**SOUTHERN CALIFORNIA EDISON
1994 RESIDENTIAL
APPLIANCE EFFICIENCY
INCENTIVE PROGRAM
NINTH YEAR
RETENTION STUDY**

**CEC Study ID #546A**

**Final Report**

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# EXECUTIVE SUMMARY

This report provides the results of a study of the ninth-year retention of space cooling appliances and refrigerators installed by customers of Southern California Edison (SCE) in 1994 under SCE's Residential Appliance Efficiency Incentive (RAEI) Program. The following four (4) types of appliances covered in the 1994 RAEI Program have been studied:

- Central air conditioning (A/C) units

- Central and through-the-wall heat pumps

- Evaporative coolers

- Refrigerators

Data for the study were collected through a two-phase mail and telephone survey effort. The data collected through the mail and telephone survey effort were used to determine the percent retention for each appliance. Based on the data collected, the ninth-year retention rates for the various appliances are as shown in Table ES-1. Fourth-year retention rates are also shown.

*Table ES-1. Retention Rates for 1994 RAEI Appliances*

| *Type of Appliance* | *Fourth-Year Retention Rates* | *Ninth-Year Retention Rates* |
|---|---|---|
| Central Air Conditioners | 98.2% | 94.3% |
| Heat Pumps | 97.1% | 88.1% |
| Evaporative Coolers | 93.7% | 83.1% |
| Refrigerators | | |
|   Households that had not moved | 96.5% | 94.9% |
|   Households that had moved | 98.2% | 84.3% |

Another objective of the study was to estimate effective useful life (EUL) for each appliance and to determine if the estimated EULs were different from expected EULs. Because of the limited time span that the collected data cover and because the early retention rates for the different appliances were relatively high, direct estimates of effective useful lives derived from the collected data were improbably high. However, hazard functions and corresponding survival functions for refrigerators and space conditioning equipment were developed using data for households in SCE's service territory that were collected in the recent Statewide Residential Appliance Saturation Survey (RASS).

The estimates of effective useful lives determined through the estimation of hazard and survival functions in this study are reported in Table ES-2, which also

reports SCE's *ex ante* estimates of effective useful lives. The hypothesis of no difference between *ex ante* and *ex post* estimates of useful life could not be rejected for any of the measures.

*Table ES-2. Estimated Median Lives Compared*
*to SCE's Ex Ante Estimates for Effective Useful Lives*
*(Lives in years)*

| *Type of Measure* | *SCE Ex Ante Estimate of EUL* | *Estimated Median Life* | *Ex Ante Different from Ex Post?* |
|---|---|---|---|
| Central air conditioners | 18 | 26.2 | No |
| Heat pumps | 18 | 13.6 | No |
| Evaporative coolers | 15 | 27.7 | No |
| Refrigerators (Scenario II) | 18 | 21.7 | No |

It was assumed that the survival functions developed from the RASS data represent the general survival behavior for these types of appliances. To determine whether the energy efficient appliances and refrigerators included in the 1994 RAEI had survival patterns that were different than this general pattern, fourth-year and ninth-year retention rates developed from the survey data and from the RASS-derived survival functions were compared. In general, the retention rate estimates were similar, indicating that the survival patterns for energy efficient appliances are similar to the general patterns.

# 1. INTRODUCTION

Under the DSM Measurement Protocols[1] adopted by the California Public Utilities Commission, Southern California Edison (SCE) is required to conduct studies to better understand the typical modes of savings erosion associated with energy-efficient measures. In line with this requirement, ADM Associates, Inc. (ADM) has performed a ninth-year retention study of space cooling appliances and refrigerators installed by SCE customers in 1994 under SCE's Residential Appliance Efficiency Incentive (RAEI) Program.

The objective of this RAEI retention study has been to determine the extent to which space cooling appliances and refrigerators installed under SCE's 1994 RAEI Program are still in place and operational. The following four (4) types of appliances covered in the 1994 RAEI Program have been studied:

- Central air conditioning (A/C) units

- Central and through-the-wall heat pumps

- Evaporative coolers

- Refrigerators

Data for the study were collected through a two-phase mail and telephone survey effort. The mail survey was used as the most cost-effective means to screen a large population to identify those households where an appliance had been removed or had failed. Telephone interviews were then conducted with households that indicated in the mail survey that an appliance had been removed or failed. The telephone interviews were used to identify when the appliance had been removed or had failed and the reasons for the removal/failure.

The data collected through the mail and telephone survey effort were used to determine the following:

- Historic percent retention for each appliance, as a function of time;

- Effective useful life (EUL) for each appliance; and

- If the estimated EULs are different from expected EULs at an 80% level of statistical significance

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[1] See *Protocols and Procedures for the Verification of Costs, Benefits, and Shareholder Earnings for Demand-Side Management Programs*, as adopted by California Public Utilities Commission Decision 93-05-063, with subsequent revisions.

The retention rates for the appliances were determined through tabulation of the data collected through the survey effort.  To develop estimates of effective useful lives for refrigerators and space cooling equipment, hazard functions and survival functions were developed for these appliances using data from the recent Statewide Residential Appliance Saturation Survey.

This final report presents and discusses the methodology used and results achieved through this study.  The report is organized into the following sections.

- Chapter 2 contains a discussion of the methods used to collect the data for the study.

- Chapter 3 presents the retention rates for the appliances as determined from the survey data.

- Chapter 4 presents and discusses the results of the analysis of effective useful lives.

- Appendix A contains copies of the forms used for the data collection.

- Appendix B contains Tables 6 and 7 as specified in the Protocols.

# 2. DATA COLLECTION METHODS

This Chapter discusses the design used to collect data for the 1994 Residential Appliance Efficiency Incentive Program Ninth-Year Retention Study. Section 2.1 discusses the survey design. Section 2.2 discusses the data collection methodology. Section 2.3 discusses sample allocation and selection. Section 2.4 discusses the survey instruments. Section 2.5 reports the survey response rates.

## 2.1 SURVEY DESIGN

As noted in Chapter 1, there were several objectives to be met with the data collected through the survey. In terms of survey design, the most stringent requirement was that the effective useful life of a program appliance be estimated with 20% precision at 80% confidence. That is, it was necessary to design a plan for the data collection survey such that sufficient sample points would be obtained for each type of appliance to meet the specified precision/confidence requirements.

The analytical framework for the development of the survey design for the study was provided by survival analysis techniques. Survival analysis pertains to the analysis of data that correspond to the time from a well-defined time origin until the occurrence of some particular event or end-point. For this study, the time origin was defined by the installation of an appliance under the 1994 RAEI Program, while the end-point was defined by the removal or failure of the measure or the discontinuance of its use.

The survival data for appliances have several features that warranted special treatment in preparing the sample design.

- The measure survival data would probably not be symmetrically distributed and cannot be reasonably represented by a normal distribution.

- The survival data would be *right-censored* in that the end points for removals, failures, or discontinuance would not be observable for some of the installed measures.

The sample design addressed these and other features of the data that were collected. The sample design was developed through the following steps.

- First, the number of removals/failures required to meet the precision and confidence specifications for each type of measure was determined.

- Second, the probability of removal/failure for each type of measure over the period of the study was determined and applied to the required number of removals/failures to determine the number of points required in the sample.

- Third, sample points for an appliance were allocated among households.

## 2.1.1  Determining Number of Required Removals/Failures

The first step in preparing the sample design was to arrive at quantitative estimates of the required sample sizes for the various types of appliances.  To do this, it was necessary to use a parametric representation for the appliance survival data.  For the sample design, it was assumed that the survivor function for an appliance's life data could be represented with the exponential distribution:

$$S(t) = e^{-\lambda t}$$

For this function, the mean survival time is given by $\mu = 1/\lambda$, with its standard error given by $\dfrac{\mu}{\sqrt{r}}$, where r is the number of appliances within a sample that have been removed or failed.  Thus, with an exponential survivor function, the standard error for the estimated mean from a sample depends on the number of removals/failures that are observed.

The precision/confidence requirements for the sample were that the estimate of mean effective useful life for a measure must have relative precision of ±20 percent at the 80 percent confidence level.  This implied the following:

$$.0.2\,\mu = \frac{z\mu}{\sqrt{r}}$$

where μ and r are defined as above and z is the upper point of the standard normal distribution defining the desired level of confidence.  For the 80 percent confidence level, z = 1.28.  Thus, the number of removals/failures required to estimate mean life for a particular type of appliance at the specified precision/confidence is r = 41.

## 2.1.2  Accounting for "Right Censoring"

Based on using an exponential survival function, it appeared that about 41 removals/failures would be required for each type of appliance to satisfy the 80/20 confidence/precision requirement.   However, the number of sample points needed to identify 41 removals/failures depends on the probability of "failure".  The sample size needed to provide the required number of removals was determined as follows:

$$\text{Sample Size} \ = \frac{\text{Number of required removals / failures}}{\text{Probability of removal / failure}}$$

As shown by Collett[1], the probability of removal/failure with an assumed survival function can be calculated as a function of (1) specified values for the survival function, (2) the study accrual time (i.e., the period when measure occurrences take place) and (3) the study follow-up time (i.e., the period when occurrences are tracked to see whether they are removed or fail).  For this study, the accrual period was 12 months (i.e., the year 1994 for the 1994 RAEI Program), and the follow-up period was 108 months (i.e., the nine years 1995-2003).

Given that the length of the study was fixed, the probability of removal/failure within a specified time span was determined primarily by the expected mean life of an appliance.  As Table 2-1 shows, the longer the mean life of an appliance, the lower the probability of removal or failure within the time span specified for this study.

*Table 2-1.  Sample Sizes Required for Different Probabilities*
*of Removal/Failure and Different Response Rates*

| *Mean Life (In Years)* | *Probability of Failure* | *Sample Size Required to Identify 41 Removals/Failures* | *Sample Size Adjusted for Response Rate* | | |
|:---:|:---:|:---:|:---:|:---:|:---:|
| | | | *40%* | *50%* | *60%* |
| 20 | .326 | 126 | 315 | 252 | 210 |
| 15 | .405 | 101 | 253 | 203 | 169 |
| 10 | .530 | 77 | 193 | 155 | 129 |
| 5 | .741 | 55 | 138 | 111 | 92 |

Table 2-1 illustrates that the number of households that had to be contacted to identify 41 where an appliance had been removed or had failed depends on the mean life of the appliance and on the rate of response to the survey.  Moreover, if the precision/confidence requirements were to be met for *each* type of appliance, the total sample size required would be a multiple of the individual sample sizes.  For example, if each of the four types of appliances had an expected life of 20 years and the response rate was 40%, the total sample required would be 1,260 (i.e., 315 x 4).

## 2.2   DATA COLLECTION PROCEDURES

Based on the preceding analysis, using a telephone survey to screen households to identify those that had an appliance that had failed or that had been removed

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1 Collett, D. *Modelling Survival Data in Medical Research*, Chapman & Hall, 1994, pp. 260-264.

would have been relatively costly. Instead, a two-phase mail-telephone data collection approach was used for each of the four types of appliances.

- In the first phase of the data collection, a mail survey was conducted of samples of participants in the 1994 RAEI Program. The primary purpose of this mail survey was to screen customers to identify those who may have had appliances that were removed or that failed.

- In the second phase of the data collection, telephone interviews were conducted with those households identified through the mail survey as having had appliances that were removed or that failed.

A mail survey was used in the first phase of the data collection because it allowed a relatively large number of households to be reached at less cost than a telephone survey. It is generally true that the depth of information that can be collected through a mail survey is less than that collected through a telephone survey. However, because the purpose of the first phase of data collection was only to identify households where an appliance may have been removed or failed, this was not a problem for the mail survey. Indeed, there was a single central question for the mail survey:

- Is the program-installed appliance still in place and operable?

This question was printed on a postcard that the respondent returned.

For those households that indicated that a program-installed appliance had been removed or had failed, follow-up telephone interviews were conducted to determine the reason for the removal/failure and the date when the removal/failure occurred.

## 2.3  SAMPLE ALLOCATION AND SELECTION

The sample allocation and selection work made use of files that SCE staff had prepared that contain information on the participants in the 1994 RAEI Program. Sampling frames for selecting the sample sites for the different types of appliances were created by extracting various items of data from three major files.

- The first file was a customer-based file that contained information on the *customers* who were 1994 RAEI Program participants.

- The second file was a customer-based follow-up file that contained information on current occupants of the residences that participated in the 1994 RAEI Program and on the current addresses of

Households that received a rebate for a refrigerator needed to be treated somewhat differently from those that had received a rebate for a space cooling

appliance. Essentially, households that received a rebate for a refrigerator in 1994 could be classified into four groups:

- Households in the same house who still had the refrigerator

- Households in the same house but who did not have the refrigerator

- Households who had moved but who still had the refrigerator

- Households who had moved and who did not have the refrigerator

Out of the 23,008 residences where an energy efficient refrigerator had been installed in 1994, 13,434 residences now had new households residing there. In other words, 13,434 of the 1994 households receiving a rebate for a refrigerator had moved since 1994.

For households who had stayed in the same house, their current address was used for the mail survey. However, because households who had moved could have taken the refrigerator with them or otherwise disposed of it, it was necessary to find the new address of these households to use for the mailing. Information from SCE's customer information system was used to identify the current addresses for households who had moved. Thus, questionnaires were mailed to these households at their new addresses.

While the household was the sampling unit for the refrigerator survey, the residence address was the sampling unit for the mail survey pertaining to space conditioning appliances. For these appliances, it is unlikely that a household would have taken the appliance when the household moved. The interest for this study was in finding whether the space conditioning appliance was still in place at the house where it had originally been installed. If the program participant no longer lived in the house where the program appliance was installed (e.g., as indicated in SCE's customer information databases), information from SCE's customer databases that showed a name for the household now living in the house was used to direct the mail survey to that household. This approach was used because not including in the survey houses from which the original program participants had moved could impart a bias to the survey results.

The second phase telephone survey was directed only at those households who reported in the first phase mail survey that an RAEI Program appliance had been removed or had failed. Information was collected pertaining to basic household demographic and socio-economic characteristics.

## 2.4    SURVEY INSTRUMENTS

The types of survey instruments used for the 1994 RAEI Program ninth-year retention study included the following:

- Survey letter and postcard questionnaire used to screen for presence of installed appliances

- Telephone survey form for interview of households where appliances have failed or been removed

Four sets of these materials were prepared, one set for each of the four types of appliances being studied. (For households who received rebates for refrigerators, there were two different questionnaires: one for the households that had not moved and another for households that had moved.) These materials are included in Appendix A.

The mail out letter to a customer was printed on SCE stationery and was mailed out in an envelope with SCE's logo.

## 2.5    SURVEY RESPONSES

Table 2-2 summarizes the data on the number of customers contacted through the mail survey and the number of customers who responded to the mail survey.

*Table 2-2. Response Rates for Mail Survey Effort*

| *Type of Appliance* | *Number in Mail Survey Sample* | *Number of Respondents to Mail Survey* | *Percentage Responding to Mail Survey* |
|---|---|---|---|
| Central Air Conditioners | 2,000 | 895 | 44.8% |
| Heat Pumps | 940 | 421 | 44.8% |
| Evaporative Coolers | 1,328 | 510 | 38.4% |
| Refrigerators: All | 2,400 | 982 | 40.9% |
|   For households that had not moved | 1,200 | 594 | 49.5% |
|   For households that had moved | 1,200 | 388 | 32.3% |

# 3. RETENTION DATA FOR EACH TYPE OF APPLIANCE

Section 3.1 addresses the observed rates of retention for the various appliances.

Retention rates for the various types of appliances were calculated using the information on the postcards returned by the respondents to the mail survey part of the data collection survey. In particular, Table 3-1 shows the percentage of households responding to the mail survey who reported that appliances installed in 1994 were no longer in place at the time of the survey. The implied retention rates are also shown. As would be expected for these types of appliances, the rates of retention for the various appliances are relatively high.

*Table 3-1.  Retention Rates for RAEI Appliances*

| Type of Appliance | Number of Mail Survey Respondents | Number of Respondents Reporting Appliance Had Been Removed, Failed or Replaced since 1994 | Percentage of All Respondents Reporting Appliance Removed, Failed or Replaced since 1994 | Percentage of Respondents Retaining Appliance in 2004 |
|---|---|---|---|---|
| Central Air Conditioners | 895 | 51 | 5.7% | 94.3% |
| Heat Pumps | 421 | 50 | 11.9% | 88.1% |
| Evaporative Coolers | 510 | 86 | 16.9% | 83.1% |
| Refrigerators: | | | | |
| For households that had not moved | 594 | 30 | 5.1% | 94.9% |
| For households that had moved | 388 | 61 | 15.7% | 84.3% |

Those customers who indicated on the postcard return that the appliance had been removed, failed or replaced since 1994 were interviewed by telephone to determine when the appliance had been removed and why.

# 4. ESTIMATES OF EFFECTIVE USEFUL LIFE FOR APPLIANCES

This Chapter presents and discusses the results of analyses used to derive estimates of effective useful lives for the appliances.

- Section 4.1 describes the analytical methods used.

- Section 4.2 provides estimates of survival functions based on the data collected for the fourth- and ninth-year retention studies.

- Section 4.3 provides estimates of survival functions based on analysis of data extracted for SCE households from the most recent Statewide Residential Appliance Saturation Survey.

- Assuming that the survival functions presented in Section 4.3 represent the general survival behavior for these types of appliances, there is a question of whether the survival patterns for high efficiency refrigerators and space conditioning equipment installed by households under the 1994 RAEI Program are similar. Comparisons are therefore presented in Section 4.4 between the survival predictions estimated in Sections 4.2 and 4.3.

## 4.1 ANALYTICAL METHODS

Under the DSM Measurement Protocols, the effective useful life (EUL) of a measure is one of several factors that enters the calculation of the earnings that a utility can recover for DSM expenditures. Estimates of EUL are to be developed through retention studies, such as this one.

In the Protocols, effective useful life of a measure is defined as the median number of years that the measure installed under a program is still in place and operable. In effect, the median age is the number of years that pass until 50% of the installed measures are no longer in place and operable. Determining the effective useful life according to this definition requires deriving a survival function for a measure, where a survival function shows the fraction of installed measures still in place and operable as time passes.

The analytical difficulty that arises in trying to derive a survival function for a program measure is that the amount of data available are relatively limited. It can be assumed that 100% of the measures are in place and operable when they are installed. Moreover, estimates of the percentage of measures still in place after the passage of years are shown by the retention rates determined from the data collected in a retention study.

However, as shown in Table 3-1, the retention rates for the appliances considered in this study were relatively high even after nine years have passed. Because of this, non-parametric methods of estimating survival functions are not appropriate. That is, non-parametric methods can give an accurate estimate of median survival time only if more than 50% of the measures are no longer in place and operable.

With parametric methods for estimating a median survival time, a survival function is estimated using the available data and the estimated function is then used to project survival rates at future points in time. The difficulty with the parametric approach for this study is that the high early retention rates for the different appliances mean that there is little information with which to distinguish between different functional forms for the survival function. Because of the limited time span that the collected data cover, a variety of survival functions that imply significantly different median lives can be fitted through the data.[1] This problem is illustrated and discussed more fully in Section 4.2.

To overcome these difficulties, other estimates of survival functions for refrigerators and for the space conditioning appliances (i.e., central air conditioners, heat pumps and evaporative coolers) were developed during this study using data for households in SCE's service territory that were collected in the Statewide Residential Appliance Saturation Survey. The steps in the procedure for estimating the survival functions were as follows:

- Prepare data for calculation of hazard rate function

- Calculate hazard rate function

- Use hazard rate function to determine survival function

- Estimate effective useful life of refrigerators or central air conditioners from survival function

- Determine whether there is reason to believe that high efficiency refrigerators or central air conditioners would have survival patterns different from those estimated from the RASS data

An essential component in this analytical procedure is the estimation of the hazard rate function. A hazard function defines the probability that an item will fail in the next unit of time, given that it has survived to the present. The hazard rate at time t is the ratio of the number of units failing in that interval to the number surviving to that time:

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[1] For discussion of this problem, see Hahn, G.J. and Meeker, W.Q, Jr., "Pitfalls and Practical Considerations in Product Life Analysis—Part I: Basic Concepts and Dangers of Extrapolation", *Journal of Quality Technology*, Vol. 14, July 1982, pp. 144-152.

$$h(t) = \frac{f(t)}{1-F(t)}$$

where $h(t)$ is the hazard rate at time t; $f(t)$ is the probability of failure during an increment of time at time t; and $F(t)$ is the cumulative probability of failure up to time t. Once a hazard function is estimated, a corresponding survival function $S(t)$ can be determined, where $S(t)$ represents the percent surviving at time t.[2]

Two of the distributions commonly used for survival analysis are the exponential distribution and the Weibull distribution[3]. The probability density functions and associated hazard functions and survival functions for these distributions are shown in Table 4-1.

*Table 4-1. Hazard and Survival Functions for Exponential and Weibull Distributions*

| *Exponential Distribution* | |
|---|---|
| Probability Density Function | $f(t) = \gamma \exp(-\gamma t)$ |
| Hazard Function | $h(t) = \gamma$ |
| Survival Function | $S(t) = \exp(-\gamma t)$ |
| *Weibull Distribution* | |
| Probability Density Function | $F(t) = \alpha\beta t^{\beta-1}\exp(-\alpha t^{\beta})$ |
| Hazard Function | $h(t) = \alpha\beta t^{\beta-1}$ |
| Survival Function | $S(t) = \exp(-\alpha t^{\beta})$ |

As Table 4-1 shows, the exponential distribution can be used to represent a hazard rate that is constant. The associated survival function is also exponential. However, the exponential distribution does not represent hazards that increase or decrease over time. If the hazard rate does increase or decrease with age, the Weibull distribution can be used to represent the hazard function and the survival function. (Note that with the Weibull distribution, $\alpha$ is termed as the scale parameter, while $\beta$ is termed as the shape parameter.)

As provided for in the Protocols, a statistical test of whether the *ex post* estimate of useful life is significantly different from the *ex ante* estimate can be made by constructing an 80% confidence interval around the *ex post* estimate and determining whether the *ex ante* estimate falls within this confidence interval. That is, if the *ex ante* estimate falls inside the constructed confidence interval, then the hypothesis of no difference between the *ex ante* and *ex post* estimates

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2 Collette, D. *Modeling Survival Data in Medical Research*, Chapman & Hall, 1994, pp. 10-13.

3 Collett, *ibid.* Also see Kiefer, Nicholas "Economic Duration Data and Hazard Functions", *Journal of Economic Literature*, Vol. XXVI, pp. 646-679, June 1988.

cannot be rejected. If the *ex ante* estimate falls outside the constructed confidence interval, then the hypothesis of no difference between the *ex ante* and *ex post* estimates can be rejected.[4]

For the analytical approach used in this study to estimate useful lives of the measures, an 80% confidence interval for the estimated median life of a measure was calculated as follows. The regression fit of the power curve coefficients was used to report the values of the estimated coefficients associated with the 80% confidence levels. Thus, the power curve regression analysis for each measure provided three sets of parameters for the Weibull hazard rate function: the "best" fit parameters and parameters for the upper and lower bounds of the 80% confidence interval for the estimated coefficients. In effect, the analysis provided an estimate of the "best" hazard function and survival function for a measure, plus estimates of the functions for the upper and lower bounds of the 80% confidence interval.

## 4.2    ESTIMATION OF SURVIVAL FUNCTIONS USING SURVEY DATA ON RETENTION RATES

Combining the survey results from the fourth-year and ninth-year retention studies provides some evidence on the survival rates for refrigerators and space conditioning appliances. Table 4-1 shows the retention rates as determined from the fourth-year and ninth-year retention studies. These retention rates show the percentage of installed appliances still in place and operable after four years and after nine years.

*Table 4-2.  Retention Rates for Appliances as Estimated from Survey Data*

| *Type of Appliance* | *Percentage of Appliances Installed in 1994* | *Percentage of Appliances Retained to 1999* | *Percentage of Appliance Retained to 2004* |
|---|---|---|---|
| Central Air Conditioners | 100% | 98.2% | 94.3% |
| Heat Pumps | 100% | 97.1% | 88.1% |
| Evaporative Coolers | 100% | 93.7% | 83.1% |
| Refrigerators: | | | |
|   For households that had not moved | 100% | 96.5% | 94.9% |
|   For households that had moved | 100% | 98.2% | 84.3% |

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4 See, for example, Snedecor, G.W. and Cochran, W.G., *Statistical Methods, 7th Edition*, Iowa State University Press, 1980,  p. 66.

