

**CALIFORNIA STATEWIDE
RESIDENTIAL APPLIANCE
SATURATION STUDY**

FINAL REPORT

Consultant Report

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California Energy Commission**

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1: PROJECT METHODOLOGY INTRODUCTION

For the first time in California, the large Investor Owned Utilities (IOUs) pooled resources and performed a RASS and Unit Energy Consumption (UEC) Study as a team. The project was administered by the California Energy Commission and sponsored by Pacific Gas and Electric (PG&E), San Diego Gas and Electric (SDG&E), Southern California Edison (SCE), Southern California Gas Company (SoCalGas), and Los Angeles Department of Water and Power (LADWP). KEMA-XENERGY was the prime consultant. Itron provided data cleaning and performed the Conditional Demand Analysis. RoperASW fielded the non-response follow-up.

The RASS effort has resulted in a research product that provides both statewide and utility-specific results. The study was designed to allow comparison of results across utility service territories, climate zones and other variables of interest (i.e. dwelling type, dwelling vintage, and income). The study includes results for 21,920 residential customers that are weighted to the population represented by the sponsoring utilities. The saturation results capture both individual and master metered dwellings. This rich set of customer data includes information on all appliances, equipment, and general usage habits. The study also includes a detailed conditional demand analysis that calculates unit energy consumption (UEC) values for all individually metered customers.

The study was initiated in late 2002 and the sampling plans and survey implementation occurred throughout 2003. The data was collected using a two stage direct mail survey targeted to a representative sample of California residential customers. The survey requested customers to provide details on their energy equipment and behaviors. A non-response follow-up survey was implemented at the end of the double mailing phase to a sub-sample of non-respondents. The non-response follow-up included telephone and in-person interviews in an effort to minimize non-response bias by using alternative surveying techniques.

The results from the RASS study were used to develop a CDA model. This analytical method uses a combination of customer energy use with the responses from the customer survey to model end uses and develop unit energy consumption results for those end uses. The results of the CDA are included in summary form along with the general study results in this executive summary and are provided in further detail in the methodology section of the report.

The study also includes onsite metering for a sample of 180 RASS participants. The onsite metering sample was designed to over-sample air conditioning use, with the meters gathering both a whole-house and central air conditioning usage at each

dwelling. The onsite meters are in the field at the time of publication and the final results from that portion of the project will be delivered as whole house and air conditioning load shapes after the 2004 cooling season has ended.

Because of the need to serve a wide range of users, the study was designed to produce multiple products:

- A high level summary of key findings;
- Detailed saturation tables for all appliances and equipment holdings;
- Detailed UEC tables for 25 electric and 8 gas end uses;
- Whole house and air conditioning load shapes; and
- An Internet-based tool providing customized data filtering and viewing.

The concept of using a statewide survey instrument provided the Energy Commission and other parties with a consistent set of questions and study results to use for statewide planning and cross utility comparisons. In addition, the sample includes sufficient data enabling utility specific analyses. The project required a cooperative effort among the sponsors as they came together to create a unified research plan, program materials, and implementation strategy. The sponsors all shared project costs and final results. Each utility provided the data necessary to create a unified sampling plan. Each utility also provided customer specific information for customers who were selected for the sample. In order to insure individual customer anonymity, the study participants were assigned a generic identification number that includes details about sampling their strata. Respondent zip codes are the only other information that is generally available in the final study database as to the customer's location. In addition to the "non-confidential" data, each utility received a "confidential" dataset of results for their service territory with customer identification information as provided by the utility initially. This key allows the utility to match up the RASS data with their own account information.

This report is split into two volumes because of the size. Volume One describes the study design and implementation methods while Volume Two details the results in the form of UEC banners and saturation banners.

2: STUDY DESIGN AND IMPLEMENTATION

2.1 OVERVIEW OF STUDY DESIGN

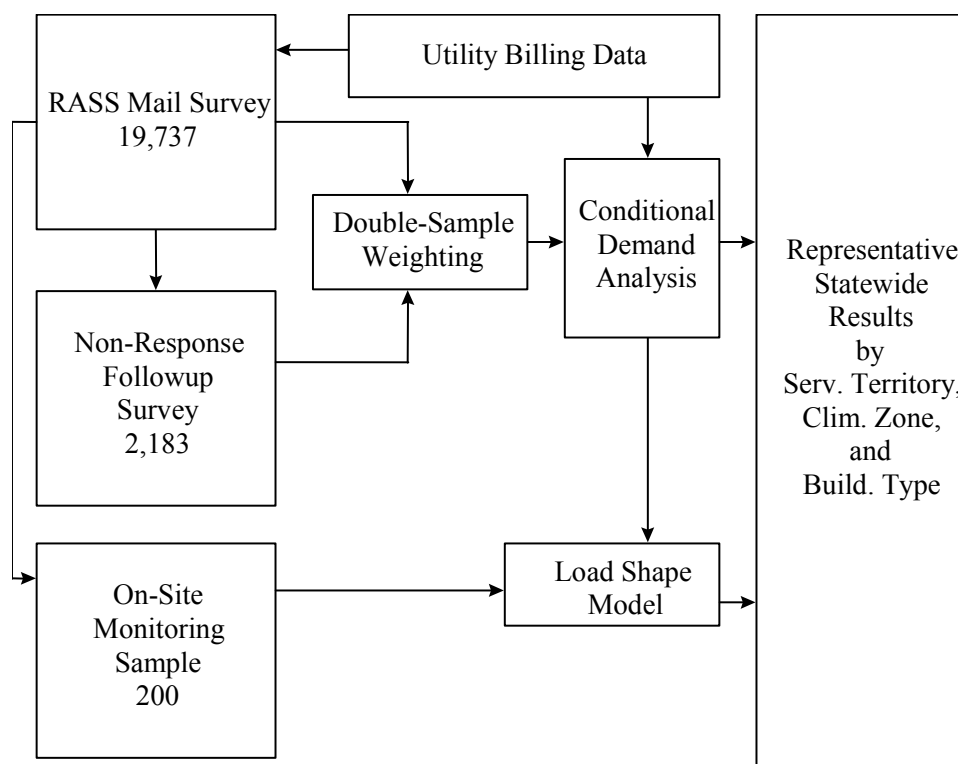
A hybrid data collection strategy involving four different data collection methods was employed for the RASS. An overview of our approach is shown in Figure 2-1. The numbers indicated on Figure 2-1 are the number of completed surveys received through each method. This section first discusses the sample design for each of the surveying components and then describes responses for each surveying type, the process of weighting results to the population, and the study's resulting precision.

Most of the survey data was collected using a mail survey. Telephone interviewing was used to gather data initially from master-metered electric accounts and for collecting survey data from a sample of non-respondents to the mail survey. An in-person interview was used in a similar fashion as part of the non-response study for cases where telephone numbers could not be obtained or attempts by phone proved unsuccessful. Finally, we collected hourly electric load data from the total home and a central cooling system for a small sample of homes. Detailed on-site surveys were conducted on the homes in the hourly metering sample. The onsite metering sample count includes results for the 180 sites metered, which are also included in the mail survey results total.

The RASS study included sending out two rounds of mail surveys to approximately one hundred thousand homes that are served by an individual electric meter. We obtained survey responses from 18,970 of these individually metered homes via the two rounds of mail surveys.

To reduce the non-response bias that was likely to occur from a mail survey alone, a second step of surveying efforts was pursued on a sample of 5,000 non-respondents to the mail survey. We ultimately surveyed a total of 2,183 of these non-respondents using either a third mail survey with an incentive, a telephone interview, or an in-person interview at the home.

**Figure 2-1
Overview of Approach**



Master metered electric accounts that serve between 2 and 4 units were surveyed similar to individually-metered accounts, except the cover letter was written with special instructions for the tenant(s) to fill out the survey for only one of the units in the building. Master-metered accounts that serve more than 4 units were surveyed using a two-stage method. In the first stage, a telephone survey was conducted with a facility manager of the master-metered complex or mobile home park to obtain data on the common area equipment and to obtain mail addresses for specific dwelling units served by the account. The second stage involved selecting a sample of the dwelling units that were identified in stage one. Mail surveys were sent to each sampled unit with phone follow-up activities to non-respondents to help maximize response. We completed 616 stage one interviews with 5,593 surveys being sent out in the second stage to addresses collected through the telephone process. A total of 767 master metered mail surveys were completed and returned.

The on-site metering component collected hourly load data for the total home and the central cooling system. For each onsite-metered site, we have the responses to the standard RASS questions so that the metering information can be leveraged using the larger set of RASS responses. In addition, we have collected detailed housing shell, lighting, plug load, and nameplate data for use in analyzing the variation of hourly demand for the metered participants. The metering data will be

presented in the form of whole house and air conditioning load shapes. In order to capture a full air conditioning cycle, meters are being left in through the summer of 2004 and the load shapes will be provided as an addendum to this report in the fall of 2004.

Using a detailed sample plan and subsequent weighting of the data to the population, the data collection activities resulted in a representative database containing 21,920 responses to the RASS survey. These data have been combined with electric and gas billing data to estimate unit energy consumption using conditional demand analysis. The full RASS data and conditional demand analysis provide saturation and end use shares that are statistically reliable for all of the segments of interest (e.g., by service territory, climate zone, and dwelling type). The second, smaller, database of 180 homes will contain the hourly load shape data along with the expanded set of survey information.

2.2 SAMPLING APPROACH

The sampling approach for RASS was based on residential population sample frames obtained from the sponsoring electric utilities (PG&E, SCE, SDG&E and LADWP). A multi-step approach was used to obtain the data. The first data transfer included all of the residential utility records with variables that were required to create the sample. Once the sample was drawn, a second request gathered the customer specific contact information for the sample subset. This multi-staged approach was preferred to maintain confidentiality of each utility's population frame.

A third round of data transfer occurred closer to the analytical piece of the study. This included a request for transaction level billing data for all customers targeted in the sample. In addition to gathering billing histories from the electric utilities, this step included a billing data matching process that located gas records for customers in SoCalGas' service territory as well as individuals served by other gas utilities from whom we could request bills. The bill matching process and cleaning is detailed in Section 4.2. By completing this step after the mailings were sent, we were able to obtain a more current set of bills to use in the conditional demand analysis.

The billing data used in the RASS study are shown in Table 2-1.

**Table 2-1
Utility Billing Data Requirements**

<p>Electric Population Frame Data</p> <ul style="list-style-type: none"> • Premise/Control # • Service city and 5-digit service zip code • Average Daily kWh consumption for premise over previous 12 months • Dwelling type indicator • Geo-demographic indicator (if available) • Electric rate schedule with baseline allowance codes • Gas service indicator (PG&E and SDG&E) • Other geographic indicators (division, forecast climate zone) • Service description field • Meter set date or Premise establishment date • Customer service start date
<p>Contact information for sampled accounts</p> <ul style="list-style-type: none"> • Service address • Mail address, city, state, and zip • Customer name
<p>SoCalGas Population Frame, and PG&E gas-only accounts or SDG&E gas-only accounts</p> <ul style="list-style-type: none"> • Premise/control # • Service address, city and 5-digit service zip code • Mail address, city, state, and zip (for supplemental matching) • Customer name (for supplemental matching)
<p>Transaction billing data (for all sampled accounts) (One year of transactions for customer that resides in the dwelling at the time of the first survey mailing).</p> <ul style="list-style-type: none"> • kWh and/or therm usage • Current and prior read dates • Transaction type (regular bill, adjustment, estimate) • Applicable rate schedule with baseline allowance • Any information describing unique characteristics of account, e.g., employee code.

The remainder of Section 2.2 outlines the sample design and provides further detail on how the variables included in Table 2-1 were used for the study sample. The individually metered sample design is discussed first, followed by the designs for the

master metered customers, the non-response follow-up and finally the onsite metering sites.

2.2.1 Individually Metered Sample Design

We used a stratified random sample design for individually metered customers. We worked with Energy Commission staff to determine the appropriate stratification variables. The total population¹ was split into 105 strata based on electric utility, age of home, presence of electric heat, home type, and Energy Commission forecast climate zone.

Stratification Variables

The first four of the five stratification variables were constructed using utility billing records for the residential population provided by the utilities during the first phase of data transfer. Age of the home was determined by the meter set date variable. Presence of electric heat was determined based on a flag in the billing system that indicates whether the home was likely to have electric heat. The electric heating variable is typically recorded by the utility at the time of the meter set date and is often used to determine the customer's baseline energy usage allotment. Home type was determined for PG&E and SCE using a combination of the annual usage variable and the dwelling type variable. Both PG&E and SCE use a rate code variable that indicates whether the home is likely single- or multi-family. SDG&E and LADWP do not have a variable in their billing records that indicates the likely dwelling type, and as such the home type variable for these two utilities was constructed using the annual usage variable only. The Energy Commission climate zone variable was constructed using the utility billing record variable "service zip code" mapped to a lookup table of Energy Commission forecast climate zones by zip code. The Energy Commission provided this lookup table.

The five stratification variables were assigned the values listed below. Each of the strata variables is used in the designation of the SFCODE which is the first six digits of each individually metered customers' unique identifier. The position each value takes up in the SFCODE is noted next to the variable and the number in parentheses following the description is the value used in the SFCODE creation. Note that some of the strata sub-groups for sample frames were too small and were combined with other groupings. In these cases a simpler SFCODE is used which designates the utility and a simple number as the last digit.

- Electric utility (1st position of SFCODE): 1=PG&E, 3=SDG&E, 4=SCE, or 5=LADWP;
- Age of home (2nd position): 0=old (prior to 1997) or 1=new (1997 or newer);

- Presence of electric heat (3rd position): 0=no or 1=yes based on utility billing records;
- Home type (4th position): combination of dwelling type (where available from utility billing records) and usage
- for PG&E and SCE: 1=single family "high" (= 15 kWh/day), 2=single family "low" (< 15 kWh/day), or 3=multi-family (all usage values); and
- for SDG&E and LADWP: 4=low (< 10 kWh/day), 5= medium (10 - 20 kWh/day), or 6=high (> 20 kWh/day).
- Energy Commission forecast climate zone (5th and 6th position).

Sample Frame

Table 2-2 presents the individually metered sample frame. The columns of the table include the following information for each of the stratum.

- Columns A through E indicate the strata variables;
- Column F shows the designated SFCODE prefix used in the database for each customer assigned to this strata;
- Column G shows the proportion of the population for each strata, where the total population comprises households in PG&E, SCE, SDG&E, and LADWP electric service territories;
- Column H shows the target number of completes using a modified proportional allocation method;
- Column I gives the expected response rates per strata;
- Column J contains the minimum mailout, which was determined by the expected response rates along with the target number of completes; and
- Column K shows the actual mailout, which is 1% higher than the minimum mailout to account for potential turnover of households.

**Table 2-2
Individually Metered Sample Design**

A	B	C	D	E	F	G	H	I	J	K	
Electric Utility	Home Age	Electric Heat Presence	Home Type	CEC Forecast Climate Zone	SFCODE Prefix	Proportion	Target Completes	Expected Response Rate	Minimum Mailout	Actual Mailout	
LADWP	Old	No	Low	11	500411	3.76%	1,644	40%	4,111	4,152	
				12	500412	1.18%	517	40%	1,293	1,306	
			Medium	11	500511	1.63%	713	55%	1,296	1,309	
				12	500512	0.95%	413	55%	750	758	
			High	11	500611	0.40%	173	55%	314	318	
				12	500612	0.44%	190	55%	346	350	
	Yes	All	All	500001	0.10%	150	50%	300	303		
	New	No	Low	11	510411	0.23%	150	40%	375	379	
		All others	All others	All others	500002	0.18%	150	50%	300	303	
	PGE	Old	No	SF-Low	1	100201	0.53%	230	45%	511	516
2					100202	0.57%	251	45%	558	563	
3					100203	1.62%	708	45%	1,573	1,588	
4					100204	3.05%	1,333	45%	2,962	2,991	
5					100205	4.17%	1,822	45%	4,048	4,088	
SF-High				1	100101	0.51%	222	55%	403	407	
				2	100102	1.18%	515	55%	936	945	
				3	100103	3.21%	1,403	55%	2,551	2,577	
				4	100104	3.77%	1,647	55%	2,995	3,025	
				5	100105	4.38%	1,915	55%	3,482	3,516	
MF				1	100301	0.13%	150	40%	375	379	
				2	100302	0.47%	206	40%	516	521	
				3	100303	1.13%	493	40%	1,232	1,244	
				4	100304	2.05%	896	40%	2,239	2,261	
				5	100305	4.31%	1,882	40%	4,704	4,751	
Yes			SF-Low	1	101201	0.37%	160	45%	356	360	
				3	101203	0.18%	150	45%	333	337	
				4	101204	0.20%	150	45%	333	337	
				5	101205	0.17%	150	45%	333	337	
				SF-High	1	101101	0.90%	394	55%	716	723
			2		101102	0.30%	150	55%	273	275	
			3		101103	0.75%	327	55%	595	601	
			4		101104	0.49%	215	55%	391	395	
			5		101105	0.26%	150	55%	273	275	
			MF	3	101303	0.15%	150	40%	375	379	
				4	101304	0.86%	374	40%	935	944	
				5	101305	1.41%	617	40%	1,543	1,558	
			All others	All others	All others	100001	0.22%	150	50%	300	303

**Table 2-2
Individually Metered Sample Design
(Continued)**

A	B	C	D	E	F	G	H	I	J	K	
Electric Utility	Home Age	Electric Heat Presence	Home Type	CEC Forecast Climate Zone	SFCODE Prefix	Proportion	Target Completes	Expected Response Rate	Minimum Mailout	Actual Mailout	
PGE (cont.)	New	No	SF-Low	2	110202	0.12%	150	45%	333	337	
				3	110203	0.19%	150	45%	333	337	
				4	110204	0.29%	150	45%	333	337	
				5	110205	0.31%	154	45%	343	346	
			SF-High	2	110102	0.24%	150	55%	273	275	
				3	110103	0.35%	154	55%	280	283	
				4	110104	0.30%	150	55%	273	275	
			MF	5	110105	0.35%	153	55%	278	280	
				3	110303	0.18%	150	40%	375	379	
				4	110304	0.17%	150	40%	375	379	
		Yes	All others	5	110305	0.24%	150	40%	375	379	
				All others	All others	100002	0.20%	150	50%	300	303
				MF	4	111304	0.11%	150	40%	375	379
				All others	All others	100003	0.32%	160	50%	320	323
All	All	All	14	100004	0.12%	150	50%	300	303		
SCE	Old	No	SF-Low	7	400207	0.52%	227	45%	504	509	
				8	400208	3.59%	1,566	45%	3,480	3,515	
				9	400209	4.30%	1,878	45%	4,174	4,215	
				10	400210	2.29%	999	45%	2,220	2,242	
				11	400211	0.71%	311	45%	692	699	
				All others	400299	0.18%	150	45%	333	337	
			SF-High	7	400107	0.83%	362	55%	659	666	
				8	400108	3.96%	1,730	55%	3,146	3,177	
				9	400109	3.91%	1,707	55%	3,103	3,134	
				10	400110	3.58%	1,562	55%	2,840	2,868	
				11	400111	0.40%	173	55%	315	318	
				All others	400199	0.36%	158	55%	287	290	
			MF	7	400307	0.37%	163	40%	407	411	
				8	400308	2.60%	1,134	40%	2,834	2,862	
				9	400309	2.52%	1,103	40%	2,757	2,785	
				10	400310	1.59%	695	40%	1,738	1,756	
				11	400311	0.84%	367	40%	918	928	
				All others	400399	0.10%	150	40%	375	379	

**Table 2-2
Individually Metered Sample Design
(Continued)**

A	B	C	D	E	F	G	H	I	J	K
Electric Utility	Home Age	Electric Heat Presence	Home Type	CEC Forecast Climate Zone	SFCODE Prefix	Proportion	Target Completes	Expected Response Rate	Minimum Mailout	Actual Mailout
SCE (cont.)	Old (cont)	Yes	SF-Low	8	401208	0.17%	150	45%	333	337
				9	401209	0.12%	150	45%	333	337
				10	401210	0.12%	150	45%	333	337
			SF-High	8	401108	0.27%	150	55%	273	275
				9	401109	0.16%	150	55%	273	275
				10	401110	0.29%	150	55%	273	275
			MF	8	401308	1.19%	519	40%	1,298	1,311
				9	401309	0.63%	277	40%	693	700
				10	401310	0.35%	152	40%	379	383
			All others	All others	400004	0.26%	150	50%	300	303
	New	No	SF-Low	8	410208	0.26%	150	45%	333	337
				9	410209	0.15%	150	45%	333	337
				10	410210	0.31%	155	45%	344	348
			SF-High	8	410108	0.29%	150	55%	273	275
				9	410109	0.15%	150	55%	273	275
				10	410110	0.50%	220	55%	400	404
			MF	8	410308	0.15%	150	40%	375	379
	All others	All others	400001	0.38%	164	50%	328	331		
	All	All	All	15	400002	0.16%	150	50%	300	303
				16	400003	0.10%	150	50%	300	303
SDGE	Old	No	Low	9	300409	0.44%	193	40%	483	488
				13	300413	3.48%	1,518	40%	3,795	3,833
			Medium	9	300509	0.42%	185	55%	336	340
				13	300513	3.40%	1,484	55%	2,698	2,725
			High	9	300609	0.18%	150	55%	273	275
		13	300613	1.48%	648	55%	1,178	1,190		
		All others	All others	300001	0.11%	150	50%	300	303	
	Yes	Medium	13	301513	0.17%	150	55%	273	275	
		High	13	301613	0.28%	150	55%	273	275	
		All others	All others	300002	0.14%	150	50%	300	303	
	New	No	Low	13	310413	0.46%	201	40%	503	508
			Medium	13	310513	0.40%	175	55%	319	322
			High	13	310613	0.19%	150	55%	273	275
All others		All others	300003	0.24%	150	50%	300	303		
Total						100.00%	46,807		100,000	100,999

Initial Mail Sample Allocation

We used a modified proportional allocation to assign the RASS sample to each of the strata. This approach ensures sufficient sample is allocated to all strata to achieve a minimum specified precision level for each stratum. Once the minimum sample sizes are determined for each stratum, the remaining sample points are assigned in a manner proportional to the population distribution.

