Commercial Facilities Contract Group
2006-2008 Direct Impact Evaluation

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Volume 2 of 3
Non-HIM Appendices

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ABSTRACT

The Commercial Facilities Contract Group evaluated two market-sector focused incentive programs (PGE2005 and PGE2007) and to two high-impact measures, a.k.a. "HIMs" (strip curtains and door gaskets in refrigerated reach-in coolers and warehouses). The overall objective was to determine the gross and net electricity and natural gas savings and demand (kW) reduction resulting from participation in the programs during the 2006 through 2008 program years.

This document is Volume 2 of the Commercial Facilities Contract Group 2006-2008 Direct Impact Evaluation Final Report (STUDY ID: PUC0016.01) and includes Appendices (A-H). These appendices document the methodology for the evaluation of savings, results and processes used for the evaluation of high-tech and large commercial programs. The appendices also include examples of our calculations, the calibration process, and our methodology and findings for net-to-gross analysis for these two programs. Customer surveys and comments have been included as well as the public comments and responses collected during the public review period.

A total of 41 projects were evaluated for the PG&E Hi-Tech Program and 61 projects were evaluated for the PG&E Large Commercial Program. The PGE2005 program achieved a gross realization rate for kWh of 0.446 and a net realization rate of 0.470 for an overall success of 0.249. The PGE2007 program achieved a gross realization rate for kWh of 0.795 and a net realization rate of 0.600 for an overall success of 0.657.

ACKNOWLEDGEMENT

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DISCLAIMER

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APPENDIX A
METHODOLOGY FOR EVALUATION OF SAVINGS FOR PGE2005 AND PGE2007

The energy savings for PGE2005 and PGE2007 were evaluated through the following activities:

- Preparing a sampling plan;
- Obtaining and reviewing project documentation for sampled projects and preparing M&V site plans;
- Collecting data to inform analysis of savings;
- Conducting analysis of achieved gross savings;
- Conducting analysis of net savings.

A.1 Sampling Plan and Methodology

The sample design for the impact evaluation of PGE2005 was prepared in accordance with the guidelines provided in the California Evaluation Framework[1] (CEF) for a Protocol Guided Direct (PGD) evaluation with an "Enhanced" level of rigor. The goal in preparing the sample design was to meet the appropriate protocol precision/confidence targets.

The sample design for the evaluation of PGE2005 was originally developed in the first quarter of 2008. At that time, a sample frame was constructed using available project information extracted from the tracking system data for the program provided by PG&E. The design variable used in developing the sampling plan was *ex-ante* gross kWh savings. Sample strata were defined by applying the Dalenius-Hodges stratification procedure to the data on *ex ante* kWh savings. The efficacy of different allocations of sample points across strata was examined by considering the precision with which total kWh savings could be estimated at the 90% confidence level, with 10% precision being the target.

The initial sample design prepared in Q1 2008 provided the basis for beginning field work to collect the data needed to analyze actual savings from the sample projects. The full tracking data for the program became available in Q1 2009, at which point the final allocation of sample points across strata was determined. The population statistics on which the final design samples

[1] The TecMarket Works Team, The California Evaluation Framework, Prepared for the California Public Utilities Commission and the Project Advisory Group, June 2004

were prepared are shown in Table A-1 and A-2. As can be seen, the distribution of kWh savings for projects in PGE2005 and PGE2007 was highly skewed, with the projects with the largest savings in Stratum 5 accounting for a relatively small percentage of the total number of projects but for much higher percentages of the total program-level savings. Given the skewness in the distribution of savings, a sample design was developed in which all of the projects in Stratum 5 were chosen for selection with certainty with smaller numbers of projects to be chosen randomly from the other strata.

The design allocations of sample points across strata are also shown in Table A-1 for PGE2005 and in Table A-2 for PGE2007.

Table A-1. Population Statistics Used for Sample Design for PGE2005

	Stratum 1	Stratum 2	Stratum 3	Stratum 4	Stratum 5	Totals
Strata boundaries (kWh)	< 57,000	57,001-171,000	171,001-315,000	315,000-764,000	> 764,001	
Number of projects	68	43	40	39	39	229
Total kWh savings	1,187,168	4,292,103	9,580,412	19,569,278	93,068,008	127,696,970
Average kWh Savings	17,458	99,816	239,510	501,776	2,387,128	557,760
Standard deviation of kWh savings	18,061	30,766	41,558	147,655	2,246,528	1,250,085
Coefficient of variation	1.03	0.31	0.17	0.29	0.94	
Final design sample	2	2	2	4	31	41

Table A-2. Population Statistics Used for Sample Design for PGE2007

	Stratum 1	Stratum 2	Stratum 3	Stratum 4	Stratum 5	Totals
Strata boundaries (kWh)	< 32,000	32,001 – 78,000	78,001-165,000	165,001 – 300,000	> 300,000	
Number of projects	163	93	75	64	48	443
Total ex ante claimed kWh savings	1,678,905	4,672,451	8,855,901	14,120,253	29,025,161	58,352,671
Average kWh Savings	10,300	50,241	118,079	220,629	604,691	131,722
Standard deviation of kWh savings	9,642	13,407	23,173	37,851	458,509	234,571
Coefficient of variation	0.936	0.267	0.196	0.172	0.758	
Design sample	1	2	2	2	38	45

A.2 Obtaining and Reviewing Project Documentation for Sampled Projects

For each project selected for the analysis sample, available documentation (e.g., audit reports, savings calculation work papers, etc.) on the project was requested from PG&E. The documentation for each project was reviewed for the following types of information:

- For equipment changed, (1) descriptions, (2) schematics, (3) performance data, and (4) other supporting information;
- For new equipment installed, (1) descriptions, (2) schematics, (3) performance data, and (4) other supporting information; and
- Savings calculation methodology, including (1) what methodology was used, (2) specifications of assumptions and sources for these specifications, and (3) correctness of calculations.

Other, more general documentation was also reviewed, including program forms, billing and interval data, and weather data.

A site-specific M&V plan was prepared for each project in the analysis sample using the information presented in the documentation for a project. Each M&V plan included the following elements:

- IPMVP (International Performance Measurement and Verification Protocol) Option chosen to analyze savings;
- Specification of approach to calculating savings;
- Identification of corresponding variables and specification of assumptions;
- Identification of data sources
- Specification of data collection techniques to be used (i.e. sampling, site inspection, and monitoring plan), if required; and
- Identification and resolution of any other M&V issues.

Each site-specific M&V plan was submitted to ED and its Technical Advisors for review. After suggested revisions, each plan was submitted for approval by the Energy Division before on-site data collection was begun at a site.

A.3 Conducting On-Site Data Collection

On-site visits were used to collect data that were used in the analyses to determine what savings had been achieved with the sample projects.. During an on-site visit, the field staff accomplished three major things.

- First, they verified the implementation status of all measures for which PG&E had provided incentive payments through PGE2005. They verified that the energy efficiency measures were indeed installed, that they were installed correctly and that they still functioned properly.
- Second, they collected the physical data needed to analyze the energy savings that have been realized from the installed improvements and measures. Data were collected using forms that

were prepared specifically for the project in question after an in-house review of the project file.

- Third, they interviewed the contact personnel at a facility to obtain additional information on the installed system to complement the data collected from other sources.

Estimates of energy use and savings for energy efficiency measures depend significantly on having accurate data for such factors as operating hours and usage patterns. Monitoring was not considered necessary for some sites. This included facilities where project documentation allowed for sufficiently detailed calculations or where this type of information was available from an energy management control system. For other facilities, information could be obtained through relatively simple monitoring using loggers. However, if a facility did not have an energy management control system or the measure being analyzed was relatively complex, monitoring of the affected equipment was conducted to gather more information to inform simulation analysis. The primary candidates for monitoring were sites where data could be collected that would allow a better analysis of savings to be developed.

A.4 Analyzing Data for Sampled Projects to Determine Achieved Gross Savings

The energy savings achieved through each project in the analysis sample were determined using a site-specific M&V approach. This involved determining the savings for each project by using one or more of the M&V Options defined in the IPMVP.

All HVAC measures were analyzed using IPMVP Option D. With this option, a Calibrated Simulation of energy use is made. For the analysis here, the eQuest energy analysis model was used to prepare computer simulations of energy use before and after the HVAC measures were installed at a facility. The major steps in the analysis were as follows:

1) Calibrate eQuest model for each site, using data collected on-site (including monitoring data) as well as interval and billing data on energy use (where available). Details of the calibration procedure are provided in Non-HIM Appendix B.
2) Execute eQuest analysis to define baseline energy use for each site.
3) Execute eQuest model to determine changes in energy use and savings from installing various energy efficiency measures in a project .

Review of the project documentation for many projects revealed that process measures for the high tech facilities participating in PGE2005 were often for space conditioning (e.g., to control space where servers were located). Thus, energy analysis with the eQuest model was also used for many of the measures that had been classified as “process” measures in PG&E’s tracking system.

For process measures that did not involve space conditioning, the specificity of the process generally precluded using an energy analysis model for simulation analysis. Savings from these

types of process improvement measures therefore were analyzed through engineering analysis of the process affected by the improvements, with monitoring used to supply information for important variables. The type of monitoring conducted for each site of this type was specified in the M&V plan for the site.

Savings for lighting measures were assessed using IPMVP Option B, Retrofit Isolation. With IPMVP Option B, savings are calculated using short term or continuous measurement, and savings are determined by field post-measurements of the system(s) to which the measure(s) have been applied, separate from the energy use of the rest of the facility. Short-term or continuous measurements are taken during the post-retrofit period. In fact, however, only a small number of the projects for high tech facilities involved lighting measures (either retrofits or controls).

The evaluation of peak kW reduction for a facility was accomplished using the DEER-defined peak definition period of 2:00 PM to 5:00 PM during the three consecutive weekday periods containing the weekday with the hottest temperature of the year for the climate zone where the facility was located. To identify these days, kW demand savings calculated from the 8,760 hourly loads generated through the eQuest modeling for a project were input to a spreadsheet that identified the three hottest days per the DEER definition and reported the peak demand savings for that three-day period.

A.5 Conducting Analysis of Net Savings

The analysis of net savings for PGE2005 and PGE2007 was conducted using the standard methodological framework that had been developed by the nonresidential net-to-gross working group formed by the Energy Division. This working group, which was composed of experienced evaluation professionals, developed a standard methodological framework, including decision rules, for integrating in a systematic and consistent manner the findings from both quantitative and qualitative information in estimating net-to-gross ratios.

The NTG method relies exclusively on the Self-Report Approach (SRA) to estimate project and domain-level Net-to-Gross Ratios (NTGRs), since other available methods and research designs are generally not feasible for large nonresidential customer programs. The approach was designed to fully comply with the *California Energy Efficiency Evaluation: Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals* (Protocols) and the *Guidelines for Estimating Net-To-Gross Ratios Using the Self-Report Approaches* (Guidelines).

With this method, a 0 to 10 scoring system is used for key questions to estimate the NTGR rather than using fixed categories that were assigned weights. Respondents are asked to jointly consider and rate the importance of the many likely events or factors that may have influenced their energy efficiency decision making, rather than focusing narrowly on only their rating of the program's importance. This question structure more accurately reflects the complex nature of

the real-world decision making and helps to ensure that all non-program influences are taken into account in assessing the unique contribution of the program as reflected in the NTGR.

There are three levels of free-ridership analysis.

- The Standard – Very Large Project NTG analysis is the most detailed level of analysis. It is applied to the largest and most complex projects (representing 10 to 20% of the total) with the greatest expected levels of gross savings[2]
- The Standard NTG analysis involves a somewhat less detailed level of analysis and is applied to projects with moderately high levels of gross savings.
- The Basic NTG analysis is the least detailed analysis, applied to all remaining projects.

The determination of when to apply these different levels of analysis is left to the discretion of the evaluator.

There were five types of free-ridership information used for the net-to-gross analysis, with each level of analysis relying on information from one or more sources. The sources of the data that were used for each of the three levels of free-ridership analysis are shown in Table A-3. Information Sources for Three Levels of NTG Analysis. Although more than one level of analysis may share the same source, the amount of information that is utilized in the analysis may vary. For example, all three levels of analysis obtain core question data from the Decision Maker survey.

Table A-3. Information Sources for Three Levels of NTG Analysis

Level of NTG Analysis	Program File	Decision Maker Survey Core Question	Vendor Surveys	Decision Maker Survey Supplemental Questions	Utility & Program Staff Interviews	Other Research Findings
Basic NTG	X	X	1		2	
Standard NTG	X	X	1	X	X	
Standard NTG - Very Large Projects	X	X	3	X	X	X

[1]Only performed for sites that indicate a vendor influence score (N3d) greater than maximum of the other program element scores (N3b, N3c, N3g, N3h, N3l).

[2]Only performed for sites that have a utility account representative

[2] Note that we do not refer to an Enhanced level of analysis, since this is defined by the Protocols to involve the application of two separate analysis approaches, such as billing analysis or discrete choice modeling.

[3]Only performed if significant vendor influence reported or if secondary research indicates the installed measure may be becoming standard practice.

Using the information from these various sources, the NTGR is calculated as an average of three scores. Each score represents the highest response or the average of several responses given to one or more questions about the decision to install a program measure.

- A *Timing and Selection* score reflects the influence of the most important of various program and program-related elements in the customer's decision to select the specific program measure at this time. Program influence through vendor recommendations is also incorporated in this score if a vendor interview has been triggered.
- A *Program Influence* score captures the perceived importance of the program (whether rebate, recommendation, training, or other program intervention) relative to non-program factors in the decision to implement the specific measure that was eventually adopted or installed. This score is determined by asking respondents to assign importance values to both the program and most important non-program influences so that the two total 10. The program influence score is adjusted (i.e., divided by 2) if respondents say they had already made their decision to install the specific program qualifying measure before they learned about the program.
- A *No-Program* score captures the likelihood of various actions the customer might have taken at this time and in the future if the program had not been available (the counterfactual). This score also accounts for deferred free ridership by incorporating the likelihood that the customer would have installed program-qualifying measures at a later date if the program had not been available.

When there are multiple questions that feed into the scoring algorithm, as is the case for both the *Timing and Selection* and *No-Program* scores, the maximum score is always used. The rationale for using the maximum value is to capture the most important program element in the participant's decision making. Thus, each score is always based on the strongest influence indicated by the respondent. However, high scores that are inconsistent with other previous responses trigger consistency checks and can lead to follow-up questions to clarify and resolve the discrepancy.

When there are missing data or 'don't knows', to critical elements of each score, one of two options is used. The missing element may be backfilled with a value that represents the average of the lowest and highest extreme values. Alternatively, if it is one of several other elements that are considered in the algorithm, the missing element may simply be excluded from consideration.

The self-reported core NTGR in most cases is simply the average of the Program Influence, Timing and Selection, and No-Program Scores, divided by 10. The one exception to this is when the respondent indicates a 10 in 10 probability of installing the same equipment at the same time

in the absence of the program, in which case the NTGR is based on the average of the Program Influence and No-Program scores only.

Calculation of the Core NTGR is based on the answers to the closed-ended questions. However, the reliance of the Standard NTG–Very Large analysis on more information from so many different sources required more of a case study level of effort. The SRA Guidelines point out that a case study is one method of assessing both quantitative and qualitative data in estimating a NTGR. A case study is an organized presentation of all these data available about a particular customer site with respect to all relevant aspects of the decision to install the efficient equipment. In such cases where multiple interviews are conducted eliciting both quantitative and qualitative data and a variety of program documentation has been collected, all of this information is integrated into an internally consistent and coherent story that supports a specific NTGR.

Sometimes, *all* the quantitative and qualitative data will clearly point in the same direction while, in others, the *preponderance* of the data will point in the same direction. Other cases will be more ambiguous. In all cases, in order to maximize reliability, it is essential that more than one person be involved in analyzing the data. Each person must analyze the data separately and then compare and discuss the results. Important insights can emerge from the different ways in which two analysts look at the same set of data. Ultimately, differences must be resolved and a case made for a particular NTGR. Careful training of analysts in the systematic use of rules is essential to insure inter-rater reliability[3].

Once the individual analysts have completed their review, they discuss their respective findings and present their respective rationales for any recommended changes to the Calculator-derived NTGR. The outcome of this discussion is the final NTGR for a specific project.

A.6 Estimating Program-Level Achieved Savings

Program-level savings are developed by applying achieved savings realization rates calculated for the analysis sample to program-level data for claimed savings. The procedure for estimating gross savings for the program is an application of ratio estimation.

Given a stratified sample design, a gross realization rate (GRR) for a stratum is defined as the ratio of the sum of the savings from the M&V sample to the sum of the *ex ante* claimed savings recorded in the tracking database for the same sample. The following formula illustrates the calculation made for each stratum:

[3] Inter-rater reliability is the extent to which two or more individuals (coders or raters) agree. Inter-rater reliability addresses the consistency of the implementation of a rating system.

$$\text{Estimated Achieved Savings for Stratum} = \left(\frac{\sum_{\text{sample}} \text{Achieved Savings}_i}{\sum_{\text{sample}} \text{Claimed Savings}_i} \right) \sum_{\text{Population}} \text{Claimed Savings}_i$$

where Achieved Savings_i is an estimate calculated for each site *i* in the analysis sample for the stratum and Claimed Savings_i is the *ex ante* claimed savings for site *i* as recorded in the program tracking database. GRR is given by the term in brackets.

To estimate total achieved savings for a program, the estimates of achieved savings for the different strata are summed. Note that this will give a realization rate at the program-level that is a weighted average of the realization rates for the different strata, with claimed savings being the weights.

APPENDIX B
TUROBOCOR EVALUATION

Determining Efficiency of Turbocor Compressors in DX Systems

ADM Associates, Inc.

Summary: Many of the sites for which we are reviewing energy savings have been retrofitted with Turbocor compressors in a DX system arrangement. The key parameter determining the amount of energy being saved is the Turbocor's part load curve. Manufacturing data regarding these compressors is both ambiguous and, in some cases, inconsistent. In order to fulfill the monitoring and evaluation requirements of the 2006-2008 EM&V project, there exists a need to develop part load curves for these compressors.[1] The following is an explanation of the method by which ADM will develop part load curves for Turbocor compressors in DX arrangements.

Our goal is to develop a power curve, for Turbocor compressors in DX systems, based on in-situ monitoring. Due to practical constraints on in-situ monitoring of compressor efficiency, part load curve development will be constrained to a small percentage of the buildings with Turbocor installations. The major constraint is access to a long section of ductwork immediately following the supply fan. Ideally, there would be only one compressor supplying one set of coils. Only one building within ADM's sample has been found which is conducive to this monitoring. As more buildings are found (whose systems fit within the monitoring constraints) their data will be collected. The building's system configuration will allow for the independent (and simultaneous) monitoring of two Turbocor compressors. Each of these compressors serves independent air handling systems, both serving similar interior zones. The part load curves collected from this installation will then be applied to our other sites with Turbocor compressors (in DX system arrangements).

Overview of Calculations:

Ultimately, the goal is to develop the coefficient of performance (COP) of these compressors as a function of compressor part load. This curve will be referred to as $\eta(PLV)$. The part load at any given point in time will be defined as the ratio of heat being removed to nominal capacity. That is:

$$PLV \equiv \frac{\text{Heat Removed}}{\text{Max Capacity Under Prevailing Conditions.}}$$

[1] The part load curve is used in our eQuest/DOE2 models to simulate energy savings.

The heat removed at any point in time is simply the heat load imparted onto the evaporator coils in order to meet building cooling requirements. Since these systems are not heat-pumps, we are only concerned with the cooling loads. The COP is defined as:

$$COP \equiv \frac{\text{Heat Removed}}{\text{Compressor Power Use}}$$

In order to develop η *(PLV)* the heat removed from the building, at the evaporator coils, will need to be determined over a period of time. The compressor power consumption will need to be monitored over the same period of time. The heat removed, or *System Load*, can be calculated as follows:

$$\text{System Load } (L_s) = \rho Q \Delta h$$

where: ρ = Density of air

Q = Volumetric flow rate of air

Δh = Change in enthalpy of the air

The density and enthalpy of air at various temperatures and pressures is well known and can be found in thermodynamic properties tables. The parameters needed to determine enthalpy and density can be obtained by monitoring the air's temperature and relative humidity, before and after, the evaporator coil. Monitoring the volumetric flow-rate however is a much more onerous task.