These retention rates in effect represent points along a survival curve.  However, the relative high rates of survival even after nine years indicate that a functional form would have to be fitted to the data points to extrapolate to the time when 50% of the measures would have survived.  For example, Table 4-2 reports the results of fitting logarithmic curves through the data points and then using the fitted equations to project the year when 50% of the measures will no longer be in place and thus to determine the implied EUL.

As Table 4-2 shows, the EULs derived from the fitted regression equations are much higher than the actual lives that would be expected.  It  is generally accepted that survival curves for most appliances are S-shaped, with high percentages of installed appliances being retained for early years but with retention rates dropping more rapidly for a middle set of years before flattening out again.  Because of the relatively high retention rates that are seen in the survey data even after nine years, the survey data do not carry enough information to allow the fitted equations to capture the inflection points that are usual for S-shaped curves.

*Table 4-3.  Retention Rates for Appliances as Estimated from Survey Data*
*(y is percent retained/surviving)*

| *Type of Appliance* | *Fitted Equation* | *Year When 50% Will No Longer Be in Place* | *Implied EUL (Years)* |
|---|---|---|---|
| Central Air Conditioners | $y = -11.517 Ln(Year) + 88.508$ <br> $R^2 = 0.991$ | 2083 | 89 |
| Heat Pumps | $y = -24.227 Ln(x) + 185.08$ <br> $R^2 = 0.9704$ | 2036 | 42 |
| Evaporative Coolers | $y = -33.828 Ln(x) + 258.02$ <br> $R^2 = 0.9991$ | 2024 | 30 |
| Refrigerators: <br> For households that had not moved | $y = -9.7098 Ln(x) + 74.768$ <br> $R^2 = 0.8928$ | 2098 | 104 |
| For households that had moved | $y = -32.604 Ln(x) + 248.74$ <br> $R^2 = 0.9101$ | 2026 | 32 |

Although the implied EULs are not informative in terms of absolute values, they are informative about the relative EULs among the different appliances.

• For the space conditioning appliances, comparison of the implied EULs suggests that the survival rate for central air conditioning units is highest, while that for evaporate coolers is lowest.

- For refrigerators, the likelihood of being in place and operable is higher for those that are being used by households that have not moved than for those that were installed in residences where the households have moved.

## 4.3    ANALYSIS OF EFFECTIVE USEFUL LIVES USING RASS DATA

Alternative estimates of EULs for refrigerators and space conditioning appliances were developed by using data for households in SCE's service territory from the most recent Statewide Residential Appliance Saturation Survey (RASS). Respondents to this survey provide information about their ownership of refrigerators and space conditioning equipment, about the ages of those appliances or equipment, about whether they had discarded a refrigerator or space conditioning equipment during the past year, and about the age of the discarded refrigerator or equipment. These RASS data provided the information needed to develop estimates of hazard functions and survival functions for refrigerators and space conditioning equipment.

### 4.3.1  Estimation of EUL for Refrigerators

Estimates of the EUL for refrigerators are developed for two scenarios:

- Under Scenario I, the discard rates that are used to estimate the hazard and survival functions represent the discard of a refrigerator without accounting for whether the refrigerator was removed from the stock.

- Under Scenario II, discard rates are determined that are associated with discarded refrigerators being taken out of the stock.

Data from the recent Statewide Residential Appliance Saturation Survey were used to estimate hazard and survival functions for both scenarios. In particular, RASS respondents provided information about various aspects of their refrigerators, including the ages of those in use and of those that had been discarded in the past year.

Table 4-4 provides the data that were developed from the RASS information and used to estimate a hazard function for refrigerator discards for Scenario I.

*Table 4-4. Data from Statewide Residential Appliance Saturation Survey*
*Used for Calculation of Hazard Function for Refrigerators*

| (1) Age of Refrigerator | (2) Stock of Refrigerators | (3) Estimated Annual Discards | (4) Annual Percentage Discarded |
|---|---|---|---|
| Less than two years | 804,481 | 30,474 | 3.8% |
| 2 – 7 years | 1,983,063 | 29,379 | 1.5% |
| 8 – 10 years | 1,000,812 | 55,814 | 5.6% |
| 11 – 20 years | 857,507 | 91,242 | 10.6% |
| More than 20 years | 167,289 | 31,357 | 18.7% |

The data in Table 4-4 were developed through the following steps.

- On the RASS questionnaire, respondents were asked to classify the ages of their refrigerators according to the age categories shown in Column (1). The stock of refrigerators in each age category, as determined from the weighted RASS data, is shown in Column (2).

- RASS respondents were asked if they had discarded a refrigerator in the previous year and, if so, to provide information on the age of the refrigerator discarded. Using the age data, the distribution of discards across the age categories in Column (1) could be determined. The annual number of discards by age category is reported in Column (3).

- Refrigerator discards for each age category as a percentage of the stock in a category are shown in Column (4).

Inspection of the calculated hazard (removal/failure) rates for each age category in Table 4-4 shows that the hazard rate is not constant across categories. This indicated that it was not warranted to assume that the survival function could be represented using the exponential distribution, since the hazard rate for an exponential survival function is constant. However, the Weibull distribution does allow for hazard rates that change over time, and the Weibull-based hazard function was therefore used as the functional form for estimating the hazard function for discarded refrigerators

A power curve fit to the hazard rate data in Table 4-4 provided the estimates of the parameters for the Weibull distribution representation of the hazard rate function. The fitted power curve was:

$$\text{Hazard rate} = h(t) = 0.020 \text{Age}^{0.4933}$$

The $R^2$ for this fit was 0.497.

The parameters from the power curve fit to the hazard rate data imply the following parametrization of the Weibull function for the hazard function:

Weibull hazard rate function = 0.01347 x 1.4933 x $Age^{0.4933}$

where 0.013474 represents the $\alpha$ (scale) parameter for the Weibull distribution and 1.4933 represents the $\beta$ (shape) parameter.

Given that the Weibull distribution provides a representation of the hazard function, the associated survival function is given as:

Percent surviving at age t = S(t) = exp(-0.01347 x $Age^{1.4933}$)

With the survival function estimated, the effective useful life of refrigerators can be estimated as the median survival time, defined as that age where 50% of the refrigerators have been removed or failed. For the survival function just calculated for refrigerators, the median survival time is 14.0 years. This can be compared to SCE's *ex ante* estimate that the effective useful life of a refrigerator is 18 years.

Figure 4-1 shows the "best" fit survival function and the upper and lower bound survival functions associated with the 80% confidence level. The upper and lower bounds on the "best" fit survival function provide the confidence interval bounds for the estimated median useful life. The estimated median useful life is 14.0 years. The 80% confidence interval for this estimate (*cf*. Figure 4-1) is 4.9 years to 92.7 years. Because SCE's *ex ante* estimate of 18 years for the useful life of refrigerators falls within this confidence interval, the hypothesis of no difference between the *ex ante* and *ex post* estimates cannot be rejected.
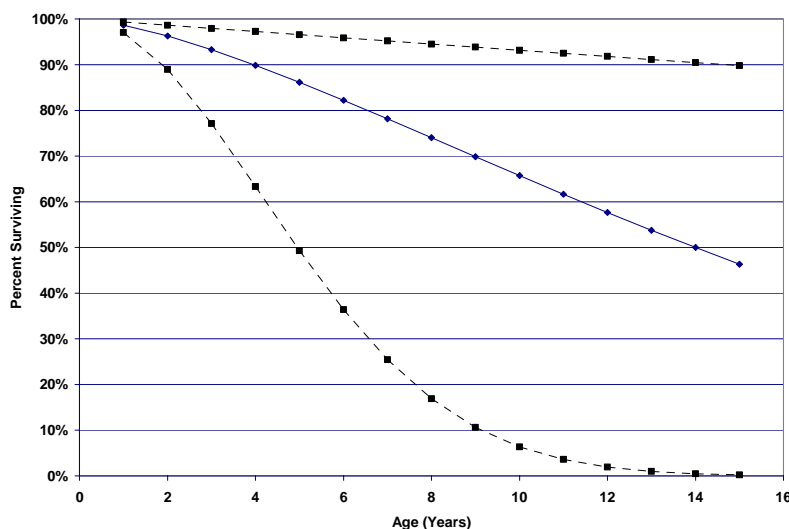


*Figure 4-1. Survival Function Plot for Refrigerator Scenario I with Upper and Lower Bounds*

The percentages reported in Column (4) of Table 4-4 can be interpreted as hazard rates for refrigerator discards under a scenario that implicitly assumes that a refrigerator's useful life ends when the first household to own it discards it. However, a refrigerator discarded by the first household to own it does not necessarily exit from the stock. Some of the discarded refrigerators may either be given away or sold and therefore remain in operation.

To determine the percentage of discards taken out of stock, survey information that was made available by KEMA-Xenergy was used to estimate refrigerator useful life under a second scenario (Scenario II). As part of their work in preparing a ninth-year retention study for the Residential Appliance Recycling Program (RARP), KEMA-Xenergy conducted a telephone survey of a sample of SCE customers who reported in the recent Statewide RASS that they had discarded a refrigerator in the past year. KEMA-Xenergy made the results of their survey available for this study as well.

In the KEMA-Xenergy survey, a respondent who reported that a refrigerator was discarded was asked several questions as to how the refrigerator was disposed of. For this study, a discarded refrigerator was assumed to be taken out of stock if one of the following conditions applied.

- If the discarded refrigerator was no longer in working condition; or

- If a respondent indicated that the refrigerator was recycled through a utility recycling program or was taken to a scrap dealer, recycler, or landfill.

The percentages of discards taken out of stock that were calculated from the KEMA-Xenergy survey data are reported in Column (5) of Table 4-5. These percentages were applied to the percentages in Column (4) to arrive at the annual percentages of discards taken out of stock, as reported in Column (6).

*Table 4-5. Data Used for Calculation of Hazard Function for Refrigerator Scenario IIs*

| *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* |
|---|---|---|---|---|---|
| *Age of Refrigerator* | *Stock of Refrigerators* | *Estimated Annual Discards* | *Annual Percentage Discarded* | *Percentage of Discards Taken Out of Stock* | *Annual Percentage of Discards Taken Out of Stock* |
| Less than two years | 804,481 | 30,474 | 3.8% | 34.6% | 1.31% |
| 2 – 7 years | 1,983,063 | 29,379 | 1.5% | 48.7% | 0.72% |
| 8 – 10 years | 1,000,812 | 55,814 | 5.6% | 43.3% | 2.42% |
| 11 – 20 years | 857,507 | 91,242 | 10.6% | 51.4% | 5.47% |
| More than 20 years | 167,289 | 31,357 | 18.7% | 49.0% | 9.19% |

The discard rates in Column (6) of Table 4-5 were used in an alternative estimation of the survival function for refrigerators. The power curve fitted to the hazard rate data in Table 4-5 was:

Hazard rate = h(t) = $0.00741 \text{Age}^{0.6330}$

The $R^2$ for this fit was 0.643. The parameters from this power curve fit to the hazard rate data implied the following parametrization of the Weibull function for the hazard function:

Weibull hazard rate function = $0.0045 \times 1.6330 \times \text{Age}^{0.6330}$.

The associated survival function is given as:

Percent surviving at age t = S(t) = $\exp(-0.0045 \times \text{Age}^{1.6330})$

For this survival function, the median survival time for refrigerators is estimated to be 21.7 years, with confidence limits between 7.7 years and 125 years.

The parameters estimated through power curve fits and the estimated scale and shape parameters of the Weibull function for the two refrigerator scenarios are reported in Table 4-6.

*Table 4-6. Summary of Hazard Rate Estimation for Refrigerator Scenarios*

| *Scenario* | *Power Curve Fit* | | | *Weibull Distribution Parameters* | |
|---|---|---|---|---|---|
| | *a* | *B* | *R-squared* | *α (Scale)* | *β (Shape)* |
| Refrigerator Scenario I | 0.0200 | 0.4933 | 0.497 | 0.0135 | 1.4933 |
| Refrigerator Scenario II | 0.0074 | 0.6330 | 0.643 | 0.0045 | 1.6330 |

The estimates of median survival lives for the two refrigerator scenarios are reported in Table 4-7 and compared to SCE's *ex ante* estimate of effective useful life for refrigerators. The hypothesis of no difference between *ex ante* and *ex post* estimates of median useful lives cannot be rejected for either of the two scenarios.

*Table 4-7. Estimated Median Lives Compared to Ex Ante Estimates*
*for Refrigerator Scenarios*
*(Lives in years)*

| *Scenario* | *SCE Ex Ante Useful Life Estimate* | | *Estimated Median Life* | | |
|---|---|---|---|---|---|
| | *Value* | *Source* | *80% Lower bound* | *Estimate* | *80% Upper Bound* |
| Refrigerator Scenario I | 18 | Protocol, App. F, Table 1 | 4.9 | 14.0 | 92.7 |
| Refrigerator Scenario II | 18 | Protocol, App. F, Table 1 | 7.7 | 21.7 | 125.0 |

SCE's *ex ante* estimate for the effective useful lives of refrigerators was 18 years. That estimate lies between the two estimates of useful life for refrigerators derived in this study: 14.0 years for Scenario I and 21.7 years for Scenario II. Moreover, SCE's *ex ante* estimate of effective useful life for refrigerators falls within the confidence levels for each scenario and thus appears appropriate.

### 4.3.2 Estimation of EULs for Space Conditioning Equipment

An analysis similar to that for refrigerators was conducted for space conditioning equipment, but with modifications to account for differences between the types of appliances and the data available for the analysis. Moreover, the market for secondary sales of space conditioning equipment is smaller than that for refrigerators, so that there was no need to account for replacements for which the equipment was not taken out of stock.

On the RASS questionnaire, respondents were asked to classify their space conditioning systems by the same age categories as for refrigerators. They were also asked if they had discarded space conditioning equipment over the previous year and, if so, indicate the age of the discarded equipment. However, there were only three age categories that applied to discarded equipment. Accordingly, the age categories for the stock of equipment were collapsed to match those for discarded equipment. The resulting data for estimating hazard functions for space conditioning equipment that were developed from the Statewide RASS database are shown in Table 4-8.

*Table 4-8. Data from Statewide Residential Appliance Saturation Survey*
*Used for Calculation of Hazard Function for Space Conditioning Equipment*

| *(1)* *Age* *of* *Equipment* | *(2)* *Stock* *of* *Equipment* | *(3)* *Estimated* *Annual* *Discards* | *(4)* *Annual* *Percentage* *Discarded* |
|---|---|---|---|
| *Central Air Conditioning Equipment* | | | |
| 1 – 10 years | 959,369 | 14,937 | 1.6% |
| 11 – 20 years | 500,879 | 16,169 | 3.2% |
| Over 20 years | 489,054 | 22,807 | 4.7% |
| *Heat Pumps* | | | |
| 1 – 10 years | 68,916 | 4,579 | 6.6% |
| 11 – 20 years | 50,122 | 921 | 1.8% |
| Over 20 years | 39,520 | 2,242 | 5.7% |
| *Evaporative Coolers* | | | |
| 1 – 10 years | 103,927 | 1,928 | 1.9% |
| 11 – 20 years | 65,358 | 2,292 | 3.5% |
| Over 20 years | 118,984 | 3,290 | 2.8% |

The percentages reported in Column (4) in Table 4-8 can be interpreted as hazard rates for replacement of space conditioning equipment. As with the refrigerator analysis, the Weibull distribution was used as the functional form to represent the hazard function for each measure. The parameters estimated through power curve fits and the estimated scale and shape parameters of the Weibull function are reported in Table 4-9.

*Table 4-9.  Summary of Hazard Rate Estimation for Space Conditioning Equipment*

| Type of Measure | Power Curve Fit | | | Weibull Distribution Parameters | |
|---|---|---|---|---|---|
| | *a* | *b* | *R-squared* | *α (Scale)* | *β (Shape)* |
| Central air conditioners | 0.0052 | 0.6517 | 0.996 | 0.0032 | 1.6517 |
| Heat pumps | 0.0684 | -0.1951 | 0.057 | 0.0850 | 0.8049 |
| Evaporative coolers | 0.0130 | 0.2688 | 0.511 | 0.0102 | 1.2588 |

The estimates of median survival lives for the three types of space conditioning equipment are reported in Table 4-10 and compared to SCE's *ex ante* estimates of effective useful lives.  The hypothesis of no difference between *ex ante* and *ex post* estimates of median useful lives cannot be rejected for any of the three types of space conditioning equipment.   (The 80% lower bound for central air conditioners as reported in Table 4-9 is a rounded value, so that it is not appropriate to reject the hypothesis of no difference between the *ex ant* and *ex post* estimates on the basis of that value.)

*Table 4-10. Estimated Median Lives Compared to Ex Ante Estimates*
*for Space Conditioning Equipment*
*(Lives in years)*

| Measure | SCE Ex Ante Useful Life Estimate | | Estimated Median Life | | |
|---|---|---|---|---|---|
| | *Value* | *Source* | *80% Lower bound* | *Estimate* | *80% Upper Bound* |
| Central air conditioners | 18 | Protocol, App. F, Table 1 | 18.1 | 26.2 | 40.1 |
| Heat pumps | 18 | Protocol, App. F, Table 1 | 0.4 | 13.6 | > 100 |
| Evaporative coolers | 15 | Protocol, App. F, Table 1 | 3.4 | 27.7 | > 100 |

## 4.4    COMPARISON OF EUL ESTIMATES

The working assumption for developing estimates of effective useful lives for refrigerators and space conditioning equipment from the Statewide RASS data is that the survival functions represent the general survival behavior for these types of appliances and should apply equally as well to the high-efficiency central air conditioners installed by households participating in SCE's 1994 RAEI Program. That is, there is no evidence at this point to indicate that the high efficiency refrigerators and space conditioning equipment will have life spans that are not governed by the same forces that determined replacement rates as shown by the analysis of the RASS data.

As evidence as to whether the survival patterns for high efficiency refrigerators and space conditioning equipment installed by households under the 1994 RAEI Program are similar to the more general survival patterns, comparisons are presented in Table 4-11 between the survival predictions estimated in Sections 4.2 and 4.3.   That is, the fourth-year and ninth-year retention rates for the high efficiency refrigerators and space conditioning equipment reported in Table 4-2

are compared to the retention rates predicted from the survival functions developed in Section 4.3.

Inspection of Table 4-11 shows that the two sets of retention rate estimates are fairly comparable for the following.

- For central air conditioners and evaporative coolers, the fourth-year and ninth-year retention rates are fairly comparable between the two sets of estimates.

- For refrigerators, Scenario II (which allows for the possibility that not all discarded refrigerators are taken out of the stock) provides estimates of retention rates that are comparable to those derived from the survey data. This comparability suggests that Scenario II is a more accurate depiction of the survival pattern for refrigerators.

*Table 4-11.  Comparison of Retention Rates*
*between Survey Data and Derived Survival Functions*

| Type of Appliance | From Survey Data | | From Derived Survival Functions | |
|---|---|---|---|---|
| | Fourth-Year Retention Rate | Ninth-Year Retention Rate | Fourth-Year Retention Rate | Ninth-Year Retention Rate |
| Central Air Conditioners | 98.2% | 94.3% | 96.9% | 88.8% |
| Heat Pumps | 97.1% | 88.1% | 77.1% | 60.8% |
| Evaporative Coolers | 93.7% | 83.1% | 94.2% | 84.7% |
| Refrigerators: | | | | |
| For households that had not moved | 96.5% | 94.9% | | |
| For households that had moved | 98.2% | 84.3% | | |
| Scenario I | | | 89.8% | 69.9% |
| Scenario II | | | 95.7% | 84.9% |

The two sets of estimates for heat pumps are not as comparable.  The survival functions for heat pumps derived from the RASS data show retention rates over time that are lower than those inferred from the survey data.   Looking back to Table 4-8 at the discard rates for heat pumps developed from the RASS data, the discard rate for heat pumps in the 11-20 years category appears low and not consistent with the pattern to be expected of discard rates increasing across age categories.  Because of this, the fitting of the hazard rate function was poor (i.e., an R-squared of 0.057 as shown in Table 4-9).

For the most part then, these comparisons between the two sets of estimates of retention rates are consistent with the hypothesis that the survival patterns for refrigerators and space conditioning equipment installed under the 1994 RAEI

Incentives Program are similar to the more general survival patterns developed from the Statewide RASS data.

# APPENDIX A

# DATA COLLECTION FORMS

The types of survey instruments used for the 1994 RAEI Program retention study include the following:

- Survey letter and postcard questionnaire used to screen for presence of installed appliances

- Telephone survey form for interview of households where appliances have failed or been removed

Sets of these materials have been prepared for the following types of appliances:

- Central air conditioners

- Heat pumps (both central and through-the-wall)

- Evaporative coolers

- Refrigerators

  - One set for households that have not moved

  - Another set for households that have moved

Copies of these survey instruments are included in this appendix.

Also included in this appendix are a copy of the Home Energy Survey questionnaire used for the Statewide Residential Appliance Saturation Survey and a copy of the follow-up survey of refrigerator/freezer discarders conducted by KEMA-Xenergy, Inc. Data from these surveys were used for analyzing effective useful lives for refrigerators and space conditioning equipment.

### *Mail Out Letter for Central Air Conditioner Households*

[Date]

[Inside Address]

[Salutation]

In 1994 Southern California Edison conducted a Residential Appliance Efficiency Incentive Program through which it paid rebates to customers who installed energy efficient central air conditioners. We are now conducting a follow-up survey to determine how many of the central air conditioners installed under that program are still installed and being used.

SCE's records show that an energy efficient central air conditioner was installed at this residence in 1994 under the RAEI Program. We would appreciate your filling out and returning the enclosed postcard. On the postcard, please check the appropriate box to indicate whether the central air conditioner installed in 1994 is still installed or whether that air conditioner has failed, has been replaced, or has been removed.

If you have any questions regarding this survey, please feel free to call ?? at ??.

Very truly yours,

[Signee]

### *Postcard Questionnaire to Return for Central Air Conditioner Households*

Is the central air conditioner installed in your residence in 1994 under Southern California Edison's Residential Appliance Efficiency Incentive Program still in place and being used to air condition the residence?

**o**  Yes, air conditioner is still in place and being used.

**o**  No, air conditioner has been removed or disconnected.

***Instrument for Telephone Survey Interview of Central Air Conditioner Households***

---

**Southern California Edison**

**1994 RAEI Program Retention Study**

Telephone Survey:
Central Air Conditioners

---

*Instructions to Interviewer:*

Hello, my name is _____ from ADM Associates. I am calling on behalf of Southern California Edison.  May I speak to _____*(Customer Name)*?

*If customer is not available, schedule a callback.*

*Once the contact has been made, make survey introduction:*

In 1994 Southern California Edison conducted a Residential Appliance Efficiency Incentive Program through which it paid rebates to customers who installed energy efficient central air conditioners.  Edison's records show that an energy efficient central air conditioner was installed at your residence in 1994 under the RAEI Program.

We are conducting a survey to see how long the energy efficient central air conditioners installed through Edison's program in 1994 remain in use.  We would be grateful for your cooperation in answering a few questions regarding the energy efficient central air conditioner installed at this residence.

1.  Is the central air conditioner installed at this residence in 1994 through Edison's program still in place?

    **o** Yes
      ↓

    Is that central air conditioner in a good state of repair?

        **o** Yes  *Go to Question 4.*

        **o** No  *Go to Question 2.*

    **o** No  *Go to Question 2.*

2.  Has the air conditioner installed in 1994 been broken or damaged?

    **o** No, it has not been broken or damaged.  *Go to Question 3.*

    **o** Yes, it has been broken or damaged.
      ↓

        a.  How was the air conditioner broken or damaged?

          (*Explain*) _____
          _____
          _____
          _____

        b.  When was the air conditioner broken/damaged?  _____*(Month/Year)*

3.  Has the air conditioner installed in 1994 been removed or disconnected?

    **o** No, it has not been removed or disconnected.  *Go to Question 4.*

    **o** Yes, it has been removed or disconnected.
      ↓

        a.  Why was the air conditioner removed or disconnected?

          **o** Air conditioner needed major repair.
          **o** Renovation of house required change to air conditioning system.
          **o** Cooling requirements changed.
          **o** Other (*Specify*)  _____
          _____
          _____
          _____

        b.  When was the air conditioner removed/disconnected?  _____*(Month/Year)*

        c.  Was the removal of the air conditioner part of a larger change?