Columns G and H in Table 2-2 show the sample proportions and target number of completes using a modified proportional allocation method.

Proportional allocation gives the best precision for the population as a whole for estimates of saturations or other proportions. At the same time, assigning target completes by cell ensures representation in the sample of each of these population segments. The stratification also allows higher mailout rates for groups that are likely to have lower response rates based on experience from prior RASS studies.

In Table 2-2, column K shows the actual mailout. The actual mailout is somewhat higher than the minimum mailout (Table 2-2, column J) because we expected a limited number of households to "turnover" between the time that the sample is pulled and the surveys are mailed.

The total sample mailout was set at 100,999 (approximately 1% greater than the minimum mailout of 100,000) and the total target number of completes was 46,807 based on an average response rate of 47%.

2.2.2 Master Metered Sample Design

Master metered electric accounts were surveyed differently depending on the type of units the account serves. All master-metered accounts were assigned sample based on a proportional sample design that approximates the ratio of target completes to the number of units or dwellings (not accounts). For this study, we stratified master-metered accounts by utility and by type of account: master-metered accounts serving 2-4 units, mobile home parks with 5 units or more, multi-family complexes with 5-20 units, and multi-family complexes with more than 20 units. Each type of account was associated with a unique survey approach to most effectively solicit a response.

Accounts serving 2-4 units were surveyed similarly to individually metered accounts, in that one survey was mailed to the service address associated with the account. The cover letter instructed the account holder to fill out the survey for one of the units.

Master-metered accounts serving more than 4 dwelling units were surveyed using a two-stage method. In the first stage, we conducted telephone surveys with a facility manager of the multi-family complex or mobile home park to obtain data on the common area equipment and to obtain mail addresses for the dwelling units served by the account. The number of calls that were made was determined by considering both the desired target completes (unit level) for a given stratum and the number of surveys to send for each account for which a telephone survey has been completed. For account types with little variation within a particular account (e.g., medium-sized multi-family complexes), it was preferable to send a smaller number of surveys per account to obtain more variation by surveying more accounts. For account types with more variation, such as mobile homes parks, sending a larger number of surveys per account was appropriate.

The second stage involved selecting a sample of units based on information provided by the facility manager. For multi-family accounts with 5-20 units, we sent four surveys each to the complexes surveyed in stage one. For multi-family accounts with more than 20 units, we sent eight surveys each. For the mobile home parks, we sent ten surveys each to the parks surveyed in stage one.

Stratification Variables

We used a stratified random sample design for the master metered customer base. The total population of master-metered homes² was split into 16 strata based on two variables. Each of the strata variables is used in the designation of the SFCODE which for master metered sites is the first two digits of each customers' unique identifier. The position each value takes up in the SFCODE is noted next to the variable and the number in parentheses following the description is the value used in the SFCODE creation.

- Electric utility (1st position in SFCODE): 1=PG&E, 3=SDG&E, 4=SCE or 5=LADWP; and
- Type: 1=2-4 unit, 2=multi-family (5-20 units), 3=multi-family (>20 units), or 4=mobile home (greater than 4 units).

Sample Frame

Table 2-3 presents the individually metered sample frame. The columns of the table include the following information for each of the stratum.

- Columns A and B indicate the strata;
- Column C shows the SFCODE prefix for each strata;

- Column D shows the total number of units for each strata;
- Column E shows the total number of meters or accounts for each strata;
- Column F shows the proportion of the population for each strata, where the total population comprises master-metered units in PG&E, SCE, SDG&E, and LADWP electric service territories;
- Column G shows the target number of phone (stage one) surveys;
- Column H shows the target number of mail survey completes using a proportional allocation method;
- Column I gives the expected response rates per strata; and
- Column J contains the target mailout, which was determined by the expected response rates along with the target number of completes.

**Table 2-3
Master Metered Sample Design**

A	B	C	D	E	F	G	H	I	J
						Target Completes			
Electric Utility	Type	SFCODE Prefix	Number of Units	Number of Meters	Proportion of Population	Phone Survey	Mail Survey	Expected Response Rate	Target Mailout
PG&E	2-4 units	11	44,411	20,128	10%	0	225	33%	675
	Multi-family 5-20 units	12	18,507	2,061	4%	100	100	25%	400
	Multi-family >20 units	13	39,171	700	9%	100	200	25%	800
	Mobile Home >4 units	14	101,305	1,638	23%	100	500	50%	1,000
	Subtotal		203,394	24,527	47%	300	1025	36%	2,875
SCE	2-4 units	41	13,025	5,609	3%	0	65	33%	195
	Multi-family 5-20 units	42	14,139	1,533	3%	75	75	25%	300
	Multi-family >20 units	43	16,080	324	4%	40	75	25%	300
	Mobile Home >4 units	44	110,710	1,592	25%	110	550	50%	1,100
	Subtotal		153,954	9,058	35%	225	765	40%	1,895
SDG&E	2-4 units	31	8,630	3,883	2%	0	45	33%	135
	Multi-family 5-20 units	32	4,449	467	1%	25	25	25%	100
	Multi-family >20 units	33	6,821	131	2%	15	35	25%	140
	Mobile Home >4 units	34	41,500	645	10%	40	200	50%	400
	Subtotal		61,400	5,126	14%	80	305	39%	775
LADWP	2-4 units	51	3,782	1,739	1%	0	20	33%	60
	Multi-family 5-20 units	52	1,269	134	0%	5	5	25%	20
	Multi-family >20 units	53	10,010	152	2%	25	50	25%	200
	Mobile Home >4 units	54	1,137	8	0%	1	5	50%	10
	Subtotal		16,198	2,033	4%	31	80	28%	290
Total	2-4 units		69,848	29,620	16%	0	355	33%	1,065
	Multi-family 5-20 units		38,364	4,061	9%	205	205	25%	820
	Multi-family >20 units		72,082	1,155	17%	180	360	25%	1,440
	Mobile Home >4 units		254,652	3,875	59%	251	1,255	50%	2,510
	Total		434,946	38,711	100%	636	2,175	37%	5,835

Initial Master Metered Mail Sample Allocation

We used a proportional allocation to assign the RASS sample to each of the stratum. The sample was assigned based on units or dwellings. Columns F, G and H in Table 2-3 show the population proportions and target number of stage one and two survey completes using a proportional allocation method. In Table 2-3, column J shows the target mailout.

Following the proportions assigned to the individually metered sample, we assigned sample on a proportional basis where the sample size was equal to one-half a percent of the population. Different from the individually metered sample, we did not use a modified proportional approach, and as such did not increase the sample for certain strata based on a pre-determined "minimum" amount of sample. The reason for not using the modified approach for the master-metered sample is that the variable "type" was included in the sample design only because the mailing strategy differs across the different types of units. This dimension of the sample design was not added to obtain a certain level of precision for estimates by the variable "type". Thus, a minimum number of sample points were not required for the strata and the proportional allocation method was most appropriate.

The total number of stage one surveys was set at 636 and the number of stage 2 surveys at 5,835. The total target number of completes was expected to be 2,175 based on an average response rate of 37%.

2.2.3 Non-Response Follow-Up Sample Design

KEMA-XENERGY worked with RoperASW to perform the non-response portion of the project. The objective was to obtain survey responses from a portion of the customers who did not respond to the mail survey to help reduce non-response bias by using multiple targeting approaches. A subsample of 5,000 customers from the original RASS sample who had not responded to the initial mailings was selected in 465 Zip Codes.

The more densely populated areas of the state were clustered by Zip Code. Clustering allowed more efficient data collection by in-person contact. Customers in these areas were contacted by First Class Mail with a small incentive and those that did not respond were contacted by telephone and/or in person.

The more sparsely populated areas of the state did not provide the opportunity for clustering that could result in efficient in-person contact. Customers in these areas were contacted by Priority Mail with a larger incentive. Those that did not respond were contacted by telephone only.

Clustered sample cases were designated as belonging to Group A. Non-clustered sample cases were designated as belonging to Group B.

Sample Selection

Step 1- Separate customers by sample group

The first step in the sample selection was to separate the households into clustered and non-clustered sample groups. The following 3-digit Zip Codes were allocated to the non-clustered sample group.

- 934, 935, 939, 949, 954, 955, 960, and 961

In addition, the two-stage selection procedure for the clustered sample resulted in inadequate sample sizes for certain strata. Customers in the following strata were also allocated to the non-clustered sample group.

- 100002, 100004, 101102, 110102
- 300001, 300003, 301513, 301613
- 400001, 400002, 400003, 400004, 400199.

Step 2 - Select the sample members from the non-clustered group

The second step in the sample selection was to select customers from within the non-clustered sample group. The non-clustered Zip Codes and strata (11.6% of the overall non-response households) contained records for 9,513 customers. The group was allocated 580 of the 5000 sample cases.

We selected a stratified random sample of households using the following procedure:

- Allocated sample fraction to strata: We computed a sample fraction as the total number of cases in a stratum to the total number of cases in the non-clustered sample.

Allocated sample cases to strata: We multiplied the sample fraction times the sample allocation (580) to get the number of sample cases allocated to each stratum. We used a statistical rounding procedure to allocate an integer number of cases to each stratum.

We selected a systematic sample from each stratum to control the final number of cases selected from the stratum. The KEMA-XENERGY sample ID was used as the sort key.

The sampling rate for cases selected from the non-clustered sample was 0.0610. The highest number of cases selected in a stratum in the non-clustered sample was 64. Two of the strata that had cases in the non-clustered area had no selections.

Step 3 - Select sample members from the clustered group

The third step in the sample selection was to select customers from within the clustered sample group.

The clustered Zip Codes (88.4% of the overall non-response households) contained records for 72,740 customers. The group was allocated 4420 of the 5000 sample cases. We allocated 20 sample cases to each Zip Code group. We used a two-stage procedure in which we first selected Zip Codes and then selected cases from within the Codes.

The initial sample had households in 1689 Zip Codes. The clustered sample had cases in 1150 Zip Codes. The non-clustered sample had cases in 539 Zip Codes.

Zip Code groups were selected using the following procedure:

Zip Codes were grouped numerically so that there was a minimum of 20 cases per group. The Zip Codes were collapsed into 830 Zip Code Groups.

A systematic sample of 221 Zip Code Groups was selected (the sort key was Zip Code number). The probability of selection of a Zip Code Group was the number of cases in the Zip Code Group divided by 329.01. Since the largest number of cases in a Zip Code Group was 259 cases, there were no certainty selections among the Zip Code Groups.

Within each selected Zip Code Group, we selected a systematic sample of households. The sampling rate within each Zip Code Group was the 20 divided by the number of households in the Zip Code Group. In 180 of the 221, all 20 selected cases were located within a single Zip Code.

The sampling rate for cases selected from the clustered sample was 0.0608.

Step 4 - Reassign cases to "rationalize" survey procedures

Group A (clustered) cases were those that received First Class Mail followed by telephone and in-person data collection procedures. Group B (non-clustered) cases

were those that received Priority Mail followed by telephone data collection procedures.

Some cases from the sparsely populated regions fell into Zip Codes that were included in a clustered Zip Code Group. To rationalize procedures, these cases (n=70) were reassigned to Group A.

Some cases from the densely populated regions fell into Zip Codes that contained fewer than 5 selected cases. To rationalize procedures, those cases (n=95) were reassigned to group B.

2.2.4 On-Site Metering Design

A sub-sample of the initial sample was used for on-site metering. On-site meter installations were done on homes in the general population with an over-weighting of homes with air conditioning. Thus, the initial sub-sampling effort took into consideration the need to target air conditioning users. The target number of installed on-site meters was 200. The metering sample called for 50 homes without air conditioning and 150 with air conditioning.

In order to achieve the results in a cost effective manner, we developed a grid that split the state into six categories and parceled out the targets in such a way that we picked 20 large geographic areas and targeted 10 customers in each area. The strategy attempted to capture a ratio of AC to non-AC customers in each area in a way that mirrors the split in that climate zone with an excess of targets to air conditioning customers. We also tried to spread the surveys around the state and amongst the utility sponsors and Energy Commission climate zones. Table 2-4 shows the planned target onsite areas and air conditioning breakdown within the various climates.

The targeting by the climactic areas was done roughly by three digit zip codes with some refinement in large areas. Table 2-5 provides the target areas used for recruiting onsite participants.

**Table 2-4
Target Areas for the Onsite Metering Sample**

	Hot Climate (AC most likely)	Moderate Climate (AC likely)	Cool Climate (AC least likely)
No Air Conditioning	12 sites (max. of 1 non-AC site per area)	24 sites (max. of 4 non-AC sites per area)	20 sites
Air Conditioning	108 sites	36 sites	0 sites
Geographic Target Areas	12 areas (120 total sites)	6 areas (60 total sites)	2 area (20 total sites)
Recruitment Strategy	Recruit with goal of meeting AC targets. Recruiters may get more AC customers than listed, but cannot exceed maximum number of non-AC households by target area.		Recruit whatever customers we get since there is a low probability we will get an AC customer.

**Table 2-5
Target Groups for Onsite Metering**

Target group	Climate category (from Table 2-4)	Proposed three digit zip code of target area	CEC climate zones covered	Major town(s) in segment	Utilities with customers in target area
1	Hot	917	9,10	Covina, Pomona, Ontario, Upland	SCE
2	Hot	919	(9)** 13	La Mesa, Spring Valley, Lemon Grove	SDG&E
3	Hot	920	13	El Cajon, Poway, Escondido	SDG&E
4	Hot	922	10	Cathedral City, Desert Hot Springs, Palm Springs, 29 Palms, Yucca Valley	SCE
5	Hot	924	10	San Bernardino	SCE
6	Hot	925	10	Riverside, Hemet, Moreno Valley, Sun City	SCE
7	Hot	933	3	Bakersfield	PG&E
8	Hot	937	3	Fresno	PG&E
9	Hot	952	1,2	Stockton, French Camp, Valley Springs	PG&E
10	Hot	956	2,4	Davis, Vacaville, Winters	PG&E

**Table 2-5
Target Groups for Onsite Metering
(continued)**

11	Hot	959	1,3	Chico, Marysville, Grass Valley	PG&E
12	Hot	960	1,3	Redding, Red Bluff	PG&E
13	Moderate	900	11	Los Angeles	LADWP, SCE
14	Moderate	910/911	9,12,16	S. Pasadena, Sunland, Tujunga, Altadena, Monrovia	LADWP, SCE
15	Moderate	919	(9)** 13	Chula Vista	SDG&E
16	Moderate	921	13	San Diego	SDG&E
17	Moderate	927	8	Santa Ana, Fountain Valley, Tustin	SCE
18	Moderate	945	4,5	Concord, Hayward, Livermore	PG&E
19	Cool*	941/946	5	Oakland and East Bay Hills, San Francisco	PG&E
20	Cool*	952/953	1	Foothill areas (sites over 2,500 feet elevation, more electric): Areas above Sonora, Angel's Camp	PG&E

Note: Because of the limited availability of recruits in the foothill areas and long travel distances between sites, we shifted the number of targets per area to 14 in the Oakland / SF area and 6 in the foothills. This yielded the 20 targeted cool area sites.

*SDG&E had some customers listed in zone 9 in the final sample. This was eventually changed to zone 13 where all SDG&E customers are located.

2.3 PROJECT IMPLEMENTATION

Throughout the time the sample frame was being developed and finalized, we created all of the program materials and planned out the overall project implementation. This section details the results of that planning and implementation effort.

2.3.1 Materials Design, Pretest, and Direct Mailings

All materials for the program were designed with input from all program sponsors. While this was a more complicated task than working with a single client, the group

worked well together and was able to accommodate the needs of the group while maintaining a survey that was user-friendly and comprehensive.

The direct mail surveys were pretested with a sample of 20 energy customers. Results of the pretest were shared with the Energy Commission and participating utilities, and all parties agreed on modifications to be made. The results from the survey pretest are included as Appendix Y.

The direct mail package consisted of:

- An outgoing envelope (7.5 x 10.5 inches) with a window opening
- A business reply envelope (7 x 10 inches)
- A 20 page scannable survey (6.75 x 9.75 inches)
- A cover letter - several different types of letters were used:
 - Standard first mailing letter
 - First mailing letter for sites with 2-4 units
 - First mailing letter for master metered sites
 - Second mailing letter (same for all customers).

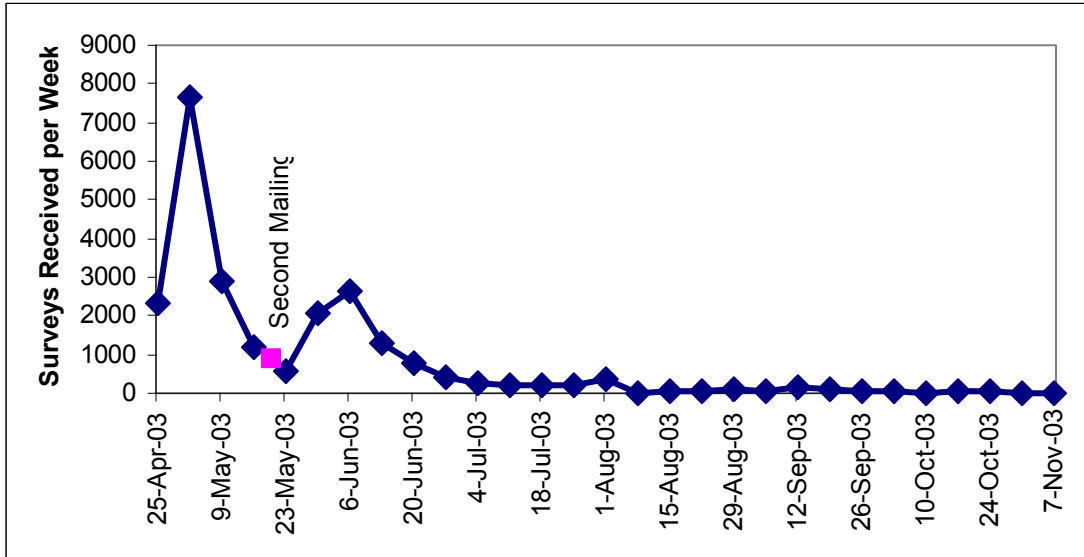
Copies of all direct mail materials are included as Appendix X.

A bar code, containing the tracking number (SFCODE), along with the respondent name, mailing address, and service address, was printed on the survey and was designed to show through the window of the main envelope. The service address was also provided on the survey to direct the respondent to fill out the survey for the dwelling that was targeted by the sampling plan. A specific cover letter depending on the type of respondent identified the sponsor(s), provided the motivation for completing the survey, and gave survey instructions. The survey instrument also included various instructions.

All packages were compiled at a mailing house where they were sorted to obtain the most favorable postage rate. Direct mail solicitation packages were mailed third class to all customers on April 16, 2003. As responses came into KEMA-XENERGY's office, we barcoded the surveys and created a list of completed surveys. Three weeks after the first mailing, we extracted the names of all participants who had replied to date and on May 20th sent a second solicitation package. This step saved on postage costs and reduced unwanted mail to those who had replied. The cover letter of the second mailing stressed the importance of the study and repeated the request for customer participation. In all other regards, the second package was identical to the first.

Figure 2-2 illustrates the influx of surveys as a result of the two mailings.

**Figure 2-2
Weekly Count of Surveys Received**



Appendix E includes the final Data Collection Protocols document which details the survey processing steps, training information, and phone scripts for master metered electric accounts and onsite metered site recruitment.

2.3.2 Toll Free Customer Support

A key component of the mail survey process is a survey support hot line. This hot line was set up for respondents to ask clarifying questions or to obtain assistance in determining correct responses. The hot line also provided a means for non-English-speaking respondents to complete the survey by phone, if they desire. Operators had a Spanish version of the survey translated and ready to use to assist Spanish-speaking callers with any survey questions.

The RASS survey hot line accepted calls with a live operator from 8:30 AM to 7 PM. At all other times, we had an answering machine available to accept messages and returned calls the following business day or as requested by the customer. Several operators were native Spanish speakers.

In total there were 302 calls received by the toll free line for the duration of the RASS project. Just over half of the calls (160) were English questions. There were 141 Spanish calls and one in Russian. We used a translation firm to assist us with the Russian call.

2.3.3 Individually Metered Survey Completes

We received a total of 18,970 responses to the mail survey. As mentioned above, we expected a total of approximately 47,000 responses assuming a 47% response rate. The actual response rate was 19%. There are several factors that may have caused the lower than expected response rate including:

- Direct mail solicitations (first and second mailings) did not include a monetary incentive
- Customers may not have identified with the Energy Commission logo on the envelope and thus did not feel compelled to open the package and read the letter and other materials;
- Customers may have been adversely affected by the 2001-2003 politically charged energy issues (blackouts, high prices, utility bankruptcy) and thus less willing to participate;
- Consumers are ever more targeted with direct mail and various surveys so may be less willing than in years past to spend their free time participating in this type of research; and
- The survey may have appeared to be too long for some customers.

While the response rate was lower than expected, the overall scope of the study was large enough to capture a large quantity of responses and allow for reasonably precise results. Section 2.5 provides more detail on the study precision.

Table 2-6 presents the number of completes and response rate for each of the individually metered sample strata. The columns of the table include the following information for each strata.

- Columns A through E indicate the strata variables;
- Column F indicates SFCODE prefix for the strata grouping;
- Column G indicates the number of target completes;
- Column H indicates the actual number of mail surveys returned;
- Column I indicates the expected response rate; and
- Column J indicates the actual response rate.