Overview of Metrics:

Several measurements will be required in order to successfully establish a part load curve. Care will also need to be taken with regards to period in which this data is collected. The duration of monitoring will be approximately two weeks, and the two weeks will be during a period of peak cooling. Given the San Jose climate, temperatures during the day will provide for large cooling loads while cooling off at night to much lower loads. Thus, ADM should be able to acquire data points across a large spectrum of part loads. In particular: return air enthalpy, supply air enthalpy, air mass flow rate, and compressor kW will all need to be monitored simultaneously. The short-term data will attempt to capture enough variation in operating conditions to develop performance curves suitable for use in the DOE-2.2 building energy simulation program. The following performance curves will be developed:

- Cooling sensible and total capacity as a function of outdoor temperature[2] and DX coil entering wetbulb temperature

[2] Outdoor temperature metric will be determined by the application – dry bulb temperature for air cooled systems, condenser water temperature for water cooled systems and wetbulb temperature for evaporatively cooled systems

- Compressor efficiency as a function of outdoor temperature and DX coil entering wetbulb temperature
- Compressor efficiency as a function of part load ratio

Supply and return air enthalpy can be calculated using the dry bulb temperature and relative humidity of each. Due to ample mixing, these parameters should not vary much across the air handler's cross-sectional area (the only caveat being outside air introduced on the return side of the coil). Therefore three temperature/relative humidity loggers will be mounted vertically on each side of the coil. Additional sensors might be required on the return side depending on the degree to which outside air is able to mix with the return air before the coil.

The air mass flow rate can be calculated by multiplying its volumetric flow rate by its density. Historically, air-flow-rates have been measured using hot-wire anemometers or pitot tubes. The flow rates within the air handlers will be low enough for the flow to be considered incompressible, making pitot tube measurements ideal for monitoring. Given the non-uniform velocity profile of the air-flow within the duct, multiple points will need to be monitored and averaged together. This gives an average flow rate through the duct. The number of points, and their position within the flow, is determined using the log-Tchebychef(log-T) rule. [3] To facilitate this measurement ADM has developed its own *pressure rakes*[4] which will be connected to a high resolution pressure transducer. Finally, all pitot tubes (and their derivatives) have an associated calibration constant. The calibration constant for ADM's pressure rake system will be calculated using a one-time hotwire anemometer measurement of air-flow.

Each Turbocor compressor has an integral variable frequency drive (VFD). This not only facilitates part load savings, but it also impacts the power factor on the circuit feeding the compressor. Consequently compressor power will need to be monitored using a real-time power meter. This meter would be connected to the compressor's input power circuit, capture the change in power factor, and monitor the true power used by the compressor.

[3] ASHRE fundamentals.

[4] For more information pertaining to the pressure rakes refer to appendix A.

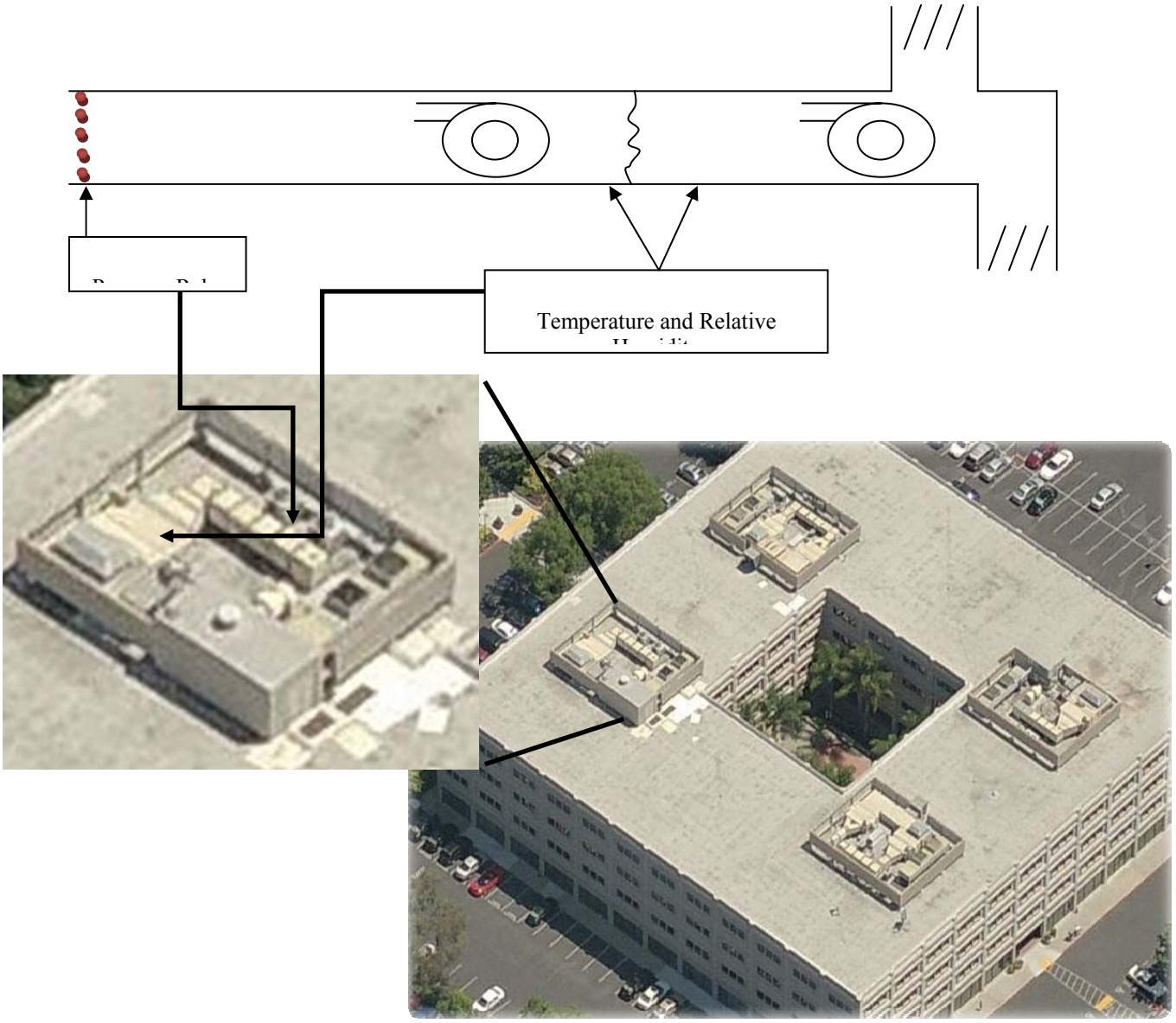
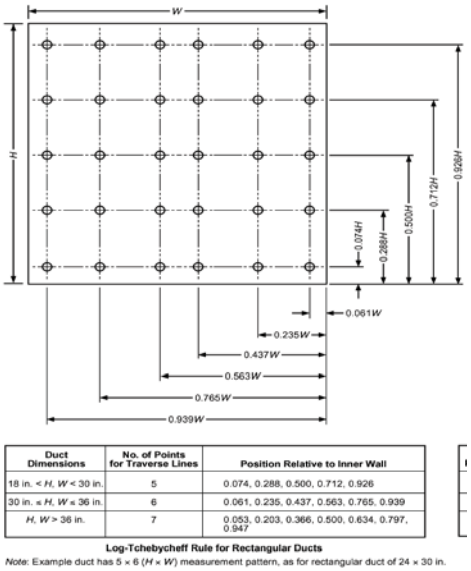


Figure 1. Schematic of Monitoring Implementation at the facility

Pressure Rake Air-Flow Measurement System:

In order to continuously monitor a modulating air flow in HVAC systems, ADM Associates has developed a metric utilizing an array of pitot tubes (known as a *pressure rake*) in conjunction with high accuracy pressure transducers. The pressure rake functions as a linearly averaged array of pitot tubes and it will be installed in a length of duct downstream of the supply fan. In order for the pressure rake to produce accurate figures it will need to be placed sufficiently far downstream of duct irregularities (such as elbows or transitions).

Because the ducts are square, the Log-Tchebycheff rule will be used in order to determine the points of measurements within the duct (figure 1). Both ducts, in which ADM will measure air-flow, have dimensions greater than 36 inches. Therefore, a seven by seven grid of measurements is required to obtain an accurate average flow-rate. This grid will be comprised of seven pressure rakes whose pressure ports are spaced as specified by the Log-Tchebycheff rule (shown in figure 2). Each pressure rake will be connected to a common *averaging chamber* which will then be connected to the pressure transducer. Simultaneously, a static pressure pitot will be connected to the other side of the pressure transducer. Data from the pressure transducer will be collected by a Hobo data logger for the duration of the monitoring period.



Duct Dimensions	No. of Points for Traverse Lines	Position Relative to Inner Wall
18 in. < *H*, *W* < 30 in.	5	0.074, 0.288, 0.500, 0.712, 0.926
30 in. ≤ *H*, *W* ≤ 36 in.	6	0.061, 0.235, 0.437, 0.563, 0.765, 0.939
H, *W* > 36 in.	7	0.053, 0.203, 0.366, 0.500, 0.634, 0.797, 0.947

Log-Tchebycheff Rule for Rectangular Ducts

Note: Example duct has 5 × 6 (*H* × *W*) measurement pattern, as for rectangular duct of 24 × 30 in.

Figure 1. Cross-section of duct with measurement holes

Figure 2. Close-up of the pressure rakes

In order to validate this metric, ADM assembled a smaller scale duct system which was attached to a fan whose flow was known and could be modulated. The flow rates tested varied from 200 – 1500 ft/min. In each experiment flow rates were measured by the pressure rakes while metered at a know rate (via a duct blaster or blower door fan). The measured flow rates were then compared against the (known) metered flow rates. Figure 3 depicts this comparison. Provided

that the flow being measured can be considered incompressible[5], all pitot tubes use the equation $V = C * (2*\Delta P*g/\rho)^{1/2}$ when calculating a flow rate from the measured differential pressure. The calibration constant, *C*, is common to all pitot tubes – its value normally very close to 1. So long as the calculated flow rate varies linearly with the actual flow rate, this calibration constant can be determined in the field by performing a hotwire anemometer traverse and dividing it by the calculated pitot tube flow rate (Assuming a calibration constant of 1). ADM in house tests confirm that the pressure rake calculated flow rates do vary linearly with the actual flow rate (refer to figure 3). Figure 4 graphs the calculated calibration constant as a function of actual air flow. Notice that though there is a discontinuity, on either side of it *C* remains constant. The discontinuity is actually introduced by a change in the fan being used to provide a known flow rate.

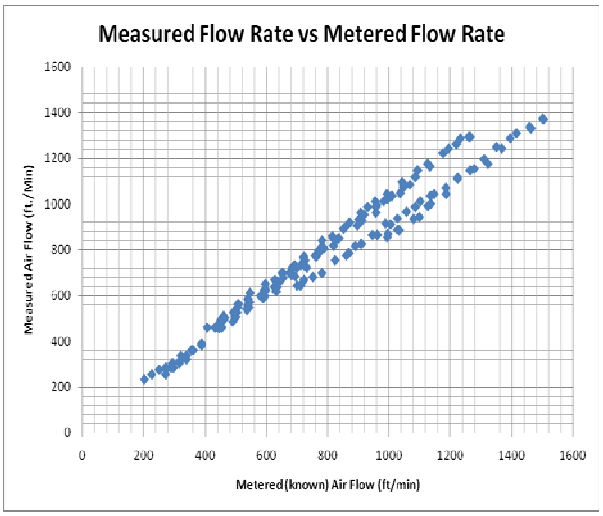


Figure 3

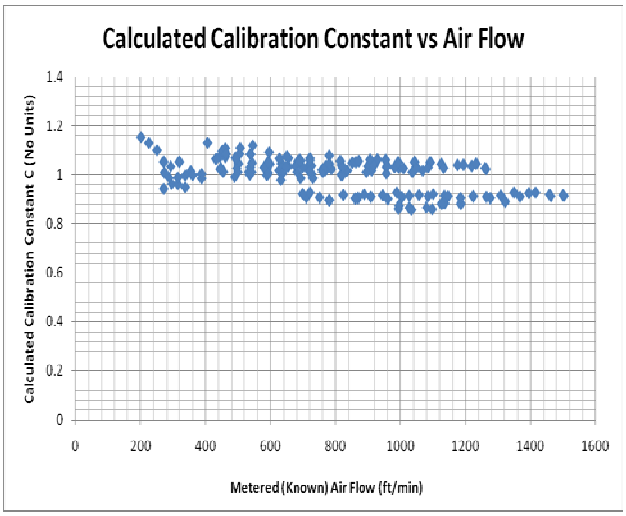


Figure 4

Three fans were used to provide known flow rates to which all measurement were compared. Each fan had several restrictor rings and adjustable speed drives, allowing for the modulation of air flow rates. A calibrated monitor, unique to each fan, was used to determine to actual flow rate within the duct. The discontinuity seen in the above graphs corresponds to all measurements made when the fans were in an *open ring* configuration. It is therefore a product of the metering device's calibration and not introduced by the pressure rake air flow measurement system. Notice that all measurements made in the open ring configuration are consistently linear among themselves.

[5] Airflow can be considered incompressible so long is its velocity is less than Mach .3 (or approximately 1/3 the speed of sound).

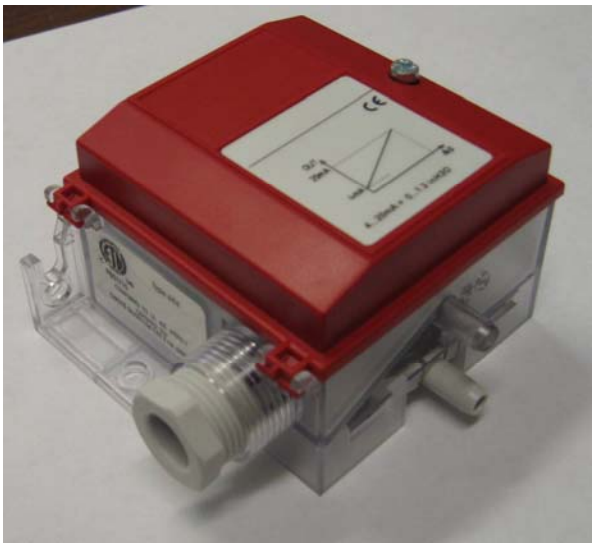


Figure 3. The pressure transducer is manufactured by Huba Control, model number 694.912115010.

Figure 4. Photograph of the calibration process showing dynamic and static pressure locations (left), averaging chamber (center), and holes for inserting the hot wire anemometer (right side of duct).

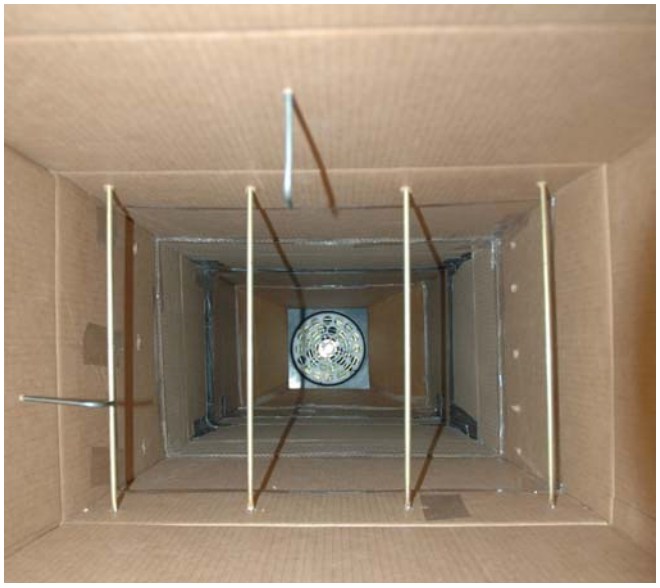
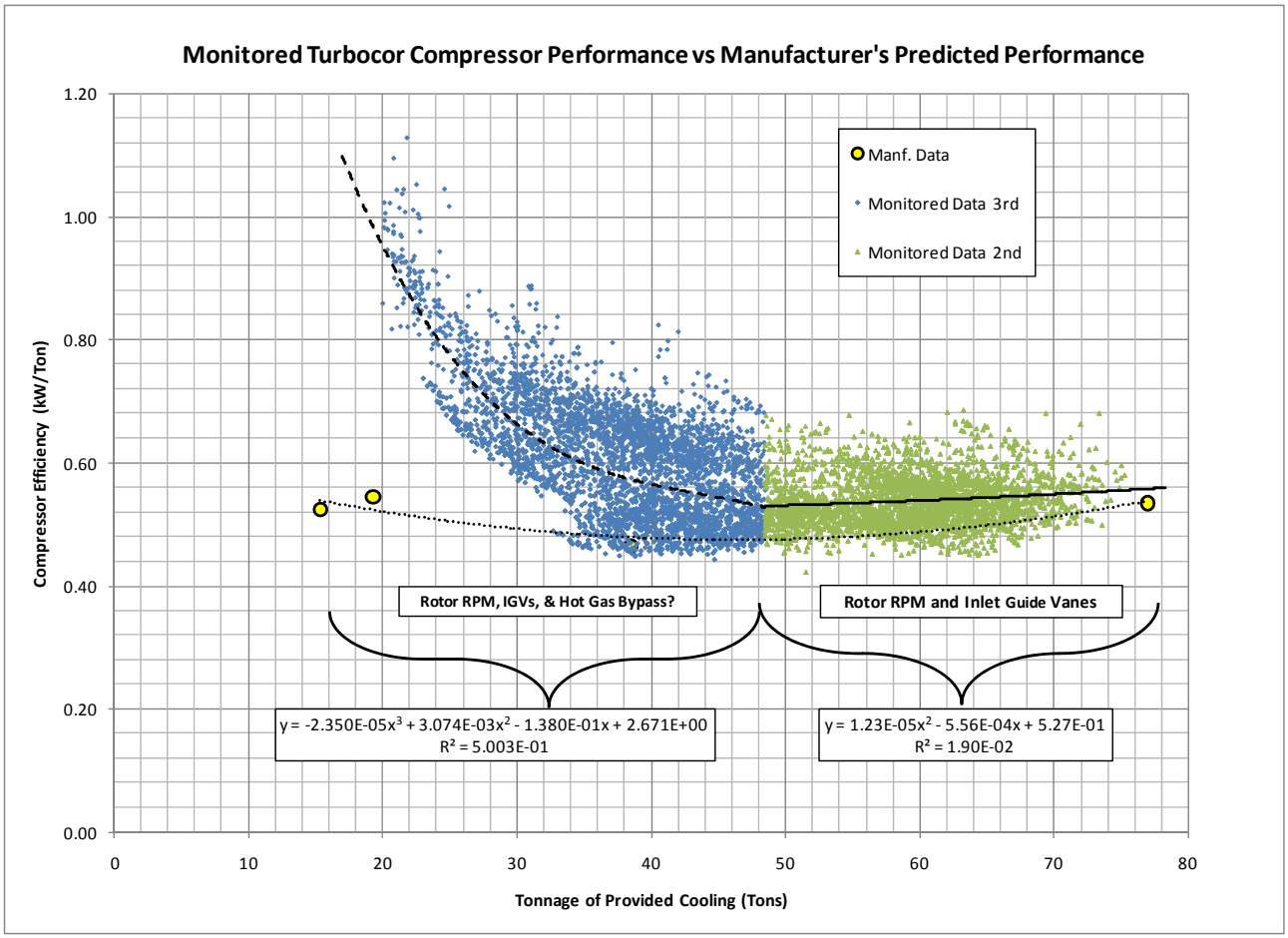


Figure 5 Photograph of the interior of the duct with pressure rakes installed. The two tubes in the foreground are static pressure pitot-tubes.

Figure 6 Photograph of In-situ monitoring equipment. One can see the pressure transducer, batteries, and Hobo datalogger.

Conclusions

ADM monitored two independent Turbocor compressors serving different zones of the same building. The data collected at this site was analyzed and a part-load performance profile was developed in order to estimate the savings achieved by this project, and other Turbocor projects in our sample. The following graph compares the monitored performance against the manufacturer's predicted performance. ADM determined that the curve was best "fit" by apply two different curve fits – each along different intervals of the data.



There are three ways by which the compressor can unload: (1) Rotor RPM, (2) Inlet Guide Vane position, and (3) Hot Gas Bypass. The first two are used conjointly until the compressor is unloaded to its minimum RPM and IGV settings. Thus, the first interval of data is affected by two parameters. However, when the compressor is unloaded any further, it begins using Hot Gas Bypassing – introducing a third parameter. The data indicates that this happens around 40 to 50 tons (roughly 50%). Therefore a third order polynomial was used to fit all data below 50 Tons of cooling, and a second order polynomial was used for all data above 50 Tons of cooling.

APPENDIX C
EXAMPLE OF CALIBRATION PROCESS FOR PGE2005 AND PGE 2007

For each project for which an eQuest model was developed, the model was calibrated to PG&E interval data for this facility to determine the savings due to the installed measures at the facility. To ensure that the eQuest model operated as closely as possible to the as-built conditions, the daily demand and monthly energy consumption were compared and the same were presented in Figures 1 and 2. In Figure 1, the simulation building demand (solid line in the figure) is compared against the building's interval data, represented by dashed lines. Figure 2 compares the monthly energy consumption of building's billing data and simulation models. This form of calibration minimizes the impact of discrepancies due to non-measure impacts and ensures that the potential savings of the installed measures is accurately represented in the simulation results.