          **o** No

          **o** Yes
          ↓

          What change was that?  _____
          _____
          _____

    d.  What, if anything, replaced the central air conditioner?

        o Air conditioner was removed but not replaced.

        o Air conditioner was replaced with a different type of cooling equipment.
          ⬇

          What was the air conditioner replaced with?
          (*Specify*) _____

          _____

          _____

        o Other (*Specify*) _____

4.  Were you living in this residence in 1994?

      o Yes

      o No
        ⬇

      When did you move into this residence? _____*(Month/Year)*

5.  Do you own or rent this residence?

      o Own residence

      o Rent residence

      o Don't know

6.  How many stories does this residence have?

      o One story

      o One-and-a-half stories

      o Two stories

      o Three or more stories

7.  How many rooms does this residence have? _____ *(Number of rooms)*

8.  What is the approximate size of the residence in square feet?
    _____ *(Square Feet)*

      o Don't know

9.  How many people live at this residence? _____*(Number of people)*

*That concludes my questions.  Thank you for your cooperation.*

### *Mail Out Letter for Heat Pump Households*

[Date]

[Inside Address]

[Salutation]

In 1994 Southern California Edison conducted a Residential Appliance Efficiency Incentive Program through which it paid rebates to customers who installed energy efficient heat pumps. We are now conducting a follow-up survey to determine how many of the heat pumps installed under that program are still installed and being used.

Edison's records show that an energy efficient heat pump was installed at this residence in 1994 under the RAEI Program. We would appreciate your filling out and returning the enclosed postcard. On the postcard, please check the appropriate box to indicate whether the heat pump installed in 1994 is still in place or whether that heat pump has failed, has been replaced, or has been removed.

If you have any questions regarding this survey, please feel free to call ?? at ??.

Very truly yours,

[Signee]

### *Postcard Questionnaire to Return for Heat Pump Households*

Is the heat pump installed in your residence in 1994 under Southern California Edison's Residential Appliance Efficiency Incentive Program still in place and being used to air condition the residence?

**o** Yes, heat pump is still in place and being used.

**o** No, heat pump has been removed or disconnected.

***Instrument for Telephone Survey Interview of Heat Pump Households***

---

**Southern California Edison**

**1994 RAEI Program Retention Study**

Telephone Survey:
Central and Through-the-Wall Heat Pumps

---

*Instructions to Interviewer:*

Hello, my name is _____ from ADM Associates. I am calling on behalf of Southern California Edison.  May I speak to _____*(Customer Name)*?

*If customer is not available, schedule a callback.*

*Once the contact has been made, make survey introduction:*

In 1994 Southern California Edison conducted a Residential Appliance Efficiency Incentive Program through which it paid rebates to customers who installed energy efficient heat pumps. Edison's records show that an energy efficient heat pump was installed at your residence in 1994 under the RAEI Program.

We are conducting a survey to see how long the energy efficient heat pumps installed through Edison's program in 1994 remain in use.  We would be grateful for your cooperation in answering a few questions regarding the energy efficient heat pump installed at this residence.

1. Is the heat pump installed at this residence in 1994 through Edison's program still in place?

   **o** Yes
   ⬇

   Is that heat pump in a good state of repair?

      **o** Yes *Go to Question 4.*

      **o** No *Go to Question 2.*

   **o** No *Go to Question 2.*

2. Has the heat pump installed in 1994 been broken or damaged?

   **o** No, it has not been broken or damaged. *Go to Question 3.*

   **o** Yes, it has been broken or damaged.
   ⬇

      a. How was the heat pump broken or damaged?

         (*Explain*) _____
         _____
         _____
         _____

      b. When was the heat pump broken/damaged? _____*(Month/Year)*

3. Has the heat pump installed in 1994 been removed or disconnected?

   **o** No, it has not been removed or disconnected. *Go to Question 4.*

   **o** Yes, it has been removed or disconnected.
   ⬇

      a. Why was the heat pump removed or disconnected?

         **o** Heat pump needed major repair.
         **o** Renovation of house required change to air conditioning system.
         **o** Cooling requirements changed.
         **o** Other (*Specify*) _____
         _____
         _____
         _____

      b. When was the heat pump removed/disconnected? _____*(Month/Year)*

      e. Was the removal of the heat pump part of a larger change?

         **o** No

         **o** Yes
      ⬇

      What change was that? _____
      _____
      _____

      f. What, if anything, replaced the heat pump?

      **o** Heat pump was removed  but not replaced.

      **o** Heat pump was replaced with a different type of cooling equipment.
      ⬇

        What was the heat pump replaced with?
        (*Specify*)  _____

        _____

        _____

      **o** Other (*Specify*)  _____

4. Were you living in this residence in 1994?

    **o** Yes

    **o** No
    ⬇

    When did you move into this residence?  _____*(Month/Year)*

5. Do you own or rent this residence?

    **o** Own residence

    **o** Rent residence

    **o** Don't know

6. How many stories does this residence have?

    **o** One story

    **o** One-and-a-half stories

    **o** Two stories

    **o** Three or more stories

7. How many rooms does this residence have?  _____ *(Number of rooms)*

8. What is the approximate size of the residence in square feet?

    _____ *(Square Feet)*

    **o** Don't know

9. How many people live at this residence? _____*(Number of people)*

*That concludes my questions.  Thank you for your cooperation.*

### *Mail Out Letter for Evaporative Cooler Households*

[Date]

[Inside Address]

[Salutation]

In 1994 Southern California Edison conducted a Residential Appliance Efficiency Incentive (RAEI) Program through which it paid rebates to customers who installed evaporative coolers. We are now conducting a follow-up survey to determine how many of the evaporative coolers installed under that program are still installed and being used.

Edison's records show that an evaporative cooler was installed at this residence in 1994 under the RAEI Program. We would appreciate your filling out and returning the enclosed postcard. On the postcard, please check the appropriate box to indicate whether the evaporative cooler installed in 1994 is still in place or whether that evaporative cooler has failed, has been replaced, or has been removed.

If you have any questions regarding this survey, please feel free to call ?? at ??.

Very truly yours,

[Signee]

### *Postcard Questionnaire to Return for Evaporative Cooler Households*

Is the evaporative cooler installed in your residence in 1994 under Southern California Edison's Residential Appliance Efficiency Incentive Program still in place and being used to air condition the residence?

**o** Yes, evaporative cooler is still in place and being used.

**o** No, evaporative cooler has been removed or disconnected.

***Instrument for Telephone Survey Interview of Evaporative Cooler Households***

---

**Southern California Edison**

**1994 RAEI Program Retention Study**

Telephone Survey:
Evaporative Coolers

---

*Instructions to Interviewer:*

Hello, my name is _____ from ADM Associates. I am calling on behalf of Southern California Edison.  May I speak to _____*(Customer Name)*?

*If customer is not available, schedule a callback.*

*Once the contact has been made, make survey introduction:*

In 1994 Southern California Edison conducted a Residential Appliance Efficiency Incentive Program through which it paid rebates to customers who installed energy efficient evaporative coolers.   Edison's records show that an energy efficient evaporative cooler was installed at your residence in 1994 under the RAEI Program.

We are conducting a survey to see how long the energy efficient evaporative coolers installed through Edison's program in 1994 remain in use.  We would be grateful for your cooperation in answering a few questions regarding the energy efficient evaporative cooler installed at this residence.

1.  Is the evaporative cooler installed at this residence in 1994 through Edison's program still in place?

    ❍ Yes
    ⬇

    Is that evaporative cooler in a good state of repair?

    ❍ Yes  *Go to Question 4.*

    ❍ No  *Go to Question 2.*

    ❍ No  *Go to Question 2.*

2.  Has the evaporative cooler installed in 1994 been broken or damaged?

    ❍ No, it has not been broken or damaged.  *Go to Question 3.*

    ❍ Yes, it has been broken or damaged.
    ⬇

    a.  How was the evaporative cooler broken or damaged?

    (*Explain*) _____
    _____
    _____
    _____

    b.  When was the evaporative cooler broken/damaged?  _____*(Month/Year)*

3.  Has the evaporative cooler installed in 1994 been removed or disconnected?

    ❍ No, it has not been removed or disconnected.  *Go to Question 4.*

    ❍ Yes, it has been removed or disconnected.
    ⬇

    a.  Why was the evaporative cooler removed or disconnected?

    ❍ Evaporative cooler needed major repair.
    ❍ Renovation of house required change to air conditioning system.
    ❍ Cooling requirements changed.
    ❍ Other (*Specify*)  _____
    _____
    _____
    _____

    b.  When was the evaporative cooler removed/disconnected?  _____*(Month/Year)*

    g.  Was the removal of the evaporative cooler part of a larger change?

    ❍ No

    ❍ Yes
    ⬇

    What change was that?  _____
    _____
    _____

    h.   What, if anything, replaced the evaporative cooler?

         ❍ Evaporative cooler was removed  but not replaced.

         ❍ Evaporative cooler was replaced with a different type of cooling equipment.
           ⬇

         What was the evaporative cooler replaced with?
         (*Specify*)  _____

         _____

         _____

         ❍ Other (*Specify*)  _____

4.  Were you living in this residence in 1994?

     ❍  Yes

     ❍  No
       ⬇

     When did you move into this residence?  _____*(Month/Year)*

5.  Do you own or rent this residence?

     ❍  Own residence

     ❍  Rent residence

     ❍  Don't know

6.  How many stories does this residence have?

     ❍  One story

     ❍  One-and-a-half stories

     ❍  Two stories

     ❍  Three or more stories

7.  How many rooms does this residence have? _____ *(Number of rooms)*

8.  What is the approximate size of the residence in square feet?
     _____ *(Square Feet)*

     ❍  Don't know

9.  How many people live at this residence? _____*(Number of people)*

*That concludes my questions.  Thank you for your cooperation.*

### *Mail Out Letter for Refrigerator Households That Have Not Moved*

[Date]

[Inside Address]

[Salutation]

In 1994 Southern California Edison conducted a Residential Appliance Efficiency Incentive Program through which it paid rebates to customers who installed energy efficient refrigerators. We are now conducting a follow-up survey to determine how many of the refrigerators installed under that program are still installed and being used.

Edison's records show that an energy efficient refrigerator was purchased for this residence in 1994 under the RAEI Program. We would appreciate your filling out and returning the enclosed postcard. On the postcard, please check the appropriate box to indicate whether the refrigerator installed in 1994 is still in place or whether that refrigerator has failed, has been replaced, or has been removed.

If you have any questions regarding this survey, please feel free to call ?? at ??.

Very truly yours,

[Signee]

### *Postcard Questionnaire to Return for Refrigerator Households That Had Not Moved*

Is the refrigerator purchased for your residence in 1994 under Southern California Edison's Residential Appliance Efficiency Incentive Program still in place and being used?

- **o** Yes, refrigerator is still in place and being used.

- **o** No, refrigerator has been removed or disconnected.

**Instrument for Telephone Survey Interview of Refrigerator Households That Have Not Moved**

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**Southern California Edison**

**1994 RAEI Program Retention Study**

Telephone Survey:
Refrigerators: Stayers

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*Instructions to Interviewer:*

Hello, my name is _____ from ADM Associates. I am calling on behalf of Southern California Edison.  May I speak to _____*(Customer Name)*?

*If customer is not available, schedule a callback.*

*Once the contact has been made, make survey introduction:*

In 1994 Southern California Edison conducted a Residential Appliance Efficiency Incentive Program through which it paid rebates to customers who installed energy efficient refrigerators. Edison's records show that an energy efficient refrigerator was installed at your residence in 1994 under the RAEI Program.

We are conducting a survey to see how long the energy efficient refrigerators installed through Edison's program in 1994 remain in use.  We would be grateful for your cooperation in answering a few questions regarding the energy efficient refrigerator installed at this residence.

1. Is the refrigerator installed at this residence in 1994 through Edison's program still in place?

    **o** Yes
    ⬇

    Is that refrigerator in a good state of repair?

    **o** Yes  *Go to Question 4.*

    **o** No  *Go to Question 2.*

    **o** No  *Go to Question 2.*

2. Has the refrigerator installed in 1994 been broken or damaged?

    **o** No, it has not been broken or damaged.  *Go to Question 3.*

    **o** Yes, it has been broken or damaged.
    ⬇

    a.  How was the refrigerator broken or damaged?

    (*Explain)* _____

    _____

    _____

    _____

    b.  When was the refrigerator broken/damaged?  _____*(Month/Year)*

3. Has the refrigerator installed in 1994 been removed or disconnected?

    **o** No, it has not been removed or disconnected.  *Go to Question 4.*

    **o** Yes, it has been removed or disconnected.
    ⬇

    a.  Why was the refrigerator removed or disconnected?

    **o** Refrigerator needed major repair.
    **o** Renovation of house required change to air conditioning system.
    **o** Cooling requirements changed.
    **o** Other (*Specify*)  _____

    _____

    _____

    _____

    b.  When was the refrigerator removed/disconnected?  _____*(Month/Year)*

    c.  Was the removal of the refrigerator part of a larger change?

    **o** No

    **o** Yes
    ⬇

    What change was that?  _____

    _____

    _____

    d.  What, if anything, replaced the refrigerator?

❍ Refrigerator was removed  but not replaced.

❍ Refrigerator was replaced with a different type of cooling equipment.
    ⬇

    What was the refrigerator replaced with?
    (*Specify*)  _____

    _____
    _____

❍ Other (*Specify*)  _____

4.  Were you living in this residence in 1994?

    ❍  Yes

    ❍  No
       ⬇
    When did you move into this residence?  _____*(Month/Year)*

5.  Do you own or rent this residence?

    ❍  Own residence

    ❍  Rent residence

    ❍  Don't know

6.  How many stories does this residence have?

    ❍  One story

    ❍  One-and-a-half stories

    ❍  Two stories

    ❍  Three or more stories

7.  How many rooms does this residence have? _____ *(Number of rooms)*

8.  What is the approximate size of the residence in square feet?
    _____ *(Square Feet)*

    ❍  Don't know

9.  How many people live at this residence? _____*(Number of people)*

*That concludes my questions.  Thank you for your cooperation.*

### *Mail Out Letter for Refrigerator Households That Had Moved*

[Date]

[Inside Address]

[Salutation]

In 1994 Southern California Edison conducted a Residential Appliance Efficiency Incentive Program through which it paid rebates to customers who installed energy efficient refrigerators. We are now conducting a follow-up survey to determine how many of the refrigerators purchased under that program are still being used.

Edison's records show that you received a rebate for purchasing an energy efficient refrigerator in 1994 while living at a previous residence.  We would appreciate your filling out and returning the enclosed postcard.  On the postcard, please check the appropriate box to indicate whether you are still using the refrigerator you bought in 1994, you left the refrigerator at your previous residence,  or have otherwise disposed of that refrigerator.

If you have any questions regarding this survey, please feel free to call ?? at ??.

Very truly yours,

[Signee]

### *Postcard Questionnaire to Return for Refrigerator Households That Had Moved*

How is the refrigerator you purchased in 1994 under Southern California Edison's Residential Appliance Efficiency Incentive Program now being used?

- Left that refrigerator at old residence when we moved.

- Took that refrigerator with us to new residence and are still using.

- Sold or gave away that refrigerator.

- Had to get rid of that refrigerator when it stopped working.

***Instrument for Telephone Survey Interview of Refrigerator Households That Have Moved***

<div style="border:1px solid black; padding:20px;">

**Southern California Edison**

**1994 RAEI Program Retention Study**

Telephone Survey:
Refrigerators: Moved Out

Draft Version: 9/21/98

</div>

*Instructions to Interviewer:*

Hello, my name is _____ from ADM Associates. I am calling on behalf of Southern California Edison.  May I speak to _____*(Customer Name)*?

*If customer is not available, schedule a callback.*

*Once the contact has been made, make survey introduction:*

In 1994 Southern California Edison conducted a Residential Appliance Efficiency Incentive Program through which it paid rebates to customers who bought energy efficient refrigerators. Edison's records show that you purchased an energy efficient refrigerator and received a rebate for that refrigerator while living at your previous residence.

We are conducting a survey to see how long the energy efficient refrigerators purchased with Edison's rebate in 1994 remain in use.  We would be grateful for your cooperation in answering a few questions regarding the energy efficient refrigerator you purchased.

1.  When did you move into this residence?  _____*(Month/Year)*

2.  Did you bring the refrigerator you bought in 1994 with a rebate from Southern California Edison to this residence?
    - Yes, we brought that refrigerator from our previous residence.  *Go to Question 3.*
    - No, there was no refrigerator here but we bought a new refrigerator.  *Go to Question 4.*
    - No, there was a refrigerator here when we moved in.  *Go to Question 4.*

3.  Is the refrigerator you bought in 1994 still in a good state of repair?
    - Yes  *Go to Question 5.*
    - No
      ⬇
      a.  Has the refrigerator you bought in 1994 been broken or damaged?
          - No, it has not been broken or damaged.  *Go to Question 5.*
          - Yes, it has been broken or damaged.
            ⬇
            a.  How was the refrigerator broken or damaged?
            (*Explain*) _____
            _____
            _____
            _____

            b.  When was the refrigerator broken/damaged?  _____*(Month/Year)*

4.  What did you do with the refrigerator you bought in 1994??
    - Left it at old residence.  *Go to Question 5.*
    - Sold or gave that refrigerator away.
    - That refrigerator had stopped working and we got rid of it.
      ⬇
      a. When did the refrigerator stop working? _____*(Month/Year)*

5.  Do you own or rent the residence you now live in?
    - Own residence
    - Rent residence
    - Don't know

6.  How many stories does this residence have?
    - One story
    - One-and-a-half stories
    - Two stories
    - Three or more stories

7.  How many rooms does this residence have? _____ *(Number of rooms)*

8.  What is the approximate size of the residence in square feet?
    _____ (*Square Feet*)
    o  Don't know

9.  How many people live at this residence? _____ *(Number of people)*

*That concludes my questions.  Thank you for your cooperation.*

# *HOME ENERGY SURVEY*

Thank you for your help!  Your participation is very important to us.  The information you provide helps us plan for the electric and natural gas needs for you and all Californians.  Please complete the survey for the service address listed below:

*(SFCODE)*

Please fill out the survey for the home at the address to the left.

## YOUR PARTICIPATION IS VERY IMPORTANT

Please fill out this survey with a **PENCIL**, filling in the oval completely as illustrated to the right. Information in **red** helps to clarify questions. Information in **blue** directs you to skip to another question based on your response.
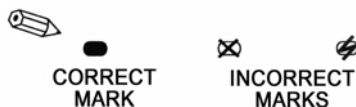
Do your best to answer all of the questions. If you do not know the answer to one of the questions, please move on to the next one. If you would like help in completing the survey, you can call our toll free survey line at 1-800-331-8786 from 8:30 a.m. to 7 p.m. Monday through Friday. You may leave a message at all other times and we will call you back with a response.

When you are done, please return the survey in the enclosed postage-paid envelope to the address below:

CEC                Survey               Processing            Center
     492                Ninth             Street,              Suite             220
     Oakland, CA 94607-4048

## Thank you for participating!

## Sponsored by:

California Energy Commission           Southern California Edison

Pacific Gas and Electric                Southern California Gas Company

San Diego Gas and Electric            Los Angeles Dept. of Water and Power

# Your Home & Lifestyle

**A1**

What type of building exists at the service address on the front cover of this survey? (DWLTYPE) (RES – Cleaned dwltype)

₁⃝ Single-family detached house ➡ Number of stories: ₁⃝ 1  ₁⃝ 2  ₁⃝ 3 or more (STORIES)

₂⃝ Townhouse, duplex, or row house *(Shares exterior walls with neighboring unit, but not roof or floor)*

₃⃝ Apartment or condominium (2 – 4 units)

₄⃝ Apartment or condominium (5 or more units)

₅⃝ Mobile home

₆⃝ Other *(Describe:* (DWLOTRD)_____*)*

**A2**

Do you own or rent this home? (OWNRENT)

₁⃝ Own / buying ₂⃝ Rent / lease

**A3**

How long have you lived at this address? (YRS_RES)

| | | | |
|---|---|---|---|
| ₁⃝ 1 yr or less | ₆⃝ 6 years | ₁₁⃝ 11 years | ₁₆⃝ 16 – 20 years |
| ₂⃝ 2 years | ₇⃝ 7 years | ₁₂⃝ 12 years | ₁₇⃝ 21 – 30 years |
| ₃⃝ 3 years | ₈⃝ 8 years | ₁₃⃝ 13 years | ₁₈⃝ More than 30 years |
| ₄⃝ 4 years | ₉⃝ 9 years | ₁₄⃝ 14 years | |
| ₅⃝ 5 years | ₁₀⃝ 10 years | ₁₅⃝ 15 years | |

**A4**

What best describes this residence? (SEASOCC)

₁⃝ This is my permanent year-round residence. (Go to *A6.*)

₂⃝ This is my partial-year or seasonal residence.

₃⃝ This is my vacation home and is generally used only by my family.

₄⃝ This is a vacation rental home.

**A5**

If this is a partial-year or vacation home, please indicate the months this home is typically occupied? *(Mark all months that apply.)*

| ₁⃝ Jan (SEASJAN) | ₁⃝ Mar (SEASMAR) | ₁⃝ May (SEASMAY) | ₁⃝ Jul (SEASJUL) | ₁⃝ Sept (SEASSEP) | ₁⃝ Nov (SEASNOV) |
|---|---|---|---|---|---|
| ₁⃝ Feb (SEASFEB) | ₁⃝ Apr (SEASAPR) | ₁⃝ Jun (SEASJUN) | ₁⃝ Aug (SEASAUG) | ₁⃝ Oct (SEASOCT) | ₁⃝ Dec (SEASDEC) |

**A6**

Approximately what year was this residence built? (BUILTYR)

(HOMEAGE – cleaned Builtyr, not including Master Metered (MM))

₁⃝ Before 1940   ₈⃝ 1973   ₁₅⃝ 1980   ₂₂⃝ 1987   ₂₉⃝ 1994   ₃₆⃝ 2001

| | | | | | |
|---|---|---|---|---|---|
| ₂⃝ 1940-1949 | ₉⃝ 1974 | ₁₆⃝ 1981 | ₂₃⃝ 1988 | ₃₀⃝ 1995 | ₃₇⃝ 2002 |
| ₃⃝ 1950-1959 | ₁₀⃝ 1975 | ₁₇⃝ 1982 | ₂₄⃝ 1989 | ₃₁⃝ 1996 | ₃₈⃝ 2003 |
| ₄⃝ 1960-1969 | ₁₁⃝ 1976 | ₁₈⃝ 1983 | ₂₅⃝ 1990 | ₃₂⃝ 1997 | |
| ₅⃝ 1970 | ₁₂⃝ 1977 | ₁₉⃝ 1984 | ₂₆⃝ 1991 | ₃₃⃝ 1998 | |
| ₆⃝ 1971 | ₁₃⃝ 1978 | ₂₀⃝ 1985 | ₂₇⃝ 1992 | ₃₄⃝ 1999 | |
| ₇⃝ 1972 | ₁₄⃝ 1979 | ₂₁⃝ 1986 | ₂₈⃝ 1993 | ₃₅⃝ 2000 | |

## A7

How many bedrooms are in your home? (NUMROOM)

| | | | |
|---|---|---|---|
| ₁⃝ No bedrooms (studio apartment) | ₄⃝ 3 | ₇⃝ 6 | ₁₀⃝ 9 |
| ₂⃝ 1 bedroom | ₅⃝ 4 | ₈⃝ 7 | ₁₁⃝ 10 |
| ₃⃝ 2 bedrooms | ₆⃝ 5 | ₉⃝ 8 | ₁₂⃝ More than 10 |

## A8

How many square feet of **living space** are there in your residence, including bathrooms, foyers and hallways? *(Exclude garages, basements and unheated porches.)* (SQFT) (SQFT_A – cleaned continuous sqft, not including MM)

| | | |
|---|---|---|
| ₁⃝ Less than 250 | ₅⃝ 1001 – 1250 | ₉⃝ 2501 – 3000 |
| ₂⃝ 250 – 500 | ₆⃝ 1251 – 1500 | ₁₀⃝ 3001 – 4000 |
| ₃⃝ 501 – 750 | ₇⃝ 1501 – 2000 | ₁₁⃝ 4001 – 5000 |
| ₄⃝ 751 –1000 | ₈⃝ 2001 – 2500 | ₁₂⃝ Greater than 5000 |

## A9

Are your home's **exterior walls** insulated? (EXTWLINS)

₁⃝ Yes, all walls     ₁⃝ Yes, some walls     ₁⃝ No

## A10

Is your home's **attic/ceiling** insulated? (ACEILINS)

₁⃝ Yes ➡ **A11**     If yes, estimate the number of inches of **attic/ceiling** insulation. (CEILINCH)

₂⃝ No

₁⃝ 0 – 3 inches *(R-value less than R-10)*
₂⃝ 4 – 6 inches *(R-11 to R-19)*
₃⃝ 7 – 10 inches *(R-20 to R-30)*
₄⃝ More than 10 inches *(R-31 or higher)*

## A12

Choose the statement that best describes your **windows**. (WINDTYPE)

₁⃝ All or most are double pane windows
₂⃝ All or most are single pane windows
₃⃝ My home has a mixture of single pane and double pane windows

## A13

Choose the statement that best describes the frames on your **windows**. (WINFRAME)

₁⃝ All or most have vinyl window frames
₂⃝ All or most have wood window frames
₃⃝ All or most have metal window frames

## A14

Has your home been remodeled in the past 12 months? (REMOD)

₁⃝ **No** *(Go to A16.)*

₂⊂⊃ Yes ➡**A15**

If yes, what type of remodel did you do? *(Choose all that apply.)*

₁⊂⊃ Room addition, added square footage to home (RMDROOM)
₁⊂⊃ Kitchen or bath re-model (RMDKTBTH)

₁⊂⊃ Re-built most of the home (RMDREBLT)

₁⊂⊃ Other (RMDOTHR)

## A16

For each of the following age groups, how many people, including yourself, usually live in this home? (NUMI – plugged continuous number in household, not including MM)

**Number of People Usually Living In This Home**

| Age | None | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Over 7 |
|---|---|---|---|---|---|---|---|---|---|
| 5 and under (NR0_5) | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ |
| 6 – 18 (NR6_18) | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ |
| 19 – 34 (NR19_34) | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ |
| 35 – 54 (NR35_54) | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ |
| 55 – 64 (NR55_64) | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ |
| 65 and over (NR65_99) | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ | ₁⊂⊃ |

## A17

Generally speaking, how often does a member of this household use major **electrical** appliances or equipment (e.g., clothes washer, electric range, dishwasher, air conditioner, etc.) on **weekdays from 12 noon to 6 pm**? (ONPKUSE)

₁⊂⊃ Frequently *(3 – 5 weekdays per week)*
₂⊂⊃ Occasionally *(1 – 2 weekdays per week)*
₃⊂⊃ Rarely or Never *(Less than 1 weekday per week)*

## A18

Is natural gas service from underground pipes from the gas utility available in your neighborhood? (NGSERV)

₁⊂⊃ Yes          ₁⊂⊃ No *(Go to B1.)*

## A19

Do you have a natural gas line or hook-up to any part of your home? (NGLINE)

₁⊂⊃ Yes          ₁⊂⊃ No

## A20

What utility do you pay for **natural gas** service to your home? (NGUTIL)

₁⊂⊃ Pacific Gas & Electric (PG&E)          ₄⊂⊃ Southwest Gas Corporation
₂⊂⊃ San Diego Gas & Electric               ₅⊂⊃ City of Coalinga
₃⊂⊃ Southern California Gas Company     ₆⊂⊃ City of Long Beach Gas Department
    ("The Gas Company")                      ₇⊂⊃ Not sure

# Space Heating

**B1**

Do you pay to heat your home?  (PAYHEAT)

₁⊂⊃ Yes     ₂⊂⊃ No, it is part of my rent/condo fee *(Go to B8.)*

₃⊂⊃ No, do not have a heating system *(Go to B8.)*

**B2**

What type of heating system do you use to heat this home?