**Table 2-6
Individually Metered Mail Survey Response**

A	B	C	D	E	F	G	H	I	J	
Electric Utility	Home Age	Electric Heat Presence	Home Type	CEC Forecast Climate Zone	SFCODE Prefix	Target Completes	Actual Completes	Expected Response Rate	Actual Response Rate	
LADWP	Old	No	Low	11	500411	1,644	487	40%	12%	
				12	500412	517	150	40%	11%	
			Medium	11	500511	713	197	55%	15%	
				12	500512	413	118	55%	16%	
			High	11	500611	173	50	55%	16%	
				12	500612	190	75	55%	21%	
	Yes	All	All	500001	150	30	50%	10%		
	New	No	Low	11	510411	150	37	40%	10%	
		All others	All others	All others	500002	150	30	50%	10%	
	PGE	Old	No	SF-Low	1	100201	230	130	45%	25%
2					100202	251	117	45%	21%	
3					100203	708	323	45%	20%	
4					100204	1,333	745	45%	25%	
5					100205	1,822	1,056	45%	26%	
SF-High				1	100101	222	124	55%	30%	
				2	100102	515	227	55%	24%	
				3	100103	1,403	592	55%	23%	
				4	100104	1,647	705	55%	23%	
				5	100105	1,915	836	55%	24%	
MF				1	100301	150	68	40%	18%	
				2	100302	206	64	40%	12%	
				3	100303	493	148	40%	12%	
				4	100304	896	337	40%	15%	
				5	100305	1,882	741	40%	16%	
Yes			SF-Low	1	101201	160	120	45%	33%	
				3	101203	150	83	45%	25%	
				4	101204	150	79	45%	23%	
				5	101205	150	58	45%	17%	
				1	101101	394	188	55%	26%	
			SF-High	2	101102	150	80	55%	29%	
				3	101103	327	173	55%	29%	
				4	101104	215	107	55%	27%	
				5	101105	150	69	55%	25%	
				MF	3	101303	150	42	40%	11%
			4		101304	374	105	40%	11%	
			5		101305	617	201	40%	13%	
			All others		All others	100001	150	55	50%	18%

**Table 2-6
Individually Metered Mail Survey Response
(continued)**

A	B	C	D	E	F	G	H	I	J
Electric Utility	Home Age	Electric Heat Presence	Home Type	CEC Forecast Climate Zone	SFCODE Prefix	Target Completes	Actual Completes	Expected Response Rate	Actual Response Rate
PGE (cont.)	New	No	SF-Low	2	110202	150	76	45%	23%
				3	110203	150	50	45%	15%
				4	110204	150	78	45%	23%
				5	110205	154	67	45%	19%
			SF-High	2	110102	150	59	55%	21%
				3	110103	154	57	55%	20%
				4	110104	150	50	55%	18%
			MF	5	110105	153	41	55%	15%
				3	110303	150	41	40%	11%
				4	110304	150	38	40%	10%
		Yes	5	110305	150	49	40%	13%	
			All others	All others	100002	150	53	50%	17%
			MF	4	111304	150	38	40%	10%
			All others	All others	100003	160	45	50%	14%
All	All	All	14	100004	150	84	50%	28%	
SCE	Old	No	SF-Low	7	400207	227	102	45%	20%
				8	400208	1,566	773	45%	22%
				9	400209	1,878	739	45%	18%
				10	400210	999	428	45%	19%
				11	400211	311	128	45%	18%
				All others	400299	150	64	45%	19%
			SF-High	7	400107	362	161	55%	24%
				8	400108	1,730	706	55%	22%
				9	400109	1,707	650	55%	21%
				10	400110	1,562	565	55%	20%
				11	400111	173	58	55%	18%
			All others	400199	158	64	55%	22%	
			MF	7	400307	163	68	40%	17%
				8	400308	1,134	411	40%	14%
				9	400309	1,103	314	40%	11%
				10	400310	695	281	40%	16%
				11	400311	367	129	40%	14%
				All others	400399	150	48	40%	13%

**Table 2-6
Individually Metered Mail Survey Response
(continued)**

A	B	C	D	E	F	G	H	I	J
Electric Utility	Home Age	Electric Heat Presence	Home Type	CEC Forecast Climate Zone	SFCODE Prefix	Target Completes	Actual Completes	Expected Response Rate	Actual Response Rate
SCE (cont.)	Old (cont)	Yes	SF-Low	8	401208	150	67	45%	20%
				9	401209	150	62	45%	18%
				10	401210	150	58	45%	17%
			SF-High	8	401108	150	63	55%	23%
				9	401109	150	72	55%	26%
				10	401110	150	48	55%	17%
			MF	8	401308	519	179	40%	14%
				9	401309	277	79	40%	11%
				10	401310	152	44	40%	11%
	All others	All others	401311	150	65	40%	17%		
	New	No	SF-Low	8	410208	150	58	45%	17%
				9	410209	150	37	45%	11%
				10	410210	155	79	45%	23%
			SF-High	8	410108	150	48	55%	17%
				9	410109	150	46	55%	17%
				10	410110	220	72	55%	18%
	MF	8	410308	150	31	40%	8%		
	All others	All others	400001	164	50	50%	15%		
	All	All	All	15	400002	150	71	50%	23%
				16	400003	150	69	50%	23%
	SDGE	Old	No	Low	9	300409	193	95	40%
13					300413	1,518	705	40%	18%
Medium				9	300509	185	81	55%	24%
				13	300513	1,484	621	55%	23%
High				9	300609	150	66	55%	24%
				13	300613	648	257	55%	22%
All others		All others	300001	150	65	50%	21%		
Yes		Medium	13	301513	150	73	55%	27%	
		High	13	301613	150	84	55%	31%	
		All others	All others	300002	150	52	50%	17%	
New		No	Low	13	310413	201	72	40%	14%
			Medium	13	310513	175	55	55%	17%
	High		13	310613	150	57	55%	21%	
	All others		All others	300003	150	52	50%	17%	
Total						46,807	18,970	46%	19%

2.3.4 Master Metered Mail Implementation

The master metered market is a segment that is often excluded from research studies because they are a difficult market to contact and survey. For this study, master metered customers were targeted using a two-phased approach. Customers were solicited for phase one using a phone survey script which can be found in the Data Collection Protocols (Appendix E).

Calls were tracked in utility specific databases so that one caller could focus on a given utility and unit type to facilitate data collection. Each phone surveyor entered customer names and addresses as provided by the facility manager into a central address spreadsheet for each utility/unit type grouping. Address files were then combined to create a central mailing database for each of the specific types.

Master metered homes with 2-4 units were not included in the stage one phone calls, but were sent customized letters requesting that they fill out the survey for only one of the units. Mobile homes were surveyed using the standard individually metered mailing with the same cover letter. Mobile homes were included in the stage one process primarily to obtain correct addresses for residents of a particular mobile home park.

Once customer names were obtained using the phase one screening, a mailing list was sent to the mailing house and solicitation packages were made up for each of the master metered customers. KEMA-XENERGY staff then transposed the survey responses gathered in the phase one calls onto the physical RASS surveys. This step assisted master metered customer with their survey responses and improved accuracy on questions where the property manager/landlord was able to assist with technical information. The technical information included the type of building, heating system, and other common equipment. This manual step insured that the master metered tenants provided appropriate answers to the questions for which they were unlikely to know the answers while allowing the tenants to provide details on the other items in the survey which they did control. Once the surveys were hand prepared, the mailing house sent them out to the customers with a special master meter letter explaining the process.

2.3.5 Master Metered Survey Completes

We conducted a total of 616 stage one phone surveys, and mailed out 5,593 mail surveys to master metered customers. Table 2-7 below provides the number of

phone surveys conducted and mail surveys sent out by strata. The columns of the table include the following information for each of the stratum.

- Columns A and B indicate the strata;
- Column C shows the SFCODE prefix for each strata;
- Column D shows the target number of phone survey completes for each strata;
- Column E shows the actual number of phone survey conducted for each strata;
- Column F shows the target mailout; and
- Column G shows the actual mailout.

There are several reasons why the actual completes differed from the targets. In some cases, we were unable to reach any additional customers after repeated calls. In other cases we ran out of valid phone numbers and had minimal success with alternative methods for looking up phone numbers. Phone numbers were initially targeted using a phone number matching service with utility supplied phone numbers added in as an additional contact number.

We had varied results reaching customers depending on their location and type of dwelling. On average, it took 8.1 phone calls to reach each phase one customer. Mobile homes had the lowest call rate with 5.3 calls per completed phone survey. Master meters with 5-20 units took 9.4 calls per complete and multi-family dwellings with over 20 units were the hardest to reach with 10.7 calls per complete. Overall, we were able to complete 97% of the targeted phone surveys.

**Table 2-7
Master Metered Phone Survey Response and Actual Mailout**

A	B	C	D	E	F	G
Electric Utility	Type	Phone Survey			Mailout	
		SFCODE Prefix	Target Completes	Actual Completes	Target	Actual
PG&E	2-4 units	11	na	na	675	672
	Multi-family 5-20 units	12	100	101	400	407
	Multi-family >20 units	13	100	91	800	690
	Mobile Home >4 units	14	100	100	1,000	954
	Subtotal		300	292	2,875	2,723
SCE	2-4 units	41	na	na	195	194
	Multi-family 5-20 units	42	75	75	300	300
	Multi-family >20 units	43	40	40	300	320
	Mobile Home >4 units	44	110	110	1,100	1100
	Subtotal		225	225	1,895	1,914
SDG&E	2-4 units	31	na	na	135	135
	Multi-family 5-20 units	32	25	26	100	104
	Multi-family >20 units	33	15	7	140	64
	Mobile Home >4 units	34	40	40	400	398
	Subtotal		80	73	775	701
LADWP	2-4 units	51	na	na	60	57
	Multi-family 5-20 units	52	5	3	20	12
	Multi-family >20 units	53	25	22	200	176
	Mobile Home >4 units	54	1	1	10	10
	Subtotal		31	26	290	255
Total	2-4 units		na	na	1,065	1,058
	Multi-family 5-20 units		205	205	820	823
	Multi-family >20 units		180	160	1,440	1,250
	Mobile Home >4 units		251	251	2,510	2,462
	Total		636	616	5,835	5,593

We received a total of 767 responses to the master metered mail survey. As mentioned above, we expected a total of approximately 2,175 responses assuming a 37% response rate. The lower response rate is similar to that found in the individually metered mailouts and is attributed to similar factors as detailed in Section 2.3.3 above. While response in the two to four unit sites and mobile home parks was reasonable, the response in the multi-family sites with five or more units was extremely low. We expect this is a result of the study-wide response rate issues, plus was impacted by the challenge of identifying unit addresses and the fact that many surveys were sent generically addressed to the California Energy Customer and were not personalized.

Table 2-8 presents the mail survey response for master metered customers. The columns of the table include the following information for each of the stratum.

- Columns A and B indicate the strata;
- Column C shows the SFCODE prefix for each strata;
- Column D shows the target number of mail survey completes for each strata;
- Column E shows the actual number of mail survey completes for each strata;
- Column F shows the expected response rate; and
- Column G shows the actual response rate.

**Table 2-8
Master Metered Mail Survey Response**

A	B	C	D	E	F	G
Electric Utility	Type	SFCODE Prefix	Target Completes	Actual Completes	Expected Response Rate	Actual Response Rate
PG&E	2-4 units	11	225	139	33%	21%
	Multi-family 5-20 units	12	100	10	25%	2%
	Multi-family >20 units	13	200	16	25%	2%
	Mobile Home >4 units	14	500	217	50%	23%
	Subtotal		1025	382	36%	14%
SCE	2-4 units	41	65	33	33%	17%
	Multi-family 5-20 units	42	75	7	25%	2%
	Multi-family >20 units	43	75	10	25%	3%
	Mobile Home >4 units	44	550	211	50%	19%
	Subtotal		765	261	40%	14%
SDG&E	2-4 units	31	45	24	33%	18%
	Multi-family 5-20 units	32	25	3	25%	3%
	Multi-family >20 units	33	35	0	25%	0%
	Mobile Home >4 units	34	200	93	50%	23%
	Subtotal		305	120	39%	17%
LADWP	2-4 units	51	20	2	33%	4%
	Multi-family 5-20 units	52	5	0	25%	0%
	Multi-family >20 units	53	50	2	25%	1%
	Mobile Home >4 units	54	5	0	50%	0%
	Subtotal		80	4	28%	2%
Total	2-4 units		355	198	33%	19%
	Multi-family 5-20 units		205	20	25%	2%
	Multi-family >20 units		360	28	25%	2%
	Mobile Home >4 units		1,255	521	50%	21%
	Total		2,175	767	37%	14%

2.3.6 Non-Response Follow-up Implementation

Customer information for the non-response follow-up sample was provided by the four sponsoring electric utilities: PG&E, SDG&E, SCE, and LADWP. Information included the identifier SFCODE, customer name, service address, mailing address, and phone number. The initial utility-provided file only included a few phone

numbers. Additional phone numbers were provided mid-way through the data collection period by three of the energy providers. No additional numbers were provided by the fourth (LADWP).

In order to maximize telephone surveying effectiveness, RoperASW also sought telephone numbers from an electronic cross-directory service for the sampled customers on the list. Roughly 30% of those requested were returned with a telephone number.³ In total 17% of the customers had at least one number initially and close to 90% had at least one number after cross-directory and utility company lists were added. However, many of the contact numbers were outdated, disconnected, or otherwise unproductive.

In order to track survey progress, a sample management database was created from the sample data. The database held all identifying information for the 5,000-member sample. The database was used to control all phases of the survey. The database was used to prepare mailing lists, interview lists and assignment materials. It was also used as a log to track interviewer assignments and final status codes as well as to generate various status reports.

Non-Response Follow-Up Materials

The questionnaire used in the non-response follow-up was the same form used for all of the initial customer mailings. KEMA-XENERGY provided copies of the questionnaire for all mailings and interviewer-gathered responses.

Group A (clustered) mailings included: (Samples of all materials appear in the Appendix.)

- Outside envelope, of the same shape as those used by KEMA-XENERGY (and provided by KEMA-XENERGY), but printed by RoperASW to look different from the initial mailout in an effort to increase recipient interest. Colored border triangles and the word First Class Mail were added to the envelope. RoperASW modified the return address by adding a tag line requesting customer participation as well as adding the Energy Commission logo.
- Cover letter, revised from those used by KEMA-XENERGY in earlier mailings, and printed on RoperASW letterhead.
- Questionnaire, provided by KEMA-XENERGY and with a RoperASW-provided label showing the customer name and the address of the household.

- A postage paid, business reply envelope, provided by KEMA-XENERGY and addressed to KEMA-XENERGY's questionnaire processing center.
- A \$1 bill as a thank you incentive.

Each packet also included a white 3.5" X 5.5" card with a message in Spanish providing a number to call at KEMA-XENERGY to complete an interview if the person could not complete the questionnaire in English.

Group B (non-clustered) mailings included: (Samples of all materials appear in the Appendix.)

- U.S. Postal Service Priority Pack outside envelope.
- Cover letter, revised from those used by KEMA-XENERGY in earlier mailings and slightly revised from the Group A letter with respect to the incentive.
- Questionnaire.
- The postage paid, business reply envelope addressed to KEMA-XENERGY.
- A \$5 bill as a thank you incentive.
- A white 3.5" X 5.5" card with a message in Spanish inviting the customers to call the toll-free survey center to complete their survey in Spanish.
- A blue 3.5" X 5.5" card promising an additional incentive for a completed questionnaire if the blue card was returned to RoperASW with the name and mailing address of the person who completed the questionnaire. These cards, when confirmed against a list of completed questionnaires reported by KEMA-XENERGY, were used to authorize payment of an additional \$15 incentive.

A separate advance letter was sent to all customers that did not respond to the mailed requests. The advance letter, on RoperASW letterhead, notified the recipient that a RoperASW interviewer would be attempting contact by phone or in person within the next few weeks. The advance letter carried the same study information as that included in the questionnaire packets. Advance letters were mailed roughly a week before interviewers began working their assignments.

Non- Response Follow-Up Data Collection

Initial mailings were sent out over several days, beginning July 18. All 5,000 sample members were included, with the Group A members receiving the First Class packet with the \$1 incentive and Group B members receiving the Priority Mail packet with the \$5 (+\$15 promised) incentive. All returned completed questionnaires were mailed directly from the customer to KEMA-XENERGY. Every few days, KEMA-XENERGY provided an update file listing the identification numbers of returned questionnaires. Those so identified were marked as complete on the sample management database and excluded from all subsequent data collection efforts.

Those customers that did not respond to the mailing within three weeks were designated for interviewer (telephone or in-person) follow-up. Advance letters indicating that the customer would be contacted by phone or in person were sent out to all such customers on August 13. A total of 4,596 advance letters were mailed using First Class postage.

In the two months prior to the advance letter mailing, telephone and in-person interviewers were recruited for the study. Telephone interviewers were recruited from among those used by RoperASW in the past. These interviewers work from their homes. Physical location in California was not required for this staff. A total of 16 telephone interviewers were hired for the study.

Many of the in-person interviewers were also recruited from among those used by RoperASW in the past. The number needed to staff this study required that additional recruiting be carried out. Word of mouth among interviewers, recommendations by supervisors from other data collection companies, and advertisements were used. A total of 34 in-person interviewers were eventually hired and trained to work the study. An additional 5 interviewers were provided by KEMA-XENERGY in the last few weeks of data collection.

Both telephone and in-person interviewers were trained by conference call in the week prior to sending out assignments to interviewers on August 14 and 15. Each trainee received a set of training materials describing their job in advance of the training call. RoperASW field managers also sent each interviewer a packet with all pertinent program materials. Telephone staff was trained separately from in-person staff because of the additional procedures that were required of the in-person staff in arranging their work and in making trips to the Zip Code areas.

Interviewers (both telephone and in-person) were provided with a customer list for each Zip Code assigned. The list provided customer name, address of the housing unit served, and, for some customers, a telephone number. A labeled questionnaire was provided for each customer listed. Interviewers typically had four or more Zip Code lists to work.

In-person interviewers received a letter of introduction for themselves to be presented to the customer at the time of in-person contact. In-person packets also included an identification badge, generic cover letters similar to the letters used in the initial mailings, and magnet thermometers to be handed out as a gift to those customers that agreed to participate. Finally, in-person interviewers received a supply of plastic door-hanger bags, business reply envelopes, and "Sorry I missed you" letters. The door-hangers were used on the final (third) trip to the Zip Code if a successful interview could not be conducted. The door hanger bag was left with a full survey package including the business reply envelope and cover letter.

The day after the advance letters were mailed, the assignments began being shipped to interviewers. Work was assigned to phone interviewers for all of Area B (which was to have no in-person follow-up), and roughly 55 Zip Codes from Area A. The Area A Zip Codes were identified because no in-person staff was yet on board to cover those codes. In all, 1,470 cases were assigned to telephone interviewers.

All remaining work from Area A was assigned directly to in-person interviewers. In-person assignments were made based on the interviewer's proximity to the Zip Code(s). Roughly 3,130 were assigned to in-person interviewers. In-person interviewers could not be identified in proximity to a handful of Zip Codes. Special procedures, discussed below, were followed for these few.

Telephone interviewers were directed to make an unlimited number of calls to the phone number of record on the assignment list. For those without phone numbers, directory assistance was consulted. The result of each call was to be recorded on the assignment sheet. Work progressed on each Zip Code until each customer finished an interview, refused, or was discovered to have no usable phone number. A limit of six weeks was applied to telephone interviewer work. As Zip Codes were completed or the time limit was reached, materials were returned to RoperASW. All cases with non-final dispositions from Area A were reassigned to in-person interviewers (with a few exceptions for Zip Codes in which no in-person interviewer was available).

In-person interviewers were directed to make several attempts to complete each interview by telephone before making a trip to the Zip Code in person. Interviewers were directed to make up to three visits to each customer in a Zip Code in an attempt to complete an interview. If no interview could be completed by the third trip, a questionnaire hanger bag was left on the door. Work proceeded for in-person interviewers until the work was completed or the field period expired (mid November, roughly 12 weeks after it began).

Interviewers were paid for each complete interview returned to RoperASW. In-person interviewers were also paid a small amount for each hanger bag that was left on the third trip.

As the final six weeks of data collection began, a few Area A Zip Codes (roughly two dozen) had not been assigned to in-person interviewers. About half of these were identified as being very up-scale and comprised of gated communities where the probability of in-person success was felt to be limited. Due to its earlier success as a data collection mode, customers in these zips were contacted by Priority Mail packet with a \$5 (+ \$15) incentive. The other half of the unassigned Zip Codes were in areas where RoperASW had been unable to recruit in-person interviewers. Those were turned over to interviewers located at or managed by KEMA-XENERGY. The KEMA-XENERGY interviewers were trained by RoperASW supervisors.

Work from all interviewers was reviewed upon receipt at RoperASW. The first three interviews were checked for correct administration. Interviewers were retrained as needed. Checking was continued for those requiring additional training until it was clear that the questionnaires were being administered correctly. All questionnaires were reviewed for completeness before they were checked in on the sample management database.

Interviewers were supervised by telephone. A supervisor contacted each interviewer several times each week. The telephone interviewer supervisor worked in-house at RoperASW. The in-person interviewers managed by RoperASW were supervised by two off-site supervisors.

The number of completed surveys in each Zip Code was regularly reviewed to keep the interviewer from providing too many or too few interviews within each sample point. Each assignment sheet showed the number of interviews desired from that Zip Code. When that goal was achieved, the remaining work on that Zip Code was halted and the interviewer was directed to continue work on the next Zip Code in the assignment. Data collection by interviewers concluded on November 15, 12 weeks after it had begun.

Although KEMA-XENERGY had planned on completion of data collection by the end of October, the effort was extended in an effort to bolster the response rate. In the final weeks, several additional steps were taken. The additional efforts in November resulted in an increase in the response rate of 7 percentage points. These efforts included:

- 1) RoperASW reassigned unworked Zip Codes to interviewers who traveled outside their designated area to collect interviews, often staying overnight to accomplish their assignment.

