Commercial Facilities Contract Group
2006-2008 Direct Impact Evaluation

Study ID: PUC0016.03

Volume 3 of 3
HIM Appendices

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February 18, 2010

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 3 of the Commercial Facilities Contract Group 2006-2008 Direct Impact Evaluation Final Report (STUDY ID: PUC0016.01) and includes Appendices (A-L). These appendices document the methods, results and processes for the evaluation of strip curtains and door gaskets in reach-in coolers and freezers and walk-in refrigerated warehouses. These documents include the methods for tracer gas testing, data collection, comparisons of treatment and control groups, and the net-to-gross analysis. We have also included other documents that explain our sample sizes and our parameters for energy savings.

The evaluation team developed a novel, first principles-based engineering analysis approach utilizing a tracer gas to determine infiltration rates calibrated to pre/post data on 19 non-participant sites. The models were then used to estimate energy usage for the HIM's based upon site-specific data collected at 40 commercial facilities. The strip curtain HIM achieved a gross realization rate for kWh of 0.42 and a net realization rate of 0.531 for an overall success of 0.23. The door gasket HIM achieved a gross realization rate for kWh of 0.03 and a net realization rate of 0.19 for an overall success of 0.01.

ACKNOWLEDGEMENT

This document was prepared by the Major Commercial Evaluation Team managed by ADM Associates, Inc. for the California Public Utilities Commission (CPUC). This study was funded through the public goods charge (PGC) for energy efficiency and is available for download at www.calmac.org as document PUC0016.03.

DISCLAIMER

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INFILTRATION DUE TO THE STACK EFFECT

Basic Theoretical Overview

Prior to field visits, the utility "work papers" that detailed the energy savings estimation calculations associated with strip curtains were reviewed. The energy savings calculations are lengthy but straightforward. The refrigeration load due to infiltration is calculated through Equation A-1 (ASHRAE, 2006):

Equation A-1: $$q_t = qD_tD_f(1-\delta)$$

Where,

q_t = the average heat gain over a 24 hour period

D_t = is the fraction of the time that the door is open

D_f = doorway flow factor, an empirically determined scale factor on the order of unity

δ = effectiveness of strip curtain at thwarting infiltration (1=100% effective, 0=no strip curtains present)

q = the refrigeration load due to infiltration for fully established flow (given below), Btu/h,

The refrigeration load due to infiltration for fully established flow is described fully in Equation A-1 (Gosney & Olama, 1975):

Equation A-1 $$q = 795.6A(h_i - h_r)\rho_r(1-\rho_i/\rho_r)^{0.5}(gH)^{0.5}F_m$$

Where,

q = refrigeration load in Btu/h

A = doorway area, ft^2

h_i = enthalpy of the infiltrating air, Btu/lb

h_r = enthalpy of the refrigerated air, Btu/lb

ρ_i = density of the infiltration air, lb/ft^3

ρ_r = density of the refrigerated air, lb/ft^3

g = gravitational constant = 32.174 ft/s^2

H = doorway height, ft

F_m is the density factor: $$F_m = \left(\frac{2}{1+(\rho_r/\rho_i)^{1/3}}\right)^{3/2}$$

The infiltration rate, in CFM, can be obtained from Equation A-1 by removing the $(h_i-h_r)\rho_r$ term. The resulting equation becomes:

Equation A-3: $$Q = 795.6A(1-\rho_i/\rho_r)^{0.5}(gH)^{0.5}F_m$$

There is another simplified formula for the prediction of infiltration due to the stack effect (ASHRAE 2005).

Equation A-4: $$Q = 60C_D A\{((T_i - T_r)/T_i)(2g\Delta H_{NPL})\}^{0.5}$$

Where,

Q = infiltration rate, measured in cubic feet per minute

A = doorway area, ft^2

T_i = temperature of the infiltrating air, °R

T_r = temperature of the refrigerated air, °R

g = gravitational constant = 32.174 ft/s2

ΔH_{NPL} = height to the neutral pressure level (effectively half the door height)

C_D = discharge coefficient of the opening, for a single opening, $CD = 0.4 + 0.0025|T_i - T_r|$.

From an operational perspective, Equation A-3 has the advantage that only the dimensions of the doorway and the temperatures of the refrigerated and surrounding spaces are necessary to determine the infiltration rate. Furthermore, the discharge coefficient C_D above seems to be in better agreement with data than the discharge coefficient that is implicit in Equation A-3. We modify Equation to better account for the case when the majority of the infiltration occurs through a single orifice. In this case, the neutral pressure level is half the height of the doorway to the walk-in refrigeration unit. The refrigerated air leaks out through the lower half of the door, and the warm, infiltrating air enters through the top half of the door. We deconstruct the lower half of the door into infinitesimal horizontal strips of width *W* and height *dh.* Each strip is treated as a separate window, and the air flow through each infinitesimal strip is given by Equation. In effect, this replaces the implicit $wh^{1.5}$ (one power from the area, and the other from ΔH_{NPL}) with the integral from 0 to *h/2* of $wh'^{0.5}\,dh'$ which results in $wh^{1.5}/(3\times 2^{0.5})$. With this modification, Equation 7-4 is recast as Equation A-5:

Equation A-5 $$Q = 20C_D A\{((Ti - T_r)/T_i)(gH)\}^{0.5}$$

The variable *H* in the above equation is the entire doorway height. Equation A-5 is somewhat easier to use because the only required inputs are readily available: the physical dimensions of

the units and the temperatures of the refrigerated and surrounding spaces. Of course, enthalpies and densities will be needed to obtain an actual refrigeration load. The discharge coefficient C_D typically takes on values 0.42-0.52 for the temperature regimes encountered. Although there is no formal discharge coefficient in Equation A-3, the equation does contain an implicit assumption of C_D = 0.663. One of the goals of this study is to use data from a large number of walk-in freezers, coolers, and refrigerated warehouse facilities to update the value or functional form of the discharge coefficient.

Tracer Gas Measurements

The infiltration rates are measured by tracer gas measurements using CO2 as the tracer gas. Assuming that there are no sources or sinks of CO2 inside the walk-in units, the concentration of CO2 at a given time after the CO2 release is given by the following equation:

Equation A-6: $$C(t) = C_{out} + (C_0 - C_{out}) \exp(-\pi t)$$

Where,

$C(t)$ = the CO_2 concentration inside the walk-in cooler or freezer at time t,

C_{out} = the outdoor CO_2 concentration,

C_0 = the "initial" CO_2 concentration inside the walk-in just after the gas has been released,

τ = the infiltration rate into the walk-in box, in air changes per hour.

Equation A-6 is readily modified to accommodate local sources and sinks of CO_2. However, preliminary measurements show stable CO_2 levels in well-sealed units with the doors closed. This indicates that there are no significant CO_2 sources or sinks inside the walk-in boxes.

APPENDIX B
TRACER GAS TESTING METHODOLOGY

The CO_2 levels inside and outside the unit are measured by Telaire 7001 Non-Dispersive Infrared (NDIR) sensors and are logged by HOBO loggers. The sensors are specified to work in temperatures ranging from 32 °F to 122 °F. To ensure proper function of the NDIR sensors in the freezers and coolers, the sensors are housed in a custom-built, insulated box equipped with heating coils and a fan that passes heated air over the sensor. The air temperature inside the box can be adjusted to be between 30 °F and 60 °F above ambient conditions. The fan reduces the response time of the CO_2 sensor because the response time is not limited by the sensing technology or the digitization process, but rather by diffusion of air to the sensor. In addition to CO_2 levels, the temperature and humidity levels are logged by HOBO loggers placed inside and outside the cold boxes. To capture any potential temperature gradient between the front and rear of large walk-in units, two temperature loggers are used: (1) a thermocouple and HOBO combination just inside unit, aligned with the center of the doorway and (2) a Temperature/RH HOBO near the back end of the unit. The temperature sensor near the front of the unit is placed at ground level to capture the temperature of the air as leaves the unit. Up to six separate tests are conducted on a walk-in unit:

1. Measurement of infiltration with the door open and the strip curtains in place
2. Measurement of infiltration with the door open and the strips removed
3. Measurement of infiltration with the door closed and sealed – to capture any leakage through other orifices and cracks (e.g. gaskets of reach-in doors for walk-in/reach-in units)
4. Measurement of infiltration for an ingress/egress test (field technicians pass through the strip curtains – the disturbance of the strip curtains makes them less effective for a short amount of time)
5. A series of three tests with the strips removed:
   - The door is opened for 15 seconds, and closed for three minutes
   - The door is opened for 30 seconds, and then closed for three minutes
   - The door is opened for 45 seconds, and then closed for three minutes.

The first three tests are conducted without exception for all sites. The last two tests are conducted if time allows. In particular, the last test is designed to address two purposes

1) For small freezer units, the changes in the CO_2 levels are so fast that they challenge the response-time of the Telaire 7001 sensor. The methodology above enables the sensor to accurately capture the CO_2 levels prior to and after the door openings.
2) For small freezers, the high air exchange rates that occur in the absence of strip curtains (often in excess of one air exchange per minute) causes significant warming of the

'refrigerated' air, which in turn diminishes the pressure differential that drives the infiltration process. Therefore, the infiltration rates diminish appreciably during the course of a test. Comparison of the data from the 15-second, 30-second, and 45-second tests captures this phenomenon.

The decays of the CO_2 inside the unit are fit with exponential functions, similar to Equation A-6, that have all parameters fixed by field data except for the air exchange rate, τ. The air exchange rate that results in the best fit of the data (automated and determined by χ^2 minimization) is taken as the measured air exchange rate and converted into the actual air flow in CFM using the volume of empty space in the unit. The volume of the empty space is measured using two separate techniques. The first method, called the 'emptiness factor judgment method', involves an actual measurement of the interior dimensions of the unit, and the estimation of the 'emptiness' of the unit. On average, the units are estimated to be approximately 80% empty. A second method, called the 'gas release calculation' method involves comparison of the rise in CO_2 levels associated with the introduction of a known amount of CO_2 (the field technicians calculate, record, and release the amount of gas required to raise the CO_2 concentration to 2,500 ppm. Both methods provide similar estimates of the volume of empty space. Compared to the 'emptiness factor judgment' method, the 'gas release calculation' method is more prone to error for small volumes that may only require two or three seconds of tracer gas release at 10 CFM. However, larger volumes require much longer release times and the amount of gas released is known with much higher accuracy Figure B-1 shows data from three tests on a large walk-in/reach-in unit at a convenience store.

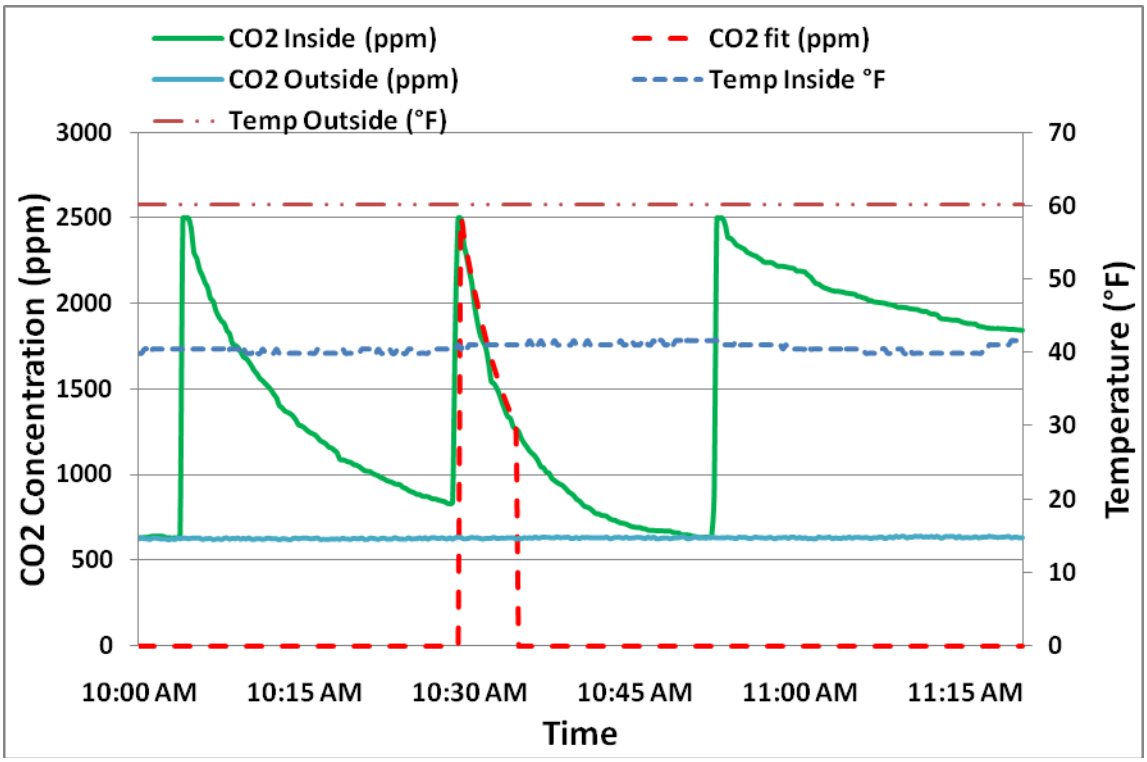

Figure B-1 Data from Testing a Large Walk-In / Reach-In Beverage Cooler

In Figure B-1, the solid green profile corresponds to the CO_2 concentrations inside the unit. There are three releases of tracer gas that occur at approximately 10:03 AM, 10:30 AM, and 10:52 AM. The second test has the sharpest drop in CO_2 levels and corresponds to the "door open, no strip curtains" case. The dashed red line shows the exponential fit function that is used to determine the air exchange rate. This particular unit is a large walk-in beverage cooler with 12 glass reach-in doors on one side. The last test corresponds to the door-closed test, and indicates that there is significant leakage through the reach-in door-gaskets. Interestingly, there is a relatively sharp drop in the CO_2 levels at about 11:04 AM, which corresponds to a customer opening a reach-in door. Typically, only the walk-in/reach-in units demonstrate significant leakage when the doors are closed. In assessing the efficacy of the strip curtains, the leakage that occurs when the doors are closed is subtracted from both leakages that are measured with and without strip curtains. Thus, the efficacies of the strip curtains are obtained by the formula:

Equation B-2: $$\delta = (Q_{NoCurtains} - Q_{Curtains\,Presnet})/(Q_{NoCurtains} - Q_{DoorClosed})$$

The infiltration tests for the refrigerator gaskets follow a similar procedure. Figure B-2 shows data from infiltration tests on a display case. The slow decline in CO_2 levels between minutes 30 and 70 correspond to leakage with the doors taped shut and to leakage with the gaskets in the "as is" condition. There is no discernable difference in the slope of the CO_2 levels (green

profile), suggesting that there is very little leakage. On the other hand, when two gaskets are removed around minute 77, the CO_2 levels drop precipitously.

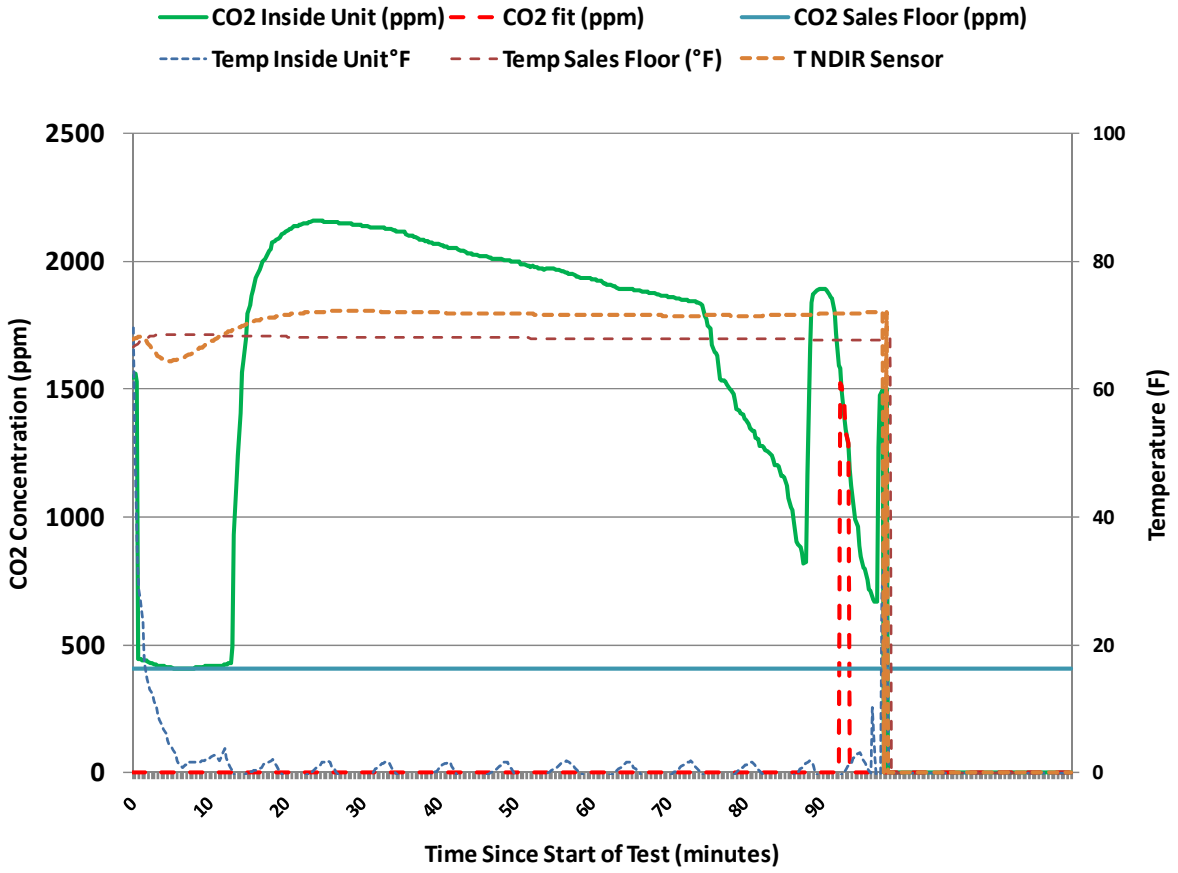

Figure B-2. Date from testing a frozen food display case.

APPENDIX C
UNCERTAINTY ANALYSIS FOR INFILTRATION TESTS

The infiltration tests determine a curtain's efficacy and the particular discharge coefficient for a site. There are several measurements and assessments that contribute to the uncertainty of the measurement in the infiltration rate and in the curtain efficacy. The nature of these uncertainties and our efforts to minimize their impacts are discussed below.

Telaire 7001 CO2 Sensor

The air exchange rate is measured through fitting an exponential decay of CO_2 levels. We log the CO_2 levels both inside and outside the walk-in units with separate Telaire CO_2 sensors. A calibration offset between the two sensors would cause a bias in the determination of the air exchange rate. Although we calibrated all sensors to a standardized 2000 ppm gas mixture, we still found issues in the field, such as store employees congregating near the CO_2 sensor outside the walk-in and causing a false CO_2 signal. This problem was solved offline by relying solely on the CO_2 sensor that is placed inside the walk-in unit. During the set up procedure for our tests, there is a five to ten minute interval before the introduction of CO_2 into the walk-in when the CO_2 sensor is logging inside the walk-in. At this time, the CO_2 level inside and outside the walk-in are most likely in equilibrium. The CO_2 content of the infiltrating air is assessed from the readings at this time. The reliance on a single CO_2 sensor for the tests has a marked advantage in that the partial derivative of the air CO_2 decay rate with respect to any offset or scale in the calibration that is constant in time is identically zero. In our uncertainty analysis, we do account for the contribution of the uncertainty in the assessment of outside CO_2 levels to the overall measurement uncertainty, which is small in comparison to the uncertainties we faced in reading from two separate outdoor sensors.