*(If you use more than one heating system, mark the system that you use the most as "Main Heating" and mark all other systems as "Additional Heating.")*

(PHTFUEL3 – Plugged heating fuel)

| | **Main Heating** *(Mark only ONE BOX below)* | **Additional Heating** *(Mark ALL BOXES that apply)* |
|---|---|---|
| **NATURAL GAS (from gas utility)** | | |
| Central forced-air furnace *(fan circulates hot air through air ducts)* | ₁⊂⊃ (PHTNGCNT) | ₁⊂⊃ (AHTNGCNT) |
| Floor or wall heater/furnace | ₁⊂⊃ (PHTNGFWL) | ₁⊂⊃ (AHTNGFWL) |
| Hot water radiator | ₁⊂⊃ (PHTNGRAD) | ₁⊂⊃ (AHTNGRAD) |
| Other system type | ₁⊂⊃ (PHTNGOTH) | ₁⊂⊃ (AHTNGOTH) |
| **ELECTRIC** | | |
| Resistance (baseboard/ceiling/floor/wall) | ₁⊂⊃ (PHTELBSB) | ₁⊂⊃ (AHTELBSB) |
| Central forced air furnace *(fan circulates hot air through air ducts)* | ₁⊂⊃ (PHTELCRH) | ₁⊂⊃ (AHTELCRH) |
| Central heat pump *(heats and cools)* | ₁⊂⊃ (PHTELCHP) | ₁⊂⊃ (AHTELCHP) |
| Through-the-wall heat pump *(looks like a window/wall air conditioner, but also provides heat)* | ₁⊂⊃ (PHTELWHP) | ₁⊂⊃ (AHTELWHP) |
| Portable heaters | ₁⊂⊃ (PHTELPOR) | ₁⊂⊃ (AHTELPOR) |
| Other system type | ₁⊂⊃ (PHTELOTH) | ₁⊂⊃ (AHTELOTH) |
| **BOTTLED GAS (propane, LP)** | | |
| Central forced air furnace *(fan circulates hot air through air ducts)* | ₁⊂⊃ (PHTBGCNT) | ₁⊂⊃ (AHTBGCNT) |
| Floor or wall heater/furnace | ₁⊂⊃ (PHTBGFWL) | ₁⊂⊃ (AHTBGFWL) |
| Hot water radiator | ₁⊂⊃ (PHTBGRAD) | ₁⊂⊃ (AHTBGRAD) |
| Other system type | ₁⊂⊃ (PHTBGOTH) | ₁⊂⊃ (AHTBGOTH) |
| **WOOD** | | |
| Woodstove/fireplace insert | ₁⊂⊃ (PHTWDWS) | ₁⊂⊃ (AHTWDWS) |
| Fireplace | ₁⊂⊃ (PHTWDFP) | ₁⊂⊃ (AHTWDFP) |
| **SOLAR** | | |
| Solar – no backup | ₁⊂⊃ (PHTSLRN) | ₁⊂⊃ (AHTSLRN) |
| Solar – natural gas backup | ₁⊂⊃ (PHTSLRG) | ₁⊂⊃ (AHTSLRG) |
| Solar – propane backup | ₁⊂⊃ (PHTSLRP) | ₁⊂⊃ (AHTSLRP) |
| Solar – electric backup | ₁⊂⊃ (PHTSLRE) | ₁⊂⊃ (AHTSLRE) |
| **OTHER** | ₁⊂⊃ (PHTOTSYS) | ₁⊂⊃ (AHTOTSYS) |

*(Describe):* (HTOTSYSD)_____

**B3**

If your heating system(s) use natural gas for fuel, indicate whether it has a pilot light(s).

| | | |
|---|---|---|
| Main gas heating (MAINPILT) | ₁⊂⊃ Yes, pilot light | ₂⊂⊃ No pilot light |
| Secondary gas heating (SECPILT) | ₁⊂⊃ Yes, pilot light(s) | ₂⊂⊃ No pilot light(s) |

**B4**

How old is your main heating system? (HTSYSAGE)

₁⬭ Less than one year    ₃⬭ 4 – 8 years    ₅⬭ 14 – 30 years
₂⬭ 1 – 3 years    ₄⬭ 9 – 13 years    ₆⬭ Over 30 years

**B5**

What type of thermostat does your main heating system(s) use? (HTCTLTYP)

₁⬭ Programmable thermostat *(Digital units usually have a digital readout and buttons. Mechanical units usually have a clock or rotary timer and tabs, pins or levers.)*
₂⬭ Standard thermostat *(Allows you to set the temperature and turn the heater on or off. You cannot set on/off times.)*
₃⬭ No thermostat *(Simple on/off control or steam valve)* *(Go to B7.)*

**B6**

If your main heating system is controlled by a thermostat, what is the average thermostat temperature usually set for each time period during the heating season? *(Choose one answer for each time period. Provide the average setting if it varies.)*

| | Off | Below 55°F | 55 – 60°F | 61 – 65°F | 66 – 70°F | 71 – 75°F | Over 75°F |
|---|---|---|---|---|---|---|---|
| Morning *(6am-9am)* (HMRNSET) | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ |
| Day *(9am-5pm)* (HDAYSET) | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ |
| Evening *(5pm-9pm)* (HEVNSET) | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ |
| Night *(9pm-6am)* (HNITESET) | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ |

**B7**

Has maintenance been performed on your main heating system in the past

12 months? (HTMAINTN)

₁⬭ Yes      ₂⬭ No

**B8**

How many electric portable heaters do you use? (NPORHTRS)

₁⬭ I don't use portable heaters    ₃⬭ 2 portable heaters
₂⬭ 1 portable heater    ₄⬭ 3 or more portable heaters

**B9**

How often do you use any additional heating system(s), including portable heaters, during the heating season? (USEADDHT)

₁⬭ No additional heating    ₄⬭ Often *(2 to 4 days per week)*
₂⬭ Rarely *(once per month)*    ₅⬭ Always *(5 to 7 days per week)*
₃⬭ Sometimes *(once per week)*

# Space Cooling

### 4.4.1.1.1   CENTRAL AIR CONDITIONING/COOLING

**C1**

Do you pay for central air conditioning/cooling for your home? (PAYCOOL)

₁⬭ Yes    ₂⬭ No, it is part of my rent/condo fee *(Go to C7.)*
     ₃⬭ No, do not have central air conditioning *(Go to C7.)*

**C2**

What type and how many central air conditioning/cooling system(s) do you have in your home?

(COOLING – Plugged combo of CAC/RAC)      **Number of Central Cooling Systems**

| | **1** | **2** | **3 or more** |
|---|---|---|---|
| Central air conditioning (CTLACAGE) | ₁⬭ | ₂⬭ | ₃⬭ |
| Central evaporative cooler *(swamp cooler)* (CTEVPAGE) | ₁⬭ | ₂⬭ | ₃⬭ |
| Heat pump *(heats and cools)* (HPAGE) | ₁⬭ | ₂⬭ | ₃⬭ |

**C3**

How old is your main central air conditioning/cooling unit? (CLCNTAGE)

₁⬭ Less than one year    ₃⬭ 4 – 8 years    ₅⬭ 14 – 30 years
₂⬭ 1 – 3 years    ₄⬭ 9 – 13 years    ₆⬭ Over 30 years

**C4**

What type of thermostat does your main cooling system(s) use? (CLCTLTYP)

₁⬭ Programmable thermostat *(Digital units usually have a digital readout and buttons. Mechanical units usually have a clock or rotary timer and tabs, pins or levers.)*

₂⬭ Standard thermostat *(Allows you to set the temperature and turn the air conditioner on or off. You cannot set on/off times.)*

₃⬭ No thermostat *(Simple on/off control) (Go to C6.)*

**C5**

What is the typical thermostat temperature setting of your main central cooling system for each time period during the cooling season? *(Choose one answer for each time period.)*

| | **Off** | **Below 70°F** | **70 – 73°F** | **74 – 76°F** | **77 – 80°F** | **Over 80°F** |
|---|---|---|---|---|---|---|
| Morning *(6am–9am)* (CMRNSET) | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ |
| Day *(9am-5pm)* (CDAYSET) | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ |
| Evening *(5pm-9pm)* (CEVNSET) | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ |
| Night *(9pm-6am)* (CNITESET) | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ | ₁⬭ |

**C6**

Has maintenance been performed on your central air conditioning system in the past 12 months? (CLMAINTN)

₁⬭ Yes      ₂⬭ No

**4.4.1.1.2  ROOM AIR CONDITIONING/COOLING  (Window / Wall Units)**

## C7

Please tell us the characteristics of each room air conditioning/cooling unit below.

₁▭ No room air conditioning/cooling units *(Go to D1.)*   (NOROOMAC)

| | **Unit 1** | **Unit 2** | **Unit 3** |
|---|---|---|---|
| **Type of Room AC/Cooling Unit** | (ACTYP1) | (ACTYP2) | (ACTYP3) |
| Window/wall air conditioner | ₁▭ | ₁▭ | ₁▭ |
| Window/wall heat pump | ₂▭ | ₂▭ | ₂▭ |
| Window/wall evaporative cooler *(swamp cooler)* | ₃▭ | ₃▭ | ₃▭ |
| **Age of Room AC/Cooling Unit** | (ACAGE1) | (ACAGE2) | (ACAGE3) |
| Less than one year | ₁▭ | ₁▭ | ₁▭ |
| 1 – 3 years | ₂▭ | ₂▭ | ₂▭ |
| 4 – 8 years | ₃▭ | ₃▭ | ₃▭ |
| 9 – 13 years | ₄▭ | ₄▭ | ₄▭ |
| More than 13 years | ₅▭ | ₅▭ | ₅▭ |

## C8

Please indicate how often your room air conditioning/cooling unit(s) is/are turned on during the cooling season. *(Choose one answer for each time period.)*

| Time Period | **Never** | **Rarely** *(1-2 days per week)* | **Sometimes** *(3-4 days per week)* | **Often** *(5-6 days per week)* | **Always** *(7 days per week)* |
|---|---|---|---|---|---|
| Morning *(6am-9am)* (CMRNUSE) | ₁▭ | ₁▭ | ₁▭ | ₁▭ | ₁▭ |
| Day *(9am–5pm)* (CDAYUSE) | ₁▭ | ₁▭ | ₁▭ | ₁▭ | ₁▭ |
| Evening *(5pm–9pm)* (CEVNUSE) | ₁▭ | ₁▭ | ₁▭ | ₁▭ | ₁▭ |
| Night *(9pm–6am)* (CNITEUSE) | ₁▭ | ₁▭ | ₁▭ | ₁▭ | ₁▭ |
| Hot weekday afternoon *(noon–6pm)* (CHOTUSE) | ₁▭ | ₁▭ | ₁▭ | ₁▭ | ₁▭ |

# Water Heating

## D1

Do you pay for heating water at your residence? (PAYWH)

₁▭ Yes      ₂▭ No, it is part of my rent/condo fee *(Go to D6.)*

                 ₃▭ No hot water heater *(Go to D6.)*

## D2

What type of water heating systems do you use in your home?

(PWHFUEL3 – Plugged Water Heating Fuel)

| | **Main Water Heater** *(Mark only ONE BOX in this column)* | **Additional Water Heater(s)** *(Mark ALL BOXES that apply)* |
|---|---|---|
| **NATURAL GAS** | | |
| Standard tank | ₁▭ (PWHNGTNK) | ₁▭ (AWHNGTNK) |
| Whole house tankless system | ₁▭ (PWHNGWHT) | ₁▭ (AWHNGWHT) |

**ELECTRIC**

| | | |
|---|---|---|
| Standard tank | ₁◯ (PWHELTNK) | ₁◯ (AWHELTNK) |
| Heat pump | ₁◯ (PWHELHP) | ₁◯ (AWHELHP) |
| Whole house tankless system | ₁◯ (PWHELWHT) | ₁◯ (AWHELWHT) |
| Point-of use tankless system | ₁◯ (PWHELPNT) | ₁◯ (AWHELPNT) |

**PROPANE**

| | | |
|---|---|---|
| Standard tank | ₁◯ (PWHLPTNK) | ₁◯ (AWHLPTNK) |
| Whole house tankless system | ₁◯ (PWHLPWHT) | ₁◯ (AWHLPWHT) |

**SOLAR**

| | | |
|---|---|---|
| With no backup system | ₁◯ (PWHSLRN) | ₁◯ (AWHSLRN) |
| With natural gas backup | ₁◯ (PWHSLRG) | ₁◯ (AWHSLRG) |
| With propane backup | ₁◯ (PWHSLRP) | ₁◯ (AWHSLRP) |
| With electric backup | ₁◯ (PWHSLRE) | ₁◯ (AWHSLRE) |

**OTHER FUEL**      ₁◯ (PWHOTSYS)      ₁◯ (AWHOTSYS)
*Describe: (*WHOTSYSD)_____

## D3

What is the typical hot water heater temperature setting? *(Medium is the standard factory setting.)* (WHTEMP)

₁◯ Low *(below 130°F)*      ₂◯ Medium *(130°F – 150°F)*      ₃◯ High *(over 150°F)*

## D4

How old is your primary water heating system? (PRWHAGE)

₁◯ Less than one year      ₃◯ 4 – 8 years      ₅◯ 14 – 30 years
₂◯ 1 – 3 years      ₄◯ 9 – 13 years      ₆◯ Over 30 years

## D5

Does your hot water heater(s) have an insulation blanket(s)? (TANKINS)

₁◯ Yes      ₂◯ No

## D6

How many total showers and baths are taken in your home on a **typical day**?

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 or more |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Showers / day (SHWRDAY) | ₁◯ | ₁◯ | ₁◯ | ₁◯ | ₁◯ | ₁◯ | ₁◯ | ₁◯ | ₁◯ | ₁◯ | ₁◯ |
| Baths / day (BATHSDAY) | ₁◯ | ₁◯ | ₁◯ | ₁◯ | ₁◯ | ₁◯ | ₁◯ | ₁◯ | ₁◯ | ₁◯ | ₁◯ |

## D7

Do you have low-flow showerheads installed in the shower(s)? *(Low-flow showerheads use 2.5 gallons per minute or less and have been standard since 1993.)* (SHOWERHD)

₁◯ Yes, all showers      ₂◯ Yes, some showers      ₃◯ No

## D8

Do the faucets in your home have water-saving aerators? *(Aerators are add-on devices that reduce the water usage by mixing air into the water stream.)* (AERATORS)

₁◯ Yes, all faucets      ₂◯ Yes, some faucets      ₃◯ No

# Laundry

## E1

Do you have the use of laundry equipment in your home? (LNDRYEQP)

₁◯ Yes      ₂◯ No, laundry facilities are located in a common area of the building. *(Go to F1.)*
     ₃◯ I do not use laundry facilities in my building *(Go to F1.)*

## E2

What type of clothes washer do you have? (CWTYP)

*(Do not include coin-operated machines or machines in common areas.)*
₁⃝ Top loading washer          ₂⃝ Front loading washer

### E3

How old is your clothes washer? (CWAGE)

₁⃝ Less than one year     ₃⃝ 6 – 8 years       ₅⃝ 16 – 30 years
₂⃝ 1 – 5 years           ₄⃝ 9 – 15 years      ₆⃝ Over 30 years

### E4

For each wash temperature below, how many loads of clothes do you wash in your home during a **typical week**?

**Number Clothes Washer Loads per Week**

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 or more |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hot water (CWHWLD) | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ |
| Warm water (CWWWLD) | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ |
| Cold water (CWCWLD) | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ | ₁⃝ |

### E5

What type of clothes dryer do you have? (CDTYP)

*(Do not include coin-operated machines or machines in common areas.)*

₁⃝ I do not have a clothes dryer   ₃⃝ Electric dryer
₂⃝ Natural gas dryer              ₄⃝ Bottled gas *(Propane, Butane, LP)*

### E6

How many loads of clothes do you dry in your clothes dryer during a **typical week**? (DRYLDS)

₁⃝ None     ₃⃝ 2     ₅⃝ 4     ₇⃝ 6     ₉⃝ 8     ₁₁⃝ 10 or more

₂⃝ 1        ₄⃝ 3     ₆⃝ 5     ₈⃝ 7     ₁₀⃝ 9

## Food Preparation

### F1

Which of the following cooking appliances are used in your home? *(Choose all that apply.)*

| Cooking Appliance | Type of Fuel | | | | Age In Years | | | |
|---|---|---|---|---|---|---|---|---|
| | Nat. Gas | Elec-tric | Bottled Gas | Other | 0–5 yrs | 6–10 yrs | 11–15 years | Over 15 years |
| Cooktop, stovetop or Range | ₁⃝ (CKRNTYP) | ₂⃝ | ₃⃝ | ₄⃝ | ₁⃝ (CKRNA) | ₂⃝ | ₃⃝ | ₄⃝ |
| Oven(s) | ₁⃝ (CKOVTYP) | ₂⃝ | ₃⃝ | ₄⃝ | ₁⃝ (CKOVA) | ₂⃝ | ₃⃝ | ₄⃝ |
| Outdoor barbecue | ₁⃝ (CKBBTYP) | ₂⃝ | ₃⃝ | ₄⃝ | ₁⃝ (CKBBQA) | ₂⃝ | ₃⃝ | ₄⃝ |

### F2

During a typical **week**, how often do you use your range or oven?

| **Never** | **Rarely** *(less than once)* | **Occasionally** *(1 – 2 times per week)* | **Sometimes** *(3 – 4 times per week)* | **Often** *(5 – 7 times per week)* |
|---|---|---|---|---|

*per week)*

| | | | | | |
|---|---|---|---|---|---|
| Breakfast (BRNOVUSE) | 1 ⬭ | 2 ⬭ | 3 ⬭ | 4 ⬭ | 5 ⬭ |
| Lunch (LRNOVUSE) | 1 ⬭ | 2 ⬭ | 3 ⬭ | 4 ⬭ | 5 ⬭ |
| Dinner (DRNOVUSE) | 1 ⬭ | 2 ⬭ | 3 ⬭ | 4 ⬭ | 5 ⬭ |
| Other (ORNOVUSE) | 1 ⬭ | 2 ⬭ | 3 ⬭ | 4 ⬭ | 5 ⬭ |

**F3**

Do you have a **microwave oven**? (MWUSE)

1 ⬭ Yes, and it is used often (7 or more times per week)
2 ⬭ Yes, and it is used less than 7 times per week
3 ⬭ No

**F4**

Do you have a **dishwasher**? (DISHWASH)

1 ⬭ Yes        2 ⬭ No *(Go to G1.)*

**F5**

How many dishwasher loads are run in a **typical week**? (DWLOADS)

1 ⬭ None      3 ⬭ 2      5 ⬭ 4      7 ⬭ 6      9 ⬭ 8
2 ⬭ 1         4 ⬭ 3      6 ⬭ 5      8 ⬭ 7      10 ⬭ 9 or more

# Refrigerators

**G1**

How many refrigerators do you have plugged in? (RFNUM)

1 ⬭ 0 *(Go to H1.)*      2 ⬭ 1      3 ⬭ 2      4 ⬭ 3 or more

**G2**

Please tell us the characteristics of each refrigerator, and for any refrigerator you discarded in the past 12 months, in the table below.

| | Refrig 1 | Refrig 2 | Refrig 3 | Old Refrigerator Discarded in the Last 12 Months |
|---|---|---|---|---|
| **Door Style** | (RF1STY) | (RF2STY) | (RF3STY) | (RFDSCSTY) |
| Single-door | 1 ⬭ | 1 ⬭ | 1 ⬭ | 1 ⬭ |
| Top Freezer – Bottom Refrigerator | 2 ⬭ | 2 ⬭ | 2 ⬭ | 2 ⬭ |
| Top Refrigerator – Bottom Freezer | 3 ⬭ | 3 ⬭ | 3 ⬭ | 3 ⬭ |
| Side-by-side | 4 ⬭ | 4 ⬭ | 4 ⬭ | 4 ⬭ |
| **Size, in Cubic Feet** | (RF1SZ) | (RF2SZ) | (RF3SZ) | (RFDSCSZ) |
| Mini *(under 13 cu. ft.)* | 1 ⬭ | 1 ⬭ | 1 ⬭ | 1 ⬭ |
| Small *(13 – 16 cu. ft.)* | 2 ⬭ | 2 ⬭ | 2 ⬭ | 2 ⬭ |
| Medium *(17 – 19 cu. ft.)* | 3 ⬭ | 3 ⬭ | 3 ⬭ | 3 ⬭ |

| | Refrigerator 1 | Refrigerator 2 | Refrigerator 3 | Old Refrigerator Discarded |
|---|---|---|---|---|
| Large *(20 – 23 cu. ft.)* | 4⬭ | 4⬭ | 4⬭ | 4⬭ |
| Very large *(over 23 cu. ft.)* | 5⬭ | 5⬭ | 5⬭ | 5⬭ |
| **Frost-free or Manual Defrost?** | (RF1DEF) | (RF2DEF) | (RF3DEF) | (RFDSCDEF) |
| Automatic (frost-free) | 1⬭ | 1⬭ | 1⬭ | 1⬭ |
| Manual | 2⬭ | 2⬭ | 2⬭ | 2⬭ |
| **Age of your Refrigerator** | (RF1AGE) | (RF2AGE) | (RF3AGE) | (RFDSCAGE) |
| Less than two years | 1⬭ | 1⬭ | 1⬭ | 1⬭ |
| 2 – 7 years | 2⬭ | 2⬭ | 2⬭ | 2⬭ |
| 8 – 10 years | 3⬭ | 3⬭ | 3⬭ | 3⬭ |
| 11 – 20 years | 4⬭ | 4⬭ | 4⬭ | 4⬭ |
| More than 20 years | 5⬭ | 5⬭ | 5⬭ | 5⬭ |
| **Other Features** | (RF1OTH) | (RF2OTH) | (RF3OTH) | (RFDSCOTH) |
| Through-the-door ice and water dispenser | 1⬭ | 1⬭ | 1⬭ | 1⬭ |