- 2) KEMA-XENERGY arranged for or provided interviewers to supplement several Zip Codes that RoperASW was unable to staff.
- 3) RoperASW offered a bonus to all working interviewers to finish interviews with 50% of the customers or complete the third trip to the Zip Code and leave hanger bags if an interview was not completed.
- 4) Zip Codes that could not be staffed by either RoperASW or KEMA-XENERGY were mailed Priority Mail Packets with a \$5 incentive. (No additional \$15 was offered to this final group.)

Non-Response Follow-Up Response Rate

Table 2-9 shows the final overall response to the non-response follow-up effort. Since interviews that were completed by mail were sent to KEMA-XENERGY directly while phone and in-person interviews were returned to RoperASW, both companies logged in completed surveys.

**Table 2-9
Final Status for All Customers**

	Frequency	Percentage of Total	Percentage of Eligible
Complete reported by KEMA-XENERGY	746	14.9%	15.6%
Complete logged at Roper	1514	30.3%	31.6%
Refusal	228	4.6%	4.8%
Gated community, access denied	114	2.3%	2.4%
Business, ineligible	24	0.5%	
Vacant	108	2.2%	
Insufficient address	73	1.5%	
No Final Status	2193	43.9%	45.7%
Total	5000	100.0%	100.0%

Of the 5,000 sampled customers, 45% (2,260) completed interviews. If ineligible households (i.e. those that were actually businesses, were vacant, or had an address insufficient to locate the household) were removed from the base, the overall rate rose to 47%.

Of those reported as complete, a third were reported as received directly at KEMA-XENERGY. Almost all of these (roughly 660) resulted from the initial mailed requests. That is, roughly 13% of all customers responded to the initial RoperASW mailing. The return for the \$1 incentive First Class packet was not as high as the return for the \$5 (+\$15) Priority Mail packet. Return for the First Class packet was 10.6%; return for the Priority Mail packet was 32.4%.

While the incentive was responsible for much of the difference between the two mailing options, part was also due to the unique physical characteristics of the Priority Mail envelope. The mailing envelope used for prior KEMA-XENERGY mailings was very plain with a simple Energy Commission return address on its face. RoperASW modified the First Class envelope in an attempt to make it more interesting and thus more likely to be opened. While the First Class envelope resulted in a higher return than was expected (10.6% v 7.5%), the Priority Mail envelope indicated much more clearly an important document that should be opened. The return to the Priority Mail pack was also higher than anticipated (32.4% v 25%).

The response rate resulting from telephone interviewer efforts alone was 12% (175/1469). This rate was lower than would normally be expected by telephone if all sample had telephone numbers. The original files provided by KEMA-XENERGY had phone numbers for only 17% of the sample, and the later supplemental list of phone numbers was not received until most of the telephone interviewer work had been returned to RoperASW at the end of the first six weeks of field work. Efforts to obtain phone numbers from credit search services resulted in matches for only 30% of the lookups and directory assistance provided fewer numbers than had been anticipated. As a result, the telephone interviewers were handicapped by the lack of readily available customer telephone numbers.

The response rate resulting from in-person interviewers was roughly 34%.⁴ The count of completed interviews excludes 324 completed questionnaires received directly by KEMA-XENERGY after assignments were made to interviewers. Those 324 included late responses to the initial mailing, customer responses by mail after being contacted by an interviewer, responses to special mailings to selected Zip Codes, returns from hanger-bag questionnaires, and returns by interviewers managed by KEMA-XENERGY. The response received from in-person efforts does not allow a direct comparison of in-person rates with telephone rates because in-person interviewers were encouraged to complete interviews by phone if possible.

Response rates for the two sampling groups (based on clustering of Zip Codes) were essentially the same. Group A returned 45% overall. Group B returned 47% overall. Response rates for all eligible customers grouped by the four utility providers ranged from 40% to 50% (Table 2-10). San Diego, serviced by SDG&E, was a difficult area to staff initially; the Zip Codes selected there contained many gated

communities; and, the fires that raged in the area late in the study interfered with interviewer efforts.

**Table 2-10
Non-Response Follow-up Response by Utility**

Provider	% Response Eligible Customers	% Response All Customers	Number of Zip Codes	Number of Customers
PG&E	46	44	239	2001
SDG&E	40	36	49	543
SCE	50	49	148	1976
LADWP	49	45	29	480
TOTAL	47	45	465	5000

Response rates by Zip Code ranged from 0% to 100%. Rates that were extremely high or low tended to come from small (Group B) Zip Codes, where, when the sample was only 1 case, the only response rates possible were 0% or 100%. Table 2-11 shows the distribution of Zip Codes by response rate for eligible customers. As can be seen, the two extremes of response were comprised predominately of Zip Codes that contained few sample units.

**Table 2-11
Distribution of Zip Codes by Response Rate**

% Response from Eligible Customers	Number of Zip Codes	% of Zip Codes	Average Customers Sampled per Zip
0-10%	79	17	2.6
11-20	12	3	17.1
21-30	24	5	14.0
31-40	41	9	10.8
41-50	130	28	14.7
51-60	67	14	18.4
61-70	31	7	13.8
71-80	12	3	10.1
81-90	3	1	10.7
91-100	65	14	1.3
TOTAL	464	100	10.8

Note: One Zip Code is excluded in this count. It had a sample size of 1 and the unit was ineligible.

The field effort was managed in an attempt to ensure that Zip Codes ended near the 50% target response. The effort was moderately successful. Roughly 42% of Zip Codes finished within 10 points of the 50% response target. Another 34% finished at 40% or below, and 24% finished above 60%. The range of response rates was affected by those Zip Codes that had small numbers of sample members; a small sample size was more likely to yield extreme results. If all Zip Codes with 3 or fewer cases were removed, 62% of the Zip Codes had a final response rate within 10 points of 50%. A list of Zip Codes showing group designation and response rate is in Appendix G.

2.3.7 Onsite Implementation

On-Site Metering. The on-site metering data collection provided valuable detailed data for use in understanding hourly demand issues and additional collection of data that cannot be obtained through a mail or other interview based survey process. The primary reason for this data collection activity is to gather hourly load shape data for a sample of homes and report on whole house and central air conditioning systems. The onsite data collection and metering activities collected the following information on a targeted sample of 200 homes, 150 of which have central cooling systems while the remaining 50 do not:

- Responses for all mail survey questions;
- One year of hourly load data for the total dwelling unit and for the central cooling system;
- Detailed housing shell characteristics such as insulation levels and window areas by type; and
- Nameplate data on major appliances (i.e. heating, cooling, water heater).

The responses to the mail RASS survey are required to facilitate the estimation of load shapes by region and market segment through the leveraging of the RASS data and various analytical methods.

The monitoring of the cooling and total home hourly loads will be performed using four-channel true-RMS current loggers. One channel captured the current draw on the main service, with a second channel measuring the branch circuit to the air conditioning unit. If the air conditioning unit is fed from more than one circuit, as may be the case with a split system air conditioning, two additional channels were available to measure those circuits as well. Due to the small size of the metering equipment, it was typically connected and secured in the main circuit breaker panel

and was completely non-intrusive to the resident. The meters operate on 10-year battery power with no power connection required. Trained field technicians performed all meter installation and recorded meter readings throughout the study period.

Data was retrieved three times per year, or every four months, by field technicians. Although the meters could store well over a year's worth of data, preliminary data retrieval was performed to ensure the quality and operation of the installation. At the time of the first meter read, all meters were changed to read every 15 minutes instead of the initial hourly reads. This change improved data quality while maintaining the proposed quarterly read schedule. Data from the meters is easily exported to comma-separated-values format. Automated data cleaning and analysis procedures were developed to prepare and process the data.

The technical information collected on-site reflects the types of data that can only be reliably collected by a trained on-site surveyor. Lighting, shell, and nameplate data for this sample provides a complete set of very rich data that is useful in understanding the factors that drive hourly demand.

The process for on-site metering data collection consisted of the following activities:

- Telephone recruitment;
- Metering installation visit and survey data collection; and
- Up to three follow-up visits to obtain data from loggers (loggers are removed on the final visit).

A \$50 incentive was offered to each home in the on-site metering sample. Half of the incentive was paid at the time of the meter installation. The second half will be paid after the logger has been removed. The loggers are being kept in place through the 2004 air conditioning season to ensure a full air conditioning cycle for load shape development.

All field personnel were trained in KEMA-XENERGY's Oakland office. Training consisted of program overview training as well as detailed metering installation instructions (including a live demonstration at an employee's home), detailed review of the onsite survey, and electrical safety training. Field personnel, with the exception of two CEUS auditors who served as field trainers, were accompanied on their first few site visits to complete the training process and ensure that they were adequately trained to perform meter installations. Details from the program training materials are outlined in the Data Collection Protocols, which is Appendix E. These protocols also include copies of the onsite survey instrument and training guide for completing the survey.

2.4 SURVEY WEIGHTS

This section discusses the process of assigning sample weights for both the individually metered and master metered samples. To minimize potential bias in the saturation and CDA results, the various components of the project were merged together and results were weighted to the initial population frame. This process adjusts the results so that they are representative of the population at large.

The individually metered sample contains both the initial mail respondents and the follow-up non-respondent sample. Thus, separate weights were created for each sampling cell to account for the different sampling approaches. Basic weights were developed for the master metered sample equal to the ratio of the population count to the completed sample count for the cell.

Individually Metered Sample Weights

We considered two different approaches to combining the follow-up survey results with the initial mail survey sample. The first approach that was considered would have treated the main survey respondents as representing only those customers who would respond to this survey if they had received it, and the follow-up respondents as representing all other customers. Thus, since the main survey response rate was 19 percent, the main survey would represent 19 percent of the population and the follow-up respondents 81 percent. Estimates from the two surveys would then be combined by taking the weighted average of the two, with these proportions as weights.

The effect of this weighting approach would be to increase the variance, or the widths of the confidence intervals, for the combined sample. If the confidence interval widths for the main and follow-up samples are w_m and w_f , respectively, and the main survey response rate is r , the confidence interval width for the combined sample is:

$$w_c = \sqrt{r^2 w_m^2 + (1-r)^2 w_f^2},$$

where :

w_c = width of confidence interval of combined sample,

r = survey response rate

w_m = width of confidence interval of main sample; and

w_f = width of confidence interval of follow - up sample.

With a sample size approximately 1/10th that of the main sample, the follow-up sample would have confidence interval widths w_f almost three times as large as the main sample. Thus, the confidence intervals for the combined sample would be almost one and a half as big as those for the main sample alone. Despite this result, the difference in confidence interval widths does not imply that including the follow-up sample degrades our representation of the underlying population. The main sample alone, while more precise (having less variability) is a more precise estimate for a poorly defined population. By surveying the non-response group using different data collection approaches, we were able to target elements of the population who would not have replied to the mail survey. This therefore decreases (improves) the non-response bias that occurs in a single surveying method survey and produces a more precise combined estimate.

The second approach to weighting the combined sample was the one that was ultimately used. It resulted in a more modest effect on the precision of the combined sample results while still gaining the benefits of a multi-pronged surveying approach and its resultant reduction of non-response bias. Essentially, the follow-up sample is weighted less heavily. The justification for this approach is to assume that the follow-up sample represents only those customers who would respond to the follow-up survey but not to the main survey, rather than assuming the follow-up respondents represent all non-respondents to the main survey. In effect, the combined sample is treated as representing only those customers who would respond to one or the other stage of the survey. Thus, the combined sample using this weighting approach strictly represents 54 percent of the population, since the main survey response rate was 19 percent and the follow-up response rate was 44 percent. Using this approach, the main sample reflects approximately 35 percent of the covered population and the follow-up sample 65 percent.

The equations for the initial mail sample stratum weights (w_1) and the follow-up sample stratum weights (w_2) are presented below.

$$w_1 = \frac{\frac{N}{n_1} \times \frac{n_1}{n_s}}{\frac{n_1}{n_s} + \frac{n_2}{n_f} \times \left(1 - \frac{n_1}{n_s}\right)} \quad \text{and} \quad w_2 = \frac{\frac{N}{n_2} \times \frac{n_2}{n_f} \times \left(1 - \frac{n_1}{n_s}\right)}{\frac{n_1}{n_s} + \frac{n_2}{n_f} \times \left(1 - \frac{n_1}{n_s}\right)}$$

where:

N = population

n_1 = response to initial mail survey

n_2 = response to follow-up survey

n_s = initial mail sample (number of initial surveys mailed)

n_f = follow-up sample

for each stratum.

Table 2-12 provides the sample weights by strata for the individually metered sample. Individually metered weights range from a low of 47 to a high of 375 for the direct mail responses and 656 to 7,292 for the non-response follow-up surveys. The overall individual sample represents just over 9.9 million customers throughout the state.

Master Metered Sample Weights

The process of creating weights for the master metered sample consisted of implementing standard sampling procedures. The basic weights were developed for each sampling cell as the ratio of the population count to the completed sample count for the cell. The population counts used to calculate the weights for the master metered sample were based on the sample frame counts developed from the initial utility billing system extracts. The completed sample counts (number of respondents) were derived directly from the RASS sample.

Table 2-13 provides the sample weights by strata for the individually metered sample. There were a few strata where we were unable to get responses. Those were combined with other strata from their respective utilities to allow us to create weights for all customers. The strata without responses were SDG&E multi-family with over 20 units, LADWP multi-family with 5-20 units, and LADWP mobile homes. Table 2-13 includes the combined dwelling types.

**Table 2-12
Individually Metered Weights**

A	B	C	D	E	F	G	H	I	J	K	
Electric Utility	Home Age	Electric Heat Presence	Home Type	CEC Forecast Climate Zone	SFCODE Prefix	Population	Initial Mail Completes (Sample 1)	Follow-Up Completes (Sample 2)	Weight 1	Weight 2	
LADWP	Old	No	Low	11	500411	373,175	487	98	179.7	2914.7	
				12	500412	117,405	150	27	190.6	3289.2	
			Medium	11	500511	161,809	197	31	222.5	3805.9	
				12	500512	93,677	118	15	208.6	4604.0	
			High	11	500611	39,246	50	6	249.7	4460.5	
				12	500612	43,236	75	11	132.2	3029.3	
	New	Yes	All	All	500001	9,703	30	5	71.9	1509.4	
			No	Low	11	510411	22,673	37	8	130.5	2230.8
		All others	All others	All others	500002	18,077	30	7	121.0	2064.0	
			All others	All others	100201	52,179	130	14	164.9	2195.5	
PGE	Old	No	SF-Low	2	100202	56,948	117	12	137.4	3405.6	
				3	100203	160,601	323	27	194.6	3620.2	
				4	100204	302,496	745	67	164.1	2690.2	
				5	100205	413,401	1,056	77	163.2	3131.1	
				1	100101	50,357	124	6	230.6	3626.2	
			SF-High	2	100102	116,818	227	16	227.2	4078.0	
				3	100103	318,444	592	44	236.8	4051.7	
				4	100104	373,897	705	87	175.0	2879.5	
				5	100105	434,596	836	82	212.0	3138.8	
				1	100301	13,378	68	11	61.7	834.6	
		MF	2	100302	46,867	64	12	160.2	3051.0		
			3	100303	111,838	148	25	211.6	3220.9		
			4	100304	203,268	337	48	165.9	3069.8		
			5	100305	427,028	741	101	182.4	2890.2		
			1	101201	36,361	120	4	206.1	2908.9		
		Yes	SF-Low	3	101203	17,776	83	7	80.9	1580.4	
				4	101204	19,860	79	6	109.0	1874.8	
				5	101205	16,585	58	7	99.6	1544.0	
				1	101101	89,323	188	24	186.2	2263.5	
				2	101102	29,246	80	6	164.8	2677.5	
	SF-High		3	101103	74,287	173	10	224.1	3552.1		
			4	101104	48,810	107	6	233.9	3963.2		
			5	101105	26,133	69	3	237.1	3256.7		
			3	101303	15,008	42	8	103.0	1335.2		
			4	101304	84,892	105	14	246.3	4216.7		
	MF	5	101305	140,040	201	37	190.5	2750.0			
		All others	All others	100001	21,360	55	6	119.3	2466.2		
		New	No	SF-Low	2	110202	11,769	76	6	67.7	1104.1
					3	110203	18,887	50	7	125.5	1801.5
					4	110204	28,442	78	6	150.5	2784.0
	5				110205	30,591	67	10	157.8	2001.6	
	2				110102	23,550	59	6	155.4	2397.2	
	SF-High			3	110103	34,984	57	9	163.9	2849.2	
				4	110104	29,547	50	7	181.8	2922.2	
				5	110105	34,663	41	7	227.3	3620.8	
				3	110303	17,439	41	10	79.7	1417.3	
				4	110304	17,043	38	6	121.5	2071.2	
	MF	5	110305	24,013	49	5	182.6	3013.0			
		All others	All others	100002	19,960	53	5	146.4	2440.1		
		Yes	MF	4	111304	11,391	38	3	158.0	1795.8	
All others			All others	100003	31,706	45	5	219.7	4363.5		
All		All	All	14	100004	11,912	84	7	61.6	963.0	

**Table 2-12
Individually Metered Weights
(continued)**

A	B	C	D	E	F	F	G	H	I	J	
Electric Utility	Home Age	Electric Heat Presence	Home Type	CEC Forecast Climate Zone	SFCODE Prefix	Population	Initial Mail Completes (Sample 1)	Follow-Up Completes (Sample 2)	Weight 1	Weight 2	
SCE	Old	No	SF-Low	7	400207	51,498	102	7	233.3	3956.9	
				8	400208	355,440	773	85	158.1	2743.8	
				9	400209	426,252	739	97	170.2	3097.6	
				10	400210	226,709	428	60	147.4	2727.4	
				11	400211	70,693	128	10	193.2	4596.4	
				All others	400299	17,854	64	19	84.1	656.3	
			SF-High	7	400107	82,319	161	3	375.4	7291.9	
				8	400108	392,688	706	62	216.2	3871.6	
				9	400109	387,282	650	82	204.7	3100.4	
				10	400110	354,469	565	79	177.5	3217.9	
				11	400111	39,275	58	4	296.9	5513.8	
				All others	400199	35,824	64	5	237.4	4126.5	
			MF	7	400307	36,910	68	5	258.9	3861.0	
				8	400308	257,250	411	71	177.8	2594.0	
				9	400309	250,289	314	85	160.0	2353.5	
				10	400310	157,814	281	35	177.7	3082.7	
				11	400311	83,381	129	15	197.9	3856.8	
				All others	400399	9,697	48	9	52.9	795.5	
	Old (cont)	Yes	SF-Low	8	401208	16,833	67	6	107.2	1608.3	
				9	401209	11,681	62	6	65.0	1275.7	
				10	401210	12,005	58	3	122.7	1629.9	
			SF-High	8	401108	26,940	63	4	232.2	3077.2	
				9	401109	16,003	72	7	111.9	1135.5	
				10	401110	28,921	48	18	141.0	1230.8	
			MF	8	401308	117,859	179	23	224.0	3381.0	
				9	401309	62,890	79	18	188.8	2665.1	
				10	401310	34,437	44	11	143.3	2557.3	
				11	401311	25,029	65	6	152.5	2519.8	
				All others	All others	400004	25,628	75	7	135.6	2208.3
				All others	All others	400001	37,206	50	11	160.5	2652.9
	New	No	SF-Low	8	410208	25,796	58	11	122.0	1701.8	
				9	410209	14,937	37	9	83.4	1316.8	
				10	410210	30,717	79	6	187.4	2652.6	
			SF-High	8	410108	28,745	48	3	232.4	5862.6	
				9	410109	15,073	46	4	155.6	1979.2	
				10	410110	49,891	72	12	215.6	2863.7	
			MF	8	410308	15,085	31	4	133.6	2735.6	
			All others	All others	400001	37,206	50	11	160.5	2652.9	
			All	All	All	15	400002	15,710	71	6	92.2
					16	400003	10,331	69	9	47.1	786.9
	SDGE	Old	No	Low	9	300409	43,840	95	13	161.7	2190.9
					13	300413	344,515	705	51	221.1	3698.6
				Medium	9	300509	41,982	81	4	288.0	4662.7
13					300513	336,787	621	49	237.1	3867.8	
High				9	300609	17,535	66	5	108.9	2069.4	
				13	300613	147,090	257	21	237.3	4100.1	
All others			All others	300001	10,891	65	5	72.6	1234.3		
Yes			Medium	13	301513	17,091	73	7	89.6	1507.6	
			High	13	301613	27,669	84	4	187.4	2982.4	
			All others	All others	300002	13,923	52	5	98.3	1762.3	
		Low	13	310413	45,658	72	10	205.4	3087.3		
		Medium	13	310513	39,778	55	8	237.6	3338.8		
New		No	High	13	310613	18,415	57	3	197.3	2389.6	
			All others	All others	300003	23,632	52	7	139.7	2338.1	
			All others	All others	All others	All others	300003	23,632	52	7	139.7
	Total					9,912,862	18,970				

**Table 2-13
Master Metered Weights**

Utility	Home Type	SFCODE Prefix	Population	Completes	Weight
PGE	2-4 units (du-tri-quadplex)	11	44,411	139	319.5
	Multi-family 5-20 units	12	18,507	10	1850.7
	Multi-family >20 units	13	39,171	16	2448.2
	Mobile home >4 units	14	101,305	217	466.8
SDGE	2-4 units (du-tri-quadplex)	31	8,630	24	359.6
	Multi-family 5+	32/33	11,270	3	3756.7
	Mobile home >4 units	34	41,500	93	446.2
SCE	2-4 units (du-tri-quadplex)	41	13,025	33	394.7
	Multi-family 5-20 units	42	14,139	7	2019.9
	Multi-family >20 units	43	16,080	10	1608.0
	Mobile home >4 units	44	110,710	211	524.7
LADWP	2-4 units (du-tri-quadplex)	51	3,782	2	1891.0
	MF and MH 5+	52/53/54	12,416	2	6208.0
TOTALS			434,946	767	

2.5 COMPARISON OF RESULTS ACROSS SAMPLING AND STUDY GROUPS

2.5.1 Non-Response Follow-Up Comparison

The non-response follow-up proved to be a successful way to capture a segment of the population underserved by the direct-mail campaign. Table 2-14 shows several key results for customers by dwelling type and survey method.