The time response of the sensor to CO_2 levels is more important in that it can directly influence the measured air exchange rate. The manufacturer claims that the CO_2 sensor has a response time of one minute. Although most of our tests last much longer than one minute, some of the smallest walk-in freezers can experience a 2000ppm drop in the CO_2 concentration in about one minute. We have taken steps to maximize the length of the tests for the small freezers and to minimize the response time of the CO_2 sensors. To maximize the length of the tests, we use a voltage divider on the output of the CO_2 sensor. The sensor is capable of 0-5V output, corresponding to 0 to 5000ppm CO_2 concentrations. The HOBO loggers, however, take a 0-2.5V input. A voltage divider transforms a 5V output from the CO_2 sensor to a 2.5V input for the HOBO logger. This allows us to fit the CO_2 levels as they drop from 5000 ppm to near ambient levels and lengthens the duration of the tests, minimizing any effects that may be due to the sensor's response time. A second important step is to minimize the sensor's response time. An NDIR sensor's response time is not limited by the analog sensor or digitization electronics. The response time is limited by the rate at which the air diffuses into the sensing chamber. We

encase the CO_2 sensor in a custom made box that uses a computer fan[1] to draw air over the NDIR sensor.

HOBO Temperature and Thermocouple Loggers

We use a combination HOBO U12 thermocouple loggers and HOBO U10 temp/rh loggers to log the temperature inside the walk-in box. The accuracy of the thermocouple loggers is +/- 2.7 °F. And the accuracy of the Temp/RH loggers is +/- 0.7 °F. The thermocouple loggers are preferred over the Temp/RH loggers due to their superior response time.

Volume of Walk-In Coolers

The measurement uncertainty in the gross volume of the walk-in coolers is negligible – it is measured by a tape-measure. The net volume, the volume of the empty walk-in minus the volume of the product stored within the walk-in, is more difficult to assess. The net volume is used in converting the air exchange rate from the infiltration tests to an infiltration rate in cubic feet per minute. The net volume results from applying an 'emptiness factor' to the gross volume. The emptiness factor relies on the field technician's judgment, yet it may be revised by the analyst based on two supporting bodies of evidence. Firstly, the analyst can use pictures of the walk-in to make an independent judgment of the emptiness factor. A better method, however, which is only valid for larger volumes, is to compare the rise in concentration of CO_2 to the amount of CO_2 released. The amount of CO_2 released is recorded by the field technicians as the duration of gas release at standardized 10 CFM. Lastly, the reported 'emptiness factors' by the various technicians are analyzed to identify technicians who may have a consistent bias that is either high or low. The gross volume measurements, after being adjusted with the emptiness factors, show good correspondence to the volumes as measured by the gas-release method. Estimated volumes by the two methods are plotted against each other in Figure C-1. We take a 10% uncertainty in the assessment of the gross volume. This uncertainty is by far the largest contributor to the overall uncertainty in the measurement of the infiltration rates, discharge coefficients, and curtain efficacies.

[1] The boxes were created during a previous collaboration with Texas A&M University. The boxes, custom made by A&M graduate students, originally housed CO_2 and CO sensors.

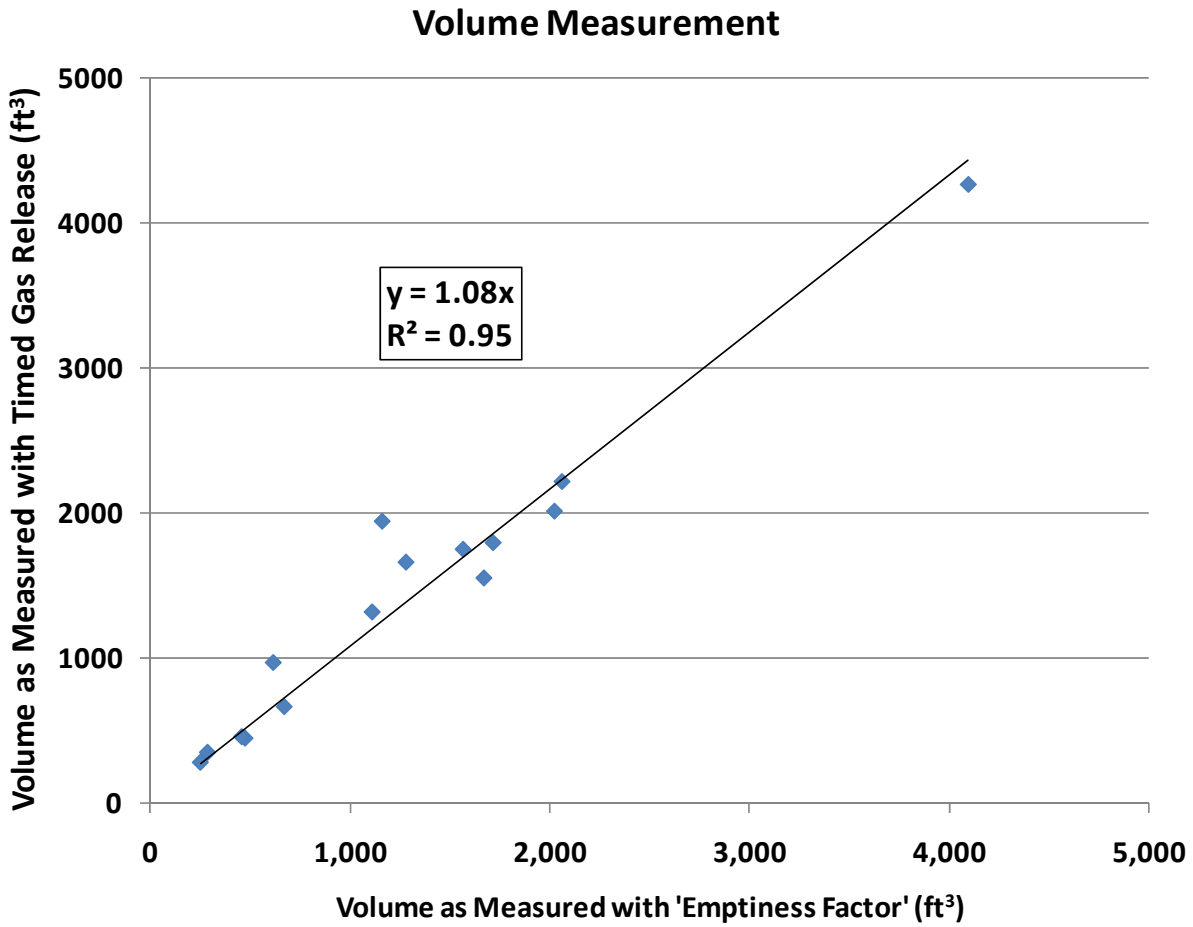

Figure C-1. Comparison of Two Volume Measurement Methods

The volumes for the display cases in the door-gasket tests are determined by the gas-release method. We use a number of 16-gram CO_2 dispensers, so the amount of CO_2 released is known with a very high degree of certainty.

APPENDIX D
UPDATED DISCHARGE COEFFICIENTS

There are two similar model equations that are often used to describe infiltration from the stack effect. They are both modifications or approximations of Tamm's equation[1]. The first one is as follows[2]:

Equation D-3: $$Q = 795.6A(1-\rho_i/\rho_r)^{0.5}(gH)^{0.5}F_m$$

Where,

Q = infiltration rate, in cubic feet per hour

A = doorway area, ft^2

ρ_i = density of the infiltration air, lb/ft^3

ρ_r = density of the refrigerated air, lb/ft^3

g = gravitational constant = 32.174 ft/s^2

H = doorway height, ft

F_m is the density factor: $$F_m = \left(\frac{2}{1+(\rho_r/\rho_i)^{1/3}}\right)^{3/2}$$

The density factor, *Fm* is of academic importance only. The factor is about .98 for a 40 °F temperature differential, and .97 for a 60 °F differential. One can easily absorb the factor into an overall multiplicative factor. The factor 795.6 is a product of 3600, which comes from converting units from seconds to hours, an integration constant of 1/3, and a *discharge coefficient of* 0.66, which is a constant that relates the predicted air flow to measured air flow. Pham and Olivier, in 1983, published a discharge coefficient of 0.68. In addition to the implicit discharge coefficient of 0.66 in Equation D-3, there is an additional *doorway flow factor* of 0.8 recommended by ASHRAE and used by the IOUs. The effective empirical constant used by the IOUs is 0.531, the product of the discharge coefficient and the doorway flow factor.

There is another simplified formula for the prediction of infiltration due to the stack effect (ASHRAE 2005).

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[1] *Kalterveluste durch kuhlraumoffnungen*. Tamm W,.**Kaltetechnik-Klimatisierung** 1966;18;142-144

[2]. *Heat and Enthalpy Gains Through Cold Room Doorways*, Gosney, W.B., and H.A.L. Olama, **Proceedings of the Institute of Refrigeration,** 1975 72: 31-41. We have removed from this equation the factor that describes infiltration load, so that a flow is predicted.

Equation D-4: $$Q = 20C_D A\{((Ti - T_r)/T_i)(gH)\}^{0.5}$$

Where,

Q = infiltration rate, measured in cubic feet per minute

A = doorway area, ft^2

T_i = temperature of the infiltrating air, °R

T_r = temperature of the refrigerated air, °R

g = gravitational constant = 32.174 ft/s2

H = height of the doorway

C_D = discharge coefficient of the opening, for a single opening, $C_D = 0.4 + 0.0025|\ T_i - T_r|$.

The discharge coefficient C_D (Kiel and Wilson, 1986) typically takes on values 0.42-0.52 for the temperature regimes encountered.

We measured the discharge coefficient directly by comparing the results of our tracer gas measurements to

Equation D-4. The measured discharge coefficients are summarized in Table D-1 below.

Table D-1. Average Discharge Coefficients by Category.

	Coolers	Freezers	Refrigerated Warehouses
Evaporator fans near doorway and blowing air out	0.49	0.49	N/A
No interference from evaporator fans	0.35	0.42	0.42

In Figure , the discharge coefficients are plotted against the unit volumes for sites that did not have forced air exchange due to evaporator fans. The factor tends toward 0.42 as the volume grows.

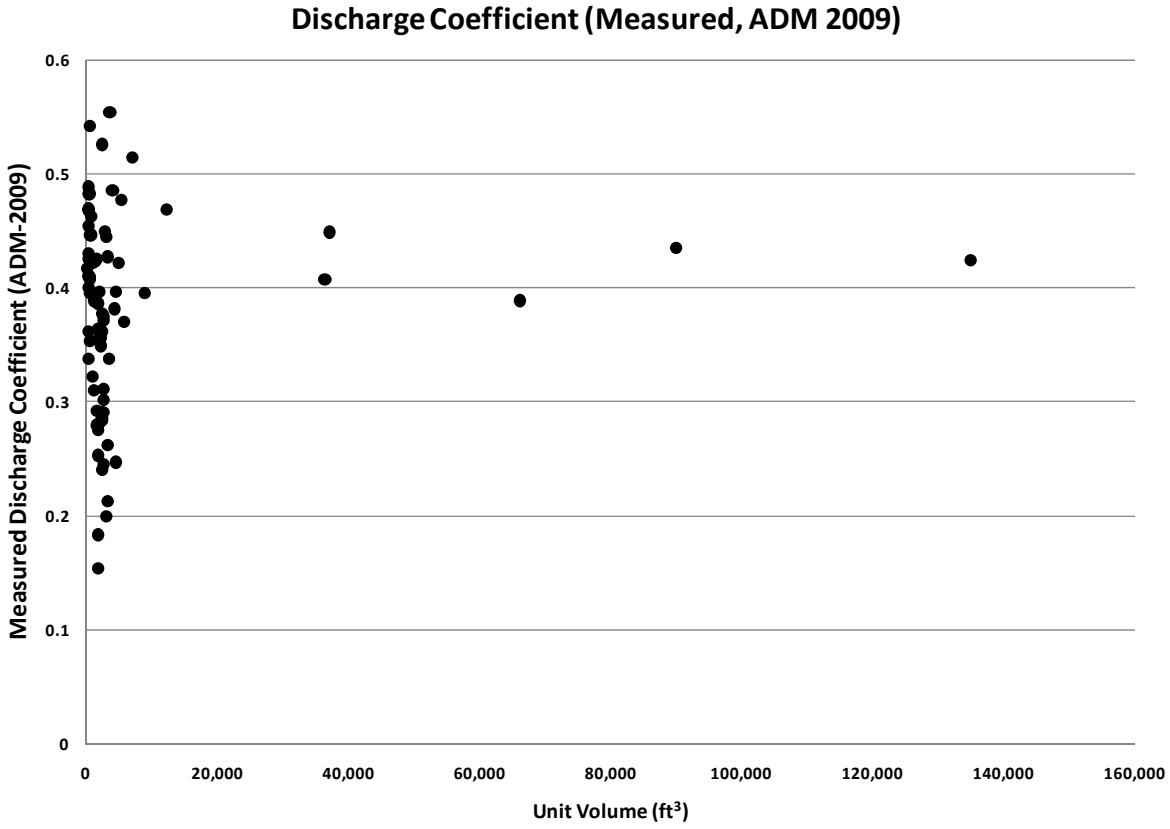


Figure D-1 Measured Discharge Coefficient vs. Gross Volume of Walk-in or Warehouse unit.

In large warehouses, there is little variation in the discharge factor because (1) there is little product stacked immediately near the doorway that may provide resistance to the infiltrating air and (2) the relatively large doors reduce the impact of boundary effects near the edges of the doorway. There is much more spread in the distribution of discharge coefficients for the smaller walk-in coolers and freezers. However, we have developed a discharge function that predicts the discharge coefficient for cases where there is no interference from evaporator fans. The discharge coefficient is a function of the unit volume and the temperature differential between the refrigerated and temperature airs:

Equation D-5

$$\begin{cases} C_D = 0.425, & V \geq 6000\ ft^3 \\ C_D = 0.525 - 0.033 \times \ln(\min(V, 3000)) + 0.00262 \times \left(T_{Infiltrating} - T_{Refrigerated}\right), & V < 6000\ ft^3 \end{cases}$$

Figure D-2 plots three calculated discharge coefficients against our measured discharge coefficients. The constant discharge coefficient used by the IOUs is shown by the green triangles. The discharge coefficient proposed by Kiel and Wilson is shown by the red circles[3]. The discharge coefficient developed in the course of this study is shown by the blue diamonds. The discharge coefficient used by the IOUs will result in an overestimation of the energy savings, particularly for walk-in coolers.

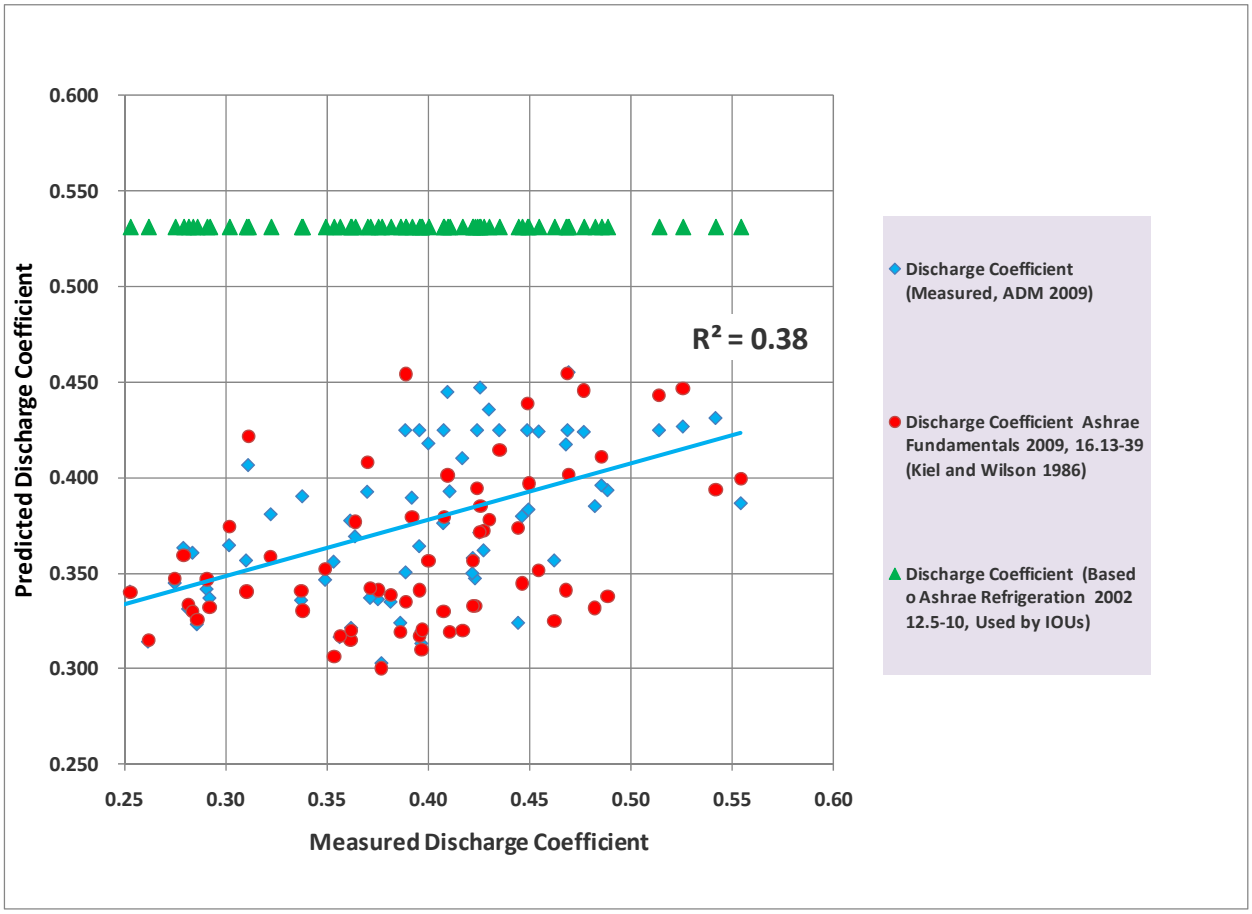


Figure D-2 Calculated discharge coefficients vs. measured discharge coefficient.

[3] Note that, an adjusted version of Kiel and Wilson seems to fit the data very well for some sites, but not for other. Our regression was optimized with this particular M&V effort in mind. The overall

APPENDIX E
PREDICTIVE PARAMETERS FOR ENERGY SAVINGS

The following parameters have the greatest influence on the energy savings achieved per square foot of strip curtain installed on a cooler or freezer door[1].

i. Door open time.

ii. Temperature differential between infiltrating and refrigerated airs.

iii. $\delta_{Efficacy}$: the difference between efficacies of the new strip curtains and of the old infiltration barriers, if any existed prior to installation of the rebated strips.