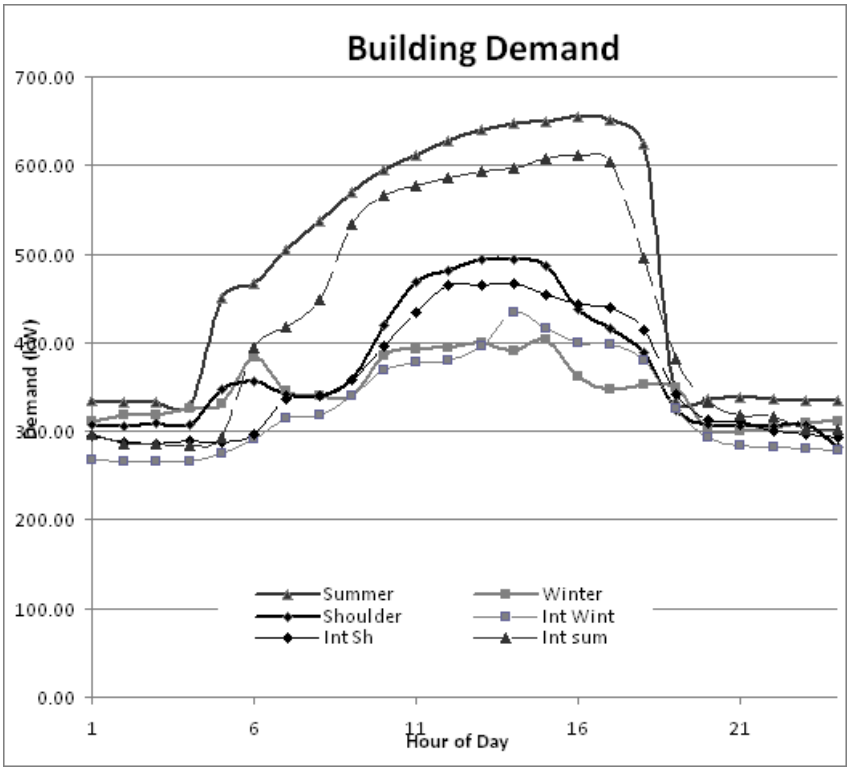


Figure B-1. Comparison of Building and Simulation Demand

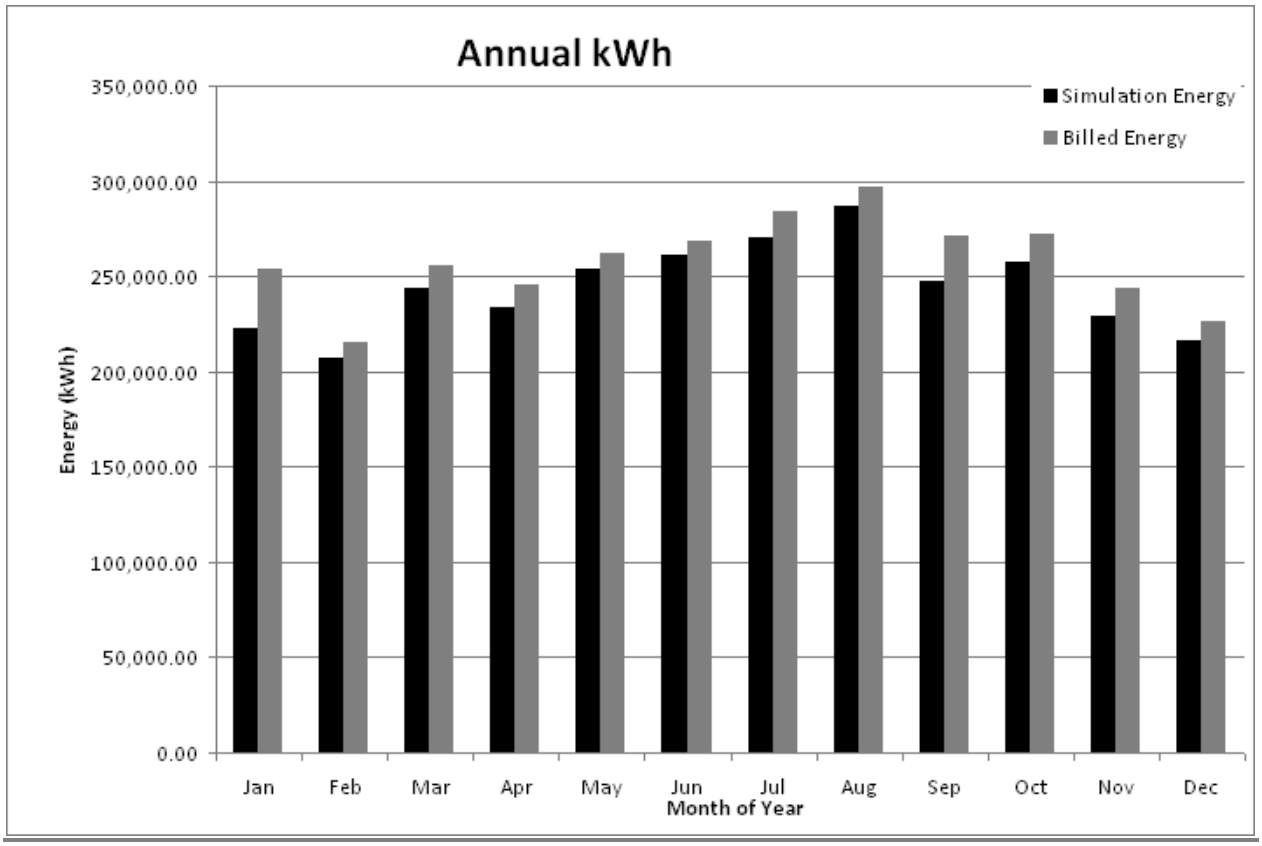


Figure B-2. eQuest Monthly Consumption Versus Billing

APPENDIX D
PEAK DEMAND REDUCTION CALCULATION

The analysis of peak demand used the California Protocol guidelines for estimating peak demand impact at the enhanced rigor level, Option D. The peak demand value was determined per CPUC's definition, average kW reduction between 2-5 p.m. for the three consecutive weekdays, including the weekday with the hottest temperature of the year.

The sites visited were in climate zones 2, 3, 4, 12, and 13. Peak day periods for these climate zones per 1991 weather conditions were as follows:

Climate Zone	Peak Day Period
2	July 22 – July 24
3	July 17 – July 19
4	July 17 – July 19
12	July 22 – July 24
13	July 30 – August 1

APPENDIX E

STEPS TO REDUCE UNCERTAINTY AND IMPROVE VALIDITY AND RELIABILITY

There can be several sources of uncertainty associated with the estimates of the impacts of the PGE2005 and PGE2007 programs. Such sources include the following.

- Sample selection bias
- Physical measurement error (e.g., meter bias, sensor placement, non-random selection of equipment or circuits to monitor)
- Engineering analysis error (e.g., baseline construction, engineering model bias, modeler bias)
- Survey error (e.g., non-response bias)

Various steps were taken to reduce the uncertainty arising from these sources and thereby increase the validity and reliability of key measurements for the evaluation of savings for PGE2005 and PGE2007.

Reducing Uncertainty from Selection Bias. The problem that selection bias creates for program evaluation has been long recognized. Accordingly, explicit steps were taken to guard against selection bias. Although projects were chosen for the evaluation according to a prescribed sampling plan, bias could have been introduced if the facilities with projects selected did not choose to participate in the evaluation effort.

Reducing Uncertainty from Physical Measurement Error. There is some error associated with all physical measurement. Several steps were taken to reduce errors from measurements that might be introduced in the monitoring data.

- To minimize measurement error from improper calibration of data loggers, the field monitoring staff checked all loggers used in the field to ensure that they were properly calibrated prior to being installed. Field staff were also trained on proper procedures for installing the loggers in the field.
- To guard against biases arising because of improper placement of the loggers, field staff were given a prescribed protocol for placing and installing the loggers within the spaces being monitored.
- Usage patterns for equipment may vary from month to month. However, the monitoring conducted for this M&V effort was primarily to obtain information about equipment performance that could inform the eQuest simulation analysis.
- Poor quality data can be a significant source of error and uncertainty. To minimize the potential impact of this problem, various quality assurance checks were applied to the logger data to ensure adequate quality for analysis.

Reducing Uncertainty from Engineering Analysis Error. Much of the analysis of energy savings for the PGE2005 impact evaluation was conducted using computer simulations developed with the eQuest (DOE-2) energy analysis model. There are several types of bias in such engineering analysis that can induce errors and uncertainty into estimates of savings. Accordingly, various steps were taken to reduce these biases.

- Engineering model bias was reduced by using eQuest, which is a well-known and widely used computer simulation model. Well-developed techniques and procedures for conducting engineering analyses with eQuest were used, coupled with rigorous internal reviews.
- Modeler bias was reduced by having the modeling and analysis performed by engineers who were experienced in energy modeling for evaluation purposes and who were familiar with applying eQuest analysis procedures.

Reducing Uncertainty in Net Savings Estimates Arising from Survey Error. For the net savings evaluation of PGE2005, the major source of uncertainty was likely to arise from survey non-response error. Accordingly, various steps were taken to ensure that non-response was minimized.

- As with the impact evaluation sample, projects were chosen for the NTG sample according to a prescribed sampling plan. Because there were multiple players in most situations, the loss of information from individual players is unlikely to have introduced any bias.
- Construct validity was ensured through the use of standard survey and analysis methods that have been pretested with multiple types of customers and have produced reasonable NTG estimates in the past. In particular, the survey instrument for the evaluation of PGE2005 was customized for decision makers at high tech facilities from the NTG survey instrument developed for large commercial customers. Similarly, the case study method developed for analyzing free ridership with large industrial and commercial customers was also adapted for the PGE2005 NTG analysis.
- Ultimately, the external validity of the NTG analysis can be measured by comparing the NTG ratios from the evaluation of PGE2005 against results from other studies using the same methodology.

APPENDIX F
FINDINGS FROM NET-TO-GROSS ANALYSIS FOR HIGH TECH AND COMMERCIAL FACILITIES

PG&E offered several program that addressed the needs of high tech and large commercial customers. These programs included but were not limited to Savings by Design, custom and prescriptive measures, High Tech program, pumps, and Utility Energy Savings Contracts (UESCs). These and other programs were offered singly and in combination at any given site. For example, Savings-by-Design might be used to enhance the efficiency of a design for new construction or a "gut rehab," a custom incentive might be offered for special purpose installations, and prescriptive incentives for lighting or other standard efficiency measures. The customer might work directly with PG&E or through a third party vendor. Depending on the installation and the requirements of the program, the customer and/or a vendor would create a proposal, a pre-installation site inspection would be conducted, the proposal would be reviewed by PG&E personnel or a subcontractor, funds would be allocated, the projects(s) implemented, a post-installation inspection completed, and the incentive paid. When multiple programs were involved, a key account representative or the third party vendor would coordinate the activities.

E.1 Qualitative Findings From Net-to-Gross Analysis

It is important to recognize the commercial market is divided into a number of submarkets. These include large office, government, retail, data centers, high tech facilities, etc. It is also important to recognize that there are multiple players. There are the owners, the building managers, the facility engineering staff, and others. In many instances buildings are managed for their owners by professional firms such as Jones Lang LaSalle or CBRE. The management firms may perform the traditional owner functions and involve the owners in instances where there are major capital decisions.

In addition there are firms that provide facility engineering services that may work for the management firms or the owners. A trend that has occurred over the last four years is that property management firms are becoming much more involved in providing facilities engineering services and are competing with the traditional facilities engineering services providers. The major national property management firms interviewed mentioned that they now have national directors of energy engineering and that energy engineering is "on the map." They now sell efficiency analysis and services as part of their offerings. This is likely an important influence for energy efficiency.

E.1.1 Large Office Submarket

Most owners and managers of commercial office properties are now paying attention to energy efficiency. This appears to be a result of pre-2006 PG&E programs. As an example, a pre-2006 project completed in a headquarters building resulted in the firm letting and even encouraging energy efficiency projects to compete with other projects for funding. The facilities engineering manager said that they have completed approximately 100 projects of which 75 may have received incentives. Those that haven't received incentives likely had paybacks that were too short to qualify for the program. The engineer who works for the property management firm is constantly looking for projects and has support from within the property management firm to find and develop projects. This is becoming common in the large commercial sector.

The incentive does improve the chances of projects that have marginal paybacks. The program also serves to highlight the importance of energy with the owners and the owners value the PG&E imprimatur associated with the program.

E.1.2 Government Submarket

The government submarket includes Federal, state, and local government. The primary issue in the government submarket has been finding the funds to do projects. Decision-makers have been able to apply for funds to undertake energy efficiency projects, but the funds have been limited and projects must compete with other projects at the state, regional, or national level. There is increased awareness for the need for energy efficiency in government. There appears to be some pent up demand but it is unclear how the stimulus funding might influence this. Many agencies have SHEW(s), safety health and environmental workers whose responsibilities include energy efficiency. Programs such as Utility Energy Saving Contracts, UESCs, make it possible for more projects to be completed and for existing projects to be accelerated. The incentives may make local projects more competitive although may reduce the overall savings at a regional or national level.

E.1.3 National Retail Submarket

The large national retail chains are paying attention to energy efficiency. They see efficiency as a way of increasing profits at the bottom line. A large retailer with nine participating stores targeted the stores after looking at their energy performance in comparison to other stores in their chain. In the case of this retailer, the decision to do these kinds of projects has evolved at the national level over recent years. Other retailers have longer histories of doing these kinds of projects. This was mostly a case of deciding where to do the projects and then determining whether rebates were available. In some instances the rebates may have influenced the choice of a store in the PG&E service territory over a store in another area. The top 100 retailers use firms like RealWinWin to find incentives and meet utility requirements so that they can obtain the incentives. The net-to-gross for large retailers is low especially for projects that have natural paybacks of three years or less.

E.1.4 Data centers

A key factor in the net-to-gross for data centers is ownership and use. Because of the opportunities for capital, commercial data centers require paybacks of about a year. In the absence of program incentives, many energy projects in commercial data centers would not be competitive.

For data centers that are mission critical for large companies, the paybacks can be much longer. As a result, the net-to-gross for these projects is somewhat lower because the firms are taking a longer term view and are willing to invest additional funds. Programs like "Savings by design" may be welcomed by these firms especially in terms of providing much more efficient up-front design.

E.2 Quantitative Findings from Net-to-Gross Survey

Net-to-gross telephone interviews were conducted with a subset of 20 customers who had had on-site verification and/or metering. The instrument that was used was a combination interview guide and survey instrument. The interviews were conducted to maximize the exchange of information while completing closed-end survey questions needed for the net-to-gross analysis. The typical interview involved an extended open-end section focusing on the how the project was initiated, who was involved in decision-making, how the decisions were made, and how the utility programs were engaged. This was typically followed by the administration of the close-ended questions. In some instances, the close-ended questions evoked additional discussion.

The survey was the standard net-to-gross questionnaire with modifications to make it appropriate to the commercial facilities and high tech projects. The two most significant modifications were the addition of some items to the influence battery, in particular, the addition of some non-energy factors that may have influenced decision-making. The other modification was that the influence battery was administered in two parts. Rather than asking respondents to rate influence on a "0" to "10" scale where zero would mean no influence, the respondents were taken through the list of influences and asked whether or not a factor influenced their decision by responding with a "yes" or "no". The respondents were then asked to rate those factors to which they responded in the affirmative in part one on a scale of 1 to 10 where "1" was "not at all important" and 10 was "very important." The two part rating scheme was designed to prevent respondents from giving a low importance score to factors that really had no influence thereby reducing the average importance score.

E.2.1 Why Respondents Participated

In almost all instances, the respondents initiated the projects on their own. Some projects resulted from contacts with vendors and/or the utility. In a few cases, the projects were based on audits or retro-commissioning studies that had been previously completed. In most instances the respondents started with a specific project in mind and then worked with an engineering firm, a vendor, or a PG&E representative to see if there was a match with a PG&E program.

Respondents were well aware of the benefits of energy efficiency especially with respect to reducing energy costs.

E.2.2 Awareness Before and After Learning about the Program

Ninety-five percent of the participants were aware of the availability of PG&E programs prior to or while thinking about their project (Table E-4). We should caution that respondents were aware of PG&E offerings in general but not necessarily the specific program in which they ultimately participated. We found only one clear instance where the respondent's firm took steps to implement a project and then learned through the vendor they had chosen that incentives were available (Table E-5). The paybacks and the culture of the firm were such that this firm would have done the project without the incentive.

Table E-4. First Learned about Program Before or After Started Thinking about Project

	Large Commercial		Data Centers	
	Frequency	Percent	Frequency	Percent
Before	13	93	5	100
After	1	7	0	
Total	14	101	5	100

Table E-5. Learned about Program Before or After Began Implementation

	Large Commercial		Data Centers	
	Frequency	Percent	Frequency	Percent
Before	13	93	5	100
After	1	7	0	
Total	14	101	5	100

There was also an instance where a firm identified a major project, engaged PG&E as part of the team at the outset, budgeted for the project without incentives, used the savings by design program, and received incentives. The representative of the firm said that the project would have been completed without PG&E and that the incentives were "gravy and the icing on the cake." This is a service industry where the paybacks on capital can be longer. It is also a firm that is seeking to be the national leader in its field. It is unclear if the participation in Savings-by-Design resulted in upgrades that would not otherwise have occurred but it is clear that this firm has a commitment to containing long-term costs and being best in class.

In the case of a major national retailer doing lighting retrofits, the retailer had within the last three or four years begun to examine the energy consumption in its stores nationwide identifying stores with high consumption. The responsibilities of the respondent were to liaise with utilities regarding efficiency programs. The decision-making involved a number of factors including near term potential for remodeling the store, the possibility that the store might be closed, and the

payback or return on investment. The payback was used to prioritize which stores would receive early retrofits. The incentive would have the effect of increasing the payback and encouraging the retailer to implement the changes in the PG&E service as opposed to some other part of the country where energy costs might be lower and the payback without an incentive or with a smaller incentive, shorter.

In the office submarket, national real estate operators told us that they now have a company officer whose responsibility is to address energy efficiency in their own buildings and in the buildings of their clients. This is a change for these companies from three years ago. At least one of the two firms has regional support as well. It is clear that their customers are asking about and doing energy efficiency and it is clear that they are promoting energy efficiency (sustainable buildings) as a profit center. Their facilities engineers are aggressively looking for opportunities in the buildings they serve. In both of these cases, the respondents reported that projects were either budgeted or could compete for funding within the capital pool. They also told us that they were not likely to advance a project unless they felt that it would meet payback requirements. Both respondents argued that the PG&E programs helped to spotlight efficiency (sustainability) and helped to legitimize projects. On the other hand they had projects that they had completed that had received and not received incentives.

At the opposite end of the spectrum was a firm with a series of data centers. They are well aware of energy costs but the nature of the business is such that one-year paybacks are needed to make a project competitive. The respondent from this firm argued that without the incentives, projects would not have proceeded.

There were some projects in state and federal office buildings. In these instance the facility would identify project and then compete in the state or federal capital pool for money. Like most other respondents, these site representatives reported that they would not put forth a project unless they were reasonably sure that the project would be competitive. One of the Federal projects worked with the PG&E UESC program to fund the project through that mechanism. This allowed the project to be diverted from the stream of projects vying or funds in the capital pool and likely accelerated the project or perhaps made it possible. It ensured that a project was completed in the PG&E service territory as opposed to another service territory.

The main takeaways from the interviews were as follows:

- Use of the programs evolved from specific projects.
- All of these customers were aware of the benefits of energy efficiency programs and many have project identification and implementation mechanisms in place.
- Many are committed to doing efficiency projects.
- Almost all of these projects were customer initiated.

- The utility programs provided important technical information and helped to validate the projects and generate support with management.

E.2.3 Program and Non-Program Influences

Nineteen respondents completed the influence battery that asked what influenced their participation. The 18 factors in the commercial and high-tech influence battery were designed to separate program and non-program influences. An attempt was made to include non-energy factors to prevent the list from being energy centric. Examples of factors representing program influences are the incentive or the recommendation from the program auditor or program vendor. Non-program factors included such things as the long-term electricity savings, being "green," and getting information through a trade publication. The complete list of influences can be seen in

Table E-6. The four program related items are marked with an asterisk in column 1 and the balance represent non-program factors that could have influenced the decision.