**Table 2-14
Comparison of Results by Surveying Method**

	Single Family		Multi-Family (2-4 Units)		Multi-Family (5+ Units)		Mobile Homes	
	Initial Mail	Non- Response	Initial Mail	Non- Response	Initial Mail	Non- Response	Initial Mail	Non- Response
Completed Surveys	12,599	1,225	2,979	409	2,866	512	526	37
Weighted to Population	2,363,823	3,693,704	524,317	1,155,001	513,069	1,463,655	95,691	103,602
Average Electric Consumption	7,248	7,160	4,429	4,201	3,689	3,969	6,271	6,531
Average Gas Consumption	547	538	341	338	215	216	491	478
Average Dwelling Size	1,837	1,755	1,156	1,061	925	914	1,258	1,083
Average Dwelling Age	14.5	18.9	24.0	24.8	28.4	34.6	19.4	27.9
Average Number of People	2.88	3.42	2.53	2.74	2.10	2.68	2.30	2.22
Average Number of Seniors	0.53	0.30	0.38	0.13	0.37	0.15	0.74	0.42
Average Income	73,389	68,714	54,246	47,346	45,388	41,702	30,971	28,807
Owners	91%	81%	50%	26%	26%	13%	87%	89%
Central Cooling	50%	47%	40%	33%	41%	31%	60%	38%
Gas Space Heating	85%	89%	77%	75%	46%	54%	57%	56%
All Exterior Walls Insulated	56%	61%	45%	48%	43%	44%	65%	59%
CFL Penetration	63%	50%	55%	42%	51%	37%	57%	51%
Primary Language English	92%	80%	85%	67%	87%	69%	95%	81%
Head of Household Hispanic	12%	26%	17%	36%	13%	33%	9%	20%
College Grad or Higher	53%	44%	47%	39%	50%	36%	23%	18%

In general, non-respondents had similar energy usage and major equipment holdings as direct-mail participants but differed significantly in that they were less likely to be property owners, less likely to be using energy-efficient lighting, more likely to be non-English speaking, more likely to be ethnically diverse, and less educated overall. It follows from this that the direct-mail campaign was most successful with individuals who were more aware of energy efficiency, were more motivated because of their ownership, more educated, and more capable of handling an English survey. The non-response follow-up was able to get to more Spanish-speaking customers. While the non-response follow-up adds significant cost to a project of this magnitude, the fact that customers differ in these ways indicates that it is a wise step to take to minimize non-response bias found in a single-method survey approach.

2.5.2 Master Metered Comparison

The master metered population has traditionally been difficult to survey. In order to attempt to capture master meter responses, this study used the two-phased approach in an effort to gather additional information about the master metered segment from property managers and thus minimize the amount of information that customers had to provide directly. While this allowed the study to target master metered homes, it still proved to be difficult to capture the market in a comprehensive way. Overall responses to the master metered survey were low and particularly low in multi-family facilities with over five units. While the market characteristics of master metered customers appear different from their corresponding housing group in the individually metered sample, it is difficult to draw strong conclusions from these results because of the relatively low number of responses. Table 2-15 provides a comparison of these two groups.

In general, it appears that the master metered mobile homes act fairly similarly to the individually metered mobile homes. Many of the direct mail based master meter results appear to have similar bias issues as were seen in the individually metered mail only study results (see previous section). This includes a higher number of senior citizens, higher education levels, and lower ethnicity variation.

2.5.3 Energy Usage Comparison

RASS results were also compared against the overall population for an energy usage bias. This involved using the original population sample frame and comparing the results received to the population usage on the basis of average energy use by strata. As is common with this type of study, the highest usage strata reported slightly lower than average use for respondents and the lowest energy group has slightly higher than average results. Table 2-16 shows the results by usage category and by utility.

**Table 2-15
Comparison of Individually and Master Metered Customer Results**

	Single Family	Multi-Family (2-4 Units)		Multi-Family (5+ Units)		Mobile Homes	
	Individual Metered	Individual Metered	Master Metered	Individual Metered	Master Metered	Individual Metered	Master Metered
Completed Surveys	13,824	3,388	200	3,378	46	563	521
Weighted to Population	6,057,528	1,679,318	73,475	1,976,724	107,955	199,293	253,514
Average Dwelling Size	1,787	1,090	1,817	917	617	1,167	992
Average Dwelling Age	17.2	24.6	10.8	33.0	4.0	23.8	18.6
Average Number of Seniors	0.39	0.21	0.54	0.21	0.56	0.57	0.72
Average Income	70,538	49,500	75,745	42,659	24,747	29,846	27,947
Owners	85%	33%	87%	16%	10%	88%	87%
Central Cooling	48%	35%	21%	34%	8%	49%	47%
Gas Space Heating	87%	76%	78%	52%	69%	56%	79%
All Exterior Walls Insulated	59%	47%	31%	44%	10%	62%	50%
Clothes Washer	96%	54%	87%	27%	23%	86%	68%
Primary Language English	85%	73%	87%	74%	81%	88%	96%
Head of Household Hispanic	21%	30%	15%	28%	7%	15%	11%
College Grad or Higher	47%	42%	58%	39%	42%	20%	21%

**Table 2-16
Comparison of Energy Use For Respondents and the Target Population**

Usage by Household		Dwelling Type and Usage Strata Definition							Utility Totals
Utility		6 High	5 Med	4 Low	1 SF-High	2 SF-Low	3 MF	all	
PG&E	Population Count				1,684,655	1,165,896	1,112,205	84,938	4,047,694
	Respondent kWh/Year				9,640	3,629	3,995	7,188	6,306
	Population kWh/Year				9,815	3,536	3,926	6,878	6,327
	Average Error				-1.8%	2.6%	1.7%	4.5%	-0.3%
SCE	Population Count				1,455,364	1,260,415	1,050,641	88,824	3,855,244
	Respondent kWh/Year				9,112	3,730	4,146	7,497	5,962
	Population kWh/Year				9,427	3,611	4,063	8,120	6,034
	Average Error				-3.3%	3.3%	2.0%	-7.7%	-1.2%
SDG&E	Population Count	210,709	435,638	434,013				48,446	1,128,806
	Respondent kWh/Year	12,106	5,277	2,343				4,831	5,404
	Population kWh/Year	11,267	5,158	2,297				6,125	5,240
	Average Error	7.4%	2.3%	2.0%				-21.1%	3.1%
LADWP	Population Count	82,482	255,486	513,253				27,780	879,001
	Respondent kWh/Year	10,432	4,869	2,257				5,046	3,872
	Population kWh/Year	11,865	4,991	2,227				5,588	4,041
	Average Error	-12.1%	-2.4%	1.4%				-9.7%	-4.2%
Strata Totals	Population Count	293,191	691,124	947,266	3,140,019	2,426,311	2,162,846	249,988	9,910,745
	Respondent kWh/Year	11,635	5,126	2,297	9,395	3,681	4,068	6,603	5,853
	Population kWh/Year	11,435	5,096	2,259	9,635	3,575	3,993	7,030	5,886
	Average Error	1.7%	0.6%	1.7%	-2.5%	3.0%	1.9%	-6.1%	-0.6%

The "All" strata column includes customers who were grouped together into composite strata because there were not enough of them with similar characteristics to create individual strata. Because they are a composite of multiple types of homes, their usage varies much more widely than the defined strata groups. However, these "All" customers represent a relatively small segment of the overall study population.

The largest differences in usage (indicated by the error percent which is the difference between the respondent usage and the population usage divided by the population usage) occur in SDG&E and LADWP's service territory. After comparing LADWP results with previous results for their territory, it appears that the single family market is underrepresented. Since single family customers use more energy than multi-family customers, it appears that this compounds the fact that the high use area was underrepresented. Section 2.5.6 below further discusses the LADWP shortfall.

SDG&E's results are in part affected by the fact that with their relatively small sample population they had a higher relative number of customers grouped into "All" strata. Some of this was caused by a misclassification of the climate zone in the SDG&E service territory (discussed further in Section 2.5.5).

Across the board, PG&E's results were underestimated by 0.3 percent of the population's energy use and SCE's results were under estimated by 1.2 percent. These two utilities together display the phenomena of under-representing the highest users and over-estimating in the lowest use strata.

2.5.4 Census Data Comparison

The weighting procedures for the individually and master metered samples are only appropriate if there is no basis for identifying differential response rates within sampling cells associated with customer characteristics that may relate to parameters of interest. Furthermore, our experience is that not all groups respond to surveys such as the RASS at the same rate. Of particular relevance to a RASS study is the tendency of response rates to vary among income levels and the elderly to respond at higher rates. Because neither households of various income levels nor elderly households can be identified reliably from utility billing information, they cannot be associated with specific sampling cells. Consequently, differential response rates from these groups may distort or bias the results for each cell. Adjustment for this type of differential response is accomplished by post-stratification weighting.

To determine whether post-stratification weighting was necessary, we compared the distribution of responses gathered from the RASS project with US Census Bureau

data from 2000. Overall, the comparison of the RASS demographic information to the 2000 Census data is reasonable, and the sampling plan yielded a set of customer respondents that reasonably mirror the population at large. The most notable area where the study appears to fall short is in the single-occupant rental market. The shortfalls occur predominantly in the young-adult age groups. Because the results aligned well with census data for other comparison segments, the study group decided to keep the initial sample weights and not post-stratify the results.

A few of the Census-to-RASS comparison values (most notably ethnicity and language) were asked in a different format from the Census so comparisons are not directly relevant. Despite language results that differ in form enough that a comparison is not meaningful, the fact that the RASS' Hispanic ethnicity numbers come out very close to the Census helps to confirm that we were able to capture results from that population segment. As noted above, this is in large part because of the non-response follow-up efforts. A series of comparison tables is included below as Figure 2-3.

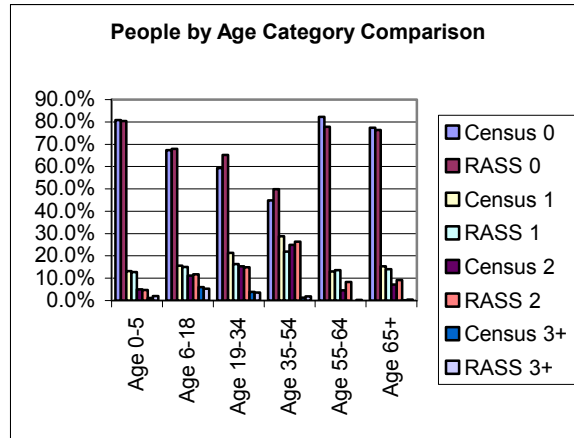
2.5.5 Reassignment of Energy Commission Climate Zones

During the process of reviewing the final results, KEMA-XENERGY discovered that the original climate zone assignment file had some errors in it. The assignment file is a link that ties customer zip code to the appropriate Energy Commission forecast climate zone. While most of the problematic zip codes were in the PG&E service territory where zones 4 and 5 had a section of zip codes that had to be switched, there were other smaller areas that needed refinement. In addition, there were several zip codes in the SDG&E area that had been changed or added and had been erroneously assigned to climate zone 9. Since all SDG&E customers should fall in climate zone 13, these were reassigned.

All reassignments occurred prior to the final reporting of results and all results and tables reporting values by climate zone use the corrected climate zones. However, due to the nature of sampling and the need to maintain the existing sample frame when assigning weights, the customers remain in their initial strata.

**Figure 2-3
Comparison of RASS Results to 2000 Census Results**





2.5.6 Calibration Issue with LADWP Totals

It appears from reviews of the LADWP results that the population provided by LADWP at the outset of the study may have excluded a number of higher consumption, single family customers. This is indicated by the fact that the overall energy use and population counts for the residential population appears lower than numbers the Energy Commission gathered from LADWP FERC filings.⁵ In addition, this is further affirmed by the fact that the number of single family homes in the LADWP service territory as reported in the study appears to be significantly lower than results obtained on other studies. Previous Energy Commission information points to single family rates in the 40-50% range. The RASS results for climate zone 11 show 27% and climate zone 12 show 17%. Both of these zones are served by LADWP.

Because the missing customers represent a small overall number, the study group has decided that it is important to caveat the results, but that there is not a significant impact on the overall statewide results.

2.5.7 Calibration of SoCalGas' Results

Because of the fact that the study was electrically focused and served the IOUs plus LADWP, a portion of SoCalGas' customers who are served by other electric providers (i.e. The City of Anaheim) were not included in the sample. In addition, the fact that a section of LADWP customers were missing and likely to be single family dwellings with higher than average use left the SoCalGas population underrepresented. As discussed in Volume 2 - Section 2.1 (Calibration Results), SoCalGas' calibration factor was 1.121. This indicates that the sample underrepresented their population by approximately 12%. When we compared the new and old responses, this difference came to light in that the ratio of new single

family homes in the sample was high enough to skew the SoCalGas new/old results such that overall new homes used slightly more energy than older homes. See Section 1.6 in the Executive Summary for a detailed discussion of the new/old home issue. SoCalGas went back and recalibrated the values using their own weighting values and came up with a revised set of weighted average annual therm values that more closely represents their actual new/old population splits. Table 2-17 displays both the RASS and SoCalGas revised totals. While the RASS values provide a good proxy of the overall use, cutting the data into smaller groups such as the new/old split can create big enough differences small segments of the population (new homes in this case) which can skew the overall totals. Please take note of this fact when reviewing SoCalGas results.

**Table 2-17
Revised Weighting of SoCalGas Customers for New/Old Dwellings**

Dwelling Type	Vintage	SCG Re-Weighted Average Annual Therms	SCG Re-Weighted Customer Count	CA RASS Sample Count	CA RASS Weighted Average Annual Therms	CA RASS Weighted Customer Count
All Homes	All	451.5	4,981,668	7686	441.1	3,743,921
	Pre 1997	452.9	4,678,961	7211	440.6	3,535,623
	Post 1996	430.2	302,707	475	450.4	208,297
Single Family	All	535.6	3,346,603	5352	521.8	2,475,867
	Pre 1997	540.0	3,111,348	4981	524.8	2,306,366
	Post 1996	478.1	235,255	371	480.2	169,500
Multiple Family	All	275.8	1,635,065	2334	275.9	1,268,054
	Pre 1997	276.8	1,567,613	2230	274.8	1,229,257
	Post 1996	251.2	67,451	104	310.3	38,797

2.6 PRECISION OF RASS ESTIMATES

This section discusses the sampling variability associated with the individually and master metered samples. We provide 90 percent confidence intervals for various percentage estimates based on the RASS sample.

2.6.1 Individually Metered Sample Precision

Table 2-18 presents the precision of estimates from the individually metered RASS sample for the individual utility service territories and for the population. The last

three columns in the table provide the percentage points to be added to and subtracted from an estimate of 50 or 50, 20 or 80, and 10 or 90 percent, respectively, to obtain the 90 percent confidence bounds. At worst, which corresponds to an estimate of 50 percent, the overall population estimate generated from the RASS individually metered sample has a precision of +/-1.2 percentage points at 90 percent confidence.

**Table 2-18
Precision of Estimates for the Individually Metered Sample**

Utility	Population	Total Completes	90% Confidence Bounds (+/-) For Estimated Responses		
			50/50%	20/80%	10/90%
PG&E	4,047,694	9,265	1.9%	1.5%	1.1%
SCE	3,857,361	7,979	2.0%	1.6%	1.2%
SDG&E	1,128,806	2,527	3.7%	2.9%	2.2%
LADWP	879,001	1,382	4.5%	3.6%	2.7%
Total	9,912,862	21,153	1.2%	1.0%	0.7%

By way of example, 50% of all PG&E's customers answered that all of their walls have exterior wall insulation. The actual value for this response includes the +/- 1.9% shown on the table or between 48.1 and 51.9%. Ten percent of SCE customers report that they have remodeled their home in the past 12 months. Using the 10 or 90% estimate column for SCE, the actual value falls in the range of 8.8 to 11.2%.

It should be noted that these confidence intervals assume a design effect equal to one. (The design effect impacts confidence intervals due to its impact on the effective sample size, since the effective sample size is equal to the sample size divided by the design effect.) That is, we have effectively assumed that the variance within the follow-up sample clusters is the same as the variance across the state.

2.6.2 Master Metered Sample Precision

Table 2-19 presents the precision of estimates from the master metered RASS sample for the individual utility service territories and for the population. The last three columns in the table provide the percentage points to be added to and subtracted from an estimate of 50 or 50, 20 or 80, and 10 or 90 percent, respectively, to obtain the 90 percent confidence bounds. At worst, which corresponds to an estimate of 50 percent, the overall population estimate generated

from the RASS individually metered sample has a precision of +/- 4.6 percentage points at 90 percent confidence.

**Table 2-19
Precision of Estimates for the Master Metered Sample**

Utility	Population	Total Completes	90% Confidence Bounds (+/-) For Estimated Responses		
			50/50%	20/80%	10/90%
PG&E	203,394	382	5.7%	4.6%	3.4%
SCE	153,954	261	6.0%	4.8%	3.6%
SDG&E	61,400	120	12.4%	9.9%	7.4%
LADWP*	16,198	4	-	-	-
Total	434,946	767	4.6%	3.6%	2.7%

* We did not calculate confidence bounds individually for LADWP since the number of completes was so low.

3: DATABASE PREPARATION

3.1 Introduction

This section provides a description of the databases that will be generated as part of the Residential Appliance Saturation Survey (RASS) performed for the California Energy Commission.

The RASS Survey was a scannable survey form. The form asked participants to fill in their best answer to each question. Since the vast majority of the surveys were mailed to participants, the responses were for the most part self-reported. The non-response follow-up effort did include some surveys that were completed by trained interviewers. Participants did have access to a toll-free survey help-line if they needed assistance in completing their form.

Following is a discussion of the construction of the databases that were used in the project and how these databases were populated, checked for data quality, and how missing values were filled for the purpose of estimating the CDA model. This section provides a brief description of the contents of the three databases and a schematic of the database preparation process. Section 4 discusses the cleaning tools used to create the databases. There are three core databases created from the RASS effort, the raw survey results, the cleaned survey and CDA results, and the billing data. In addition, each sponsoring utility received a copy of their own sample frame information so that they can link RASS responses with their specific customers.

3.2 Database Formats

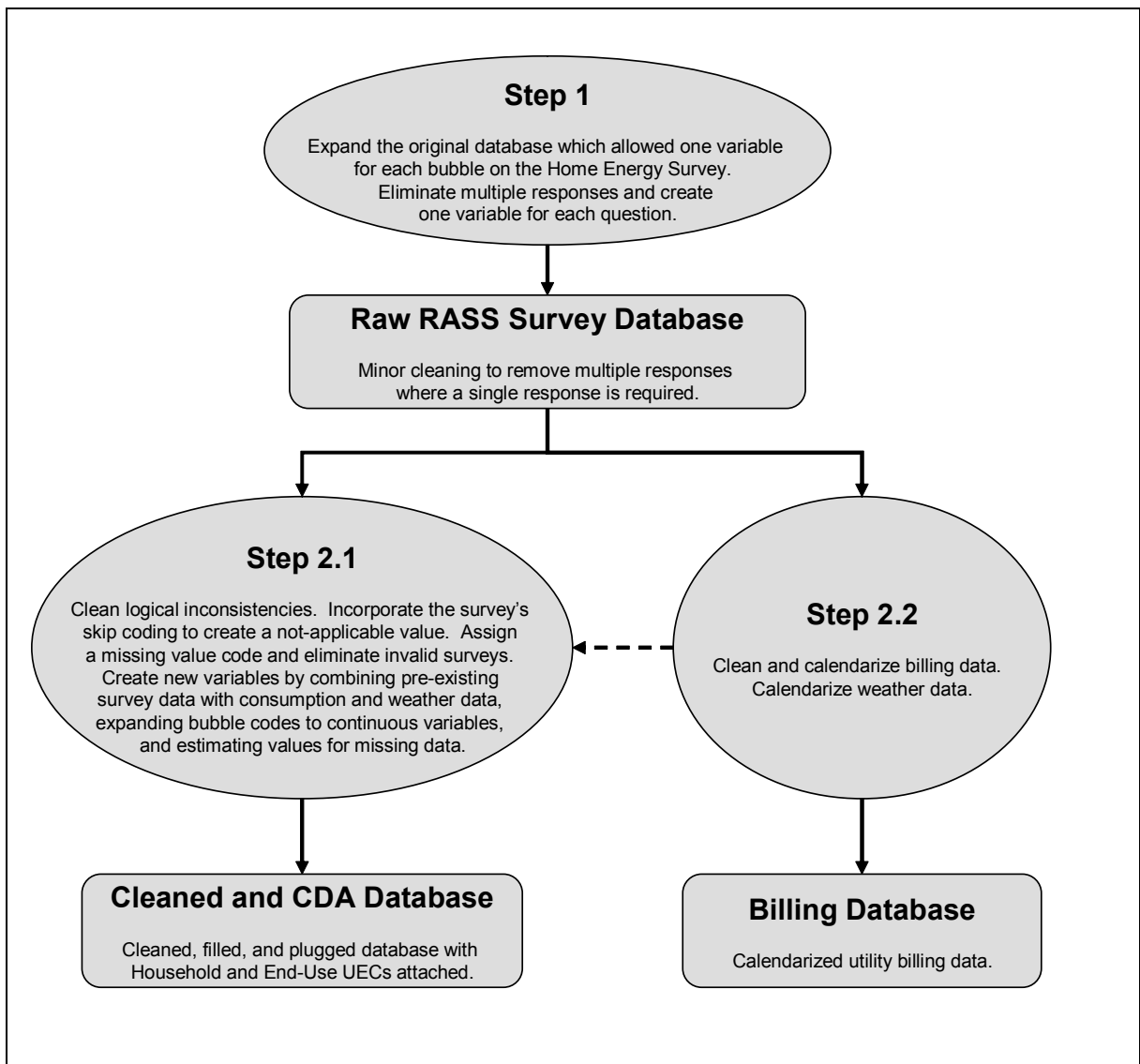
The tool that was used for analysis in this project is created from The SAS System (SAS). To facilitate the use of SAS, the data was stored in SAS datasets and SAS was used to perform all the tasks described in this document. The SAS System allows for large, fanned out databases that are easily manipulated and SAS supports the analytical processes needed in the Conditional Demand Analysis.