The three most influential factors can be reduced to one factor by simple multiplication. First, the door open time and the average temperature difference between the refrigerated and infiltrating airs (average is weighted by the door-open time) are combined by multiplication. The resulting variable, called $\boldsymbol{DegreeDays_{Open}}$ herein, is akin to the *DegreeDays* variable used for building cooling load calculations.

Equation E-6: $$DegreeDays_{Open} = \frac{1}{24}\sum_{i=1}^{8760}\left(T^i_{infiltrating} - T^i_{refrigerated}\right) \times f^i_{Door\ Open}$$

Where,

$T^i_{infiltrating}$ is the drybulb temperature of the infiltrating air during the i_{th} hour of the year,

$T^i_{refrigerated}$ is the drybulb temperature of the refrigerated air during the i_{th} hour of the year,

$f^i_{Door\ Open}$ is the fraction of the time that the door is open during the i_{th} hour of the year and,

and the factor of 24 converts from hours to days.

The third variable listed above, $\delta_{Efficacy}$, takes on values in the range $\mathbf{0 \le \delta_{Efficacy} \le 1}$, where the low end of the range corresponds to no difference in efficacy between the baseline and rebated

[1] Other factors that influence savings include the average duration of door-openings (independent of, and of secondary significance to the overall door-open-time), the moisture content of the refrigerated and infiltrating airs, the efficiencies of the refrigeration equipment, and to a lesser extent, the efficiencies of any systems that condition the area surrounding the walk-in door, the door height, the aerodynamic resistance of objects within the paths of the infiltrating and exfiltrating airs, and the effects of any fans that may blow air out the door. These are all considered in our formal site-by-site calculations. In this discussion, however, a simple functional form for the expected energy savings is distilled from the results of this work.

strip curtains, and the high end of the range corresponds to perfect strip curtains installed in a doorway where there were no strip curtain before.

The $\boldsymbol{DegreeDays_{Open}}$ and $\delta_{Efficacy}$ variables can be combined by multiplication to form a simple predictor for the first-year energy savings of the strip curtains, normalized per square foot. Figure E-1 demonstrates the dependence of the ex-post energy savings on this variable.

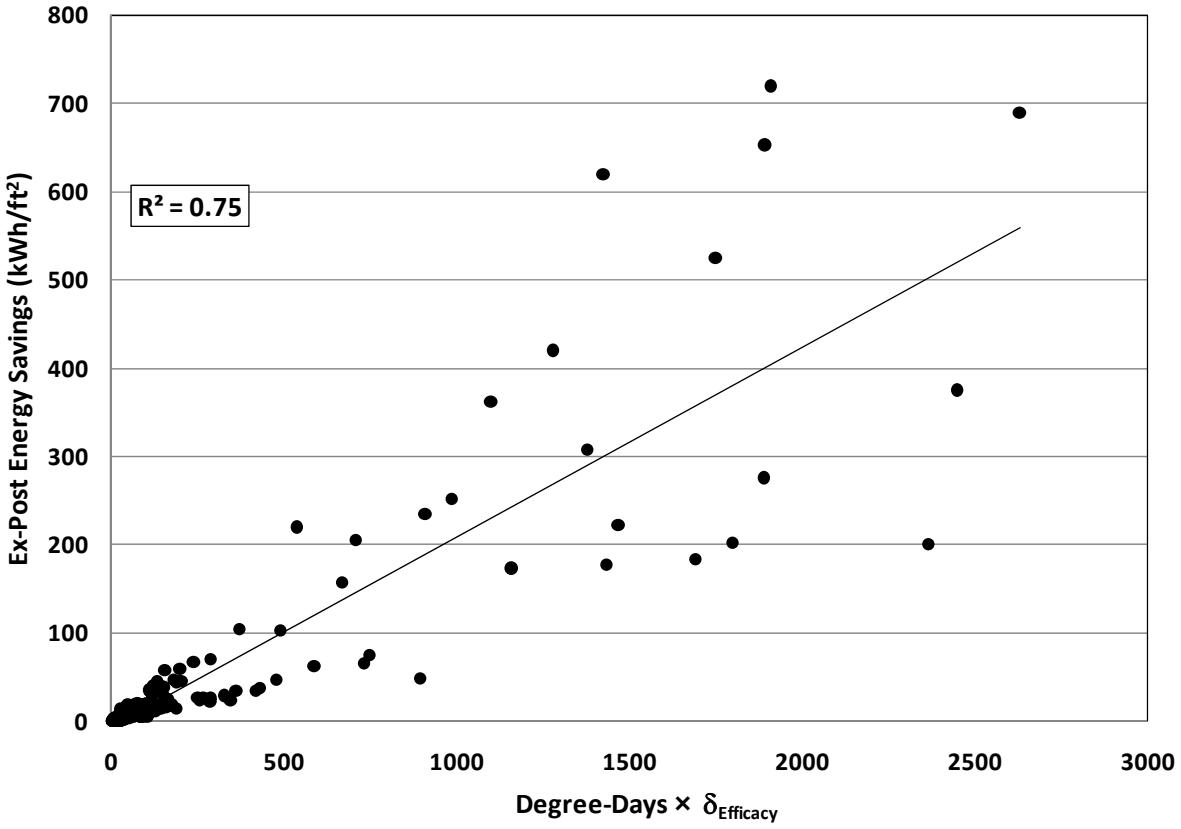


Figure E-1. Annual Energy Savings Attributable to Strip Curtains (kW/ft^2) versus Product of $\boldsymbol{DegreeDays_{Open}}$ and $\delta_{Efficacy}$.

One notable feature of Figure E-1 is that there seem to be two prominent slopes to the distribution. This is explained by that fact that our simplistic predictor for energy savings is really a predictor for the refrigeration load, rather than of energy savings. To first order, energy savings are the ratio of a walk-in's infiltration load to the COP of its refrigeration system. To this end, we modify our $\boldsymbol{DegreeDays_{Open}} \times \delta_{Efficacy}$ variable by multiplying another factor that represents the inverse of the refrigeration systems COPs. In this discussion we use 1.5 as the nominal COP for freezers, and 2.5 as the nominal COP for coolers. The resulting variable, $\boldsymbol{DegreeDays_{Open}} \times \delta_{Efficacy} \times \boldsymbol{COP^{-1}}$, is a superior predictor for energy savings, as shown in Figure E-2.

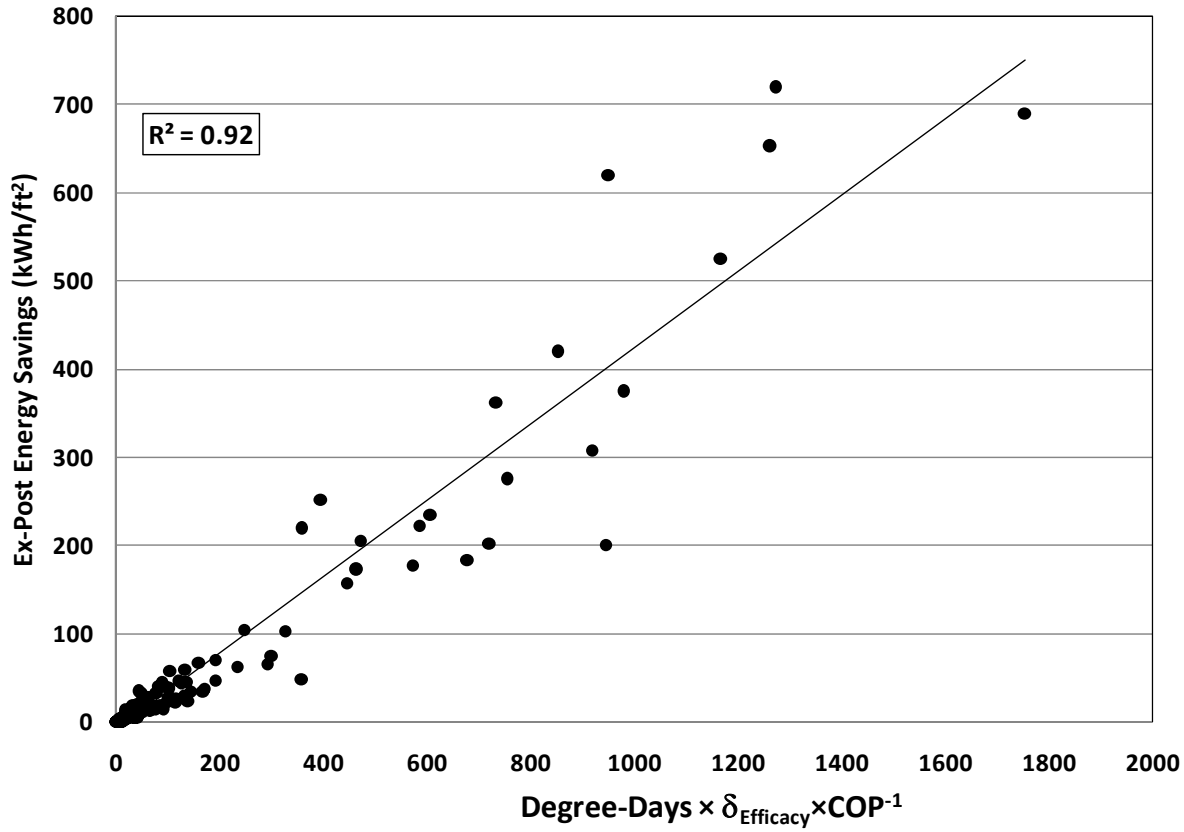


Figure E-2. Annual Energy Savings Attributable to Strip Curtains (kW/ft^2) versus Product of *DegreeDays*$_{Open}$ and $\delta_{Efficacy}$ divided by Nominal COP (Nominal COP = 1.5 for freezers and = 2.5 for coolers.

Figure E-2 demonstrates that relative differences in the energy savings achieved by the strip curtains on various applications are well-described by simple predictive parameters.

All other variables, such as climate zone, for example, are relatively insignificant predictors for the energy savings due to strip curtains. *It is important to note that the explanation for gross impact realization ratios that stray far from unity must come from a mismatch between ex-ante assumptions and ex-post determinations of the three predictive parameters listed above.* Values of these parameters that are specific to walk-in coolers, freezes, and refrigerated facilities are presented in the following discussion.

The monitored daily door open times, refrigerated and infiltrating air temperatures, and measured curtain efficacies are listed for each domain of study in the tables below. In these tables, the average temperature of the infiltrating air is not the average for the two-week monitoring period, but rather a calculated year-round average, weighted by the time that the door is open, as described in Section **Error! Reference source not found.**.

Table E-1. Daily Door Open Times, Refrigerated and Infiltrating Air Temperatures, and Measured Curtain Efficacies for Freezers in Supermarkets (n=9)

	Minutes Door Open per Day	$T_{Refrigerated}$	$T_{Infiltrating}$	$T_{Infiltrating} - T_{Refrigerated}$ When Door is Open	New Curtain Efficacy	Old Curtain Efficacy	Delta Efficacy
Average	102	5	67	58	0.88	0.00	0.88
Relative Precision	0.32	0.78	0.05	0.09	0.04	0.00	0.04
Standard Deviation	59	7	6	10	0.06	0.00	0.06

Table E-2. Daily Door Open Times, Refrigerated and Infiltrating Air Temperatures, and Measured Curtain Efficacies for Coolers in Supermarkets (n=14)

	Minutes Door Open per Day	$T_{Refrigerated}$	$T_{Infiltrating}$	$T_{Infiltrating} - T_{Refrigerated}$ When Door is Open	New Curtain Efficacy	Old Curtain Efficacy	Delta Efficacy
Average	132	37	71	34	0.88	0.00	0.88
Relative Precision	0.4	0.1	0.1	0.2	0.01	0.00	0.01
Standard Deviation	55	3	6	5	0.01	0.00	0.01

Table E-3. Daily Door Open Times, Refrigerated and Infiltrating Air Temperatures, and Measured Curtain Efficacies for Freezers in Restaurants (n=20)

	Minutes Door Open per Day	$T_{Refrigerated}$	$T_{Infiltrating}$	$T_{Infiltrating} - T_{Refrigerated}$ When Door is Open	New Curtain Efficacy	Old Curtain Efficacy	Delta Efficacy
Average	38	8	67	57	0.81	0.26	0.55
Relative Precision	0.47	0.66	0.06	0.09	0.04	0.34	0.17
Standard Deviation	49	14	12	14	0.09	0.24	0.26

*The relative precision for the freezer temperatures is seemingly poor because the values are clustered around 0 °F. The precision of interest is the one for the fourth column, $T_{Infiltrating} - T_{Refrigerated}$

Table E-4. Daily Door Open Times, Refrigerated and Infiltrating Air Temperatures, and Measured Curtain Efficacies for Coolers In Restaurants (n=22)

	Minutes Door Open per Day	$T_{Refrigerated}$	$T_{Infiltrating}$	$T_{Infiltrating} - T_{Refrigerated}$ When Door is Open	New Curtain Efficacy	Old Curtain Efficacy	Delta Efficacy
Average	45	39	70	33	0.80	0.33	0.46
Relative Precision	0.21	0.03	0.05	0.06	0.04	0.23	0.19
Standard Deviation	27	3	9	5	0.09	0.22	0.25

Table E-5. Daily Door Open Times, Refrigerated and Infiltrating Air Temperatures, and Measured Curtain Efficacies for Freezers In Small Grocers and Convenience Stores (n=17)

	Minutes Door Open per Day	$T_{Refrigerated}$	$T_{Infiltrating}$	$T_{Infiltrating} - T_{Refrigerated}$ When Door is Open	New Curtain Efficacy	Old Curtain Efficacy	Delta Efficacy
Average	9	5	64	57	0.83	0.30	0.52
Relative Precision	0.37	1.02	0.06	0.11	0.03	0.31	0.18
Standard Deviation	8	14	9	16	0.07	0.23	0.24

Table E-6. Daily Door Open Times, Refrigerated and Infiltrating Air Temperatures, and Measured Curtain Efficacies for Coolers In Small Grocers and Convenience Stores (n=54)

	Minutes Door Open per Day	$T_{Refrigerated}$	$T_{Infiltrating}$	$T_{Infiltrating} - T_{Refrigerated}$ When Door is Open	New Curtain Efficacy	Old Curtain Efficacy	Delta Efficacy
Average	38	39	68	31	0.79	0.34	0.46
Relative Precision	0.27	0.03	0.02	0.05	0.02	0.14	0.10
Standard Deviation	45	5	7	7	0.08	0.21	0.21

Table E-7. Daily Door Open Times, Refrigerated and Infiltrating Air Temperatures, and Measured Curtain Efficacies for Refrigerated Warehouse Facilities (n=14)

	Minutes Door Open per Day	$T_{Refrigerated}$	$T_{Infiltrating}$	$T_{Infiltrating} - T_{Refrigerated}$ When Door is Open	New Curtain Efficacy	Old Curtain Efficacy	Delta Efficacy
Average	494	28	59	32	0.89	0.54	0.35
Relative Precision	0.34	0.25	0.06	0.19	0.02	0.00	0.04
Standard Deviation	388	16	8	14	0.03	0.00	0.03

The average daily door open times for various market sectors are shown in Figure E-3**Error! Reference source not found.** In general, the door-open times are positively correlated with the areas of the typical buildings in which the walk-ins are installed and are also positively correlated with the doorway areas. These trends are expected as the door-open time is expected to scale with the amount of product that is moved in and out of the areas per day. In each sector, the coolers tend to have longer door-open times than freezers.

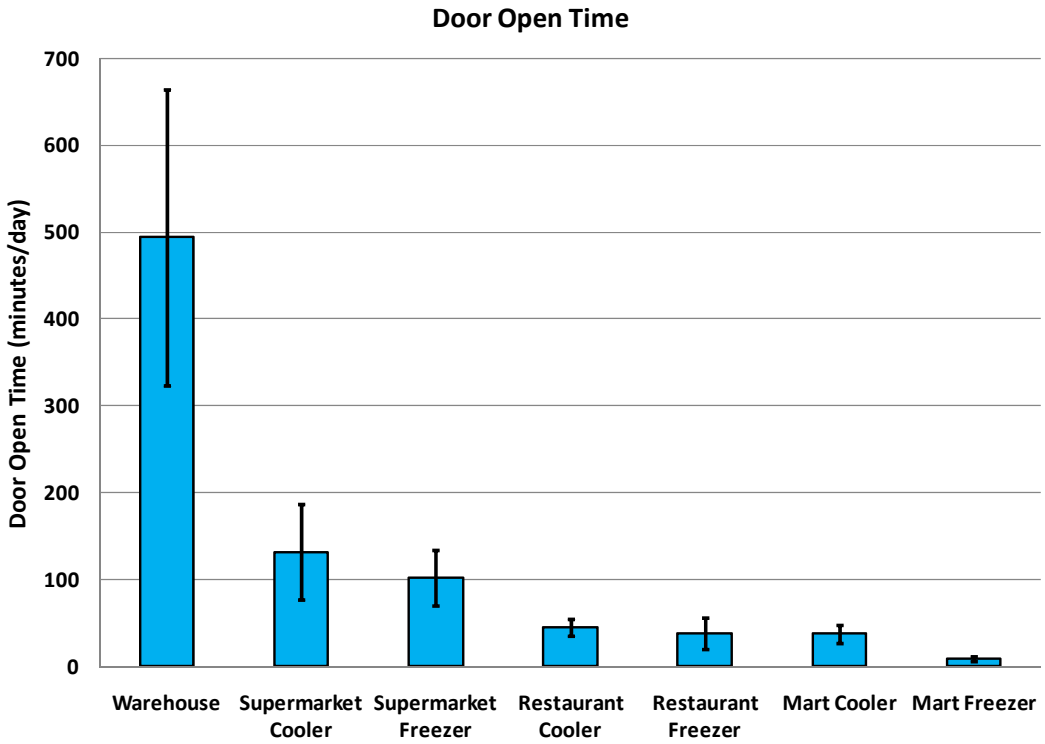


Figure E-3. Average Daily Door-Open Time (in minutes) for Various Market Sectors. (Error bars represent precision at 90% confidence interval)

The curtain efficacies for the baseline and post-measure curtains in various market sectors are shown in Figure E-5. The measured efficacies of the post-measure curtains are generally in the 0.8-0.9 range. As discussed above, the average baseline efficacies were determined from the post-measure sample. The averages shown in this section represent market-specific weighted averages of baseline efficacies for sites that did and did not have strip curtains prior to the ones rebated in the 2006-2008 program cycle.

