MeasDetail6»				
7	«MeasDesc7» ---- «MeasDetail7»				
8	«MeasDesc8» ---- «MeasDesc7»				
9	«MeasDesc9» ---- «MeasDetail9»				
10	«MeasDesc10» ---- «MeasDetail10»				

Why? (Ask for each Measure that gets a 1,2 3, or 5 for Q41)

Measure#(__)____
______________________Measure#(__)____
____Measure#(__)_____________________
____Measur
e#(__)____
____

Measure#(__)____
____
____

Why? (Ask for each Measure that gets a 4 for Q41)

DO NOT PROMPT

1.As a result of what was learned through previous SBD program participation ***(2 points)***

2. As a result of what was learned in past utility efficiency programs, (0 points)

3. Because it is our standard practice (0 points)

4. Because we have had positive prior experience with the same measure (0 points)

5. Because we would have funded design analysis through the project budget (0 points)

6. Measure already met financial criteria without the program incentive (0 points)

7. Other____(individually assessed)

Q42. Mitigating factors scoring documented by surveyor, or project file reviewer.

Measure#(__) FR Score ____; Surveyor or Project file reviewer ______; Project Manager _______; Date _____

Explanation:

____
____

____
____

Measure#(__) FR Score ____; Surveyor or Project file reviewer ______; Project Manager _______; Date _____

Explanation:

____
____

____
____

Measure#(__) FR Score ____; Surveyor or Project file reviewer ______; Project Manager _______; Date _____

Explanation:

____
____

____

Measure#(__) FR Score ____; Surveyor or Project file reviewer ______; Project Manager _______; Date _____

Explanation:

____

Why? (Ask for each Measure that receives a 4 for Q41)

1. *As a result of what was learned in past utility efficiency programs, (1 point)*
2. *Because it is our standard practice (0 points)*
3. *As a result of what was learned in this program (2 points)*
4. *Because this quality of facility is desired again (0 points)*

50. *Other____(ind. assessed)*

Q43. Approximately how many buildings in California have you built using this prototype?

01 1 (Skip to Q45)
02 2-5
03 5-10
04 More than 10
98 DK

Q44. Can you recall the approximate percentage of buildings for which you received, or will receive, a SBD incentive?

01 ____%
02 All
98 DK

Q45. Would you have still participated in SBD if the CA utilities had limited you to receive an incentive for only one building that was built using this prototype?

01 Yes
02 No, why?
98 DK

Q46. Can you recall what energy efficiency improvements were made to the prototype based on your involvement in SBD? (Have measure info ready to discuss if need be)

____

Would you participate in the SBD program in the future to further improve the efficiency of your prototype construction plans?

Q47. If only one prototype project would be eligible for an incentive?

01 Yes (skip to Q51)
02 No
03 Maybe
98 DK

Q48. If all buildings constructed using the prototype were eligible for incentives?

01 Yes (skip to Q50)
02 No
03 Maybe
98 DK

Q49. Please explain why you would not participate again?

____
____
______________________________ (Skip to Q51)

Q50. Please explain why you would not participate for only one incentive?

____
____
____
____

Q51. Would you please rate your overall satisfaction with the assistance you were provided by «utility» in the development of your prototype plans?

01 Very satisfied
02 Satisfied
03 Neutral
04 Dissatisfied, why
05 Very dissatisfied, why

WHY____
____
____
____

Q52. If any, what recommendations would you have to change the SBD program to improve its delivery to customers such as yourself?

No changes needed

Utility reps need to present benefits more clearly

Increase incentives

More marketing to increase awareness of program

Review and response from utility needs to be more timely

More interaction with design team

Utilities should try to get involved earlier in projects

Less paperwork and red tape

Increase post project feedback, better "closure"

Other: ____

98 DK

99 Refused

Thank you, this concludes our interview. Do you have any questions before we finish?

Appendix E: Complete Verbatim Responses

Participant Complete Responses

Q14: Complete Participant Responses (How/why asked design team to go beyond Title 24)
Yes, we did go beyond Title-24 by incorporating premium efficient motors with VFD's, lighting controls, and reflective roofs. This is one of the most energy efficient buildings in history of Amgen.
Yes, there was some analysis and modest changes only on the rebated measures: lighting and HVAC.
Yes, primarily the cooling loads were of concern. Needed to keep it in line, prevent excessive use; energy costs are high, so we needed to optimize energy efficiency.
With energy rates so high in California, we knew it was important to design an efficient building. SCE helped us achieve that by improving our HVAC & lighting.
With energy rates so high in California we knew it was important to design an efficient building because of the utility rates are so high. SCE helped us formulate a design for lighting, HVAC, skylights and roof top coatings.
We were trying to achieve 25% better than Title 24; the systems we worked on to achieve this were lighting, glazing and HVAC.
We went to PG&E so that we could meet the minimum requirements to qualify for the SBD program. After we found out what those requirements were, we told the design team to incorporate them.
We wanted to do better than Title-24 by incorporating energy-efficient lighting fixtures with occupancy sensors and timers.
We wanted dimmable ballasts on our lights to capture natural daylight, high efficiency refrigeration compressors, and improved HVAC system.
We tried to make the building as energy efficient as we could by installing efficient lighting and improved insulation.
We told them to incorporate energy efficient features that were effective in saving energy but not too costly. These discussions on energy efficiency came after our meetings with PG&E.
We specifically requested high performance lighting and VSD on cooling pumps.
We researched the HP ratings. Sizing the equipment was done by the design team.
We may have looked at being LEED compliant.
We looked at windows, glazing, and lighting sensors.
We looked at improving the efficiency of the lighting, HVAC and primarily refrigeration.
We have ten buildings on this campus that are similar and there is a significant amount of glass. Glazing options were fully reviewed & studied in addition to other energy efficiency building characteristics.
We had them take a look at glazing, HVAC systems, and insulation.
We ask our design teams to build with operational savings in mind.

Q14: Complete Participant Responses (How/why asked design team to go beyond Title 24)
We are constantly looking at new methods to save energy. The main systems we are concerned with are lighting, HVAC and refrigeration.
We always do, we design our buildings with premium efficiency motors, high EER on the AC, T-8 lighting and EMS on the floating suction pressure controls.
Tough to say, our requirements were to exceed Title 24. We increased the qty of skylights, increased insulation to reduce HVAC load added, economizers, and used 4-10A ozone friendly refrigerant T-5 lighting in showrooms.
To be as energy efficient as possible and attain the lowest lifecycle cost.
They are required under the Federal BOP standards to look at energy efficiency opportunities.
There was a lot of discussion on the performance and savings to be acquired by HVAC systems.
The energy systems that were of great importance include refrigeration, lighting and the conveyors.
The design team was told to develop the building under the CHPS (collaborative for high performance schools) criteria.
Refrigeration does not fall under Title 24 requirements.
Our projects nationwide are designed to exceed the standards in CA for T 24 and are generally somewhat better than code. We concentrate on thicker insulation, high efficiency roof-top units and efficient lighting.
Our project was being designed during the energy crisis so we not only explored options for energy efficiency measure but we also look at alternate power sources such as PV or micro-turbines.
Our maintenance staff is now more involved with designing the ventilation and lighting controls.
Our main considerations were control mechanisms to shut off lighting and AC. We installed sensors, timers, and door controls where the system (AC) would shut off as soon as the door was opened.
Our company specializes in developing building automation systems. At any point we could curb our usage through settings on our VAV. We also take advantage of daylight harvesting. These are just a few components we incorporated into our design.
LPD, Day-lighting controls and advanced design refrigeration system.
Learning environment and the CHPS model drives the criterion.
It is standard to examine skylights and energy efficient rooftop units
It is pretty standard to examine skylights and energy efficient rooftop units
In an ASHRE conference and in their workshops we learned about the benefits of using VFD on all motors, pumps & fans. We instructed the dt to design the chiller plant with this new idea.
I believe we did discuss energy efficiency beyond Title 24, but nothing was incorporated that did not meet our return on investment criteria.
HVAC & lighting were the two main criteria discussed.
Heat recovery efficiency, VFD on motors, and water-cooled chilling system.

Q14: Complete Participant Responses (How/why asked design team to go beyond Title 24)
Energy efficiency was the subject of many meetings with the design team not sure of the specifics.
DES Architects evaluated all the energy efficiency possibilities. Glazing was fully reviewed & studied as the building has a significant amount of glass.
Can't recall the specifics but everyone wants to do better than T 24, (as much as they can afford).
Because the building is for the most part unoccupied, lighting levels became a big part. We wanted to use as much natural lighting as possible. We also discussed VSD on air compressor but the payback was too long.
"What we did as far as lighting levels was to go to dimmable ballasts w/ FL and some of the fixtures were custom made".
"To save money on the life of the building".
"To look at the most cost effective measures, things that we would consider included windows, insulation, lighting and the mechanical system".
"In the RFP we asked them to look at energy efficiency for the entire project including HVAC, lighting and thermal comfort".

Q15: Complete Participant Responses (Energy efficiency downgraded by value engineering)
There was competitive bidding but energy efficiency features were not compromised.
The chillers that were installed are a different make & model from the original specified. Boilers were also different from the spec.
Engineering was also of value here, for example our lumen monitoring system was disabled and down-graded.
Changing out the HVAC improved the performance. We did change out some of the 500W lights and converted from 120V to 110V.
Added more HP motors, to increase the fan size for pumping more H20 to the top of the building. Change order on the surgical lighting.

Q21: Other Participant Responses (How first aware of SBD)
Called SCE searching for incentive program.
Called PG&E

Q24: Other Participant Responses (Biggest advocate)
The representative of the major tenant
Refrigeration Specialist CommAir
Both mechanical engineer & owner were advocates.

Q27: Complete Participant Responses (SBD influence to standard building practice)
We think our design team is cutting-edge and they build the most efficient buildings possible.
We have already changed our practice. We don’t envision additional changes.
We had already specified energy-efficiency components in our prototype design absent of the program. When a representative contacted us about the program they determined that our specifications were better than code and qualified for incentives.
We already had energy efficiency in our design. It is part of our standard practice.
They didn't play a part in the building design.
They already had energy-efficient guidelines.
The college isn't going to build anything for a long while so it's hard to foresee what we might do on future projects.
The {organization’s} standards influence our design standards, these buildings don't have to meet Title 24. This was a unique project, so we would not be designing something like this usually.
Possible. It is more complicated
Not sure, we don't plan on developing any projects.
General Efficiency Focus.
Couldn't justify the cost of EMS without incentive

Q28: Complete Participant Responses (Changes to Standard Practice)
With our new buildings we have increased the maintenance staff involvement and input to be a part of the design process. We are also looking at putting in a Novar EMS.
We've changed our lighting fixtures by improving the luminaire and the ballast factor has been reduced to 0.78 from 0.88 BF. We also improved the HVAC packaged rooftop units to a higher EER and included economizers where applicable.
We'll look at LEED options as opposed to Title-24.
We would go through the same process of relying on SBD and our design team if we were to build a similar project.
We would go through the same process and see where we could improve our design. We would probably implement the lighting timers and sensors.
We would be more apt to review the benefits of incorporating natural lighting.
We try to exceed Title 24 by 20% we achieve this by installing increased insulation, glazing and higher efficiency HVAC system.
We start our projects with the basic requirements and improve them over time by gathering input from utilities and the design team. Some of the features we like to use are high performance glazing & better lab controls with variable capabilities.
We modified some of the lighting, HVAC controls, low-e coating and added programmable T-stats.

Q28: Complete Participant Responses (Changes to Standard Practice)
In the future, we will also work with PG&E to try and capture all future developments in the program.
We improved the refrigeration compressor motors and high efficiency HVAC.
We improved lighting and control systems, dropped insulated ceilings, and added energy efficient air conditioning with controls.
We have begun to incorporate oversized condensors, floating head pressure and floating suction pressure into our design.
We are trying to stay on top of the new information by attending seminars on energy efficiency; this has helped improve our designs.
We always incorporate energy efficiency into our design for various reasons, including return on investment and business objectives. We know that daylight harvesting improves test scores in schools.
Using HVAC systems with high SEER rating and incorporating Energy Mangement Systems.
Using energy efficient lighting wasn't something we had done in the past. We are not only putting in efficient lighting in new construction but also renovating existing buildings. Air handlers for HVAC we make sure they are always high performance w/ VFD.
Unsure of specifics, depends on the application. The types of buildings we build are typically big energy users, so we would be concerned with all of the building characteristics.
To incorporate day-lighting controls.
They have influenced us to include VFD, the other measures are pretty much standard practice.
They (SBD, Vacom) have helped us make decisions about incorporating energy efficient equipment. We have gone to high performance condensors with lower RPM fan motors, changed condensor control strategies and eliminated some refrigerant case lighting.
There were not a lot of changes that needed to be made from our original specifications. We exceeded T 24 where we could afford. The T-5 lighting was new to us and something we would do again on future projects.
The program helped us justify the use of EMS, additionally, we will continue to implement T-8 lighting in the office areas.
The program has had some influence but there are many factors to consider and our primary concern is security. We obviously want to be good stewards of taxpayer money but no one has taken a look at how our designs have changed as a result of the SBD.
The program does have an influence on us by providing feedback on ROI & payback for energy efficiency features. As the design team we become more informed on how to design more efficient buildings. SBD's past experiences help us enhance future designs.
The one thing we learned from participating was the value of saving money over the life of the building by incorporating timers, which we will include in future projects.
The mechanical zoning system could have had a better design because it's all on or all off which is a big waste of energy. Title 24 lighting code required some areas, hallways etc., to be always on, in the future we would install more efficient fixtures.
The mechanical zoning could have better because it is always on or always off. T 24 code required

Q28: Complete Participant Responses (Changes to Standard Practice)
"always on" fixtures that could have been more efficient.
Skylights; without Savings By Design having shown us the savings, we would not have gone ahead and installed them.
Selection of equipment specifically HVAC would be more efficient.
Refrigeration is 95% of the load at this facility so we changed the EMS control strategies on the evaporative fans, now they are more efficient. We can reduce the load by 3qtrs when we are not in operation.
Over the course of the last few years this program has played a role in improving our building designs from day-lighting to supermarket refrigeration.
Our district priorities are to improve test scores, to achieve a reasonable ROI and it's our business objective to design efficient buildings. Are prototype is already 30% better than Title-24 there isn't much else that can be done.
On the next project we will include VFDs on the pumps, cooling tower, chillers and air handlers.
On future projects, we would install high performance lighting and HVAC systems.
None.
More use of natural lighting, energy efficient lighting fixtures, and different types of material on insulation.
Measures incorporated as a result of the program (respondent Doug Scott at Vacom) Variable set-point control strategy on the floating head pressure controls, and high efficiency display case motors.
Looking at energy efficient lighting.
It has impacted us on incorporating new ideas; we consider the design process as an evolving process. The program has specifically influenced the installation of VFDs on motors that we probably wouldn't have done otherwise.
It has caused us to explore more energy efficient designs for HVAC systems.
Incorporating EMS (PLC controlled system) energy efficient lighting and refrigeration.
Incorporating a computerized energy management system t to control pumps that typically run 24/7.
Including timers on our lighting system.
Incentives helped us to practice more energy efficient designs. It is our goal (design team) to beat Title 24 on every project.
Improved lighting is something we are trying to promote on our existing buildings along with improved insulation.
If we were to develop another building we would get involved with SBD earlier, during project conception, and we would reduce the quantity of lighting fixtures.
How we approach new or renovated buildings has changed; we strive to exceed Title 24 where we can and where there is a reasonable payback.
Energy efficiency is a standard practice.

Q28: Complete Participant Responses (Changes to Standard Practice)
During the time of this project, the SBD program didn't have a lot of influence on our design. Over the last few years, they have influenced us on VFD and other components.
CO measure as standard practice.
Changes we'll make are to go with a more efficient lighting system. Better insulation and incorporating energy management systems.
Both AC & lighting will be important considerations on future projects.
Better lighting design that would incorporate fewer fixtures. More flexible HVAC system and more VAV sources to get heating or cooling to needed areas and cut back in areas that don't need HVAC.
As the owners became cognizant of LEED compliance or certification, high performance glazing became a minimum requirement.
As a result of the program we have specified oversized evaporative condensors, automatic control system, on all fans we have VSD and we have included floating head pressure.
"The program makes people more conscious of building energy efficiency projects".
"Not sure of the specific details we would change in the future. There is a general concern about energy efficient characteristics".

Q35: Complete Participant Responses (Other Recommended Changes)
When power is established at the site they should update people on this program.
We felt that some of their suggestions and their thresholds were unreasonable without a cost-benefit analysis (systems approach). From our assessment the (AC units) were too expensive to justify the increased cost relative to the savings.
Streamline the process and improve the turnaround on the application process.
Simplify application so owners can fill it out. We had a difficult time understanding the terms, owners need to be able to fill this out and we are not engineers.
Savings by Design should look at cold storage doors
On a previous project the DT received a lrg incentive than we did which we don't think is right. Some questions we have are as an end user how do we get the most out of the program. We also wanted to know what we missed. There is no design check list.
More market research on new technologies.
Methodology needs to be explained better for some of the measures as to why they are a good practice. The utility reps also need to present benefits more uniformly we get a lot of different information depending on who we talk to.
Lower the standards for qualifying design teams.
It would extremely helpful to give incentives during the design rather than the installation so the initial capital cost could be quickly recovered. And if the measures weren't installed than of course we would return the money.

Q35: Complete Participant Responses (Other Recommended Changes)
"A lot of our clients are hesitant to participate in the program because it takes too long to get the check and they (utilities) are too picky when they verify measures.

Q45: Complete Participant Responses (Why wouldn't participate for only one prototype building)
We probably would not have produced as many buildings using this prototype with only one incentive.
We need the incentive on each project to pay for the high performance measures.
We need the incentive for each project to install most of the measures. We wouldn't achieve our payback without the incentive, especially on lighting.
There is a lot of extra work to coordinate SBD requirements if we could get incentives for all the projects we wouldn't participate.
Our construction process is constantly evolving overtime through input from SBD. Our designs are not project-by-project but prototypes so it would be worth the effort for just one project.

Q46: Complete Participant Responses (Prototype improvements based on SBD involvement)
Yes, prototype changed to include skylights (on PG&E and future developments none of the SCE sites in sample).
VFD's on Chiller.
VFDs added
The two projects that were awarded SBD incentives were about the same; we did not change the HVAC or lighting.
The only real changes were including VFD to the motors.
None, no influence, this project was one of the first using this prototype. All of our projects are going to exceed T-24. One of the representatives heard about our project we submitted plans and our spec's meet program qualifications.
Including VFD on our motors.
In addition to lighting we discussed the benefits of including shade trees around the outside of the building, we looked at construction elevation and slanting the roof to reflect heat and adjusted, tillted the overhangs by about 6'.
Higher efficient HVAC equipment.
Don't Recall.
Don't know cannot recall.
Don't know
Can't recall

Q46: Complete Participant Responses (Prototype improvements based on SBD involvement)
"Glazing, insulation factors, green building stuff, thermal mass - masonry block walls in gymnasium."

Q50: Complete Participant Responses (Why wouldn't participate for only one incentive on prototype design)
With the amount of time spent developing the prototype the projects would not be financially feasible without the incentives.
We would implement the energy efficient measure on the prototype project. But we would not do this on the other projects if they didn't receive an incentive because they would not meet to the 2 yr payback criterion.
The energy rates are so high in CA this becomes a motivating factor. We would probably participate but we might not install all of the measures mainly skylights.
Payback wouldn't be achieved. We would consider the benefits of the lighting but not the other measures.
Our construction process is constantly evolving overtime through input from SBD. Our designs are not project-by-project but prototypes, so it would be worth the effort for just one project.

Non-Participant Complete Responses

NPQ14: Complete Non-Participant Responses (How/why asked design team to go beyond Title24)
We wanted PG&E rebates and extra money we could get.
They use "canned" specs.
They requested the designers give them options.
The volume of this building was of concern so we asked for zones.
The priorities were security, then efficiency.
The HVAC system is always specific for high efficiency. We also requested motion sensors and EMS to control the HVAC units.
Requested day-lighting to reduce light load.
Our team attended a seminar at the PEC and came to us with 3-4 methods to design an efficient building.
Not applicable.
My guess is no but we have achieved an efficient lighting by painting all the walls white so the light reflects and we can alternate the corridor fixtures.
Money was the biggest issue.
Longevity of equipment and being better than Title-24 within our limited budget.

NPQ14: Complete Non-Participant Responses (How/why asked design team to go beyond Title24)
Federal building, so Title 24 was not applicable.
Built from another plan and was site-adapted. The original plan was Sunny Hills HS in Fresno.
Asked for the best they could afford.
Asked for day-lighting and the natural air flow (circulation).
All energy efficient.
Typically HVAC exceeds--it is standard operating procedure.

NPQ15: Complete Non-Participant Responses (Energy efficiency downgraded by value engineering)
We modeled our building after another building using CALWALL--but it got Ved out and we used another design.
There may have been through competitive bidding. The architect would know about that.
The PV had to be eliminated, but we got the windows and airflow.
The contractor didn't deliver on the skylights.
Refrigerator's compressor motors.
Probably yes, the project was on a tight budget I suspect the mechanical system was value engineered.
Don't know that energy efficiency was compromised but there was some value engineering on the AC system.
All the systems went through competitive bidding but energy efficiency was not compromised.