All final databases were provided in a series of output formats – SAS datasets for both PC and mainframe SAS, and a flat comma delimited file that can be imported into other database platforms. The study team has also developed a web interface to provide access to the data in a user friendly manner. The web interface allows users to subset saturation results and view them by a variety of crossed variables.

3.3 Overview of Database Preparation

An overview of the database preparation process is presented in Figure 3-1. As presented in Figure 1, three databases were generated to hold the data in various stages of the process. The three databases contain the raw survey data, a cleaned version of the survey data along with the CDA results, and the billing data. All final datasets were provided in confidential format where all identifying information about the customers' address, name, and utility identification numbers were removed.

Figure 3-1
Schematic of the Database Preparation Process



- **Database 1: Raw RASS Survey Database.** This database contains the RASS questionnaire responses. Minimal cleaning was undertaken to eliminate multiple responses such that there is a single answer for all questions that do not allow multiples and multiple responses as appropriate throughout the survey.
- **Database 2: Cleaned Survey and CDA Database.** The cleaned RASS survey results and CDA database is a result of implementing a number of data cleaning and quality control techniques on the raw survey results. These steps are outlined in detail in Section 4. The database contains both the cleaned survey input and household and end-use UECs calculated from the CDA and UEC models. The cleaning techniques used to create the database included quality control procedures to check for and correct logical inconsistencies, the definition of missing and not applicable values, the elimination of invalid surveys, and the plugging of fuel types. In some cases, where the database indicates that the respondent did not reply to a question, a response may be estimated from other customer information provided in the survey. This database also contains the normalized monthly heating and cooling degree days and household and end-use UEC for each respondent.
- **Database 3: Billing Database.** This database contains the billing data that was used in the CDA modeling process. To create this database, the team used the billing data provided by the utility companies. These data were cleaned for missing and inconsistent values and were calendarized and normalized to a 30.4 day month.

3.4 Database 1: Raw RASS Survey Database

The original RASS results were scanned electronically into fixed format text files. The data in these files represents the respondents' answers to the RASS Survey.

The first step of the database preparation process, Step 1 in Figure 1, used SAS to read in the original data and create variables for each bubble on the RASS Survey. For example, a variable from the raw data file, which has 10 possible answers, will be expanded to create 10 new fields in the SAS dataset. Expanding the fields in this manner allowed for a rigorous analysis of multiple answers provided by survey respondents.

For those questions where the respondent answered the question with only one response, a single variable was created to hold the answer. For questions where respondents answered multiple values, the project team determined an algorithm to collapse the multiple response fields down into a single field. For most variables, the

team chose either the largest or the smallest response the respondent provided. For example, if the respondent provided multiple answers for the year their home was built, the team chose to accept the oldest possible housing age. Several questions that eventually end up with a single response such as primary heating or water heating fuel were kept with an individual variables for each survey option so that the cleaning process could more comprehensively evaluate other survey responses before making a decision on the appropriate single response for the question.

3.5 Database 2.1: Cleaned and CDA Database

A multi-step cleaning process was used to create the Cleaned and CDA Database. The cleaning process began with a process to count missing values and checking for and cleaning logical inconsistencies. Surveys were eliminated if they were invalid due to too many multiple responses, incomplete surveys, or too many logical inconsistencies. Section 4 outlines cleaning code details.

Prior to estimating the CDA models, algorithms were designed to fill and plug missing variables. A careful review was undertaken to validate and check fuel and system types. Once the values were used in the CDA model, the household and end-use UECs and the normalized monthly heating and cooling degree days for each site were appended to the cleaned survey data. Pre and Post-cleaned annualized electricity and therm consumption variables were also added to these data. Section 4 includes an in-depth description of the CDA data filling and consumption cleaning processes. Section 5 provides a detailed description of the CDA modeling process.

3.5.1 Non Response Indicator

After the initial data were cleaned of multiple responses, the team differentiated between non-responses due to the survey's skip coding and simple respondent non-response. During the cleaning process, skip coding non-response was assigned a value of 99, which meant not applicable. Simple respondent non-response was assigned a value of 97. Surveys that contained an excessive amount of non-responses were eliminated as invalid.

3.5.2 Logical Response Inconsistencies

Throughout the survey, respondents were asked several questions where their response should have naturally influenced their response to later questions. When the respondent's answers to these types of questions was not consistent, the team

either filled the answer with the most appropriate response, or if no response was obvious, the respondent was given a missing value code (97) and a logical inconsistency flag. The flag's value was increased by one each time the respondent answered in a manner that was logically inconsistent. A large percentage of the sample (slightly over 60%) never responded in a logically inconsistent fashion, and many of the observed inconsistencies were so minor that they were handled in the cleaning process. Only 1.7% of the sample responded in a manner that was logically inconsistent more than five times during the survey.

3.5.3 Filling Missing Values

For a variety of reasons, the Cleaned RASS Survey contains a number of missing values. Simply allowing these missing values to disqualify an observation from the regression dataset would create non-response bias in the estimation of model parameters. A multi-step approach was used to fill missing values. This approach is discussed in detail in Section 4.3, the CDA Data Filling Process.

3.5.4 Refining Fuel and System Types

It is fairly well known that survey respondents often misreport fuels and system types. This kind of misreporting creates significant challenges when using results to predict overall enduses consumption levels using the CDA approach. As a result, a considerable amount of care was taken to validate (and, where justified, to override) reported systems and fuels. The team's approach to fuel checking and plugging is discussed in detail in the Data Cleaning and Processing Section.

3.5.5 Normalized Weather and Estimated UECs

The Cleaned and CDA Database contains estimates of each site's normalized electric and gas whole household UEC and UECs for all end-uses. The creation of these estimates required the creation of calendarized energy consumption and weather data. Energy consumption was used as the dependent variable and weather was used as one of the independent variables in the UEC models. The normalized weather, used to create the UECs was also appended to the Cleaned and CDA Database.

3.6 Database 2.2: Billing Database

The Billing Database holds the monthly energy consumption for each survey site. The consumption data includes information on the monthly electricity and natural gas usage, the year and month, the presence of a gas master meter, and two indicators for the utilities serving each customer. During the creation of the Billing Database, the information on energy consumption and the meter reading date was used to calendarize the site's energy consumption for the month standardized to a fixed number of days per month.

3.7 Data Delivery

Data was delivered to each study sponsor on CD. The CD contained the files noted below.

Survey Data:

SURVDATA.csv (unformatted)

SURVDATE.csv (formatted)

SURVDATA.xpt

SURVDATA.sas7bdat

SURVCONT.xls (contents)

FORMATS.txt (format statements)

ApplyFormats.txt (applies formats to specific variables)

Billing Data:

BILLDATA.csv

BILLDATA.xpt

BILLDATA.sas7bdat

BILLCONT.xls (contents)

Raw Survey Data:

sampledata_all.zip (individually metered)

sampledata_mm.zip (master metered)

Electronic Version of Survey:

Statewise-RASS-var-final.doc

SAS Files: See description of files included in Appendix L

For all of the datasets, we have created a comma-delimited version, a SAS export file for mainframe users, and a PC SAS dataset. In addition, we have included an Excel copy of the contents of the database which should allow users to sort the data as you need and access labels in a central location. We have provided an electronic version of the survey as well.

*As a reminder, each sponsoring utility received a dataset with their customer specific information tied to the generic SFCODE, which serves as the primary key for the RASS databases. The SFCODE is a generic value that provides embedded information about the utility and strata from which the customer was drawn. All study participants receive the full statewide survey data set, which includes not only the cleaned survey responses, but also UEC results for each of the individually metered customers. The cleaned survey data is provided in both formatted and unformatted form. There is a copy of the format statements on the CD as well so that users can use the raw data and apply formats dynamically.

The CD also included a copy of the billing data (again, generically labeled) that was used for the conditional demand analysis. It also included a raw survey file that includes results for each possible response on the survey.

4: DATA CLEANING AND PROCESSING

4.1 RASS Survey Data Cleaning

The section outlines the criteria used to eliminate surveys that were determined to have excessive amounts of invalid data, the cleaning done on RASS Survey variables, and the creation of new variables from the cleaning process and the combination of survey variables.

4.1.1 Overview

When the surveys were scanned, each bubble response was initially read as if it were its own variable. In the SAS program *min_max.sas*, if multiple bubbles were filled for the same question (where the question did not allow multiple responses), the project team developed a hierarchical procedure to decide which response to select. For most questions, either the highest or the lowest response was selected as appropriate. The resulting dataset (*survdata_short*) contains one variable per question (except for questions where multiple responses were allowed).

A SAS program called *TooManyResponses.SAS* was run on the initial SAS data set, *SampleData_All1* to identify problematic responses and correct them. The program counted the number of multiple responses (where the question did not allow multiple responses) to assess possible problems with the survey data provided by each customer.

The systematic approach to data validation and cleaning performed in this program concentrated on the following issues:

- Multiple question response
- No response indicated
- Logical response inconsistencies
- Missing values
- Fuel misreporting

Multiple Question Responses

Most questions in the RASS Survey were designed to have one response. However, many respondents provided multiple answers for at least one question on the

survey. For each question, an algorithm to collapse the multiple response fields into a single field was developed. The algorithm provides a systematic method for handling multiple responses in a consistent and logical manner. The field retained from this cleaning process was given the original field name from the RASS Survey. For most variables, the team chose either the largest or the smallest response the respondent provided. For example, if the respondent provided multiple answers for the year their home was built, the team chose to accept the oldest possible housing age. Several questions that eventually end up with a single response such as primary heating or water heating fuel were kept with an individual variable for each survey option so that the cleaning process could more comprehensively evaluate other survey responses before making a decision on the appropriate single response for the question. Details of those subsequent steps are provided in this section.

Non-Response Indicator

After the initial data were cleaned of multiple responses, non-responses due to the survey's skip coding and simple respondent non-response were identified. The raw text non-response data coding for the RASS Survey did not distinguish skip coding non-response from simple respondent non-response. These two types of non-response, however, are not equivalent. During the cleaning process, skip coding non-response was assigned a value of 99, meaning not applicable. Simple respondent non-response was given a value of 97.

Logical Response Inconsistencies

Survey respondents were asked several questions where their response should have naturally influenced their response to later questions. When the answers to these questions were inconsistent, an attempt was made to fill the answer with the most appropriate response or, if no response was obvious, the response was given a missing value code of 97.

To assess this potential problem further, a flag for logical inconsistencies was created. The flag's value was increased by one each time the respondent answered in a logically inconsistent manner. For example, the survey questioned the respondent about the number of computers in the residence, the number of hours the household computers are used, and the types of activities undertaken on the computers. If a respondent stated that they had no computers or failed to answer this question, but proceeded to list hours of usage and tasks undertaken, their first response to the number of household computers would be counted as logically inconsistent. The logical inconsistency flag would be augmented by one. The total number of logical inconsistencies was checked to determine surveys that were

answered poorly. The logical inconsistency flags indicate that most respondents answered the survey's questions in a logically consistent manner.

Missing Values

As discussed above, the Cleaned RASS Survey contained a number of missing values. Simply allowing these missing values to disqualify an observation from the regression dataset would create non-response bias in the estimation of model parameters. Replacing these missing values with overall means for the variables in question would also lead to biased estimates insofar as question-specific non-respondents tend to be different from respondents. To minimize non response bias, the team created a new "filled" variable for the purposes of the conditional demand analysis. The process for filling missing values used a multi-step approach that relied on correlations between the question with the missing response and other questions that contained valid responses. The team used this approach to fill missing values for household income, square footage of the home, number of residents, and the age of the home. These variables are in addition to the cleaned survey data and are developed primarily for use in the conditional demand analysis.

In addition to the four primary plugged variables, there were surveys with missing values for residence type (no response or "other") and surveys whose chosen residence type did not match the utility's residence type designation. To fill these missing values and check the discrepancies between survey response and utility records, a multi-step procedure was developed. The algorithm relied on a series of logistical checks with other pertinent information supplied from the respondent. Details on the CDA filling process are included as Section 4.3.

Refining Fuel and System Types

It is common for survey respondents to misreport fuels and system types. This kind of misreporting can be troublesome for the process of disentangling end-use consumption levels through the conditional demand approach. As a result, considerable care was taken to validate (and, where justified, to override) reported systems and fuels. The Data Cleaning section of this report discusses the algorithm used to fill for missing and incorrectly specified fuel type and the number of observations effected by this issue.

4.1.2 Invalid Surveys

The cleaning process eliminated unwanted multiple responses, coded missing responses, and checked for logical inconsistencies. Individual surveys needing extensive cleaning could represent respondents whose limited understanding of their system types or the survey format invalidated their survey responses. This section details the criteria developed to eliminate survey observations containing data deemed too unreliable for use in the survey saturation tables or the CDA analysis. In particular, surveys were eliminated if they contained an excessive number of multiple responses, were incomplete, or contained too many logically inconsistent responses.

In all cases, the team did initial physical checks to customers' physical surveys to insure that problems identified using a systematic computer based screen were correctly representing the issue identified. This included checking for surveys answered in pen (the scanner requires pencil and most pen surveys are caught upfront before they are scanned) and insuring that invalid surveys were in fact highly problematic. The extra systematic check with manual backup identified a small number of surveys that had made it into the database in pen. Surveys that were "fixable" were manually adjusted as necessary. This includes coloring over pen marks with pencil to insure readability on the scanner.

Multiple Responses. Respondents who provided more than 15 multiple responses were deleted from the second (cleaned survey) database.

Incomplete Surveys. To help determine if a survey was incomplete, 20 variables were chosen that all respondents should have answered. The 20 variables included household type, age of residence, system types, education, and income. None of the 20 variables was included in a skip coding sequence. The 20 variables were chosen to represent all areas of the survey (beginning, middle, and end). Households not responding to at least 10 of the key survey questions were eliminated from the database.

Four survey pages were also examined to determine incomplete surveys, pages 1 (Home and Lifestyle), 2 (Home and Lifestyle), 8 (Laundry, Food Preparation), and 9 (Refrigerators). Surveys with no responses at all on page 1 and 2 or page 8 and 9 were eliminated because these represent areas of the survey that most everyone should have answered and which make estimation nearly impossible for other missing data. As a third check for incomplete surveys, surveys with no responses on page 8 or 9, that were also missing at least 5 of the 20 variables chosen above, were also eliminated from the database.

Logical Inconsistencies. Logical inconsistencies in a respondent's answers also indicated a lack of understanding of either their system types or the survey format.

Flags for logical inconsistencies were created during the data cleaning process. Respondents with more than 10 logically inconsistent responses were eliminated from the second database, however, no surveys were found to have 10 or more logical inconsistencies

Table 4-1 summarizes the total number of invalid surveys identified in the cleaning process. This is in addition to 315 that were returned with all customer information removed making it impossible to process them for inclusion in the study results. The number of surveys eliminated due to incomplete surveys is not surprising given the length of the survey. The survey's length required a reasonable time commitment from respondents, increasing the probability that some respondents would not have the time to fully complete the survey.

**Table 4-1
Summary of Invalid Surveys**

Reasons for Eliminating Survey	Number Eliminated
Too many multiple responses	13
Incomplete survey	146
Too many logical inconsistencies	0

4.1.3 Survey Specific Cleaning

The remainder of this section describes the data cleaning efforts for the individual survey responses. Included is a discussion on how invalid surveys were identified and a description of the data cleaning for individual questions organized by the following survey sections:

- Your Home and Lifestyle
- Space Heating
- Space Cooling
- Water Heating
- Laundry
- Food Preparation
- Refrigerators
- Freezers
- Spas and Hot Tubs
- Pools
- Entertainment and Technology
- Lighting
- Miscellaneous Appliances
- Household Information

Numerous sections include additional filling in of missing data for the CDA which is detailed as a second cleaning step in Section 4.3.

4.1.4 Your Home and Lifestyle

The Your Home and Lifestyle section of the survey contained 20 questions. Table 4-2 summarizes the percent of missing responses for nine of the major questions in this section. The section continues with details on the method for cleaning and filling these nine questions.

**Table 4-2
Missing Home and Lifestyle Responses**

Question	Missing Pre Cleaning	Missing Post Cleaning
A1. Type of Building (<i>DWLTYPE</i>)	11.3%	11.1%
A2. Own or rent home (<i>OWNRENT</i>)	1.8%	1.6%
A3. How long at address (<i>YRS_RES</i>)	1.8%	2.1%
A4. Seasonal Occupancy (<i>SEASOCC</i>)	2.2%	0.0%
A6. Year home built (<i>BUILTYR</i>)	7.7%	8.8%
A7. Number of bedrooms (<i>NUMROOM</i>)	1.1%	5.5%
A8. How many square feet of living space (<i>SQFT</i>)	10.0%	11.0%
A18. Is natural gas available (<i>NGSERV</i>)	6.1%	1.6%
A19. Natural gas hookup in home (<i>NGLINE</i>)	13.3%	1.1%

A1 – Type of Building (*DWLTYPE*)

The following describes the *DWLTYPE* variable and the process to develop a residence type variable to be used in the CDA model (*RESIDENCE* – note this variable was concatenated to *RES* in the final database files). Note that in this case, the original survey response to type of building (*DWLTYPE*) was unchanged from the original responses.⁶ Instead, a new variable *RESIDENCE* was constructed. The process used the individual's survey response, the utility's residence type description (fourth digit of *SFCODE* for individual metered customers and the second digit of *SFCODE* of master meter customers), the residence street address, the survey

response for payment of heating, cooling, water heating, and laundry systems, and the survey response for the dwelling's square footage.

For the following discussion, *DWLTYPE* is the individual's response to the survey question, *RESTYPE* is the fourth digit of *SFCODE* provided by the utilities, and *RESIDENCE* is the new variable created in the following process. If there was no problem with the individual's original *DWLTYPE* response, the value for *RESIDENCE* is their original *DWLTYPE* value.

On the survey, *DWLTYPE* has the following coding:

- 1 is a single family detached house,
- 2 is a townhouse,
- 3 is a 2-4 unit apartment or condominium,
- 4 is a 5+ unit apartment or condominium,
- 5 is a mobile home, and
- 6 is other.

DWLTYPE was coded 97 if the survey respondent did not answer the question.

The utility codes for *RESTYPE* for individual metered customers are as follows:

- 1 or 2 are single family residences,
- 3 is a multifamily residence,
- 4 is a low usage residence,
- 5 is a medium usage residence,
- 6 is a high usage residence, and
- 0 is unknown.

The following are the rules for developing the *RESIDENCE* variable for individual metered customers.

- If *DWLTYPE* is equal to 2, 3, or 4 and the utility's *RESTYPE* code is equal to 1, 2, 4, 5, 6, leave *RESIDENCE* at the individual's response for *DWLTYPE*. In this situation the survey response overrides the utility's *RESTYPE* code (codes 1 and 2 are single family; 4, 5, and 6 are usage codes).
- If *DWLTYPE* is equal to 1 and the utility's *RESTYPE* is equal to 3 (utility code for multifamily), proceed through the following checks:

Review the service address. If address ends in a number 1-4 or the letter A, B, C, or D, set *RESIDENCE* to 3.

Review the service address. If the address ends in a number larger than 4 or a letter later than D, set *RESIDENCE* to 4.

Review the service address. If the service address does not end in a letter or a number, check if the property owner pays for a major system and if the survey response to square footage is less than 1,500.2 If both checks are satisfied, then set *RESIDENCE* to 2.

If none of the above conditions is met, set *RESIDENCE* to 1.

- If *DWLTYPE* is equal to 6 and the utility's *RESTYPE* is equal to 3, proceed through the following checks:

Review the service address. If the address ends in a number 1-4 or a letter A-D, set *RESIDENCE* to 3.

Review the service address. If the address ends in a number larger than 4 or a letter later than D, set *RESIDENCE* to 4.

If the address does not end in a number or a letter, set *RESIDENCE* to 2.

- If *DWLTYPE* is equal to 6 and *RESTYPE* is equal to zero (the utility does not know the *RESTYPE*), proceed through the following checks:

Review the service address. If the address ends in a number 1-4 or a letter A-D, set *RESIDENCE* to 3.

Review the service address. If the address ends in a number larger than 4 or a letter later than D, set *RESIDENCE* to 4.

If the address does not end in a number or a letter and the survey response to square footage is greater than or equal to 1,500, set *RESIDENCE* to 1.

If the address does not end in a number or a letter and the survey response to square footage is less than 1,500, set *RESIDENCE* to 2.

- If *DWLTYPE* is equal to 6 and *RESTYPE* is equal to 4, 5, or 6 (utility codes are based on usage, not a residence type indicator), proceed through the following checks.

Review the service address. If the address ends in a number 1-4 or a letter A-D set *RESIDENCE* to 3.

Review the service address. If the address ends in a number larger than 4 or a letter later than D set *RESIDENCE* to 4.

If the address does not end in a number or a letter, set *RESIDENCE* to 1.

- If *DWLTYPE* is equal to 6 and *RESTYPE* is equal to 1 or 2 (utility codes for single family), proceed through the following checks.

Review the service address. If the address ends in a number 1-4 or a letter A-D, set *RESIDENCE* to 3.