As noted above, the battery was administered in two parts. The respondents were taken through the list of influences and asked whether or not a factor influenced their decision by responding with a "yes" or "no". In part two, respondents rated those factors to which they responded in the affirmative in part one on a scale of 1 to 10 where "1" was "not at all important" and 10 was "very important." The two part rating scheme was designed to prevent respondents from giving a low importance score to factors that really had no influence thereby reducing the average importance scores.

The data for these respondents is displayed in

Table E-6.

. The percent column indicates the percentage of respondents indicating that a factor influenced them. The average score displays the average for those who rated the factor. The rows are arranged from the highest average rating to the lowest with the exception

The highest average importance score across the ten-point scale was reduced costs on future electric bills (9.2). Having a standard to install efficient equipment was the second highest rated factor (9.1). It should be noted that this was interpreted to include a respondent saying that there was an internal culture that would encourage the installation of efficient equipment. Helping the environment to be green with an average rating of 8.6, and the age and cost of equipment being replaced (8.5) occupied the next two slots. The fifth ranked item was prior experience with the equipment. The four program factors followed. Clearly non-program measures took precedent over program measures in the rankings.

The most frequently cited factors were the cost reduction on future energy bills (100 percent), the program incentive (95 percent), and helping the environment (84 percent) were the three most frequently cited items. The age of the equipment being replaced (63 percent), and prior experience with the equipment were the next most cited items.

Table E-6. Factors Motivating Participation in Program

	Reason for participation	Frequency	Percent	Number	Mean
	The reduced energy cost on future electric bills	19	100	17	9.2
	Your company has a standard to install equipment like the measures installed	9	47	7	9.1
	To help the environment and/or be green	16	84	16	8.6
	The age or condition of the equipment being replaced	12	63	12	8.5
	Prior experience with measure being implemented	11	58	9	7.9
*	The incentive provided by the High Tech Program to help pay for the measure	18	95	18	7.8
*	A recommendation from a representative of PG&E	10	53	7	7.7
*	Recommendation from the installer or vendor	9	47	7	7.6
	Attendance at a PG&E training course	2	11	2	7.0
*	The recommendation from an auditor or engineering firm	10	53	9	6.9
	Prior experience with the High Tech program or another energy efficiency program	9	47	9	6.8
	Information obtained from PG&E in the past	7	37	6	6.8
	Information at a trade show	2	11	2	6.5
	A recommendation from a colleague or another firm	6	32	5	6.4
	Previous recommendation from an auditor or engineer	4	21	4	6.2
	Other firms in the industry are installing measures like MD1	5	26	5	5.0
	Information from a trade publication	3	16	2	5.0
	Previous recommendation from some other vendor	1	5	2	5.0

For each respondent, the program factor scores and the non-program factor scores were averaged. Only factors that participants cited and that participants rated were included in the averages. Table E-8 shows the distribution of the scores for the program and non-program factors. Average program scores (8.1) were higher than average non-program scores (7.6).

After the influence battery was administered and the respondents had an opportunity to think about the various factors that influenced them, they were asked to summarize their perceptions of various aspects of the program, such as the incentive or the recommendations of the auditor were more important, or whether non-program factors were more important. The preponderance of respondents selected program factors.

Table E-7. Which type of factor is more important

Which factor is more important	Count	Percent
Program factors more important	16	84
Non-program factors more important	1	5
Can't distinguish	1	5
No answer	1	5
Totals	19	99

The respondents were then asked to distribute 10 points between program factors and non-program factors. The sum of the points had to add to 10. The respondents attributed an average of 6.22 points to non-program factors and 3.78 points to the program factors.

Table E-8. Distribution of average scores for program and non-program factors

	Program Factors	Program (Percent)	Non-program factors	Non-program (Percent)
0 to .99				
1 to 1.99				
2 to 2.99	1	5		
3 to 3.99	1	5		
4 to 4.99				
5 to 5.99	1	5	3	16
6 to 6.99	1	5	2	10
7 to 7.99	4	21	4	21
8 to 8.99	7	37	5	26
Greater than 9	3	16	5	26
Don't know/no answer	1	5		0
Total	19	99	19	99

Finally, the respondents were asked how likely they were to have completed the project in the absence of the program. On a 10-point scale the respondents judged that their likelihood of installing the strip curtains in the absence of the program 6.58. In other words, on average they would have been more likely than not to have replaced the strip curtains. This suggests that many of the respondents were prepared to act on their own.

E.3 Calculating Overall Net-to-Gross Ratio

The NTGR is calculated as an average of three scores. Each of these scores represents the highest response or the average of several responses given to one or more questions about the decision to install a program measure.

- A *Timing and Selection* score that reflects the influence of the *most important* of various program and program-related elements in the customer's decision to select the specific program measure at this time. Program influence through vendor recommendations is also incorporated in this score.
- A *Program Influence* score that captures the perceived importance of the program (whether rebate, recommendation, training, or other program intervention) relative to non-program factors in the decision to implement the specific measure that was eventually adopted or installed. This score is determined by asking respondents to assign importance values to both the program and most important non-program influences so that the two total 10. The program influence score is adjusted (i.e., divided by 2) if respondents say they had already made their decision to install the specific program qualifying measure before they learned about the program.
- A *No-Program* score that captures the likelihood of various actions the customer might have taken at this time and in the future if the program had not been available (the counterfactual). This score also accounts for deferred free ridership by incorporating the likelihood that the customer would have installed program-qualifying measures at a later date if the program had not been available.

Table E-9 shows the net-to-gross ratio by type of respondent. General commercial facilities have a net-to-gross ratios of about 0.6. The high tech data centers have a somewhat lower net-to-gross ratio.

Table E-9. Net-to-Gross Ratio by Type of Respondent

Category of respondent	Count	Percent	Group net-to-gross
Commercial Facilities	14	74	.60
High Tech Data Centers	4	21	.46
High Tech other	1	5	.50
Total/weighted total	19	100	-

APPENDIX G
NET-TO-GROSS DATA COLLECTION INSTRUMENTS, GUIDANCE DOCUMENTS, AND SUMMARY NTG RESULTS

The following pages contain the survey instruments and survey guidance documents that were employed during the of Net-To-Gross analysis of Strip Curtains and Door Gaskets.

Pre Survey Fill Data

Name of facility(ies) and location(s)

Facility ID Number	Name	Address	City	State	Zip

Name and position of persons to be interviewed

Name	Title	Location	Telephone Number(s)	Interview Priority

	Facility ID Number	Standard Measure Name	Measure description(MD)	Quantity installed	
1					
2					
3					

Introduction

Hello, my name is _____and I am calling from Innovologie on behalf of the California Public Utilities Commission. We are calling about your participation PG&E's Commercial/High Tech Program. We have been asked to help assess the energy savings from this program. It is extremely important that we talk with you about how the decisions were made about this installation.

According to our records you installed and received incentives for MD1, MD2 and MD3 at address1.

I-1. Does that sound right, and do you recall this?

- ❑ Yes (1) *Go to I-2*
- ❑ No (0) *Go to I-1a*
- ❑ Don't know or don't remember (9) *Go to I-1a*

I-1a. Is there someone else who might know about such installations?

- ❑ Yes (1) *Go to I-1b*
- ❑ No (0) *Thank and terminate the interview*
- ❑ Don't know or don't remember (9) *Thank and terminate the interview*

I-1b. It would be appreciated if you could provide the name and contact for this person *(follow up with contacts).*

Name _____

Telephone _____

E-mail _____

Thank you very much. You have been most helpful. *Terminate the interview*

I-2. We are interviewing firms that participated in the PG&E Commercial/High Tech Program in 2006, 2007, or 2008 in order to help us understand how much energy the program saved. We would like to ask a few questions about your firm's decision to

participate in the program. The results will be used to help calculate the energy savings. Is this a good time? [*If necessary,* The interview may take 30 – 60 minutes. We can call back. We are conducting this study under the auspices of the California Public Utility Commission. If you have any questions you, may call Ms. Kay Hardy at the California Public Utilities Commission 415 703-2322.]

I-3. What was your role in deciding to install this/these measures? Did you:

1. ❑ Receive information and/or recommendations and personally decide to participate (Ask I-31a)

   I-31a. Were you the sole decision maker or were you assisted by others such as a vendor, architect or someone else?

   1. ❑ Sole decision maker (go to first measure)
   2. ❑ No, others inside our outside your company helped to decide (Ask I-4)
   98. ❑ Don't know (Ask I-4)
   99. ❑ Refused/Not applicable (Ask I-4)

2. ❑ Receive information, evaluate it, and participate with others in deciding to do the project (Ask I-4)
3. ❑ Receive information, evaluate it, and make a recommendation to others about whether to do the project (Ask I-4)
4. ❑ Receive information and pass it along to other decision-makers without a recommendation (Ask I-3b)
5. ❑ Refer the vendor to someone else in your firm who makes the decision (Ask I-3b)
6. ❑ Or, were you told that someone would be coming to do the audit and/or the installation (Ask I-3b)
7. ❑ The decision was made some other way
   Please explain_____ (Ask I-3b)

8. ❑ Don't remember (Ask I-3b)

I-3b. So did you influence or participate in the decision or was it entirely made by others?

1. ❑ Yes, participated (Ask I-3c)
2. ❑ No, others made decision (Ask I-4)
98. ❑ Don't know [*Thank and terminate the interview]*
99. ❑ Refused [*Thank and terminate the interview]*

I-3c. Are you the best person to speak with concerning the decision to participate?

1. ❑ Yes (Go to first technology)
2. ❑ No (I-4)
98. ❑ Don't know (I-4)
99. ❑ Refused/Not applicable (I-4)

I-4. Can you tell me who significantly influenced or else helped make the decision including others in your company, any outside vendors or engineers, or others?

Name: _____ Name: _____ Name: _____

Position: _____ Position: _____ Position: _____

Telephone: _____ Telephone: _____ Telephone: _____

Email: _____ Email: _____ Email: _____

[Thank and terminate the interview if I-3b was 2 or I-3c was 2, 98, or 99 Follow-up interviews with these folks should be conducted]

I-5. Of these people, who had the most influence? _____

Measure 1

MO1. According to our records MD1-MDN was installed. Can you tell me why your firm decided to install MD1? For example, who suggested the installation? (Probe: For as much information as you can get. Were there any other reasons?)

1. ❑ Record VERBATIM

98. ❑ Don't know

99. ❑ Refused/Not applicable

MO2. Prior to 2006, had you installed anything like MD1-MDN through a utility program and receive rebates for that?

1. ❑ Yes

0. ❑ No

98. ❑ Don't know

99. ❑ Refused/Not applicable

MO3. Did you first learn about the High Tech Program BEFORE or AFTER you or your firm began to think about undertaking the project that installed MD1

1. ❑ Before (Ask MO5)

2. ❑ After (Ask MO4)

98. ❑ Don't Know (Ask MO4)

99. ❑ Refused (Ask MO4)

MO4DG10. Did you or your firm learn about the Commercial/High Tech Program BEFORE or AFTER you decided and took steps to install MD1-MDN

1. ❑ Before
2. ❑ After
98. ❑ Don't Know
99. ❑ Refused

MO5. Now I am going to list some things that may have influenced you to install MD1. I would like to have you tell me if any of these influenced your decision to participate in the **program** even if it influenced your decision just a little bit? [Rotate list]

		Yes (1)	No (0)	DK (98)	RF NA (99)
a.	The age or condition of the equipment being replaced	❑	❑	❑	❑
b.	The incentive provided by the Commercial/High Tech Program to help pay for the measure	❑	❑	❑	❑
c.	The reduced energy cost on future electric bills	❑	❑	❑	❑
d.	Other firms in the industry are installing measures like MD1-MDN	❑	❑	❑	❑
e.	The recommendation from program auditor or engineering firm	❑	❑	❑	❑
f.	Recommendation from an installer or vendor	❑	❑	❑	❑
g.	Information obtained from PG&E in the past	❑	❑	❑	❑

h.	Prior experience with MD1-MDN	❑	❑	❑	❑
i.	Prior experience with the Commercial/High Tech program or another energy efficiency program	❑	❑	❑	❑
j.	Information from a trade publication	❑	❑	❑	❑
k.	Attendance at a PG&E training course	❑	❑	❑	❑
l.	Previous recommendation from some other vendor	❑	❑	❑	❑
m.	Previous recommendation from some other auditor or engineer	❑	❑	❑	❑
n.	Information at a trade show	❑	❑	❑	❑
o.	A recommendation from a representative of PG&E	❑	❑	❑	❑
p.	Your company has a standard to install equipment like MD1-MDn	❑	❑	❑	❑
q.	To help the environment and/or be green	❑	❑	❑	❑
r.	A recommendation from a colleague or another firm	❑	❑	❑	❑
t.	Other				

MO6. *[Ask only questions answered with a Yes from MO5. Keep the rotation in question 12.]*

Now I am going to ask you to rate the importance on a scale of 1 to 10 of each of the items you said influenced your decision. A one means the item is not at all important and a ten means the item is very important.

MO6a. The age or condition of the equipment being replaced

Not at all important									Very Important		
❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA

98 99

MO6b. The incentive provided by the Commercia/Program to help pay for the measure

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

1 2 3 4 5 6 7 8 9 10 DK RF/NA

98 99

MO6c. The reduced energy cost on future electric bills

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

1 2 3 4 5 6 7 8 9 10 DK RF/NA

98 99

MO6d. Other firms in the industry are installing measures like MD1-MDn

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

1 2 3 4 5 6 7 8 9 10 DK RF/NA

98 99

MO6e. The recommendation from a program auditor or engineer

Not at all important Very Important

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO6f. The recommendation program installer or vendor

Not at all important Very Important

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO6g. Information obtained from PG&E in the past?

Not at all important Very Important

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO6h. Prior experience with MD1-MDn?

Not at all important Very Important

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO6i. Prior experience with the Commercial/High Tech Program or another energy efficiency program?

Not at all important									Very Important		
❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO6j. Information from a trade publication?

Not at all important									Very Important		
❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO6k. Attendance at a PG&E training course?

Not at all important									Very Important		
❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO6l. Previous recommendation from some other vendor?

Not at all important Very Important

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO6m. Previous recommendation from some other auditor or engineer?

Not at all important Very Important

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO6n. Information at a trade show?

Not at all important Very Important

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO6o. A recommendation from a representative of PG&E?

Not at all important Very Important

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO6p. Your company has a standard to install such equipment?

Not at all important									Very Important		
❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO6q. Help the environment and/or be green?

Not at all important									Very Important		
❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO6r. A recommendation from a colleague or another firm

Not at all important									Very Important		
❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

Do not put in rotation

MO6u. Other? (describe) _____

Not at all important									Very Important		
❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO7a . *(The computer will determine the highest rated item(s) from among MO6a, d, g, h, j, k, l, m, n, o, p, q, r, s, t, u Based on this respondent will be asked)*

In summary, you told us *high rated factor #1, high rated factor #2, ... high rated factor #n* was/were important, and gave it/them a score of *X*. Comparing this/these factors to the program over all, which was more important, the program or the other factors?

- ❑ a. Program more important
- ❑ b. Other factor(s) more important
- ❑ c. Can't distinguish (probe to see if you can get customer to select a or b.

MO7b. If I give you 10 importance points and you award points based on importance to either (the) *high rated factor #1, high rated factor #2, ...and, high rated factor #n* or to the program, how many total points out of ten would you award to just the high rated factors and how many to the program. *(If there is confusion provide the following examples,* For example, you think the program is much more important than the other factors so you award 7 points to the program and three to the other factors or if you think the other factors are a bit more important than the program you could award 7 to the other factors and 3 to the program*.)*

Points to factor(s)____

Points to program_____

Make sure total points add to 10.

Now I would like you to think about the action you would have taken if the High Tech Program had not been available.

MO7d. If the High Tech Program had not been available, how likely is it that you would have installed MD1-MDn where 1 is "absolutely wouldn't have installed" and 10 is "absolutely would have installed"?

Not at all likely									Very Likely		
❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10	DK	RF/NA
										98	99

MO7E. In the absence of the rebate from the _____ program, is it more likely that you would have done nothing or is it more likely that you would have installed the alternative that you just described?

1. ❑ The alternative just described
2. ❑ Nothing
98. ❑ Don't know
99 ❑ Refused

MO7F. (If question MO7D > 5) You indicated in your response to the previous question that there was an X in 10 likelihood that you would have installed the same equipment if the utility program had not been available. When do you think you would have installed this equipment? Please express your answer in months.

1. ❑ At the same time

2. ❑ Within months

3. ❑ Never

98. ❑ Don't know

99. ❑ Refused

A. IF RESPONDENT HAS DIFFICULTY SPECIFYING ANSWER IN MONTHS, READ: Would it have been ...

1. ❑ within 6 months?

2. ❑ 6 months to 1 year later

3. ❑ 1 - 2 years later

4. ❑ 2 - 3 years later?

5. ❑ 3 - 4 years later?

6. ❑ 4 or more years later

98. ❑ Don't know

99. ❑ Refused

CORPORATE POLICY BATTERY

MO8. Does your firm have an environmental policy or commitment to reduce environmental emissions or energy use? Some examples would be to "buy green" or use sustainable approaches to business investments.

1. ❑ Yes [CAN I OBTAIN A COPY OF THE POLICY?]
2. ❑ No
98. ❑ Don't know
99. ❑ Refused

MO9. Did that policy influence your decision to purchase and install equipment like MD1?

1. ❑ Record VERBATIM [CAN I OBTAIN A COPY OF THE POLICY?]
98. ❑ Don't know
99. ❑ Refused

MO10. What financial calculations, if any, did your company make before proceeding with installation of MD1?

1. ❑ Record VERBATIM

2. ❑ No financial calculation (Go to MO13)

98. ❑ Don't know

99. ❑ Refused

MO11. What is the cut-off point your company uses before deciding to proceed with an investment like M1-Mn?

1. ❑ Record VERBATIM

98. ❑ Don't know (Go to MO13)

99. ❑ Refused (Go to MO13)

MO12. What was the result of the calculation for M1 a) with the rebate? b) without the rebate?

1. ❑ With rebate _____

2. ❑ Without rebate_____

98. ❑ Don't know

99. ❑ Refused

INVESTIGATE INCONSISTENT RESPONSES

MO13. What competing investments, if any, were considered for the funds that were allocated to installing MD1-MDN?

1. ❑ First mention: _____
2. ❑ Second mention: _____
3. ❑ Third mention: _____
4. ❑ Fourth mention: _____
98. ❑ Don't know (Go to S1)
99. ❑ Refused (Go to S1)
97. ❑ No mention (Go to S1)

MO14. Why was MD1 chosen over these other investments?

1. ❑ Record VERBATIM

98. ❑ Don't know
99. ❑ Refused

Replication and incidental measures questions

S1. Have you installed any additional energy efficiency measures at this location since you installed MD1?

1. ❑ No (Thank and finish)
2. ❑ Yes (Go to S2)
98. ❑ Don't know
99. ❑ Refused/no answer

S2. Were any of these quite similar to MD1

1. ❑ No
2. ❑ Yes
5. ❑ None
98. ❑ Don't know
99. ❑ Refused/no answer

S3. Have you implemented any other kinds of measures including measures we haven't talked about?

1. ❑ No
2. ❑ Yes (Go to S4)
98. ❑ Don't know
99. ❑ Refused/no answer

S4. Could you tell me what those measures are?

a. _____
b. _____
c. _____

S6. (If S4 a, b, c) Were any of the additional measures like (S4 A, B, C) covered by a utility or government energy efficiency incentive program?

1. ❑ No

2. ❑ Yes)

98. ❑ Don't know

99. ❑ Refused/no answer

3. Could you tell me what program

S11. Using a 1 to 10 scale, where 1 is absolutely not important and 10 is absolutely important, how important was your experience with the Commercial/High Tech Program in your decision to implement [S4 A, B, C]?

Absolutely not important Absolutely important

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10

S12. If you had not participated in the Commercial/High Tech program, how likely is that your organization would still have implemented M1 and S4: a - c], using a 1 to 10 scale, where 1 means you ***definitely WOULD NOT*** have implemented the measure and 10 means you ***definitely*** would have implemented the measure.

Definitely would not have Definitely would have

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10

S13. How significant was your experience in the 06-08 Commercial/High Tech in your decision to implement this M1 and S4: a - c] that did not receive incentives, using a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant?

Definitely would not have Definitely would have

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10

S14. Now, thinking about your firm's other facilities operated in parts of the PG&E service territory, Southern California Edison, Socal Gas, and San Diego Gas and Electric, are you aware of any measures like M1 being implemented

S15. Have you implemented any other kinds of measures including measures we haven't talked about at any of those sites as a result of your participation in the Commercial/High Tech Program?