NPQ20: Non-Participant Complete Responses (Reasons for not participating)
Would participate if it made sense.
Well, because we chose to do SBD with another school. We were supposed to also participate with this one too.
We missed the opportunity to dial it in during the design process. It was site-adapted from another school in Fresno.
Time constraints were the biggest reasons. We needed to proceed as quickly as possible and we would have had to back into it; we just needed to proceed.
This was a fast track project and we were not thoroughly aware of the entire process we suspected including them would slow down the development.
This project was expected to be a SBD recipient but the utilities changed their requirements so it no

NPQ20: Non-Participant Complete Responses (Reasons for not participating)
longer qualified. Our managers didn't alter the design but we have pursued SBD for other projects since this one.
They've got a formula that has worked for them in the past.
The time constraints--they were on a fast track schedule--they were largely working out of state and the design was 90% complete.
The architects. We tried and most of it is influenced by the savings deal. The uniqueness of the theater lighting was a problem.
The architects have to stick to the plan that comes from the architectural team in Salt Lake City. They are all cookie cutter.
Subject was considered, (design team), isn't sure why it wasn't pursued.
Not aware of the program.
It was mentioned at the pre-design conference. It was not pursued because of cost. The value in the payback wasn't there because of the amount of time we would have had to spend.
It was considered but the effort to submit the plans and go through the process would have cost more than we would have received from the incentive. Incentive was not significant enough to pursue.
I was never aware of it.
I suspect my predecessors were vaguely aware of the program but not enough to put it work.
I remember discussing SBD with SDG&E but after our meeting we figured that various BOC requirements would prohibit us from meeting SBD requirements. Problems included insulation, LPD & the glass had to be bullet proof.
I believe the project didn't qualify for what we specified.
I asked my architect, but they never followed through to get me involved.
(Electrical Engineer) We made it clear to the Port that the building would comply with the program and they could pursue the incentives. But, they showed no interest and there was no budget for us to assist in pursuing the incentives.
(Architect Resp) There was no compensation to pursue the programs and the follow through with SBD suggestions. Construction schedule was tight. And schools look for a short payback for their investments which wouldn't have been possible.

NPQ21: Complete Non-Participant Responses (Design team interaction with SBD or utility's New Construction program representative)
We spoke to the SBD rep and determined the program qualifications but they had no influence on design and equipment specifications.
We met with the rep, submitted the application and gave them the plans, I don't know what happened.

NPQ21: Complete Non-Participant Responses (Design team interaction with SBD or utility's New Construction program representative)
We incorporate efficiency as much as is financially reasonable.
We discussed the project with SDG&E but we had to prioritize the {organization} requirements and their requirements the building wouldn't comply.
This project made it to the pre-commitment phase but SBD program managers changed their requirements therefore the project no longer qualified.
The SBD program was mentioned at the pre-design conference--that was the last of it.
The manufactures reps & mechanical engineer came up wit 4 options and communicated them.
The architect would know. (I called the architect and he said he had no interaction with SBD [kra]).
{Name} (EE) met with the reps from SBD.
Our design team at the time of construction on this project wasn't aware of the program since. However our recent development will be a participant in SBD.
Not sure if they meet with them.
Not for this one.
No, but Colombo Construction would know.
It was too much of a nightmare. Three times we submitted plans and they were rejected. There are communication problems at Edison.
It was just thrown out at the pre-design meeting by Rene Quinones who was the DEH person on New Projects in Master Planning.
Energy wasn't an issue due to budget constraints.
Building was mandated by the City of Oakland to be LEED complaint but we don't know why the developer didn't pursue SBD.

Appendix F: MBSS

Model based statistical sampling was used to design the BEA sample and to extrapolate the findings to the population. MBSS is a statistical methodology for studying a large population by collecting data in a carefully selected sample. MBSS builds on conventional finite population sampling theory, but MBSS goes beyond the standard theory. The idea behind model-based statistics is that there is a relationship between the variable of interest – in this case, measured kWh savings – and a variable that is known for the entire population – program estimate of savings. Using this prior information allows for greater precision with a given sample size because the prior information eliminates some statistical uncertainty. The sample design section of the report contains additional references to MBSS methods. Additional information on the theoretical foundations of MBSS can be provided upon request. The remainder of this section describes the files used in the extrapolations.

Energy Results

The energy results generated by each set of pop, sam, and cmd files are described below.

npbarkwh	Non-participant as-built energy savings results
partallkwh	Participant as-built energy savings results by utility, all equipment, whole building savings for performance projects not disaggregated into end uses
partmokwh	Participant as-built energy savings results by utility, measures only, whole building savings for performance projects not disaggregated into end uses
partallbarkwh	Participant as-built energy savings results by utility, all equipment, whole building savings for performance projects disaggregated into end uses

Table 30: Energy Results - Gross Savings Result

freeallkwh	Participant net energy savings results by utility, all equipment , whole building savings for performance projects *not* disaggregated into end uses
freeallbarkwh	Participant net energy savings results by utility, all equipment, whole building savings for performance projects disaggregated into end uses
freemokwh	Participant net energy savings results by utility, measures only, whole building savings for performance projects *not* disaggregated into end uses
spillSRkwh	Non-participant spillover energy results self-report methodology

Table 31: Energy Results - Net Savings

Demand Results

The demand results generated by each set of pop, sam, and cmd files are described below.

npbarpkw	Non-participant as-built demand reduction results
partallpkw	Participant as-built demand reduction results by utility, all equipment, whole building savings for performance projects *not* disaggregated into end uses
partmopkw	Participant as-built demand reduction results by utility, measures only, whole building savings for performance projects *not* disaggregated into end uses
partallbarpkw	Participant as-built demand reduction results by utility, all equipment, whole building savings for performance projects disaggregated into end uses

Table 32: Demand Results – Gross Savings

freeallpkw	Participant net demand reduction results by utility, all equipment, whole building savings for performance projects *not* disaggregated into end uses
freeallbarpkw	Participant net demand reduction results by utility, all equipment, whole building savings for performance projects disaggregated into end uses
freemokwh	Participant net demand reduction results by utility, measures only, whole building savings for performance projects *not* disaggregated into end uses
spillSRpkw	Non-participant demand reduction spillover results, self-report methodology

Table 33: Demand Results – Net Savings

Appendix G: Related Programs

National Energy Efficiency Programs

The following is a partial list of national organizations and programs that promote energy efficient new construction.

Rebuild America

Rebuild America is a national program supported by the US Department of Energy.[1] Rebuild America is a growing network of community-driven voluntary partnerships that foster energy efficiency and renewable energy in commercial, government and public-housing buildings. At the federal level, it is the largest, most established technology deployment program within DOE's Office of Energy Efficiency and Renewable Energy (EERE).

The program's goals are to: conserve energy, accelerate use of the best energy technologies, save money, reduce air pollution, lower U.S. reliance on energy imports, help revitalize aging city and town neighborhoods, and create "smart energy" jobs.

Rebuild America works to overcome market barriers that inhibit use of the best technologies. Building owners and managers in both the public and private sectors often lack knowledge of the best technologies, financing mechanisms, savings potential and other benefits. To break down these barriers, the program:

- Spreads knowledge
- Develops projects to stimulate market change
- Provides analyses and advice in support of the best technologies
- Networks with state and local governments and the private sector

The energy consumption of most buildings can be cut 25 percent through retrofits and better operation. New construction, too, benefits from energy-efficient designs, effective commissioning and smart operations.

LEED

The LEED® (Leadership in Energy and Environmental Design) Green Building Rating System™, developed by the USGBC, is the only nationally recognized green building rating system. LEED evaluates the performance of buildings from a "whole building" perspective, over the course of a building's life-cycle, which provides a definitive standard for what constitutes a green building.

The LEED system is a feature-oriented rating system where credits are earned for satisfying specified green building criteria. Certified, Silver, Gold, and Platinum levels of green building certification are awarded based on the total credits earned. The LEED standard has been adopted nationwide by federal agencies, state and local governments, and interested private companies as the guideline for sustainable building.

[1] http://www.rebuild.org/index.asp

USGB

The U.S. Green Building Council is the nation's leading coalition of corporations, builders, universities, government agencies, and non-profit organizations working together to promote buildings that are environmentally responsible, profitable, and healthy places to live and work. Since its founding in 1993, the Council has grown to more than 5,200 member companies and organizations, a 50-person professional staff, a broad portfolio of LEED® products and services, the industry's popular Greenbuild International Conference and Expo, and a network of 67 local chapters, affiliates, and organizing groups.

Consortium for Energy Efficiency

The Consortium for Energy Efficiency (CEE), a nonprofit public benefits corporation, develops national initiatives to promote the manufacture and purchase of energy-efficient products and services. Our goal is to induce lasting structural and behavioral changes in the marketplace, resulting in the increased adoption of energy-efficient technologies. [2]

In today's restructured utility market, some states are continuing with utility administration of energy-efficiency programs; other states are designating public agencies for this work. CEE serves the needs of both, providing a forum for the exchange of information and ideas.

CEE members include utilities, statewide and regional market transformation administrators, environmental groups, research organizations and state energy offices. Also contributing to the collaborative process are CEE partners – manufacturers, retailers and government agencies. The U.S. Department of Energy and Environmental Protection Agency both provide support through active participation as well as funding.

California Programs

The following are a few of the programs and organizations focusing on energy efficiency in California.

Flex Your Power

Flex Your Power is California's statewide energy efficiency marketing and outreach campaign. Initiated in 2001, Flex Your Power is a partnership of California's utilities, residents, businesses, institutions, government agencies and nonprofit organizations working to save energy. The campaign includes retail promotions, a comprehensive website, an electronic newsletter, educational materials and advertising. Flex Your Power has received national and international recognition, including an ENERGY STAR Award for excellence.

The campaign's primary funding comes from the Public Goods Charge as approved by the California Public Utilities Commission (CPUC), as well as contributing partner organizations and companies.

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[2] http://www.cee1.org/cee/mtg/6-04_ppt/com-new.pdf

The Division of the State Architect

The Division of the State Architect (DSA) acts as California's policy leader for building design and construction, and provides design and construction oversight for K–12 schools and community colleges. DSA also develops and maintains the accessibility standards and codes utilized in public and private buildings throughout California. [3]

CHPS [4]

The Collaborative for High Performance Schools (CHPS, often pronounced "chips") aims to increase the energy efficiency of schools in California by marketing information, services, and incentive programs directly to school districts and designers. The Collaborative's goal is to facilitate the design of high performance schools - environments that are not only energy efficient, but also healthy, comfortable, well lit, and containing the amenities needed for a quality education.

The goals of CHPS are to:

Increase the performance of California students with better-designed and healthier facilities.

Raise the level of awareness in California districts of the impact and advantages of high performance school design.

Provide design professionals with better tools to facilitate effective design.

Increase the energy and resource efficiency of California schools.

Reduce peak electric loads.

To achieve these goals, CHPS has adopted the SBD philosophy - using a whole building, integrated design strategy that incorporates the best of today's ideas and technologies. From the beginning of the design process, each of the building elements (windows, walls, building materials, air-conditioning, landscaping, etc.) is considered part of an integrated system of interacting components. Choices in one area often affect other building systems; integrated design leverages these interactions to maximize the overall building performance.

While SBD is part of CHPS, the Collaborative includes a broad spectrum of state agencies, utilities and public interest groups, all interested in promoting energy efficiency in California's schools. Its member state agencies include the California Energy Commission, California Integrated Waste Management Board, California Air Resources Board, California Department of Education, Department of Health Services, Division of the State Architect, and the Office of Public School Construction. Its member utilities include the SBD participants - Pacific Gas and Electric, San Diego Gas and Electric, Southern California Edison, and Southern California Gas - as well as the large municipal utilities - Los Angeles Department of Water and Power and Sacramento Municipal

[3] http://www.dsa.dgs.ca.gov/default.htm

[4] http://www.chps.net/overview/index.htm

Utility District. The public interest groups include the Coalition for Adequate School Housing and the Natural Resources Defense Council.

Bright Schools Program

The California Energy Commission's Bright Schools Program offers a full suite of programs to schools considering high performance design strategies in new and existing buildings. School districts can use the program to evaluate potential areas for energy and resource savings and prioritize their needs. The services are typically provided at little or no cost to the district. [5]

On new construction projects, Bright Schools Program provides a variety of services, including design consultation, cost-effectiveness calculations, development of specifications, help in selection of the design team, review of construction plans, and complete value engineering of specific efficiency measures.

Bright Schools also includes comprehensive services for energy renovations. The particular services are determined by the program and the district and may include energy audits, feasibility studies, design review, equipment specifications, and contractor selection and installation assistance. In addition, schools can take advantage of a loan program (at 3% interest rates) to help finance the required district match of renovation projects.

Title 24 Energy Standards

The Title 24 Energy Efficiency Standards for Residential and Nonresidential Buildings were established in 1978 in response to a legislative mandate to reduce California's energy consumption. California's building efficiency standards (along with those for energy efficient appliances) have saved more than $36 billion in electricity and natural gas costs since 1978. It is estimated the standards will save an additional $43 billion by 2013. [6]

The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. As in prior years, the Title 24 energy standards were substantially strengthened in 2005. The following is a partial list of some of the new requirements. [7]

Time Dependent Valuation (TDV). Favors measures such as daylighting or thermal storage that save energy during periods of likely peak demand.

[5] http://www.chps.net/overview/overviewPrograms.htm

[6] http://www.energy.ca.gov/title24/

[7] http://www.sdge.com/construction/T24.pdf

Water heaters and residential-size air conditioners will be required to meet the new federal appliance standards as specified in the Appliance Efficiency Regulations.

Mandatory measures for basic building commissioning for lighting and HVAC equipment and controls.

Prescriptive approach requires a “cool roof” in all nonresidential low-slope applications.

Placing insulation directly over suspended (T-bar) ceilings is not allowed, except for limited applications. Insulation must be placed at the roof or on hard ceilings.

Prescriptive requirement for skylights with daylighting controls. Applies to top story of spaces larger than 25,000 square feet with ceilings higher than 15 feet.

Mandatory requirement to include sensors that measure CO2 levels and adjust ventilation rates in spaces with varying occupancy such as conference rooms, dining rooms, lounges and gyms.

In unconditioned or indirectly conditioned space, mandatory requirement for R-8 duct insulation.

Prescriptive approach requires duct sealing with field verification in new buildings and in existing buildings when space conditioning equipment is to be installed or replaced.

Prescriptive requirements to improve HVAC system efficiency, including variable speed drives, electronically commutated motors, better controls, and efficient cooling towers.

Mandatory requirement lowers the lighting power limits for interior lighting to encourage use of new efficient lighting technology

The updated Standards contain requirements for efficient electric lighting and controls that apply to unconditioned buildings such as warehouses and parking garages.

New mandatory and prescriptive requirements apply to general site illumination and specific outdoor lighting applications of nonresidential buildings. Applies to areas such as parking lots, pedestrian areas, building entrances, vehicle service stations, areas under canopies, and ornamental lighting.

Establishes outdoor lighting power limits that vary by Lighting Zone or ambient lighting levels. Lamps larger than 175 W must have cutoff luminaires to reduce glare. Luminaires with lamps larger then 60 W must be high efficacy or have motion sensor controls.

Requirements for outdoor lighting controls in some areas, including the capability to reduce lighting levels by 50 percent when not needed.

Mandatory and prescriptive requirements for lighting power limits or efficient lighting sources apply to indoor and outdoor signs.

Appendix H:- Assessment of Impact, 1999-2001

The following material appeared as an appendix in the Final Report, 1999-2001 Building Efficiency Assessment (BEA) Study, An Evaluation of the Savings By Design Program

Free Ridership

The free-ridership was estimated by reviewing the program files and discussing the decision-making process with the participants. We used all of the available information to assess what the customer would have done in the absence of the program.

The formal free-ridership survey is shown below. The first question identified the importance the incentive had on the customer's participation in the program. (Question FR1 was not used in the free-ridership analysis, although it was used to double-check the results for rationality.) The remaining questions, FR2-FR5, were asked at the measure level. These measure level questions were used to develop a free-ridership scoring methodology to determine what might have happened absent the program and its incentives.

FR 1. How important was dollar incentive paid to you, the owner, in motivating your organization to participate in the SBD program?

06 Very unimportant

07 Somewhat unimportant

08 Neither important nor unimportant

09 Somewhat important

10 Very important

100 Don't know

101 Refused

FR 2. Let's talk about specific energy efficient measures included in your project. Did the SBD incentive play a role in influencing you to install the energy efficient measures contracted under the program? **ASK FOR EACH MEASURE LISTED ON MEASURE SHEET.**

Definitely Influenced (0 points)

Possibly Influenced (1 points)

Did Not Influence (2 points)

FR 3. Which, if any, of these measures would you have installed if the incentives offered through the program were not available? **ASK FOR EACH MEASURE LISTED ON MEASURE SHEET.**

01 Would have installed (4 points)

02 Possibly would have installed (2 points)

03 Would not have installed (0 points)

FR 4. Prior to building this facility, which of these energy efficient measures, if any, have you installed previously? **ASK FOR EACH MEASURE LISTED ON MEASURE SHEET.**

01 Have installed previously

02 Have not installed previously

97 Not Applicable (No Previous Experience)

FR 5. Did you receive any outside funding for these previous energy efficient designs or equipment choices, including other utility program incentives?

01 Yes

02 No

97 Not Applicable

98 Don't Know

99 Refused

Scoring Methodology

The free-ridership scoring methodology is based on the answers to questions FR2, FR3, and if applicable FR4 and FR5. The score for each measure range from 0, which represents a measure that was completely incentive influenced, up to 6, for an absolute free-rider. The measure is assigned up to two points for FR2 and four points for FR3. Question FR3, which asks whether they would have installed the measure in the absence of the incentive, is the essence of free-ridership. It logically follows then that scoring for this question is weighted greater than question FR2. Question FR2, whether the incentive played a role in influencing the measure, is secondary but is given some consideration for insuring that the incentive was implemented even if there was intent to implement without the incentive. In other words, the incentive "locked in" the installation of the measure. If the company has built any previous facilities, and has implemented a similar measure in the absence of any incentive, determined from the answers to FR4 and FR5, the measure is considered an absolute free-rider, and assigned a score of six regardless of the answers to FR2 and FR3. If they have not installed a similar measure or have installed a similar measure with an incentive, the score from questions FR2 and FR3 are the score for the measure.

Energy efficiency measures can be classified into two distinct types, dichotomous measures, those measures that are either implemented or not, such as VFDs and lighting controls, and measures with continuous or incremental efficiency ratings such as motor efficiency and glazing performance.

A copy of the database containing all of the “as surveyed” models was made after finalization of calibration and quality control. This copy was converted into a “modified” or free-ridership database. The free-ridership database consisted of adjustments of efficiency levels and removals of some dichotomous measures from the “as-surveyed” database, according to the free-ridership assessment.

Dichotomous measures were left in the models when measures had scores of three or less. The dichotomous measure was removed from the free-ridership model if the score was four or greater.

For measures with continuous or incremental energy efficiency ratings, a free-ridership energy rating was calculated using the following formula.

$$\frac{[(6-Score)(AsBuiltRating)]+[(Score)(BaselineRating)]}{6}=FreeRidershipRating$$

For an example, the lighting power density (LPD) measure of one site had a free-rider score of 2. When asked FR2, the site contact claimed to have been definitely influenced by the incentive, which counts zero for the free-rider score. When asked question FR3, the same site contact claimed that there was a possibility that an equally low LPD would have been installed without the incentive, counting two points in the free-rider scoring. This site had an as-built LPD of 0.94 watts per square foot. The space, which is an office, had a baseline LPD of 1.6 Watts per square foot. These values and the score were plugged into the above equation.

$$\frac{[(6-2)(0.94)]+[(2)(1.6)]}{6}=1.16$$

Therefore the free-ridership LPD for this space was 1.16 watts per square foot. In the free-rider simulation model, lighting fixtures were added until the LPD was brought up to 1.16 Watts per square foot. For sites with multiple space types, the same adjustment approach was applied to every space type.

A free-ridership rating was calculated for all continuous energy ratings to be modified, including motor efficiency, cooling EER, lighting power density, glazing U-value and shading coefficient. These were calculated on a per item basis and adjusted individually to create the free-ridership models.

For a more complex example, assume the site in the previous LPD example also was incented for VFDs on secondary chilled water pumps. When asked FR2 for the VFDs, the site contact claimed that they were not influenced by the incentive, which counts two points toward the free-rider score. When asked question FR3, the same site contact claimed that the VFDs would have been installed without the incentive, counting four points in the free-rider scoring. Therefore, the free-ridership score for the VFDs would be 6, indicating strong free-ridership. In this case, the VFD controls would be changed to constant volume in the free-ridership model.

Having an analogous free-rider model for every "as-surveyed" model provided a simple approach to the calculation of net program savings. The net savings were calculated using the same methodology as whole building savings for the original "as-surveyed models." The modified free-rider "as-built" run for both energy and demand was deducted from the baseline run yielding the net savings.

To determine the best estimate of net program savings, the analysis followed the following steps:

The *net savings* are determined for each participant at the end-use level.

The *program net savings estimate* is calculated by using the same MBSS methods described for the gross savings, but using the net savings estimates for each sampled site*.*

The *free-ridership rate* is calculated as the proportion between the *program gross* savings less the *program net savings* divided by the *program gross savings.* The net-to-gross ratio is simply 1 – *free-ridership rate* or the *program net savings* divided by the *program gross savings*.