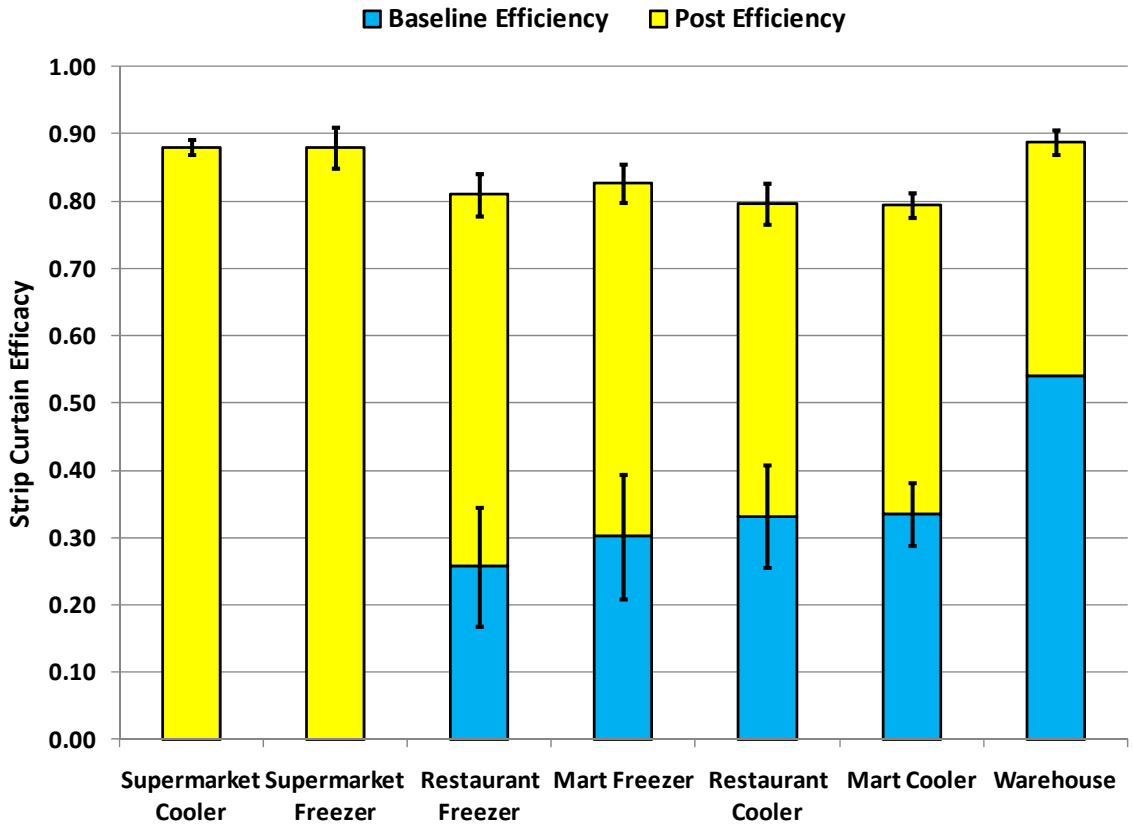


Figure E-4. Average Baseline Curtain Efficacy and Post-Install Curtain Efficacy for Various Market Sectors
(Error bars represent the precision at the 90% confidence interval.)

Figure E-5 shows the average temperature differential between the infiltrating and refrigerated airs, weighted by the amount of time that the walk-in doors are open per hour. The infiltrating air temperature for each hour of the year is determined by a regression that predicts the infiltrating air temperature based on the outdoor temperature and some parameters that describe the thermal properties of the space that surrounds the walk-in cooler or freezer (e.g. conditioned space, loading bay, outdoors).

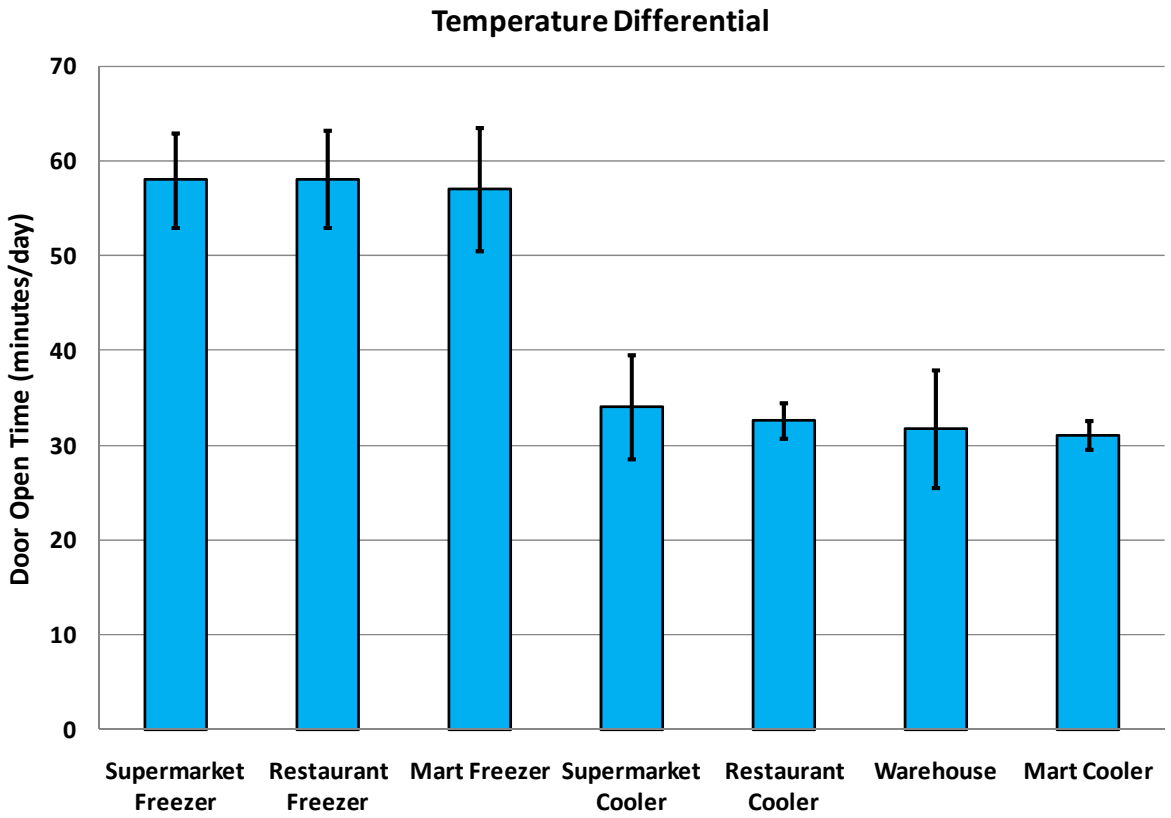


Figure E-5. Average Temperature Differential between Infiltrating and Refrigerated Airs for Various Market Sectors
(Error bars represent the precision at 90% confidence level.)

Comparison of Workpaper Assumptions to Field Findings

Table E-8 presents the ex-ante assumptions used by PG&E and SDG&E weighted to represent a 20%/80% mixture of freezers to coolers. This mixture, which is a key assumption in the PG&E/SDG&E work paper, is rather conservative. In this study, 41% of all walk-in units encountered in chain supermarkets were freezers.

Table E-9 presents the ex-ante assumptions used by SCE. The assumptions are more conservative.

Table E-8. Ex-Ante Assumptions Used by PG&E and SDGE Weighted to Represent 20/80 Mixture of Freezers to Coolers

	Minutes Open	Delta T	Delta Efficacy	COP	Empirical Constant for Infiltration Equation
Supermarket Cooler	300	44	0.80	2.1	0.531
Supermarket Freezer	300	44	0.80	2.1	0.531
Mart Cooler	300	44	0.80	2.1	0.531
Mart Freezer	300	44	0.80	2.1	0.531
Restaurant Cooler	300	44	0.80	2.1	0.531
Restaurant Freezer	300	44	0.80	2.1	0.531
Warehouse	300	44	0.80	2.1	0.531

Table E-9. Ex-Ante Assumptions Used by PG&E and SDGE Weighted to Represent 20/80 Mixture of Freezers to Coolers

	Minutes Open	Delta T	Delta Efficacy	COP*	Empirical Constant for Infiltration Equation
Supermarket Cooler	64	37	0.52	N/A	0.531
Supermarket Freezer	64	75	0.52	N/A	0.531
Mart Cooler	64	37	0.52	N/A	0.531
Mart Freezer	64	75	0.52	N/A	0.531
Restaurant Cooler	64	42	0.52	N/A	0.531
Restaurant Freezer	64	80	0.52	N/A	0.531

*The COPs in the SCE work paper are weather dependent and depend on part-load, etc., and are not readily available.

Error! Not a valid bookmark self-reference. lists the ex-post values in key parameters. The disparities between the values and Table E-10 and the corresponding values in Table E-8 and E-9 are, for the most part, accountable for any realization ratios that may differ from unity.

Table E-10. Measured Values for Parameters Used in Tables E-8 and E-9.

	Minutes Open	Delta T	Delta Efficacy	COP*	Empirical Constant for Infiltration Equation
Supermarket Cooler	132	34	0.88	2.5	0.37
Supermarket Freezer	102	58	0.88	1.5	0.42
Mart Cooler	38	31	0.46	2.5	0.35
Mart Freezer	9	57	0.52	1.5	0.42
Restaurant Cooler	45	33	0.46	2.5	0.38
Restaurant Freezer	38	58	0.55	1.5	0.44
Warehouse	494	32	0.35	1.5	0.43

* The COPs here are suggested nominal COPs. Our analysis uses weather dependent COPs for each climate zone.

APPENDIX F
UNCERTAINTY ANALYSIS

The energy savings due to strip curtains have the general form

$$Savings = \sum_{i=i}^{8760} Q_i \times (h_{inf}^i \rho_{inf}^i - h_{frig}^i \rho_{frig}^i) \times COP_i^{-1}$$

Where,

The variable *i* represents the *i*th hour of the year[1].

Q_i is the avoided infiltration during hour *i.* It is measured with a Telaire 7001 Nondispersive Infrared (NDIR) CO_2 sensor and HOBO thermocouple and temp/rh sensors inside and outside the walk-in units. Additionally, the volume of the walk-in is estimated by a combination of a gross volume measurement and a net-to-gross factor, called the *emptiness factor* that is deemed by analysts based on (a) technician's estimations of the amount of product in the walk-in, (b) pictures of the walk-in unit and (c) a comparison of the relative rise in CO_2 concentration following the release of a known amount of CO_2.

h^i_{inf} and ρ^i_{inf} are the enthalpy and density of the infiltrating air during hour *i*, respectively. They are monitored with a HOBO temp/rh loggers.

h^i_{frig} and ρ^i_{frig} are the enthalpy and density of the refrigerated air during hour *i*, respectively. They are monitored with a HOBO temp/rh loggers.

COP_i is the refrigerator's coefficient of performance during the *i*th hour. The COP is estimated based on (1) refrigeration system type (cooler or freezer) and (2) outdoor temperature.

The measurement uncertainty in the energy savings are obtained as follows:

1) For each measurable *x*, the partial derivative $\frac{\partial Savings}{\delta x}$ of the energy savings with respect to *x* is calculated.

[1] The *i* occurs in the subscript and superscript at times for convenience. Einstein summation is not implied between superscripts and subscripts of the same variable.

2) Each partial derivative $\frac{\partial Savings}{\partial x}$ is multiplied by the measurement uncertainty in *x*

3) The individual uncertainty terms are added in quadrature:

$$\sigma_{Savings} = \sqrt{\sum \left(\frac{\partial Savings}{\partial x} \sigma_x \right)}$$

In practice, the partial derivatives are calculated by varying the values of measured data in the spreadsheet calculations and noting the change in the final result.

MEASUREMENT AND CALCULATION UNCERTAINTIES FOR STRIP CURTAINS

The contributions of the measurements and assessments to the overall uncertainty in the measurement of the infiltration rate (and, identically, the empirical discharge coefficient) are listed in Table F-1. The contributions of the measurements and assessments to the overall uncertainty in the measurement of the curtain efficacy are listed in Table F-2. Note that the uncertainty in the efficacy of the strip curtain is negligible because the efficacy is calculated as a difference and many of the measurement uncertainties cancel, as evident in the small partial derivatives listed in Table F-2. The main uncertainty in curtain efficacy, however, is in the efficacy of the baseline strip curtains. This uncertainty has two contributions. Firstly, the actual efficacy of damaged curtains is estimated from our post-only sample to be 0.54. Although the curtain efficacy measurement is quite accurate, we ran into a relatively small number of genuine "baseline" curtains. As such, the standard error on the number is 0.065, and this is used as the uncertainty in the estimation of the efficacy of baseline curtains. There is a separate statistical uncertainty regarding the fraction of doorways that had old strip curtains in place prior to the installations of the rebated ones. This is captured in the statistical uncertainty calculations.

Table F-1. Contribution of Measurement Uncertainties to Determination of Discharge Coefficient C_D.

Measurement	Absolute Uncertainty: (σ_x)	Normalized Partial Derivative: $\frac{\partial C_D}{\partial x} / C_D$	Relative Uncertainty: $(\sigma_x \times \frac{\partial C_D}{\partial x}) / C_D$
Emptiness Factor	0.1	1.25	12.5%
Outside CO2	100 ppm	0.0006	5.7%
Walk-In Temp	2.7 °F	7.2E-03	2.0%
Outside Temp	0.7°F	5.9E-03	0.4%
Final Measurement Uncertainty in Discharge Coefficient			**13.9%**

Table F-2. Contribution of Measurement Uncertainties to Determination of Curtain Efficacy

Measurement	Absolute Uncertainty: (σ_x)	Partial Derivative: $\frac{\partial Efficacy}{\partial x}$	Relative Uncertainty: $\frac{(\sigma_x \times \frac{\partial Efficacy}{\partial x})}{Efficacy}$
Emptiness Factor	0.1	0	0.0%
Outside CO2	100 ppm	1E-05	0.1%
Walk-In Temp	2.7 °F	0	0.0%
Outside Temp	0.7°F	0	0.0%
Final Measurement Uncertainty in Curtain Efficacy			**0.1%**

Uncertainty in the Calculations Based on Monitoring Data

The monitoring data are gathered with Hobo U10 Temp/RH loggers and Hobo H6 state loggers. The main contribution to the uncertainties in the hourly calculations, however, are not due to the accuracies of the loggers, but are rather due to the extrapolation of data from a three-week monitoring period to a 52-week year. We have listed the contributions of the various calculation and extrapolation uncertainties to the overall site-specific energy savings uncertainty in Table F-3. The overall site-specific savings have an uncertainty of 29.1%. The 29.1% relative error is significant only on a site-specific level. When all sites for a given domain of study are grouped together (e.g., all 20 freezers in restaurants), this measurement uncertainty is divided by the square root of the sample size. The relative contribution of measurement and calculation uncertainty to the overall precision is small.

Table F-3. Contributions of Various Calculation and Extrapolation Uncertainties to Overall Site-Specific Energy Savings

Measured/Assessed Quantity	Absolute Uncertainty: (σ_x)	Normalized Derivative: $\frac{\partial kWh}{\partial x}/kWh$	Relative Uncertainty: $\frac{(\sigma_x \times \frac{\partial kWh}{\partial x})}{kWh}$
Delta Curtain Efficacy	0.065	1.000	6.5%
Discharge Coefficient	13.9% of measured C_D	1.000	5.0%
Refrigerated Air Temp	2 °F	0.031	6.1%
Infiltrating Air Temp	8 °F	0.028	22.2%
Refrigerated Air RH	15 % RH	0.000	0.7%
Infiltrating Air RH	20% RH	0.007	13.3%
Refrigeration COP	0.15 for freezers, 0.25 for coolers	0.5	7.5%
Final Measurement Uncertainty in Site-Specific Energy Savings			**29.1%**

Door State and Refrigerated Air Data

A 168-row lookup table is created that contains the average temperature of the refrigerated space, and the average door-open time for each hour of the week. The 8760 rows in the calculation are populated from this lookup table. The relative humidity of the refrigerated air is extrapolated in a two-stage process. First, the relative humidity is calculated with the assumption that the air in the walk-in has the same moisture content as the infiltrating air. This initial calculation is then capped with at a maximum RH that corresponds to the high end of the RH range (but not the absolute maximum) recorded in the walk-in during the monitoring period. The walk-in units are well-controlled environments with stringent temperature requirements. This is especially true for freezers that store perishables. As such, we take the uncertainty of the refrigerated air temperature to be 2 °F, and the uncertainty in the walk-in relative humidity to be 15 % RH.

Infiltrating Air Data

The infiltrating air conditions depend on the space that the walk-in door opens to. If the walk-in opens to outdoors, then the infiltrating air temperature and relative humidity are taken from the same CEC climate-zone specific weather data set that is used to generate weather-dependent results in the DEER database. Typically, walk-in units in restaurants open to conditioned space, walk-in units in convenience stores and grocery stores may open to conditioned space or to a 'loading bay' area. The loading bay temperatures depend on both indoor and outdoor temperatures and generally resemble the outdoor temperatures with attenuated and delayed diurnal swings. We develop site-specific models for the infiltrating temperature and relative humidity. This is done by fitting the observed loading bay (or sales floor) temperature as a function of outdoor temperature, averaged over a variable number of hours $N_{Average}$, delayed by a variable number of hours N_{Delay}, and averaged with another number $T_{Average}$. The parameters $N_{Average,}$ N_{Delay}, and $T_{Average}$ are varied over reasonable ranges until and their site-specific values are determined by χ^2 minimization. Once the fit function is created, an 8760-row long lookup table is created that describes the temperature of the infiltrating air. If the building is conditioned, the temperatures are capped at the high and low ends by adjustable heating and cooling set points. If the space immediately surrounding the walk-in is conditioned, the energy associated with heating the exfiltrated refrigerated air, or the energy saved by the 'free cooling' provided by the exfiltrated refrigerated air are calculated for all hours when the temperature is within two degrees Fahrenheit of the heating or cooling set point. We estimate the uncertainty in the 8760 hour temperature map that results from this process to be 8 °F.

The relative humidity of the infiltrating air is simply taken as an average of the monitored data. Attempts at fitting the relative humidity with a procedure similar to that explained for the infiltrating air, or with assumptions relating the moisture content in the loading bay to the moisture content to outside air proved unfruitful. Our uncertainty analyses showed that a 20% uncertainty in the RH of the infiltrating air will have a small impact on the overall relative precision of the energy savings for a given site.

Other Assessments

The COP is estimated based on (1) refrigeration system type (cooler or freezer) and (2) outdoor temperature. The COP for coolers is given by[2]

$$COP=2.5(1.7603 – 0.0377T +0.0004T^2)$$

where T is the outdoor temperature in °C.

The COP for freezers is given by $COP=1.5(1.7603 – 0.0377T +0.0004T^2)$

We estimate a 10% uncertainty in the COP.

MEASUREMENT AND CALCULATION UNCERTAINTIES FOR DOOR GASKETS

The uncertainty for the door gasket study is dominated entirely by uncertainty in the assessment of the baseline gasket efficacy. The baseline gasket efficacy is the product of the average infiltration (normalized to the square root of the temperature differential) of the case with the gaskets removed and the fraction of the "baseline" gaskets that are missing or ineffective. We recorded the conditions of 5311 feet of gaskets prior to replacement. We observed 12.5 feet of missing gaskets. The implementers replaced 850 feet of gaskets. Therefore, 12.5/850, or 1.46% of the replaced gaskets were completely ineffective. The uncertainty in this ratio is given by:

$$\sigma_{x/y} = \sqrt{((\frac{1}{y}\sigma_x)^2 + ((\frac{-x}{y^2})\sigma_y)^2)}$$

Where x and y correspond to the gasket lengths that were ineffective and to the total feet of new gaskets installed, respectively and σ is the uncertainty in the quantity indicated by its subscript.