1. ❑ No (Finish and Thank)
2. ❑ Yes (Go to S16)
98. ❑ Don't know
99. ❑ Refused/no answer

S16. Could you tell me what those measures are?

a. _____
b. _____
c. _____

S13. How significant was your experience in the 06-08 Commercial/High Tech program in your decision to implement this S16: a - c] that did not receive incentives, using a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant?

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
1	2	3	4	5	6	7	8	9	10

C3. Recent Survey Area Changes: Give a brief description about any changes made to this site since Jan. 2006 that significantly impacted energy usage.

End of Large Commercial Net-to-Gross Survey instrument and interview guide.

APPENDIX H
SUMMARY RESULTS ON THE EVALUATION OF HIGH TECH AND COMMERCIAL FACILITIES (PGE2005 AND PGE2007)

The following pages contain a condensed spreadsheet report showing data collected during the Net-to-Gross surveys. Confidential customer information has been redacted.

Decision Maker NTG Scoring Worksheet For CPUC Large Commercial

Sector	Commercial	Commercial	Commercial	Commercial	Commercial	Commercial
ADM ID Number	CF05[AC-13]6	CF07[AC-09]	CF07[AC-10]5	CF07[A2-4]4	CF05[CC-15]6	CF05[AC-16]5
PG&E Number	2K6-L-0713-	2K07000188	2K6-S0570E	2K6-L-0629-LC	NC0074193	2K6-L-0080-
Measure	Lighting on Da	Lighting	Air cooled chi	Lighting contr	Premium Effic	VFDs on three
Timing and Selection Score	**10**	**9**	**8**	**9**	**10**	**9**
Please rate the importance of each of the following in your decision to implement this specific [MEASURE] at this time.						
Age or condition of the facility	8	0	5	9	0	0
Availability of the program rebate	10	5	8	9	10	9
Information provided through study, audit or other technical assistance provided through &PROGRAM	9	9	0	9	0	5
Recommendation from a vendor	0	0	0	0	0	7
VENDOR VMAX Score times Vendor Recommendation score if Vendor Recommendation>5						
Previous experience with MEASURE	8	0	0	9	8	0
Previous experience with PROGRAM	8	0	6	9	8	4
Information from UTILITY or program training course	7	0	0	0	0	0
Information from UTILITY or program marketing materials	7	0	0	0	0	6
A recommendation from an auditor or consulting engineer	7	0	0	0	0	5
Standard practice in your industry	5	0	0	0	0	0
Recommendation from PROGRAM staff	8	0	0	0	7	7
Endorsement or recommendation by UTILITY Account Rep						
Corporate policy or guidelines	10	0	0	9	0	0
Energy cost savings	10	10	0	9	8	8
Information from a trade publications	0	0	4	0	0	0
Information at a trade show	0	0	0	0	0	0

Decision Maker NTG Scoring Worksheet For CP

Sector	Commercial	Commercial/d	Water resourc	High tech	Commercial	Commercial	Commercial
ADM ID Number	CF07[CC-20]5	CF05[BC-2]6	CF07[CC-19]5	CF05[CC-16]	CF07[AC-6]6	CF07[CC-15]	CF05[CC-18]6
PG&E Number	2K07001291	2K07001291	2K8007200-7	2K08005778	2K6-L-0467	2K08007547	2K07000308
Measure	Lighting retrof	Low Velocity A	7 Water Pump	Vacuum Tube	DDC for VAV	Lighting Retro	CAV to VAV R
Timing and Selection Score	**8**	**4**	**0**	**10**	**10**	**10**	**8**
Please rate the importance of each of the following in your decision to implement this specific [MEASURE] at this time.							
Age or condition of the facility	10	10	10	10	7	9	6
Availability of the program rebate	8	4	0	10	10	10	8
Information provided through study, audit or other technical assistance provided through &PROGRAM	0	0	0	0	9	0	0
Recommendation from a vendor	0	8	0	7	0	0	0
VENDOR VMAX Score times Vendor Recommendation score if Vendor Recommendation>5							
Previous experience with MEASURE	0	7	10	0	0	0	8
Previous experience with PROGRAM	0	5	0	0	0	0	8
Information from UTILITY or program training course	0	0	0	0	0	0	0
Information from UTILITY or program marketing materials	0	0	0	8	0	0	0
A recommendation from an auditor or consulting engineer	6	0	0	0	0	0	0
Standard practice in your industry	0	1	0	8	6	0	0
Recommendation from PROGRAM staff	0	0	0	9	10	0	0
Endorsement or recommendation by UTILITY Account Rep							
Corporate policy or guidelines	0	0	10	0	10	0	0
Energy cost savings	8	10	7	10	10	10	9
Information from a trade publications	0	0	0	0	0	0	0
Information at a trade show	7	0	0	0	0	0	0

Decision Maker NTG Scoring Worksheet For CP

Sector	Commercial/d	Commercial	Commercial	Data center	Commercial
ADM ID Number	CF05[CC-17]6	CF07[CC-26]5	CF07[A2-18]2	CF05[CC-9]6	CF07[AC-23]
PG&E Number	2K07000199	2K07001677	2K07000481	2K08006919	2K6-L-0792-
Measure	Replace three	Evaporator fa	Three Water F	Replace CRA	Lighting powe
Timing and Selection Score	**10**	**7**	**9**	**10**	**5**
Please rate the importance of each of the following in your decision to implement this specific [MEASURE] at this time.					
Age or condition of the facility	0	0	9	9	0
Availability of the program rebate	7	7	9	10	5
Information provided through study, audit or other technical assistance provided through &PROGRAM	10	0	6	0	0
Recommendation from a vendor	10	8	6	0	7
VENDOR VMAX Score times Vendor Recommendation score if Vendor Recommendation>5					
Previous experience with MEASURE	0	0	8	6	0
Previous experience with PROGRAM	0	0	0	6	0
Information from UTILITY or program training course	0	0	7	0	0
Information from UTILITY or program marketing materials	0	0	7	0	3
A recommendation from an auditor or consulting engineer	0	0	7	0	0
Standard practice in your industry	0	0	0	0	5
Recommendation from PROGRAM staff	0	0	8	0	5
Endorsement or recommendation by UTILITY Account Rep					
Corporate policy or guidelines	0	0	9	0	8
Energy cost savings	10	9	10	0	10
Information from a trade publications	0	0	6	0	0
Information at a trade show	0	0	6	0	0

Timing and Selection Score	**10**	**9**	**8**	**9**	**10**	**9**	
To help the environment or be green	10	8	8	9	8	6	
Recommendation form a colleague or another firm	8	4	0	0	0	0	
Previous recommendation from some other vendor	6	0	4	0	0	0	
Other	#NULL!	0	0	0	5	0	
Other, such as non-energy benefits							
Importance of other factor							
Program Influence Score (reduced by half if learned after decision)	**8**	**7**	**6**	**1**	**6**	**3**	
Did you first learn about &PROGRAM BEFORE or AFTER you first began to think about implementing &MEASURE?	BEFORE	BEFORE	BEFORE	BEFORE	BEFORE	BEFORE	
Did you learn about the program BEFORE or AFTER you decided to implement MEASURE?							
Please rate the overall importance of the Program versus the non-program factors we just discussed in your decision to implement the measure, so that the two importance ratings total 10							
Please rate the overall importance of PROGRAM in your decision to implement MEASURE?	8	7	6	1	6	3	
Please rate the overall importance of other factors in your decision to implement MEASURE?	2	3	4	9	4	7	
No-Program Score	**2.0**	**6.4**	**4.0**	**1.0**	**8.0**	**6.0**	
If the &PROGRAM had not been available, what is the likelihood that you would have installed exactly the same item/equipment	8	5	6	9	2	4	
When do you think you would have done this? (months)							
Number of months	0	18	0	0	0	0	
NTGR SCORE =	0.67	0.75	0.60	0.37	0.80	0.60	

Timing and Selection Score	**8**	**4**	**0**	**10**	**10**	**10**	**8**
To help the environment or be green	10	10	0	8	8	10	8
Recommendation form a colleague or another firm	0	9	0	0	0	0	0
Previous recommendation from some other vendor	0	0	0	0	0	0	0
Other	0	0	10	0	#NULL!	0	0
Other, such as non-energy benefits							
Importance of other factor							
Program Influence Score (reduced by half if learned after decision)	**7**	**#NULL!**	**7**	**7**	**7**	**5**	**6**
Did you first learn about &PROGRAM BEFORE or AFTER you first began to think about implementing &MEASURE?	BEFORE	BEFORE	BEFORE	BEFORE	BEFORE	BEFORE	BEFORE
Did you learn about the program BEFORE or AFTER you decided to implement MEASURE?							
Please rate the overall importance of the Program versus the non-program factors we just discussed in your decision to implement the measure, so that the two importance ratings total 10							
Please rate the overall importance of PROGRAM in your decision to implement MEASURE?	7	#NULL!	7	7	7	5	6
Please rate the overall importance of other factors in your decision to implement MEASURE?	3	#NULL!	3	3	3	5	4
No-Program Score	**2.0**	**0.0**	**0.0**	**1.4**	**8.0**	**1.0**	**3.0**
If the &PROGRAM had not been available, what is the likelihood that you would have installed exactly the same item/equipment	8	10	10	10	2	9	7
When do you think you would have done this? (months)							
Number of months	0	0	0	12	0	0	0
NTGR SCORE =	**0.57**	**#NULL!**	**0.35**	**0.61**	**0.83**	**0.53**	**0.57**

Timing and Selection Score	**10**	**7**	**9**	**10**	**5**
To help the environment or be green	9	0	10	10	0
Recommendation form a colleague or another firm	0	0	9	0	0
Previous recommendation from some other vendor	0	0	0	0	0
Other	0	0	0	0	0
Other, such as non-energy benefits					
Importance of other factor					
Program Influence Score (reduced by half if learned after decision)	**8**	**5**	**6**	**4**	**7**
Did you first learn about &PROGRAM BEFORE or AFTER you first began to think about implementing &MEASURE?	BEFORE	AFTER	BEFORE	BEFORE	BEFORE
Did you learn about the program BEFORE or AFTER you decided to implement MEASURE?		AFTER			
Please rate the overall importance of the Program versus the non-program factors we just discussed in your decision to implement the measure, so that the two importance ratings total 10					
Please rate the overall importance of PROGRAM in your decision to implement MEASURE?	8	10	6	4	7
Please rate the overall importance of other factors in your decision to implement MEASURE?	2	0	4	6	3
No-Program Score	**3.0**	**0.0**	**7.0**	**8.0**	**4.9**
If the &PROGRAM had not been available, what is the likelihood that you would have installed exactly the same item/equipment	7	10	3	2	6
When do you think you would have done this? (months)					
Number of months	0	0	0	0	12
NTGR SCORE =	**0.70**	**0.25**	**0.73**	**0.73**	**0.40**

APPENDIX I
PUBLIC COMMENTS AND RESPONSES ON THE EVALUATION OF HIGH TECH AND COMMERCIAL FACILITIES (PGE2005 AND PGE2007), STRIP CURTAINS AND DOOR GASKETS HIGH IMPACT MEASURES

The following pages contain the survey instruments and survey guidance documents that were employed during the of Net-To-Gross analysis of Strip Curtains and Door Gaskets.

01/11/2010	**Brett Close**	**SCE Comments on Commercial Facilities**		**SCE_comAttach_1938.pdf**
	Comment:	Letter subject: SCE Comments on HIM Portions of the Commercial Facilities Report.		
	Response:	Thank you for your letter. Our responses are attached at the end of this document.		
01/11/2010	**PG&E Company**	**PG&E Cover Letter**		
		Response: Thank you for your letter. We believe that all of the issues raised in your letter are addressed in the responses to more specific comments.		
01/11/2010	**PG&E Company**	**Site Specific**	**Site Specific Reports – Offices**	
	Comment: P3	PG&E has comments to the Site-Specific Measurement and Evaluation Reports that were not publicly-posted by the Energy Division. The comments refer to and discuss the information in the non-public site-specific reports, and also contain confidential, market sensitive, proprietary customer information, which if publicly disclosed could place PG&E's customers at a competitive disadvantage. Therefore, rather than post these comments publicly, PG&E is submitting Attachment C under separate cover to Energy Division pursuant to California Public Utilities Code section 583 and General Order 66-C.		
	Response:	Responses to site-specific comments have been provided to PG&E.		

01/11/2010	**PG&E Company**	**Site Specific**	**Site Specific Reports – High Tech**	
Comment: P4		PG&E has comments to the Site-Specific Measurement and Evaluation Reports that were not publicly-posted by the Energy Division. The comments refer to and discuss the information in the non-public site-specific reports, and also contain confidential, market sensitive, proprietary customer information, which if publicly disclosed could place PG&E's customers at a competitive disadvantage. Therefore, rather than post these comments publicly, PG&E is submitting Attachment B under separate cover to Energy Division pursuant to California Public Utilities Code section 583 and General Order 66-C.		
Response:		Responses to site-specific comments have been provided to PG&E.		
01/11/2010	**PG&E Company**	**Overarching - Shift to HIMs**	**p2-2**	
Comment: P5		One key factor in determining the appropriate allocation of evaluation resources is the level of uncertainty associated with a particular measure, application, or even program. Energy Division's shift to examining HIMs shifted evaluation resources away from the evaluation of third-party programs as well as other PG&E administered programs. In this evaluation report seven third-party programs were dropped from the evaluation. This exclusion is inappropriate, as many third-party implementers have been running programs for several years with little or no feedback on program performance.		
Response:		In Decision 07-09-043, the Commission recognized that its staff may not have the resources to verify each parameter on an ex post basis for every program, and that the EM&V protocols provided staff with the flexibility to establish priorities for the EM&V efforts throughout the program cycle. We believe that the HIM results can provide important gross savings information to program managers, even if their program was not included in any of the HIM sample frames. The administrative structure set up by Decision 05-01-055, under which these evaluations are still governed, provided the IOUs with authority to conduct process evaluations to provide feedback to third-party programs.		
01/11/2010	**PG&E Company**	**Overarching – Recommendations**	**General**	
Comment: P6		This and other evaluation reports fall short on offering specific and actionable recommendations for program improvements. While the quantitative results are meaningful in themselves, the meaningful analysis of those findings in the context of program design, operational efficiency, scalability, and market penetration could be significantly improved given the large amount of resources devoted to the evaluation effort. Moreover, the CPUC, IOUs, and the evaluation community would benefit from the evaluators' insights and recommendations for evaluation improvements as we embark program implementation and new evaluations and research for the 2010 – 2012 program cycle.		
Response:		The administrative structure set up by Decision 05-01-055, under which these evaluations are governed, assigned Energy Division the responsibility for conducting all EM&V studies used to measure and verify energy and peak load savings, generate the data for savings estimates and cost-effectiveness inputs, and measure and evaluate the achievements of energy efficiency programs, groups of programs and/or the portfolio in terms of the "performance basis" for		

		determining whether program or portfolio goals are met. Meaningful analysis of such findings in the context of program design, operational efficiency, scalability, and market penetration would necessarily take place in the context of process evaluations, for which the utilities were assigned responsibility by D 05-01-055.		
01/11/2010	**PG&E Company**	**Overarching - Greater evaluator/implementer intera**	**General**	
Comment: P7		There needs to be more interaction between evaluation teams and program staff. This is especially true in cases involving custom measures and highly specialized sites, like those evaluated in PGE2005. While the objectivity and independence of evaluation is necessary, greater interaction and dialogue between evaluators and program staff will likely lead to improved (and more cost-effective) evaluations and program performance.		
(CPUC) Response:		In the course of the 06-08 evaluations, Energy Division held webinars and workshops, and gave early feedback to the utilities on various issues relating to custom measures. In addition, Energy Division met with the utilities to discuss issues relating to the evaluations whenever the utilities made such requests. Energy Division agrees that collaboration is important and useful and expects even greater collaboration in future EM&V efforts.		
01/11/2010	**PG&E Company**	**Lg Comm - Baselines, early replacement**	**General, multiple sites**	
Comment: P8		Based on comments made during the webinar, it seems that some projects' savings with early equipment replacement may have been determined using inappropriate baselines, and in contradiction to published program policy. When equipment is replaced early to install more efficient equipment, Title 24 requirements can be triggered. However, when the utility program is responsible for triggering the early replacement, the appropriate baseline is the existing equipment, not Title 24, because absent program intervention, the existing equipment would remain in place. We have not had sufficient time to review all sampled sites for this issue, but incorrect baselines should be corrected throughout the report with associated savings credited to the sample and population.		
Response:		Baselines were determined on a case by case basis, taking into account numerous factors including remaining useful life of the equipment. Baseline determinations are explained in the individual site reports.		
01/11/2010	**PG&E Company**	**Lg Comm - Ex Post savings**	**General**	
Question: P9		In general, were ex-post gross savings estimates developed to reflect current-year savings estimates, or average annual savings? (i.e. to what extent were recessionary effects taken into account?) How did the evaluation extrapolate first year savings to "typical year" savings?		
Response:		Ex-post gross savings estimates were developed to reflect first-year savings, as required for purposes of determining load impacts and as specified in the California Energy Efficiency Protocols. Energy Division determined that economic conditions would not be taken into account in estimating savings in the 2006-2008 evaluation, as has been standard practice in energy efficiency evaluations in California. [See "Non-Adjustment of Evaluation Results for Economic Conditions in 2006-2008 Energy Efficiency Evaluation," posted under the Commercial Facilities topic as "Economic Conditions Paper" at www.energydataweb.com/cpuc/].		

		We used first year savings consistent with the conditions of the building as found during our on-site visits. Typical year's savings are calculated separately and not "extrapolated" from first year savings.		
01/11/2010	**PG&E Company**	**Lg Comm - HVAC Interactions for Lighting Measures.**	**General**	
	Question: P10	Did the evaluation consider lighting measure interactive effects on HVAC systems? The report is unclear on this point.		
	Response:	Yes. Lighting interactive effects were calculated based upon typical commercial building end-use profiles. Consistent with other contract groups, savings with and without interactive effects will be reported in the final Energy Division report.		
01/11/2010	**PG&E Company**	**Lg Comm - Site specific gross savings**	**Sec. 4.4.1, p4-6**	
	Comment: P11	The discussion of findings of the gross savings analysis (Section 4.4.1) offers no discussion of the reasons why ex post evaluated savings are not equal to the ex ante savings. While the site-specific reports present the engineering analysis for each evaluated site, these individual site reports are not useful or practical from a program planning and process improvement perspective. It would be helpful if ADM could elaborate on the various reasons for adjustments in the main report and include a summary table showing the frequency and magnitude of each type of adjustment.		
	Response:	The final report has been updated with a table that illustrates the predominant reasons why the sample sites did not achieve the expected savings.		
01/11/2010	**PG&E Company**	**Lg Comm - Sample design**	**Section 4.2.1**	
	Question: P12	How closely does the evaluation sample represent the population, in terms of average kWh usage per stratum?		
	Response:	Table 3-3 on page 3-3 describes the number of projects in the population and sample for Large Commercial. A total of 39 sites were selected with certainty and account for 73.8% of the program savings. Two sites each of the other strata were required to achieve the certainty and precision goals for the evaluation.		
01/11/2010	**PG&E Company**	**Lg Comm - Therm Sample**	**Section 4.4.1, p 4-7 & Section 4.4.3, p 4-9**	
	Question: P13	Why are there only four sample sites for therms on page 4-7, while page 4-9 shows an error bound of only 12%? What was the population of projects with therms savings? What was the sample design and the relationship between this sample and the sample for estimating kW and kWh?		
	Response:	A separate sample domain for natural gas Therms was not required for this program because the		

		Therms savings were such a small part of the program claims. Therefore, sample design was based only upon kWh savings. Therms savings was not used as a design variable for the sample selection.		
01/11/2010	**PG&E Company**	**Lg Comm - Realization Rate for Therms**	**Section 4.4.3 and 4.6**	
Question: P14		Given that the therm savings estimate is based on a sample size of only four sites, but has an error bound of only 12%, we assume the population of projects with therms savings was very small. In the evaluators' opinion, is the sample size and results significant enough to be used for future program planning and decision making?		
Response:		See answer for P13. Therms savings were relatively small as compared to the kWh savings on an equivalent BTU basis. The savings estimates for Therms are representative of the program within the reported statistical certainty and precision. The applicability of these estimates for future year programs is dependent upon the similarity between this and future years, along with the composition of this year's projects compared to that of future years.		
01/11/2010	**PG&E Company**	**Lg Comm - NTG analysis**	**Section 4.4.2, Page 4-8**	
Question: P15		How was the standard NTG methodology modified for this evaluation as stated on page 4-8 (third paragraph)?		
(John Reed) Response:		There were two basic modifications to the methodology needed to tailor the standard survey for this market. The first was to make the factors battery a two-part process. The first part was to ask the customer representative whether a given factor played a role in decision-making. If the customer indicated that a factor played a role in the decision, then the customer was asked to rate the importance on a scale of one to ten. This assures that only factors that played a role are rated and that factors that had no influence receive a zero rather than some low score such as a one, two or three. The second was to add additional non-program responses to the factors battery to better capture non-program factors that might influence decision-makers. The calculation of the net-to-gross values for each firm used the limited set of standard factor questions worded to fit the circumstances and followed the standard analysis methodology using the same items.		