Spillover

The spillover was estimated by discussing the decision-making process with the non-participants. We used all of the available information to assess what the customer would have done in the absence of any influence from the new construction rep or program material.

The formal spillover survey is shown below. The first question identified the customer's awareness of the program. The second question was used to determine whether the customer had any interaction with the program rep or material on the current project. (Questions SP1, SP2, and SP4 were not used in the spillover analysis, but were used to validate the results of the spillover analysis.) The remaining questions, SP3-SP5, were asked at the measure level. SP3 and SP5 were used to develop a spillover scoring methodology to determine the level of influence the program representative or material had on the customer. Below, the questions are presented as they were during the decision-maker interviews.

SP 1. Were you aware of your *utility's* Savings By Design New Construction energy efficiency program before you began construction?

01 Yes

02 No

98 Don't Know

99 Refused

SP 2. Did you have any interaction with your utilities New Construction program representative or Savings By Design program material regarding the design and equipment specification on this project?

01 Yes

02 No

98 Don't Know

99 Refused

SP 3. Please rate the level of influence the new construction rep or program material had on your design and equipment choices for the following end-use categories.

01 Definitely Influenced (4 points)

02 Possibly Influenced (2 points)

03 Did Not Influence (0 points)

SP 4. Please rate your level of interaction with your *utility's* New Construction efficiency program staff during the design and equipment selection of those projects before this building was designed. (on each end use)

01 Significant Interaction

02 Some Interaction

03 No Interaction

SP 5. Did the prior interaction influence the design and equipment choices of this project? (for each end use)

01 Definitely Influenced (2 points)

02 Possibly Influenced (1 points)

03 Did Not Influence (0 points)

Scoring Methodology

Each of the questions above attempts to investigate the various ways the customer might have been influenced by previous NRNC programs or utility program staff. Similar to the free-rider analysis, the spillover analysis relies on end-use specific customer self-report methods for estimating the amount of spillover. However, unlike the participant sample where measure specific data exists (e.g., tracking data, files), there is very little readily available information on the non-participant buildings. The difficulty that exists is trying to understand what the non-participant would have done at the end-use level had there been no previous program influences.

Questions SP01-SP05 from above were asked of the non-participant respondent. If the customer responded "no" to most or all questions, then there is no spillover, however if the customer responded "yes, or possibly" then there is most likely some amount of spillover. We then asked end-use level questions to try to determine where the spillover occurred within the building design.

One problem remained however, the interviewer still had no information on whether or not the end-use in discussion was truly energy efficient or whether the customer just believed it to be. Typically the on-site and subsequent DOE-2 model are unavailable at the time of the decision-maker surveys and cannot be used to inform us if any of the end-uses are energy efficient, or built more efficient than code. However, it was posed that if the decision-maker interview questions were withheld until the on-site survey and modeling tasks were completed we could use the data to inform the DM survey questions. With this information the interviewer would have more strategic information for directing end-use specific spillover questions to the respondent. This was the approach used for the non-participants. Initial contact was made with the decision-maker to explain the nature of the study and ultimately gain permission to conduct an on-site survey. Once the data collection and simulation model was complete, the decision-maker was re-contacted to complete the end-use level questions.

The spillover scoring methodology is based on the answers to questions SP3 and SP5. The score for each measure range from 0, which represents a measure that was not at all influenced by the program rep or material, up to 6, for absolute spillover. The measure is assigned up to four points for SP3 and two points for SP5. Since SP3, the level of influence the program rep or material had on the design and equipment choices on the current project, is the essence of spillover, it logically follows that scoring for this question is weighted greater than question SP5. Question SP5, whether the customer's prior interaction with the program rep or material played a role in influencing the measure, is secondary but is given some consideration since previous interaction with the program rep or program material may have influenced the design and equipment choices for the current project. The previous interaction may have had a lasting impact on the customer which would influence them to design differently than they would have without the previous interaction.

As stated in the free-ridership assessment, energy efficiency measures can be classified into two distinct types, dichotomous measures, that are either implemented or not, such as VFDs and lighting controls, and measures with continuous or incremental efficiency ratings such as motor efficiency and glazing performance.

A copy of the database containing all of the "as surveyed" non-participant models was made after finalization of calibration and quality control. This copy was converted into a "modified" or spillover database. The spillover database consisted of adjustments of efficiency levels and removals of dichotomous measures from the "as-surveyed" database, according to the spillover assessment.

Dichotomous measures were left in the models when measures had scores of three or less. The dichotomous measure was removed from the spillover model if the score was four or greater.

For measures with continuous or incremental energy efficiency ratings, a spillover energy rating was calculated using the following formula.

$$\frac{[(6 - Score)(AsBuiltRating)] + [(Score)(BaselineRating)]}{6} = SpilloverRating$$

For example, the lighting power density (LPD) measure of one site had a spillover score of 3. When asked question SP3, the site contact claimed to have been possibly influenced by the program rep or material on the current project, which counts two for the spillover score. When asked question SP5, the same site contact claimed that there was a possibility that *prior* interaction with the program rep or material influenced the current project, counting one points in the spillover scoring. For this site, the as built LPD was 1.0 Watts per square foot. The space, which was an office, had a baseline LPD of 1.6 Watts per square foot. These values and the score were plugged into the above equation.

$$\frac{[(6-3)(1.0)] + [(3)(1.6)]}{6} = 1.3$$

Therefore the spillover LPD for this space was 1.3 watts per square foot. In the spillover model, lighting fixtures were added until the LPD was brought up to 1.3 watts per square foot. For sites with multiple space types, the same adjustment approach was applied to every space type.

A spillover rating was calculated for all continuous energy ratings to be modified, including motor efficiency, cooling EER, lighting power density, glazing U-value and shading coefficient. These were calculated on a per item basis and adjusted individually to create the spillover models.

As another example, high performance glazing measure of one site had a spillover score of 5. When asked question SP3, the site contact claimed to have been definitely influenced by the construction rep or program material, which counts four for the spillover score. When asked question SP5, the same site contact claimed that the prior interaction with the rep or program information possibly influenced the design and equipment choices of this project, counting 1 towards the spillover score. The total spillover score for the high performance glazing measure for this site would be 5, indicating strong spillover. Therefore, the U-Value and the shading coefficient would be increased.

Having an analogous spillover model for every "as-surveyed" model provided a simple approach to the calculation of spillover. The spillover savings were calculated as the difference between the gross savings and the net savings for the non-participants. The following equation shows the actual calculation that was used to compute the spillover:

$$SpilloverSavings = GrossSavings - NetSavings:$$

$$[Baseline - AsBuilt]_{\substack{As-Surveyed \\ Model}} - [Baseline - AsBuilt]_{\substack{Spillover \\ Model}}$$

Spillover was calculated for each site in the sample. MBSS ratio estimation was be used to estimate the total amount of spillover occurring in the NRNC population. The result is total spillover, and spillover at the end-use level for the population. As shown in the owner survey results chapter, the only spillover in the non-participant population was for the lighting end use.

Appendix I: As-Built Simulation Results Database

The As-Built Simulation Results database contains the data used to calculate the gross savings results shown in the final report and consists of 32 “raw-data” tables and 4 additional “results” tables. The “raw data” tables contain energy consumption and summer peak demand values while the results tables contain energy savings and demand reduction resulting from the consumption and demand values in the raw data tables.

It is important to note that the “raw data” tables contain only the data related to the commercial components of the buildings in the study and were generated from the engineering models created in Survey-It. On the other hand, the industrial components of the buildings in the study necessitated site-specific engineering calculations and were handled on an individual basis.

The resultant energy savings and demand reduction attributable to industrial measures were then aggregated to the commercial energy savings and demand reduction to create the 4 “results tables”. MBSS was then used to extrapolate the sample data in the 4 results tables to the participant and non-participant populations.

Raw Data Tables

The 32 “raw-data” tables can be grouped into 2 categories by data content, which are electric consumption and coincident summer peak demand. Each data type is identified by the last 3 characters of the file name, which end in “kwh” and “pkw” respectively. The “raw-data” tables are also differentiated by BEA run-type definitions as identified by the first 4 or 5 characters of the file name. Table 34 below is a list of the raw-data tables:

1. assplkwh	2. mop7kwh
3. assplpkw	4. mop7pkw
5. blinekwh	6. parm1kwh
7. Blinepkw	8. parm1pkw
9. mop1kwh	10. parm2kwh
11. mop1pkw	12. parm2pkw
13. mop2kwh	14. parm3kwh
15. mop2pkw	16. parm3pkw
17. mop3kwh	18. parm4kwh
19. mop3pkw	20. parm4pkw
21. mop4kwh	22. parm5kwh
23. mop4pkw	24. parm5pkw
25. mop5kwh	26. parm6kwh
27. mop5pkw	28. parm6pkw
29. mop6kwh	30. parm7kwh
31. mop6pkw	32. parm7pkw

Table 34: List of Raw Data Tables

Parametric Run Type Definitions

The parametric run-type definitions are described in Table 35 below. The run-type is the prefix to each of the raw data tables which is then followed by either a kwh or pkw (ie., parm1kwh).

Run-Type	Description
bline	Baseline
mop1	Shell, measures only – Baseline envelope properties (glazing U-value and shading coefficient; and opaque surface insulation) for incented measures only will be returned to their as-built condition.
parm1	All Shell – All baseline envelope properties will be returned to their as-built condition.
mop2	Lighting Power Density, measures only – Parm1 above, plus baseline lighting power densities for spaces in the building that received incentives will be returned to their as-built condition.
parm2	All Lighting Power Density – Parm1 above, plus all baseline lighting power densities will be returned to their as-built condition.
mop3	Daylighting Controls, measures only – Parm2 above, plus daylighting controls that received incentives will be returned to their as-built condition.
parm3	All Daylighting Controls – Parm2 above, plus all daylighting controls will be returned to their as-built condition.
mop4	Other Lighting Controls, measures only – Parm3 above, plus all other lighting controls that received incentives will be returned to their as-built condition.
parm4	All Other Lighting Controls – Parm3 above, plus all other lighting controls will be returned to their as-built condition.
mop5	Motors and Air Distribution, measures only – Parm4 above, plus baseline motor efficiency, fan power indices (W/CFM), and motor controls for incented measures only will be returned to their as-built condition.
parm5	All Motors and Air Distribution – Parm4 above, plus all baseline motor efficiency fan power indices (W/CFM), and motor controls will be returned to their as-built condition.
mop6	HVAC, measures only. Parm5 above, plus HVAC parameters for incented measures only will be returned to their as-built condition.
parm6	All HVAC – Parm5 above, plus all HVAC parameters will be returned to their as-built condition.

mop7	Refrigeration, measures only – Parm6 above, plus refrigeration parameters for incented measures in buildings eligible for the grocery store refrigeration program only will be returned to their as-built condition.
parm7	All Refrigeration – Parm6 above, plus all refrigeration parameters in buildings eligible for the grocery store refrigeration programs will be returned to their as-built condition. This run is equivalent to the full as-built run.
asspl	As-built

Table 35: Run Type Definitions

Energy Tables

Table 36 describes the field headings and values of the 16 raw-data tables with filenames ending in "kwh". The data contained in these energy tables are annual energy consumption (KWh) values for each parametric run. As mentioned above, the parametric runs are represented by the first 4 to 5 letters in the table name (ie., parm1, mop1). Use the definitions in Table 35 to describe the values in the energy tables. For example, the *parm1kwh table* shows consumption related to the baseline building with the shell measure reset to it's as-built condition; the *parm2kwh table* shows consumption related to the baseline building with shell and LPD measures set back to its as-built conditions, etc.

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
RUNTYPE	Run-type	N/A
WBLGANN	Whole building annual consumption (kWh)	N/A
WBLGSONP	Whole building summer on peak consumption (kWh)	N/A
WBLGSPRT	Whole building summer partial peak consumption (kWh)	N/A
WBLGSOFF	Whole building summer off peak consumption (kWh)	N/A
WBLGWPRT	Whole building winter partial peak consumption (kWh)	N/A
WBLGWOFF	Whole building winter off peak consumption (kWh)	N/A
HEATANN	Heating annual consumption (kWh)	N/A
HEATSONP	Heating summer on peak consumption (kWh)	N/A

HEATSPRT	Heating summer partial peak consumption (kWh)	N/A
HEATSOFF	Heating summer off peak consumption (kWh)	N/A
HEATWPRT	Heating winter partial peak consumption (kWh)	N/A
HEATWOFF	Heating at winter off peak consumption (kWh)	N/A
COOLANN	Cooling annual consumption (kWh)	N/A
COOLSONP	Cooling summer on peak consumption (kWh)	N/A
COOLSPRT	Cooling summer partial peak consumption (kWh)	N/A
COOLSOFF	Cooling summer off peak consumption (kWh)	N/A
COOLWPRT	Cooling winter partial peak consumption (kWh)	N/A
COOLWOFF	Cooling winter off peak consumption (kWh)	N/A
LTGANN	Lighting annual consumption (kWh)	N/A
LTGSONP	Lighting summer on peak consumption (kWh)	N/A
LTGSPRT	Lighting summer partial peak consumption (kWh)	N/A
LTGSOFF	Lighting summer off peak consumption (kWh)	N/A
LTGWPRT	Lighting winter partial peak consumption (kWh)	N/A
LTGWOFF	Lighting winter off peak consumption (kWh)	N/A
FANANN	Fan annual consumption (kWh)	N/A
FANSONP	Fan summer on peak consumption (kWh)	N/A
FANSPRT	Fan summer partial peak consumption (kWh)	N/A
FANSOFF	Fan summer off peak consumption (kWh)	N/A

FANWPRT	Fan winter partial peak consumption (kWh)	N/A
FANWOFF	Fan winter off peak consumption (kWh)	N/A
REFRANN	Refrigeration annual consumption (kWh)	N/A
REFRSONP	Refrigeration summer on peak consumption (kWh)	N/A
REFRSPRT	Refrigeration summer partial peak consumption (kWh)	N/A
REFRSOFF	Refrigeration summer off peak consumption (kWh)	N/A
REFRWPRT	Refrigeration winter partial peak consumption (kWh)	N/A
REFRWOFF	Refrigeration winter off peak consumption (kWh)	N/A
RESDANN	Residual annual consumption (kWh)	N/A
RESDSONP	Residual summer on peak consumption (kWh)	N/A
RESDSPRT	Residual summer partial peak consumption (kWh)	N/A
RESDSOFF	Residual summer off peak consumption (kWh)	N/A
RESDWPRT	Residual winter partial peak consumption (kWh)	N/A
RESDWOFF	Residual winter off peak consumption (kWh)	N/A

Table 36: Energy Tables - Tables ending in "kwh"

Demand Tables

Table 37 below describes the field headings and values of the remaining 16 raw-data tables with filenames ending in "pkw".

The data contained in these demand tables are summer on-peak demand (pkW) values for each parametric run. As mentioned above, the parametric runs are represented by the first 4 to 5 letters in the table name (ie., parm1, mop1). Use the definitions in Table 35 to describe the values in the energy tables. For example, the *parm1pkw table* shows demand related to the baseline building with the shell measure reset to it's as-built condition; the *parm2pkw table* shows demand related to the baseline building with shell and LPD measures set back to its as-built conditions, etc.

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
RUNTYPE	Run-type	N/A
WBLGANN	Whole building annual demand (pKW)	N/A
WBLGSONP	Whole building summer on peak demand (pKW)	N/A
WBLGSPRT	Whole building summer partial peak demand (pKW)	N/A
WBLGSOFF	Whole building summer off peak demand (pKW)	N/A
WBLGWPRT	Whole building winter partial peak demand (pKW)	N/A
WBLGWOFF	Whole building winter off peak demand (pKW)	N/A
HEATANN	Heating annual demand (pKW)	N/A
HEATSONP	Heating summer on peak demand (pKW)	N/A
HEATSPRT	Heating summer partial peak demand (pKW)	N/A
HEATSOFF	Heating summer off peak demand (pKW)	N/A
HEATWPRT	Heating winter partial peak demand (pKW)	N/A
HEATWOFF	He Heating at winter off peak demand (pKW)	N/A
COOLANN	Cooling annual demand (pKW)	N/A
COOLSONP	Cooling summer on peak demand (pKW)	N/A
COOLSPRT	Cooling summer partial peak demand (pKW)	N/A
COOLSOFF	Cooling summer off peak demand (pKW)	N/A
COOLWPRT	Cooling winter partial peak demand (pKW)	N/A
COOLWOFF	Cooling winter off peak demand (pKW)	N/A

LTGANN	Lighting annual demand (pKW)	N/A
LTGSONP	Lighting summer on peak demand (pKW)	N/A
LTGSPRT	Lighting summer partial peak demand (pKW)	N/A
LTGSOFF	Lighting summer off peak demand (pKW)	N/A
LTGWPRT	Lighting winter partial peak demand (pKW)	N/A
LTGWOFF	Lighting winter off peak demand (pKW)	N/A
FANANN	Fan annual demand (pKW)	N/A
FANSONP	Fan summer on peak demand (pKW)	N/A
FANSPRT	Fan summer partial peak demand (pKW)	N/A
FANSOFF	Fan summer off peak demand (pKW)	N/A
FANWPRT	Fan winter partial peak demand (pKW)	N/A
FANWOFF	Fan winter off peak demand (pKW)	N/A
REFRANN	Refrigeration annual demand (pKW)	N/A
REFRSONP	Refrigeration summer on peak demand (pKW)	N/A
REFRSPRT	Refrigeration summer partial peak demand (pKW)	N/A
REFRSOFF	Refrigeration summer off peak demand (pKW)	N/A
REFRWPRT	Refrigeration winter partial peak demand (pKW)	N/A
REFRWOFF	Refrigeration winter off peak demand (pKW)	N/A
RESDANN	Residual annual demand (pKW)	N/A
RESDSONP	Residual summer on peak demand (pKW)	N/A
RESDSPRT	Residual summer partial	N/A

	peak demand (pKW)	
RESDSOFF	Residual summer off peak demand (pKW)	N/A
RESDWPRT	Residual winter partial peak demand (pKW)	N/A
RESDWOFF	Residual winter off peak demand (pKW)	N/A

Table 37: Demand Tables - Tables ending in "pkw"

Results Data Tables

The 4 "results" tables can also be grouped into 2 categories by data content, which are kWh savings and pkW demand reduction. Table 38 below lists the 4 results tables. Table 39 and Table 41 list their variables and description.

1. kWh Savings – All Runs	2. pkW Reduction – All Runs
3. kWh Savings – Measures Only	4. pkW Reduction – Measures Only

Table 38: List of Results Tables

Field Heading	Value	Comments
Weight	Case Weight	
Baseline	Title-24 Baseline Energy Consumption	
Building (C + I)	Whole building energy savings, including both commercial and industrial equipment - incented and non-incented equipment (kWh)	
Building (C Only)	Whole building energy savings, commercial equipment only - incented and non-incented equipment (kWh)	
Shell	Shell energy savings- incented and non-incented equipment (kWh)	
LPD	LPD energy savings- incented and non-incented	

	equipment (kWh)	
DayLt	Daylighting controls energy savings- incented and non-incented equipment (kWh)	
OtrLt	Other lighting controls energy savings- incented and non-incented equipment (kWh)	
HVAC + Motors	HVAC & motors energy savings- incented and non-incented equipment (kWh)	
Refr	Refrigeration energy savings- incented and non-incented equipment (kWh)	
Industrial	Industrial energy savings – incented equipment only (kWh)	
Utility	RLW Utility Code	1 = SDG&E; 2 = PG&E; 3 = SCE
Approach	Rebate approach	0 = systems, 1 = performance, 2 = non-participant.
Part?	Participant or Non-Participant	1=participant; 0 = non-participant
SQFT	Square Footage	
RLW_ID	RLW ID Number	Primary Key

Table 39: kWh Savings – All Equipment

Field Heading	Value	Comments
Weight	Case Weight	
Shell	Shell energy savings for incented measures only (kWh)	
LPD + OtrLtg	LPD & other lighting controls energy savings for incented measures only (kWh)	
DayLt	Daylighting controls energy savings for incented measures only (kWh)	
HVAC + Motors	HVAC & motors energy	

	savings for incented measures only (kWh)	
Refr	Refrigeration energy savings for incented measures only (kWh)	
Industrial	Industrial energy savings – incented equipment only (kWh)	
Building	Whole Building energy savings for incented measures only (kWh)	Performance approach sites only
Utility	RLW Utility Code	1 = SDG&E; 2 = PG&E; 3 = SCE
Approach	Rebate approach	0 = systems, 1 = performance, 2 = non-participant.
Part?	Participant or Non-Participant	1=participant; 0 = non-participant
SQFT	Square Footage	
RLW_ID	RLW ID Number	Primary Key

Table 40: kWh Savings – Measures Only

Field Heading	Value	Comments
Weight	Case Weight	
Baseline	Title-24 Baseline Demand (pkW)	
Building (C + I)	Whole building summer peak demand reduction, including both commercial and industrial equipment - incented and non-incented equipment (pkW)	
Building (C Only)	Whole building summer peak demand reduction, commercial equipment only - incented and non-incented equipment (pkW)	

Shell	Shell summer peak demand reduction - incented and non-incented equipment (pkW)	
LPD	LPD summer peak demand reduction - incented and non-incented equipment (pkW)	
DayLt	Daylighting controls summer peak demand reduction - incented and non-incented equipment (pkW)	
OtrLt	Other lighting controls summer peak demand reduction - incented and non-incented equipment (pkW)	
HVAC + Motors	HVAC & motors summer peak demand reduction - incented and non-incented equipment (pkW)	
Refr	Refrigeration summer peak demand reduction - incented and non-incented equipment (pkW)	
Industrial	Industrial summer peak demand reduction – incented equipment only (pkW)	
Utility	RLW Utility Code	1 = SDG&E; 2 = PG&E; 3 = SCE
Approach	Rebate approach	0 = systems, 1 = performance, 2 = non-participant.
Part?	Participant or Non-Participant	1=participant; 0 = non-participant
SQFT	Square Footage	
RLW_ID	RLW ID Number	Primary Key

Table 41: pkW Reduction – All Equipment

Field Heading	Value	Comments
Weight	Case Weight	
Shell	Shell summer peak demand reduction for incented measures only (pkW)	
LPD + OtrLtg	LPD & other lighting controls summer peak demand reduction for incented measures only (pkW)	
DayLt	Daylighting controls summer peak demand reduction for incented measures only (pkW)	
HVAC + Motors	HVAC & motors summer peak demand reduction for incented measures only (pkW)	
Refr	Refrigeration summer peak demand reduction for incented measures only (pkW)	
Industrial	Industrial summer peak demand reduction – incented equipment only (pkW)	
Building	Whole Building summer peak demand reduction for incented measures only (pkW)	Performance approach sites only
Utility	RLW Utility Code	1 = SDG&E; 2 = PG&E; 3 = SCE
Approach	Rebate approach	0 = systems, 1 = performance, 2 = non-participant.
Part?	Participant or Non-Participant	1=participant; 0 = non-participant
SQFT	Square Footage	
RLW_ID	RLW ID Number	Primary Key

Table 42: pkW Reduction – Measures Only

Appendix J: Net Savings Simulation Results Database

Similar to the As-Built Simulation Results database, the Net Savings Simulation Results Database has 32 "raw-data" tables and 4 additional "results" tables. The net savings simulations results account for participant free-ridership and non-participant spillover.