Review the service address. If the address ends in a number larger than 4 or a letter later than D, set *RESIDENCE* to 4.

If the address does not end in a number or a letter, set *RESIDENCE* to 1.

- If *DWLTYPE* is equal to 97 and *RESTYPE* is equal to 1 or 2 (utility codes for single family), proceed through the following checks.

Review the service address. If the address ends in a number 1-4 or a letter A-D, set *RESIDENCE* to 3.

Review the service address. If the address ends in a number larger than 4 or a letter later than D, set *RESIDENCE* to 4.

If the address does not end in a number or a letter, set *RESIDENCE* to 1.

- If *DWLTYPE* is equal to 97 and *RESTYPE* is equal to 3 (utility code for multifamily), proceed through the following checks:

Review the service address. If the address ends in a number 1-4 or a letter A-D, set *RESIDENCE* to 3.

Review the service address. If the address ends in a number larger than 4 or a letter later than D, set *RESIDENCE* to 4.

If the address does not end in a number or a letter, set *RESIDENCE* to 2.

- If *DWLTYPE* is equal to 97 and *RESTYPE* is equal to zero (utility code for unknown), proceed through the following checks:

Review the service address. If the address ends in a number 1-4 or a letter A-D, set *RESIDENCE* to 3.

Review the service address. If the address ends in a number larger than 4 or a letter later than D, set *RESIDENCE* to 4.

If the address does not end in a number or a letter and the property owner does not pay for any major system, set *RESIDENCE* to 1.

If the address does not end in a number or a letter, the survey response to square footage is less than 1,500, and the property owner pays for at least one of the major systems, set *RESIDENCE* to 2.

- If *DWLTYPE* is equal to 97 and *RESTYPE* is equal to 4, 5, or 6 (utility code for usage strata), proceed through the following checks:

Review the service address. If the address ends in a number 1-4 or a letter A-D, set *RESIDENCE* to 3.

Review the service address. If the address ends in a number larger than 4 or a letter later than D, set *RESIDENCE* to 4.

If the address does not end in a number or a letter and the property owner does not pay for any major systems, set *RESIDENCE* to 1.

If the address does not end in a number or a letter and the property owner pays for at least one of the major systems, set *RESIDENCE* to 2.

If at the end of this process *RESIDENCE* is still equalled 6 or 97, an attempt was made to match the observation with a telephone number from the survey. Team members then telephoned the survey respondents to determine the appropriate residence type. If the residence type could not be determined, *RESIDENCE* type was set to missing for the cleaned survey dataset.

The resulting *RESIDENCE* variable (*which was shortened to RES in the final database*) has the following definitions.

- 1 is a single family detached house,
- 2 is a townhouse,
- 3 is a 2-4 unit apartment or condominium,
- 4 is a 5+ unit apartment or condominium,
- 5 is a mobile home

Creating a *RESIDENCE* variable for master metered customers followed a similar, but simplified process. The strata codes for *RESTYPE* for master meter customers are as follows:

- 1 is a 2 to 4 unit duplex, triplex or quadplex,
- 2 is a 5-20 unit multifamily residence,
- 3 is a 20 + unit multifamily residence,
- 4 is a mobile home park.

During the survey process all individuals living in master meter units with a *RESTYPE* of 2-4 received a phone call to insure the identification of the individual. Given that each of these individuals received a call, if *DWLTYPE* and *RESTYPE* differ, the cleaning code for master customers assumes that the *RESTYPE* coding is correct.

The following are the rules for developing the *RESIDENCE* variable for master meter customers.

- If *DWLTYPE* is equal to 1, the individual's survey response is assumed to be incorrect. The master meter file only contains individuals living in multifamily residences. In this situation, the *RESTYPE* code is maintained.
- If *DWLTYPE* is equal to 2, and *RESTYPE* is not equal to 1, the strata *RESTYPE* code is preserved.
- If *DWLTYPE* is equal to 3 or 4, and *RESTYPE* equals 2 or 3, the survey response is maintained, otherwise the strata *RESTYPE* code is preserved.
- If *DWLTYPE* is equal to 5, and *RESTYPE* is not equal to 4, the strata *RESTYPE* code is maintained.

Due to slight inconsistencies between the *RESTYPE* code and the *DWLTYPE* and *RESIDENCE* code, the master meter customers with problems in their *DWLTYPE* variable must have their *RESTYPE* variable transformed. If a master meter customer's *RESTYPE* code was preserved, the following rules were used to transform *RESTYPE* to *RESIDENCE*:

- If *RESTYPE* is equal to 1, *RESIDENCE* is set equal to 2.
- If *RESTYPE* is equal to 2 or 3, *RESIDENCE* is set equal to 4.
- If *RESTYPE* is equal to 4, *RESIDENCE* is set equal to 5.

If there were no problems in master meter customers' survey response to *DWLTYPE*, their survey response is carried over into their *RESIDENCE* variable.

A2 – Own or Rent Home (*OWNRENT*)

Responses to the *OWNRENT* question are unchanged.

- 1 indicates respondent owns or is buying the residence,
- 2 indicates respondent rents or leases the residence, and
- 97 indicates respondent did not answer this question.

A3 – Length of Time at this Address (*YRS_RES*)

Responses for how long have you lived at this residence (*YRS_RES*) and what year was the home built (*BUILTYR*) were cross-referenced. In particular, if the number of years at the address response was longer than the number of years the house has been in existence based on the *BUILTYR* response, then both *YRS_RES* and *BUILTYR* were set to missing.

A4/A5 – Seasonal Occupancy (*SEASOCC*)

The description of your residence (*SEASOCC*) responses were cleaned based on the following criteria.

- If the months the home is typically occupied (*SEASJAN... SEASDEC*) totaled two or fewer, then *SEASOCC* was set to 4 (vacation or rental home),
- If the months the home is typically occupied (*SEASJAN... SEASDEC*) totaled three or more, then *SEASOCC* was set to 2 (partial year or seasonal residence),
- If the months the home is typically occupied (*SEASJAN... SEASDEC*) was left blank, then *SEASOCC* was set to 1 (year-round residence).

A6 – Year Home Built (*BUILTYR*)

The responses for how long have you lived at this residence (*YRS_RES*) and what year was the home built (*BUILTYR*) were cross-referenced. In particular, if the number of years at the address response was longer than the number of years the house has been in existence based on the *BUILTYR* response, then both *YRS_RES* and *BUILTYR* were set to missing.

A further check of *BUILTYR* was made by comparing the age of the major heating (*HTSYSAGE*) and water heating (*PRWHAGE*) systems to the age of the home based on the response to *BUILTYR*. If the ages of the water heating or space heating systems were greater than the age of the home, then the *BUILTYR* was set to missing.

BUILTYR is the basis for the derivation of the home's age (*AGEHOME*) and the *NEWHOME* variables which are used in the conditional demand analysis model. The construction of the *AGEHOME* and *NEWHOME* variables are discussed further in Section 4.3 - CDA Data Filling Process.

A7 – Number of Bedrooms (*NUMROOM*)

The number of bedrooms responses were screened based on the following criteria.

- If *DWLTYPE* equaled 1, 2, 3, or 4, *SQFT* was less than 2,500, and *NUMROOM* is greater than 9, then *NUMROOM* was set to missing.
- If *DWLTYPE* equaled 3 or 4, *SQFT* was less than 1,500, and *NUMROOM* is greater than 5, then *NUMROOM* was set to missing.
- If *DWLTYPE* equaled 5 and *NUMROOM* was greater than 5, then *NUMROOM* was set to missing.

A8 – Square Feet of Living Space (*SQFT*)

The responses to the number of square feet of living space in the home (*SQFT*) are unchanged.

The *SQFT* variable is the basis for the number of square feet variable (*SQFT_A*) variable derived for use in the CDA model. The *SQFT_A* variable is a continuous variable derived from the *SQFT* responses and plugged when the response to *SQFT* is missing. A discussion of the derivation of *SQFT_A* is discussed further in Section 4.3 - CDA Data Filling Process.

A16 – Number of Occupants by Age Group (*NR0-5, NR6-18, NR19_34, NR35-54, NR55-64, NR65-99*)

The responses to this question are unchanged and are used to construct the following variables.

- Number of people living in the household (*RESCNT*),
- Number of people living in the household over 65 (*SENIORS*),
- Number of people living in the household under 19 (*KIDS*), and
- Number of people living in the household 19-64 (*ADULTS*).

For the CDA analysis *RESCNT* will be plugged when missing to the new variable *NUMI*. The *NUMI* variable will be discussed later in Section 4.3 - CDA Data Filling Process.

A18 – Natural Gas Availability (*NGSERV*)

The responses to whether natural gas was available were changed if the cleaned data indicated the presence of a natural gas line, but the respondent indicated there was no natural gas service.

A19 – Natural Gas Hookup in the Home (*NGLINE*)

An initial clean of the survey question *NGLINE*, the existence of a natural gas line, was undertaken to improve the accuracy of the database for space heat and water heat fuel choice. If a household does not have a natural gas line, it cannot have natural gas appliances. To insure the accuracy of the *NGLINE* survey question, surveys were matched with billing data. If the household's survey response to *NGLINE* indicated that they did not have a natural gas line, and billing data were available, the response to *NGLINE* was cleaned to agree with the household's billing data.

Other Cleanings

A1 (subset) – Number of Stories (*STORIES*)

The responses to this question were changed if respondents answered the question when the skip coding instructed them to skip the variable.

A10/A11 – Attic/Ceiling Insulation (*ACEILINS* and *CEILINCH*)

The responses to *ACEILINS* were changed if the respondent indicated that they had no insulation, *ACEILINS* was missing, and they provided a value for *CEILINCH*. For these observations, *ACEILINS* was recoded as "yes."

A14/A15 – Remodeling (*REMOD*)

The response to *REMOD* was changed if the individual listed a type of remodel, but *REMOD* was "no" or missing. For these observations, *REMOD* was set to "yes."

4.1.5 Space Heating

Data cleaning in the space heating section of the survey consisted of two processes.

- **Cleaning the Space Heating Survey Responses.** This process cleaned the existing raw survey responses to eliminate multiple responses, survey inconsistencies, and illogical responses. In addition, variables were constructed to indicate the primary and secondary heating fuel and primary and secondary heating system types.
- **Accounting for Fuel Misreporting.** In this process, space heating survey responses were compared to electric and gas billing data and other fuel-related survey responses to determine the consistency of the fuel type survey responses. Corrections were made to the primary system type and primary heating system type variables.

Cleaning Space Heating Survey Responses

The following steps were taken to clean the survey responses in the space heating section of the survey. The steps are listed in the order that they were undertaken during the cleaning process. Note that during the cleaning phase, no fuel switching is performed. The fuel switching analysis comes during the process of creating the variables used in the CDA.

- Survey data were read from the text files and a variable was created for each bubble on the survey form.
- The field representing how the home pays for heating (*PAYHEAT*) was evaluated. If there were multiple answers for this question, then the first answer was taken (i.e., if pay heat was indicated as both "yes" and "no, it is part of my rent," then pay heat is set to "yes").
- The cleaned field indicating if there is natural gas service at the home (*NGLINE*) was checked. If there was no natural gas service at the residence

and the heating type indicated that there was natural gas heating, then these fields were set to missing (97).

- If a residence had natural gas, then no propane heating systems were allowed at the home. Any propane heating systems were set to missing.
- If the survey responses indicated that a residence had central heat pump heating and central forced air heating, then the heat pump was determined to be the primary heating source and the central forced air heating response was set to missing.
- If five or more electric space heating sources were indicated at the site, then it was determined that the answers for type of heating were erroneous and all were set to missing.
- If the survey indicated that there are three or more "other" space heating systems at the site, then it was determined that the answers for type of heating were erroneous and all were set to missing.
- The primary heating system was determined by selecting the first system in the list of primary heating systems as presented on the survey. All other primary heating systems were moved to the additional heater column. If no primary heating system was indicated on the survey, then the first additional heating system was moved to the primary heating system survey field.
- If the survey response to *PAYHEAT* was "yes" and there was no system indicated, then all system variables were set to missing.
- If the *PAYHEAT* response was "no" and all system variables were missing, then the system variables were set to not applicable (99).
- If *PAYHEAT* was missing and all of the system variables were missing, then the system variables were coded as missing (97).
- If *PAYHEAT* was missing or "no" and at least one system variable was provided, then a new variable *PAYHEAT1* was created and the system variables were maintained. These residences were then analyzed with their billing data to determine the correct value for *PAYHEAT*.

Once this process was completed, a primary heating fuel indicator variable (*PHTFUEL*) was constructed with the following definitions.

- 1 = natural gas
- 2 = electric

- 3 = bottled gas
- 4 = wood
- 5 = solar
- 6 = other
- 97 = respondent failed to answer question
- 99 = respondent does not pay for heat or does not have a primary heating system.

In addition to this space heating fuel type indicator, a number of primary space heating system type variables were constructed for use in the CDA model and provide a higher level of cleaning. These variables are defined in Section 4.3 - CDA Data Filling Process.

Accounting for Fuel Misreporting for Space Heating

The determination of fuel misreporting for space heating is a manual process. In particular, criteria were specified to identify survey responses with likely fuel misreporting. These survey responses were stored in a worksheet and reviewed. Included in this workbook were electric and gas billing records, if available, and selected fuel-related variables that might help in determining the presence of and appropriate value for the space heating system fuel type.

Following are the criteria used to select the residences that were reviewed for fuel misreporting.

- All surveyed residences where respondents did not indicate if they paid for heating and all surveyed single family residences where the respondent indicated that the heating bill is included in the rent were saved to a worksheet for review. In this worksheet, electric and gas consumption fields were stored along with other appropriate fuel-related variables to help decide what type of system was likely to be present at the residence. If all indicators in the bills showed no sign of the end use, then no change was made. Otherwise, the pay heat field was set to "yes," a flag was set to indicate that a manual fuel switch had been made for the site, and an indication was made in the worksheet as to what fuel type was found at the site. This decision was very generic in nature. Indicators of gas or electric systems were set, and for heating, a determination as to whether it is a room or central system was also made if possible from the other variables available on the survey.
- All surveyed residences that had gas consumption and *PAYHEAT* was "yes" but the respondent indicated that their main heating system was not gas were stored in a worksheet for review. As with the previous criterion, all appropriate variables were also included in the worksheet. The billing data were re-

examined to determine if gas or electric systems were present and, if possible, if the system was a room or central system. If this could not be determined, the systems were set to central for gas systems and room for electric systems.

- All surveyed residences that had no gas consumption and where the respondent indicated that there was no gas service, yet indicated the presence of natural gas appliances, were stored to a third worksheet and manually reviewed. Through this inspection it was determined if these appliances should be changed to either electric or possibly propane service.
- All sites where there were responses in the space heating system type (B2) questions but the pay heat or pay water heat was not answered positively (*PAYHEAT1*) were stored to a fourth worksheet and manually reviewed. Using all applicable survey questions and the utility billing data, the team determined whether the resident paid for the use of these systems on their utility bill. If so, the survey variables were changed appropriately to reflect the billing status of the systems. If the systems listed were wood, propane, or solar, billing records provided no additional data. These individuals were assumed to pay for their heat.

The primary heating fuel type indicator variable (*PHTFUEL*) was refined based on this analysis and recorded in a new variable (*PHTFUEL2*). By not overriding the initial *PHTFUEL* variable, the initial primary space heating fuel responses were preserved.

In addition, the primary space heating system types were also refined. This process is discussed in Section 4.3 - CDA Data Filling Process.

All sites where the respondents indicated that they pay for their heat (*PAYHEAT* was set equal to 1) but did not provide information about the system type (B2) were stored on a fifth worksheet and manually reviewed. Using all applicable survey data and billing records, it was determined if the system type was electric, gas, or other. If it was not possible to determine if the system was room or central air conditioning, gas systems were assumed to be central and electric systems were set to room.

4.1.6 Space Cooling

This process cleaned the existing raw survey responses to eliminate multiple responses, survey inconsistencies, and illogical responses. In addition, variables were constructed to indicate the type and number of central and room air conditioning system types. The following steps created the cleaned variables for the space cooling section of the survey.

- Survey data were read from the text files and a variable was created for each bubble on the survey form.
- The field representing how the home pays for central cooling (*PAYCOOL*) was reviewed. If multiple answers were indicated, then the first answer was taken (i.e., if *PAYCOOL* was indicated as "yes" and "no, in rent," then *PAYCOOL* was set to "yes").
- The central heat pump heating variable was tested. If true and the survey indicated the presence of central air conditioning, it was changed to central heat pump.
- If the survey indicated the addition of a central air conditioning unit in the past 12 months, the home is owner occupied, yet there are no central air conditioning units specified, one was added.
- For room air conditioning, the three fields that represent units 1, 2, and 3 were checked for multiple answers. The maximum value was selected from the list of three systems offered on the survey form.
- If the type of room air conditioning field was missing but the age field indicated the presence of a room air conditioning unit, then window/wall air conditioner was set for that unit number.
- If the survey indicated the addition of a room air conditioning unit in the past 12 months but no room air conditioning units were specified, one was added.
- Room air conditioning units were counted by adding units 1, 2, and 3. If this count was greater than zero, then the no room air conditioner indicator was set to false.
- If type of room air conditioner was indicated and age was not, then age was set to missing (97).
- If age of room air conditioner was indicated and type of room air conditioner was not, the type of room air conditioner was set to missing (97).
- If no room air conditioner unit was specified, the variable was set to not applicable (99).

Manual comparison of central air conditioning survey responses and electric consumption data was undertaken on a limited basis. This analysis was limited to surveys whose CDA results and consumption profiles supported the presence of

central air. The results of this plugging process are listed in Section 4.3 - CDA Data Filling Process.

4.1.7 Water Heating

Data cleaning in the water heating section of the survey consists of two processes.

- **Cleaning the Water Heating Survey Responses.** This process cleaned the existing raw survey responses to eliminate multiple responses, survey inconsistencies, and illogical responses.
- **Accounting for Fuel Misreporting.** In this process, water heating survey responses were compared to electric and gas billing data and other fuel-related survey responses to determine the consistency of the fuel type survey responses.

Cleaning Water Heating Survey Responses

The following steps were taken to clean the survey responses in the water heating section of the survey. The steps are listed in the order they were undertaken during the cleaning process. Noted that during the initial cleaning phase, fuel misreporting is not analyzed, but is reviewed in Section 4.3 - CDA Data Filling Process.

- Survey data were read from the text files and a variable was created for each bubble on the survey form.
- The field representing how the home pays for heating (*PAYWH*) was evaluated. If there were multiple answers for this question, then the first answer was taken (i.e., if *PAYWH* was indicated as both "yes" and "no, it is part of my rent," then *PAYWH* was set to "yes").
- The cleaned field indicating whether there is natural gas service at the home (*NGLINE*) was checked. If there was no natural gas service at the residence and the water heating type indicated that there was natural gas water heating, then these fields were set to missing (97).
- If a residence had natural gas, then no propane water heating systems were allowed at the home. Any propane water heating systems were set to missing.

- If five or more water heating sources were indicated at the site, then it was determined that the answers for type of water heating are erroneous and all are set to missing.
- If the survey indicated that there were three or more "other" water heating systems at the site, then it was determined that the answers for type of water heating were erroneous and all were set to missing.
- The primary water heating system was determined by selecting the first system in the list of primary water heating systems as presented on the survey. All other primary water heating systems were moved to the additional water heater column. If no primary water heating system was indicated, then the first additional water heating system was moved to the primary water heating system survey field.
- If the survey response to *PAYWH* was "yes" and no system was indicated, then all system variables were set to missing.
- If the *PAYWH* response was "no" and all system variables were missing, then the system variables were set to not applicable (99).
- If *PAYWH* was missing and all of the system variables were missing, then the system variables were coded as missing (97).
- If *PAYWH* was missing or "no" and at least one system variable was provided, then a new variable *PAYWH1* was created and the system variables were maintained. These residences were then analyzed with their billing data to determine the correct value for *PAYWH*.
- The number of showers/baths taken per day (*SHWRDAY* and *BATHDAY*) was conditionally checked against the cleaned number of residents (*RESCNT*). For the number of showers/baths, two per day per person was the maximum value allowed; responses over that were set to "no response."

Accounting for Fuel Misreporting for Water Heating

Determining fuel misreporting for water heating was a manual process. In particular, criteria were specified to identify survey responses with likely fuel misreporting. The survey responses for these residences were stored in a worksheet and reviewed. Included in this workbook were electric and gas billing records, if available, and selected fuel-related variables that might help in determining the presence of and appropriate value for the water heating system fuel type.

The following criteria were used to select the residences that were reviewed for water heating fuel misreporting.

- All surveyed residences where respondents did not indicate if they paid for water heating (*PAYWH* is missing) and all surveyed single family residences where the respondent indicated that their water heating bill is included in their rent were saved to a worksheet for review. In this worksheet, the electric and gas consumption fields were stored along with other appropriate fuel-related variables to help determine what type of system was likely present at the residence. If all indicators in the bills showed no sign of the end use, then no change was made. Otherwise the pay water heat field was set to "yes," a flag was set to indicate that a manual fuel switch had been made for the site, and an indication was made in the worksheet as to what type of water heating system was found at the site. This decision was very generic in nature. Indicators of gas or electric systems were set.
- All surveyed residences that had gas consumption, where *PAYWH* was "yes," but the respondent indicated that the water heating system was not natural gas were stored in a worksheet for review. As with the previous criterion, all appropriate variables were included in the worksheet. The team re-examined the billing data to determine if gas or electric systems were present.
- All surveyed residences that had no gas consumption, where the respondent indicated that there was no gas service, but indicated the presence of natural gas appliances were stored to a third worksheet and manually reviewed. Through this analysis it was determined if these appliances should be changed to either electric or possibly propane service.
- All sites where there were responses in the system water heating system type (D2) questions but the pay water heat response was missing were stored to a worksheet and manually reviewed. Using all applicable survey questions and the utility billing data, a determination was made on whether the resident paid for the use of these systems on their utility bill. If so, the survey variables were changed appropriately to reflect the billing status of the systems.
- All sites where the resident indicated they paid for their water heat but did not provide information on the water heating system type were stored on a worksheet and manually reviewed. Using all applicable survey questions and utility billing data, it was determined if the water heater was gas, electric, or other.