01/11/2010	**PG&E Company**	**Lg Comm - NTG surveys**	**Section 4.4.2, Page 4-7**	
Question: P16		Section 4.4.2 correctly indicates that there are multiple players: owners, building managers, facility engineering staff, property managers, vendors, etc. Regarding interviews with these players for a given project, how did you weight their responses in situations where they were not the primary decision maker? For the projects you reviewed, how did you verify that the person being interviewed was involved at the time the decision to proceed with an EE project, and if they were not, how did you weight their response?		
(John Reed) Response:		In almost all cases we spoke directly to the person who was responsible for developing and planning the projects. In some cases we spoke to a successor. The successors were present during the period when the project was completed. One of the first questions in the interview guide was a question about the role of the individual in the decision-making. They were asked if they were the sole decision-maker, one of a group of decisions-makers, etc. This portion of the interview usually took from one to five minutes depending whether the person was the owner and had made the decision or whether they were at a lower level and their role in decision making had to be determined. When multiple interviews were completed, priority was given to the person most responsible for initiating and managing the project. Data from the supplemental interviews were used to fill in gaps in the detail. The data from different individuals did not typically conflict but rather provided more detail or additional perspective. Thus, it was not a matter of weighting responses but rather one of combining the detail together.		
01/11/2010	**PG&E Company**	**Lg Comm - NTG analysis**	**Section 4.4.2, Pages 4-8 and 4-9**	
Question: P17		What is the sample precision of the NTG?		
(John Reed) Response:		For the large commercial there are fourteen firms and 22 sites. For the data centers there are four firms. There is one additional firm that is a high tech site but not a data center. For the 14 firms the average NTG is 0.6011 with a standard error of 0.0619. The numbers change slightly if one analyzes sites rather than firms. The 14 firms represent 22 sites which have a mean NTG of 0.5825. The standard error of the estimate is then 0.039. The standard error of the estimate declines because of repeated for the different sites. There were four data centers and six data center sites. The average NTG for the data center firms is 0.47 with a standard error of the estimate of 0.124. The average NTG for the six sites is 0,5829 with a standard error of the estimate of 0.11672. The increase in the average because the firm with three sites had the highest NTG.		

01/11/2010	**PG&E Company**	**Lg Comm - NTG Interview Sample**	**Section 4.4.2, Page 4-8**	
Question: P18		The report states that the net impact analysis was based upon 14 interviews. Do these interviews represent 14 individuals, projects, or sites? Were there any cases where multiple individuals were interviewed regarding the same site or project? Is the NTG sample a sub-sample of the gross impact analysis? If not, how was the sample selected?		
(John Reed) Response:		Multiple individuals were interviewed about a site/project and single individuals were interviewed about multiple sites. In some cases, multiple individuals participated in the interview. The sample is a subset of the sites in the gross impact analysis. See the response to question P17.		
01/11/2010	**PG&E Company**	**Lg Comm - NTG analysis significance**	**General**	
Question: P19		In the evaluators' opinion, is the NTG sample size and results significant enough to be used for future program planning and decision making?		
(John Reed) Response:		The NTG ratio for large commercial represents a distribution of NTG values ranging from 0.2 to 0.9. We stand behind the calculation of the net-to-gross values. This spread reflects the fact that the NTG ratio for commercial facilities will vary across commercial submarkets and by firm within submarkets. It will also vary by technology and program design. Increasing the sample size will increase the number of data points, likely reducing the standard error of the estimate, but the spread is unlikely to go away. This is because there are very different levels of sophistication regarding energy efficiency within submarkets and among firms within submarkets. In the current environment, decision-making and program planning need to be much more finely targeted. The NTG values in this study can be combined with others to support decision-making. These values can be useful in pointing to areas where refinements to programs and technologies may be needed within submarkets. See the response to P17 for the net to gross ratios.		
01/11/2010	**PG&E Company**	**Lg Comm - NTG Interview Sample**	**Section 4.4.2, Page 4-8**	
Question: P20		The report mentions that the sample for net impact analysis included firms that have multiple sites. What are the implications of this on sample precision? Did the analysis/precision need to account for cluster sampling? Were sites selected randomly or was sample selection by the customer?		
(John Reed) Response:		The sample is a reflection of the random sample of sites drawn for measurement and verification. The unit of analysis was the firm in situations where the decision-makers and technologies involved were constant, for example, one firm with nine sites and the same program and		

		technology. In other cases, we interviewed different decision-makers from the same firm about different projects. When the M&V sites were drawn, large sites were drawn with certainty and smaller sites were drawn at random. For the data center projects, the sample sites represented about 11 percent of the total savings.		
01/11/2010	**PG&E Company**	**Lg Comm - NTG analysis**	**General**	
	Question: P21	The NTG sample is considerably smaller than the gross impact evaluation sample. Is there evidence of non-response bias?		
	(John Reed) Answer:	There is insufficient evidence to indicate a non-response bias. There are several potential sources of bias but it is unclear in which direction these might operate, individually or collectively, to influence the outcome.		
01/11/2010	**PG&E Company**	**Lg Comm - NTG analysis**	**General**	
	Question: P22	The size of the NTG sample is insufficient. What efforts were undertaken to increase the sample size?		
	(John Reed) Answer:	Multiple e-mails were used and multiple follow-up telephone calls were made. For people who had left their positions, inquiries were made about their whereabouts.		
01/11/2010	**PG&E Company**	**HIM - Door Gasket Baseline**	**Section 5.2.3.4, Page 5-5**	
	Question: P23	A significant issue is the baseline condition of door gaskets; the evaluation highlights PG&E's baseline assumptions as a primary factor for the low realization rate. The evaluation used the nonparticipant population to determine baseline conditions for gaskets through a survey of nonparticipating sites. In other words, gaskets at nonparticipating sites are used to represent those replaced through the program. Can you justify this assumption? According to the report, only 18% of gaskets are replaced in a maintenance cycle. Assuming that installers replace gaskets that are in the worst condition, this means that replaced gaskets would not be well represented by average gaskets in nonparticipating sites. Instead, the evaluation should have focused on the worst 18% of the gaskets at these sites in establishing a relevant baseline.		
	Answer:	We did not use the nonparticipant population to determine baseline conditions for gaskets. Our baseline determination follows exactly what you suggested in your question: "should have focused on the worst 18% of these gaskets at these sites". This is fully explained in our evaluation report in section 5.4, page 5-8.		

01/11/2010	**PG&E Company**	**HIM - Claimed Savings**	**Section 5.3, Page 5-7, Table 5-1.**	
Question: P24	What are the claimed savings for this measure?			
Answer:	As noted in the report, the claimed savings for this measure depend on the program and utility company. PG&E and SDG&E claim 105 kWh/ft energy savings for door gaskets. This number is a weighted average, representing 80% coolers and 20% freezers. SCE savings claims are based on refrigerator type (cooler or freezer) and climate zone (CZ), and range from 7 kWh/ft for coolers in CZ 1 to 28 kWh/ft2 for freezers in CZ15.			
01/11/2010	**PG&E Company**	**HIM - NTG Methodology**	**Section 5.2.4, Page 5-6**	
Question: P25	The NTG methodology assumes that all participants with maintenance contracts (less than 4 years) or who regularly maintain equipment would have adopted the strip curtains in the absence of the program. Can you elaborate on the basis for this assumption?			
Answer:	If a site had strip curtains and they were being maintained (either through a maintenance contract or the efforts of the firm) within the lifetime of the strip curtain, then there would be no need for the site to participate in the program unless additional strip curtains were being added. Put slightly differently, if strip curtains existed and were being maintained prior to the program, then the answer to the question of what would the respondent have done in the absence of the program is that they would have maintained the strip curtains. As stated in the report, three percent of the respondents had a maintenance contract and 15 percent of respondents indicated that they were maintaining strip curtains within the life of the strip curtains. The remaining 82 percent of respondents did not have strip curtains or were not maintaining them. The NTG battery was administered to this 82 percent of respondents.			
01/11/2010	**PG&E Company**	**HIM - Gasket Baseline Assumption and Methodology**	**Section 5.2.3.4**	
Question: P26	Please provide as much detail on participants as possible. As written, this report does not effectively identify the location types or maintenance practices of the stores in which gasket conditions were observed in order to establish baseline gasket conditions. If the following data for each site is provided, that was audited and used to establish this study's baseline findings, more precise comments and/or questions could be provided. Actual baseline study participants: Store Names Business type Store Address Information on previous gasket replacements and schedules. Type of contractor used for previous replacement (internal, external) Affiliation of contractor that conducted replacement (Utility Trade Ally or not) Information on each customer's specific answers to the free ridership questionnaire. Without the specifics on the conditions, type and location of the facilities in which the 5300 linear feet of gasket were counted, the conclusions that were generated to established baseline conditions; the energy savings cannot be properly assessed. The assumptions that stem from this assessment are not consistent with evaluation reports from previous statewide third-party programs.			
Answer:	This question must be submitted as a data request. Responses will be subject to policies regarding confidentiality of the participants and customers in the evaluation.			

01/11/2010	**PG&E Company**	**HIM - NTG Ratio**	**Section 5.2.4**	
Question: P27		Presently, gasket replacements by refrigeration maintenance contractors cost customers more than the $4.00/linear foot price that it costs to replace themselves. Did the NTG questionnaire ask the customer whether the theoretical gasket replacement schedule that was documented would have actually occurred if the replacement gaskets would have cost the customer $8.00-$12.00/linear foot?		
Answer:		No, it did not. The NTGR survey asked participants questions regarding their decision-making process prior to participating in the program. Respondents were asked whether prior to the program they were maintaining the gaskets. These questions were historical, not theoretical in nature. It is reasonable to assume that those decisions were based on gasket replacement costs that the customers, as non-participants, faced at the time.		
01/11/2010	**PG&E Company**	**HIM - Representative Sample**	**Section 5.5.1.3, Page 5-10**	
Question: P28		How well do the 19 sites represent the population, in terms of baseline conditions?		
Answer:		The 19 sites were all program participants – they were from large chain supermarkets in the SF Bay Area. Based upon our observation of 5300 feet of gaskets, we found that only about 16% of gaskets were actually replaced by the contractors. Due to this fact, we believe that the judgment of the contractor, as to which gaskets to replace, will have more influence on the energy savings compared to variations in gasket conditions that occur among stores. The contractor that replaced the gaskets for all three of the sites was responsible for nearly 60% of gaskets rebated by PG&E for the 2006-2008 program cycle. In this sense, the 19 sites are quite representative of the baseline gaskets found in supermarkets, because the baseline assessment represented the gasket replacement threshold of the largest implementer of in the 2006-2008 program. The gaskets in convenience stores may have different baseline conditions. However, the physical laws associated with the refrigeration load due to infiltration, along with typical COP values for low, and medium temperature refrigeration, dictate that the energy usage associated with infiltration in coolers is dramatically lower than that associated with refrigerators. As such, any uncertainties associated with baseline conditions for cooler gaskets will have minimal impact in the overall realization rate.		
01/11/2010	**PG&E Company**	**HIM - Program Goals**	**General**	
Question: P29		The report should be clear about program goals. Does the program install strip curtains where they were not already present, or does it involve the replacement of existing strip curtains?		
Answer:		Several programs installed strip curtains in the 2006-2008 cycle. Some programs installed strip curtains only where none existed before. Other programs included a combination of strip curtain replacements and first-time strip curtain installations. Please see section 6.1, page 6-1 of the Evaluation Report: "Some programs targeted doors that had no strip curtains installed prior to the rebate process, while other programs also replaced old, degraded strip curtains."		

01/11/2010	**PG&E Company**	**HIM - Claimed Savings**	**Section 6.3, Page 6-5, Tale 6-3**	
	Question: P30	What are the claimed savings for this measure?		
	Answer:	As noted in the Evaluation Report and as found in the savings tracking database, PG&E and SDG&E claim 465 kWh/ft^2 annual energy savings for strip curtains. This number is a weighted average over coolers (80%) and freezers (20%), and is used for all business types and climate zones. SCE ex-ante claims depend on refrigeration type, climate zone, and business type, and range from 57 kwh/ft2 for coolers in grocery stores in CZ1 to 495 kWh/ft^2 for freezers in restaurants in CZ15.		
01/11/2010	**PG&E Company**	**HIM - Economic Factors**	**Section 6.5.1, Page 6-5**	
	Question: P31	In lean economic times, we believe that food refrigerators would contain less food, more air and less lag. If there's less stock it also affects the door usage patterns. Were these economic factors considered?		
	Answer:	Energy Division determined that economic conditions would not be taken into account in estimating savings in the 2006-2008 evaluation, as has been standard practice in energy efficiency evaluations in California. [See "Non-Adjustment of Evaluation Results for Economic Conditions in 2006-2008 Energy Efficiency Evaluation," posted under the Commercial Facilities topic as "Economic Conditions" at www.energydataweb.com/cpuc/].		
01/11/2010	**PG&E Company**	**HIM - Net to Gross Methodology**	**Section 6.5.2, Page 6-11**	
	Question: P32	The NTG methodology assumes that all participants with maintenance contracts (less than 4 years) or who regularly maintain equipment would have adopted the strip curtains in the absence of the program. Please elaborate on the basis for this assumption.		
	Answer:	If you have strip curtains or gaskets and you are already maintaining them at some interval that is less than their lifetime then the program is duplicating a service for which the respondent is already paying or doing in-house. The presumption is that respondents would continue that maintenance in the absence of the program. Strip curtains were much less likely to be maintained than door gaskets. It is important to note that only 3% of all participants had maintenance contracts. There is some elaboration on page K-3 of the HIM appendix K. As a result, most interviewees went through the whole battery of questions.		

01/11/2010	**PG&E Company**	**HIM - NTG Ratio**	**Section 6.2.4**	
Comment: P33		This statistic would suggest that even if it was assumed that 100% of the 39% of facilities that had strip curtains (regardless of condition) would have installed them without PG&E's influence, we should still at minimum receive a NTG of .61. Based on this data, it would appear that the NTG survey method appears to be flawed.		
Response:		The methodology was developed as a common endeavor [see "Methodological Framework for Using the Self-Report Approach to Estimating Net-to-Gross Ratios for Nonresidential Customers," posted under the Commercial Facilities Topic at www.energydataweb.com/cpuc/ as "CommercialSRA_Response"]. The HIM methodology takes into account multiple-factors, one of which was what respondents said would have happened in the absence of the program. The combined factors may have a value that differs from the value of any single factor. We could not find the data source in section 6.2.4 of the evaluation report (cited above by PG&E), but we assume that the 39% is from the first line of Table K-2 in the appendix. The NTGR is derived from a different calculation and is not based directly on the quantities in Table K-2.		
01/11/2010	**PG&E Company**	**HIM-Disparity between IOU ex-ante values and rec**	**Section 6.7, P. 6-14**	
Comment: P34		We find in reviewing the section "Evaluation of Refrigeration Strip Curtains HIM" that the main reason for the disparity between the IOU ex-ante values and the recommended updates is that for the PG&E work paper, the EM&V study used the EnergySmart Grocer 2004-2005 study, which only focused on grocery stores and does not distinguish between walk-in coolers and freezers or building types. By contrast, this evaluation differentiates between supermarkets, convenience stores, restaurants, and refrigerated warehouses as well as coolers and freezers. The report does note that "the overall approach can potentially yield satisfactory results", so it appears that while the calculations are sound, the discrepancies in the values result from the field measurements that took into account the type of facility as well as whether the unit was a walk-in cooler or freezer.		
Response:		Although the calculations used by the different IOUs were considerably different, they both predicted similar savings if adapted to describe the same temperature differentials, door openings and closings, and (post-baseline) curtain efficacy differentials. Our evaluation concluded that the ex-ante and ex-post assumptions for these parameters were quite different. If an implementer applied a value from a grocery store to another type of facility, then our study suggests that those savings estimates were incorrect.		

01/11/2010	**PG&E Company**	**HIM - Sample size disparity**	**Section 6.4, Pp 6-7**	
	Question: P35	On page 6-7, the report notes that a total of 181 walk-in coolers, walk-in freezers, and refrigerated warehouses were monitored. However in Table 6-4, which summarizes the monitored units type of business and type of unit, the total number of units sum up to 150. It is unclear where the 31 unit discrepancy comes from. Please correct this discrepancy.		
	Answer:	We actually monitored 181 coolers, freezers, and warehouses. However, not all of them were used for the analysis. A total of 18 units were early attempts at "pre-post" measurements. These units employed the same data acquisition methods as those used for the final "post-only" sample. A total of 5 units were used to test our field techniques and were not part of the official sample of program participants. Our field staff were unable to locate and retrieve Hobo loggers from 4 sites. Four sites – all warehouses, had failures of the HOBO state loggers installed on the doors (the tell-tale sign is that the logger registers as "open" 100% of the time after some date). We have revised the report so that there is no discrepancy in the reported numbers. These facts have been added to the Evaluation Report Appendix.		
01/11/2010	**PG&E Company**	**HIM - Missing sentence**	**Section 6.5.1.1, pp. 6-8**	
	Question: P36	In section 6.5.1.1 on page 6-8 the report lists 4 parameters that have the greatest effect on energy savings. It then goes on to say that "these three influential factors can be reduced to one factor" without differentiating which 3 factors. Please add this.		
	Answer:	Thank you for the comment, we made this edit reducing the number of parameters to 3.		
01/11/2010	**PG&E Company**	**High Tech -Use of eQuest on Data Centers**	**Section 1, Page 1-1**	
	Question: P37	The report indicates that eQuest modeling was used for the evaluation. eQuest uses the DOE2 modeling engine, which can run into serious problems when modeling high tech facilities. What is the justification for using eQuest for the simulations?		
	Answer:	ADM adjusted default values in eQuest appropriately for each site evaluation. Proper internal loads were calculated and provided as input to the model allowing eQuest to be a very reliable tool for estimate measure savings. In fact, the effect of the economizer on energy savings is best calculated with a DOE-2 model like eQuest rather than a simplified bin method.		
01/11/2010	**PG&E Company**	**High Tech -Sample design**	**Section 3.2.1**	
	Question: P38	How closely does the evaluation sample represent the population, in terms of average kWh usage per stratum?		
	Answer:	Please see Table 4-2 of the Evaluation Report on page 4.3, which describes the number of projects in the population and sample for High Tech. A total of 53 sites were selected with certainty and account for 55.9% of the program savings. Two sites for each of the other strata were required to achieve the certainty and precision goals for the evaluation.		