It is important to note that the "raw data" tables contain only the data related to the commercial components of the buildings in the study and were generated from the engineering models created in Survey-It. On the other hand, the industrial components of the buildings in the study necessitated site-specific engineering calculations and were handled on an individual basis.

The resultant energy savings and demand reduction attributable to industrial measures were then aggregated to the commercial energy savings and demand reduction to create the 4 "results tables". MBSS was then used to extrapolate the sample data in the 4 results tables to the participant and non-participant populations.

Net Savings Raw Data Tables

The 32 "raw-data" tables can be grouped into 2 categories by data content, which are energy consumption and coincident electric demand. Each data type is identified by the last 2 or 3 characters of the file name, which end in "kwh" and "pkw" respectively. The "raw-data" tables are also differentiated by BEA run-type definitions as identified by the first 4 or 5 characters of the file name.

Table 43 below is a list of the raw-data tables:

1.assplkwh	2. mop7kwh
3. assplpkw	4. mop7pkw
5. blinekwh	6. parm1kwh
7. Blinepkw	8. parm1pkw
9. mop1kwh	10. parm2kwh
11. mop1pkw	12. parm2pkw
13. mop2kwh	14. parm3kwh
15. mop2pkw	16. parm3pkw
17. mop3kwh	18. parm4kwh
19. mop3pkw	20. parm4pkw
21. mop4kwh	22. parm5kwh
23. mop4pkw	24. parm5pkw
25. mop5kwh	26. parm6kwh
27. mop5pkw	28. parm6pkw
29. mop6kwh	30. parm7kwh
31. mop6pkw	32. parm7pkw

Table 43: List of Net Savings Raw Data Tables

Net Savings Parametric Run-Types

The run-type definitions are described in Table 44 below. The run-type is the prefix to each of the raw data tables which is then followed by either a kwh or pkw (ie., parm1kwh).

Parametric Run-Type	Description
bline	Baseline
mop1	Shell, measures only – Baseline envelope properties (glazing U-value and shading coefficient; and opaque surface insulation) for incented measures only will be returned to their as-built condition.
parm1	All Shell – All baseline envelope properties will be returned to their as-built condition.
mop2	Lighting Power Density, measures only – Parm1 above, plus baseline lighting power densities for spaces in the building that received incentives will be returned to their as-built condition.
parm2	All Lighting Power Density – Parm1 above, plus all baseline lighting power densities will be returned to their as-built condition.
mop3	Daylighting Controls, measures only – Parm2 above, plus daylighting controls that received incentives will be returned to their as-built condition.
parm3	All Daylighting Controls – Parm2 above, plus all daylighting controls will be returned to their as-built condition.
mop4	Other Lighting Controls, measures only – Parm3 above, plus all other lighting controls that received incentives will be returned to their as-built condition.
parm4	All Other Lighting Controls – Parm3 above, plus all other lighting controls will be returned to their as-built condition.
mop5	Motors and Air Distribution, measures only – Parm4 above, plus baseline motor efficiency, fan power indices (W/CFM), and motor controls for incented measures only will be returned to their as-built condition.
parm5	All Motors and Air Distribution – Parm4 above, plus all baseline motor efficiency fan power indices (W/CFM), and motor controls will be returned to their as-built condition.
mop6	HVAC, measures only. Parm5 above, plus HVAC parameters for incented measures only will be returned to their as-built condition.

parm6	All HVAC – Parm5 above, plus all HVAC parameters will be returned to their as-built condition.
mop7	Refrigeration, measures only – Parm6 above, plus refrigeration parameters for incented measures in buildings eligible for the grocery store refrigeration program only will be returned to their as-built condition.
parm7	All Refrigeration – Parm6 above, plus all refrigeration parameters in buildings eligible for the grocery store refrigeration programs will be returned to their as-built condition. This run is equivalent to the full as-built run.
asspl	As-built

Table 44: Parametric Run-Type Definitions

Net Savings Raw Data Tables

Table 45 below describes the field headings and values of the 16 raw-data tables with filenames ending in “kwh”.

The data contained in these energy tables are annual energy consumption (KWh) values for each parametric run. As mentioned above, the parametric runs are represented by the first 4 to 5 letters in the table name (ie., parm1, mop1). Use the definitions in Table 35 to describe the values in the energy tables. For example, the *parm1kwh table* shows consumption related to the baseline building with the shell measure reset to it’s as-built condition; the *parm2kwh table* shows consumption related to the baseline building with shell and LPD measures set back to its as-built conditions.

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
RUNTYPE	Run-type	N/A
WBLGANN	Whole building annual consumption (kWh)	N/A
WBLGSONP	Whole building summer on peak consumption (kWh)	N/A
WBLGSPRT	Whole building summer partial peak consumption (kWh)	N/A
WBLGSOFF	Whole building summer off peak consumption (kWh)	N/A
WBLGWPRT	Whole building winter partial peak consumption (kWh)	N/A
WBLGWOFF	Whole building winter off peak consumption (kWh)	N/A

HEATANN	Heating annual consumption (kWh)	N/A
HEATSONP	Heating summer on peak consumption (kWh)	N/A
HEATSPRT	Heating summer partial peak consumption (kWh)	N/A
HEATSOFF	Heating summer off peak consumption (kWh)	N/A
HEATWPRT	Heating winter partial peak consumption (kWh)	N/A
HEATWOFF	Heating at winter off peak consumption (kWh)	N/A
COOLANN	Cooling annual consumption (kWh)	N/A
COOLSONP	Cooling summer on peak consumption (kWh)	N/A
COOLSPRT	Cooling summer partial peak consumption (kWh)	N/A
COOLSOFF	Cooling summer off peak consumption (kWh)	N/A
COOLWPRT	Cooling winter partial peak consumption (kWh)	N/A
COOLWOFF	Cooling winter off peak consumption (kWh)	N/A
LTGANN	Lighting annual consumption (kWh)	N/A
LTGSONP	Lighting summer on peak consumption (kWh)	N/A
LTGSPRT	Lighting summer partial peak consumption (kWh)	N/A
LTGSOFF	Lighting summer off peak consumption (kWh)	N/A
LTGWPRT	Lighting winter partial peak consumption (kWh)	N/A
LTGWOFF	Lighting winter off peak consumption (kWh)	N/A
FANANN	Fan annual consumption (kWh)	N/A
FANSONP	Fan summer on peak consumption (kWh)	N/A

FANSPRT	Fan summer partial peak consumption (kWh)	N/A
FANSOFF	Fan summer off peak consumption (kWh)	N/A
FANWPRT	Fan winter partial peak consumption (kWh)	N/A
FANWOFF	Fan winter off peak consumption (kWh)	N/A
REFRANN	Refrigeration annual consumption (kWh)	N/A
REFRSONP	Refrigeration summer on peak consumption (kWh)	N/A
REFRSPRT	Refrigeration summer partial peak consumption (kWh)	N/A
REFRSOFF	Refrigeration summer off peak consumption (kWh)	N/A
REFRWPRT	Refrigeration winter partial peak consumption (kWh)	N/A
REFRWOFF	Refrigeration winter off peak consumption (kWh)	N/A
RESDANN	Residual annual consumption (kWh)	N/A
RESDSONP	Residual summer on peak consumption (kWh)	N/A
RESDSPRT	Residual summer partial peak consumption (kWh)	N/A
RESDSOFF	Residual summer off peak consumption (kWh)	N/A
RESDWPRT	Residual winter partial peak consumption (kWh)	N/A
RESDWOFF	Residual winter off peak consumption (kWh)	N/A

Table 45: Net Savings Consumption Tables - Tables ending in “kwh”

Table 46 below describes the field headings and values of the remaining 16 raw-data tables with filenames ending in “pkw”.

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A

RUNTYPE	Run-type	N/A
WBLGANN	Whole building annual demand (kW)	N/A
WBLGSONP	Whole building summer on peak demand (kW)	N/A
WBLGSPRT	Whole building summer partial peak demand (kW)	N/A
WBLGSOFF	Whole building summer off peak demand (kW)	N/A
WBLGWPRT	Whole building winter partial peak demand (kW)	N/A
WBLGWOFF	Whole building winter off peak demand (kW)	N/A
HEATANN	Heating annual demand (kW)	N/A
HEATSONP	Heating summer on peak demand (kW)	N/A
HEATSPRT	Heating summer partial peak demand (kW)	N/A
HEATSOFF	Heating summer off peak demand (kW)	N/A
HEATWPRT	Heating winter partial peak demand (kW)	N/A
HEATWOFF	Heating at winter off peak demand (kW)	N/A
COOLANN	Cooling annual demand (kW)	N/A
COOLSONP	Cooling summer on peak demand (kW)	N/A
COOLSPRT	Cooling summer partial peak demand (kW)	N/A
COOLSOFF	Cooling summer off peak demand (kW)	N/A
COOLWPRT	Cooling winter partial peak demand (kW)	N/A
COOLWOFF	Cooling winter off peak demand (kW)	N/A
LTGANN	Lighting annual demand (kW)	N/A
LTGSONP	Lighting summer on peak	N/A

	demand (kW)	
LTGSPRT	Lighting summer partial peak demand (kW)	N/A
LTGSOFF	Lighting summer off peak demand (kW)	N/A
LTGWPRT	Lighting winter partial peak demand (kW)	N/A
LTGWOFF	Lighting winter off peak demand (kW)	N/A
FANANN	Fan annual demand (kW)	N/A
FANSONP	Fan summer on peak demand (kW)	N/A
FANSPRT	Fan summer partial peak demand (kW)	N/A
FANSOFF	Fan summer off peak demand (kW)	N/A
FANWPRT	Fan winter partial peak demand (kW)	N/A
FANWOFF	Fan winter off peak demand (kW)	N/A
REFRANN	Refrigeration annual demand (kW)	N/A
REFRSONP	Refrigeration summer on peak demand (kW)	N/A
REFRSPRT	Refrigeration summer partial peak demand (kW)	N/A
REFRSOFF	Refrigeration summer off peak demand (kW)	N/A
REFRWPRT	Refrigeration winter partial peak demand (kW)	N/A
REFRWOFF	Refrigeration winter off peak demand (kW)	N/A
RESDANN	Residual annual demand (kW)	N/A
RESDSONP	Residual summer on peak demand (kW)	N/A
RESDSPRT	Residual summer partial peak demand (kW)	N/A
RESDSOFF	Residual summer off peak demand (kW)	N/A

RESDWPRT	Residual winter partial peak demand (kW)	N/A
RESDWOFF	Residual winter off peak demand (kW)	N/A

Table 46: Net Savings Demand Tables - Tables ending in "pkw"

Net Savings Results Data Tables

The 4 "results" tables can also be grouped into 2 categories by data content, which are kWh savings and pkW reduction. For participants, the values represent energy savings (demand reduction) once free-ridership is taken into account, while for non-participants, the values represent spillover energy savings (demand reduction). Table 47 below lists the 4 results tables. Table 48 through Table 51 list their variables and description.

1. kWh Savings – All Runs	2. pkW Reduction – All Runs
3. kWh Savings – Measures Only	4. pkW Reduction – Measures Only

Table 47: List of Net Savings Results Tables

Field Heading	Value	Comments
Weight	Case Weight	
Building (C Only)	Whole building energy savings, commercial equipment only - incented and non-incented equipment (kWh)	
Shell	Shell energy savings- incented and non-incented equipment (kWh)	
LPD	LPD energy savings- incented and non-incented equipment (kWh)	
DayLt	Daylighting controls energy savings- incented and non-incented equipment (kWh)	
OtrLt	Other lighting controls energy savings- incented and non-incented equipment (kWh)	
HVAC + Motors	HVAC & motors energy savings- incented and non-	

	incented equipment (kWh)	
Refr	Refrigeration energy savings- incented and non-incented equipment (kWh)	
Industrial	Industrial energy savings – incented equipment only (kWh)	
Utility	RLW Utility Code	1 = SDG&E; 2 = PG&E; 3 = SCE
Approach	Rebate approach	0 = systems, 1 = performance, 2 = non-participant.
Part?	Participant or Non-Participant	1=participant; 0 = non-participant
SQFT	Square Footage	
RLW_ID	RLW ID Number	Primary Key

Table 48: kWh Savings – All Equipment

Field Heading	Value	Comments
Weight	Case Weight	
Shell	Shell energy savings for incented measures only (kWh)	
LPD + OtrLtg	LPD & other lighting controls energy savings for incented measures only (kWh)	
DayLt	Daylighting controls energy savings for incented measures only (kWh)	
HVAC + Motors	HVAC & motors energy savings for incented measures only (kWh)	
Refr	Refrigeration energy savings for incented measures only (kWh)	
Industrial	Industrial energy savings – incented equipment only (kWh)	
Building	Whole Building energy savings for incented	Performance approach sites only

	measures only (kWh)	
Utility	RLW Utility Code	1 = SDG&E; 2 = PG&E; 3 = SCE
Approach	Rebate approach	0 = systems, 1 = performance, 2 = non-participant
Part?	Participant or Non-Participant	1=participant; 0 = non-participant
SQFT	Square Footage	
RLW_ID	RLW ID Number	Primary Key

Table 49: kWh Savings – Measures Only

Field Heading	Value	Comments
Weight	Case Weight	
Building (C Only)	Whole building summer peak demand reduction, commercial equipment only - incented and non-incented equipment (pkW)	
Shell	Shell summer peak demand reduction - incented and non-incented equipment (pkW)	
LPD	LPD summer peak demand reduction - incented and non-incented equipment (pkW)	
DayLt	Daylighting controls summer peak demand reduction - incented and non-incented equipment (pkW)	
OtrLt	Other lighting controls summer peak demand reduction - incented and non-incented equipment (pkW)	
HVAC + Motors	HVAC & motors summer peak demand reduction - incented and non-incented equipment (pkW)	

Refr	Refrigeration summer peak demand reduction - incented and non-incented equipment (pkW)	
Industrial	Industrial summer peak demand reduction – incented equipment only (pkW)	
Utility	RLW Utility Code	1 = SDG&E; 2 = PG&E; 3 = SCE
Approach	Rebate approach	0 = systems, 1 = performance, 2 = non-participant
Part?	Participant or Non-Participant	1=participant; 0 = non-participant
SQFT	Square Footage	
RLW_ID	RLW ID Number	Primary Key

Table 50: pkW Reduction – All Equipment

Field Heading	Value	Comments
Weight	Case Weight	
Shell	Shell summer peak demand reduction for incented measures only (pkW)	
LPD + OtrLtg	LPD & other lighting controls summer peak demand reduction for incented measures only (pkW)	
DayLt	Daylighting controls summer peak demand reduction for incented measures only (pkW)	
HVAC + Motors	HVAC & motors summer peak demand reduction for incented measures only (pkW)	
Refr	Refrigeration summer peak demand reduction for incented measures only (pkW)	
Industrial	Industrial summer peak	

	demand reduction – incented equipment only (pkW)	
Building	Whole Building summer peak demand reduction for incented measures only (pkW)	Performance approach sites only
Utility	RLW Utility Code	1 = SDG&E; 2 = PG&E; 3 = SCE
Approach	Rebate approach	0 = systems, 1 = performance, 2 = non-participant
Part?	Participant or Non-Participant	1=participant; 0 = non-participant
SQFT	Square Footage	
RLW_ID	RLW ID Number	Primary Key

Table 51: pkW Reduction – Measures Only

Appendix K: Survey-It BEA Database

The following tables document the database tables in the BEA Confidential Survey-IT database and BEA Confidential Free-rider Survey-IT database. Note that both the databases have the exact same tables (with different data) and therefore the tables are documented once below.

Field Heading	Value	Comments
SITEID	RLW Site ID Number	N/A
CCN_NO	Air handler ID number	N/A
CCNT24	Air handler Name	N/A
CCNLOC	Air handler location	N/A
CCNQTY	Quantity	N/A
CCNQTYM	Energy-efficient duct system measure (W/CFM) ID flag	N/A
CCNTYPE	Air handler type code	1 = Single duct 2 = Dual duct 3 = Multizone
CCNEVAP	Evaporative section type code	0 = None 1 = Direct 2 = Indirect 3 = Ind-Dir 4 = None
CCNEVAPM	Evaporative system measure ID flag	
CCNFTYPE	Fan type code	0 = DK 1 = Constant Volume 2 = Two-Speed 3 = Variable Volume
CCNFCON	Fan control code	0 = DK 1 = Constant Volume 2 = Cycles 3 = VSD 4 = Discharge Dampers 5 = Inlet Vanes
CCNFCONM	Fan control measure ID flag	N/A
CCNFLOW	AHU Supply CFM	N/A
CCNSHP	Supply Fan motor hp	N/A
CCNSHPM	Supply fan motor measure ID flag	N/A
CCNSRPM3	Supply fan motor efficiency	N/A

Field Heading	Value	Comments
CCNRHP	Return fan motor hp	N/A
CCNRRPM3	Return fan motor efficiency	N/A
CCNRHPM	Return fan motor measure ID flag	N/A
CCNOA	Economizer control code	1 = Fixed 2 = Temperature 3 = Enthalpy 4 = DK
CCNOAM	Economizer measure flag	N/A
C_OA	Outdoor Air Fraction	N/A
CNOTE	AHU Notes field	N/A
vsys	Virtual system assignment	N/A
zC_OARQD	Not Used	N/A
zCENQTY	Not Used	N/A
zCENQTYM	Not Used	N/A
zCENTYPE	Not Used	N/A
zCENEVAP	Not Used	N/A
zCENEVAPM	Not Used	N/A
zCENFTYPE	Not Used	N/A
zCENFCON	Not Used	N/A
zCENFCONM	Not Used	N/A
zCENFLOW	Not Used	N/A
zCENSHP	Not Used	N/A
zCENSHPM	Not Used	N/A
zCENSMOT	Not Used	N/A
zCENSRPM3	Not Used	N/A
zCENSRPM1	Not Used	N/A
zCCNSRPM1	Not Used	N/A
zCENSRPM2	Not Used	N/A
zCCNSRPM2	Not Used	N/A

Field Heading	Value	Comments
zCENRHP	Not Used	N/A
zCENRHPM	Not Used	N/A
zCENRMOT	Not Used	N/A
zCCNRMOT	Not Used	N/A
zCENRRPM1	Not Used	N/A
zCCNRRPM1	Not Used	N/A
zCENRRPM2	Not Used	N/A
zCCNRRPM2	Not Used	N/A
zCENRRPM3	Not Used	N/A
zCENOA	Not Used	N/A
zCENOAM	Not Used	N/A
zSRVMORE	Not Used	N/A
zCEN_NO	Not Used	N/A
zCENT24	Not Used	N/A
zCENLOC	Not Used	N/A
CNFLOWUN	AHU Supply flow rate units. Code	0 = cfm 1 = cfm/sf
bOld	Old Construction?	N/A
EMSSupFanC	EMS Control of Supply Fan	N/A
EMSOACtrl	EMS Control of OA	N/A
DuctLeak	Duct leakage as percent of design flow.	N/A

Table 52: ccentair

Field Heading	Value	Comments
SITEID	RLW Site ID Number	N/A
CCH_NO	Chiller ID number	N/A
SRVMORE	Flag to indicate matchup between chiller and surveyed space	N/A