Combining Statistical and Measurement/Calculation Uncertainties

The relative precision at the 90% confidence interval is given by the following formula:

$$RP = 1.645 \times SD/(\overline{kWh_{Saved}} \times \sqrt{n})$$

Where,

[2] E.T. Hale, et al. *Technical Support Document: Development of the Advanced Energy Design Guide for Grocery Stores – 50% Energy Savings*, Technical Report NREL/TO-550-42829 (September 2009) p.40. We use a COP of 2.5 instead of 2.8 for the coolers.

RP is the relative precision in the ex-post energy savings at the 90% confidence interval,

SD is the standard deviation in the ex-post energy savings,

kWh_{Saved} is the average energy savings per square foot of strip curtain for a given sample, and

n is the sample size

The statistical and measurement/computational uncertainties are added in quadrature:

$$RP_{Final} - \sqrt{RP^2_{Statistical} + RP^2_{Instrumentation/Computation}}$$

For strip curtains, the statistical term dominates the uncertainty, and the opposite is true for door gaskets.

APPENDIX G

COMPARISON OF GASKET EFFICACIES AMONG TREATMENT AND CONTROL GROUPS

Figure G-1 shows the measured gasket leakages, normalized to CFM per foot of gasket per square root of degree difference between the refrigerated and infiltrating air temperatures. Note that there are three sites that show "negative" leakage. This is an indication that we are at the sensitivity limit of our testing methodology. The efficacy of the post-retrofit gaskets is approximately 100%. We were unable to correlate the efficacy of the gaskets with other observable quantities such as tears or nicks in the gaskets, or the age of the gaskets.

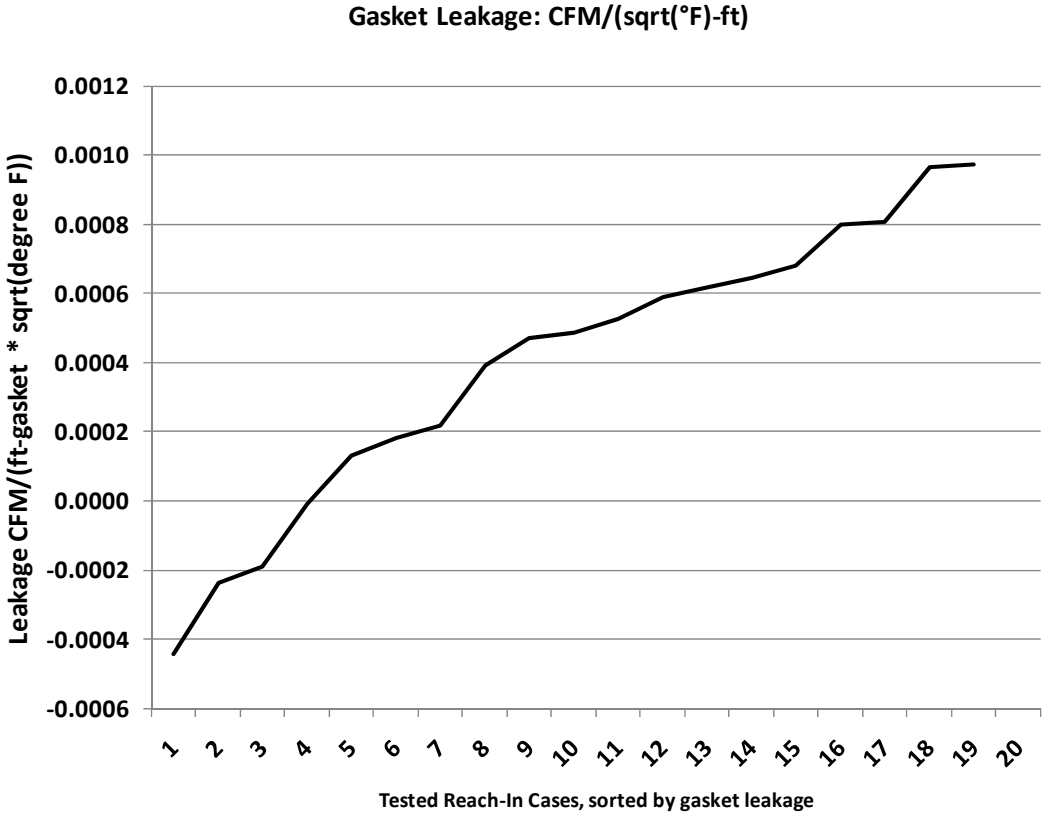


Figure G-1. Measured Leakages, Normalized to CFM per Foot of Gasket per Square Root of Degree Difference between Refrigerated and Infiltrating Air Temperatures

APPENDIX H
SAMPLE SIZES FOR DOOR GASKET FIELD MEASUREMENTS

Table H-1 lists the sample sizes for the various domains of study in the door gasket HIM evaluation.

Table H-1. Sample Sizes for Door Gasket Field Measurements by Business Type and Type of Refrigeration Unit (Samples sizes in cells are divided equally between Coastal and Inland Regions)

Type of Business	Type of Refrigeration Unit	
	Freezers	Coolers
First Approach (With and Without Monitoring)		
Supermarkets	20	20
Convenience Stores	n/a	20
Restaurants	n/a	
Refrigerated Warehouses	n/a	n/a
Second Approach (Comparison Groups)		
Supermarkets	10	10
Convenience Stores		10
Restaurants		
Refrigerated Warehouses		

APPENDIX I
POTENTIAL REASONS FOR DISPARITY BETWEEN EX-POST AND EX-ANTE ENERGY SAVINGS ESTIMATIONS FOR DOOR GASKETS

Sample Size

The SCE ex-ante methodology is commendable, though it is unfortunate that the lab tests were conducted on a single sample. The leakage through the gap between the door and the case depends on the specific case. Our field measurements reveal that the leakage through the gaps between the cases and doors can vary up to 400% between two cases (see Figure I-1). Lab tests should include several cases to capture the diversity in case-specific leakages.

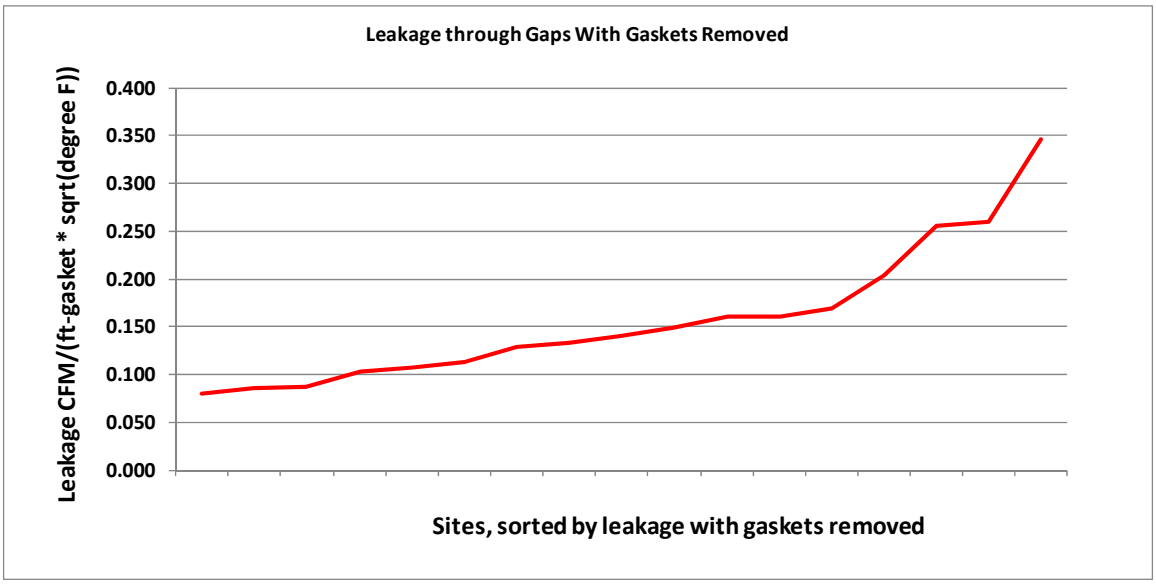


Figure I-1. Leakage through Gaps between Doors and Cases

Factors That May Affect Infiltration Rates

Gap Location

Theoretically, if the sole gap in the gaskets is along the top or bottom of the door, and therefore at just one height, such as in the SCE lab test, there should be no leakage due to the stack effect unless there is make-up air from a gap at a different height. For a large, contiguous gap, such s the one-foot gap used to simulate poor gaskets in the SCE lab test, the location of the gap in the gasket, especially in relation to the position of the evaporator fans, may have more influence on the infiltration than the stack effect.

Product Location

Time permitting, the field staff measured the infiltration rate to the reach-in unit with one or two doors fully open. Examination of the data collected through these field tests suggests that the infiltration rate with the door open is significantly lower in reach-in display cases than in walk-in units, even after normalizing for door height and area. One possible explanation is that the product that is stored in the cases provides additional resistance to the infiltrating/exfiltrating air streams. It is not known if this phenomenon suppresses the infiltration rates that are measured during the "gaskets removed" test. Because of the difficulty in accessing supermarkets for testing, the field technicians were instructed not to remove product from the cases. Laboratory testing might be used to assess whether the amount of product has an appreciable role in impeding the infiltration in the absence of door gaskets.

Refrigerant Side Load Measurement vs. Electric Power Measurement

The SCE work paper[1] states that the refrigeration load increased by approximately 20% when the new gaskets were replaced with "baseline" gaskets. However, the overall increase in energy usage was just 5%. If one uses the energy usage data with the new and "baseline" curtains from Table 2 in the SCE work paper and extrapolates to a full year, the resulting energy savings are about half of the SCE ex-ante estimated savings, which result from a much more complex calculation.

Correction to "Free Cooling" to Sales Floor

In many climate zones, particularly in SCE territory, the supermarkets use HVAC to cool the sales floor during the summer. Leakage of the refrigerated air from the display cases into conditioned space amounts to "free cooling". We account for this interactive effect in our analysis. This is a small correction, however, and tends to decrease the energy savings by approximately 5%. On the other hand, there are gas energy savings due to the same effect associated with door gaskets (and strip curtains). The IOUs are not claiming any gas savings for strip curtains or door gaskets.

Temperatures and Humidity in Sales Floor and In Display Cases

Our field findings suggest that the temperature differential between the sales floor and the refrigerated display cases are slightly lower than the values used in the IOU work papers.

[1] SCE work paper WPSCNRRN0013, Table 2.

APPENDIX J
NET-TO-GROSS RATIO FOR DOOR GASKETS

Third party and mass market programs offered free replacement of door gaskets for refrigerator and freezer cases. Auditors recommended replacement of door gaskets and in some instances, for example PECI, a program contractor vendor recommended and installed door gaskets for utility customers with whom they had contact.

The estimates are based on net-to gross surveys conducted in September, October and November. The survey was a modified version of the standard net-to-gross battery especially designed for the door gaskets and strip curtain. The modifications were required because:

- Program participants may have had maintenance contracts for door gasket replacements. In other words, they had already adopted the measure.
- Participants may have had an internal program for maintaining door gaskets.
- Door gaskets were provided at no charge. While this is a major program incentive, the customer is not paying for the measure and therefore payback, which is the total cost of the measure to the customer divided by annual cost savings is zero and therefore not meaningful. There is no financial decision to be made.

Logic of the Net-to-Gross

The logic for the net-to gross for the replacement of door gaskets is as follows.

If the respondent had a maintenance contract and the maintenance contract was less than the assumed measure life (four years) of a door gasket, the respondent was identified as a free rider, in other words, the net-to-gross ratio for these respondents is zero. The respondent was administered a shortened list of questions. Any respondents reporting contract maintenance but with a periodicity greater than the measure life were identified as a non free-riding participant and administered the full battery.

If the respondent reported that they regularly maintained door gaskets on there own without a maintenance contract, and the periodicity of the maintenance was less than the assumed measure life (four years), the respondent was assumed to be the a free rider with a net-to-gross ratio of zero and administered a shortened list of questions. Any respondents who maintained door gaskets with a periodicity greater than the measure life were identified as non-free-riding participants and were administered the net-to-gross battery.

The remaining participants either did not report maintaining gaskets, did not have maintenance contracts, had maintenance contracts but were not replacing gaskets within the expected lifetime of the gaskets, or reported doing maintenance but reported that they were doing the maintenance at intervals greater than the life of the gaskets. The full door gasket net-to-gross battery was administered to this group of participants.

The distribution of the respondents over these categories was as follows:

Table J-1 Percent of respondents by whether they maintained door gaskets

Category of respondent	Frequency	Percent
Maintenance contract	12	17
No maintenance contract but claimed to maintain with the life of the gasket	33	46
Did not maintain gaskets	26	37
Total	71	100

Sampling

Convenience stores and supermarkets were stratified into three groups each according to the savings. Stores and supermarkets with large savings were sampled with certainty. Stores and supermarkets with medium and small savings were randomly sampled in accordance with the variance in the estimates of the savings.

Reasons for Program Participation

Data for door gaskets was available for 71 respondents. Forty-five of the respondents provided one or more verbatim reasons for participating in the program.

These respondents offered one or more of three reasons for participating in the program. The need to replace gaskets was the dominant reason followed by their installation and replacement being free of charge. The future energy savings were mentioned somewhat frequently mentioned. Reducing future energy costs was five percent with various other reasons accounting for the rest.

Table J-2. Reason for participating in the program

Reason for participating	Frequency*	Percent
Existing gaskets were old and in need of replacement	27	33
Gaskets were free of charge	13	16
Energy savings from replacing the gaskets	8	10
Reduce energy costs	4	5
Because of the program	3	4
Maintain the temperature	1	1
Replace sooner than would have	1	1
No answer / did not apply	26	31
Total	83	101

*Some respondents offered more than one reason. Number of respondents equals 71.

Maintenance Contracts

Of the 71 respondents, 17 percent (or 12 respondents) had a maintenance contract. Forty-eight or 68 percent of respondents reported no maintenance contract and the remainder either said that they didn't know (10 percent) or refused to answer (six percent).

For seven of the 12 (58 percent) with a contract, the scope of the contract covered all cases that had door gaskets. Five of 12 indicated that not all cases were covered.

In four of the seven instances where all cases were included within the scope of the contract, the maintenance contract included replacing the door gaskets. In two of the four instances where only some of the cases were covered by the maintenance contracts, replacement gaskets were included in the contract. In five additional instances the cost of replacement gaskets was not covered. The remaining respondent didn't reply.

Of the five who said replacement gaskets were an additional charge above the contract, one said that there were times when replacements were postponed, two said that they did not delay replacements, and the remaining individual did not respond. The respondent who indicated that even with the maintenance contract, replacements were sometimes postponed indicated that the postponement was due to the gaskets costing too much. The individual, who did not answer whether replacements were postponed, indicated in the follow-up question that gaskets “cost too much in a slow economy.”

For six of the 12 with maintenance contracts, six (55 percent) said that the contractor inspected and replaced as needed. Three (27 percent) said that the contractor either replaced as needed or they called the contractor when gaskets were needed, and the remaining two (18 percent) said that they called the contractor as needed. There was no response from one of the respondents.

Of the 11 respondents with maintenance contracts who answered the question, 46 percent said that the gaskets were maintained at least annually, 18 percent said that they were maintained at least every two years, and 36 percent said that they were maintained on average between two and three years. Assuming the life of gaskets is four years or less (DEER assumption), it appears that firms with maintenance contracts maintain the gaskets well within their lifetimes.

We conclude that these firms have a maintenance contract and that on the basis of the way in which they maintain gaskets, they represent free riders.

Firms without Maintenance Contracts

Of the fifty-nine respondents who said that they did not have a contract, 19 percent said that they “often” maintained door gaskets, 53 percent said that gaskets were maintained sporadically, and 19 percent said that they did not maintain them. An additional 10 percent did not provide data

Table J-3. Frequency of Maintaining Door Gaskets

Frequency of Maintenance	Count	Percent
Often	31	53
Sporadically	11	19
No	11	19
Don't know	3	5
Refused/Not Applicable	3	5
Total	59	100

The 43 respondents, who said that prior to participating that they did at least some maintenance either often or sporadically, were asked how they determined the need for maintenance. Respondents were offered a series of options from which they could choose multiple responses. Gaskets were replaced most often when the doors needed repair, when it was clear that the gaskets were failing, and when the refrigerator technicians suggested that they be repaired. About 10 percent of firms said that they were checked periodically or that there was regularly scheduled maintenance.

Table J-4. Basis for Maintaining Door Gaskets*

Basis for maintenance	Frequency	Percent of the total answers
Door gaskets were checked and replaced periodically	9	11
Done as part of regularly scheduled maintenance	6	8
Observed need no specific reason	9	11
Observed need - Refrigerator techs suggested	17	20
Observed need – When doors needed repair	24	28
Observed need – When it was clear gaskets were failing	20	24
Total		100

* Respondents could elect more than one response

Of the 43 firms who claimed to have done some maintenance 19 percent said that they maintained the gaskets at least every two years. Forty-four percent claimed that they were done every 2 to three years. Thirty-five firms (79 percent of those who didn't have maintenance contract claimed to be doing maintenance within the lifetime of the gaskets (4 years).

Table J-5. Elapsed Years to Maintaining Gaskets

Years	Frequency	Percent
At least once a year	3	7
Less than 2 years	5	12
2 to 3 years	19	44
3 to 4 years	7	16
4 to 5 years	2	5
More than 5 years	4	9
Don't know	3	7
Total	43	101

Firms Who Didn't Have Maintenance Contracts and/or Did Maintenance Less Often Than Every Four Years

The final group is firms that indicated that they did not do maintenance or said that they maintained gaskets at intervals greater than four years. This group is comprised of 26 firms. The following table shows what they said about why they did not undertake maintenance. Primarily these firms either perceived maintenance to be too costly or didn't perceive the need for maintenance. Only one firm said that gaskets were not replaced because some but not all of the cases were new.

Table J-6. Reasons for not doing maintenance

Reason	Count	Percent
Too costly	8	31
Did not perceive the need	7	27
Deferred maintenance	3	12
Did not replace	3	12
Other responses	4	15
No reply	1	4
Total	26	101

The Program Influence Battery

The 26 respondents were administered an influence battery and asked what influenced their participation. The 21 factors in the door gasket 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 (free installation in case of the door gaskets) 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 J-7.. 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.

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 J-7.. 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.

The highest average importance score across the ten-point scale was the incentive at 9.2. This is consistent with the finding that respondents did not maintain door gaskets because of the cost. This was followed by reduced future electric bills (8.31), the recommendation of the auditor (8.28), and the recommendation of the vendors and the installers (8.08).

The most frequently cited factors were the age and condition of the door gaskets (65 percent), the reduced energy costs in the future (62 percent), and the program incentive (58 percent). Being green was the fourth most frequently cited factor and the fifth highest in terms of the average scores.