# Freezers

**H1**

How many **stand-alone** freezers do you have plugged in? (FZNUM)

*(Do not include freezers that are part of your refrigerator.)*
1⬭ 0 *(Go to I1.)*          2⬭ 1          3⬭ 2 or more

**H2**

Please tell us the characteristics for each stand-alone freezer, and for any stand-alone freezer you discarded in the past 12 months, in the table below.

| | **Freezer 1** | **Freezer 2** | **Old Freezer Discarded in the Last 12 Months** |
|---|---|---|---|
| **Style** | (FZ1STY) | (FZ2STY) | (FZDSCSTY) |
| Upright, frost-free | 1⬭ | 1⬭ | 1⬭ |
| Upright manual defrost | 2⬭ | 2⬭ | 2⬭ |

| | (FZ1SZ) | (FZ2SZ) | (FZDSCSZ) |
|---|---|---|---|
| Chest frost-free | 3⬭ | 3⬭ | 3⬭ |
| Chest manual defrost | 4⬭ | 4⬭ | 4⬭ |
| **Size, in Cubic Feet** | **(FZ1SZ)** | **(FZ2SZ)** | **(FZDSCSZ)** |
| Small *(under 13 cu. ft.)* | 1⬭ | 1⬭ | 1⬭ |
| Medium *(13 – 16 cu. ft.)* | 2⬭ | 2⬭ | 2⬭ |
| Large *(over 16 cu. ft.)* | 3⬭ | 3⬭ | 3⬭ |
| **Age of your Freezer** | **(FZ1AGE)** | **(FZ2AGE)** | **(FZDSCAGE)** |
| Less than two years | 1⬭ | 1⬭ | 1⬭ |
| 2 – 7 years | 2⬭ | 2⬭ | 2⬭ |
| 8 – 10 years | 3⬭ | 3⬭ | 3⬭ |
| 11 – 20 years | 4⬭ | 4⬭ | 4⬭ |
| More than 20 years | 5⬭ | 5⬭ | 5⬭ |

# Spas and Hot Tubs

**I1**

Do you have the use of a spa or hot tub at your home?  (SPTYP)

*(Do not include whirlpool tubs in your bathroom.)*
1⬭ Yes, and **I pay for its energy use**
2⬭ Yes, but it is in a **common area** and **I do not pay for its energy use** *(Go to J1.)*
3⬭ No spa or hot tub *(Go to J1.)*

**I2**

What fuel do you use to heat the spa or hot tub?  (SPHTF)
1⬭ Electricity        3⬭ Solar and electricity        5⬭ Bottled gas *(propane, butane, LP)*
2⬭ Natural gas        4⬭ Solar and natural gas        6⬭ Other

**I3**

How large is the spa or hot tub?  (SPSZ)
1⬭ Small *(3 people or fewer)*        2⬭ Medium *(4 – 6 people)*        3⬭ Large *(7 or more people)*

**I4**

Where is the spa located? (SPLOC)
1⬭ Outside, in the ground        2⬭ Outside, above ground        3⬭ Indoor spa

**I5**

Do you have an insulated cover on your spa or hot tub? (SPCOV)
1⬭ Yes                2⬭ No

**I6**

How often do you run the filter pump on your spa or hot tub?

| | Summer *(May – Oct.)* (SMFLTPMP) | Winter *(Nov. – April)* (WNFLTPMP) |
|---|---|---|
| Never | 1 | 1 |
| Rarely | 2 | 2 |
| Only when we use it | 3 | 3 |
| 1 – 3 hours every day | 4 | 4 |
| 4 – 6 hours every day | 5 | 5 |

**I7**

Please indicate how often you **heat** your spa or hot tub in the winter and summer.

| | Summer *(May – Oct.)* (SMHTSPA) | Winter *(Nov. – April)* (WNHTSPA) |
|---|---|---|
| Never | 1 | 1 |
| 0 – 2 times per month | 2 | 2 |
| 3 – 8 times per month | 3 | 3 |
| 9 or more times per month | 4 | 4 |
| Maintain set temperature | 5 | 5 |

# Pools

**J1**

Do you have the use of a swimming pool at your home? (PLTYP)

1 Yes, and **I pay for its energy use**
2 Yes, but it is in a **common area** and **I do not pay for its energy use** *(Go to K1.)*
3 No pool *(Go to K1.)*

**J2**    How large is your pool? *(An average-size pool is about 5 ft. deep by 40 ft. long by 20 ft. wide and holds 30,000 gallons of water.)* (PLSZ)

1 Less than 20,000 gallons    2 20,000 – 40,000 gallons    3 More than 40,000 gallons

**J3**

How many **hours per day** do you operate your **swimming pool filter**?

| | Summer *(May – Oct.)* (SMFLTHR) | Winter *(Nov. – April)* (WNFLTHR) |
|---|---|---|
| None | 1 | 1 |
| 1 – 2 | 2 | 2 |
| 3 – 4 | 3 | 3 |
| 5 – 7 | 4 | 4 |
| 8 – 11 | 5 | 5 |
| 12 – 15 | 6 | 6 |
| 16 – 20 | 7 | 7 |
| 21 or more | 8 | 8 |

**J4**

Which fuel do you use to heat your pool? (PLHTF)

1⬭ Pool is not heated          5⬭ Solar heater *(using solar collectors)*
2⬭ Natural gas only           6⬭ Bottled gas only *(propane, butane, LP)*
3⬭ Electricity only            7⬭ Other
4⬭ Electric heat pump only

**J5**

Please indicate how often you **heat** your pool in the summer and winter.

| | **Summer** *(May – Oct.)* (SMHTPL) | **Winter** *(Nov. – April)* (WNHTPL) |
|---|---|---|
| Never | 1⬭ | 1⬭ |
| Once a month | 2⬭ | 2⬭ |
| Once a week | 3⬭ | 3⬭ |
| 2 – 4 times per week | 4⬭ | 4⬭ |
| Keep pool heated continuously | 5⬭ | 5⬭ |

**J6**

Which of the following attributes does your pool have? *(Choose all that apply.)*

1⬭ Cover        1⬭ Pool timer        1⬭ Pool sweep        1⬭ Pool is indoors
(PLCOV)        (PLTIMR)            (PLSWEEP)            (PLINDOOR)

# Entertainment and Technology

**K1**

How many televisions and accessories do you **use** in this home?

| | None | 1 | 2 | 3 or more |
|---|---|---|---|---|
| Home theater (THEATER) | 1⬭ | 1⬭ | 1⬭ | 1⬭ |
| Large screen television (greater than 36 inches) (BSTV) | 1⬭ | 1⬭ | 1⬭ | 1⬭ |
| Standard size television (36 inches or less) (CLTV) | 1⬭ | 1⬭ | 1⬭ | 1⬭ |
| Analog cable box (CABLE) | 1⬭ | 1⬭ | 1⬭ | 1⬭ |
| Digital cable box (DIGCABLE) | 1⬭ | 1⬭ | 1⬭ | 1⬭ |
| Digital satellite box (DSS) | 1⬭ | 1⬭ | 1⬭ | 1⬭ |
| DVD Player (or combined DVD/VCR) (DVD) | 1⬭ | 1⬭ | 1⬭ | 1⬭ |
| VCR (VCR) | 1⬭ | 1⬭ | 1⬭ | 1⬭ |
| Personal video recorders (e.g., TiVo, ReplayTV) (TIVO) | 1⬭ | 1⬭ | 1⬭ | 1⬭ |
| Stereo (MUSIC) | 1⬭ | 1⬭ | 1⬭ | 1⬭ |

**K2**

How many total hours are all your **televisions** on each day? (TVUSE)

*(Add up time for each television.)*

1⬭ Less than 1 hour       4⬭ 9 – 12 hours        7⬭ 21 – 30 hours
2⬭ 1 – 4 hours           5⬭ 13 – 16 hours       8⬭ More than 30 hours
3⬭ 5 – 8 hours           6⬭ 17 – 20 hours

**K3**

How many **personal computer(s)** (PC, Macintosh, etc.) do you **use** in this home? *(Include both desktops and laptops.)* (NPCS)

₁⃝ We have no computers in this home *(Go to K7.)*    ₃⃝ 2 computers

₂⃝ 1 computer        ₄⃝ 3 or more computers

**K4**

you have one or more personal computer(s) in this home, how many total hours are they turned on each day? *(Add up time for each computer.)* (PCHRS)

₁⃝ Less than 1 hour     ₄⃝ 9 – 12 hours     ₇⃝ 21 – 30 hours

₂⃝ 1 – 4 hours        ₅⃝ 13 – 16 hours    ₈⃝ More than 30 hours

₃⃝ 5 – 8 hours        ₆⃝ 17 – 20 hours

**K5**

How often does anyone in your home perform any of the following activities on your computer?

| | Never | Rarely *(less than once a week)* | Occasionally *(several times a week)* | Frequently *(several times a day)* |
|---|---|---|---|---|
| Send or receive e-mail (EMAIL) | 1⃝ | 2⃝ | 3⃝ | 4⃝ |
| Browse the Internet for information (BRWSONLN) | 1⃝ | 2⃝ | 3⃝ | 4⃝ |
| Make purchases using the Internet (BUYONLN) | 1⃝ | 2⃝ | 3⃝ | 4⃝ |
| Pay bills on-line (BILLONLN) | 1⃝ | 2⃝ | 3⃝ | 4⃝ |

**K6**

ɔ you (or someone else in your home) operate a business and/or work from your home? (WORKHOME)

₁⃝ No *(Go to K8.)*

₂⃝ Yes ➡ How many hours a week is someone working out of your home? (WKHRSHM)

     ₁⃝ 0 – 10 hours per week

     ₂⃝ 11 – 30 hours per week

     ₃⃝ More than 30 hours per week

**K8**

How many of the following products do you **use** in this home?

| | None | One | Two | Three or more |
|---|---|---|---|---|
| Answering machine or service (ANSRMCHN) | 1⃝ | 1⃝ | 1⃝ | 1⃝ |
| Multifunction machine *(printer, fax, scanner, copier)* (MULTMCHN) | 1⃝ | 1⃝ | 1⃝ | 1⃝ |
| FAX machine (FAX) | 1⃝ | 1⃝ | 1⃝ | 1⃝ |
| Printer for computer (PRTLAS) | 1⃝ | 1⃝ | 1⃝ | 1⃝ |
| Scanner (SCAN) | 1⃝ | 1⃝ | 1⃝ | 1⃝ |
| Copier (COPIER) | 1⃝ | 1⃝ | 1⃝ | 1⃝ |
| Internet access via traditional phone line (PHINT) | 1⃝ | 1⃝ | 1⃝ | 1⃝ |
| DSL modem for Internet (DSLINT) | 1⃝ | 1⃝ | 1⃝ | 1⃝ |
| Cable modem for Internet (CBLINT) | 1⃝ | 1⃝ | 1⃝ | 1⃝ |
| Satellite communication for Internet (SATCMINT) | 1⃝ | 1⃝ | 1⃝ | 1⃝ |
| Home network *(LAN)* (NETWK) | 1⃝ | 1⃝ | 1⃝ | 1⃝ |
| Cell phone *(used by occupants of this home)* (CELL) | 1⃝ | 1⃝ | 1⃝ | 1⃝ |

## Lighting

**L1**

How many of the following lighting products do you use **inside** your home?

| Interior Lighting Products | None | 1 – 2 | 3 – 5 | 6 – 10 | 11 or More |
|---|---|---|---|---|---|
| Compact fluorescent lamps (ICFL) | 1 | 2 | 3 | 4 | 5 |
| Fixtures on Timers (ICTLTIMR) | 1 | 2 | 3 | 4 | 5 |
| Fixtures on Motion Detectors or Occupancy Sensors (ICTLOCCS) | 1 | 2 | 3 | 4 | 5 |
| Fixtures on a Dimming Switch (ICTLDIM) | 1 | 2 | 3 | 4 | 5 |

**L2**

How many of the following lighting products do you use **outside** your home? *(Include items in your garage. Only include exterior lights that are paid for on your electricity bill.)*

| | None | 1 – 2 | 3 – 5 | 6 or More |
|---|---|---|---|---|
| **Exterior Fixtures** | | | | |
| Exterior incandescent fixtures (EXINC) | 1 | 2 | 3 | 4 |
| Exterior compact fluorescent fixtures (EXCFL) | 1 | 2 | 3 | 4 |
| Low voltage landscape light system (EXLOWV) | 1 | 2 | 3 | 4 |
| HID (sodium vapor, metal halide) fixture (EXHID) | 1 | 2 | 3 | 4 |
| **Exterior Lighting Controls** | 1 | 2 | 3 | 4 |
| Fixtures on Timers (ECTLTIMR) | 1 | 2 | 3 | 4 |
| Fixtures on Dusk-to-Dawn Sensors (ECTLDSK) | 1 | 2 | 3 | 4 |
| Fixtures on Motion Detectors (ECTLMOTN) | 1 | 2 | 3 | 4 |

## Miscellaneous Appliances

**M1**

How many of each of the following appliances or equipment do you **use** in your home? *(Choose all that apply.)*

| | None | 1 | 2 | 3 or More |
|---|---|---|---|---|
| Portable fan (FNPORT) | 1 | 1 | 1 | 1 |
| Ceiling fan (FNCEIL) | 1 | 1 | 1 | 1 |
| Wind turbine attic ventilator (non-electric) (WNDATV) | 1 | 1 | 1 | 1 |
| Electric attic fan (FNATTIC) | 1 | 1 | 1 | 1 |
| Whole-house fan (FNWHOLE) | 1 | 1 | 1 | 1 |
| Electronic household air cleaner (AIRCLEAN) | 1 | 1 | 1 | 1 |
| Humidifier (HUM) | 1 | 1 | 1 | 1 |
| Dehumidifier (DEH) | 1 | 1 | 1 | 1 |
| Water purification system (WHPURIFY) | 1 | 1 | 1 | 1 |
| Heated waterbed (WBED) | 1 | 1 | 1 | 1 |
| Electric blanket (ELBLNKET) | 1 | 1 | 1 | 1 |
| Aquarium (AQUAR) | 1 | 1 | 1 | 1 |
| Trash compactor (TRSHCOMP) | 1 | 1 | 1 | 1 |
| Sauna – electric (SAUNA) | 1 | 1 | 1 | 1 |
| Electronic security system (SCRTYSYS) | 1 | 1 | 1 | 1 |
| Pond or water garden pump (POND) | 1 | 1 | 1 | 1 |
| Electric garage door opener (GRGDROPN) | 1 | 1 | 1 | 1 |
| Lawn mower – electric (LAWNMOWR) | 1 | 1 | 1 | 1 |

**M2**

> you use an electric well water pump to provide water for your home?
> (WLWTRPMP)
> 
> ₁⟜ No *(Go to M5.)*
> 
> ₂⟜ Yes **M3** Does your home also have access to city/county water
> sources? (WTRSRCES) ₁⟜ Yes    ₂⟜ No

> **M4** How do you use your well water? (WLWTUSE)
> 
> ₁⟜ Only for gardening and landscaping
> ₂⟜ Only for household use
> ₃⟜ Both household and gardening/landscape use

**M5**

> Select any of the equipment and its fuel from the list that you **use** three or
> more hours per week?

| | Electric | Natural Gas | Bottled Gas |
|---|---|---|---|
| Sump pump (SUMPPMP) | ₁⟜ | | |
| Shop tools  (SHOPTLS) | ₁⟜ | | |
| Electric welding equipment (WELD) | ₁⟜ | | |
| Electric air compressor (AIRCOMP) | ₁⟜ | | |
| Large battery charger (BATCHRGE) | ₁⟜ | | |
| Kiln for ceramics and pottery (KILN) | ₁⟜ | ₁⟜ | ₁⟜ |
| Medical equipment (e.g., respirator) (MEDICAL) | ₁⟜ | ₁⟜ | ₁⟜ |

**M6**

> Do you have an electric vehicle, electric wheelchair, or golf cart at your
> home? (ELVEH)
> 
> ₁⟜ No *(Go to M8.)*
> ₂⟜ Yes, but it is a hybrid vehicle and does not need to be charged at home. *(Go to M8.)*
> ₃⟜ Yes, electric wheelchair/cart ➡ **M7** Do you charge your electric vehicle at home?
> ₄⟜ Yes, electric car/vehicle          (CHRGVEH)
> 
> ₁⟜ Yes ₂⟜ No

**M8**

> Do you use any other equipment or large appliance that consumes a
> significant amount of electricity or natural gas in your home?
> (OLRGAPP)
> 
> ₁⟜ Yes ₂⟜ No
> *(Please describe*
> *equipment and fuel.):* (OLRGEQP), (OLRGFUEL) _____

**M9**

Please indicate if you have **added** any of the following appliances in the past 12 months. If the new item replaced an existing unit, please be sure to answer question **M10** as well. *(Choose all that apply.)*

| Appliance | Added a New Unit | Fuel Type of New Unit Elec | Nat. Gas | Other |
|---|---|---|---|---|
| Central heating | ₁⬭ (CHADD) | (CHFUEL) ₁⬭ | ₁⬭ | ₁⬭ |
| Central cooling | ₁⬭ (CCADD) | (CCFUEL) ₁⬭ | | |
| Wall or window air conditioner | ₁⬭ (WWADD) | (WWFUEL) ₁⬭ | | |
| Water heater | ₁⬭ (WHADD) | (WHFUEL) ₁⬭ | ₁⬭ | ₁⬭ |
| Stove top | ₁⬭ (STADD) | (STFUEL) ₁⬭ | ₁⬭ | ₁⬭ |
| Oven | ₁⬭ (OVADD) | (OVFUEL) ₁⬭ | ₁⬭ | ₁⬭ |
| Microwave oven | ₁⬭ (MWADD) | (MWFUEL) ₁⬭ | | |
| Dishwasher | ₁⬭ (DWADD) | (DWFUEL) ₁⬭ | | |
| Clothes washer | ₁⬭ (CWADD) | (CWFUEL) ₁⬭ | | |
| Clothes dryer | ₁⬭ (CDADD) | (CDFUEL) ₁⬭ | ₁⬭ | ₁⬭ |
| Pool heater | ₁⬭ (PHADD) | (PHFUEL) ₁⬭ | ₁⬭ | ₁⬭ |
| Pool pump | ₁⬭ (PPADD) | (PPFUEL) ₁⬭ | | |
| Hot tub/spa heater | ₁⬭ (TBADD) | (TBFUEL) ₁⬭ | ₁⬭ | ₁⬭ |

₁⬭ Have not **added** any of the above appliances. (NOADD)

**M10**

Please indicate if you have **discarded** any of the following appliances in the past 12 months. Include both items that were replaced and those that were discarded without being replaced. *(Choose all that apply.)*

| Appliance | Age of Discarded Unit 1–10 years | 11–20 years | Over 20 years | Fuel Type of Discarded Unit Elec | Nat. Gas | Other |
|---|---|---|---|---|---|---|
| Central heating | (DCHAGE) ₁⬭ | ₁⬭ | ₁⬭ | (DCHFL) ₁⬭ | ₁⬭ | ₁⬭ |
| Central cooling | (DCCAGE) ₁⬭ | ₁⬭ | ₁⬭ | (DCCFL) ₁⬭ | | |
| Wall or window air conditioner | (DWWAGE) ₁⬭ | ₁⬭ | ₁⬭ | (DWWFL) ₁⬭ | | |
| Water heater | (DWHAGE) ₁⬭ | ₁⬭ | ₁⬭ | (DWHFL) ₁⬭ | ₁⬭ | ₁⬭ |
| Stove top | (DSTAGE) ₁⬭ | ₁⬭ | ₁⬭ | (DSTFL) ₁⬭ | ₁⬭ | ₁⬭ |
| Oven | (DOVAGE) ₁⬭ | ₁⬭ | ₁⬭ | (DOVFL) ₁⬭ | ₁⬭ | ₁⬭ |
| Microwave oven | (DMWAGE) ₁⬭ | ₁⬭ | ₁⬭ | (DMWFL) ₁⬭ | | |
| Dishwasher | (DDWAGE) ₁⬭ | ₁⬭ | ₁⬭ | (DDWFL) ₁⬭ | | |
| Clothes washer | (DCWAGE) ₁⬭ | ₁⬭ | ₁⬭ | (DCWFL) ₁⬭ | | |
| Clothes dryer | (DCDAGE) ₁⬭ | ₁⬭ | ₁⬭ | (DCDFL) ₁⬭ | ₁⬭ | ₁⬭ |
| Pool heater | (DPHAGE) ₁⬭ | ₁⬭ | ₁⬭ | (DPHFL) ₁⬭ | ₁⬭ | ₁⬭ |
| Pool pump | (DPPAGE) ₁⬭ | ₁⬭ | ₁⬭ | (DPPFL) ₁⬭ | | |
| Hot tub/spa heater | (DTBAGE) ₁⬭ | ₁⬭ | ₁⬭ | (DTBFL) ₁⬭ | ₁⬭ | ₁⬭ |

₁⬭ Have not **discarded** any of the above appliances. (NODISCRD)

# Household Information

Please provide answers to the following questions. **Your responses will be confidential** and no data will be used on an individual basis. The information is used to allow us to compare energy usage between various groups.

**N1**

In addition to the home described in this survey, do you own any other home in California that is occupied on a part-time basis by your family or as a vacation rental? *(Please do not answer yes for any full-time rental property or time-share units.)* (PTHME)

₁⟩ Yes         ₂⟩ No (Go to *N3.*)

**N2**

Please provide the following information for your seasonal or vacation home that you own in California? *(Please do **not** provide information for the home described in this survey, any full-time rental property or any time-share units.)*

| Location  (PTHMELOC) | ₁⟩ In the mountains ₄⟩ Near the ocean<br>₂⟩ In the desert  ₅⟩ Other<br>₃⟩ Near a lake or river |
|---|---|
| **Electricity** is provided to this vacation home by: (PTHMEUTL) | ₁⟩ PG&E  ₄⟩ LADWP<br>₂⟩ SCE  ₅⟩ Other<br>₃⟩ SDG&E |

**N3**

What was the highest level of education completed by any head of household in the home? (EDUC)

₁⟩ Elementary *(grades 1 – 8)*      ₄⟩ Some college/trade/ vocational school
₂⟩ Some high school *(grades 9 – 12)*    ₅⟩ College graduate
₃⟩ High school graduate          ₆⟩ Postgraduate degree

**N4**

What is the primary language spoken in this home? (ETHNIC)

₁⟩ English               ₃⟩ Spanish
₂⟩ Asian *(describe)*        ₄⟩ Other *(describe)*
(ASIAETHD)_____     (OTHETHD)_____

**N5**

Are any of the occupants of your home permanently disabled? (DISABLED)

₁⟩ No    ₂⟩ Yes, 1 permanently disabled      ₃⟩ Yes, 2 or more permanently disabled

**N6**

Which of the following ethnic groups are represented by your head(s) of household? *(Choose all that apply.)*

| | **Head of Household # 1** | **Head of Household # 2** |
|---|---|---|
| American Indian, Alaska Native | ₁⟩ (HOHIND1) | ₁⟩ (HOHIND2) |
| Asian or Pacific Islander | ₁⟩ (HOHASN1) | ₁⟩ (HOHASN2) |

| | | |
|---|---|---|
| Black, African American | ₁▭ (HOHBLK1) | ₁▭ (HOHBLK2) |
| Hispanic / Latino | ₁▭ (HOHLAT1) | ₁▭ (HOHLAT2) |
| White, Caucasian | ₁▭ (HOHWHT1) | ₁▭ (HOHWHT2) |
| Other | ₁▭ (HOHOTH1) | ₁▭ (HOHOTH2) |

**N7**

Please check the range that best describes your household's **total annual income**. (INCOME) (AVGINC – Plugged continuous income, not including MM)

₁▭ Less than $10,000      ₅▭ $30,000 – $34,999      ₉▭ $60,000 – $74,999
₂▭ $10,000 – $19,999     ₆▭ $35,000 – $39,999      ₁₀▭ $75,000 – $99,999
₃▭ $20,000 – $24,999     ₇▭ $40,000 – $49,999      ₁₁▭ $100,000 – $149,999
₄▭ $25,000 – $29,999     ₈▭ $50,000 – $59,999      ₁₂▭ $150,000 or more

We may need to contact you to verify some of the information you have provided in the survey. Please provide your telephone number and the times that would be most convenient for you to be contacted. Your phone number will not be given out to anyone and will be used only for this research project. You will only be called if we need to follow-up on some of the information in the survey.