Field Heading	Value	Comments
CCHT24	Chiller name	N/A
CCHLOC	Chiller location	N/A
CCHQTY	Chiller quantity	N/A
CCHQTYM	Chiller measure flag	N/A
CCHMANU	Chiller manufacturer	N/A
CCHMOD	Chiller model number	N/A
CCHSER	Chiller serial number Only required when greater than 250 tons.	N/A
CCHSIZE	Chiller size (tons)	N/A
CCHTYPE	Chiller type code	1 = Electric Reciprocating Chiller 2 = Electric Screw Chiller 3 = Electric Centrifugal Chiller 4 = Absorption Chiller 5 = Gas Engine Chiller
CCHEFFC	Chiller rated efficiency (kW/ton)	N/A
CCHFANHP	Air-cooled condenser fan hp (air cooled chillers w/ integral condenser only)	N/A
CNOTE	Chiller notes	N/A
CT24EFF	Not used	N/A
CMSTRYCHL	Flag for invalid make/model number	N/A
CISGT250	Not used	N/A
bOld	Old Construction?	N/A
CondType	Condenser Type Air/ Water default = Water	N/A

Table 53: cchiller

Field Heading	Value	Comments
SITEID	RLW Site ID Number	N/A
CHE_NO	Heating system ID number	N/A
CHET24	Heating system name	N/A
CHELOC	Heating system location	N/A
CHEQTY	Equipment quantity	N/A
CHEQTYM	Measure ID flag	N/A
CHEMANU	Manufacturer	N/A
CHEMOD	Model number	N/A
cCap	Heating output capacity	N/A
CHETYPE	Equipment type code	N/A
CHEFUEL	Heating fuel	N/A
CNOTE	Heating system notes	N/A
zCHEFANHP	Draft fan hp	N/A
hCapUnit	Heating capacity units (kBtu/hr or kW)	N/A
bOld	Old Construction?	N/A
Effcy	Boiler Efficiency	N/A

Table 54: cHeatSys

Field Heading	Value	Comments
City Name	City name closest to building site	N/A
Elevation	Elevation (ft)	N/A
Climate Zone	CEC climate zone	N/A
C Dry Bulb	Summer design dry bulb temperature (deg F)	N/A
C Wet Bulb	Summer design wet bulb temperature (deg F)	N/A

Field Heading	Value	Comments
Latitiude	Degrees N latitude	N/A

Table 55: CityList

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
cac_no	Unit ID number	N/A
cact24	Unit name	N/A
CACLOC	Unit location	N/A
CACQTY	Quantity	N/A
CACQTYM	Measure flag	N/A
CACTYPE	Unit type code	1 = Pkg Rooftop AC, 2 = Pkg Rooftop HP, 3 = Split AC, 4 = Split HP, 5 = PTAC, 6 = PTHP, 7 = Window/Wall AC, 8=Window/Wall HP, 9=Water Loop HP, 10 = Dual Fuel HP, 11 = Evap System, 12 = Groundwater Source HP, 13 = Ground Source HP
CACMANU	Manufacturer	N/A
CACMOD	Model number of unit (outdoor section only if split system)	N/A
cMod_In	Model number of indoor section if split system	N/A
CACCCAP	Output capacity at ARI rating conditions (ton)	N/A
CACEFFC	Cooling efficiency at ARI rating conditions (EER or SEER)	N/A
CACEER	Cooling efficiency units (EER or SEER)	N/A
CACFUEL	Heating fuel	N/A

Field Heading	Value	Comments
CACHCAP	Heating capacity (kBtu/hr) (at 47 OAT if heat pump)	N/A
CACCON	Condenser type	0 = DK; 1 = ap. Cnd.; 2 = Dry Air; 3 = Pad pre-cooler
CACCONM	Condenser measure flag	
CACESYS	Evaporative section type code	0 = None, 1 = Direct, 2 = Indirect, 3 = Ind-Dir, 4 = None
CACESYSM	Evaporative section measure flag	N/A
CACFTYPE	Fan type code	0 = DK , 1 = Constant Volume, 2 = VAV, 3 = VVT
CACFCON	Fan control code	0 = DK, 1 = Constant Volume, 2 = Cycles, 3 = VSD, 4 = Discharge Dampers, 5 = Inlet Vanes
CACFCONM	Fan control measure flag	N/A
CACFANHP	Supply fan hp	N/A
CACCONHP	Not used	N/A
CACRETHP	Return fan hp	N/A
CACOA	Economizer control code	1 = Fixed, 2 = Temperature, 3 = Enthalpy, 4 = DK
CACOAM	Economizer measure flag	N/A
CSUPCFM	Supply fan CFM	N/A
C_HCOP	Heating system efficiency	N/A
m_hcp	Heating system measure flag - either heat pump or gas furnace	N/A
htEfUnit	Heating efficiency units	1 = COP, 2 = HSPF, 3 = AFUE
C_OA	Outdoor air fraction	N/A
CNOTE	Packaged system notes	N/A
CMSTRYUNIT	Not used	N/A
vsys	Virtual system assignment	N/A

Field Heading	Value	Comments
TwrCode	Cooling tower assignment (for water loop heat pumps only)	N/A
bOld	Old Construction?	N/A
EMSSupFanC	EMS Supply Fan Control?	N/A
EMSOACtrl	EMS OA Control?	N/A
SerialNo	Serial Number	N/A
TStatMN	Thermostat model number	N/A
TStatLoc	Thermostat location	N/A
SFMotorEff	Supply fan motor efficiency(0-100)	N/A
RFMotorEff	Return fan motor efficiency(0-100)	N/A
DuctLeak	Duct leakage as percent of design flow.	N/A
SFMotorKw	Supply fan motor kW	N/A
RFMotorKw	Return fan motor kW	N/A
EcNoWork	Economizer not working (Yes means it's not working)	N/A

Table 56: cPHVACSY

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
CPMP_NO	Pump ID	N/A
PmpQty	Quantity of this type of pump	N/A
cPmpNm	Pump Name	N/A
CPMPHP	Pump motor hp	N/A
CPMPRPM3	Pump motor efficiency	N/A

Field Heading	Value	Comments
mP_Eff	motor efficiency measure flag	N/A
CPMPCTRL	Pump control code	1 = CV, 2 = 2-spd, 3 = VSD, 4 = DK
mP_ctrl	pump control measure flag	N/A
CPMPLOC	Pump location	N/A
CPMPLOOP	Pump loop flag	1 = Chilled water, 2 = Condenser water, 3 = Hot water
CPMPUSE	loop type flag	1 = primary, 2 = secondary
CNOTE	Pump notes	N/A
zCPMPTYPE	not used	N/A
zCPMPRPM1	not used	N/A
zCPMPRPM2	not used	N/A
zCPMPM	not used	N/A
SRVMORE	not used	N/A
M94	Generic measure flag from '94 PGE/SCE survey data	N/A
Bold	Old Construction?	N/A
EMS	EMS Control ?	N/A

Table 57: cPump

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
CTW_NO	Tower ID	N/A
CTWT24	Tower name	N/A
CTWLOC	Tower location	N/A
CTWQTY	Tower quantity	N/A
CTWQTYM	Tower measure flag	N/A
CTWMANU	Tower manufacturer	N/A
CTWMOD	Tower model number	N/A

Field Heading	Value	Comments
CTWFANHP	Tower fan hp(Large)	N/A
CTWCTRL	Tower fan control code	1 = 1 speed, 2 = 2 speed, 3 = VSD, 4 = Pony
CTWCTRLM	Tower fan control measure flag	N/A
CTWPUMP	Tower pump hp(Spray)	N/A
CNOTE	Tower notes	N/A
RateCap	Heat rejection capacity at rated conditions	N/A
RateCond	Rated Condensing Temp	N/A
RambWB	Rated Ambient Wet Bulb	N/A
RambDB	Rated Ambient Dry Bulb	N/A
TWFANEFF	Tower fan motor efficiency(Large)	N/A
Bold	Old Construction?	N/A
SmlFanHP	Small Fan HP	N/A
SmlFanEff	Small Fan Efficiency	N/A
SprayPmpEf	Tower pump efficiency (Spray)	N/A

Table 58: cTower

Field Heading	Value	Comments
SITEID	RLW site ID	N/A
ZONE	Zone ID	N/A
cst24	Wall name	N/A
CSTYPE	Wall type code	1 = Brick & brick, 2 = Brick & conc, 3 = Brick & block, 4 = Concrete & finish, 5 = Block & finish, 6 = Wood frame, 7 = Metal frame, 8= Curtain wal, 9= Open
CSR	Insulation R-value	N/A
CUval	Overall U-value	N/A

Field Heading	Value	Comments
CHC	Assembly heat capacity	N/A
CSORI	Compass Orientation= N, NE, E , SE, S, SW, W, NW	N/A
CSHGHT	Gross Wall height (ft) (includes windows)	N/A
CSWDTH	Gross Wall width (ft) (includes windows)	N/A
CSM	Measure ID flag	N/A
CNOTE	Wall notes	N/A
Bold	Old Construction?	N/A
WallNo	Wall number, auto generated	N/A

Table 59: cWalls

Field Heading	Value	Comments
SITEID	RLW site ID	N/A
ZONE	Zone ID	N/A
CWT24	Window name	N/A
CWTYPE	Glass type code	C=Clear, R=Reflective, T=Tinted, F=Fritted
CWSC	Window shading coefficient	N/A
cWinuVAl	Window U-value	N/A
CWORI	Window orientation	SW, W, NW, H (horizontal) (Not used v17.15+)
CWHGHT	Window height (ft)	N/A
CWWDTH	Window width (ft)	N/A
CWQTY	Window quantity	N/A
CWISHAD	Interior shading type code	1 = None, 2 = Blinds, 3 = Light shds/drps, 4 = Dark shds/drps
cPctShd	Overall window shading (%)	N/A

Field Heading	Value	Comments
CWOHOFF	Fixed overhang offset (ft)	N/A
CWOHPROJ	Fixed overhang projection (ft)	N/A
CWM	Measure flag	0 = No, 1 = Shell Measure, 2 = Daylighting Measure
CNOTE	Window notes	N/A
Panes	Number of panes	N/A
Frame	Frame type code	S=Std. Metal; T=Thermal Break Metal; W=Wood or Vinyl
Bold	Old Construction	N/A
MeasTrans	Measured transmission	N/A
SHGC	Solar heat gain coefficent	N/A
SFOffset	Side fin offset (ft)	N/A
SFProj	Side fin projection (ft)	N/A
WallNo	Wall number to which window is assigned	N/A
Features	Window features	1 = Low-E, 2 = Gas-Filled, 3 = Low-E, Gas-Filled

Table 60: cWindows

Field Heading	Value	Comments
SiteID	Site ID	N/A
Vsys	Virtual system assignment	N/A
Location	Location of the ducts	1 = Plenum, 2 = Conditioned, 3 = Outside, 4 = Other
Constr	Duct construction	1 = Sheetmetal, 2 = Flex, 3 = Fiberglass, 4 = Ductboard, 5 = Other
Rvalue	Insulation R-value	N/A
RelArea	Not Used	N/A
Type	Type of duct	1 = Supply, 2 = Return

Field Heading	Value	Comments
Diameter	Diameter of round ducts	N/A
Width	Width of rectangular ducts	N/A
Height	Height of rectangular ducts	N/A
Run	Length of duct run	N/A
Notes	Notes regarding this duct entry	N/A

Table 61: Ducts

Field Heading	Value	Comments
siteid	RLW SIte ID number	N/A
emefl01	Full occupancy exterior miscellaneous load schedule hour 1	N/A
emefl02	Full occupancy exterior miscellaneous load schedule hour 2	N/A
emefl03	Full occupancy exterior miscellaneous load schedule hour 3	N/A
emefl04	Full occupancy exterior miscellaneous load schedule hour 4	N/A
emefl05	Full occupancy exterior miscellaneous load schedule hour 5	N/A
emefl06	Full occupancy exterior miscellaneous load schedule hour 6	N/A
emefl07	Full occupancy exterior miscellaneous load schedule hour 7	N/A
emefl08	Full occupancy exterior miscellaneous load schedule hour 8	N/A

Field Heading	Value	Comments
emefl09	Full occupancy exterior miscellaneous load schedule hour 9	N/A
emefl10	Full occupancy exterior miscellaneous load schedule hour 10	N/A
emefl11	Full occupancy exterior miscellaneous load schedule hour 11	N/A
emefl12	Full occupancy exterior miscellaneous load schedule hour 12	N/A
emefl13	Full occupancy exterior miscellaneous load schedule hour 13	N/A
emefl14	Full occupancy exterior miscellaneous load schedule hour 14	N/A
emefl15	Full occupancy exterior miscellaneous load schedule hour 15	N/A
emefl16	Full occupancy exterior miscellaneous load schedule hour 16	N/A
emefl17	Full occupancy exterior miscellaneous load schedule hour 17	N/A
emefl18	Full occupancy exterior miscellaneous load schedule hour 18	N/A
emefl19	Full occupancy exterior miscellaneous load schedule hour 19	N/A
emefl20	Full occupancy exterior miscellaneous load schedule hour 20	N/A
emefl21	Full occupancy exterior miscellaneous load schedule hour 21	N/A

Field Heading	Value	Comments
emefl22	Full occupancy exterior miscellaneous load schedule hour 22	N/A
emefl23	Full occupancy exterior miscellaneous load schedule hour 23	N/A
emefl24	Full occupancy exterior miscellaneous load schedule hour 24	N/A
emelt01	Light occupancy exterior miscellaneous load schedule hour 1	N/A
emelt02	Light occupancy exterior miscellaneous load schedule hour 2	N/A
emelt03	Light occupancy exterior miscellaneous load schedule hour 3	N/A
emelt04	Light occupancy exterior miscellaneous load schedule hour 4	N/A
emelt05	Light occupancy exterior miscellaneous load schedule hour 5	N/A
emelt06	Light occupancy exterior miscellaneous load schedule hour 6	N/A
emelt07	Light occupancy exterior miscellaneous load schedule hour 7	N/A
emelt08	Light occupancy exterior miscellaneous load schedule hour 8	N/A
emelt09	Light occupancy exterior miscellaneous load schedule hour 9	N/A
emelt10	Light occupancy exterior miscellaneous load schedule hour 10	N/A

Field Heading	Value	Comments
emelt11	Light occupancy exterior miscellaneous load schedule hour 11	N/A
emelt12	Light occupancy exterior miscellaneous load schedule hour 12	N/A
emelt13	Light occupancy exterior miscellaneous load schedule hour 13	N/A
emelt14	Light occupancy exterior miscellaneous load schedule hour 14	N/A
emelt15	Light occupancy exterior miscellaneous load schedule hour 15	N/A
emelt16	Light occupancy exterior miscellaneous load schedule hour 16	N/A
emelt17	Light occupancy exterior miscellaneous load schedule hour 17	N/A
emelt18	Light occupancy exterior miscellaneous load schedule hour 18	N/A
emelt19	Light occupancy exterior miscellaneous load schedule hour 19	N/A
emelt20	Light occupancy exterior miscellaneous load schedule hour 20	N/A
emelt21	Light occupancy exterior miscellaneous load schedule hour 21	N/A
emelt22	Light occupancy exterior miscellaneous load schedule hour 22	N/A
emelt23	Light occupancy exterior miscellaneous load schedule hour 23	N/A

Field Heading	Value	Comments
emelt24	Light occupancy exterior miscellaneous load schedule hour 24	N/A
emecl01	Closed occupancy exterior miscellaneous load schedule hour 1	N/A
emecl02	Closed occupancy exterior miscellaneous load schedule hour 2	N/A
emecl03	Closed occupancy exterior miscellaneous load schedule hour 3	N/A
emecl04	Closed occupancy exterior miscellaneous load schedule hour 4	N/A
emecl05	Closed occupancy exterior miscellaneous load schedule hour 5	N/A
emecl06	Closed occupancy exterior miscellaneous load schedule hour 6	N/A
emecl07	Closed occupancy exterior miscellaneous load schedule hour 7	N/A
emecl08	Closed occupancy exterior miscellaneous load schedule hour 8	N/A
emecl09	Closed occupancy exterior miscellaneous load schedule hour 9	N/A
emecl10	Closed occupancy exterior miscellaneous load schedule hour 10	N/A
emecl11	Closed occupancy exterior miscellaneous load schedule hour 11	N/A
emecl12	Closed occupancy exterior miscellaneous load schedule hour 12	N/A

Field Heading	Value	Comments
emecl13	Closed occupancy exterior miscellaneous load schedule hour 13	N/A
emecl14	Closed occupancy exterior miscellaneous load schedule hour 14	N/A
emecl15	Closed occupancy exterior miscellaneous load schedule hour 15	N/A
emecl16	Closed occupancy exterior miscellaneous load schedule hour 16	N/A
emecl17	Closed occupancy exterior miscellaneous load schedule hour 17	N/A
emecl18	Closed occupancy exterior miscellaneous load schedule hour 18	N/A
emecl19	Closed occupancy exterior miscellaneous load schedule hour 19	N/A
emecl20	Closed occupancy exterior miscellaneous load schedule hour 20	N/A
emecl21	Closed occupancy exterior miscellaneous load schedule hour 21	N/A
emecl22	Closed occupancy exterior miscellaneous load schedule hour 22	N/A
emecl23	Closed occupancy exterior miscellaneous load schedule hour 23	N/A
emecl24	Closed occupancy exterior miscellaneous load schedule hour 24	N/A

Table 62: ExtMiscSched

Field Heading	Value	Comments
SITEID	RLW site ID	N/A
ZONE	Zone ID	N/A
K1QTY	Equipment quantity	N/A
K1TYPE	Equipment type code	N/A
K1FUEL	Fuel type code	1 = Electric, 2 = Other, 3 = DK, 4 = none
K1KW	Electric equip nameplate kW	N/A
K1VOLT	Electric equip nameplate V	N/A
K1AMP	Electric equip nameplate amps	N/A
K1KBTUH	Gas equip nameplate input rating (kBtu/hr)	N/A
K1SIZE	Trade size	N/A
K1HOOD	Hood ID code	N/A

Table 63: foodsvc

Field Heading	Value	Comments
SITEID	RLW site ID	N/A
ZONE	Zone ID	N/A
H1TYPE	Hood type code	0 = DK, 1 = Canopy, 2 = Island, 3 = Backshelf
H1SIZE	Hood face area (SF)	N/A
H1FLOW	Hood flow rate (CFM)	N/A
H1HP	Makeup and Exhaust fan hp	N/A
H1AIR	Makeup air source	0 = DK, 1 = Conditioned MUA, 2 = Unconditioned MUA

Table 64: foodsvc2

Field Heading	Value	Comments
SITEID	RLW site ID	N/A
wh1loc	Water heater location	N/A
WH1TYPE	Water heater type code	1 = Storage, 2 = Instantaneous, 3 = Heat Pump
WH1CAP	Water heater storage tank capacity (gal)	N/A
WH1FUEL	Water heater fuel code	1 = Electric, 2 = Other, 3 = DK, 4 = none
WH1HP	Service hot water recirc pump hp	N/A
WH1M	Measure flag	N/A
bOld	Old Construction ?	N/A
Input	Energy input, kBtuh for fuel type other, kWh for fuel type electric	N/A
EF	Energy Factor (if type residential)	N/A
RecEff	Recovery efficency (%) (if type residential)	N/A
ThermEff	Thermal efficiency (%) (if type commercial)	N/A
SBLoss	Standby loss (%/hr) (if type commercial)	N/A
Make	Manufacturer	N/A
ModelNo	Model number	N/A

Table 65: hotwat1

Field Heading	Value	Comments
siteID	Text	N/A
Incident	Text	N/A
Comment	Memo	N/A

Table 66: Incidents

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
Name1	Site Name	N/A
Name2	Site Name	N/A
Address1	Site Address	N/A
city	Site City	N/A
SURVEYOR	Surveyor name	N/A
Engineer	Engineer name	N/A
NCCalcBlg	Building type code, see keyNCCalcBlg	N/A
qFlr_sf	Total building SF	N/A
qnew_eq	Whole building flag (new const = total)	N/A
qnew_sf	New construction SF	N/A
qChgs	Any changes in overall energy use since built	N/A
qTnt_cnt	# of tenants	N/A
qTnt_mtr	Tenant metering flag (Do the majority of tentants have their own electric meters)	N/A
t24env	Title 24 ENV compliance path code	0 = DK, 1 = Component, 2 = Overall Envelope, 3 = Performance
t24mech	Title 24 MECH compliance path code	0 = DK, 1 = Prescriptive, 2 = Performance
t24ltg	Title 24 LTG compliance path code	0 = DK, 1 = Complete Building, 2 = Area Category, 3 = Tailored, 4 = Performance
qRfCtrl1	Not used	N/A
qRfCtrl2	Not used	N/A
Q1	Number of areas in building	N/A
Q2AREA1	Not used	N/A
Q2AREA2	Not used	N/A

Field Heading	Value	Comments
Q2AREA3	Not used	N/A
Q2AREA4	Not used	N/A
Q2AREA5	Not used	N/A
Q38	Exterior lighting control type code	1 = Time Clock, 2 = Photocell, 3 = Both, 4 = Neither, 5 = Don't Know
Q401	Exterior lighting schedule under time clock control= hour 1	N/A
Q402	Exterior lighting schedule under time clock control= hour 2	N/A
Q403	Exterior lighting schedule under time clock control= hour 3	N/A
Q404	Exterior lighting schedule under time clock control= hour 4	N/A
Q405	Exterior lighting schedule under time clock control= hour 5	N/A
Q406	Exterior lighting schedule under time clock control= hour 6	N/A
Q407	Exterior lighting schedule under time clock control= hour 7	N/A
Q408	Exterior lighting schedule under time clock control= hour 8	N/A
Q409	Exterior lighting schedule under time clock control= hour 9	N/A
Q4010	Exterior lighting schedule under time clock control= hour 10	N/A
Q4011	Exterior lighting schedule under time clock control= hour 11	N/A