01/11/2010	**PG&E Company**	**High Tech -Data Center Usage Patterns**	**Section 3.2.2, Page 3-4 & Appendix B, Table B-1**	
Question: P39		The report states, "estimates of energy use and savings depend significantly on having accurate data for operating hours and usage patterns." Data Centers are 24-7 facilities with constant loads so usage patterns are not relevant. Table B-1 in Appendix B shows a commercial building load profile with increased electricity consumption during the day. Is this the load profile used for data center facility simulations, or did the evaluators consider data centers as higher load factor more constant load based (flatter) on their typical usage?		
Answer:		For all methods of estimating energy savings, including eQuest models, we used actual occupancy and equipment operating schedules specific to the site evaluated. No generic load pattern was used.		
01/11/2010	**PG&E Company**	**High Tech -Bin analysis for PGE2005**	**Section 3.4.1 Pg. 1-2, 3-7**	
Question: P40		The report indicates that most of the high tech projects were analyzed using a bin analysis, but PG&E does not use bin analysis. Rather, PG&E used hourly temperature simulations. Why does the evaluator claim that PG&E used bin analysis?		
Answer:		Our review of the project documents shows that many projects used a simplified Bin method in their engineering analysis to determine measure savings. If PG&E is using hourly simulations, documentation of this fact was not included in the project documentation provided to us via the data request process.		
01/11/2010	**PG&E Company**	**High Tech -Selection of Modeling Tool**	**Section 3.4.1, Pages 3-7**	
Question: P41		Is it the position of the evaluators that the type of the calculation model employed (i.e., hourly models in spreadsheet format) -- setting aside any issues regarding the inputs to the model -- necessarily resulted in an over-estimation of ex-ante energy savings for any of the projects in the evaluation sample group? In other words, was the calculation model employed intrinsically inaccurate? If so, how? And which projects in the sample were affected?		
Answer:		No and no. Calculation errors propagated from insufficient attention to and documentation of baseline conditions including schedules of occupancy and equipment operation through simplified Bin analysis methods. We are aware of no systematic bias that simplified Bin analyses introduced to the ex ante estimates in isolation to other factors affecting the gross realization rate such as failure to achieve full build-out, economic downturn, etc		

01/11/2010	**PG&E Company**	**High Tech -Ex-Post Gross savings Estimate Calculation**	**Section 3.4.1, Page 3-7 - 3-10**	
	Question: P42	In general, were ex-post gross savings estimates developed to reflect current-year savings estimates, or average annual savings? (i.e., to what extent were recessionary effects taken into account?) How did the evaluation extrapolate first year savings to "typical year" savings?		
	Answer:	Ex-post gross savings estimates were developed to reflect first-year savings, as required for purposes of determining load impacts and as specified in the California Energy Efficiency Protocols. Energy Division determined that economic conditions would not be taken into account in estimating savings in the 2006-2008 evaluation, as has been standard practice in energy efficiency evaluations in California. [See "Non-Adjustment of Evaluation Results for Economic Conditions in 2006-2008 Energy Efficiency Evaluation," posted under the Commercial Facilities topic as "Economic Conditions Paper" at www.energydataweb.com/cpuc/]. We used first year savings consistent with the conditions of the building as found during our on-site visits. Typical year's savings are calculated separately and not "extrapolated" from first year savings.		
01/11/2010	**PG&E Company**	**High Tech - Ex-Post Gross savings Estimate Calcula**	**Section 3.4.1 Pg 3-7**	
	Question: P43	The report states that there are "various reasons why ex post evaluated savings might not match ex ante claimed savings." Aside from the analysis of internal loads, what are the other reasons?		
	Answer:	Please see Table 3.6 in the Evaluation Report, which has been added to explain the reasons for ex post savings being different than ex ante.		
01/11/2010	**PG&E Company**	**High Tech -Outlier Site for PGE 2005**	**Section 3.4.1, Page 3-8, Site Report 5026**	
	Question: P44	Site 5026 is an outlier site, with an expected a load of 5.6 MW, but which was only found to have a load of about 857 kW by the evaluators. The savings for this site are significantly reduced in ex-post savings calculations based on low internal loading at the time of evaluation. Can the evaluator provide insight into why the facility is under loaded or why the ex ante savings were overstated? Did the evaluation contractor observe and take into consideration that the site was only partly full of equipment (i.e. load) and was there any indicator that the ultimate load would be significantly larger? How did the evaluator treat its ultimate load? Given that this site appears to be an outlier in the analysis, how would the analysis and results change if this site was excluded from the analysis?		
	Answer:	Evaluators are required to evaluate what is found at the time of the evaluation and the methodology does not call for dropping outlier sites. Note that if the site were excluded, the realization rate would increase for the high tech facilities program. The purpose of the evaluation is to verify what is there, not to forecast what will be there in the future. The site did not implement what the ex ante documentation implied would be installed. The energy division's "no economic forecasting" policy [see paper referenced in the response to Question		

		P42], means that our evaluation did not attempt to forecast future load as it may vary by economic conditions, positively or negatively.		
01/11/2010	**PG&E Company**	**High Tech -Realization Rates**	**Section 3.4.2, Page 3-9, Table 3-4**	
	Question: P45	Table 3-4 shows a pattern in realization rates of being much higher for smaller projects (greater than 100%) and less than 69% for larger projects, possibly indicating that larger projects are new construction projection. Were retrofit and NC combined in the evaluation or were separate realization rates developed for each category then somehow combined to produce a program-level estimate?		
	Answer:	We designed our sample to reflect the conditions of the PGE2005 program. The program did not distinguish between new construction and retrofit; therefore, our sample design did not distinguish in this manner. However, we had 40-50 sites which were selected with certainty, each one of which was a detailed case study, that represented nothing but themselves. The smaller sites largely had lighting measures whereas the larger sites had HVAC measures. It should be noted that one large new construction site, involving retrofitted well water pumps, received a very high realization rate. Thus, the nature of the installed measures better accounts for the differences in realization rate within the evaluation, as opposed to using New Construction versus retrofit as the criterion.		
01/11/2010	**PG&E Company**	**High Tech - Realization Rates**	**Section 3.4.2, Page 3-9, Table 3-4**	
	Question: P46	Can the evaluation contractor provide insight into stratum 3 results, which are considerably different than other strata?		
	Answer:	For specific details regarding the realization rates for stratum 3 please see the individual site reports and the table referred to in response to question P43. It should be noted that the realization rate for stratum 3 was weighted by the contribution of stratum 3 to the total savings. Thus stratum 3 does not carry much weight in the overall realization rate.		
01/11/2010	**PG&E Company**	**High Tech – Realization Rates**	**Section 3.4.2, Page 3-9, Table 3-4**	
	Question: P47	Can the evaluation contractor provide insight into stratum 3 results, which are considerably different than other strata?		
	Answer:	Duplicate question, see answer to P46 above.		

01/11/2010	**PG&E Company**	**High Tech -Realization Rate**	**Section 3.4.3, Page 3-10, Table 3-7**	
Question: P48		What is the explanation for the low realization rate for Therms?		
Answer:		See response to questions P13 and P14. Site by site explanations for the Therms realization rate are provided in the site reports.		
01/11/2010	**PG&E Company**	**High Tech –Baselines**	**Section 3.6, Page 3-11**	
Comment: P49		The report recommends more clear documentation on baseline assumptions. PG&E updates the baselines for high tech every year and this is published online at http://pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/incentivesbyindustry/hightech/data_center_baseline2009-10-01.pdf		
Response:		The recommendation is intended to advise on improving the procedures for documenting the baseline for each participating project. The over-arching baseline document referenced above is only as good as the rigor employed and the documentation that results from following its guidelines. Furthermore, the above document is not the same as the baseline document referenced in many of the project files submitted to the evaluator in response to EEGA data requests. Please note that the document cited by PG&E in its comment was not referenced in any of the sample project files.		
01/11/2010	**PG&E Company**	**High Tech -NTG analysis**	**Appendix E, page E-4**	
Question: P50		Tables E-4 and E-5: How should the totals in these tables be interpreted? Do these tables combine results from both PGE2005 and PGE2007?		
(John Reed) Answer:		These tables did combine the results because the results are so similar. We have created separate tables for each program and revised the final report appendix accordingly.		
01/11/2010	**PG&E Company**	**High Tech -NTG analysis**	**Section 3.4.2, Page 3-10**	
Question: P51		What is the sample precision of the NTGRs? Can you please provide uncertainty ranges?		
(John Reed) Answer:		See the response to question P17.		

01/11/2010	**PG&E Company**	**High Tech -NTG analysis**	**Section 3.4.2, Page 3-10**	
Question: P52	The report indicates that the NTGR was calculated from interviews with only 5 decision makers. Do these interviews represent 5 customers? 5 projects? Are the 4 data centers commercial or enterprise data centers? What role did the "decision maker" you interviewed have at the company? Were there sites where you tried to interview more than one person? If so, which ones and if the responses differed what did you do? Did you use other evidence besides the self-report interviews to determine the site's NTGR?			
(John Reed) Answer:	In the case of the high tech program, the interviews were with five firms. One of these firms was not a data center operator. There were four data centers with six sites. The interviews were project specific. The respondent with the three sites cut off the interview after the first site because of other commitments. However, he stated that all of the detail would be the same for the other sites. Just to be clear on definitions, the term enterprise data centers refers to data centers that are critical to the operations of a particular firm or institution and commercial data centers refers to those that are operated to support the operations of other firms. Three of the four firms operated enterprise data centers and the firm with three sites operated commercial data centers. The decision-makers have different roles. They ranged from a national manager of facilities, to a chief engineer, and to a facility engineer. In every case, these individuals were directly involved in identifying, defining and managing the projects. These projects fell in the province of facility engineering because they were HVAC related. IT managers collaborated in these projects.			
01/11/2010	**PG&E Company**	**High Tech -Review of Self-Sponsored Projects**	**Section 3.6, Page 3-12**	
Comment: P53	The evaluation implies that self-sponsored projects are not reviewed by a third party outside of the sponsor. Self-sponsored and non-self-sponsored projects only differ in who receives the incentive check. All the high-tech projects are reviewed by PG&E and often by a consultant, as well. Did you notice any differences between these two cohorts?			
Response:	This is part of our recommendations and does not affect the gross savings results. The recommendation follows from the observation that many of the self-sponsored projects were also "self-engineered" by the program participant/customer facility staff. In many of these projects it was found that the documentation of baseline conditions and the algorithms used to determine projects savings were inferior to projects overseen by and/or engineered by an outside energy engineering firm. The sample design did not distinguish between self-sponsored and non self-sponsored projects.			

01/11/2010	**PG&E Company**	**High Tech -NTG analysis**	**Section 3.4.2 Page 3-9**	
Question: P54	How was the NTG methodology modified for this evaluation?			
(John Reed) Answer:	See the response to question P15.			
01/11/2010	**PG&E Company**	**High Tech -NTG analysis**	**General**	
Question: P55	The NTG sample is considerably smaller than the gross impact evaluation sample. Is there evidence of no response bias and if so, how did you deal with it?			
Answer:	There is insufficient evidence to indicate a non-response bias. There are several potential sources of bias but it is unclear in which direction these might operate, individually or collectively, to influence the outcome.			
01/11/2010	**PG&E Company**	**High Tech -NTG analysis**	**General**	
Question: P56	The NTG sample is insufficient. What efforts were undertaken to increase the sample size? How did this possibly affect reliability of results? What would you do differently in the future?			
Answer:	Multiple e-mails were used and multiple follow-up telephone calls were made. For people who had left their positions, inquiries were made about their whereabouts.			
01/11/2010	**Paul Schertz**	**PGE2066 - Supermarket Controls (and Energy Smart G**	**5.2.3 and 5.7.2**	**view attachment** **PECI_comAttach_1843**
Question: P57	"[PECI - Gasket Response #1 with attachment] PECI contends that ADM used inappropriate methods to determine relative humidity and temerature of infiltrating air, introducing appreciable error to the test data. 1) Given the impact of ambient temperature and moisture on refrigeration systems, basing yearly estimates on only a two-week measurement period is inappropriate and fails to account for variation in the parameters (5.2.3.3). Furthermore, PECI requests data regarding the actual duration of monitoring at each site as well as information regarding climate zone and location of sensors (stratified, single point, distance from cases). 2) Using TMY data to extrapolate load and system performance data requires that the mean temperature of the monitoring period be consistent with the mean annual temperature (per Kissock, et al '93). This was likely not the case here. 3) It is PECI's experience that grocery stores strive to keep the relative humidity above 50% to keep their produce fresh. The subject study used 37.5% (Table 5-7). The artificially low relative humidity would cause an underestimate of the defrost load and under predict the measure savings."			
Answer:	In summary, the main points of this question are: **1)** A two-week monitoring period is inappropriate. PECI requests data regarding duration of monitoring for each site, as well as climate zone and sensor number and placement.			

2) TMY data to extrapolate load and system performance data requires that the mean temperatures of the monitoring and TMY (annual) data be consistent

3) In PECI's experience, grocery stores keep RH at 50% to keep produce fresh. A lower RH would underestimate energy savings.

Response 1: It is imperative to recognize that the temperature differential of interest is the difference between the temperature of the infiltrating and refrigerated airs. The 2-week period of monitoring for the refrigerated temperature is reasonable because the inside of a walk-in refrigerator is a well-regulated environment. In the case of door gaskets, the infiltrating air is the air of the sales floor. This sales floor is also a well-regulated environment.

It should be noted that the warmest average sales floor temperature that we observed was 76 °F. Although the relative change is substantial, the key point is that the result with 80 °F sales floor temperatures is still a factor of 25 lower than PG&E's ex-ante estimation.

Response 2: For gaskets, TMY is used to adjust the COP of the refrigeration system because the efficiency of the air-cooled compressors varies with outside air temperatures. The refrigeration load due to infiltration is based on the difference between freezer and sales floor temperatures and RH. These are well-characterized quantities and not subject to extrapolation.

It should be noted that a COP of 0.8 is unrealistically low. Although the relative change is substantial, the key point is that the result with a COP of 0.8 is still a factor of 15 lower than PG&E's ex-ante estimation.

Response 3: We actually did use temperature from a typical store in the SF Bay area, and the humidities that we used were 48% average, 43% minimum, 52% high. To better understand the sensitivity of our analysis to humidity we raised it to 70%, holding all else constant, and we arrived at 7.664 kWh/ft2 annual savings. Again, this is a large relative change, but in absolute terms, less than 4% of the ex-ante claimed savings.

Requests for data must be submitted as a data request by the utility.

01/11/2010	**Paul Schertz**	**PGE2066 - Supermarket Controls (and Energy Smart G**	**6.5.2**	
Question: P58	"[PECI - Strip Curtain Response #5] The NTG methodology stipulates a NTG ratio of zero for all participants who reported having had a maintenance program that replaced strip curtains within a four-year period. ADM's surveys identified 18 out of 101 respondents to fall into this category. PECI's direct experience with major California grocery stores indicates that out of the major chains only Raleys had a gasket maintenance program prior to the program cycle (other than to ""replace on demand"" as box temeratures or evaporator coil frosting and icing issues became severe and chronic. Ralphs (Brian Clark from Kroger Corporate Energy Dept., Vons-Safeway (Rob Uhl Safeway Corporate Engineering), Albertsons (Larry Meeker, Corporate Engineering) and Save Mart confirmed this point. In our work with participants, PECI has found that store personnel frequently confuse the Grocer Smart Program with a maintenance contract or program. Lastly, especially in grocery stores, store managers are likely not the most knowledgeable about equipment related programs driven from corporate headquarters. Because of the potentially significant impact of these issues on the NTG estimate, PECI requests copies of the actual instruments used for this survey as well as the screening questions, name and positions of respondents and responses. "		
(John Reed) Answer:	The first point to be made is that from day one, the evaluation team knew the difference between a store contact and a corporate contact. The focus was on corporate decision-makers, not store managers. A second point to be made is that the decision-maker contact data for the HIM programs was extremely poor. The issue of getting decision-maker contacts was raised multiple times from the beginning of the project and there were various discussions and numerous requests were made. In a very high percentage of cases, the PG&E data set contained just a firm name, a telephone number and an address. There was no indication whether the telephone number was associated with a store or a corporate office/decision-maker. We analyzed the data by firm name and telephone number to detect corporate offices. Attempts were made to use the internet to find the appropriate parties. Near the end of the data gathering period, we compiled a short list of firms with whom we wanted to speak and attempted to return to knowledgeable contractor and utility personnel to obtain decision-maker contact names. This was minimally successful. Finally, corporate telephone numbers were called blind and an attempt was made to identify a decision-maker. <u>We strongly recommend that a decision-maker contact be required on all records</u>. The first screener in the questionnaire was designed to ascertain if the person on the telephone was the key decision-maker. If not, then the respondent was asked to identify the person and an effort was made to contact that person. Store contacts, except where the decision-maker was the store owner or decision maker, would have been bypassed. There was a battery of questions designed to determine if the firm had a maintenance contract, handled maintenance in some other way, or essentially did not do maintenance. Key questions from the battery are provided in Appendix J. The data accurately reflect what we were told. For gross savings analysis, this is the information requested by PECI. • Copies of Survey Instruments; these are provided in Appendix L of the HIM Appendix. • Screening Questions		

		• Name and Positions of Respondents and Responses • Information on Previous Gasket Schedules This information must be requested as a utility data request . Responses will be subject to policies regarding confidentiality of the participants and customers in the evaluation.		
01/11/2010	**Paul Schertz**	**PGE2066 - Supermarket Controls (and Energy Smart G**	**6.2/6-1**	
	Question: P59	"[PECI - Strip Curtain Response #4] The author refers to a ""custom-made computer model."" The assumptions and methods of this model are not sufficiently described to build confidence in the results. PECI requests that the model be provided."		
	Answer:	Pursuant to a data request by the utility, we will gladly provide our analysis methods and the tools that we use to process the site data. Our tools are entirely Excel based, although raw data must be exported from HOBO loggers using the Hoboware software. Our model will be provided in accordance with a utility data request and subject to CPUC requirements for disclosure. Instructions will be provided within the spreadsheet.		
01/11/2010	**Paul Schertz**	**PGE2066 - Supermarket Controls (and Energy Smart G**	**6.2.3.2/6-4**	
	Question: P60	"[PECI - Strip Curtain Response #3] The author mentions ""calibration constants"" in the last two lines of the page. Other than saying the constants were determined with a least squares approach, very little is described. PECI requests documentation and detail regarding the constants including how were they used, how were they generated, and what assumptions apply."		
	Answer:	This question must be submitted as a data request - subject to policies regarding confidentiality of the participants and customers in the evaluation. A discussion of the calibration constants will be included with the data.		
01/11/2010	**Paul Schertz**	**PGE2066 - Supermarket Controls (and Energy Smart G**	**6.5.1.2/6-9**	
	Comment: P61	"[PECI - Strip Curtain Response #2] The author appears to exclude the effect of evaporator fans and uses discharge coefficients more appropriate for fan-less situations (Table 6-5). Fans can increase infiltration by 17 to 40% by pushing cold air out the door (based on the author's data presented in Table D-1) and thus create an error in the calculated savings of 17 to 40%. Many evaporator fans do not stop when the door is open because the door switch is absent, broken or subverted. "		
	Response:	We use site-specific data. Sites with fans blowing out the door tend to have larger discharge coefficients. This is captured in our analysis through the usage of site-specific data.		

01/11/2010	**Paul Schertz**	**PGE2066 - Supermarket Controls (and Energy Smart G**	**6.5.1.2/6-9**	
	Question: P62	"[PECI - Strip Curtain Response #1] The values used for Delta Temp are unrealistically low for freezers. The DEER value for walk-in freezer temperature is -9 degrees F. ADM reports a Delta Temp of 57 to 58 degrees F with an ambient of 70 F which results in an average freezer temp of 12 to 13 degrees F (substantially higher than the DEER value). Since the freezer temperature has a significant impact on energy savings, this difference is important and could represent a different of close to 40% in the calculated savings. PECI requests documentation and details of how the freezer temperature was determined along with documentation and details of how the ambient temperature (temperature of infiltrating air) was determined."		
	Answer:	The results are based upon site-specific data. The Evaluation Report Appendix discusses the various inputs. Any additional data must be requested through a data request submitted by the utility.		
01/11/2010	**Paul Schertz**	**PGE2066 - Supermarket Controls (and Energy Smart G**	**5.5.1.1./5-9**	
	Question: P63	"[PECI - Gasket Response #7] PECI requests that the method of developing the data for each of the values in the first 3 columns of Table 5-3 be provided. ADM also refers to a custom model, but does not adequately describe it. PECI requests that the model be provided."		
	Answer:	This question must be submitted as a data request by the utility- responses will be subject to policies regarding confidentiality of the participants and customers in the evaluation.		
01/11/2010	**Paul Schertz**	**PGE2066 - Supermarket Controls (and Energy Smart G**	**5.5.1.2/5-10**	
	Question: P64	"[PECI - Gasket Response #6] The subject study relied on leak tests of non-program gaskets to bolster the conclusion that ""baseline"" gaskets are effective barriers. These test results were not quantified nor were the test methods described. PECI requests that the quantifiable test methods, test data and results be provided."		
	Answer:	The fact that just a small fraction of gaskets are replaced makes it operationally impossible to test a refrigerator case with 100% baseline gaskets. The non-participant gaskets tested were used to develop and test the engineering model, and in no way determined the baseline conditions. As such, we defined the leakage through baseline curtains (when present) as 1.5% of the leakage that occurs with the curtains completely removed. The test method, data, etc., must be requested through a data request submitted by the utility.		

01/11/2010	**Paul Schertz**	**PGE2066 - Supermarket Controls (and Energy Smart G**	**5.3**	
Question: P65	"[PECI - Gasket Response #5] Section 5.3 suggests that the final field measurement sample did not include convenience stores (n=20). This section comments on the reduced sample set but the reasons provided focus on supermarkets only. PECI requests information on why convenient stores were dropped from the final sample. Unlike in supermarkets, convenience stores tend to have less ongoing maintenance and are not as likely to have ongoing maintenance contracts. Therefore, the savings estimates as well as the NTG score for convenient stores are expected to differ from supermarkets. "			
Answer:	Gross savings in convenience stores in the PG&E programs would be dramatically lower than for grocery stores since convenience stores have coolers almost exclusively, not freezers. The typical cooler in a convenience store is set at 39 °F, compared to -1 °F for freezers in grocery stores and 37 °F for coolers in grocery stores. We determined that the savings per linear foot for gaskets on coolers are about one eighth that of gaskets on freezers. Convenience stores are a smaller population in the market, so they represent a relatively small amount of the total energy savings attributable to door gaskets.			
01/11/2010	**Paul Schertz**	**PGE2066 - Supermarket Controls (and Energy Smart G**	**5.22/H-1**	
Question: P66	"[PECI - Gasket Response #4] Section 5.2.2 ""Sample Selection"" describes the testing/measurement methodologies used but does not provide information on the sampling approach used. PECI requests a detailed description of the sampling approach (including data tables detailing sampling frame by type of business) and a distribution of the sample frame and final sample showing the number of unique stores (locations), grocery chains, and climate zone represented in the sample. Please also provide list of criteria or methodology used to pick final sample. "			
Answer:	This question should be submitted as a data request by the utility- responses will be subject to policies regarding confidentiality of the participants and customers in the evaluation.			