**Phone Number** *(Please write in your answer and* (PHONE)
*fill out the circles to match each number in the box below.)*      **Best Time to Call** (TIMECALL)

| 1 | 2 | 3 | - | 4 | 5 | 6 | - | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|----|
| 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | | 1 | 1 | 1 | | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | | 2 | 2 | 2 | | 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | | 4 | 4 | 4 | | 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | | 5 | 5 | 5 | | 5 | 5 | 5 | 5 |
| 6 | 6 | 6 | | 6 | 6 | 6 | | 6 | 6 | 6 | 6 |
| 7 | 7 | 7 | | 7 | 7 | 7 | | 7 | 7 | 7 | 7 |
| 8 | 8 | 8 | | 8 | 8 | 8 | | 8 | 8 | 8 | 8 |
| 9 | 9 | 9 | | 9 | 9 | 9 | | 9 | 9 | 9 | 9 |

₁▭ Weekday mornings

₂▭ Weekday afternoons

₃▭ Weekday early evening

₄▭ Weekday evening

₅▭ Weekend

**Thank you very much for your cooperation and assistance!**

**Survey Form for KEMA-Xenergy Follow-Up Survey
of Refrigerator/Freezer Discarders**

## A.1 PARTICIPANT SURVEY

### Sample Data

pname: participant name

paddy: participating premises full address

porig: occupant expected to be participant or household surveyed by fourth-year persistence

study (1), else 0

imoyr: fielding of impact evaluation survey, month year

cmoyr: if fourth-year retention study respondent, when the survey was fielded = January 1999;

otherwise imoyr

cyear = year only from cmoyr

OPR: number of refrigerators plugged in and running at time of impact evaluation

OPF: number of freezers plugged in and running at time of impact evaluation

<DSC>: refrigerator, stand-alone freezer, refrigerator and a stand-alone freezer

<DSCNUM>: =1 if refrigerator only, 2= if stand-alone freezer only, 3= if both

<DSCS>: refrigerators, stand-alone freezers, refrigerators and stand-alone freezers

### Section 1: Lead In

• Identify original participant vs. movers (original participant no longer resides at premise).

b1. Hello, may I speak with <PNAME>?
Yes ....................................................................................................[SKIP TO b3] 1
No.........................................................................................................................2
Don't know ........................................................................................................–97
Refused .............................................................[THANK AND TERMINATE] –98

b2. [IF AN ADULT ANSWERED OR YOU CAN GET AN ADULT ON THE LINE.] Perhaps you can help me.

b3. My name is _____ and I'm with Research America. I'm calling on behalf of Southern California Edison. We're conducting a brief survey to learn about refrigerators and freezers in Southern California Edison territory. This is not a marketing call.

We're collecting data to help Southern California Edison improve its residential programs and services and help its customers save energy. Southern California Edison is required by the California Public Utility Commission to conduct this type of research. Your responses will be kept entirely confidential.

b4. First, I'd like to confirm your current address. Is it <PADDY>?

Yes ...........................................................................................................................1
No...........................................................................[THANK AND TERMINATE] 2
Don't know...........................................................[THANK AND TERMINATE] –97
Refused .................................................................[THANK AND TERMINATE] –98

b5. [[IF <PORIG>=0 SKIP TO mr1] According to our records, while living at this address you recycled a <DSC> through a Southern California Edison program in the mid 1990s. Is this correct?

Yes ....................................................................................[SKIP TO pr1] 1
No…..............................................................................................................2
Don't know ..............................................................................................–97
Refused ....................................................................................................–98

b6. Perhaps you moved to this address since that time. Did you move to this address after <IMOYR>?

Yes............................................................................................................1
No............................................................................................[SKIP TO b7b] 2
Don't know ............................................................................[SKIP TO b7b] –97
Refused ..................................................................................[SKIP TO b7b] –98

b7a. I would like to ask you some questions about the number of <DSCS> you have had in recent years. [SKIP TO mr1]

b7b. I would still like to ask you some questions about the number of <DSCS> you have had in recent years. Please, answer the questions as best you can.

## Section 2: Original Participants Refrigerator Questions

### Subsection 2.1 Refrigerators acquired

pr1. [IF <DSCNUM>=2 SKIP TO pf1] According to our records, in <IMOYR>, there were <OPR> refrigerator(s) plugged in and running at this address. Since then, have you brought any refrigerators into your home? [IF RESPONDENT DISAGREES WITH NUMBER OF FRIDGES, SAY "I'll note that" AND GET RESPONSE TO QUESTION.]

Yes ...........................................................................................................................1
No..................................................................................................[SKIP TO pr11] 2
Don't know ....................................................................................[SKIP TO pr4] –97
Refused .........................................................................................[SKIP TO pr4] –98

pr2. How many?
[RECORD NUMBER >0]..........................................................................................
Don't know ....................................................................................[SKIP TO pr4] –97
Refused .........................................................................................[SKIP TO pr4] –98

pr3a. [IF pr2=1] Was this refrigerator plugged in and running for 3 months or more in a year?

Yes ...................................................................................................................................1
No.....................................................................................................................................2
Don't know ....................................................................................................................–97
Refused .........................................................................................................................–98

pr3b. [IF pr2>1] How many of these refrigerators were plugged in and running for 3 months or more in a year?
[RECORD NUMBER <= r2].............................................................................................
Don't know ....................................................................................................................–97
Refused .........................................................................................................................–98

**Subsection 2.2 Refrigerators discarded**

[IF pr3a=2 OR pr3b=0 SKIP TO pr11

IF (pr3a=1 OR pr3b=1) AND <OPR>=0 SKIP TO pr8a

IF pr3b>1 AND <OPR>=0 SKIP TO pr9a]

pr4. Since <IMOYR>, have you gotten rid of any refrigerators?

Yes ...................................................................................................................................1
No....................................................................................................[SKIP TO pr7] 2
Don't know .......................................................................................[SKIP TO pr7] –97
Refused ............................................................................................[SKIP TO pr7] –98

pr5. How many?
[RECORD NUMBER >0] .................................................................................................
Don't know .......................................................................................[SKIP TO pr7] –97
Refused ............................................................................................[SKIP TO pr7] –98

pr6a. [IF pr5=1] Was this refrigerator plugged in and running for 3 months or more in a year after < IMOYR>?
Yes ...................................................................................................................................1
No.....................................................................................................................................2
Don't know ....................................................................................................................–97
Refused .........................................................................................................................–98

pr6b. [IF pr5>1] How many of these refrigerators were plugged in and running for 3 months or more in a year after < IMOYR>?
[RECORD NUMBER <= pr5]...........................................................................................
Don't know ....................................................................................................................–97
Refused .........................................................................................................................–98

**Subsection 2.3 Exceed # refrigerators at time of impact evaluation? If so, when**

pr7. Since <CMOYR>, have you ever had more than <OPR> refrigerator(s) plugged in and running **at the same time** for at least 3 months in a year?
Yes ...................................................................................................................................1
No.....................................................................................................[SKIP TO pr11] 2
Don't know .....................................................................................[SKIP TO pr11] –97
Refused ..........................................................................................[SKIP TO pr11] –98

pr8a. [IF CYEAR=1999] About what year did this first happen? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']
1999..............................................................................................................................1
2000..............................................................................................................................2
2001..............................................................................................................................3
2002..............................................................................................................................4
2003..............................................................................................................................5
2004..............................................................................................................................6
Other [SPECIFY].........................................................................[SKIP TO pr11] 96
Don't know ...........................................................................[SKIP TO pr11] –97
Refused ................................................................................[SKIP TO pr11] –98

pr8b. [IF CYEAR=1995] About what year did this first happen? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']
1995..............................................................................................................................1
1996..............................................................................................................................2
1997..............................................................................................................................3
1998..............................................................................................................................4
1999..............................................................................................................................5
2000..............................................................................................................................6
2001..............................................................................................................................7
2002..............................................................................................................................8
2003..............................................................................................................................9
2004............................................................................................................................10
Other [SPECIFY].........................................................................[SKIP TO pr11] 96
Don't know ...........................................................................[SKIP TO pr11] –97
Refused ................................................................................[SKIP TO pr11] –98

pr8c. [IF CYEAR=1998] About what year did this first happen? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']
1998..............................................................................................................................1
1999..............................................................................................................................2
2000..............................................................................................................................3
2001..............................................................................................................................4
2002..............................................................................................................................5
2003..............................................................................................................................6
2004..............................................................................................................................7
Other [SPECIFY].........................................................................[SKIP TO pr11] 96
Don't know ...........................................................................[SKIP TO pr11] –97
Refused ................................................................................[SKIP TO pr11] –98

pr9a. [IF pr3b>1 AND <OPR>=0 AND CYEAR=1999] Since January 1999, about what year did you first have one or more of these refrigerators plugged in and running for at least 3 months? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']

1999......................................................................................................................................1
2000......................................................................................................................................2
2001......................................................................................................................................3
2002......................................................................................................................................4
2003......................................................................................................................................5
2004......................................................................................................................................6
Other [SPECIFY]..................................................................................[SKIP TO pr11] 96
Don't know ...........................................................................................[SKIP TO pr11] –97
Refused .................................................................................................[SKIP TO pr11] –98

pr9b. [IF pr3b>1 AND <OPR>=0 AND CYEAR=1995] Since November 1995, about what year did you first have one or more of these refrigerators plugged in and running for at least 3 months? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']

1995......................................................................................................................................1
1996......................................................................................................................................2
1997......................................................................................................................................3
1998......................................................................................................................................4
1999......................................................................................................................................5
2000......................................................................................................................................6
2001......................................................................................................................................7
2002......................................................................................................................................8
2003......................................................................................................................................9
2004....................................................................................................................................10
Other [SPECIFY]..................................................................................[SKIP TO pr11] 96
Don't know ...........................................................................................[SKIP TO pr11] –97
Refused .................................................................................................[SKIP TO pr11] –98

pr9c. [IF pr3b>1 AND <OPR>=0 AND CYEAR=1998] Since January 1998, about what year did you first have one or more of these refrigerators plugged in and running for at least 3 months? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']

1998......................................................................................................................................1
1999......................................................................................................................................2
2000......................................................................................................................................3
2001......................................................................................................................................4
2002......................................................................................................................................5
2003......................................................................................................................................6
2004......................................................................................................................................7
Other [SPECIFY]..................................................................................[SKIP TO pr11] 96
Don't know ...........................................................................................[SKIP TO pr11] –97
Refused .................................................................................................[SKIP TO pr11] –98

pr10. Can you tell me about what month during this year it first happen? [WE'RE LOOKING FOR THE EXACT MONTH. IF CAN'T SPECIFY EXACT MONTH, RECORD RESPONSE IN 'Other.']

January ...............................................................................................................................1
February ............................................................................................................................2
March .................................................................................................................................3
April ..................................................................................................................................4
May ...................................................................................................................................5
June ...................................................................................................................................6
July....................................................................................................................................7
August...............................................................................................................................8
September .........................................................................................................................9
October............................................................................................................................10
November.........................................................................................................................11
December .........................................................................................................................12
Other [SPECIFY]............................................................................................................96
Don't know ....................................................................................................................–97
Refused ..........................................................................................................................–98

pr11. How many refrigerators do you now have at this address that are plugged in and running? [RECORD NUMBER]........................................................................................................................
Don't know ....................................................................................................................–97
Refused ..........................................................................................................................–98

## Section 3: Original Participants Freezer Questions

[IF <DSCNUM>=1 THANK AND TERMINATE]

### Subsection 3.1 Freezers acquired[VG6]

pf1. According to our records, in <IMOYR>, there were <OPF> stand-alone freezer(s) plugged in and running at this address. Since then, have you brought [VG7]any stand-alone freezers into your home? [IF RESPONDENT DISAGREES WITH NUMBER OF FREEZERS, SAY "I'll note that" AND GET RESPONSE TO QUESTION.]

Yes ....................................................................................................................................1
No...................................................................................................... [SKIP TO PF11] 2
Don't know ...................................................................................[SKIP TO pf4] –97
Refused ........................................................................................[SKIP TO pf4] –98

pf2. How many?
[RECORD NUMBER>0] ..........................................................................................................
Don't know ...................................................................................[SKIP TO pf4] –97
Refused ........................................................................................[SKIP TO pf4] –98

pf3a. [IF pf2=1] Was this freezer plugged in and running for 3 months or more in a year[VG8]?
Yes ....................................................................................................................................1
No......................................................................................................................................2
Don't know ....................................................................................................................–97
Refused ..........................................................................................................................–98

pf3b. [IF pf2>1] How many of these freezers were plugged in and running for 3 months or more in a year[VG9]?
[RECORD NUMBER <= pf2].............................................................................................................
Don't know ...............................................................................................................................–97
Refused ....................................................................................................................................–98

**Subsection 3.2 Freezers discarded**

[IF pf3a=2 OR pf3b=0 SKIP TO PF11

IF (pf3a=1 OR pf3b=1) AND <OPF>=0 SKIP TO pf8a

IF pf3b>1 AND <OPF>=0 SKIP TO pf9a]]

pf4. Since <IMOYR>, have you gotten rid of any stand-alone freezers?
Yes ...........................................................................................................................................1
No................................................................................................................[SKIP TO pf7] 2
Don't know ...............................................................................................[SKIP TO pf7] –97
Refused ....................................................................................................[SKIP TO pf7] –98

pf5. How many?
[RECORD NUMBER>0] ...........................................................................................................
Don't know ...............................................................................................[SKIP TO pf7] –97
Refused ....................................................................................................[SKIP TO pf7] –98

pf6a. [IF pf5=1] Was this freezer plugged in and running for 3 months or more in a year after < IMOYR>?
Yes ...........................................................................................................................................1
No...............................................................................................................................................2
Don't know ...............................................................................................................................–97
Refused ....................................................................................................................................–98

pf6b. [IF pf5>1] How many of these freezers were plugged in and running for 3 months or more in a year after < IMOYR>?
[RECORD NUMBER <= pf5]......................................................................................................
Don't know ...............................................................................................................................–97
Refused ....................................................................................................................................–98

**Subsection 3.3 Exceed # freezers at time of impact evaluation? If so, when**

pf7. Since <CMOYR>, have you ever had more than <OPF> stand-alone freezer(s) plugged in and running at the same time for at least 3 months in a year?
Yes ...........................................................................................................................................1
No................................................................................................................ [SKIP TO PF11] 2
Don't know ................................................................................................ [SKIP TO PF11] –97
Refused ..................................................................................................... [SKIP TO PF11] –98

pf8a. [IF CYEAR=1999] About what year did this first happen? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']
1999...............................................................................................................................1
2000...............................................................................................................................2
2001...............................................................................................................................3
2002...............................................................................................................................4
2003...............................................................................................................................5
2004...............................................................................................................................6
Other [SPECIFY].................................................................................. [SKIP TO PF11] 96
Don't know ..................................................................................... [SKIP TO PF11] –97
Refused ........................................................................................... [SKIP TO PF11] –98

pf8b. [IF CYEAR=1995] About what year did this first happen? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']
1995...............................................................................................................................1
1996...............................................................................................................................2
1997...............................................................................................................................3
1998...............................................................................................................................4
1999...............................................................................................................................5
2000...............................................................................................................................6
2001...............................................................................................................................7
2002...............................................................................................................................8
2003...............................................................................................................................9
2004.............................................................................................................................10
Other [SPECIFY].................................................................................. [SKIP TO PF11] 96
Don't know ..................................................................................... [SKIP TO PF11] –97
Refused ........................................................................................... [SKIP TO PF11] –98

pf8c. [IF CYEAR=1998] About what year did this first happen? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']
1998...............................................................................................................................1
1999...............................................................................................................................2
2000...............................................................................................................................3
2001...............................................................................................................................4
2002...............................................................................................................................5
2003...............................................................................................................................6
2004...............................................................................................................................7
Other [SPECIFY].................................................................................. [SKIP TO PF11] 96
Don't know ..................................................................................... [SKIP TO PF11] –97
Refused ........................................................................................... [SKIP TO PF11] –98

pf9a. [IF pf3b>1 AND <OPF>=0 AND CYEAR=1999] Since January 1999, about what year did you first have one or more of these freezers plugged in and running for at least 3 months? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']

1999................................................................................................................................1
2000................................................................................................................................2
2001................................................................................................................................3
2002................................................................................................................................4
2003................................................................................................................................5
2004................................................................................................................................6
Other [SPECIFY].................................................................................... [SKIP TO PF11] 96
Don't know ......................................................................................... [SKIP TO PF11] –97
Refused .............................................................................................. [SKIP TO PF11] –98

pf9b. [IF pf3b>1 AND <OPF>=0 AND CYEAR=1995] Since November 1995, about what year did you first have one or more of these freezers plugged in and running for at least 3 months? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']

1995................................................................................................................................1
1996................................................................................................................................2
1997................................................................................................................................3
1998................................................................................................................................4
1999................................................................................................................................5
2000................................................................................................................................6
2001................................................................................................................................7
2002................................................................................................................................8
2003................................................................................................................................9
2004..............................................................................................................................10
Other [SPECIFY].................................................................................... [SKIP TO PF11] 96
Don't know ......................................................................................... [SKIP TO PF11] –97
Refused .............................................................................................. [SKIP TO PF11] –98

pf9c. [IF pf3b>1 AND <OPF>=0 AND CYEAR=1998] Since January 1998, about what year did you first have one or more of these freezers plugged in and running for at least 3 months? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']

1998................................................................................................................................1
1999................................................................................................................................2
2000................................................................................................................................3
2001................................................................................................................................4
2002................................................................................................................................5
2003................................................................................................................................6
2004................................................................................................................................7
Other [SPECIFY].................................................................................... [SKIP TO PF11] 96
Don't know ......................................................................................... [SKIP TO PF11] –97
Refused .............................................................................................. [SKIP TO PF11] –98

pf10. Can you tell me about what month during this year it first happen? [WE'RE LOOKING FOR THE EXACT MONTH. IF CAN'T SPECIFY EXACT MONTH, RECORD RESPONSE IN 'Other.']

January ........................................................................................................................1
February ......................................................................................................................2
March ...........................................................................................................................3
April .............................................................................................................................4
May ..............................................................................................................................5
June ..............................................................................................................................6
July...............................................................................................................................7
August...........................................................................................................................8
September ......................................................................................................................9
October.........................................................................................................................10
November......................................................................................................................11
December ......................................................................................................................12
Other [SPECIFY]...........................................................................................................96
Don't know ..................................................................................................................–97
Refused .......................................................................................................................–98

pf11. How many stand-alone freezers do you now have at this address that are plugged in and running?
[RECORD NUMBER].......................................................................................................
Don't know ..................................................................................................................–97
Refused .......................................................................................................................–98

## Section 4: Mover Refrigerator Questions

### Subsection 4.1 Mover's starting point and refrigerators acquired[VG10]

[IF b5=1 OR b6^=1 THANK AND TERMINATE]

mr1. [IF <DSCNUM>=2 SKIP TO mf1] When you first moved to this address, how many refrigerators did you have? Either that you brought with you or that were there when you moved in.
[RECORD NUMBER].......................................................................................................
Don't know ..................................................................................................................–97
Refused .......................................................................................................................–98

mr2. After moving here, have you brought any refrigerators into your home?
Yes ...............................................................................................................................1
No...................................................................................................[SKIP TO mr6a] 2
Don't know ............................................................................................. [SKIP TO mr7b] –97
Refused ................................................................................................. [SKIP TO mr7b] –98

mr3. How many?
[RECORD NUMBER>0] ..................................................................................................
Don't know ............................................................................................. [SKIP TO mr7b] –97
Refused ................................................................................................. [SKIP TO mr7b] –98

//when first moved=0, after moving>0//

mr4a. [IF mr1=0 AND mr3=1] Was this refrigerator plugged in and running for 3 months or more in a year?

Yes .................................................................................................................................1
No.................................................................................................... [SKIP TO mr13] 2
Don't know ...................................................................................... [SKIP TO mr7b] –97
Refused .......................................................................................... [SKIP TO mr7b] –98

mr4b. [IF mr1=0 AND mr3>1] How many of these refrigerators were plugged in and running for 3 months or more in a year?

[RECORD NUMBER <=mr3]..................................................................................................
Don't know ...................................................................................... [SKIP TO mr7b] –97
Refused .......................................................................................... [SKIP TO mr7b] –98

//when first moved>0, after moving>0//

mr5. [IF mr1>0] Consider the <mr1> refrigerator(s) you had when you first moved here as well as the <mr3> refrigerator(s) you've brought into your home since moving here. Since moving here, how many of these refrigerators were plugged in and running for 3 months or more in a year?

[RECORD NUMBER <= (mr1+mr3)] ......................................................................................
Don't know ...................................................................................... [SKIP TO mr7b] –97
Refused .......................................................................................... [SKIP TO mr7b] –98

//when first moved>0, after moving=0//

mr6a. [IF mr1=1 AND mr2=2] Consider the refrigerator you had when you first moved here. since moving here, was this refrigerator plugged in and running for 3 months or more in a year?

Yes .................................................................................................................................1
No.................................................................................................... [SKIP TO mr13] 2
Don't know ...................................................................................... [SKIP TO mr7b] –97
Refused .......................................................................................... [SKIP TO mr7b] –98

mr6b. [IF mr1>1 AND mr2=2] Consider the <mr1> refrigerators you had when you first moved here. Since moving here, how many of these refrigerators were plugged in and running for 3 months or more in a year?

[RECORD NUMBER <= mr1]..................................................................................................
Don't know ...................................................................................... [SKIP TO mr7b] –97
Refused .......................................................................................... [SKIP TO mr7b] –98

## Subsection 4.2 Refrigerators discarded

[IF mr1=0 and mr2=2 GO TO mr13

IF mr1=–97 or –98 SKIP TO mr7b

IF (mr4a<=<OPR> OR mr4b<=<OPR> OR mr5<=<OPR> OR mr6a<=<OPR> OR mr6b<=<OPR>) GO TO mr13

IF (mr4a=1 OR mr4b=1 OR mr5=1 OR mr6a=1 OR mr6b=1) AND <OPR>=0 GO TO mr10a

IF (mr4b>1 OR mr5>1 OR mr6b>1) AND <OPR>=0 GO TO mr11a]

mr7a[VG11]. Since moving here, have you gotten rid of any of these refrigerators?
Yes ...................................................................................................... [SKIP TO mr8] 1
No...................................................................................................... [SKIP TO mr9] 2
Don't know ....................................................................................... [SKIP TO mr9] –97
Refused ............................................................................................. [SKIP TO mr9] –98

mr7b. Since moving here, have you gotten rid of any refrigerators?
Yes .......................................................................................................................1
No...................................................................................................... [SKIP TO mr9] 2
Don't know ....................................................................................... [SKIP TO mr9] –97
Refused ............................................................................................. [SKIP TO mr9] –98

mr8. How many?
[RECORD NUMBER].................................................................................................
Don't know .........................................................................................................–97
Refused ...............................................................................................................–98

**Subsection 4.3 Exceed # refrigerators at time of impact evaluation? If so, when**

mr9. Since moving here, have you ever had more than <OPR> refrigerator(s) plugged in and running at the same time for at least 3 months in a year?
Yes .......................................................................................................................1
No...................................................................................................... [SKIP TO mr13] 2
Don't know ....................................................................................... [SKIP TO mr13] –97
Refused ............................................................................................. [SKIP TO mr13] –98

mr10a. [IF CYEAR=1999] About what year did this first happen? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']
1999.......................................................................................................................1
2000.......................................................................................................................2
2001.......................................................................................................................3
2002.......................................................................................................................4
2003.......................................................................................................................5
2004.......................................................................................................................6
Other [SPECIFY]....................................................................... [SKIP TO mr13] 96
Don't know ....................................................................................... [SKIP TO mr13] –97
Refused ............................................................................................. [SKIP TO mr13] –98

mr10b. [IF CYEAR=1995] About what year did this first happen? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']

1995..........................................................................................................................1
1996..........................................................................................................................2
1997..........................................................................................................................3
1998..........................................................................................................................4
1999..........................................................................................................................5
2000..........................................................................................................................6
2001..........................................................................................................................7
2002..........................................................................................................................8
2003..........................................................................................................................9
2004.........................................................................................................................10
Other [SPECIFY].................................................................... [SKIP TO mr13] 96
Don't know ........................................................................... [SKIP TO mr13] –97
Refused ................................................................................. [SKIP TO mr13] –98

mr10c. [IF CYEAR=1998] About what year did this first happen [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']

1998..........................................................................................................................1
1999..........................................................................................................................2
2000..........................................................................................................................3
2001..........................................................................................................................4
2002..........................................................................................................................5
2003..........................................................................................................................6
2004..........................................................................................................................7
Other [SPECIFY].................................................................... [SKIP TO mr13] 96
Don't know ........................................................................... [SKIP TO mr13] –97
Refused ................................................................................. [SKIP TO mr13] –98

mr11a. [IF (mr4b>1 OR mr5>1 OR mr6b>1) AND <OPR>=0 AND CYEAR=1999] Since moving here, about what year did you first have one or more of these refrigerators plugged in and running for at least 3 months[WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']

1999..........................................................................................................................1
2000..........................................................................................................................2
2001..........................................................................................................................3
2002..........................................................................................................................4
2003..........................................................................................................................5
2004..........................................................................................................................6
Other [SPECIFY].................................................................... [SKIP TO mr13] 96
Don't know ........................................................................... [SKIP TO mr13] –97
Refused ................................................................................. [SKIP TO mr13] –98

mr11b. [IF (mr4b>1 OR mr5>1 OR mr6b>1) AND <OPR>=0 AND CYEAR=1995] Since moving here, about what year did you first have one or more of these refrigerators plugged in and running for at least 3 months? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']

1995........................................................................................................................................1
1996........................................................................................................................................2
1997........................................................................................................................................3
1998........................................................................................................................................4
1999........................................................................................................................................5
2000........................................................................................................................................6
2001........................................................................................................................................7
2002........................................................................................................................................8
2003........................................................................................................................................9
2004......................................................................................................................................10
Other [SPECIFY]................................................................................ [SKIP TO mr13] 96
Don't know ..................................................................................... [SKIP TO mr13] –97
Refused ......................................................................................... [SKIP TO mr13] –98

mr11c. [IF (mr4b>1 OR mr5>1 OR mr6b>1) AND <OPR>=0 AND CYEAR=1998] Since moving here, about what year did you first have one or more of these refrigerators plugged in and running for at least 3 months? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']

1998........................................................................................................................................1
1999........................................................................................................................................2
2000........................................................................................................................................3
2001........................................................................................................................................4
2002........................................................................................................................................5
2003........................................................................................................................................6
2004........................................................................................................................................7
Other [SPECIFY]................................................................................ [SKIP TO mr13] 96
Don't know ..................................................................................... [SKIP TO mr13] –97
Refused ......................................................................................... [SKIP TO mr13] –98

mr12. Can you tell me about what month during this year it first happen? [WE'RE LOOKING FOR THE EXACT MONTH. IF CAN'T SPECIFY EXACT MONTH, RECORD RESPONSE IN 'Other.']