Field Heading	Value	Comments
Q4012	Exterior lighting schedule under time clock control= hour 12	N/A
Q4013	Exterior lighting schedule under time clock control= hour 13	N/A
Q4014	Exterior lighting schedule under time clock control= hour 14	N/A
Q4015	Exterior lighting schedule under time clock control= hour 15	N/A
Q4016	Exterior lighting schedule under time clock control= hour 16	N/A
Q4017	Exterior lighting schedule under time clock control= hour 17	N/A
Q4018	Exterior lighting schedule under time clock control= hour 18	N/A
Q4019	Exterior lighting schedule under time clock control= hour 19	N/A
Q4020	Exterior lighting schedule under time clock control= hour 20	N/A
Q4021	Exterior lighting schedule under time clock control= hour 21	N/A
Q4022	Exterior lighting schedule under time clock control= hour 22	N/A
Q4023	Exterior lighting schedule under time clock control= hour 23	N/A
Q4024	Exterior lighting schedule under time clock control= hour 24	N/A

Field Heading	Value	Comments
Q42	Window shading occupant behavior code	1 = Always open, 2 = Always closed, 3 = Operated to control comfort, 4 = Open only when occupied
Q56SET	Cooling supply air temperature setpoint (NOT USED MOVED TO VSYSTEMS)	N/A
Q58SET	Chilled water set point temperature	N/A
Q59MIN	Minimum condenser water setpoint	N/A
Q59DK	Not used	N/A
Q59CON	Not used	N/A
Q59FAN	Not used	N/A
Q76	Refrigeration remote condenser flag	1 = Yes, 2 = No
Q78ATEMP	Refrigeration system minimum condensing temperature setpoint	N/A
RefrFhpM	Floating head pressure measure code	N/A
zQ78ADK	Not used	N/A
zQ78BTEMP	Not used	N/A
zQ78BDK	Not used	N/A
zQ78CTEMP	Not used	N/A
zQ78CDK	Not used	N/A
Q79A	LT refrigeration system defrost type code	1 = electric, 2 = hot gas, 3 = time off, 4 = DK
Q79B	MT refrigeration system defrost type code	1 = electric, 2 = hot gas, 3 = time off, 4 = DK
Q79C	HT refrigeration system defrost type code	1 = electric, 2 = hot gas, 3 = time off, 4 = DK
METINFNA	Meter information availability status flag	N/A
STATUS	Not used	N/A

Field Heading	Value	Comments
NOTES	Not used	N/A
q57	Not used	N/A
Q60	Water side economizer flag	0 = Don't know, 1 = Yes, 2 = No
Q61	Water side economizer type flag	1 = Strainer Cycle, 2 = Thermosyphon, 3 = Plate HX, 4 = Unknown
q62jan	Water side economizer enabled flag	N/A
q62feb	Water side economizer enabled flag	N/A
q62mar	Water side economizer enabled flag	N/A
q62apr	Water side economizer enabled flag	N/A
q62may	Water side economizer enabled flag	N/A
q62jun	Water side economizer enabled flag	N/A
q62jul	Water side economizer enabled flag	N/A
q62aug	Water side economizer enabled flag	N/A
q62sep	Water side economizer enabled flag	N/A
q62oct	Water side economizer enabled flag	N/A
q62nov	Water side economizer enabled flag	N/A
q62dec	Water side economizer enabled flag	N/A
q62dk	Water side economizer enabled flag	N/A
ht_off	Heating system lockout flag	N/A
htjan	Monthly heating lockout flag	N/A

Field Heading	Value	Comments
htfeb	Monthly heating lockout flag	N/A
htmar	Monthly heating lockout flag	N/A
htapr	Monthly heating lockout flag	N/A
htmay	Monthly heating lockout flag	N/A
htjun	Monthly heating lockout flag	N/A
htjul	Monthly heating lockout flag	N/A
htaug	Monthly heating lockout flag	N/A
htsep	Monthly heating lockout flag	N/A
htoct	Monthly heating lockout flag	N/A
htnov	Monthly heating lockout flag	N/A
htdec	Monthly heating lockout flag	N/A
htdk	Monthly heating lockout flag	N/A
q43	Pool water temperature setpoint	N/A
q44	Pool cover used flag	0 = No, -1 = Yes
q45	Pool cover on time (24 hr clock)	N/A
q46	Pool cover off time (24 hr clock)	N/A
q47	Spa setpoint temperature	N/A
q48	Spa cover used flag	0 = No, -1 = Yes
q49	Spa cover on time (24 hr clock)	N/A

Field Heading	Value	Comments
q50	Spa cover off time (24 hr clock)	N/A
Q3JAN	Occupied fraction, Jan last year	N/A
Q3FEB	Occupied fraction, Feb last year	N/A
Q3MAR	Occupied fraction, Mar last year	N/A
Q3APR	Occupied fraction, Apr last year	N/A
Q3MAY	Occupied fraction, May last year	N/A
Q3JUN	Occupied fraction, Jun last year	N/A
Q3JUL	Occupied fraction, Jul last year	N/A
Q3AUG	Occupied fraction, Aug last year	N/A
Q3SEP	Occupied fraction, Sep last year	N/A
Q3OCT	Occupied fraction, Oct last year	N/A
Q3NOV	Occupied fraction, Nov last year	N/A
Q3DEC	Occupied fraction, Dec last year	N/A
Q3bJAN	Occupied fraction, Jan this year	N/A
Q3bFEB	Occupied fraction, Feb this year	N/A
Q3bMAR	Occupied fraction, Mar this year	N/A
Q3bAPR	Occupied fraction, Apr this year	N/A
Q3bMAY	Occupied fraction, May this year	N/A

Field Heading	Value	Comments
Q3bJUN	Occupied fraction, Jun this year	N/A
Q3bJUL	Occupied fraction, Jul this year	N/A
Q3bAUG	Occupied fraction, Aug this year	N/A
Q3bSEP	Occupied fraction, Sep this year	N/A
Q3bOCT	Occupied fraction, Oct this year	N/A
Q3bNOV	Occupied fraction, Nov this year	N/A
Q3bDEC	Occupied fraction, Dec this year	N/A
Q4JAN	Conditioned fraction, Jan last year	N/A
Q4FEB	Conditioned fraction, Feb last year	N/A
Q4MAR	Conditioned fraction, Mar last year	N/A
Q4APR	Conditioned fraction, Apr last year	N/A
Q4MAY	Conditioned fraction, May last year	N/A
Q4JUN	Conditioned fraction, Jun last year	N/A
Q4JUL	Conditioned fraction, Jul last year	N/A
Q4AUG	Conditioned fraction, Aug last year	N/A
Q4SEP	Conditioned fraction, Sep last year	N/A
Q4OCT	Conditioned fraction, Oct last year	N/A
Q4NOV	Conditioned fraction, Nov last year	N/A

Field Heading	Value	Comments
Q4DEC	Conditioned fraction, Dec last year	N/A
Q4bJAN	Conditioned fraction, Jan this year	N/A
Q4bFEB	Conditioned fraction, Feb this year	N/A
Q4bMAR	Conditioned fraction, Mar this year	N/A
Q4bAPR	Conditioned fraction, Apr this year	N/A
Q4bMAY	Conditioned fraction, May this year	N/A
Q4bJUN	Conditioned fraction, Jun this year	N/A
Q4bJUL	Conditioned fraction, Jul this year	N/A
Q4bAUG	Conditioned fraction, Aug this year	N/A
Q4bSEP	Conditioned fraction, Sep this year	N/A
Q4bOCT	Conditioned fraction, Oct this year	N/A
Q4bNOV	Conditioned fraction, Nov this year	N/A
Q4bDEC	Conditioned fraction, Dec this year	N/A
qVAV	VAV box type code	0 = Std Boxes, 1 = Fan-powered Boxes, 2 = DK
EntStat	Data entry status code	0 = In progress, 1 = Entry complete DOE, 2 not running, 3 = Entry complete DOE2 runs
CalStat	Calibration status code	0 = In progress, 1 = Billing data not available, 2 = Could not calibrate, 3 = Calibration completed, 4 = Not Started=default

Field Heading	Value	Comments
QCStat	QC status code	0 = In progress, 1 = As-built model QC'd, 2 = Savings QC'd
BriefDsc	Not used	N/A
Incent	Not used	N/A
Floors	Number of floors	N/A
Tlr_ltg	Tailored lighting compliance notes	N/A
Perf_frm	Performance compliance notes	N/A
StartDate	Survey start date	N/A
Start	Survey start time	N/A
FinishDate	Survey finish date	N/A
Finish	Survey finish time	N/A
DiffInfo	Contact info notes field	N/A
backup	Backup generator flag	N/A
pkReduc	Peak reduction flag	N/A
Cogen	Cogen system flag	N/A
Tes	Thermal energy storage flag	N/A
RfConPsi	Minimum condensing pressure setpoint (psig)	N/A
ASHtCtrl	Anti-sweat heater control on room RH flag	N/A
RhOff	Room RH setpoint to turn AS heaters off	N/A
RhOn	Room RH setpoint to turn AS heaters on	N/A
RfCoName	Refrigeration mechanic name	N/A
Stock	Stocking practices code 1 = Cases stocked randomly as needed 2 = Cases stocked on a regular schedule	N/A

Field Heading	Value	Comments
StockTxt	Stocking practices comment field	N/A
rfgntLow	Refrigerant type for LT system= HCFC-22, HFC-134a, R-502, R-11, R-12	N/A
rfgntMed	Refrigerant type for MT system= HCFC-22, HFC-134a, R-502, R-11, R-12	N/A
rfgntHgh	Refrigerant type for HT system= HCFC-22, HFC-134a, R-502, R-11, R-12	N/A
STM	Potential short term monitoring site flag	0 = no , -1 = yes
WinNotes	Not used	N/A
T24Type	Building type from Title 24 categories, see keyTitle24BlgTypes	N/A
EntStatN	Entry status notes.	N/A
CalStatN	Calibration status notes.	N/A
QCStatN	QC status notes.	N/A
CTAppro	Cooling tower approach	N/A
SiteChar	Site Characterization 1-New;2-Alter;3-Addition;4-Alt and Addition	N/A
bInRebateP	Partcipate in in an energy efficient rebate program with local utility?	N/A
CndCtrl	Condenser control	0 = DK, 1 = Fixed, 2 = Reset on Outside temp
CndCtrlEMS	Condenser control on EMS?	N/A
HaveEMS	Does the building have a central EMS system	N/A
EMSM	Did the EMS receive a rebate?	N/A
RfCondCtrl	Refrigeration condenser control	1 = fixed, 2 = wetbulb offset

Field Heading	Value	Comments
RfWBDeltaT	Refrigeration condenser wetbulb offset temperature	N/A
RfLtDfCtrl	LT refrigeration system defrost control code	1 = time clock, 2 = demand, 3 = don't know
RfMtDfCtrl	MT refrigeration system defrost control code	1 = time clock, 2 = demand, 3 = don't know
RfHtDfCtrl	HT refrigeration system defrost control code	1 = time clock, 2 = demand, 3 = don't know
qCEC_typ	Building type code	1 = Large Office, 2 = Small Office, 3 = Restaurants, 4 = Large Retail, 5 = Small Retail, 6 = Food Stores, 7 = Refrg Whses, 8=Non-Refrg Whses, 9=Elem/Scndry Schools, 10 = Colleges, Universities, 11 = Hospitals, 12 = Medical Clinic, 13 = Hotel/Motel, 14 = Misc.
RefrigCalc	Calculate refrigeration savings?	N/A

Table 67: intview1

Field Heading	Value	Comments
SiteID	RLW site ID	N/A
Zone	Zone ID	N/A
Name	Wall name	N/A
Type	Wall type code	1 = Wall, 2 = Air
Area	Wall area (sf) (takes precedense over height/width)	N/A
Height	Wall height (ft)	N/A
Width	Wall width (ft)	N/A
NextTo	Number of adjacent zone	N/A
Notes	Wall notes	N/A

Table 68: IntWalls

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
XL1FIXT	Exterior lighting fixture code	N/A
XL1CNT	Exterior lighting fixture count	N/A
zXL1CONT	Not used	N/A
zXL1HRWK	Not used	N/A
XL1M	Not used, exterior lighting not a measure	N/A
STATUS	Not used	N/A
Comment	Not used	N/A
Location	Exterior lighting fixture location	N/A
bOld	Old construction	N/A

Table 69: lite_ext

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
mc1code	Miscellaneous exterior equipment type code	1 = Misc. Appliance, 2 = Washer, 3 = Dryer, 4 = Cash Register, 5 = Box Crusher, 6 = Gasoline pump, 7 = Air Compressor, 8= Welder, 9 = Battery Charger, 10 = Machine Tools, 11 = Motor, 12 = Other
MC1DESC	Miscellaneous exterior equipment description	N/A
MC1QTY	Miscellaneous exterior equipment quantity	N/A
MC1KW	Miscellaneous exterior equipment kW/unit	N/A
MC1HP	Miscellaneous exterior equipment hp/unit	N/A
MC1HRWK	Not used	N/A
dvrsty	Not used	N/A

Field Heading	Value	Comments
STATUS	Comment field	N/A

Table 70: Misc1

Field Heading	Value	Comments
SiteID	RLW site ID	N/A
Coupon Number	Coupon number	N/A
Coupon Date	Check issue date	N/A
SCE Rep	SCE NC rep	N/A
Address	Street	N/A
City	City	N/A
Zip Code	zip	N/A
Rebate	Check amount	N/A
KW Reduced	Expected demand savings	N/A
KWH Saved	Expected energy savings	N/A
Program	Program year	N/A
category	SIC code	N/A
new cat	SIC description	N/A
Case/Cust	Customer name	N/A
Name		N/A
Project Title	Project title	N/A

Table 71: participants

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
PS1LOC	Pool location	N/A
PS1SF	Water surface area (SF)	N/A
PS1HP	Pump hp	N/A
PS1HEAT	Heated pool flag	N/A

Field Heading	Value	Comments
PH1LOC	Pool heater location	N/A
PH1FUEL	Pool heater fuel type	1 = DK, 2 = Electric, 3 = Other, 4 = DK
PH1TYPE	Solar pool heater type	0 = DK, 1 = Glazed, 2 = Unglazed
PH1SF	Solar pool heater SF	N/A
PH1TILT	Solar pool heater tilt (deg, 0=horizontal)	N/A
PH1HEAT	Pool heat recovery flag	0 = No, -1 = Yes
PH1M	Pool heating measure flag	0 = No, -1 = Yes

Table 72: pools

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
RC1MAKE	Condenser make	N/A
RC1MOD	Condenser model	N/A
RC1TYPE	Condenser type flag	0= DK, 1= Dry, 2 = Evap Cnd or Tower, 3= DK
RC1FANHP	Large Condenser fan hp	N/A
RC1PUMP	Condenser pump hp	N/A
RC1SPCON	Condenser fan control flag	0 = DK 1 = One speed 2 = Two speed 3 = VSD
4 = Pony motor		N/A
RC1M	Oversized condenser measure flag	N/A
RCNote	Condenser notes	N/A
NameCnd	Condenser name	N/A
CompServ	Compressor rack served	N/A
RateCap	Heat rejection capacity at rated conditions	N/A
RateCond	Rated Condensing Temp	N/A

Field Heading	Value	Comments
RambWB	Rated Ambient Wet Bulb	N/A
RambDB	Rated Ambient Dry Bulb	N/A
Mfan	Fan control measure flag	N/A
M94	Generic measure flag from '94 PGE/SCE survey data	N/A
bOld	Old Construction?	N/A
LrgFanM	Not Used	N/A
SmFanM	Not Used	N/A
PumpM	Not Used	N/A

Table 73: refr_Cnd

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
ZONE	Zone containing refrigerated cases	N/A
CR1MAKE	Compressor Make	N/A
CR1MOD	Compressor Model No.	N/A
CR1COMP	Compressor type code	1 = Stand-alone, 2 = Stand-alone w/ VSD, 3 = Parallel equal multiplex, 4 = Parallel unequal multiplex
CR1HP	Compressor motor hp	N/A
CR1TEMP	Rack temperature L;M;H	N/A
CR1AHU	Rejects heat to building HVAC system flag	N/A
CR1M	Compressor measure flag	N/A
NameRCmp	Condenser name	N/A
sst	Compressor Saturated Suction Temperature (SST)	N/A

Field Heading	Value	Comments
EvTons	Compressor capacity (tons)	N/A
bOld	Old Construction?	N/A
SbCooling	Mechanical Cooling?	

Table 74: refrCmp

Field Heading	Value	Comments
SITEID	RLW SIte ID	N/A
ZONE	Zone containing refrigerated cases	N/A
RF1TYPE	Refrigerated case type code	N/A
RF1QTY	Quantity	N/A
RF1SIZE	Refrigerated case size (LF) all except walk-in	N/A
sfWalkIn	Walk-in and walk-in/reach-in size (SF)	N/A
RF1PROD	Product displayed	1 = Ice Cream, 2 = Frozen Food, 3 = Fresh Meat, 4 = Deli, 5 = Dairy/Beverage, 6 = Produce
RF1LOC	Condenser location Int=Inside Rem=Remote	N/A
doorCode	Door type code	N/A
M_door	Door measure flag	N/A
RF1LTG	Case display lighting code	1 = Std, 2 = Ebal, 3 = T-8
M_ltg	Display lighting measure flag	N/A
EE_mtr	Energy efficient evaporator motor flag	N/A
M_mtr	Motor measure flag	N/A
RF1MANU	Not used	N/A

Field Heading	Value	Comments
M94	Generic measure flag from '94 PGE/SCE survey data	N/A
bOld	Old Construction?	N/A
HELSX	High efficiency liquid suction heat exchanger?	N/A
HELSX_M	High efficiency liquid suction heat exchanger a measure?	N/A
LCOHours	Light control off hours	
LightCtrlM	Light control is a measure	

Table 75: refrig

Field Heading	Value	Comments
SITEID	Site ID	N/A
ZONE	Zone ID	N/A
cst24	Roof name	N/A
CSTYPE	Roof type code	10 = ROOF-Conc deck, 11 = ROOF-wood joist, 12 = ROOF-metal joist
CSR	Roof insulation R-value	N/A
cUval	Overall U-value	N/A
cHC	Assembly heat capacity	N/A
CSHGHT	Height (ft)	N/A
CSWDTH	Width (ft)	N/A
CSM	Measure flag	N/A
CNOTE	Notes	N/A
bOld	Old Construction?	N/A
CeilingR	Ceiling insulation R-value	N/A

Field Heading	Value	Comments
Color	Roof color	1=White, 2=Silver, 3=Light grey, 4=Grey, 5=Green, 6=Light brown, 7=Medium brown, 8=Dark brown, 9=Black
Reflect	Roof reflectivity, 0 to 1	N/A
PlenumHt	Plenum height (ft)	N/A
PlenumR	Plenum wall insulation R-value	N/A
RetPlenum	Plenum used for return air?	N/A
Emittance	Roof emittance, 0 to 1	N/A
Surface	Surface type	1=Paint, 2=Elastomeric coating, 3=Single-ply membrane, 4=Metal roofing, 5=Asphalt shingles or roll, 6=Gravel (ballast)
Tilt	Tilt of the roof surface (degrees); 0 = horizontal	N/A
Orient	Compass Orientation= N, NE, E , SE, S, SW, W, NW	N/A
RoofNo	Roof number, auto generated	N/A

Table 76: Roofs

Field Heading	Value	Comments
SITEID	RLW SIte ID	N/A
AREA	Area ID	N/A
Q5_M	Daytype code for Monday	1=full, 2=light, 3=closed
Q5_TU	Daytype code for Tuesday	1=full, 2=light, 3=closed
Q5_W	Daytype code for Wednesday	1=full, 2=light, 3=closed

Field Heading	Value	Comments
Q5_TH	Daytype code for Thursday	1=full, 2=light, 3=closed
Q5_F	Daytype code for Friday	1=full, 2=light, 3=closed
Q5_SA	Daytype code for Saturday	1=full, 2=light, 3=closed
Q5_SU	Daytype code for Sunday	1=full, 2=light, 3=closed
Q5_HOL	Daytype code for Holiday	1=full, 2=light, 3=closed
Q6JANLIT	Lighting % of normal, Jan	N/A
Q6JANHVC	HVAC % of normal, Jan	N/A
Q6JANEQU	Misc. equipment % of normal, Jan	N/A
Q6FEBLIT	Lighting % of normal, Feb	N/A
Q6FEBHVC	HVAC % of normal, Feb	N/A
Q6FEBEQU	Misc. equipment % of normal, Feb	N/A
Q6MARLIT	Lighting % of normal, Mar	N/A
Q6MARHVC	HVAC % of normal, Mar	N/A
Q6MAREQU	Misc. equipment % of normal, Mar	N/A
Q6APRLIT	Lighting % of normal, Apr	N/A
Q6APRHVC	HVAC % of normal, Apr	N/A
Q6APREQU	Misc. equipment % of normal, Apr	N/A
Q6MAYLIT	Lighting % of normal, May	N/A
Q6MAYHVC	HVAC % of normal, May	N/A
Q6MAYEQU	Misc. equipment % of normal, May	N/A
Q6JUNLIT	Lighting % of normal, Jun	N/A
Q6JUNHVC	HVAC % of normal, Jun	N/A