01/11/2010	**Paul Schertz**	**PGE2066 - Supermarket Controls (and Energy Smart G**	**5.5.2/5-11**	
Question: P67		"[PECI - Gasket Response #3] The NTG methodology stipulates a NTG ratio of zero for all participants who reported having had maintenance contract or program that replaced gaskets within a four-year period. ADM's surveys identified 45 out of 71 respondents to fall into this category. PECI's direct experience with major California grocery stores indicates that out of the major chains only Raleys had a gasket maintenance program prior to the program cycle (other than to replace on demand as case/box temeratures or evaporator coil frosting and icing issues became severe and chronic. Ralphs (Brian Clark from Kroger Corporate Energy Dept., Vons-Safeway (Rob Uhl Safeway Corporate Engineering), Albertsons (Larry Meeker, Corporate Engineering) and Save Mart confirmed this point. In our work with participants, PECI has found that store personnel frequently confuse the Grocer Smart Program with a maintenance contract or other internal programs. Lastly, especially in grocery stores, store managers are likely not knowledgeable about equipment related programs driven from corporate headquarters. Because of the potentially significant impact of these issues on the NTG estimate, PECI requests copies of the actual instruments used for this survey as well as the screening questions, name and positions of respondents and responses. "		
Answer:		See the response to Question P58. Note that data requests must be submitted by the utility-responses will be subject to policies regarding confidentiality of the participants and customers in the evaluation.		
01/11/2010	**Paul Schertz**	**PGE2066 - Supermarket Controls (and Energy Smart G**	**5.2/5-1**	
Comment: P68		"[PECI - Gasket Response #2] The proxy method for gasket testing used by ADM is inappropriate. The study did not measure gasket performance before and after replacement. Rather, it measured the leak rate as a function of missing gasket length and then relied on inspection to describe the damaged gaskets. This indirect method of testing adds appreciable risk in that many areas of uncertainties can not be fully identified."		
Response:		The proxy method is the only feasible way of informing calculations based on field or lab measurements with baseline gasket conditions. This method has been used to establish ex-ante savings estimates for gaskets by both BPA and SCE (please see SCE's work paper, for example), and both those estimations yield claims that are physically possible. The PG&E savings estimate for gaskets is higher than the maximum savings with no gaskets installed. Other lab tests have confirmed that gaskets, if entirely removed, do not cause increases in energy usage comparable to the ex-ante energy savings claims used by PG&E/PECI. Our sensitivity tests show that the input parameters to our calculations would have to have very large uncertainties – multiple, correlated uncertainties each in excess of 1000% - for the realization rate, as calculated against the PG&E ex-ante, to reach 10%. [redacted]		

01/11/2010	Paul Schertz	**PGE2066 - Supermarket Controls (and Energy Smart G**	**5.2.3 and 5.7.2**	
Question: P69		"[PECI - Gasket Response #1] PECI contends that ADM used inappropriate methods to determine relative humidity and temperature of infiltrating air, introducing appreciable error to the test data. 1) Given the impact of ambient temperature and moisture on refrigeration systems, basing yearly estimates on only a two-week measurement period is inappropriate and fails to account for variation in the parameters (5.2.3.3). Furthermore, PECI requests data regarding the actual duration of monitoring at each site as well as information regarding climate zone and location of sensors (stratified, single point, distance from cases). 2) Using TMY data to extrapolate load and system performance data requires that the mean temperature of the monitoring period be consistent with the mean annual temperature (per Kissock, et al '93). This was likely not the case here. 3) It is PECI's experience that grocery stores strive to keep the relative humidity above 50% to keep their produce fresh. The subject study used 37.5% (Table 5-7). The artificially low relative humidity would cause an underestimate of the defrost load and under predict the measure savings."		
Answer:		See response to P57.		
01/11/2010	Paul Schertz	**PGE2066 - Supermarket Controls (and Energy Smart G**	**1/1-1**	
Comment: P70		"[PECI - Summary of Response for Gaskets and Strip Curtains] PECI supports the effort to improve the quality and reliability of savings estimates for door gasket and strip curtain replacements. One issue of specific importance is the development of reliable estimates of baseline gasket efficacy (Recommendation in Section 5.7.3). Because of a lack of documentation of the sampling approach, limited sample size and insufficient detail regarding actual testing procedures underlying the field data, PECI finds this draft final report insufficient to support ADM's recommendation to use the study's data to replace current gasket program assumptions state-wide. PECI questions the estimate of the realization rate and the net-to-gross ratio determination for gasket replacement. PECI questions some of the survey and test methods used for the strip curtain replacement study. In its current format, the draft final report lacks sufficient documentation, explanation and data necessary for the reader to follow and understand, in detail, the approach used by ADM to generate key study estimates.		
Response:		We understand and appreciate your interest in obtaining detailed information regarding the entire evaluation process. We hope that our responses to any data requests submitted by the utility will clarify our sampling, monitoring, and analysis methodology.		

01/11/2010	**Athena Besa**	**Overarching Comments**		**view attachment** **SDG&E_comAttach_1823.doc**
Comment: P71		SAN DIEGO GAS AND ELECTRIC COMPANY AND THE SOUTHERN CALIFORNIA GAS COMPANY COMMENTS ON THE DRAFT COMMERCIAL FACILITIES IMPACT EVALUATION: DOOR GASKETS AND REFRIGERATION STRIP CURTAINS The Joint Utilities have several concerns with Commercial Facilities impact Evaluation. The most important of these are the following: 1) The door gasket gross realization rate is very low for SDG&E. Some of the low realization rate is related to (1) the gas tracer finding that leakage through existing gaskets is much lower than anticipated (see Table 5-3) and (2) there was no significant difference in gasket leakage for participants (post-installation) and non-participants. Both of these factors increase the baseline from which savings are calculated. Unfortunately, the gas tracer and participant/non-participant data is not provided in the report. The Joint Utilities request that this data be provided. 2) The gross realization rate analysis for both door gaskets and strip curtains uses short-term (two weeks) monitoring to extrapolate to annual energy use. Extrapolation from short-term logger results is problematic because they are operational for insufficient periods of time. This creates two obvious problems. First, a short installation/operation period (e.g., two weeks) will be unlikely to capture the fluctuations in use patterns that occur over the year that correspond to variations in weather, daylight hours, macroeconomic conditions, etc. In essence, an analysis based on one to two weeks of logging data is exactly akin to basing the analysis on spot readings. Second, achieving a 10 percent precision with a 90 percent confidence level requires many more weeks of logger information. Thus, sampling design must consider both the number of sites and the time period over which the loggers are installed/operational. Without this the Evaluation results are unreliable and should be rejected. 3) The NTGR results for door gaskets and strip curtains are based on relatively small samples (26 sites and 81 sites, respectively). In addition, the SRA as used in this application suffers from the same set of problems identified in other comments (e.g., self-report bias, recall error, failure to survey the appropriate "decision-maker," inherent bias related to the "program influence" score in the non-residential survey, etc.). Again, these types of issues call into question the validity of the NTGR evaluation procedure implemented by the evaluators and the results of the evaluation. Conclusion As a result of the problems described above the Joint Utilities strongly recommend that unless these problems can be corrected, the study not be accepted as reliable or used for updating DEER or used to measure utility performance in the ERT and VRT process.		
Response:				

Response to point 1: We have provided tracer gas data and records of our data analysis in response to a data request.

Response to point 2: It is important to note that the two weeks of logging occurred for 150 sites, at different times of the year. In the case of gaskets, please keep in mind that:

1) The sales floor temperatures for supermarkets are well-regulated.
2) We have run several limiting scenarios to assess the impact of sales floor conditions to door gasket energy savings – please see our response to question P57.
3) Door usage is a non-issue with gaskets. Besides, we generously stipulate that the doors are closed 8760 hours per year.

To address overall study reliability: The door gasket gross realization ratio is very low for SDG&E because SDG&E's ex-ante savings claims are physically impossible:

1) Energy savings claimed by SDG&E are higher than the energy savings that would result if the gaskets were removed entirely. (Emerson 2008, ADM 2009)
2) The energy savings are a weighted average of 300 kWh/ft for freezers and 56 kWh/ft for coolers. Lab tests show that the energy usage of the average freezer case, if divided by linear feet of average gaskets, is approximately 500 kWh/ft (Emerson 2008, SCE 2007).
3) The ex-ante savings calculations used to arrive at 105 kWh/ft do not document any usage of empirical data.
4) BPA and SCE have coupled lab tests with field observations to come up with energy savings for gaskets that range from 20-28 kWh/ft for freezers, and lower numbers for coolers. This is to be compared with the 300 kWh/ft that is a key component of SDG&E's ex-ante energy savings calculation. The BPA energy savings estimates of 16 kWh/ft for coolers and 27 kWh/ft for freezers are based on lab test results, scaled by field observations made by PECI regarding gasket damage. They are also based on the assumption that "The standard used for repair in the PNW is a minimum 6-inch double tear. A man's fist should generally fit comfortably through the tear." We observed that gaskets that were in better condition than described above were replaced as part of the program.
5) The 16 kWh/ft and 27 kWh/ft estimates are based on reported damage from a major implementer, and cannot be judged as unbiased. Furthermore, we observed gasket replacements on gaskets that were in relatively good condition compared to those used to arrive at those estimations. Based on this information, the 16 kWh/ft and 27 kWh/ft numbers should be considered the far upper limit of the energy savings.

Section 5.4, page 5-8 of our report states:

> *There were no badly damaged gaskets in the post-only sample. Furthermore, the comparison group also did not have any leaky gaskets. As such, resort had to be made to records of baseline gasket conditions (see Table 5 4) prior to retrofit. The baseline gasket efficacy is defined as the ratio of the overall gasket length that was removed by the installers to the gasket length that was replaced.*

Regarding strip curtains, SCE had much higher realization rates than SDG&E– above 80% for

	their largest program - because they claimed reasonable door-open durations and conceded that old strip curtains could be present about 50% of the time. Using reasonable assumptions, three SCE programs, 2510, 2511, and 2517 achieved realization rates of 93%, 85%, and 84% respectively. SDG&E claimed 300 minutes of door-open time per day. This was not born out in the field data. The study confirms the energy savings of strip curtains; provided that the door-open times and the prevalence of old strip curtains are estimated accurately. The same case can be made for door gaskets. Had we observed more damage in the baseline gaskets, the energy savings would have been in line with BPA and SCE lab tests. To the extent that the BPA lab tests are trustworthy, this check validates our data acquisition and data analysis. The only data left to question is the amount of damage on baseline gaskets. Our field observations indicate that, of 850' of replaced gaskets, only 1.5% of them, by length, were missing. The IOUs have not provided any documentation or photographs of pre-installation conditions. As such, we there is no data to use for baseline establishment apart from quantitative records that our field staff collected from one mile of gaskets in participating stores. The energy savings due to gaskets can reach the SCE and BPA ex-ante estimates provided that there is a fully enforced policy regarding the criteria used to justify gasket replacement. We found no evidence of such a policy in action during our field observations. **Response to Point 3:** Response: A number of comments have been received from the IOUs claiming that the self report approach (SRA) is an invalid method for estimating the net-to-gross ratio. Some comments appear to quarrel not so much with the SRA itself but with a failure to adequately address a number of methodological challenges in its application. These issues are addressed in "Response to Overarching IOU Concerns Regarding the Estimation of the Net-To-Gross Ratio Using the Nonresidential Self-Report Approach" [posted as "CommercialSRA_Response" under the Commercial Facilities Topic at www.energydataweb.com/cpuc/], whose objectives are to demonstrate that: 1. The methodological principles underlying the SRA are endorsed by leading evaluators. 2. The IOUs have a long tradition of relying on the SRA and have actively participated in its continuing development. 3. The SRA has incorporated many of the techniques that have become standard in survey research to mitigate the technical challenges raised by the IOUs.

SCE Comments on HIM Portions of the Commercial Facilities Report

Comments Applicable to both Door Gaskets and Strip Curtains

Program accomplishments should be based on weather actually experienced during the program, with future years based on average year weather data. This will give actual program accomplishments, as a billing analysis would, as opposed to average savings in a hypothetical year.

> **Response**: Program guidelines and CPUC protocols require that program savings are to be calculated according to long-term average weather conditions. We started our evaluation with a "sensitivity analysis." As most of the strip curtains and gaskets are installed indoors, the weather affects the savings in two ways. First, it influences the temperature in unconditioned spaces that surround some walk-in units – however, the temperature of the nearby conditioned space has a large influence on loading dock temperatures as well. Secondly, it influences the COP of the refrigeration systems. Our sensitivity analysis indicates that, year to year variation in weather will have a negligible impact on the overall savings for strip curtains and door gaskets.

The Net-to-Gross ratio was incorrectly determined because the analysis automatically assumed that customers with a maintenance contract were freeriders, without considering the effect of the program on how businesses decide what sorts of maintenance contracts they want. It is entirely likely that many of the businesses with a maintenance contract to replace door gaskets would or strip curtains would not have designed or signed such a maintenance contract without the program and its incentives. Similarly, the program is likely to affect the frequency with which gaskets and curtains are changed, even if they don't have a maintenance contract. The current analysis, assuming that the program only affects ad hoc activities, significantly misses major portions of program activity. A true estimate would need to actually instigate the effects of the program on maintenance contracts and maintenance schedules to see what portion of program activity simply satisfied free-rider contracts and schedules versus how much actually led to a desirable change in business practices. Not administering the net-to-gross battery to all the respondents significantly handicaps the analysis and means that the NTGR estimate is essentially a very lower bound estimate.

> **Response**: The surveys asked "at the time of the program or prior to participating, did you have a maintenance contract that included door gasket inspection and/or replacements?" In other words, did the participant have a maintenance contract? This was followed by several questions that attempted to determine what the nature of the contract was and the frequency of inspections and maintenance. A bit further in the questionnaire there is a section that follows a similar pattern which attempts to determine if the participant was regularly doing maintenance on door gaskets. Finally there is a set of questions that sort out those folks who did not have a contract and were not doing or having maintenance done.
>
> There were two reasons for this set of questions. One was that a program implementation contractor could have a maintenance contract with the firm prior to "selling" the program's wares, but install gaskets and receive payment from the contract and from the program without the store owner knowing. The other is that if a firm is maintaining gaskets before the program, then they would be likely continue to do so, and the answer to the question of "what would you have done in the absence of the program?" is that "you would have continued to maintain the gaskets." Therefore, the respondent is a freerider. Some gaskets might have gotten replaced sooner but the savings effect of damaged gaskets as opposed to missing gaskets is low. The point of the program is to capture substantial savings from units that are not maintained or do not have gaskets and get the participants to understand the value of maintenance. Neither of these conditions is fulfilled for people who have maintenance contractors or are doing some kind of regular maintenance. The NTG evaluation was administered without regard to the participant's status as a site with a maintenance contract, or not. In this manner, the potential impact of program influence was assessed; however, any site which reported having maintenance contracts prior to the incentive program was deemed to be a freerider. If, during the extended questionnaire, any answer might have changed their status as a freerider, the full Net-to-Gross battery of questions was administered.

The NTGR methodology also seems to mix up an attempt to determine which effects are stronger, program and non-program, with an attempt to discover what portion of the savings would not have occurred in the absence of the program. These are not the same. Thus even if there were non-program effects that were stronger than program effects, the savings may still be net savings. Furthermore, by averaging the scores for a respondent, the analysis weakens the influence of the stronger effect in the analysis. That is, if the program had a large score on one factor but a low score on the over factor, the program still likely had a very strong effect, and the low score should not bring down the total score.

> **Response:** The NTG analysis for the commercial facilities evaluation parallels the standard non-residential NTGR methodology. [For a discussion of that methodology, see "Response to Overarching IOU Concerns Regarding the Estimation of the Nonresidential Net-To-Gross Ratio Using the Self-Report Approach," posted under the Commercial Facilities topic at www.energydataweb.com/cpuc/.] Tables were included in the evaluation report to show the relative importance of program and nonprogram factors. For the HIM analysis for door gaskets and strip curtains, the procedure was changed slightly and this appears to be what this comment is referring to.

> Hypothetically, if the respondent says, "the incentive made me do it and some other non program influence made me do it" and the incentive has an influence of seven out of 10 and the non program influence is five out of ten then there are 12 total parts of influence. The effect of the incentive is seven out of 12 or 0.58. The non-program influence cannot be ignored and the claim made that the program influence is 7. A more concrete example is if the program factor was the incentive and the non-program factor was the long term energy cost savings, the incentive may or may not have been sufficient and the long-term cost savings may or may not have been necessary to obtain the savings. Therefore the balancing.

What went into the confidence and precision estimates? Are these based on the variance in the building simulation results? Or does it include the uncertainties in the building simulation estimates themselves? The argument that the relative precision is large simply because the numbers are small doesn't make sense. The concept of relative precision eliminates the scale effects associated with large versus small numbers. Most likely, the relative precision is very large because there was a very small sample size. The report seems to be confusing relative precision with uncertainty. Table 5-2 reports standard deviations, which deal with the variation in individual sample points. But these are not the same as the standard errors that would show the level of precision in the actual mean. Thus it is unclear exactly what inference to draw from the conclusions. If the precision

shown is calculated with the standard deviation only and the same size is 20, the true prevision should be more like 35%.

> **Response:** The absolute precision and uncertainty are combined prior to casting them as relative uncertainty or relative precision at 90% confidence level. Statistical uncertainties (variance in building simulation results) are based on the standard error (however, we do not do a site-by-site analysis for gaskets). Uncertainties due to instrumentation and calculation (e.g. extrapolations, instrumentation accuracies) are assumed to be uncorrelated between sites and are added in quadrature with the following exception:
>
> Often, uncertainties are added in quadrature (e.g. sqrt(a^2 + b^2)) with the assumption that they are uncorrelated because they are based upon leakage testing at a single site. The uncertainty due to the gasket baseline estimation applies to all sites – the correlation for the uncertainties between the various sites is 100%. This is the reason behind the apparent lack of the square root of 20 in our uncertainty which results

in an estimate with generous estimate of uncertainty than "standard error" might suggest. Second, we propagate our uncertainties using a Taylor series expansion approach. We assume that statistical uncertainties and instrumentation uncertainties are uncorrelated. And, as mentioned, we assume that the uncertainty on the baseline estimation is 100% correlated for all sites. That is, if you double the baseline leakage, the gross realization doubles. This is the reason for the large uncertainty on our gross realization.

Second, we do not argue that the relative precision is large just because the numbers are small. We argue that the absolute precision, though larger than 10% of the ex-post savings for gaskets, is very small compared to the ex-ante numbers (at least PG&E and SDG&E's ex-ante numbers). Therefore, we can exclude PG&E and SDG&E claims with very high confidence. The issue is whether the savings for gaskets are 3 kWh/ft or 6 kWh/ft – not whether they are 3 kWh/ft or 105 kWh/ft.

For illustration purposes, please consider the following hypothetical situation. Suppose you toss a coin, stipulating a value of 1 for heads and -1 for tails. After 100 tosses, it turns out you get a total mean value of 0.02. What is the relative precision on that number? Does it imply that the value of 0.02 (51 heads and 49 tails) is unexpected?

Comments Specific to Door Gasket HIM

5.2.2

Sample sizes should be in the text, not in an appendix. This is necessary information for

understanding the validity of the conclusions.

Response: The sample sizes have been moved to the body of the report.

5.2.3.3

"Accordingly, the analysis for the door gasket evaluation involved making 32 archetypal

8760-hour calculations—one for coolers and one for freezers— in each of the 16 climate zones." Were there really 32 calculations in each climate zone, or was the intention to say that there were 32 total, which is two in each of 16 climate zones?

Response: Thank you for pointing out the error in our description. As you surmised, we intended to say: "Accordingly, the analysis for the door gasket evaluation involved making 32 typical 8760-hour calculations—one for coolers and one for freezers in each of the 16 climate zones." So, that is 32 in total. We have corrected the report.