January ..............................................................................................................1
February .............................................................................................................2
March .................................................................................................................3
April ..................................................................................................................4
May ...................................................................................................................5
June ...................................................................................................................6
July.....................................................................................................................7
August................................................................................................................8
September ..........................................................................................................9
October..............................................................................................................10
November...........................................................................................................11
December ...........................................................................................................12
Other [SPECIFY].................................................................................................96
Don't know .........................................................................................................–97
Refused ..............................................................................................................–98

mr13. How many refrigerators do you now have at this address that are plugged in and running? [RECORD NUMBER]..........................................................................................................
Don't know .........................................................................................................–97
Refused ..............................................................................................................–98

## Section 5: Mover Freezer Questions

// //

mf0. [IF <DSCNUM>=1 THANK AND TERMINATE]

### Subsection 5.1 Mover's starting point and freezers acquired[VG13]

mf1. When you first moved to this address, how many stand-alone freezers did you have? Either that you brought with you or that were there when you moved in.
[RECORD NUMBER].........................................................................................................
Don't know .........................................................................................................–97
Refused ..............................................................................................................–98

mf2. After moving here, have you brought any stand-alone freezers into your home?
Yes .....................................................................................................................1
No.................................................................................................[SKIP TO mf6a] 2
Don't know ...................................................................... [SKIP TO mf7b] –97
Refused .......................................................................... [SKIP TO mf7b] –98

mf3. How many?
[RECORD NUMBER>0] ....................................................................................................
Don't know ...................................................................... [SKIP TO mf7b] –97
Refused .......................................................................... [SKIP TO mf7b] –98

//when first moved=0, after moving>0//

mf4a. [IF mf1=0 AND mf3=1] Was this freezer plugged in and running for 3 months or more in a year?

Yes ........................................................................................................................1
No.................................................................................................. [SKIP TO MF13] 2
Don't know ............................................................................... [SKIP TO mf7b] –97
Refused ..................................................................................... [SKIP TO mf7b] –98

mf4b. [IF mf1=0 AND mf3>1] How many of these freezers were plugged in and running for 3 months or more in a year?

[RECORD NUMBER <=mf3]........................................................................................
Don't know ............................................................................... [SKIP TO mf7b] –97
Refused ..................................................................................... [SKIP TO mf7b] –98

//when first moved>0, after moving>0//

mf5. [IF mf1>0] Consider the <mf1> stand-alone freezer(s) you had when you first moved here as well as the <mf3> stand-alone freezer(s) you've brought into your home since moving here. Since moving here, how many of these freezers were plugged in and running for 3 months or more in a year?

[RECORD NUMBER <= (mf1+mf3)] .................................................................................
Don't know ............................................................................... [SKIP TO mf7b] –97
Refused ..................................................................................... [SKIP TO mf7b] –98

//when first moved>0, after moving=0//

mf6a. [IF mf1=1 AND mf2=2] Consider the stand-alone freezer you had when you first moved here. Since moving here, was this freezer plugged in and running for 3 months or more in a year?

Yes ........................................................................................................................1
No................................................................................................... [SKIP TO MF13] 2
Don't know ............................................................................... [SKIP TO mf7b] –97
Refused ..................................................................................... [SKIP TO mf7b] –98

mf6b. [IF mf1>1 AND mf2=2] Consider the <mf1> stand-alone freezers you had when you first moved here. Since moving here, how many of these freezers were plugged in and running for 3 months or more in a year?

[RECORD NUMBER <= mf1]..........................................................................................
Don't know ............................................................................... [SKIP TO mf7b] –97
Refused ..................................................................................... [SKIP TO mf7b] –98

**Subsection 5.2 Freezers discarded**

[IF mf1=0 and mf2=2 SKIP TO MF13

IF mf1=–97 or –98 SKIP TO mf7b

IF (mf4a<=<OPF> OR mf4b<=<OPF> OR mf5<=<OPF> OR mf6a<=<OPF> OR

mf6b<=<OPF>) SKIP TO MF13

IF (mf4a=1 OR mf4b=1 OR mf5=1 OR mf6a=1 OR mf6b=1) AND <OPF>=0 GO TO mf10a

IF (mf4b>1 OR mf5>1 OR mf6b>1) AND <OPF>=0 GO TO mf11a]

mf7a[VG14]. Since moving here, have you gotten rid of any of these freezers?

Yes ...................................................................................... [SKIP TO mf8] 1
No......................................................................................... [SKIP TO mf9] 2
Don't know ..................................................................... [SKIP TO mf9] –97
Refused .......................................................................... [SKIP TO mf9] –98

mf7b. Since moving here, have you gotten rid of any stand-alone freezers?
Yes ...............................................................................................................1
No......................................................................................... [SKIP TO mf9] 2
Don't know ..................................................................... [SKIP TO mf9] –97
Refused .......................................................................... [SKIP TO mf9] –98

mf8. How many?
[RECORD NUMBER]................................................................................................
Don't know ................................................................................................–97
Refused ......................................................................................................–98

## Subsection 5.3 Exceed # freezers at time of impact evaluation? If so, when

mf9. Since moving here, have you ever had more than <OPF> stand-alone freezer(s) plugged in and running at the same time for at least 3 months in a year?
Yes ...............................................................................................................1
No........................................................................................ [SKIP TO MF13] 2
Don't know .................................................................... [SKIP TO MF13] –97
Refused ......................................................................... [SKIP TO MF13] –98

mf10a. [IF CYEAR=1999] About what year did this first happen? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']
1999.............................................................................................................1
2000.............................................................................................................2
2001.............................................................................................................3
2002.............................................................................................................4
2003.............................................................................................................5
2004.............................................................................................................6
Other [SPECIFY].............................................................. [SKIP TO MF13] 96
Don't know ..................................................................... [SKIP TO MF13] –97
Refused ......................................................................... [SKIP TO MF13] –98

mf10b. [IF CYEAR=1995] About what year did this first happen? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']
1995......................................................................................................................................1
1996......................................................................................................................................2
1997......................................................................................................................................3
1998......................................................................................................................................4
1999......................................................................................................................................5
2000......................................................................................................................................6
2001......................................................................................................................................7
2002......................................................................................................................................8
2003......................................................................................................................................9
2004....................................................................................................................................10
Other [SPECIFY].................................................................................. [SKIP TO MF13] 96
Don't know ...................................................................................... [SKIP TO MF13] –97
Refused ........................................................................................... [SKIP TO MF13] –98

mf10c. [IF CYEAR=1998] About what year did this first happen [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']
1998......................................................................................................................................1
1999......................................................................................................................................2
2000......................................................................................................................................3
2001......................................................................................................................................4
2002......................................................................................................................................5
2003......................................................................................................................................6
2004......................................................................................................................................7
Other [SPECIFY].................................................................................. [SKIP TO MF13] 96
Don't know ...................................................................................... [SKIP TO MF13] –97
Refused ........................................................................................... [SKIP TO MF13] –98

mf11a. [IF (mf4b>1 OR mf5>1 OR mf6b>1) AND <OPF>=0 AND CYEAR=1999] Since moving here, about what year did you first have one or more of these freezers plugged in and running for at least 3 months? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']
1999......................................................................................................................................1
2000......................................................................................................................................2
2001......................................................................................................................................3
2002......................................................................................................................................4
2003......................................................................................................................................5
2004......................................................................................................................................6
Other [SPECIFY].................................................................................. [SKIP TO MF13] 96
Don't know ...................................................................................... [SKIP TO MF13] –97
Refused ........................................................................................... [SKIP TO MF13] –98

mf11b. [IF (mf4b>1 OR mf5>1 OR mf6b>1) AND <OPF>=0 AND CYEAR=1995] Since moving here, about what year did you first have one or more of these freezers plugged in and running for at least 3 months? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']

1995.........................................................................................................................................1
1996.........................................................................................................................................2
1997.........................................................................................................................................3
1998.........................................................................................................................................4
1999.........................................................................................................................................5
2000.........................................................................................................................................6
2001.........................................................................................................................................7
2002.........................................................................................................................................8
2003.........................................................................................................................................9
2004.......................................................................................................................................10
Other [SPECIFY]..................................................................................... [SKIP TO MF13] 96
Don't know ........................................................................................ [SKIP TO MF13] –97
Refused ............................................................................................... [SKIP TO MF13] –98

mf11c. [IF (mf4b>1 OR mf5>1 OR mf6b>1) AND <OPF>=0 AND CYEAR=1998] Since moving here, about what year did you first have one or more of these freezers plugged in and running for at least 3 months? [WE'RE LOOKING FOR THE EXACT YEAR. IF CAN'T SPECIFY EXACT YEAR, RECORD RESPONSE IN 'Other.']

1998.........................................................................................................................................1
1999.........................................................................................................................................2
2000.........................................................................................................................................3
2001.........................................................................................................................................4
2002.........................................................................................................................................5
2003.........................................................................................................................................6
2004.........................................................................................................................................7
Other [SPECIFY]..................................................................................... [SKIP TO MF13] 96
Don't know ........................................................................................ [SKIP TO MF13] –97
Refused ............................................................................................... [SKIP TO MF13] –98

mf12. Can you tell me about what month during this year it first happen? [WE'RE LOOKINGFOR THE EXACT MONTH. IF CAN'T SPECIFY EXACT MONTH, TRY TO GET TO SPECIFY A RANGE OF MONTHS AND RECORD ALL, BEFORE MONTH, OR AFTER MONTH.]

January ................................................................................................................1
February ..............................................................................................................2
March ..................................................................................................................3
April ....................................................................................................................4
May .....................................................................................................................5
June .....................................................................................................................6
July......................................................................................................................7
August.................................................................................................................8
September ............................................................................................................9
October..............................................................................................................10
November...........................................................................................................11
December ...........................................................................................................12
Other [SPECIFY]...............................................................................................96
Don't know ......................................................................................................–97
Refused ............................................................................................................–98

mf13. How many stand-alone freezers do you now have at this address that are plugged in and running?
[RECORD NUMBER]...............................................................................................
Don't know ......................................................................................................–97
Refused ............................................................................................................–98

Those are all the questions I have for you. Thank you very much for your help.

## A.2 RECENT APPLIANCE DISCARDERS

### *Sample Data*

<NPNAME>: nonparticipant name

<RFDSCSTY>: RASS fielded in 2003, door style of old refrigerator discarded in last 12 months

<RFDSCDEF>: RASS fielded in 2003, old refrigerator discarded in last 12 months frost-free or manual defrost

<RFDSCSZ>: RASS fielded in 2003, size of old refrigerator discarded in last 12 months

<FZDSCSTY>: RASS fielded in 2003, style of old freezer discarded in last 12 months

<FZDSCSZ>: RASS fielded in 2003, size of old freezer discarded in last 12 months

FYI, RASS data = 98 means missing

Discuss with survey house:

- Not all contact names are persons or master metered w/person as contact. Wing it or revise/add questions to handle. Seems could simply start with b2. Reference to household is somewhat awkward. However, expected survey to be completed for a home.

- Collecting age data: note follow up question

- If range, need a range before\after is not sufficient

### *Section 1: Lead In*

b1. Hello, may I speak with <NPNAME>?
Yes.............................................................................................................[SKIP TO b3] 1
No...........................................................................................................................................2
Don't know ..............................................................................................................................–97
Refused ............................................................................[THANK AND TERMINATE] –98

b2. [IF AN ADULT ANSWERED OR YOU CAN GET AN ADULT ON THE LINE.] Perhaps you can help me.

b3. My name is _____ and I'm with Research America. I'm calling on behalf of Southern California Edison. We're conducting a brief survey to learn about refrigerators and freezers in Southern California Edison territory. This is not a marketing call. We're collecting data to help Southern California Edison improve its residential programs and services and help its customers save energy. Southern California Edison is required by the California Public Utility Commission to conduct this type of research. Your responses will be kept entirely confidential.

b4. Did you get rid of a refrigerator or a stand-alone freezer sometime in the last couple of years; say, sometime since January 2002?

Yes ................................................................................................................................1
No....................................................................................................................................2
Don't know ..............................................................................................................–97
Refused .....................................................................................................................–98

b5. What about in the last 5 years?

Yes ................................................................................................................................1
No....................................................................................................................................2
Don't know ..............................................................................................................–97
Refused .....................................................................................................................–98

b6. Is there anyone else that might know about refrigerators or freezers gotten rid of from this address?

Yes ........................................................ [BACK TO BEGINNING WITH NEW PERSON] 1
No.....................................................................................[THANK AND TERMINATE] 2
Don't know ......................................................................[THANK AND TERMINATE] –97
Refused ...........................................................................[THANK AND TERMINATE] –98

## Section 2: Refrigerator Questions

### Subsection 2.1 Intro

r0. How many refrigerators [VG16]have you gotten rid of since then?

[RECORD NUMBER > 0] .................................................................................................
Don't know ..............................................................................................................–97
Refused .....................................................................................................................–98

[IF r0=0 THEN GO TO f0
ELSE GO TO r1]

r1. [IF r0^=1] Please answer my questions for the refrigerator you got rid of most recently.

### Subsection 2.2 When got rid of worked? If not, age broke + age at discard

r2a. [VG17]. When you got rid of the refrigerator, was it still in working condition?

Yes ...............................................................................[SKIP TO r2b] 1
No....................................................................................[SKIP TO r2c] 2
Don't know .................................................................[SKIP TO rd1] –97
Refused .......................................................................[SKIP TO rd1] –98

r2b. [IF r2a=1] Was it in need of any repair?

Yes ...............................................................................[SKIP TO rd1] 1
No...................................................................................[SKIP TO rd1] 2
Don't know .................................................................[SKIP TO rd1] –97
Refused .......................................................................[SKIP TO rd1] –98

r2c. [IF r2a=2] Was it worth repairing?

Yes .............................................................................................................................1
No...............................................................................................................................2
Don't know ...........................................................................................................–97
Refused .................................................................................................................–98

r3 [VG18]. About how many years ago was the refrigerator no longer in working condition?
[RECORD A RANGE IN 'Other[VG19].']

[RECORD EXACT NUMBER OF YEARS]................................................................................
Other [SPECIFY].....................................................................................................96
Don't know ...........................................................................................................–97
Refused .................................................................................................................–98

r4a [VG20]. About how many years old was the refrigerator then? Thinking about what else happened around the same time you bought the refrigerator may help you remember the age of the refrigerator. Also, if you did not buy the refrigerator new, be sure to factor in the age of the refrigerator when you bought it. [WE'RE LOOKING FOR AN EXACT NUMBER OF YEARS. RECORD A RANGE IN 'Other.']
[RECORD EXACT NUMBER OF YEARS]................................................................................
Other [SPECIFY].....................................................................................................96
Don't know ...........................................................................[SKIP TO r5a] –97
Refused .................................................................................[SKIP TO r5a] –98

r4b. Just to confirm: This is the age of the refrigerator when it was no longer in working condition and not necessarily its age when you got rid of it?
Yes .............................................................................[SKIP TO r6] 1
No...............................................................................................................................2
Don't know ...........................................................................................................–97
Refused .................................................................................................................–98

r4c[VG21]. About how many years old was the refrigerator when it was no longer in working condition? [WE'RE LOOKING FOR AN EXACT NUMBER OF YEARS. RECORD A RANGE IN 'Other.']
[RECORD EXACT NUMBER OF YEARS]...........................................................[SKIP TO r6]
Other [SPECIFY]...............................................................................[SKIP TO r6] 96
Don't know ...........................................................................................................–97
Refused .................................................................................................................–98

r5a. Can you tell me within five years how old the refrigerator was when it was no longer in working condition? That is, would you say it was closest to 5 years old, 10 years old, 15 years old, etc.?

Closest to 5 years old ........................................................................................................1
Closest to 10 years old ......................................................................................................2
Closest to 15 years old ......................................................................................................3
Closest to 20 years old ......................................................................................................4
Closest to 25 years old ......................................................................................................5
Closest to 30 years old ......................................................................................................6
Closest to 35 years old ......................................................................................................7
Closest to 40 years old ......................................................................................................8
Closest to 45 years old ......................................................................................................9
Closest to 50 years old ....................................................................................................10
Other [SPECIFY]............................................................................................................96
Don't know ...............................................................................[SKIP TO rd1] –97
Refused ......................................................................................[SKIP TO rd1] –98

r5b. Just to confirm: This is the age of the refrigerator when it was no longer in working condition and not necessarily its age when you got rid of it?

Yes ............................................................................................[SKIP TO r6] 1
No.......................................................................................................................2
Don't know ......................................................................................................–97
Refused ............................................................................................................–98

r5c. Can you tell me within five years how old the refrigerator was when it was no longer in working condition? That is, would you say it was closest to 5 years old, 10 years old, 15 years old, etc.?

Closest to 5 years old ........................................................................................................1
Closest to 10 years old ......................................................................................................2
Closest to 15 years old ......................................................................................................3
Closest to 20 years old ......................................................................................................4
Closest to 25 years old ......................................................................................................5
Closest to 30 years old ......................................................................................................6
Closest to 35 years old ......................................................................................................7
Closest to 40 years old ......................................................................................................8
Closest to 45 years old ......................................................................................................9
Closest to 50 years old ....................................................................................................10
Other [SPECIFY]............................................................................................................96
Don't know ...............................................................................[SKIP TO rd1] –97
Refused ......................................................................................[SKIP TO rd1] –98

r6. About how long after the refrigerator was no longer in working condition did you get rid of it: less than 6 months, 1 year, 2 years, etc.?

Less than 6 months................................................................................ [SKIP TO rs1] 1
1 year.................................................................................................... [SKIP TO rs1] 2
2 years ...................................................................................................[SKIP TO rs1] 3
3 years ...................................................................................................[SKIP TO rs1] 4
4 years ...................................................................................................[SKIP TO rs1] 5

5 years ........................................................................................................[SKIP TO rs1] 6
Other [SPECIFY]........................................................................... [SKIP TO rs1] 96
Don't know ................................................................................[SKIP TO rs1] –97
Refused ......................................................................................[SKIP TO rs1] –98

### Subsection 2.3 Discard age [VG22]

rd1. My next questions concern the age of the refrigerator when you got rid of it. Thinking about what else happened around the same time you bought the refrigerator may help you remember the age of the refrigerator. Also, if you did not buy the refrigerator new, be sure to factor in the age of the refrigerator when you bought it.

rd7a. About how many years old was the refrigerator when you got rid of it? [WE'RE LOOKING FOR AN EXACT NUMBER OF YEARS. RECORD A RANGE IN 'Other.']
[RECORD NUMBER OF YEARS] ................................................... [SKIP TO rs1]
Other [SPECIFY]........................................................... [SKIP TO rs1] 96
Don't know ...............................................................................................–97
Refused .....................................................................................................–98

rd7b. Can you tell me within five years how old it was? That is, would you say it was closest to 1 year old, 5 years old, 10 years old, 15 years old, etc.?
Closest to 1 year old......................................................................................1
Closest to 5 years old.....................................................................................2
Closest to 10 years old....................................................................................3
Closest to 15 years old....................................................................................4
Closest to 20 years old....................................................................................5
Closest to 25 years old....................................................................................6
Closest to 30 years old....................................................................................7
Closest to 35 years old....................................................................................8
Closest to 40 years old....................................................................................9
Closest to 45 years old...................................................................................10
Closest to 50 years old ..................................................................................11
Other [SPECIFY]..........................................................................................96
Don't know ...............................................................................[SKIP TO f0] –97
Refused .....................................................................................[SKIP TO f0] –98

### Subsection 2.4 Discard status

rs1. To get rid of the refrigerator, did you pay someone, did someone pay you, or did you give it away?
You paid someone..........................................................................................1
Someone paid you..........................................................................................2
Gave it away .................................................................................................3
Don't know .................................................................................................–97
Refused ......................................................................................................–98

rs2. To get rid of the refrigerator, did you take it somewhere or was it picked up?
You took it somewhere ..................................................................................................1
It was picked it up ........................................................................ [SKIP TO rs3b] 2
Don't know ...................................................................................[SKIP TO rc1] –97
Refused ........................................................................................[SKIP TO rc1] –98

rs3a. Which of the following best describes where you took it? [READ LIST. DON'T RECORD RESPONSE UNTIL FINISHED READING LIST]
To a utility recycling program ....................................................[SKIP TO rc1] 1
To a scrap dealer or recycler......................................................[SKIP TO rc1] 2
To a landfill................................................................................[SKIP TO rc1] 3
To an appliance dealer ...............................................................[SKIP TO rc1] 4
Or to someone's home ................................................................[SKIP TO rc1] 5
[DO NOT READ]Other [SPECIFY] .............................................[SKIP TO rc1] 96
Don't know ................................................................................[SKIP TO rc1] –97
Refused .....................................................................................[SKIP TO rc1] –98

rs3b. Which of the following best describes who picked it up? [READ LIST. DON'T RECORD RESPONSE UNTIL FINISHED READING LIST]
The dealer you bought a new refrigerator from ...........................................................1
A dealer, but not one you just bought a refrigerator from ...........................................2
A utility recycling program...........................................................................................3
A scrap dealer or recycler ............................................................................................4
Someone you hired to take it away ..............................................................................5
Or a private citizen.......................................................................................................6
[DO NOT READ]Other [SPECIFY] ...........................................................................96
Don't know ...............................................................................................................–97
Refused ...................................................................................................................–98

**Subsection 2.5 Refrigerator characteristics**

rc1[VG23]. [IF r2a=2] During the year prior to the refrigerator no longer being in working condition, about how many months did you use it?
[RECORD NUMBER OF MONTHS 0–12] ...............................................................................
Don't know ...............................................................................................................–97
Refused ...................................................................................................................–98

rc2. During the year prior to getting rid of the refrigerator, about how many months did you use it? [IF RESPOND "all the time," CONFIRM "that would be 12 months?"]
[RECORD NUMBER OF MONTHS 0–12] ...............................................................................
Don't know ...............................................................................................................–97
Refused ...................................................................................................................–98

rc3. [IF r0^=1 OR <RFDSCSTY>=98] Which of the following best describes the refrigerator you got rid of? [READ LIST. DON'T RECORD RESPONSE UNTIL FINISHED READING LIST.]
Single-door.................................................................................................................1
Top freezer, bottom refrigerator ................................................................................2
Bottom freezer, top refrigerator ................................................................................3

Or side-by-side..................................................................................................4
[DON'T READ] Don't know ...........................................................................–97
[DON'T READ] Refused ..................................................................................–98

rc4. [IF r0^=1 OR <RFDSCDEF>=98] Was the refrigerator frost-free or manual defrost?
Frost-free...........................................................................................................1
Manual defrost ..................................................................................................2
Don't know .....................................................................................................–97
Refused ...........................................................................................................–98

rc5. [IF r0^=1 OR <RFDSCSZ>=98] In terms of size, was the refrigerator mini, which would be less than 13 cubic feet?
Yes .....................................................................................................................1
No........................................................................................................................2
Don't know .....................................................................................................–97
Refused ...........................................................................................................–98

## Section 3: Freezer Questions

### Subsection 3.1 Intro

f0. How many stand-alone freezers have you gotten rid of since January 2002?
[RECORD NUMBER>0] ........................................................................................................
Don't know .....................................................................................................–97
Refused ...........................................................................................................–98

[IF f0=0 THEN THANK AND TERMINATE
ELSE GO TO f1]

f1 [IFf0^=1] Please answer my questions for the freezer you got rid of most recently.