Field Heading	Value	Comments
Q6JUNEQU	Misc. equipment % of normal, Jun	N/A
Q6JULLIT	Lighting % of normal, Jul	N/A
Q6JULHVC	HVAC % of normal, Jul	N/A
Q6JULEQU	Misc. equipment % of normal, Jul	N/A
Q6AUGLIT	Lighting % of normal, Aug	N/A
Q6AUGHVC	HVAC % of normal, Aug	N/A
Q6AUGEQU	Misc. equipment % of normal, Aug	N/A
Q6SEPLIT	Lighting % of normal, Sep	N/A
Q6SEPHVC	HVAC % of normal, Sep	N/A
Q6SEPEQU	Misc. equipment % of normal, Sep	N/A
Q6OCTLIT	Lighting % of normal, Oct	N/A
Q6OCTHVC	HVAC % of normal, Oct	N/A
Q6OCTEQU	Misc. equipment % of normal, Oct	N/A
Q6NOVLIT	Lighting % of normal, Nov	N/A
Q6NOVHVC	HVAC % of normal, Nov	N/A
Q6NOVEQU	Misc. equipment % of normal, Nov	N/A
Q6DECLIT	Lighting % of normal, Dec	N/A
Q6DECHVC	HVAC % of normal, Dec	N/A
Q6DECEQU	Misc. equipment % of normal, Dec	N/A
Q7NY	Holiday observed flag, New Years Day	N/A
Q7MLK	Holiday observed flag, MLK day	N/A
Q7PRES	Holiday observed flag, Presidents day	N/A

Field Heading	Value	Comments
Q7ESTR	Holiday observed flag, Easter	N/A
Q7MEM	Holiday observed flag, Memorial Day	N/A
Q74TH	Holiday observed flag, Jul 4	N/A
Q7LABOR	Holiday observed flag, Labor Day	N/A
Q7COLS	Holiday observed flag, Columbus day	N/A
q7VETS	Holiday observed flag, Veterans day	N/A
Q7THANKS	Holiday observed flag, Thanksgiving	N/A
Q7XMAS	Holiday observed flag, Christmas	N/A
Q8	Not used	N/A
Q91	Full day occupancy, hour 1	N/A
Q92	Full day occupancy, hour 2	N/A
Q93	Full day occupancy, hour 3	N/A
Q94	Full day occupancy, hour 4	N/A
Q95	Full day occupancy, hour 5	N/A
Q96	Full day occupancy, hour 6	N/A
Q97	Full day occupancy, hour 7	N/A
Q98	Full day occupancy, hour 8	N/A
Q99	Full day occupancy, hour 9	N/A
Q910	Full day occupancy, hour 10	N/A
Q911	Full day occupancy, hour 11	N/A
Q912	Full day occupancy, hour 12	N/A
Q913	Full day occupancy, hour 13	N/A

Field Heading	Value	Comments
Q914	Full day occupancy, hour 14	N/A
Q915	Full day occupancy, hour 15	N/A
Q916	Full day occupancy, hour 16	N/A
Q917	Full day occupancy, hour 17	N/A
Q918	Full day occupancy, hour 18	N/A
Q919	Full day occupancy, hour 19	N/A
Q920	Full day occupancy, hour 20	N/A
Q921	Full day occupancy, hour 21	N/A
Q922	Full day occupancy, hour 22	N/A
Q923	Full day occupancy, hour 23	N/A
Q924	Full day occupancy, hour 24	N/A
Q101	Light day occupancy, hour 1	N/A
Q102	Light day occupancy, hour 2	N/A
Q103	Light day occupancy, hour 3	N/A
Q104	Light day occupancy, hour 4	N/A
Q105	Light day occupancy, hour 5	N/A
Q106	Light day occupancy, hour 6	N/A
Q107	Light day occupancy, hour 7	N/A

Field Heading	Value	Comments
Q108	Light day occupancy, hour 8	N/A
Q109	Light day occupancy, hour 9	N/A
Q1010	Light day occupancy, hour 10	N/A
Q1011	Light day occupancy, hour 11	N/A
Q1012	Light day occupancy, hour 12	N/A
Q1013	Light day occupancy, hour 13	N/A
Q1014	Light day occupancy, hour 14	N/A
Q1015	Light day occupancy, hour 15	N/A
Q1016	Light day occupancy, hour 16	N/A
Q1017	Light day occupancy, hour 17	N/A
Q1018	Light day occupancy, hour 18	N/A
Q1019	Light day occupancy, hour 19	N/A
Q1020	Light day occupancy, hour 20	N/A
Q1021	Light day occupancy, hour 21	N/A
Q1022	Light day occupancy, hour 22	N/A
Q1023	Light day occupancy, hour 23	N/A
Q1024	Light day occupancy, hour 24	N/A
Q111	Closed day occupancy, hour 1	N/A

Field Heading	Value	Comments
Q112	Closed day occupancy, hour 2	N/A
Q113	Closed day occupancy, hour 3	N/A
Q114	Closed day occupancy, hour 4	N/A
Q115	Closed day occupancy, hour 5	N/A
Q116	Closed day occupancy, hour 6	N/A
Q117	Closed day occupancy, hour 7	N/A
Q118	Closed day occupancy, hour 8	N/A
Q119	Closed day occupancy, hour 9	N/A
Q1110	Closed day occupancy, hour 10	N/A
Q1111	Closed day occupancy, hour 11	N/A
Q1112	Closed day occupancy, hour 12	N/A
Q1113	Closed day occupancy, hour 13	N/A
Q1114	Closed day occupancy, hour 14	N/A
Q1115	Closed day occupancy, hour 15	N/A
Q1116	Closed day occupancy, hour 16	N/A
Q1117	Closed day occupancy, hour 17	N/A
Q1118	Closed day occupancy, hour 18	N/A
Q1119	Closed day occupancy, hour 19	N/A

Field Heading	Value	Comments
Q1120	Closed day occupancy, hour 20	N/A
Q1121	Closed day occupancy, hour 21	N/A
Q1122	Closed day occupancy, hour 22	N/A
Q1123	Closed day occupancy, hour 23	N/A
Q1124	Closed day occupancy, hour 24	N/A
STATUS	Not used	N/A
thnk_cnt	Days observed during thanksgiving	N/A
xmas_cnt	Days observed during Christmas	N/A
estr_cnt	Days observed during Easter	N/A
nSchdAdj	How to adjust schedule	1 = By duration, 2 = By Intensity

Table 77: sched1

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
AREA	Area ID	N/A
Q121	Full day interior lighting use, hour 1	N/A
Q122	Full day interior lighting use, hour 2	N/A
Q123	Full day interior lighting use, hour 3	N/A
Q124	Full day interior lighting use, hour 4	N/A
Q125	Full day interior lighting use, hour 5	N/A

Field Heading	Value	Comments
Q126	Full day interior lighting use, hour 6	N/A
Q127	Full day interior lighting use, hour 7	N/A
Q128	Full day interior lighting use, hour 8	N/A
Q129	Full day interior lighting use, hour 9	N/A
Q1210	Full day interior lighting use, hour 10	N/A
Q1211	Full day interior lighting use, hour 11	N/A
Q1212	Full day interior lighting use, hour 12	N/A
Q1213	Full day interior lighting use, hour 13	N/A
Q1214	Full day interior lighting use, hour 14	N/A
Q1215	Full day interior lighting use, hour 15	N/A
Q1216	Full day interior lighting use, hour 16	N/A
Q1217	Full day interior lighting use, hour 17	N/A
Q1218	Full day interior lighting use, hour 18	N/A
Q1219	Full day interior lighting use, hour 19	N/A
Q1220	Full day interior lighting use, hour 20	N/A
Q1221	Full day interior lighting use, hour 21	N/A
Q1222	Full day interior lighting use, hour 22	N/A
Q1223	Full day interior lighting use, hour 23	N/A

Field Heading	Value	Comments
Q1224	Full day interior lighting use, hour 24	N/A
Q131	Light day interior lighting use, hour 1	N/A
Q132	Light day interior lighting use, hour 2	N/A
Q133	Light day interior lighting use, hour 3	N/A
Q134	Light day interior lighting use, hour 4	N/A
Q135	Light day interior lighting use, hour 5	N/A
Q136	Light day interior lighting use, hour 6	N/A
Q137	Light day interior lighting use, hour 7	N/A
Q138	Light day interior lighting use, hour 8	N/A
Q139	Light day interior lighting use, hour 9	N/A
Q1310	Light day interior lighting use, hour 10	N/A
Q1311	Light day interior lighting use, hour 11	N/A
Q1312	Light day interior lighting use, hour 12	N/A
Q1313	Light day interior lighting use, hour 13	N/A
Q1314	Light day interior lighting use, hour 14	N/A
Q1315	Light day interior lighting use, hour 15	N/A
Q1316	Light day interior lighting use, hour 16	N/A
Q1317	Light day interior lighting use, hour 17	N/A

Field Heading	Value	Comments
Q1318	Light day interior lighting use, hour 18	N/A
Q1319	Light day interior lighting use, hour 19	N/A
Q1320	Light day interior lighting use, hour 20	N/A
Q1321	Light day interior lighting use, hour 21	N/A
Q1322	Light day interior lighting use, hour 22	N/A
Q1323	Light day interior lighting use, hour 23	N/A
Q1324	Light day interior lighting use, hour 24	N/A
Q141	Closed day interior lighting use, hour 1	N/A
Q142	Closed day interior lighting use, hour 2	N/A
Q143	Closed day interior lighting use, hour 3	N/A
Q144	Closed day interior lighting use, hour 4	N/A
Q145	Closed day interior lighting use, hour 5	N/A
Q146	Closed day interior lighting use, hour 6	N/A
Q147	Closed day interior lighting use, hour 7	N/A
Q148	Closed day interior lighting use, hour 8	N/A
Q149	Closed day interior lighting use, hour 9	N/A
Q1410	Closed day interior lighting use, hour 10	N/A
Q1411	Closed day interior lighting use, hour 11	N/A

Field Heading	Value	Comments
Q1412	Closed day interior lighting use, hour 12	N/A
Q1413	Closed day interior lighting use, hour 13	N/A
Q1414	Closed day interior lighting use, hour 14	N/A
Q1415	Closed day interior lighting use, hour 15	N/A
Q1416	Closed day interior lighting use, hour 16	N/A
Q1417	Closed day interior lighting use, hour 17	N/A
Q1418	Closed day interior lighting use, hour 18	N/A
Q1419	Closed day interior lighting use, hour 19	N/A
Q1420	Closed day interior lighting use, hour 20	N/A
Q1421	Closed day interior lighting use, hour 21	N/A
Q1422	Closed day interior lighting use, hour 22	N/A
Q1423	Closed day interior lighting use, hour 23	N/A
Q1424	Closed day interior lighting use, hour 24	N/A
Q151	Full day miscellaneous equipment use, hour 1	N/A
Q152	Full day miscellaneous equipment use, hour 2	N/A
Q153	Full day miscellaneous equipment use, hour 3	N/A
Q154	Full day miscellaneous equipment use, hour 4	N/A
Q155	Full day miscellaneous equipment use, hour 5	N/A

Field Heading	Value	Comments
Q156	Full day miscellaneous equipment use, hour 6	N/A
Q157	Full day miscellaneous equipment use, hour 7	N/A
Q158	Full day miscellaneous equipment use, hour 8	N/A
Q159	Full day miscellaneous equipment use, hour 9	N/A
Q1510	Full day miscellaneous equipment use, hour 10	N/A
Q1511	Full day miscellaneous equipment use, hour 11	N/A
Q1512	Full day miscellaneous equipment use, hour 12	N/A
Q1513	Full day miscellaneous equipment use, hour 13	N/A
Q1514	Full day miscellaneous equipment use, hour 14	N/A
Q1515	Full day miscellaneous equipment use, hour 15	N/A
Q1516	Full day miscellaneous equipment use, hour 16	N/A
Q1517	Full day miscellaneous equipment use, hour 17	N/A
Q1518	Full day miscellaneous equipment use, hour 18	N/A
Q1519	Full day miscellaneous equipment use, hour 19	N/A
Q1520	Full day miscellaneous equipment use, hour 20	N/A
Q1521	Full day miscellaneous equipment use, hour 21	N/A
Q1522	Full day miscellaneous equipment use, hour 22	N/A
Q1523	Full day miscellaneous equipment use, hour 23	N/A

Field Heading	Value	Comments
Q1524	Full day miscellaneous equipment use, hour 24	N/A
Q161	Light day miscellaneous equipment use, hour 1	N/A
Q162	Light day miscellaneous equipment use, hour 2	N/A
Q163	Light day miscellaneous equipment use, hour 3	N/A
Q164	Light day miscellaneous equipment use, hour 4	N/A
Q165	Light day miscellaneous equipment use, hour 5	N/A
Q166	Light day miscellaneous equipment use, hour 6	N/A
Q167	Light day miscellaneous equipment use, hour 7	N/A
Q168	Light day miscellaneous equipment use, hour 8	N/A
Q169	Light day miscellaneous equipment use, hour 9	N/A
Q1610	Light day miscellaneous equipment use, hour 10	N/A
Q1611	Light day miscellaneous equipment use, hour 11	N/A
Q1612	Light day miscellaneous equipment use, hour 12	N/A
Q1613	Light day miscellaneous equipment use, hour 13	N/A
Q1614	Light day miscellaneous equipment use, hour 14	N/A
Q1615	Light day miscellaneous equipment use, hour 15	N/A
Q1616	Light day miscellaneous equipment use, hour 16	N/A
Q1617	Light day miscellaneous equipment use, hour 17	N/A

Field Heading	Value	Comments
Q1618	Light day miscellaneous equipment use, hour 18	N/A
Q1619	Light day miscellaneous equipment use, hour 19	N/A
Q1620	Light day miscellaneous equipment use, hour 20	N/A
Q1621	Light day miscellaneous equipment use, hour 21	N/A
Q1622	Light day miscellaneous equipment use, hour 22	N/A
Q1623	Light day miscellaneous equipment use, hour 23	N/A
Q1624	Light day miscellaneous equipment use, hour 24	N/A
Q171	Closed day miscellaneous equipment use, hour 1	N/A
Q172	Closed day miscellaneous equipment use, hour 2	N/A
Q173	Closed day miscellaneous equipment use, hour 3	N/A
Q174	Closed day miscellaneous equipment use, hour 4	N/A
Q175	Closed day miscellaneous equipment use, hour 5	N/A
Q176	Closed day miscellaneous equipment use, hour 6	N/A
Q177	Closed day miscellaneous equipment use, hour 7	N/A
Q178	Closed day miscellaneous equipment use, hour 8	N/A
Q179	Closed day miscellaneous equipment use, hour 9	N/A
Q1710	Closed day miscellaneous equipment use, hour 10	N/A
Q1711	Closed day miscellaneous equipment use, hour 11	N/A

Field Heading	Value	Comments
Q1712	Closed day miscellaneous equipment use, hour 12	N/A
Q1713	Closed day miscellaneous equipment use, hour 13	N/A
Q1714	Closed day miscellaneous equipment use, hour 14	N/A
Q1715	Closed day miscellaneous equipment use, hour 15	N/A
Q1716	Closed day miscellaneous equipment use, hour 16	N/A
Q1717	Closed day miscellaneous equipment use, hour 17	N/A
Q1718	Closed day miscellaneous equipment use, hour 18	N/A
Q1719	Closed day miscellaneous equipment use, hour 19	N/A
Q1720	Closed day miscellaneous equipment use, hour 20	N/A
Q1721	Closed day miscellaneous equipment use, hour 21	N/A
Q1722	Closed day miscellaneous equipment use, hour 22	N/A
Q1723	Closed day miscellaneous equipment use, hour 23	N/A
Q1724	Closed day miscellaneous equipment use, hour 24	N/A
Q181	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 1	N/A
Q182	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 2	N/A
Q183	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 3	N/A

Field Heading	Value	Comments
Q184	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 4	N/A
Q185	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 5	N/A
Q186	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 6	N/A
Q187	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 7	N/A
Q188	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 8	N/A
Q189	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 9	N/A
Q1810	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 10	N/A
Q1811	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 11	N/A
Q1812	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 12	N/A
Q1813	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 13	N/A
Q1814	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 14	N/A
Q1815	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 15	N/A
Q1816	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 16	N/A

Field Heading	Value	Comments
Q1817	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 17	N/A
Q1818	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 18	N/A
Q1819	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 19	N/A
Q1820	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 20	N/A
Q1821	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 21	N/A
Q1822	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 22	N/A
Q1823	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 23	N/A
Q1824	Full day kitchen appliance use (High, Med, Low, Idle, Off), hour 24	N/A
Q191	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 1	N/A
Q192	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 2	N/A
Q193	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 3	N/A
Q194	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 4	N/A
Q195	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 5	N/A

Field Heading	Value	Comments
Q196	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 6	N/A
Q197	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 7	N/A
Q198	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 8	N/A
Q199	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 9	N/A
Q1910	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 10	N/A
Q1911	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 11	N/A
Q1912	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 12	N/A
Q1913	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 13	N/A
Q1914	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 14	N/A
Q1915	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 15	N/A
Q1916	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 16	N/A
Q1917	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 17	N/A
Q1918	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 18	N/A

Field Heading	Value	Comments
Q1919	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 19	N/A
Q1920	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 20	N/A
Q1921	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 21	N/A
Q1922	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 22	N/A
Q1923	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 23	N/A
Q1924	Light day kitchen appliance use (High, Med, Low, Idle, Off), hour 24	N/A
STATUS	Not used	N/A

Table 78: sched2

Field Heading	Value	Comments
SITEID	RLW SIte ID	N/A
VSYS	Virtual system ID	N/A
h1	Closed daytype fan operation status flag, hour 1	N/A
h2	Closed daytype fan operation status flag, hour 2	N/A
h3	Closed daytype fan operation status flag, hour 3	N/A
h4	Closed daytype fan operation status flag, hour 4	N/A
h5	Closed daytype fan operation status flag, hour 5	N/A
h6	Closed daytype fan operation status flag, hour 6	N/A

Field Heading	Value	Comments
h7	Closed daytype fan operation status flag, hour 7	N/A
h8	Closed daytype fan operation status flag, hour 8	N/A
h9	Closed daytype fan operation status flag, hour 9	N/A
h10	Closed daytype fan operation status flag, hour 10	N/A
h11	Closed daytype fan operation status flag, hour 11	N/A
h12	Closed daytype fan operation status flag, hour 12	N/A
h13	Closed daytype fan operation status flag, hour 13	N/A
h14	Closed daytype fan operation status flag, hour 14	N/A
h15	Closed daytype fan operation status flag, hour 15	N/A
h16	Closed daytype fan operation status flag, hour 16	N/A
h17	Closed daytype fan operation status flag, hour 17	N/A
h18	Closed daytype fan operation status flag, hour 18	N/A
h19	Closed daytype fan operation status flag, hour 19	N/A
h20	Closed daytype fan operation status flag, hour 20	N/A

Field Heading	Value	Comments
h21	Closed daytype fan operation status flag, hour 21	N/A
h22	Closed daytype fan operation status flag, hour 22	N/A
h23	Closed daytype fan operation status flag, hour 23	N/A
h24	Closed daytype fan operation status flag, hour 24	N/A

Table 79: schFnCl

Field Heading	Value	Comments
SITEID	RLW SIte ID	N/A
VSYS	Virtual system ID	N/A
h1	Full operation daytype fan operation status flag, hour 1	N/A
h2	Full operation daytype fan operation status flag, hour 2	N/A
h3	Full operation daytype fan operation status flag, hour 3	N/A
h4	Full operation daytype fan operation status flag, hour 4	N/A
h5	Full operation daytype fan operation status flag, hour 5	N/A
h6	Full operation daytype fan operation status flag, hour 6	N/A
h7	Full operation daytype fan operation status flag, hour 7	N/A
h8	Full operation daytype fan operation status flag, hour 8	N/A
h9	Full operation daytype fan operation status flag, hour 9	N/A

Field Heading	Value	Comments
h10	Full operation daytype fan operation status flag, hour 10	N/A
h11	Full operation daytype fan operation status flag, hour 11	N/A
h12	Full operation daytype fan operation status flag, hour 12	N/A
h13	Full operation daytype fan operation status flag, hour 13	N/A
h14	Full operation daytype fan operation status flag, hour 14	N/A
h15	Full operation daytype fan operation status flag, hour 15	N/A
h16	Full operation daytype fan operation status flag, hour 16	N/A
h17	Full operation daytype fan operation status flag, hour 17	N/A
h18	Full operation daytype fan operation status flag, hour 18	N/A
h19	Full operation daytype fan operation status flag, hour 19	N/A
h20	Full operation daytype fan operation status flag, hour 20	N/A
h21	Full operation daytype fan operation status flag, hour 21	N/A
h22	Full operation daytype fan operation status flag, hour 22	N/A

Field Heading	Value	Comments
h23	Full operation daytype fan operation status flag, hour 23	N/A
h24	Full operation daytype fan operation status flag, hour 24	N/A