Table J-7. Factors That May Have Influenced Participation in Program

Program Factor	Factor	Count	Percent	Average Score on 10 Point Scale
*	The fact that door gaskets were replaced by the program without cost	15	58	9.2
	The reduced energy cost on future electric bills	16	62	8.31
*	The recommendation from the auditor	7	31	8.28
*	Recommendation from an installer or vendor who installed the door gaskets	12	46	8.08
	Help the environment and/or be green	13	50	8.08
	The age or condition of the door gaskets	17	65	7.82
*	A recommendation from a representative of the utility	10	39	7.7
	Information obtained from the utility in the past	6	23	7.5
	Prior experience with the program or other utility efficiency program	6	23	7.5
	Previous recommendation from an auditor or engineer	5	19	7.4
	Prior experience with replacing door gaskets	5	19	7.4
	Avoid hassles with the health inspectors	6	23	7.33

Program Factor	Factor	Count	Percent	Average Score on 10 Point Scale
	A recommendation from other businesses like mine	3	12	7.33
	Previous recommendation from some other vendor	5	19	7.2
	Other (describe)	1	4	7.00
	Attendance at a utility training course	1	4	7.0
	Cleaning and maintaining seals contributes to a positive image	8	31	6.87
	Your company has a standard to install and maintain door gaskets	5	19	6.4
	Other firms in the industry are maintaining door gaskets	5	19	6
	Information at a trade show	4	15	5.25
	Information from a trade publication	1	4	1

The four program factors (influences) are found in the seven factors with the highest average influence scores. Three of the program factor influences are among the top four most mentioned factors. For program participants who did not have contracts to maintain door gaskets and who reported minimal or no maintenance of door gaskets, the program factors were among the most important influences by frequency of mention and by average assigned score. Non-program factors such as the cost on future electric bills and the environment were also important factor but a bit more secondary.

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 J-9. shows the distribution of the scores for the program and non-program factors. Average program scores (8.6) were higher than average non-program scores (7.5).

Respondents' Summary of Program and Non-program Influences

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 J-8. Which Type of Factor Is More Important

Which factor is more important	Count	Percent
Program factors more important	21	81
Non-program factors more important	3	12
Can't distinguish	2	8
Totals	26	101

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 6.02 points to the program and 3.98 points to the non-program factors. The

Table J-9. Distribution of Average Scores for Program and Non-Program Factors

	Program Factors	Program (Percent)	Non-program factors	Non-program (Percent)	Summary Program Rating	Summary Factor Program Rating (Percent)
2 to 2.99					3	12
3 to 3.99					2	8
4 to 4.99					2	8
5 to 5.99			1	4	2	8
6 to 6.99			4	15	6	23
7 to 7.99	3	12	7	27	3	12
8 to 8.99	8	31	3	12	3	12
Greater than 9	7	27	3	12	5	19
Don't know/no answer	8	31	8	31		
Total	26	101	26	101	26	102

Finally, the respondents were asked how likely they were to have replaced door gaskets in the absence of the program. On a 10-point scale the respondents judged that their likelihood would have been 6.17 on a 10-point scale. In other words, on average they would have been more likely than not to have replaced the gaskets. One might have expected this to be less than five on a 10 scale given the ratings above.

Calculating Overall Net-to-Gross Ratio for Door Gaskets

Participants with a maintenance contract that replaced door gaskets within a four-year period, the assumed life of door gaskets, were assigned a net-to-gross ratio of zero. The data suggest that half of these customers maintain gaskets at least annually and sixty-four percent replace

them within two years. There is a near certainty that door gaskets within these establishments would have been replaced without the program.

Participants that did not have maintenance contracts but maintained gaskets on a schedule that was more frequent than the lifetime of the gasket were also assigned a net-to-gross ratio of zero. Sixty-three percent of these participants claimed to maintain gaskets on a cycle that was less than three years. There is a high probability that door gaskets within these establishments would have been replaced without the program.

One might argue that the program might have accelerated the replacement of door gaskets for these respondents. On the other hand, it is likely that linear feet of compromised door gaskets for these firms is not large and that the losses from compromised gaskets sufficiently low replacement might not have been cost effective.

The third group is respondents whose firms did not have maintenance contracts and did not regularly maintain gaskets. A very high percentage of these firms thought replacement too costly, was not needed, or tended to defer maintenance. It is clear that these establishments could substantially benefit from this program. Ultimately, the question for this group is would they have replaced door gaskets without the program.

The net-to-gross ratio was calculated for this group based on three scores:

- Factor specific program influence score
- Summary program influence score
- Likelihood that door gaskets would not have been replaced without the program.

The factor specific program influence score was derived from the program and non-program factors. An average factor specific program influence score and a factor specific non-program influence score was calculated for each respondent. The average factor specific influence score was then divided by the sum of the average of the program and non-program specific factor influence scores. This resulted in a program influence ratio ranging between 0 and 1. If program specific factors had higher average ratings than the non-program specific factors then the factor specific program influence score is above 0.5. Alternatively, if the program factors had a lower average rating in comparison to the non-program ratings, then the program influence would be less than 0.5. If there were program specific factors but no specific non-program factors, then the program specific factor influence score would be 1. Likewise if there were only non-program specific factors, then the program influence score would be zero.

As noted above, respondents were also asked provide a summary program influence score by distributing 10 points to what they understood to be “program factors” and “non-program factors.” The summary program influence score was calculated by dividing the number of points that respondent gave to “program factors” by 10. This results in a score between 0 and 1.

The likelihood that the action was program induced was calculated as well. The likelihood score was based on the question about the likelihood that the respondent would have installed door gaskets in the absence of the program. The likelihood that the respondent would have taken action without the program was calculated as 10 minus the likelihood of taking the action in the absence of the program divided by 10.

The factor specific program influence score and the summary program influence score were combined to form a composite program summary score. The composite program influence score is the average of the two program influence scores.

The net-to-gross ratio was formed by averaging the composite program summary influence score and likelihood score. In a situation where one or the other score is missing, only the one score is used.

Table J-10. Percent of Respondents by Whether They Maintained Door Gaskets

Category of respondent	Count	Percent	Group net-to-gross	Weighted net-to-gross
Maintenance contract	12	17	0	0
No maintenance contract but who claimed to maintain within the lifetime of the gasket	33	47	0	0
Did not maintain gaskets	26	37	0.50	0.19
Total/weighted total	71	101	-	0.19

APPENDIX K
NET-TO-GROSS RATIO FOR STRIP CURTAINS

Third party and mass market programs offered the installation and replacement of strip curtains for refrigerator and freezer boxes. The strip curtains were installed for free or for a nominal amount. Auditors recommended replacement strip curtains and in some instances, for example PECI, a program contractor vendor recommended and installed strip curtains for utility customers with whom they had contact.

The survey was a modified version of the standard net-to-gross battery especially designed for strip curtains. The modifications were required because:

- Program participants may have had maintenance contracts for strip curtains and may have already been regularly maintaining strip curtains. In other words, they had already adopted the measure.
- Participants may have had an internal program for maintaining strip curtains.
- Strip curtains were provided to some without charge. While this is a major program incentive, the customer is not paying for the measure and therefore payback, which is the total cost of the measure to the customer divided by annual cost savings is zero and therefore not meaningful. There is no financial decision to be made.

Surveys were completed with 101 customers with strip curtains

Why Respondents Participated

Respondents were asked why they participated. Respondents could supply more than one response. A total of 98 responses were received from 72 participants. An additional 29 respondents did not provide a response. The response were a mix of non program related and program related responses. In terms of non-program related reasons, roughly a fifth of the unaided responses indicated that existing curtains were being replaced. When asked a more direct question even more said that they already had existing curtains (see below). Fourteen percent participated because of the anticipated future energy savings and presumably reduced energy costs. About one in sixteen said that they participated in order to maintain temperatures in the boxes. In terms of program response, 17 percent participated because the curtains were free. A few indicated that the nature of the program, particularly the direct contact and the convenience were factors in their decision. Thirteen percent of the respondents (13 individuals) reported that they had previously participated in a utility program that had installed strip curtains.

Table K-1. Reasons for Participating in Program

Reason	Frequency	Percent of Responses*
Replacement	24	19
Free	21	17
Savings	18	14
Maintain Temperatures	7	6
New Installation	6	5
Unclear response	6	5
Program	4	3
Reduce energy costs	3	2
Convenience	3	2
Visibility	2	2
Don't know	1	1
Purchased outright	1	1
Prior decision	1	1
Additions	1	1
Contact	1	1
No response	28	22
	127	100

*Respondents could offer more than one response. N = 101

Experience with and Awareness of Strip Curtains

Respondents were specifically asked if they had or previously had had strip curtains in their facility. Approximately, 41 percent of the respondents said that they had strip curtains in their facility at the time of the recommendation. Another 14 percent said that they had previously had strip curtains but had none at the time of the recommendation. Just under 40 percent indicated that they had never had strip curtains.

Table K-2. Presence or Absence of Strip Curtains before Participating in Program

Status of Strip Curtains	Frequency	Percent
Already had at least some strip curtains	39	40.6
Previously had strip curtains but didn't have any at the time of the recommendation	13	13.5
Never had strip curtains in the store?	38	39.6
Don't know	4	4.2
Refused/Not applicable	2	2.1
Total	96	100

Those who had never had strip curtains and those who didn't know or refused to answer the question (46 percent) were asked if they knew about strip curtains prior to the program. Twenty-eight of the 44 respondents (64 percent) knew about them prior to the program. Thirteen percent of the total respondents said that they were unaware of the strip curtains. Thus, 77 percent of the respondents either had strip curtains, had had them in the past or knew about them.

Of the 28 respondents who reported that they knew about strip curtains, 61 percent said that they had a positive impression of the benefits of strip curtains and the remainder said that they were neither positively or negatively disposed toward them. There was no one among those who had experience with strip curtains or who knew about them that reported negative perceptions of them.

Those with a positive impression were asked what contributed to the positive impression. There were 19 usable responses from 15 respondents. The responses were more focused on temperature control than on energy savings. Seven of the 15 mentioned maintaining the temperatures in the boxes. Four said that they had observed other stores or had colleagues who used them or swore by them. Three mentioned energy savings. There were other responses including two who mentioned prior experience. Only one person mentioned cost savings.

Replacing or Adding Strip Curtains

Of those who said that they previously had strip curtains about half were replacing existing strip curtains, about 15 percent said that they were adding new strip curtains and about 28 percent said that they were both replacing and adding curtains.

We also asked this group of respondents whether they had maintenance contracts. Only 3 respondents representing 3 percent of all respondents said that they had a maintenance contract for strip curtains. Two of the three said that the contract included replacements. One said that the strip curtains were maintained annually, the second said at least every two years and the third said every three to four years. Two respondents reported that the contractors inspected and maintained the curtains as needed and one reported that they were inspected but that they could call and have them fixed as well. In comparison to door gaskets a much smaller percentage of respondents have maintenance contracts.

Table K-3. Were Respondents Replacing or Adding Strip Curtains

	Frequency	Valid Percent
Replace existing strip curtains	19	48.7
Add new strip curtains	6	15.4
Both, replace and add new curtains	11	28.2
Refused/Not applicable	3	7.7
Total	39	100

Participants who had strip curtains but did not have maintenance contracts were asked if they maintained the strip curtains. Twenty (61 percent) of theses respondents who reported having strip curtains and answered the question reported that they did maintenance.

Table K-4. Respondents Reporting That They Do Maintenance

	Frequency	Percent
Yes	20	61
No	11	33
Don't know	2	6
Total	33	100

When asked about the frequency of maintaining the strip curtains for those who had them, forty percent said that they maintained the strip curtains annually. Another 35 percent reported replacing the strip curtains within four years. The remaining 25 percent either said more than four years or did not provide an estimate of the frequency of maintenance.

Table K-5. Frequency of Maintaining Strip Curtains

	Frequency	Percent
At least once a year	8	40.0
Less than 2 years	1	5.0
2 to 3 years	4	20.0
3 to 4 years	2	10.0
More than 5 years	2	10.0
Don't know	1	5.0
Refused/Not applicable	2	10.0
Total	20	100.0

Reason for Not Having Strip Curtains

Those who didn't have strip curtains prior to the program were asked why they did not have them. The most frequently cited reasons (31 percent of responses each) were that they were too costly and that the firm had too many other priorities. About 13 percent said that they were not aware of the benefits. About an equal number said that they were either a nuisance or they didn't make a difference.

Table K-6. Why Respondents Didn't Have Strip Curtains

Reason	Frequency	Percent
Too costly	17	31
Too many other priorities	17	31
Wasn't aware of benefits of strip curtains	7	13
Nuisance to deal with	4	7
Doesn't make a difference	2	4
Other	4	7
Don't know	2	4
Refused/Not applicable	2	4
Total	55	100

Awareness Before and After Learning about and Taking Steps to Implement Strip Curtains.

About 50 percent of the participants reported that they learned about the program after they began to think about strip curtains (Table K-7.). Of these respondents, about 70 percent said that they learned about the program after they took steps to implement the program (Table K-8.).

Table K-7. First Learned about Program Before or After Started Thinking about Strip Curtains

	Frequency	Percent
Before	33	41
After	42	52
Don't Know	3	4
Refused	3	4
Total	81	101

Table K-8. Learned about Program Before or After Took Steps to Install Strip Curtains

	Frequency	Percent
Before	9	19
After	33	69
Don't Know	3	6
Refused	3	6
Total	48	100

Program and Non-Program Influences

Eight-one respondents were administered an influence battery and asked what influenced their participation. The 18 factors in the strip curtain 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 K-9.. 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.

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 K-9.. 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 the incentive at 8.5. Helping the environment to be green with an average rating of 8.2, the recommendation of the auditor (8.1), and cost reduction on future energy bills at 7.93 followed.

The most frequently cited factors were the cost reduction on future energy bills (74 percent), helping the environment and/or to be green (70 percent) the incentive, the program incentive (58 percent), and the recommendation of the install at 48 percent.

Table K-9. Factors Motivating Participation in Program

	Factors motivating participation	Number	Percent	Mean	Number
*	The program offered an incentive to replace/install strip curtains	47	58	8.53	47
	Help the environment and/or be green	55	70	8.2	55
*	The recommendation from auditor	24	30	8.08	24
	The amount of the cost reduction on future energy bills	60	74	7.93	60
*	A recommendation from a representative of the utility	42	52	7.85	41
*	The recommendation from the installer or vendor auditor	46	57	7.83	46

Factors motivating participation	Number	Percent	Mean	Number
A recommendation from others in the company or business	16	20	7.56	16
Your firm has a standard to install and maintain strip curtains	20	25	7.5	20
The age or condition of the strip curtains	39	48	7.46	39
Previous recommendation from some other vendor	10	12	7.1	10
Other firms in the industry are installing strip curtains	20	25	7.05	20
Previous recommendation from an auditor or engineer	11	12	6.82	11
Prior experience with the utility program or another energy efficiency program	19	24	6.42	12
Information obtained from the utility in the past	18	22	6.41	17
Prior experience with replacing strip curtains	19	24	6.26	19
Information at a trade show	5	6	6.2	5
Information from a trade publication	6	7	4.5	6
Attendance at utility training course	1	-	9	1

Program factors dominated four the of the top five spots in terms of the average rating. In terms of the number of respondents citing a factor, non-program factors were cited as the top two motivations followed by three program factors.

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 J-9. 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 K-10. Which Type of Factor Is More Important

Which factor is more important	Count	Percent
Program factors more important	66	82
Non-program factors more important	11	14
Can't distinguish	4	5
Totals	81	101

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 6.06 points to the program and 3.94 points to the non-program factors.

Table K-11. Distribution of Average Scores for Program and Non-Program Factors

	Program Factors	Program (Percent)	Non-program factors	Non-program (Percent)	Summary Program Rating	Summary Factor Program Rating (Percent)
0 to .99						
1 to 1.99					6	7
2 to 2.99					4	5
3 to 3.99			1	1	5	6
4 to 4.99	1	1	1	1	6	7
5 to 5.99	2	2	4	5	13	16
6 to 6.99	9	11	13	16	10	12
7 to 7.99	9	11	16	20	9	11
8 to 8.99	26	32	28	35	16	20
Greater than 9	18	22	8	10	8	10
Don't know/no answer	16	20	10	12	4	5
Total	81	101	81	100	81	100

Finally, the respondents were asked how likely they were to have replaced strip curtains 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 would have been 5.81. In other words, on average they would have been more likely than not to have replaced the strip curtains. One might have expected this to be less than five on a 10 scale given the preceding ratings.

Calculating Overall Net-to-Gross Ratio for Strip Curtains

Participants with a maintenance contract that replaced strip curtains within a four-year period, the assumed life strip curtains, were assigned a net-to-gross ratio of zero. There were just three such customers. There is a near certainty that strip curtains within these establishments would have been replaced without the program.

Participants that did not have maintenance contracts but maintained strip curtains on a schedule that was more frequent than the lifetime of the strip curtains were also assigned a net-to-gross ratio of zero. Seventy-five percent of these participants claimed to maintain strip curtains on a cycle that was four years or less. There is a high probability that curtains within these establishments would have been replaced without the program.

The third group is respondents whose firms that did not have maintenance contracts and did not regularly maintain strip curtains or did not have strip curtains. Ultimately, the question for this group is would they have replaced or added strip curtains without the program.

The net-to-gross ratio was calculated for this group based on three scores:

- The factor specific program influence score.
- The summary program influence score
- The likelihood that strip curtains would not have been replaced without the program.

The factor specific program influence score was derived from the program and non-program factors. An average factor specific program influence score and a factor specific non-program influence score was calculated for each respondent. The average factor specific influence score was then divided by the sum of the average of the program and non-program specific factor influence scores. This resulted in a program influence ratio ranging between 0 and 1. If program specific factors had higher average ratings than the non-program specific factors then the factor specific program influence score is above 0.5. Alternatively, if the program factors had a lower average rating in comparison to the non-program ratings, then the program influence would be less than 0.5. If there were program specific factors but no specific non-program factors, then the program specific factor influence score would be 1. Likewise if there were only non-program specific factors, then the program influence score would be zero.

As noted above, respondents were also asked provide a summary program influence score by distributing 10 points to what they understood to be “program factors” and “non-program factors.” The summary program influence score was calculated by dividing the number of points that respondent gave to “program factors” by 10. This results in a score between 0 and 1.

The likelihood that the action was program induced was calculated as well. The likelihood score was based on the question about the likelihood that the respondent would have installed strip

curtains in the absence of the program. The likelihood that the respondent would have taken action without the program was calculated as 10 minus the likelihood of taking the action in the absence of the program divided by 10.

The factor specific program influence score and the summary program influence score were combined to form a composite program summary score. The composite program influence score is the average of the two program influence scores.

The net-to-gross ratio was formed by averaging the composite program summary influence score and likelihood score. In a situation where one or the other score is missing, only the one score is used.

Table K-12. Percent of Respondents by Whether They Maintained Strip Curtains

Category of respondent	Count	Percent	Group Net-to-Gross	Weighted Net-to-Gross
Maintenance contract	3	3	0	0
No maintenance contract but who claimed to maintain within the lifetime of the strip curtains	15	15	0	0
Did not have or did not maintain strip curtains	81	81	0.49	0.40
Indeterminate	2	2		0
Total/weighted total	101	101	-	0.40

Longer Term Effectiveness of Strip Curtains

Respondents were asked if the strip curtains were still installed. Twenty-two percent of the customers indicated that some of the strip curtains had been removed. For example one respondent indicated that he had removed the curtain in one door way because it was causing inconvenience. Another five percent indicated that all of the strip curtains had been removed. Except for the respondent who reported that a curtain was removed because of convenience factors, the curtains were removed because they had become worn or damaged. One respondent reported that he believed the damage had occurred because extreme temperatures made the curtains less flexible. Thus, in five percent of the cases there were no continuing savings and in another 22 percent of cases there were reduced savings at the time of the interview.