### Subsection 3.2 When got rid of worked? If not, age broke + age at discard

f2a. [VG25]. When you got rid of the freezer, was it still in working condition?
Yes ....................................................................................[SKIP TO f2b] 1
No......................................................................................[SKIP TO f2c] 2
Don't know ....................................................................[SKIP TO fd1] –97
Refused ...........................................................................[SKIP TO fd1] –98

f2b. [IF f2a=1] Was it in need of any repair?
Yes ....................................................................................[SKIP TO fd1] 1
No......................................................................................[SKIP TO fd1] 2
Don't know ....................................................................[SKIP TO fd1] –97
Refused ...........................................................................[SKIP TO fd1] –98

f2c. [IF f2a=2] Was it worth repairing?
Yes .....................................................................................................................1
No........................................................................................................................2
Don't know .....................................................................................................–97
Refused ...........................................................................................................–98

f3[VG26]. About how many years ago was the freezer no longer in working condition? [RECORD A RANGE IN 'Other.']

[RECORD EXACT NUMBER OF YEARS]............................................................................

Other [SPECIFY]..............................................................................................96

Don't know ....................................................................................................–97

Refused ........................................................................................................–98

f4a[VG27]. About how many years old was the freezer then? Thinking about what else happened around the same time you bought the freezer may help you remember the age of the freezer. Also, if you did not buy the freezer new, be sure to factor in the age of the freezer when you bought it. [WE'RE LOOKING FOR AN EXACT NUMBER OF YEARS. RECORD A RANGE IN 'Other.']

[RECORD EXACT NUMBER OF YEARS]............................................................................

Other [SPECIFY]..............................................................................................96

Don't know ........................................................................[SKIP TO f5a] –97

Refused ............................................................................[SKIP TO f5a] –98

f4b. Just to confirm: This is the age of the freezer when it was no longer in working condition and not necessarily its age when you got rid of it?

Yes ........................................................................................[SKIP TO f6] 1

No..................................................................................................................2

Don't know ....................................................................................................–97

Refused ........................................................................................................–98

f4c[VG28]. About how many years old was the freezer when it was no longer in working condition? [WE'RE LOOKING FOR AN EXACT NUMBER OF YEARS. RECORD A RANGE IN 'Other.']

[RECORD EXACT NUMBER OF YEARS]..........................................[SKIP TO f6]

Other [SPECIFY]..................................................................[SKIP TO f6] 96

Don't know ....................................................................................................–97

Refused ........................................................................................................–98

f5a. Can you tell me within five years how old the freezer was when it was no longer in working condition? That is, would you say it was closest to 5 years old, 10 years old, 15 years old, etc.?

Closest to 5 years old ........................................................................................1

Closest to 10 years old ......................................................................................2

Closest to 15 years old ......................................................................................3

Closest to 20 years old ......................................................................................4

Closest to 25 years old ......................................................................................5

Closest to 30 years old ......................................................................................6

Closest to 35 years old ......................................................................................7

Closest to 40 years old ......................................................................................8

Closest to 45 years old ......................................................................................9

Closest to 50 years old ....................................................................................10

Other [SPECIFY]..............................................................................................96

Don't know ......................................................................[SKIP TO fd1] –97

Refused ..........................................................................[SKIP TO fd1] –98

f5b. Just to confirm: This is the age of the freezer when it was no longer in working condition and not necessarily its age when you got rid of it?

Yes ........................................................................................[SKIP TO f6] 1

No.............................................................................................................................2
Don't know ...........................................................................................................–97
Refused ................................................................................................................–98

f5c. Can you tell me within five years how old the freezer was when it was no longer in working condition? That is, would you say it was closest to 5 years old, 10 years old, 15 years old, etc.?
Closest to 5 years old ..............................................................................................1
Closest to 10 years old ............................................................................................2
Closest to 15 years old ............................................................................................3
Closest to 20 years old ............................................................................................4
Closest to 25 years old ............................................................................................5
Closest to 30 years old ............................................................................................6
Closest to 35 years old ............................................................................................7
Closest to 40 years old ............................................................................................8
Closest to 45 years old ............................................................................................9
Closest to 50 years old ..........................................................................................10
Other [SPECIFY]....................................................................................................96
Don't know ...................................................................[SKIP TO fd1] –97
Refused .......................................................................[SKIP TO fd1] –98

f6. About how long after the freezer was no longer in working condition did you get rid of it: less than 6 months, 1 year, 2 years, etc.?
Less than 6 months............................................................... [SKIP TO fs1] 1
1 year.................................................................................. [SKIP TO fs1] 2
2 years ................................................................................[SKIP TO fs1] 3
3 years ................................................................................[SKIP TO fs1] 4
4 years ................................................................................[SKIP TO fs1] 5
5 years ................................................................................[SKIP TO fs1] 6
Other [SPECIFY]................................................................. [SKIP TO fs1] 96
Don't know ......................................................................... [SKIP TO fs1] –97
Refused ...............................................................................[SKIP TO fs1] –98

**Subsection 3.3 Discard age [VG29]**

fd1. My next questions concern the age of the freezer when you got rid of it. Thinking about what else happened around the same time you bought the freezer may help you remember the age of the freezer. Also, if you did not buy the freezer new, be sure to factor in the age of the freezer when you bought it.

fd7a. About how many years old was the freezer when you got rid of it? [WE'RE LOOKING FOR AN EXACT NUMBER OF YEARS. RECORD A RANGE IN 'Other.']
[RECORD NUMBER OF YEARS]....................................................... [SKIP TO fs1]
Other [SPECIFY]...................................................................... [SKIP TO fs1] 96
Don't know ...........................................................................................................–97
Refused ................................................................................................................–98

fd7b. Can you tell me within five years how old it was? That is, would you say it was closest to 1 year old, 5 years old, 10 years old, 15 years old, etc.?
Closest to 1 year old.................................................................................................1

Closest to 5 years old ........................................................................................2
Closest to 10 years old ......................................................................................3
Closest to 15 years old ......................................................................................4
Closest to 20 years old ......................................................................................5
Closest to 25 years old ......................................................................................6
Closest to 30 years old ......................................................................................7
Closest to 35 years old ......................................................................................8
Closest to 40 years old ......................................................................................9
Closest to 45 years old ....................................................................................10
Closest to 50 years old ....................................................................................11
Other [SPECIFY]............................................................................................96
Don't know ..........................................................[THANK AND TERMINATE] –97
Refused ...............................................................[THANK AND TERMINATE] –98

**Subsection 3.4 Discard status**

fs1. To get rid of the freezer, did you pay someone, did someone pay you, or did you give it away?
You paid someone........................................................................................... 1
Someone paid you........................................................................................... 2
Gave it away .................................................................................................. 3
Don't know .................................................................................................. –97
Refused ...................................................................................................... –98

fs2. To get rid of the freezer, did you take it somewhere or was it picked up?
You took it somewhere ................................................................................... 1
It was picked it up ........................................................................ [SKIP TO fs3b] 2
Don't know ...............................................................................[SKIP TO fc1] –97
Refused ....................................................................................[SKIP TO fc1] –98

fs3a. Which of the following best describes where you took it? [READ LIST. DON'T RECORD RESPONSE UNTIL FINISHED READING LIST]
To a utility recycling program .......................................................[SKIP TO fc1] 1
To a scrap dealer or recycler.........................................................[SKIP TO fc1] 2
To a landfill.................................................................................[SKIP TO fc1] 3
To an appliance dealer .................................................................[SKIP TO fc1] 4
Or to someone's home .................................................................[SKIP TO fc1] 5
[DO NOT READ]Other [SPECIFY ................................................[SKIP TO fc1] 96
Don't know .............................................................................[SKIP TO fc1] –97
Refused ..................................................................................[SKIP TO fc1] –98

fs3b. Which of the following best describes who picked it up? [READ LIST. DON'T RECORD RESPONSE UNTIL FINISHED READING LIST]

The dealer you bought a new freezer from .................................................................1

A dealer, but not one you just bought a freezer from ................................................2

A utility recycling program....................................................................................3

A scrap dealer or recycler .....................................................................................4

Someone you hired to take it away ........................................................................5

Or a private citizen...............................................................................................6

[DO NOT READ]Other [SPECIFY] ...............................................................................96

Don't know ......................................................................................................–97

Refused ............................................................................................................–98

**Subsection 3.5 Freezer characteristics**

fc1[VG30]. [IF f2a=2] During the year prior to the freezer no longer being in working condition, about how many months did you use it?

[RECORD NUMBER OF MONTHS 0–12]....................................................................

Don't know ......................................................................................................–97

Refused ............................................................................................................–98

fc2. During the year prior to getting rid of the freezer, about how many months did you use it? [IF RESPOND "all the time," CONFIRM "that would be 12 months?"]

[RECORD NUMBER OF MONTHS 0–12]....................................................................

Don't know ......................................................................................................–97

Refused ............................................................................................................–98

fc3. [IF f0^=1 OR <FZDSCSTY>=98] Which of the following best describes the freezer you got rid of? [READ LIST. DON'T RECORD RESPONSE UNTIL FINISHED READING LIST.]

Upright, frost free.................................................................................................1

Upright, manual defrost .........................................................................................2

Chest, frost free....................................................................................................3

Chest, manual defrost............................................................................................4

Don't know ......................................................................................................–97

Refused ............................................................................................................–98

fc4. [IF f0^=1 OR <FZDSCSZ>=98] What was the approximate size of the freezer? [READ LIST. DON'T RECORD RESPONSE UNTIL FINISHED READING LIST.]

Small (under 13 cubic feet)....................................................................................1

Medium (13 – 16 cubic feet)..................................................................................2

Or large (over 16 cubic feet) .................................................................................3

Don't know ......................................................................................................–97

Refused ............................................................................................................–98

Those are all the questions I have for you. Thank you very much for your help.

# APPENDIX B

# PROTOCOL TABLES 6 AND 7

This appendix provides the information requested in Tables 6 and 7 of the M&E Protocols.

## B.1    INFORMATION REQUIRED PER TABLE 6 OF M&E PROTOCOLS

The information required per Table 6 of the M&E Protocols is reported in Table B-1.

*Table B-1.  Required Information per Protocols Table 6*

| Measure | SCE Ex Ante Useful Life Estimate | | Estimated Median Life | | |
| --- | --- | --- | --- | --- | --- |
| | Value | Source | 80% Lower bound | Estimate | 80% Upper Bound |
| Central air conditioners | 18 | Protocol, App. F, Table 1 | 18.1 | 26.2 | 40.1 |
| Heat pumps | 18 | Protocol, App. F, Table 1 | 0.4 | 13.6 | > 100 |
| Evaporative coolers | 15 | Protocol, App. F, Table 1 | 3.4 | 27.7 | > 100 |
| Refrigerators (Scenario II) | 18 | Protocol, App. F, Table 1 | 7.7 | 21.7 | 125 |

1.  *Identify the studied measure and the end use it belongs to.*

    The measures studied included three type of residential space cooling equipment (i.e., central air conditioners, heat pumps, and evaporative coolers) and refrigerators.

2.  *Identify the ex ante expected useful life and the source of the ex ante expected useful life.*

    This information is provided in Columns (2) and (3) of Table B-1.

3.  *Identify the ex post expected useful life estimated in the study.*

    This information is provided in Column (5) of Table B-1.

4.  *Identify the ex post expected useful life to be used by the utility in the earnings claim.*

    The hypothesis that the *ex ante* and *ex post* estimates of effective useful life were the same could not be rejected for any of the appliances.  Accordingly, the *ex post* expected useful lives to be used in the earnings claim are the same as the *ex ante* lives.

5.  *Identify the standard error associated with the ex post expected useful life.*

    Because the survival functions for the measures are not symmetric, the standard error does not provide meaningful information on the spread around the estimated median life.  The information on the spread around the estimated value is provided by the lower and upper bounds of the confidence interval, reported in Columns (4) and (6) of Table B-1.

6.  *Provide the 80% confidence interval associated with the ex post expected useful life.*

    This information is provided in Columns (4) and (6) of Table B-1.

7.  *Provide the p-value associated with the ex post expected useful life.*

    The p-value is 20%.

8.  *Provide the realization rate for the adopted ex post expected useful life. This is defined as the ratio of the adopted ex post expected useful life to the ex ante expected useful life.*

    The realization rates are 1 for all the measures studied.

9.  *Identify all the "like" measures associated with the studied measure.*

    There are no "like" 'measures associated with the studied measures

## B.2    INFORMATION REQUIRED PER TABLE 7 OF M&E PROTOCOLS

This section provides the information required per Table 7 of the M&E Protocols.

1.  a.  *Study Title and Study ID No.*
        Study title is:
        1994 Residential Appliance Efficiency Incentive Program
        Ninth Year Retention Study

        Study ID No. is:
        CEC Study Id #546A

    b.  *Program, Program years, and program description*

        *Program is*:

        Residential Appliance Efficiency Incentive Program

        *Program Year:*
        1994.

        *Program Description:*

        Residential customers were offered and paid financial incentives for purchasing and installing energy efficient refrigerators or space cooling equipment.

    c.  *End Uses and Measures Covered:*

        The end uses and measures covered are as listed in Table B-2.

*Table B-2.  Measures and End Uses Covered*

| Measures | End Uses |
|----------|----------|
| Central air conditioners | HVAC |
| Evaporative coolers | HVAC |
| Heat pumps | HVAC |
| Refrigerators | Refrigeration |

d. *Methods and Models Used:  Describe the final model specification used for the study.  Where applicable, indicate the study location of the competing class or types of models that were estimated but were not selected.  State why the final specification was chosen.*

Data for the study have been collected through a mail/telephone survey effort. Data on whether installed measures were still in place and operable were collected through the mail and telephone surveys.

The data collected were directly tabulated to determine the percent retention for each measure. Another objective of the study was to estimate effective useful life (EUL) for each measure and to determine if the *ex post* EULs were different from *ex ante* EULs.  Survey data showed that the early retention rates for the different measures were relatively high, making direct estimation of survival functions from the collected data not informative.  However, hazard functions could be estimated for the measures using data from the recent Statewide Residential Appliance Saturation Survey, and corresponding survival functions could be developed using the estimated hazard functions.

e. *Analysis Sample Size: Provide the number of customers, number of installations, number of measures (if different) and the number of observations in the analysis and time periods of data collection.  If different for different units of analysis, a summary table should be provided.*

Table B-3 shows the number of customers that were actually surveyed and included in the study.

*Table B-3. Numbers of Customers Surveyed by Type of Measure*

| Type of Appliance | Number in Program | Number in Mail Survey Sample | Number of Respondents to Mail Survey | Percentage Responding to Mail Survey |
|-------------------|-------------------|------------------------------|--------------------------------------|--------------------------------------|
| Central Air Conditioners | 5,541 | 2,000 | 895 | 44.8% |
| Heat Pumps | 940 | 940 | 421 | 44.8% |
| Evaporative Coolers | 1,328 | 1,328 | 510 | 38.4% |
| Refrigerators: All | 23,008 | 2,400 | 982 | 40.9% |
| For households that had not moved | 9,574 | 1,200 | 594 | 49.5% |
| For households that had moved | 13,434 | 1,200 | 388 | 32.3% |

*2  a.   Identify the specific data sources used for each data element.*

The source for the initial data was the program tracking system.  Thereafter data for the study have been collected through a mail and telephone survey effort.  The data that have been collected through the mail and telephone surveys were used to determine the removals/failures and percent retention for each measure.  Data from the recent Statewide Residential Appliance Saturation Survey were also used in the estimation of hazard and survival functions.

*b.   Diagram and describe the data attrition process commencing with the program database for participants.  Specific numbers and decision points for inclusion and exclusion should be provided.   Where different data sources are used (e.g., surveys and program records), appropriate attrition categories should be used (e.g., response rates for surveys).*

The steps involved in preparing the various data sets used for the measure retention analysis are depicted in Table B-4.

*Table B-4. Data Attrition Process*

| *Type of Appliance* | *Number in Program* | *Number in Mail Survey Sample* | *Number of Respondents to Mail Survey* | *Number of Customers Interviewed by Telephone* |
|---|---|---|---|---|
| Central Air Conditioners | 5,541 | 2,000 | 895 | 51 |
| Heat Pumps | 940 | 940 | 421 | 50 |
| Evaporative Coolers | 1,328 | 1,328 | 510 | 86 |
| Refrigerators: All | 23,008 | 2,400 | 982 | 91 |
| For households that had not moved | 9,574 | 1,200 | 594 | 30 |
| For households that had moved | 13,434 | 1,200 | 388 | 61 |

*c.   Describe the internal/organizational data quality checks and data quality procedures used to match customers and surveys, participation records, and any other data used in the analysis.*

As discussed below with respect to sampling, a file was provided by SCE that contained information on the customers who participated in the 1994 Residential Appliance Efficiency Incentive Program.  Each participant was identified by a customer service identifier that SCE uses for geographical locations; each unique customer location is identified with the customer service identifier.   This identifier was used as the key by which to match customer information across program files and SCE's customer information files.  Matches were inspected manually for verification purposes.

   *d.   Provide a summary of the data collected specifically for the analysis but not used, the reasons for them not being used, and a documentation of where those data reside.*

The instruments that were used for the mail and telephone data collection are provided in Appendix A of this final report for the ninth-year study. These instruments show all of the data that were collected for the analysis. The major items that were used for the analysis were the removal/failure data. Other data were not used in the quantitative analysis, but were used to verify that the removal/failure data was accurate.

*3  a.   Sampling procedures and protocols: Describe the sampling procedures and protocols used. Information provided should include the sampling frame (e.g., eligible population), sampling strategy (e.g., random, stratified, etc.), sampling basis (e.g., customers, installation, rebate issued), and stratification criteria (e.g., geographic, etc.). Specific data and formulas should be used to present sampling goals and achieved results.*

The analytical framework for the development of the sample design for the study was provided by survival analysis techniques. Survival analysis pertains to the analysis of data that correspond to the time from a well-defined time origin until the occurrence of some particular event or end-point. For this study, the time origin is defined by the installation of a measure under the RAEI program, while the end-point is defined by the removal or failure of the measure or the discontinuance of its use.

The measure survival data were expected to have several features that warranted special treatment in preparing the sample design.

- The measure survival data would probably not be symmetrically distributed and cannot be reasonably represented by a normal distribution.

- The survival data would be *right-censored* in that the end points associated with removals, failures, or discontinuances will not be observable for some of the installed measures.

A sample design for addressing these and other features of the data was developed through the following steps.

- First, the number of removals/failures required to meet the precision/confidence specifications for each type of measure was determined.

- Second, the probability of removal/failure for each type of measure over the period of the study was determined and applied to the required number of removals/failures to determine the number of points required in the sample.

- Third, sample points for a measure were allocated among customers.

*b.  Survey information: Survey instruments should be provided.  Response rates should be presented. Reasons for refusals should be presented in tabular form. Efforts to account for or test for non-response bias should be presented, as well as corrections to account for the bias.*

The instruments that were used for the mail and telephone data collection are provided in Appendix A of the final report for the ninth-year study.

Response rates to the mail survey are reported in Table B-3.

*c.  Statistical descriptions.  For the key variables that were used in the final models, provide descriptive statistics for the participant group, and, when present, for the comparison group.*

The key variable for the analysis of retention is the number of removal/failures that occur for a measure over a specified time period.  The removal/failure rates by 2004 are summarized for the various measures in Table B-5.

*Table B-5. Removal/Failure Rates by 2004*
*for RAEI Program Measures*

| Type of Appliance | Percentage of All Respondents Reporting Appliance Removed, Failed or Replaced since 1994 |
|---|---|
| Central Air Conditioners | 5.7% |
| Heat Pumps | 11.9% |
| Evaporative Coolers | 16.9% |
| Refrigerators: | |
|   For households that had not moved | 5.1% |
|   For households that had moved | 15.7% |

*4  a.  Describe procedures used for the treatment of outliers, and missing data points.*

The basic information required for the analysis was whether a measure had failed or been removed within the time span of the study period.  For an individual measure, a removal or failure is essentially a binary 0-1 decision for purposes of analysis.  The problem of outliers would arise primarily at the aggregate level if there appeared to be a disproportionate percentage of removals or failures.  The possibility of outlier percentages was examined on a measure-by-measure basis. No excessively high rates of removal/failure were detected.

*b.*    *Describe what was done to control for the effects of background variables, such as economic, political activity, etc.*

This was a retention study, which tracks the removals/failures of program measures over time. The effects of economic and political activities are subsumed within the general analysis of removals/failures.

*c.*    *Describe procedures used to screen data for inclusion into the final analysis dataset. Show how many customers, installations or observations were eliminated with each screen.*

No screens were used to eliminate customers, installations, or observations from the data sets that were used for the analysis. The numbers of sites and measures used for the analysis were as reported in Table B-3.

*d.*    *Model Statistics. For all final models, provide standard model statistics in a tabular form.*

The final models used for estimating median useful lives for various measures were established by estimating hazard functions for each such measure, using power curve fits for a hazard function defined by a Weibull distribution. The summary statistics for the various models fitted are shown in Table B-6.

*Table B-6. Summary of Hazard Function Estimation*

| *Type of Measure* | *Power Curve Fit* | | | *Weibull Distribution Parameters* | |
|---|---|---|---|---|---|
| | *A* | *b* | *R-squared* | *α (Scale)* | *β (Shape)* |
| Central air conditioners | 0.0052 | 0.6517 | 0,996 | 0.0032 | 1.6517 |
| Heat pumps | 0.0684 | -0.1951 | 0.057 | 0.0850 | 0.8049 |
| Evaporative coolers | 0.0130 | 0.2688 | 0.511 | 0.0102 | 1.2588 |
| Refrigerators | | | | | |
|    Scenario I | 0.0200 | 0.4933 | 0.497 | 0.0135 | 1.4933 |
|    Scenario II | 0.0074 | 0.6330 | 0.643 | 0.0045 | 1.6330 |

*e.*    *Specification: Refer to the section(s) of the Study that present the initial and final model specifications that were used, the rationale for each, and the documentation for the major alternative models used. In addition, the presentation of the specification should address, at a minimum, the following:*

     *1)Describe how the model specification and estimation procedures recognize and address heterogeneity of customers (i.e., cross-sectional variation)*

     *2) Discuss the factors, and their associated measures, that are omitted from the analysis, and any tests, reasoning, or special circumstances that justify their omission.*

The model specifications used for the study are presented and discussed in Chapter 2 (survey design and data collection) and Section 4.1 (analytical procedures).

f.  *Error in measuring variables: Describe whether and how this issue was addressed, and what was done to minimize the problem (e.g., response bias, measurement errors, etc.)*

Because the removal/failure variable is binary, the issue of measurement error was not considered to affect the results of the analysis.

g.  *Influential data points. Describe the influential data diagnostics that were used, and how the identified outliers were treated.*

For some measures, the hazard plots showed a saw tooth pattern over period of study (i.e., low, high, low, high). With this pattern, a low or a high point could move the fitted regression line.

h.  *Missing data: Describe the methods used for handling missing data during the analysis phase of the study.*

Missing data was not a problem for this analysis.

i.  *Precision: Present the methods for the calculation of standard errors.*

Because the survival functions for the measures studied are not symmetric, the standard error does not provide meaningful information on the spread around the estimated median life. The information on the spread around the estimated value is provided by the lower and upper bounds of the confidence interval.

An 80% confidence interval for the estimated median life of a measure was calculated as follows. The regression fit of the power curve coefficients was used to report the values of the estimated coefficients associated with the 80% confidence levels. Thus, the power curve regression analysis for each measure provided three sets of parameters for the Weibull hazard rate function: the "best" fit parameters and parameters for the upper and lower bounds of the 80% confidence interval for the estimated coefficients. In effect, the analysis provided an estimate of the "best" hazard function and survival function for a measure, plus estimates of the functions for the upper and lower bounds of the 80% confidence interval.