Table 80: schFnFul

Field Heading	Value	Comments
SITEID	RLW SIte ID	N/A
VSYS	Virtual system ID	N/A
h1	Light operation daytype fan operation status flag, hour 1	N/A
h2	Light operation daytype fan operation status flag, hour 2	N/A
h3	Light operation daytype fan operation status flag, hour 3	N/A
h4	Light operation daytype fan operation status flag, hour 4	N/A
h5	Light operation daytype fan operation status flag, hour 5	N/A
h6	Light operation daytype fan operation status flag, hour 6	N/A
h7	Light operation daytype fan operation status flag, hour 7	N/A
h8	Light operation daytype fan operation status flag, hour 8	N/A
h9	Light operation daytype fan operation status flag, hour 9	N/A
h10	Light operation daytype fan operation status flag, hour 10	N/A
h11	Light operation daytype fan operation status flag, hour 11	N/A

Field Heading	Value	Comments
h12	Light operation daytype fan operation status flag, hour 12	N/A
h13	Light operation daytype fan operation status flag, hour 13	N/A
h14	Light operation daytype fan operation status flag, hour 14	N/A
h15	Light operation daytype fan operation status flag, hour 15	N/A
h16	Light operation daytype fan operation status flag, hour 16	N/A
h17	Light operation daytype fan operation status flag, hour 17	N/A
h18	Light operation daytype fan operation status flag, hour 18	N/A
h19	Light operation daytype fan operation status flag, hour 19	N/A
h20	Light operation daytype fan operation status flag, hour 20	N/A
h21	Light operation daytype fan operation status flag, hour 21	N/A
h22	Light operation daytype fan operation status flag, hour 22	N/A
h23	Light operation daytype fan operation status flag, hour 23	N/A
h24	Light operation daytype fan operation status flag, hour 24	N/A

Table 81: schFnLt

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
AREA	Area ID	N/A
hSPOCC	Occupied period heating setpoint	N/A
hSPUNOCC	Unoccupied period heating setpoint	N/A
cSPOCC	Occupied period cooling setpoint	N/A
cSPUNOCC	Unoccupied period cooling setpoint	N/A
FanSch	Thermostat schedule follows fan schedule flag	N/A
full1	Full occupancy daytype occupied mode flag for hour 1	N/A
full2	Full occupancy daytype occupied mode flag for hour 2	N/A
full3	Full occupancy daytype occupied mode flag for hour 3	N/A
full4	Full occupancy daytype occupied mode flag for hour 4	N/A
full5	Full occupancy daytype occupied mode flag for hour 5	N/A
full6	Full occupancy daytype occupied mode flag for hour 6	N/A
full7	Full occupancy daytype occupied mode flag for hour 7	N/A
full8	Full occupancy daytype occupied mode flag for hour 8	N/A

Field Heading	Value	Comments
full9	Full occupancy daytype occupied mode flag for hour 9	N/A
full10	Full occupancy daytype occupied mode flag for hour 10	N/A
full11	Full occupancy daytype occupied mode flag for hour 11	N/A
full12	Full occupancy daytype occupied mode flag for hour 12	N/A
full13	Full occupancy daytype occupied mode flag for hour 13	N/A
full14	Full occupancy daytype occupied mode flag for hour 14	N/A
full15	Full occupancy daytype occupied mode flag for hour 15	N/A
full16	Full occupancy daytype occupied mode flag for hour 16	N/A
full17	Full occupancy daytype occupied mode flag for hour 17	N/A
full18	Full occupancy daytype occupied mode flag for hour 18	N/A
full19	Full occupancy daytype occupied mode flag for hour 19	N/A
full20	Full occupancy daytype occupied mode flag for hour 20	N/A
full21	Full occupancy daytype occupied mode flag for hour 21	N/A

Field Heading	Value	Comments
full22	Full occupancy daytype occupied mode flag for hour 22	N/A
full23	Full occupancy daytype occupied mode flag for hour 23	N/A
full24	Full occupancy daytype occupied mode flag for hour 24	N/A
light1	Light occupancy daytype occupied mode flag for hour 1	N/A
light2	Light occupancy daytype occupied mode flag for hour 2	N/A
light3	Light occupancy daytype occupied mode flag for hour 3	N/A
light4	Light occupancy daytype occupied mode flag for hour 4	N/A
light5	Light occupancy daytype occupied mode flag for hour 5	N/A
light6	Light occupancy daytype occupied mode flag for hour 6	N/A
light7	Light occupancy daytype occupied mode flag for hour 7	N/A
light8	Light occupancy daytype occupied mode flag for hour 8	N/A
light9	Light occupancy daytype occupied mode flag for hour 9	N/A
light10	Light occupancy daytype occupied mode flag for hour 10	N/A

Field Heading	Value	Comments
light11	Light occupancy daytype occupied mode flag for hour 11	N/A
light12	Light occupancy daytype occupied mode flag for hour 12	N/A
light13	Light occupancy daytype occupied mode flag for hour 13	N/A
light14	Light occupancy daytype occupied mode flag for hour 14	N/A
light15	Light occupancy daytype occupied mode flag for hour 15	N/A
light16	Light occupancy daytype occupied mode flag for hour 16	N/A
light17	Light occupancy daytype occupied mode flag for hour 17	N/A
light18	Light occupancy daytype occupied mode flag for hour 18	N/A
light19	Light occupancy daytype occupied mode flag for hour 19	N/A
light20	Light occupancy daytype occupied mode flag for hour 20	N/A
light21	Light occupancy daytype occupied mode flag for hour 21	N/A
light22	Light occupancy daytype occupied mode flag for hour 22	N/A
light23	Light occupancy daytype occupied mode flag for hour 23	N/A

Field Heading	Value	Comments
light24	Light occupancy daytype occupied mode flag for hour 24	N/A
close1	Closed daytype occupied mode flag for hour 1	N/A
close2	Closed daytype occupied mode flag for hour 2	N/A
close3	Closed daytype occupied mode flag for hour 3	N/A
close4	Closed daytype occupied mode flag for hour 4	N/A
close5	Closed daytype occupied mode flag for hour 5	N/A
close6	Closed daytype occupied mode flag for hour 6	N/A
close7	Closed daytype occupied mode flag for hour 7	N/A
close8	Closed daytype occupied mode flag for hour 8	N/A
close9	Closed daytype occupied mode flag for hour 9	N/A
close10	Closed daytype occupied mode flag for hour 10	N/A
close11	Closed daytype occupied mode flag for hour 11	N/A
close12	Closed daytype occupied mode flag for hour 12	N/A
close13	Closed daytype occupied mode flag for hour 13	N/A
close14	Closed daytype occupied mode flag for hour 14	N/A
close15	Closed daytype occupied mode flag for hour 15	N/A
close16	Closed daytype occupied mode flag for hour 16	N/A
close17	Closed daytype occupied mode flag for hour 17	N/A

Field Heading	Value	Comments
close18	Closed daytype occupied mode flag for hour 18	N/A
close19	Closed daytype occupied mode flag for hour 19	N/A
close20	Closed daytype occupied mode flag for hour 20	N/A
close21	Closed daytype occupied mode flag for hour 21	N/A
close22	Closed daytype occupied mode flag for hour 22	N/A
close23	Closed daytype occupied mode flag for hour 23	N/A
close24	Closed daytype occupied mode flag for hour 24	N/A
EMS	Is the system on EMS?	N/A
SPMaint	Setpoint maintenance list	1 = occupants, 2 = management, 3 = HVAC Service Co, 4 = Other

Table 82: SchTStat

Field Heading	Value	Comments
SiteID	RLW Site ID	N/A
Area	Area ID code	N/A
AreaName	Area name	N/A

Table 83: SiteArea

Field Heading	Value	Comments
SITEID	Site ID	N/A
ZONE	Zone ID	N/A
CWT24	Skylight name	N/A

Field Heading	Value	Comments
CWTYPE	Glass type code	1 = Clear Glass, 2 =Tinted Glass (transparent), 3 = Fritted Glass (diffusing), 4 =Clear Plastic - clear, 5 = Tinted Plastic (transparent), 6 White Plastic (diffusing), 7 Translucent Plastic (e.g. Kalwall), 8 Other (describe in notes)
CWSC	Window shading coefficient	N/A
cWinuVAl	Window U-value	N/A
CWHGHT	Window height (ft)	N/A
CWWDTH	Window width (ft)	N/A
CWQTY	Window quantity	N/A
CWISHAD	Interior shading type code	1 = None, 2 = Blinds, 3 = Drapes/Shades, 4 = Prismatic Diffuser, 5 = Other
CWM	Measure ID flag	N/A
CNOTE	Window notes	N/A
Panes	Number of panes	N/A
Frame	Frame type code FrameType	1 = Std. Metal w/o Curb, 2 = Std. Metal w/ Curb, 3 = Thermal Break Metal w/o Curb, 4 = Thermal Break Metal w/ Curb,
bOld	Old Construction	N/A
MeasTrans	Measured transmission	N/A
SHGC	Solar heat gain coefficent	N/A
Shape	Shape of the skylight	1=Domed, 2=Flat, 3=Pyramid, 4=Ridge, 5=Vault, 6=Other
RoofNo	Number of the roof to which the skylight is assigned	N/A
Features	Window features	1 = Low-E, 2 = Gas-Filled, 3 = Low-E, Gas-Filled

Table 84: Skylts

Field Heading	Value	Comments

Field Heading	Value	Comments
SITEID	RLW SIte ID	N/A
SW1LOC	Location	N/A
SW1TYPE	System Type	N/A
SW1SF	Area(ft2)	N/A
SW1TILT	Tilt(deg)	N/A
SW1CAP	Tank Cap(gal)	N/A
SW1M	Rebated Measure?	N/A
Comment	Comment	N/A

Table 85: sol_DHW

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
CH1	Virtual system number for chiller 1	N/A
CH2	Virtual system number for chiller 2	N/A
CH3	Virtual system number for chiller 3	N/A
CH1B	Virtual system number for chiller 1b	N/A
CH2B	Virtual system number for chiller 2b	N/A
CH3B	Virtual system number for chiller3b	N/A
T1	Virtual system number for Tower 1	N/A
T2	Virtual system number for Tower 2	N/A
T3	Virtual system number for Tower 3	N/A
T1B	Virtual system number for Tower 1b	N/A
T2B	Virtual system number for Tower 2b	N/A
T3B	Virtual system number for Tower 3b	N/A
HS1	Virtual system number for Heating system 1	N/A
HS2	Virtual system number for Heating system 2	N/A
HS3	Virtual system number for Heating system 3	N/A
HS1B	Virtual system number for Heating system 1b	N/A
HS2B	Virtual system number for Heating system 2b	N/A

Field Heading	Value	Comments
HS3B	Virtual system number for Heating system 3b	N/A
P1	Virtual system number for pump 1	N/A
P2	Virtual system number for pump 2	N/A
P3	Virtual system number for pump 3	N/A
P4	Virtual system number for pump 4	N/A
P5	Virtual system number for pump 5	N/A
P6	Virtual system number for pump 6	N/A
P7	Virtual system number for pump 7	N/A
P8	Virtual system number for pump 8	N/A
P9	Virtual system number for pump 9	N/A
P10	Virtual system number for pump 10	N/A
P11	Virtual system number for pump 11	N/A
P12	Virtual system number for pump 12	N/A
P13	Virtual system number for pump 13	N/A
P14	Virtual system number for pump 14	N/A
P15	Virtual system number for pump 15	N/A
P16	Virtual system number for pump 16	N/A
P17	Virtual system number for pump 17	N/A
P18	Virtual system number for pump 18	N/A
P19	Virtual system number for pump 19	N/A
P20	Virtual system number for pump 20	N/A
ZONE1	Virtual system number zone 1	N/A
ZONE2	Virtual system number zone 2	N/A
ZONE3	Virtual system number zone 3	N/A
ZONE4	Virtual system number zone 4	N/A
ZONE5	Virtual system number zone 5	N/A
ZONE1B	Virtual system number zone 1b	N/A
ZONE2B	Virtual system number zone 2b	N/A
ZONE3B	Virtual system number zone 3b	N/A

Field Heading	Value	Comments
ZONE4B	Virtual system number zone 4b	N/A
ZONE5B	Virtual system number zone 5b	N/A
Z1AREA	Area assignment for Zone 1	N/A
Z2AREA	Area assignment for Zone 2	N/A
Z3AREA	Area assignment for Zone 3	N/A
Z4AREA	Area assignment for Zone 4	N/A
Z5AREA	Area assignment for Zone 5	N/A
Z1BAREA	Area assignment for Zone 1b	N/A
Z2BAREA	Area assignment for Zone 2b	N/A
Z3BAREA	Area assignment for Zone 3b	N/A
Z4BAREA	Area assignment for Zone 4b	N/A
Z5BAREA	Area assignment for Zone 5b	N/A
STATUS	Not used	N/A

Table 86: syszone

Field Heading	Value	Comments
siteid	RLW Site ID	N/A
spc_num	Space ID	N/A
ECODE	Equipment type code	N/A
ECOUNT	Equipment unit count	N/A
EKW	Equipment nameplate kW, if different from default	N/A
EHP	Equipment nameplate hp, if different from default	N/A
EKBTUH	Equipment nameplate fuel input rating, kBtu/hr	N/A
EHOOD	Hood status code	N/A
EINTENS	Not used	N/A

Field Heading	Value	Comments
ENOTES	comment field	N/A
Units	Equipment namplate units flag	1 = kW, 2 = HP, 3 = kBtuh
EpwrRat	Not used	N/A
UseFactor	Fraction of time equipment in use	N/A

Table 87: tbSpEq

Field Heading	Value	Comments
siteid	RLW Site ID	N/A
spc_num	Space ID	N/A
lfcode	fixture code	N/A
lcount	Fixture count	N/A
lmt	mounting type code	1 = Recessed, 2 = Suspended, 3 = Plug-In Task, 4 = Direct, 5 = Indirect, 6 = Indirect-Direct, 7 = Furniture-Integrated Task, 8 = Track, 9 = Exempt
lccode	Control code	1 = Occ sensor, 2 = Daylighting - cont dim, 3 = Daylighting - stepped, 4 = Lumen maint, 5 = Occ sensor plus daylighting, 6 = Occ sensor plus lumen maint, 7 = Daylighting plus lumen maint, 8= None
lfcon	% fixtures controlled	N/A
lcon_opr	% lighting controls operational	N/A
lm	Fixture measure flag	N/A
NameNote	Notes field	N/A
lc_m	Control measure flag	N/A

Field Heading	Value	Comments
M94	Generic measure flag from '94 PGE/SCE survey data	N/A
bEMS	EMS?	N/A
TrkLength	Length of track lighting in feet.	N/A

Table 88: tbSpLt

Field Heading	Value	Comments
siteid	RLW SIte ID	N/A
Number	Number used to reference definition of typical loads	N/A
ECODE	Equipment type code	N/A
ECOUNT	Equipment unit count	N/A
EKW	Equipment nameplate kW, if different from default	N/A
EHP	Equipment nameplate hp, if different from default	N/A
EKBTUH	Equipment nameplate fuel input rating, kBtu/hr	N/A
EHOOD	Hood status code	N/A
EINTENS	Not used	N/A
ENOTES	comment field	N/A
Units	Equipment namplate units flag	1 = kW, 2 = HP, 3 = kBtuh
EpwrRat	Not used	N/A
UseFactor	Fraction of time equipment in use	N/A

Table 89: tbSpTypEq

Field Heading	Value	Comments
siteid	RLW SIte ID	N/A
Number	Number used to reference definition of typical loads	N/A
Name	Typical equipment survey area description	N/A
FLRAREA	Floor area surveyed to establish typical density	N/A

Table 90: tbSpTypEqRef

Field Heading	Value	Comments
SITEID	RLW SIte ID	N/A
TESNotes	Notes on TES installation	N/A

Table 91: TESsup

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
Name	Transformer name	N/A
Locate	Transformer location	N/A
Qty	Quantity	N/A
Manuf	Manufacturer	N/A
Model	Model number	N/A
kVA	kVA rating	N/A
TempRise	Temperature rise (deg C)	N/A
Fan	Mechanical cooling fan flag	N/A
M94	Measure flag from '94 PGE/SCE survey data	N/A
bOld	Old Construction?	N/A

Table 92: Trnsfrmr

Field Heading	Value	Comments
siteid	RLW SIte ID	N/A
spc_num	Space ID code (1-30)	N/A
zone	Zone ID	N/A
spc_nme	Space name	N/A
spc_oc	Space occupancy code	N/A
spcArea	Space area (SF)	N/A
sCorPct	Percent of total space area that is corridor or utility	N/A
spc_mlt	Space multiplier	N/A
sEqCalc	Miscellaneous equipment survey assignment reference number	N/A
lt_msr	LPD measure flag	N/A
Tlr_ALPD	Allowed lighting power in watts from tailored lighting compliance	N/A
HWFlow	DHW flow rate (gal/min/sf), from keyOcc2	N/A
LtgIsOld	Flag indicating whether lighting system in space is old.	N/A
LPD	Lighting power density for space - can be used instead of surveying fixtures.	N/A
MaxPeople	Maximum number of people in this space	N/A

Table 93: tSpace

Field Heading	Value	Comments
siteID	RLW Site ID	N/A
vSys	Virtual ID code	N/A
SysName	Virtual system name	N/A
SAcontrol	Supply air control	1=fixed, 2=OA temp, 3=zone temp
Q56SET	Cooling supply air temperature setpoint	N/A
CO2Control	CO2 control used	N/A
SAFlowCont	How Flow rate determined for control Duct Static; Measured	N/A
airFlow, DK		N/A
EMSSAContr	Supply air controlled by EMS	N/A
EMSSAFlowC	Supply air Flow controlled by EMS	N/A
EMSCO2Cont	CO2 Control by EMS	N/A
OptimumFan	Optimimum fan start employed in building	N/A
FanSysEMS	Fan Ssytem controlled by EMS?	N/A
MaxHumid	If humidity control, % maximum	N/A
NightCtrl	Night fan control	1 = Stay off, 2 = Cycle on any
DuctNotes	Notes regarding overall duct system	N/A

Table 94: vSystems

Field Heading	Value	Comments
SITEID	RLW Site ID code	N/A

Field Heading	Value	Comments
VT1TYPE	Vertical transportation type code	1 = Elevator, 2 = Escalator
VT1QTY	Vertical Transportation quantity	N/A
VT1HP	Vertical Transportation motor hp	N/A
VT1NOFL	Elevator number of floors	N/A
VT1WDTH	Escalator width	N/A
VT1RISE	Escalator Rise	N/A
VT1RUN	Escalator Run	N/A
STATUS	Not used	N/A

Table 95: vt_Trns

Field Heading	Value	Comments
SITEID	RLW SIte ID	N/A
ZONE	Zone ID	N/A
zName	Zone name	N/A
ZEXPOSE	Zone by exposure status flag	1 = yes, 2 = no
ZMULT	Zone multiplier	N/A
vsys	Virtual system assignment	N/A
Area	Area assignment	N/A

Table 96: zones1

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
ZONE	Zone ID	N/A

Field Heading	Value	Comments
ZS1CODE	Zone level HVAC system type code	1= Basebd or rad heat, 2= 2 pipe fc, 3= 4 pipe fc, 4= 2 pipe induc, 5= 4 pipe induc, 6= Unit htr, 7= Unit vent, 8= std VAV, 9= Series VAV, 10= Parall VAV, 11= Comp room unit, 12= Exh fan
ZS1QTY	Zone system quantity	N/A
ZS1HP	Zone system fan hp	N/A
ZS1HEAT	Zone system heat source	0 = DK, 1 = Electric, 2 = Other, 3 = None
ZS1KW	Zone system heat kW	N/A
STATUS	Not used	N/A
ZS1CFM	Zone system CFM for exhausts fans, unit ventilators	N/A

Table 65: zones2

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
UNITNO	Air Handle ID number	Link to ccentair table
FANID	FanID	Autogenerated
TYPE	Type of fan	1=supply; 2=return
HP	Motor horsepower	
EFF	Motor efficiency	
PHASECOUNT	Number of phases	
RPM	Revs per minute	
REBATE	Motor rebate	
MOTORTYPE	Type of motor	0;"ODP";1;"TEFC";2;"Don't know"

Table 66: AHUFanMotor

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
UNITNO	Refrigeration condenser ID number	Link to refr_Cnd table
FANID	FanID	Autogenerated
TYPE	Type of fan	0;"Main fan";1;"Pony fan";2;"Pump fan"
QTY	Number of fans	
HP	Motor horsepower	
PHASECOUNT	Number of phases	
RPM	Revs per minute	
EFF	Motor efficiency	
REBATE	Motor rebate	
MOTORTYPE	Type of motor	0;"ODP";1;"TEFC";2;"Don't know"

Table 977: CondenserFanMotor

Field Heading	Value	Comments
SITEID	RLW Site ID	N/A
UNITNO	Cooling Tower ID number	Link to cTower table
FANID	FanID	Autogenerated
TYPE	Type of fan	0;"Main fan";1;"Pony fan";2;"Pump fan"
QTY	Number of fans	
HP	Motor horsepower	

Field Heading	Value	Comments
PHASECOUNT	Number of phases	
RPM	Revs per minute	
EFF	Motor efficiency	
REBATE	Motor rebate	
MOTORTYPE	Type of motor	0;"ODP";1;"TEFC";2;"Don't know"

Table 988: TowerFanMotor