The data indicate that only in a small percentage of cases are the curtains are being tied back or modified in ways that would compromise their effective efficiency.

APPENDIX L
NET-TO-GROSS DATA COLLECTION AND SURVEY GUIDANCE INSTRUMENTS

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.

Final Door Gasket / Strip Curtain Nonresidential Net-to-Gross Methodology Decision Maker Survey -12/09

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	Quantity installed	

Introduction

Hello, my name is __and I am calling from Marketing Excellence/Innovologie on behalf of the California Public Utilities Commission. We are calling about your participation in the_____ program. You may have been recruited to the program by _____ (vendor name). According to our records the program installed _____, _____, _____, and _____ at your site in_____ (month) _____ (year).

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. The *Program Name* _____(vendor name) conducted a walk through or an audit and then installed refrigerator door seals, refrigerator strip curtains, lighting, or other energy savings measures at no cost or provided an incentive that reduced the cost of these measures. Now, do you recall the *Program Name*?

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

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

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

I-1c. 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 *Program Name* 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. The interview will take about 30 minutes. [*If necessary,* 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-2a0 The questions on this survey pertain to work completed: [Pre-fill the box from info below].
…where X,Y & Z measures were installed.

					Gaskets	Strip curtains	Door closers	Lighting	Controls
1	❑	At [a single site located at]	_____	❑	❑	❑	❑	❑	
2	❑	At several sites including	_____	❑	❑	❑	❑	❑	
3	❑		_____	❑	❑	❑	❑	❑	
4	❑		_____	❑	❑	❑	❑	❑	
5	❑		_____	❑	❑	❑	❑	❑	
6	❑		_____	❑	❑	❑	❑	❑	

1-2a1 *(If multiple-site I-2a02 checked)* Your firm participated at several sites (for example, _____, _____, _____. Was there a single decision or decision-maker who approved the work at all of these sites or was the work at each site approved by a separate decision or decision-maker?

- ❑ 1. Single decision (Goto 1-2b)
- ❑ 2. Multiple decisions (Goto 1-2a2)
- ❑ 9. Don't know or don't remember (*go to I-2a2)*

I-2a2 *(If more than one site)* Let's talk only about (*randomly pre-selected site*)

Are you familiar with that site?

- ❑ 1. Yes (*Proceed to 1-2b)*
- ❑ 0. No (*go to I-2a3)*
- ❑ 9. Don't know or don't remember (*go to I-2a3)*

I-2a3 Can you identify a site with which you are familiar? I can read a short list to refresh you memory

- ❑ 1. Yes, (*Help customer choose site from pick list*)
- ❑ 0. No, (*go to I-1B*)
- ❑ 9. Don't know or don't remember (go to *I-1B)*

I-2b. Ok, according to our records the *Program Name* installed (*insert measure list, pre-fill*)_____ at that site. Is that correct?

(Pre-fill these items) ❑ *Refrigerator case door gaskets* ❑ *Strip curtains*

❑ *Lightings*

- ❑ 1.Yes (*proceed to I-3*)
- ❑ 0. No (*go to I-2c*)
- ❑ 9. DK (*go to I-2c*)
- ❑ 7. Other *(Please explain, record verbatim)*

I-2c. What do you think was installed?

❑ Gaskets ❑ Strip curtains ❑ Lighting ❑ None of the above
❑ Other (Please explain_____)

I-2d. *If none of the above,* Please explain, *(Record verbatim.)*

_____

If no measures but there are additional sites, go to I-2a3

If no measures and no more sites thank and terminate the interview

I-2d1 1. ❑ Terminated

2. ❑ Cycled

I-3. What was your role in deciding to install these things? 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 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? _____

The CATI system will present the relevant technologies in order based on what was installed or what the respondent says was installed.

Door Gaskets

DG1. According to our records or what you told us, door gaskets were installed on refrigerator cases. Can you tell me why your firm decided to add or replace refrigerator case door gaskets through this program? (Probe: Were there any other reasons?)

1. ❑Record VERBATIM

98. ❑ Don't know

99. ❑Refused/Not applicable

DG1.2. Prior to 2006, did you install door gaskets through a utility program and receive rebates for that?

1. ❑Yes

0. ❑No

98. ❑Don't know

99. ❑Refused/Not applicable

DG2. At the time of the program or prior to participating, did you have a maintenance contract that included door gasket inspection and/or replacements?

1. ❑Yes (Ask DG3a)

0. ❑No (Ask DG5)

98. ❑Don't know (Ask DG5)

99. ❑Refused/Not applicable (Ask DG5)

DG3a. Did the contract cover door gaskets on all cases that you have door gaskets or just some cases?

1. ❑ All cases that could have door gaskets
2. ❑ Just some cases that had door gaskets

98. ❑ Don't know

99. ❑ Refused/Not applicable

DG3b. Did the contract include inspecting and replacing the seals as needed or were there charges for replacements extra?

1. ❑ Replacements included (Ask DG3d)
2. ❑ Replacements extra (Ask DG3c)

98. ❑ Don't know (Ask DG3d)

99. ❑ Refused/Not applicable (Ask DG3d)

DG3c. Were there times when door seals were needed but you postponed replacement?

1. ❑ Yes
0. ❑ No
98. ❑ Don't know (Ask DG5)
99. ❑ Refused/Not applicable (Ask DG5)

DG3c1. Can you explain why you postponed the decision?

DG3d. Under the maintenance contract, how was it decided when to replace door gaskets?

1. ❑Contractor inspected and replaced as needed
2. ❑You called the contractor as needed
3. ❑The contractor inspected but you also called if needed
4. ❑Other (describe)_____
5. ❑No replacements have been done

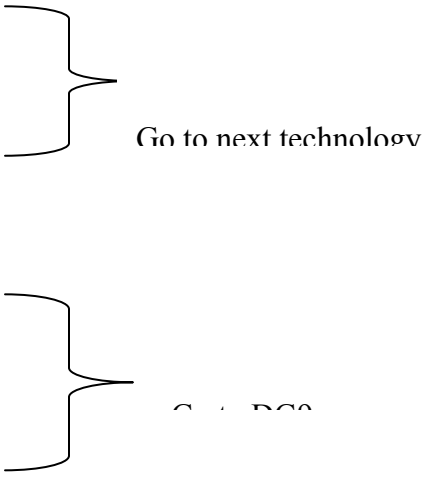
98. ❑Don't know (Ask DG5)

99. ❑Refused/Not applicable (Ask DG5)

DG4. On average how often were at least **some** door gaskets maintained and replaced?

1. ❑Once a year or less
2. ❑More than a year but less that two years
3. ❑2 to 3 years
4. ❑3 to 4 years
5. ❑4 to 5 years
6. ❑More than 5 years
7. ❑Not replaced

98. ❑Don't know
99. ❑Refused/Not applicable



DG5. Prior to participating in the program did your firm maintain refrigerator door gaskets?

2. ❑ Often (Ask DG6)
1. ❑ Sporadically (Ask DG6)
0. ❑ No (Ask DG8)
98. ❑ Don't know (Ask DG8)
99. ❑ Refused/Not Applicable (Ask DG8)

DG6. Under what circumstances did you replace your door gaskets? (check all that apply)

1. ❑ Door gaskets were checked and replaced periodically
2. ❑ Done as part of regularly scheduled maintenance
3. ❑ Observed need (check more detailed box if applicable)

3a. ❑ Refrigerator techs suggested

3b. ❑ When doors needed repair

3c. ❑ When it was clear gaskets were failing

9. ❑ Other (describe) _____
8. ❑Don't know
0. ❑ Have not replaced door gaskets (Ask DG8)

DG7. How often were door gaskets replaced?

1. ❑At least once a year
2. ❑Less then 2 years

3. ❑2 to 3 years
4. ❑3 to 4 years
5. ❑4 to 5 years
6. ❑More then 5 years
98. ❑Don't know
99. ❑Refused/Not applicable

Go to next technology

DG8. It appears that door gaskets have received only minimal attention. Can you tell be why? *(Record verbatim answer and then check an appropriate category below)*

1. ❑Too costly
2. ❑The gaskets don't make a difference
3. ❑Nuisance to deal with
4. ❑Too many other priorities
5. ❑Cases are old and decided to wait for replacement
6. ❑Gaskets have remained in good condition
7. ❑Wasn't aware that bad gaskets could cause problems
8. ❑Company policy
9. ❑ Other (describe) _____
98. ❑ Don't know
99. ❑Refused/Not applicable

DG9. Did you first learn about the *Program Name* BEFORE or AFTER you or your firm began to think about whether door gaskets should be maintained or replaced?

1. ❑Before (Ask DG11)
2. ❑After (Ask DG10)
98. ❑ Don't Know (Ask DG10)
99. ❑Refused (Ask DG10)

DG10. Did you or your firm learn about the *Program Name* BEFORE or AFTER you decided and took steps to install door gaskets?

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

DG11. Prior to participating in the *Program Name* had you ever had gaskets replaced without charge or received a utility or other kind of incentive to replace gasket seals?

1. ❑ Yes Please explain _____
2. ❑ No
98. ❑ Don't know
99. ❑ Refused/Not applicable

DG12. Now I am going to list some things that may have influenced you to inspect and repair the door gaskets. 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	No	DK	RF NA
		(1)	(0)	(98)	(99)
a.	The age or condition of the door gaskets	❑	❑	❑	❑
b.	The fact that door gaskets were replaced by the *Program Name* without cost	❑	❑	❑	❑
c.	The reduced energy cost on future electric bills	❑	❑	❑	❑
d.	Other firms in the industry are maintaining door gaskets	❑	❑	❑	❑
e.	The recommendation from the program auditor	❑	❑	❑	❑
f.	Recommendation from an installer or vendor who installed the door gaskets	❑	❑	❑	❑
g.	Information obtained from the utility in the past	❑	❑	❑	❑
h.	Prior experience with replacing door gaskets	❑	❑	❑	❑
i.	Prior experience with the *Program Name* or another energy efficiency program	❑	❑	❑	❑
j.	Information from a trade publication	❑	❑	❑	❑
k.	Attendance at a utility or vendor 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 the utility	❑	❑	❑	❑
p.	Your company has a standard to install and maintain door gaskets	❑	❑	❑	❑
q.	Help the environment and/or be green	❑	❑	❑	❑

r. A recommendation from other businesses like yours ❑ ❑ ❑ ❑

s. Cleaning and maintaining seals contributes to a positive customer image ❑ ❑ ❑ ❑

t. Avoid hassles with the health inspectors ❑ ❑ ❑ ❑

Keep last, do not rotate

u. Other (describe)_____ ❑ ❑ ❑ ❑

DG13. *[Ask only questions answered with a Yes from DG12. 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.

DG13a. The age or condition of the door gaskets

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

DG13b. The fact that door gaskets were replaced by the *Program Name* without cost

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

DG13c. 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

DG13d. Other firms in the industry are maintaining door gaskets

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

DG13e. The recommendation from the program auditor?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

DG13f. The recommendation of the installer or vendor who installed the door gaskets

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

DG13g. Information obtained from the utility in the past?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

DG13h. Prior experience with replacing door gaskets?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

DG13i. Prior experience with the *Program Name* 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

DG13j. 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

DG13k. Attendance at a utility or vendor training course?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

DG13l. 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

DG13m. 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

DG13n. 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

DG13o. A recommendation from a representative of the utility?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

DG13p. Your company has a standard to maintain door gaskets?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

DG13q. 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

DG13r. A recommendation from other businesses like yours?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

DG13s. Cleaning and maintaining seals contributes to a positive customer image?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

DG13t. Avoid hassles with the health inspector?

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

DG13u. Other? (describe) _____

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

DG14a. *(The computer will determine the highest rated item(s) from among 13a, 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.

DG14b. 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 with regard to the maintaining door seals if the *Program Name* had not been available.

DG15. If the *Program Name* had not been available, how likely is it that you would have replaced door gaskets where 1 is "absolutely wouldn't have replaced" and 10 is "absolutely would have replaced"?

Not at all likely Very Likely

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

CORPORATE POLICY BATTERY

DG16. Does your firm or store 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

DG17. Did that policy influence your decision to maintain door gaskets?

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

Set Corporate Policy Flag = Yes

Strip Curtains

SC1. According to our records or what you told us, strip curtains provided to you or were installed on walk in refrigerator or freezer doors or on refrigerator or freezer cases. Can you tell me why you decided to add or replace refrigerator strip curtains through this program? (Probe: Were there any other reasons?)

1. ❑Record VERBATIM

98. ❑ Don't know

99. ❑Refused/Not applicable

SC1.2. Prior to 2006, did you install strip curtains through a utility program and receive rebates for that?

1. ❑Yes
2. ❑No
98. ❑Don't know
99. ❑Refused/Not applicable

SC2. Did the contractor?

1. ❑ Install the strip curtains? (Go to SC4d)
2. ❑ Leave them for you to install? (Go to SC3)
3. ❑ Installed some and left some (Go to SC3)

SC3. Have you installed

1. ❑ All of the strip curtains that were left (Go to SC4d)
2. ❑ Some of the strip curtains that were left (Go to SC4a)
3. ❑ None of the strip curtains that were left (Go to SC4c)

SC4a. How many curtains still need to be installed?

_____

SC4b. Can you tell me where the curtains still need to be installed?

SC4b1. Is it likely the curtains will still be installed?

1. ❑ Yes
2. ❑ No
98. ❑ Don't know
99. ❑ Refused

SC4c. Is there some reason you weren't able to install the curtains?

If SC3 = 2 then go to SC4d

If SC3 = 3 and SC4b1 = 2 then free rider go to next technology

SC4d. Are all of the curtains that were installed still installed or have some or all been removed?

1. ❑ Yes all are still installed (Go to SC4f)
2. ❑ Some have been removed (Go to SC4E)
3. ❑ All have been removed (Go to SC4E)
98. ❑ Don't know
99. ❑ Refused

SC4e. Can you tell me why the curtains were removed?

If SC4d = 2 then go to SC4f

If SC4d = 3 go to next technology

SC4f. When workers are using the refrigerator or freezers where the curtains are installed do they leave them hanging naturally or do they tie them back, prop them back or drape them over the open door?

1. ❑ Left them hanging as installed (Go to SC5)
2. ❑ Prop them open some how (Go to SC4g)
98. ❑ Don't know (Go to SC5)
99. ❑ Refused (Go to SC5)

SC4g. Roughly how many hours a day would the refrigerator or freezer door be open with just the strip curtains?

_____

98. ❑ Don't know (Go to SC5)
99. ❑ Refused (Go to SC5)

SC4h. How many of those hours would the curtains be propped back? *(Make sure the number of hours is less than the number of ours in 4g)*

_____

98. ❑ Don't know (Go to SC5)
99. ❑ Refused (Go to SC5)

SC5 Prior to installing the strip curtains recommended by the program, what was the situation with respect to strip curtains?

1. ❑ Already had at least some strip curtains installed in your store? (Ask SC10)
2. ❑ Previously had strip curtains but didn't have any at the time of the recommendation? (Ask SC9)
3. ❑ Never had strip curtains in the store? (Ask SC6)

98. ❑ Don't know (Ask SC6)

99. ❑ Refused/Not applicable(Ask SC6)

SC6. Prior to being contacted for this program did you know about strip curtains?

1. ❑ Yes (Ask SC7)
2. ❑ No (Ask SC17)

98. ❑ Don't know (Ask SC17)

99. ❑ Refused/Not applicable (Ask SC174)

SC7. At that time, what was your impression of strip curtains?

1. ❑ Positive (Ask SC8)
2. ❑ Negative (Ask SC8)
3. ❑ Neither positive nor negative (Ask SC9)

98. ❑ Don't know (Ask SC9)

99. ❑ Refused/Not applicable (Ask SC9)

SC8. What led to this impression?

1. ❑ Record VERBATIM

98. ❑ Don't know

99. ❑ Refused/Not applicable

SC9. Is there a reason for not having strip curtains installed? (check all that apply)

1. ❑ Too costly
2. ❑ Doesn't make a difference
3. ❑ Nuisance to deal with
4. ❑ Too many other priorities
7. ❑ Wasn't aware of benefits of strip curtains
8. ❑ Other (describe) _____
98. ❑ Don't know
99. ❑ Refused/Not applicable

Goto SC17

SC10. Did the strip curtains installed through the *Program Name*:

1. ❑ Replace existing strip curtains (Ask SC11)
2. ❑ Add new strip curtains (Ask SC17)
3. ❑ Both, replace and add new curtains (Ask SC11)
98. ❑ Don't know (Ask SC11)
99. ❑ Refused/Not applicable (Ask SC11)

SC11. Prior to participating, did you have a maintenance contract that included strip curtains?

1. ❑ Yes (Ask SC12a)

2. ❑ No (Ask SC14)

98. ❑ Don't know (Ask SC14)

99. ❑ Refused/Not applicable (Ask SC14)

SC12a. Did the contract include inspecting and replacing strip curtains as needed or were the charges for replacements extra?

1. ❑ Replacements included (Ask SC12c)
2. ❑ Replacements extra (Ask SC12b)

98. ❑ Don't know (Ask SC12c)

99. ❑ Refused/Not applicable (Ask SC12c)

SC12b. Were there times when strip curtains were needed but you postponed replacement?

1. ❑ Yes (Go to SC12b1)

0. ❑ No (Go to SC12c)

98. ❑ Don't know (Ask SC14)

99. ❑ Refused/Not applicable (Ask SC14)

SC12b1. Can you explain why you postponed the decision?

SC12c. Under the maintenance contract, when were the strip curtains replaced?

1. ❑ Contractor inspected and replaced as needed
2. ❑ You called contractor as needed
3. ❑ The contractor inspected, but you also called if needed
4. ❑ Other (describe)_____
5. ❑ No replacements under the contract

SC13. On average, how often were at least some strip curtains maintained and replaced?

1. ❑ Once a year or less
2. ❑ Less then 2 years
3. ❑ 2 to 3 years
4. ❑ 3 to 4 years
5. ❑ 4 to 5 years
6. ❑ More then 5 years
7. ❑ Not replaced
98. ❑ Don't know
99 ❑ Refused/Not applicable

[If SC10 = 2 and SC13 < 5, then free rider go to next section]

SC14. Prior to participating in the program did you regularly maintain strip curtains?

1. ❑ Yes (Ask SC15)
2. ❑ No (Ask SC17)
98. ❑ Don't know (Ask SC17)
99. ❑ Refused/Not applicable (Ask SC17)

SC15. Under what circumstances did you replace your strip curtains?

1. ❑ Regular scheduled maintenance
2. ❑ Observed need (check more detailed box if applicable)
   - 2a. ❑ Refrigerator techs suggested
   - 2b. ❑ When it was clear previous strip curtain was failing
3. ❑ Other (describe) _____
4. ❑ Don't know
5. ❑ Have not replaced strip curtains

SC16. How often were strip curtains replaced?

1. ❑ At least once a year
2. ❑ Less then 2 years
3. ❑ 2 to 3 years
4. ❑ 3 to 4 years
5. ❑ 4 to 5 years
6. ❑ More then 5 years
98. ❑ Don't know
99. ❑ Refused/Not applicable

Go to next technology

[If SC10 = 2 and SC15 < 5, then free rider go to next technology]

SC17. Did you first learn about the *Program Name* BEFORE or AFTER you or your firm began to think about implementing strip curtains?

1. ❑Before (Ask SC19)
2. ❑After (Ask SC18)
98. ❑ Don't Know (Ask SC18)
99. ❑Refused (Ask SC18)

SC18. Did you or your firm learn about the *Program Name* BEFORE or AFTER you decided and took steps to install strip curtains?

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

SC19. Prior to this have you ever received a utility incentive for strip curtains?

1. ❑ Yes
2. ❑ No
98. ❑ Don’t know
99. ❑ Refused/Not applicable

SC19.1. Now I am going to list some things that may have influenced you to update the strip curtains. I would like to have you tell me if any of these influenced your decision to participate in the program even just a little bit?

	Yes	No	DK	RF	NA

	(1)	(2)	(98)	(99)
a. The age or condition of the strip curtains	❑	❑	❑	❑
b. The program offered an incentive to replace/install strip curtains	❑	❑	❑	❑
c. The amount of the cost reduction on future energy bills	❑	❑	❑	❑
d. Other firms in the industry are installing strip curtains	❑	❑	❑	❑
e. The recommendation from program auditor	❑	❑	❑	❑
f. The recommendation from the program installer or vendor	❑	❑	❑	❑
g. Information obtained from the utility in the past	❑	❑	❑	❑
h. Prior experience with replacing strip curtains	❑	❑	❑	❑
i. Prior experience with the vendor auditor or another energy efficiency program	❑	❑	❑	❑
j. Information from a trade publication	❑	❑	❑	❑
k. Attendance at a utility 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 the utility	❑	❑	❑	❑
p. Your firm has a standard to install and maintain strip curtains	❑	❑	❑	❑
q. Help the environment and/or be green	❑	❑	❑	❑
r. A recommendation from others in the company or business	❑	❑	❑	❑

Do not put in rotation

t. Other? (describe) _____

SC20. 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. *[Only questions marked Yes from SC19.1 will be asked. They should stay in the rotation.]*

SC21a. The age or condition of the strip curtains

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

SC21b. The program offered and incentive to replace/install the strip curtains?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

SC21c. The amount of the cost reduction on future energy bills

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

SC21d. Other firms in the industry are installing and maintaining strip curtains

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

SC21e. The recommendation from the program auditor

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

SC21f. The recommendation from the 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

SC21g. Information obtained from the utility in the past

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

SC21h. Prior experience with replacing strip curtains

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

SC21i. Prior experience with the vendor auditor 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

SC21j. 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

SC21k. Attendance at a utility or vendor training course

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

SC21l. 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

SC21m. 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

SC21n. 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

SC21o. A recommendation from a representative of the utility?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

SC21p. Your company has a standard to install or maintain strip curtains

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

SC21q. 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

SC21r. A recommendation from others in the business

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

SC21t. Other? (describe) _____

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

Sc22a. *(The computer will determine the highest rated item(s) from among 13a, d, g, h, j, k, l, m, n, o, p, q, r, s. 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.

SC22b. 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 aware 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 with regard to the maintaining strip curtains if the *Program Name* had not been available.

SC23. If the *Program Name* had not been available, what is the likelihood that you would have replaced strip curtains, using a likelihood scale from 1 to 10, where 1 is "absolutely wouldn't have replaced" and 10 is "absolutely would have replaced"?

Not at all likely Very Likely

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

Additional Decision Maker Questions **PAYBACK BATTERY(If payback importance >5)**

SC24. What financial calculations, if any, did your company make before proceeding with installation of strip curtains?

1. ❑Record VERBATIM

2. ❑ No financial calculation (Go to SC28)

98. ❑Don't know

99. ❑Refused

SC25. What is the cut-off point your company uses before deciding to proceed with the strip curtain investment?

1. ❑Record VERBATIM

98. ❑ Don't know (Go to SC28)

99. ❑ Refused (Go to SC28)

SC26. What was the result of the calculation for strip curtains: a) with the rebate? b) without the rebate?

1. ❑With rebate

2. ❑Without rebate

98. ❑ Don't know

99. ❑Refused

INVESTIGATE INCONSISTENT RESPONSES

SC27. What competing investments, if any, were considered for the funds that were allocated to the adoption of strip curtains?

1. ❑ First mention: _____
2. ❑ Second mention: _____
3. ❑ Third mention: _____
4. ❑ Fourth mention: _____

98. ❑ Don't know (Go to SC 28)

99. ❑ Refused (Go to SC 28)

97. ❑ No mention (Go to SC 28)

SC27. Why was strip curtains chosen over these other investments?

1. ❑Record VERBATIM

98. ❑ Don't know

99. ❑Refused

CORPORATE POLICY BATTERY

SC28. [Ask if corporate policy flag = no] Does your organization have a corporate environmental policy 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

SC29. What specific corporate policy influenced your decision to adopt or install strip curtains?

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

Set Corporate Policy Flag = Yes

Lighting

L1. According to our records or what you told us, lighting retrofits were completed. Can you tell me why your firm decided to replace lighting through this program? (Probe: Were there any other reasons?)

1. ❑Record VERBATIM

98. ❑ Don't know

99. ❑Refused/Not applicable

L1.2. Prior to 2006, did you install lighting retrofits through a utility program and receive rebates for that?

1. ❑Yes

2. ❑No

98. ❑Don't know

99. ❑Refused/Not applicable

L2. Prior to participating in the program, had you previously updated the lighting in this or another location?

1. ❑ Yes (Ask L3)

2. ❑ No (Ask L4)

98. ❑ Don't know (Ask L4)

99. ❑ Refused/Not applicable (Ask L4)

L3. When you did that, did you participate in any kind of lighting incentive program or did you just update the lighting?

1. ❑ Yes, used program
2. ❑ No, did not use program
98. ❑ Don't know
99. ❑ Refused/ Not applicable

L4. Prior to participating in the program, were you considering changing your lighting for any reason?

1. ❑ Yes (Ask L5)
2. ❑ No (Ask L7)
98. ❑ Don't know (Ask L7)
99. ❑ Refused/ Not applicable (Ask L7)

L5. If you were going to change the lighting before participating, how soon do you think you would have done it?

1. ❑ Record VERBATIM

98. ❑ Don't know
99. ❑ Refused/Not applicable

L6. Why were you considering changing the lighting? (check all that apply)

1. ❑ Make the store brighter
2. ❑ Make the store look better
3. ❑ Getting ready to remodel or update store
4. ❑ Heard about the utility programs but hadn't gotten around to doing anything
5. ❑ Had seen a store with updated lighting
6. ❑ Concerned about energy costs
7. ❑ Wanted to save energy
8. ❑ Wanted to be green
9. ❑ Other (describe) _____

L7. Did you first learn about *Program Name* BEFORE or AFTER you or your firm began to think about implementing lighting?

1. ❑Before (Ask L9)
2. ❑After (Ask L8)

98. ❑ Don't Know (Ask L8)

99. ❑Refused (Ask L8)

L8. Did you or your firm learn about the *Program Name* BEFORE or AFTER you decided and took steps to install lighting?

1. ❑ Before
2. ❑ After

98. ❑ Don't Know

99. ❑ Refused

L9. Now I am going to list some things that may have influenced you to update the lighting. I would like to have you tell me if any of these influenced your decision to participate in the lighting program even just a little bit?

	Yes	No	DK	RF NA
	(1)	(2)	(98)	(99)
a. The age or condition of the lighting	❑	❑	❑	❑
b. The fact that the program offered an incentive to replace lighting	❑	❑	❑	❑
c. The amount of the cost reduction on future energy bills	❑	❑	❑	❑
d. Other firms in the industry are installing new lighting	❑	❑	❑	❑
e. The recommendation from the program auditor	❑	❑	❑	❑
f. The recommendation form the program installer or vendor	❑	❑	❑	❑
g. Information obtained from the utility in the past	❑	❑	❑	❑
h. Prior experience with replacing lighting	❑	❑	❑	❑
i. Prior experience with the *Program Name* or another energy efficiency program	❑	❑	❑	❑
j. Information from a trade publication	❑	❑	❑	❑
k. Attendance at a utility or vendor 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 the utility	❑	❑	❑	❑

p. Your firm has a standard to install up to date	❑	❑	❑	❑
lighting	❑	❑	❑	❑
q. Help the environment and/or be green	❑	❑	❑	❑
r. A recommendation from others in the company	❑	❑	❑	❑
or business				
s. Want to give the store a fresh look	❑	❑	❑	❑

Do not put in rotation

t. Other? (describe) _____

L10. 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. *[Only questions marked Yes from L9 will be asked. They should stay in the rotation.]*

L10a. The age or condition of the lighting

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

L10b. The fact that the program replaced the lighting without cost?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

L10c. The amount of the cost reduction on future energy bills?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

L10d. Other firms in the industry are installing new lighting

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

L10e. The recommendation from *the program auditor*?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

L10f. The recommendation from the installer or vendor who installed the lighting?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

L10g. Information obtained from the utility in the past?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

L10h. Prior experience with replacing lighting?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

L10i. Prior experience with the *Program Name* 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

L10j. 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

L10k. Attendance at a utility or vendor training course?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

L10l. 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

L10m. 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

L10n. 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

L10o. 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

L10p. Company has a standard to maintain lighting?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

L10q. 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

L10r. A recommendation from others in the business?

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

L10s. Want to give the store a fresh look?

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

L10u. Other? (describe) _____

Not at all important Very Important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

L11a. *(The computer will determine the highest rated item(s) from among 13a, d, g, h, j, l, m, n, o, p, q, r, s. 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.

L11b. 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 aware 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 with regard to the maintaining lighting if the *Program Name* had not been available.

L12. If the *Program Name* had not been available, what is the likelihood that you would have replaced lighting, using a likelihood scale from 1 to 10, where 1 is "absolutely wouldn't have replaced" and 10 is "absolutely would have replaced"?

Not at all likely Very Likely

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

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

98 99

❑ 98. Don't know

❑ 99. Refused/no answer

L13. Did you consider any alternatives to the lighting installed with the rebate from *Program Name*, which you would have implemented in the same time frame if the rebate had not been available?

1. ❑ Yes (ASK L14)

2. ❑ No (SKIP TO D16)

98. ❑Don't know (SKIP TO L16)

99 . ❑ Refused/ Not applicable (SKIP TO L16)

L14. Please describe the alternative which you most likely would have installed if the *Program Name* had not been available. Prompt: Can you be more specific about efficiency level and quantities.

1. ❑ Record VERBATIM

98. ❑ Don't know

99. ❑ Refused

L15. In the absence of the rebate from the *Program Name*, 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

L16. (If question L12 > 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 *Program Name* 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

Additional Decision Maker Questions **PAYBACK BATTERY(If payback importance >5)**

L17. What financial calculations, if any, does your company make before proceeding with installation of lighting like this one?

1. ❑ Record VERBATIM
2. ❑ No financial calculation (Go to L22)

98. ❑Don't know

99. ❑Refused

L18. What is the cut-off point your company uses before deciding to proceed with the investment?

1. ❑ Record VERBATIM

98. ❑ Don't know (Go to L22)

99. ❑ Refused (Go to L22)

L19. What was the result of the calculation for lighting: a) with the rebate? b) without the rebate?

1. ❑ With rebate
2. ❑ Without rebate
98. ❑ Don't know
99. ❑ Refused

INVESTIGATE INCONSISTENT RESPONSES

L20. What competing investments, if any, were considered for the funds that were allocated to the adoption of lighting?

1. ❑ First mention: _____
2. ❑ Second mention: _____
3. ❑ Third mention: _____
4. ❑ Fourth mention: _____
98. ❑ Don't know (Go to L22)
99. ❑ Refused (Go to L22)
97. ❑ No mention (Go to L22)

L21. Why was lighting chosen over these other investments?

1. ❑ Record VERBATIM

98. ❑ Don't know
99. ❑ Refused

CORPORATE POLICY BATTERY

L22. [Only ask if Corporate Flag = No] Does your organization have a corporate environmental policy 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

L23. What specific corporate policy influenced your decision to adopt or install lighting?

1. ❑ Record VERBATIM [IF NOT ALREADY ASKED IN 13: CAN I OBTAIN A COPY OF THE POLICY?]
98. ❑ Don't know
99. ❑ Refused

Replication and incidental measures questions

S1. Have you installed any additional energy efficiency measures at the location we have been discussing since you installed the ones we just talked about?

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

S2. Were any of these?

1. ❑ Door Gaskets
2. ❑ Strip curtains
4. ❑ Lighting
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. _____

S5. Were door gaskets [substitute S2: 1-4 and S4: a - c] covered by a utility or government energy efficiency incentive program?

1. ❑ No
2. ❑ Yes (Go to S5)
98. ❑ Don't know
99. ❑ Refused/no answer

3. Could you tell me what program

S6. Have you applied for or are you expecting to receive a rebate for door gaskets [substitute S2: 1-4 and S4: a - c]?

1. ❑ No
2. ❑ Yes [Rotate to next measure]
98. ❑ Don't know
99. ❑ Refused/no answer

S7. Why aren't you expecting a rebate for door gaskets [substitute S2: 1-4 and S4: a - c]?

S8. How many door gaskets [substitute S2: 1-4 and S4: a - c] did you install?

S9. [If Applicable] Can you tell be the size (linear feet, square feet, wattage) of the door gaskets [substitute S2: 1-4 and S4: a – c]?

S10. Were these door gaskets [substitute S2: 1-4 and S4: a - c] specifically recommended by an audit, report, or technical specialist?

1. ❑ No [Rotate to next measure]
2. ❑ Yes [Go to
98. ❑ Don't know
99. ❑ Refused/no answer

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 *Program Name* in your decision to implement this door gaskets substitute [S2: 1-4 and S4: a - c]?

Absolutely not important Absolutely important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

1 2 3 4 5 6 7 8 9 10

S12. If you had not participated in the *Program Name*, how likely is that your organization would still have implemented door gaskets [substitute S2: 1-4 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 [PROGRAM] in your decision to implement this [substitute S2: 1-4 and S4: a - c] that was not part of the program, using a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant?

Repeat for all measures at this location

S14. Now, thinking about your firm's 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 the following measures being implemented since your participation in the *Program Name*?

1. ❑ Door Gaskets
2. ❑ Strip curtains
4. ❑ Lighting
5. ❑ None
98. ❑ Don't know
99. ❑ Refused/no answer

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 *Program Name*?

1. ❑ No (If S14:5 = None Terminate)
2. ❑ Yes (Go to S17)
98. ❑ Don't know
99. ❑ Refused/no answer

S16. Could you tell me what those measures are?

a. _____
b. _____
c. _____

Rotate through measures identified as being installed at other sites

S17. Were door gaskets [substitute S14: 1-4 and S16: a - c] covered by a utility or government energy efficiency incentive program?

1. ❑ No
2. ❑ Yes (Go to S5)
98. ❑ Don't know
99. ❑ Refused/no answer

S18. Could you tell me what program

S19. Have you applie ive a rebate for door gaskets [substitute S2: 1-4 and S4: a - c]?

1. ❑ No
2. ❑ Yes [Rotate to next measure]
98. ❑ Don't know
99. ❑ Refused/no answer

S20. Why aren't you expecting a rebate for [substitute S14: 1-4 and S16: a - c]?

S21. How many door gaskets [substitute S14: 1-4 and S16: a - c] did you install?

S22. [If Applicable] Can you tell be the size (linear feet, wattage, horsepower) of the door gaskets [substitute S14: 1-4 and S16: a - c]?

S22. Using a 1 to 10 scale, where 1 is absolutely not important and 10 is absolutely important, how important was your experience with the *Program Name* in your decision to implement this door gaskets substitute [substitute S14: 1-4 and S16: a - c]?

Absolutely not important Absolutely important

❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑

1 2 3 4 5 6 7 8 9 10

Classification Data

C1. PRIMARY BUSINESS TYPE CODE: (Use codes from the Business Type table, Form on the next page)) _____

C2. Premise Business Type Description Uniqueness: Give a brief description about the type of work and/or primary product/service. What makes this premise unique from other businesses of this type?

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

Premise General Information

31. What kind of premise is this?: **P** = Part of a bldg **B** = 1 building, single footprint **MF** = 1 building w/multiple footprints **SM** = Small multi-building **CM** = Campus (multi-bldg) **OT** = Other _____	P B MF SM CM OT
32. What is the total occupied floor area of this premise (excluding enclosed parking garage area)?	_____ ft^2
32a. If the premise has an enclosed parking garage, approximately what is the floor area?	_____ ft^2
33. How many buildings are part of this premise?	_____
34. Is this premise owner-occupied (**O**) or leased (**L**)?	O L
35. What year was this business established at this location?	_ _ _ _
36. How many full-time equivalent employees work at this premise?	_____
37. Sample frame SIC Code (4-digit) NAIC?	_ _ _ _
38. Is interval metered (load research) electric data available for this premise?	Y N
39. Was short-term metering performed for this premise?	Y N

Business/Building Type Codes

	Code	Business Tv >e	Code	Business Tv e	Code
Offices (Commercial):		**Retail Store:**		**Lodging:**	
Administration and management	011	Department / Variety Store	041	Hotel	081
Financial/Legal	012	**Retail Warehouse/Clubs**	042	Motel	082
InsurancelReal Estate	013	Shop in Enclosed Mall	043	Resort	083
Data Processing/Computer Center	014	Shop in Strip Mall	044	Other Lodging	084
Mixed- Use/Multi-tenant	015	Auto Sales	045	**Public Assembly:**	
Lab/R&D Facility	016	Other Retail Store	046	Religious Assembly (worship only)	091
Software Development	017	**Warehouse:**		Religious Assembly (mixed use)	092
Government Agency	018	Refrigerated Warehouse	051	Health/Fitness Center	093
Other *Office*	019	**Unconditioned Warehouse, High Bay**	052	**Movie Theaters**	094
Restaurant/Food Service:		**Unconditioned Warehouse. Low Bay**	053	Theater / Performing Arts	095
Fast Food or Self Service	021	**Conditioned Warehouse, High Bay**	054	**Library / Museum**	096
Specialty/Novelty Food Service	022	**Conditioned Warehouse, Low Bay**	055	**Conference/Convention Center**	097
Table Service	023	Health Care:		**Community Center**	098
Bar/Tavern/Nightclub/Other	024	Hospital	061	**Other Recreational/Public Assembly**	099
Other Food Service	025	Nursing Home	062	**Service:**	
Food Stores:		Medical/Dental *Office*	063	**Gas Station / Auto Repair**	101

Supemlarkets	031	Clinic/Outpatient Care	064	**Gas Station w/Convenience Store ••**	102
Small General Grocery	032	MedicaliDental Lab	065	Repair (Non-Anto)	103
Specialty/Ethnic Grocery	033	**Education:**		Other Service Shop	104
Convenience Store"'''	034	**Daycare or Preschool**	071	**:\lisct'lIant'ous:**	
Liquor Store	035	Elementary School	072	Assembly / Light Mfg.	**III**
Other Food Store	036	Middle / Secondary School	073	Police / Fire Stations	112
		College or University	074	Post *Office*	113
		Vocational or Trade School	075	**Otht"r *Describe on Form J***	130

End of Strip Curtains and Door Gaskets Net-to-Gross Survey instrument and interview guide.

END