4.1.8 Laundry

There are six questions (E1-E6) in this section of the survey. The raw responses were cleaned to account for multiple and inconsistent responses.

The consistency checks for clothes washers included the following. The number of loads washed during an average week (sum of *CWHWLD*, *CWWWLD*, *CWCWLD*) was conditionally checked for an out-of-range response against the number of residents (*A16*), after the number of residents was cleaned. In particular, up to five loads per week per person was assigned as the outer limit of reasonableness; any responses over that value were set to "missing."

Responses to the clothes washer type (*CWTYP*), clothes washer age (*CWAGE*), and the clothes dryer type (*CDTYP*) were used to confirm or override the response to the presence of laundry equipment in the respondent's home (*LNDRYEQP*). In particular, if the respondent described their clothes washer's type or age, it was assumed they had laundry equipment for the private use of the home (*LNDRYEQP* = 1); if not, *LNDRYEQP* was unchanged. Note that *LNDRYEQP* is only overridden if the individual provided system information but did not state that they had laundry equipment in their home.

The consistency checks for clothes dryers included the following. The number of dryer loads during an average week (*DRYLDS*) was conditionally checked for an out-of-range response against the number of residents (*A16*), after the number of residents was cleaned. In particular, up to five dryer loads per week per person was assigned as the outer limit of reasonableness; any responses over that value were set to "missing."

In addition, for clothes dryers, if natural gas service was determined not present (*NGLINE=0*), but a respondent reported a natural gas clothes dryer (*CDTYP*), the clothes dryer fuel was set to "missing." Finally, manual comparison of clothes dryer fuel types was undertaken on a limited basis. This analysis was limited to surveys whose CDA results and consumption profiles supported the presence of a dryer with an alternative fuel source. The results of this plugging process are listed in Section 4.3 - CDA Data Filling Process.

4.1.9 Food Preparation

There are five questions (F1-F5) in this section of the survey. The raw responses were cleaned to account for multiple and inconsistent responses.

The food preparation section cleaning deals with one possible inconsistency. If natural gas is determined not present (*NGLINE=0*) but the respondent reports a natural gas range or oven, that response (*CKRNTYP* and/or *CKOVTYP*) was set to "no response."

4.1.10 Refrigerators

There are two sets of questions (*REFNUM* and the series of characteristics in G2) in this section of the survey. The raw responses were cleaned to account for multiple and inconsistent responses.

These following are consistency checks for refrigerators. These checks were developed given that the columnar design of the questions related to the characteristics of each refrigerator.

- If there is a missing response to the characteristics of the first refrigerator, the respondent indicated that they have a first refrigerator, and a response was provided in the second refrigerator column, then this response was assumed to apply to the first refrigerator. A similar approach was used for the second refrigerator relative to the third refrigerator. This process leads to a reduction in percentage of first refrigerators with missing values but will lead to an increase in missing values for second and third refrigerators.
- If a respondent indicated a number of refrigerators less than the number of refrigerators for which they provide responses, then the number of refrigerators was increased to be consistent with the characteristics data. For example, if the respondent indicated they had only one refrigerator in *REFNUM* but provided characteristics detail in G2 for two refrigerators, then the response to *REFNUM* was changed to indicate the ownership of two refrigerators.
- If *REFNUM* was larger than the set of refrigerator characteristics provided, the characteristics were set to "missing." The characteristics will be filled during the CDA analysis.
- If *REFNUM* was missing and characteristics were provided in G2, *REFNUM* was set to be consistent with the number of characteristics. If no characteristics were provided, *REFNUM* remains missing.
- If *RF10TH* was missing and a door style was provided for *RF1STY* (the refrigerator variable with the fewest missing observations), *RF10TH* was set to zero, indicating that the refrigerator did not have an ice maker. A similar procedure was followed for *RF20TH* and *RF30TH*.

Note that none of the data cleans results in a number of refrigerators less than the number indicated in *RFNUM*. The number can increase depending on the amount of information provide in the characteristics question G2. The increase in the number of refrigerators may lead to an increase in the percent or refrigerator characteristics missing after cleaning.

Table 4-3 presents a summary of the percent of missing values for each refrigerator after the preliminary data cleaning was performed. Note these missing values for respondents who indicated that they have a first, second or third refrigerator.

Table 4-3
Missing Refrigerator Number and Characteristics

Refrigerator Questions	Missing Prior to Cleaning	Missing Post Cleaning
G1. How many refrigerators do you have plugged in? (<i>RFNUM</i>)	1.2%	0.1%
G2. Refrigerator 1		
Door Style (<i>RF1STY</i>)	3.6%	2.3%
Size in Cubic Feet (<i>RF1SZ</i>)	7.3%	6.1%
Frost-Free or Manual Defrost (<i>RF1DEF</i>)	7.1%	5.9%
Age (<i>RF1AGE</i>)	4.4%	3.6%
Other Features (<i>RF1OTH</i>)	3.6%	1.7%
G2. Refrigerator 2 (<i>RFNUM</i> = 2, 3)		
Door Style (<i>RF2STY</i>)	11.9%	16.5%
Size in Cubic Feet (<i>RF2SZ</i>)	13.5%	17.9%
Frost-Free or Manual Defrost (<i>RF2DEF</i>)	14.5%	19.3%
Age (<i>RF2AGE</i>)	11.8%	14.5%
Other Features (<i>RF2OTH</i>)	11.9%	16.4%
G2. Refrigerator 3 (<i>RFNUM</i> = 3)		
Door Style (<i>RF3STY</i>)	26.1%	29.6%
Size in Cubic Feet (<i>RF3SZ</i>)	23.5%	26.6%
Frost-Free or Manual Defrost (<i>RF3DEF</i>)	28.0%	31.0%
Age (<i>RF3AGE</i>)	20.8%	23.2%
Other Features (<i>RF3OTH</i>)	26.1%	29.3%

In addition to these checks, algorithms to fill missing values for each of the refrigerators' characteristics were developed. The filled variables were used in the CDA model to develop an engineering estimate of monthly kWh usage. Details of the filling algorithms and the development of the engineering estimate of usage are described in Section 4.3 - CDA Data Filling Process.

4.1.11 Freezers

This section of the survey contains two questions (*FZNUM* and the series of characteristics in H2). The raw responses were cleaned to account for multiple and inconsistent responses.

In addition, a few other consistency checks were used for freezers. These checks were developed given that the columnar design of the questions related to the characteristics of each freezer.

- If there is a missing response for the characteristics of the first freezer, the respondent indicated that they have a first freezer, and a response is provided in the second freezer column, then this response was assumed to apply to the first freezer.
- If a respondent indicated a number of freezers less than the number of freezers for which they provided responses, then the number of freezers was increased to be consistent with the characteristics data. For example, if the respondent indicated they had only one freezer in *FZNUM* but provided characteristics detail in H2 for two freezers, then the *FZNUM* response was changed to indicate the ownership of two freezers.
- If *FZNUM* was missing and characteristics were provided in H2, *FZNUM* was set to be consistent with the number of characteristics. If no characteristics were provided and *FZNUM* was missing, *FZNUM* was set to zero.

Note that none of the data cleans resulted in a number of freezers less than the number indicated in *FZNUM*. The number could increase depending on the amount of information provided in the characteristics question H2. The possible increase in the number of freezers may lead to an increase in the percent of freezer characteristics missing.

Table 4-4 presents a summary of the percent of missing values for each freezer after the preliminary data cleaning was performed. Note the pre-cleaned missing were for survey respondents whose survey response indicated that they had one or two

freezers. The post-cleaned missing were for respondents whose cleaned *FZNUM* was equal to one or two.

**Table 4-4
Missing Freezer Number and Characteristics**

Freezer Questions	Missing Prior to Cleaning	Missing Post Cleaning
H1. How many freezers to you have plugged in? (<i>FZNUM</i>)	4.9%	4.0%
H2. Freezer 1 (<i>FZNUM</i> = 1, 2)		
Style (<i>FZ1STY</i>)	5.5%	5.6%
Size in Cubic Feet (<i>FZ1SZ</i>)	8.2%	8.6%
Age (<i>FZ1AGE</i>)	6.5%	6.8%
H2. Freezer 2 (<i>FZNUM</i> = 2)		
Door Style (<i>FZ2STY</i>)	17.8%	23.9%
Size in Cubic Feet (<i>FZ2SZ</i>)	23.8%	27.4%
Age (<i>FZ2AGE</i>)	22.7%	26.4%

In addition to these checks, the team developed algorithms to fill missing values for each of the freezers' characteristics. The filled variables were used in the CDA model to develop an engineering estimate of monthly kWh usage. Details of the filling algorithms and the development of the engineering estimate of usage are described in Section 4.3 - CDA Data Filling Process.

4.1.12 Spas and Hot Tubs

There are seven questions (I1-I7) in this section of the survey. The raw responses were cleaned to account for multiple and inconsistent responses.

In addition, the following checks were made.

- If the respondent provided answers to one or more of the spa or hot tub characteristics (I2-I7) and indicated that they did not have the use of a spa or hot tub (*SPTYP*=No spa or hot tub), then the response to the use of a spa or hot tub was set to "yes" (*SPATYP* = Yes, I pay for its energy use).
- Natural gas spa or hot tub heating (*SPHT*) was only permitted if a gas line was present at the residence (*NGLINE* = Yes). If there was no natural gas line to the residence, then *SPHT* was set to "missing."

- Spas and hot tubs were only permitted in households designated as single family, town homes, or mobile homes.

4.1.13 Pools

This section contains six questions (J1-J6). The raw responses were cleaned to account for multiple and inconsistent responses.

In addition, the following checks were made.

- If the respondent provided responses to one or more of the pool characteristics (J2-J6) and indicated that they did not have the use of a pool (*PLTYP*= No pool), then the response to the use of a pool was set to "yes" (*PLTYP* = Yes, I pay for its energy use).
- Natural gas pool heating (*PLHT*) was only permitted if a gas line was present at the residence (*NGLINE* = Yes). If there was no natural gas line at the residence and the cleaned survey response to *PLHT* was natural gas, then *PLHT* was set to "missing."
- If *PLTYP* equaled 1, Yes I have use of a swimming pool at my home and I pay for it, a pool was only permitted in single family homes. If *PLTYP* equaled 1 and the cleaned value of *RESIDENCE* is not single family, then *PLTYP* was set equal to 2 (pool is in the common area and I do not pay for the energy use). Ninety-six pools were changed from *PLTYP* equal to 1 to *PLTYP* equal to 2 due to this restriction.

4.1.14 Entertainment and Technology

There are eight questions (K1-K8) in this section. The raw responses were cleaned to account for multiple and inconsistent responses.

The entertainment and technology section consistency checks primarily deal with tabular formatting in questions relating to the presence of a television and accessories (K1) and use of appliances in the home (K8). In particular, if the responses in the tables were entirely blank, then the responses to the individual questions were coded as "no response." Otherwise, if at least one response was recorded in the table, then the remainder of the "missing" answers were considered "none" or "no," as opposed to "missing." This process leads to the same percentage missing for all entertainment and technology appliances after cleaning. Table 4-5

summarizes the percent of responses with missing values for the variables used to develop the entertainment and technology appliance ownership indicator variables.

In addition to the initial cleaning process, a number of indicator variables were constructed for the CDA analysis. This process involved cleaning the raw survey responses to account for missing values. The derivation of these variables is discussed in Section 4.3 - CDA Data Filling Process.

**Table 4-5
Missing Entertainment and Technology Appliances**

Entertainment and Technology Question (K1)	Missing Prior to Cleaning	Missing Post Cleaning
Home Theater (<i>THEATER</i>)	46.2%	0.9%
Large Screen Televisions (<i>BSTV</i>)	44.7%	0.9%
Standard Size Televisions (<i>CLTV</i>)	7.0%	0.9%
DVD Player (<i>DVD</i>)	31.6%	0.9%
VCR (<i>VCR</i>)	16.4%	0.9%
Personal Video Recorder (<i>TiVo</i>)	51.9%	0.9%
Stereo (music)	27.0%	0.9%

4.1.15 Lighting

There are two questions (L1 and L2) in this section of the survey. These questions were subject to the raw cleaning algorithms designed to account for inconsistent and multiple responses.

The lighting section consistency checks primarily deal with tabular formatting in questions relating to the presence of indoor (L1) and outdoor (L2) lighting technologies. In particular, if the responses in the tables were entirely blank, then responses to the individual questions were coded as "missing." Otherwise, if at least one response was recorded in the table, then the remainder of the "missing" answers were considered "none" or "no," as opposed to "missing."

Additionally, outdoor lighting variables used in the CDA model were developed. Development of these variables is discussed in Section 4.3 - CDA Data Filling Process.

4.1.16 Miscellaneous Appliances

There are 12 questions (M1-M12) in the miscellaneous appliances section. The raw responses were cleaned to account for multiple and inconsistent responses.

The miscellaneous appliances section consistency checks primarily deal with tabular formatting in the question relating to the presence of miscellaneous appliances (M1). In particular, if the responses in the tables were entirely blank, then the responses to the individual questions were coded as "no response." Otherwise, if at least one response was recorded in the table, then the remainder of the "missing" answers were considered "none" or "no," as opposed to "missing."

The responses to the addition of appliances in the last 12 months (M9) were also used as a check against the presence of any of the appliances included in this question. That is, if the respondent indicated that any of the covered appliances were added in the last twelve months, but did not indicate the presence of this appliance in the previous sections of the survey, then the responses in the earlier sections were overridden to indicate the presence of the appliance. If the respondent indicated the addition of a central heating system (*CHADD*), it was a single family home, and the cleaned response to *PAYHEAT* did not indicate the household paid for their heat, then *PAYHEAT* was changed to show the household paid for their heat.

If the resident indicated the addition of a microwave oven (*MWADD*) and the cleaned response to the presence of a microwave oven (*MWUSE*) indicated no microwave, then *MWUSE* would be set to 2, a seldom used microwave.

In addition to the initial cleaning process, a number of indicator variables were constructed for the CDA. This process involved cleaning the raw survey responses to account for missing values. Table 4-6 presents the percent of responses with missing values for the variables used to develop the appliance ownership indicator variables for the CDA. The derivation of the variables used in the CDA analysis is discussed in Section 4.3 - CDA Data Filling Process.

**Table 4-6
Missing Miscellaneous Appliances**

Miscellaneous Appliances (M1)	Missing Prior to Cleaning	Missing Post Cleaning
Portable Fan (<i>FNPORT</i>)	11.4%	3.0%
Ceiling Fan (<i>FNCEIL</i>)	11.5%	3.0%
Attic Ventilator (<i>WNDATV</i>)	22.5%	3.0%
Electric Attic Fan (<i>FNATTIC</i>)	21.9%	3.0%
Whole House Fan (<i>FNWHOLE</i>)	22.7%	3.0%
Electric Air Cleaner (<i>AIRCLEAN</i>)	22.2%	3.0%
Humidifier (<i>HUM</i>)	22.5%	3.0%
Dehumidifier (<i>DEH</i>)	23.2%	3.0%
Water Purification (<i>WHPURIFY</i>)	21.6%	3.0%
Heated Waterbed (<i>WBED</i>)	22.9%	3.0%
Electric Blanket (<i>ELBLNKET</i>)	19.1%	3.0%
Aquarium (<i>AQUAR</i>)	22.2%	3.0%
Trash Compactor (<i>TRSHCOMP</i>)	22.0%	3.0%
Sauna – Electric (<i>SAUNA</i>)	23.2%	3.0%
Electronic Security System (<i>SCRTYSYS</i>)	21.2%	3.0%
Pool or water garden Pump (<i>POND</i>)	21.9%	3.0%
Electric Garage Door Opener (<i>GRGDROPN</i>)	14.6%	3.0%
Lawn Mower – electric (<i>LAWNMOWR</i>)	22.5%	3.0%

4.1.17 Household Information

There are seven questions (N1 - N7) in the household information section of the survey. Table 4-7 shows the percent of missing responses for these questions. Raw responses were maintained for household information variables N3-N7. Differences in the pre and post-cleaning percentages are due to a decline in the number of respondents due to invalid surveys.

Responses to the survey questions concerning second homes in California (*PTHME* (N1), *PTHMELOC*, and *PTHMEUTL* (N2)) were cleaned for logical consistency. If the respondent provided a location (*PTHMELOC*) and/or a utility (*PTHMEUTL*) for

their second home, then *PTHME* was set to one. If the respondent stated that they did not have a second home in California (*PTHME* = 2), then both *PTHMELOC* and *PTHMEUTL* were set to not applicable (99). If the respondent did not answer *PTHME*, or stated that they had a second home, and did not provide information about the second homes location (*PTHMELOC*) or utility (*PTHMEUTL*), these variables were set to missing.

Responses to the total household income question were further refined to create a continuous variable and to infer missing values. The resulting variable (*AVGINC*) was used in the CDA analysis. The derivation of *AVGINC* is discussed in Section 4.3 - CDA Data Filling Process.

**Table 4-7
Missing Household Information**

Household Information	Missing Pre Cleaning	Missing Post Cleaning
N1. Own vacation home (<i>PTHME</i>)	4.1%	3.7%
N2. Location for vacation home (<i>PTHMELOC</i>)	4.9%	4.6%
N2. Electric utility provide for vacation home (<i>PTHMEUTL</i>)	5.1%	4.8%
N3. Highest level of education (<i>EDUC</i>)	3.9%	3.5%
N4. Primary spoken language (<i>ETHNIC</i>)	2.8%	2.5%
N5. Number of occupants of home disabled (<i>DISABLED</i>)	4.0%	3.7%
N7. Household total annual income (<i>INCOME</i>)	14.1%	13.8%

4.2 Billing and Weather Data

This section discusses the development of the billing data that is stored in the RASS billing database. This section includes a description of the billing databases provided by each utility, the calendarization routines employed to standardize the bills, the methods used to clean errors in the billing data, and the merging of the billing data with the survey data.

4.2.1 Billing Databases

The three California IOUs and the Los Angeles Department of Water and Power were responsible for delivering their billing data to the study team. The data transaction requested included billing records for all customers sampled. Southern California Gas Company provided gas consumption data for households that were

identified as SCG customers using an account matching process. The following discusses the variables included in the billing databases and the timeframe for various steps in the billing data process.

Pacific Gas & Electric Company

The gas and electric billing data for PG&E customers was provided in two separate data sets. The variables included in the data sets were similar, with the electric file containing the kWh consumption and the gas file containing the therm consumption. Both data sets contained a PG&E control identification number while neither data set contained a premise or customer identification number.

The billing frame for PG&E customers contained information from 41,111 residential electric meters and 29,833 gas meters. PG&E's billing data included the following set of information: an old PG&E identification number (CNTL) that was identical for gas and electric customers, a new PG&E electric identification number, a new PG&E gas identification number, kWh and therm consumption, gas and electric tariffs, and a start and end date for the bills. The electric billing data covered the period October 2001 through June 2003 and the gas billing data covered the period October 2001 through August 2003.

Southern California Edison

The billing frame contains information on 39,276 residences within SCE's territory. SCE's billing data includes the following set of information: a customer number, a premise number, kWh consumption, bill date, number of billing days, tariff, Energy Commission weather zone, and SCE weather stations. The billing data covers the period November 2001 through May of 2003.

San Diego Gas & Electric Company

The SDG&E billing frame contains data for 11,179 residences within SDG&E's territory. The SDG&E gas and electric data was provided in a single data set. The data set had billing data for 11,179 residences with electric usage and 7,063 residences with gas usage. The data included a premise identification number, customer number, customer name, read date, electricity tariff, gas tariff, an indicator that the bill was an estimate or a regular read, bill date, electricity consumption, therm consumption, and the number of billing days in the cycle. The billing data covered the period November 2001 through May 2003.

Los Angeles Department of Water & Power

The LADWP billing frame contained data for 9,073 customers within LADWP's territory. The LADWP data included a reference number that was unique to the dwelling, a service number which was used in the first RASS data request, annual consumption, an electricity tariff code, an all electric flag, electricity consumption, a read date, and the number of billing days. The billing data covered the period October 2001 through July 2003.

Southern California Gas Company

The sample frame for the RASS survey is based on information on electric customers from the three electric serving IOUs and LADWP. As such, collecting natural gas billing data for customers served by SoCalGas involved a customer matching procedure between the RASS sample frame data and the SoCalGas customer records. This multi-step procedure is discussed below.

- **Step 1—Identify SoCalGas Zip Codes.** The sample frame was sorted by zip code and merged with a file that contained the natural gas utility serving each zip code in California. The sample having SoCalGas as the gas utility was saved for further analysis. The frequency of cases by utility before and after the merging is as follows:

Table 4-8
Counts of Residences by Utility and by SoCalGas Zip Codes

Utility	Number of Residences in the Sample Frame	Number of Residences with SoCalGas Zip Codes
LADWP	9,073	9,034
PG&E	41,111	2,156
SCE	39,276	35,047
SDG&E	11,179	1,098
Total	100,639	47,335

- **Step 2—Disaggregate Customer Address:** The service address variable in the sample frame was disaggregated into the following pieces:

Street Number
Street Number Fraction
Street Direction
Street Name

Apartment/Unit Number
Zip code

Code was developed for each utility that created the 6 pieces of the address. These pieces along with the customer name and survey ID were matched against SoCalGas' population data for further analysis.

- **Step 3—Customer Address Merging with SoCalGas Master File:** The merging of sample addresses with SoCalGas master file data to capture account number and rate information involved several phases. The two files were first merged by zip code, street number, street number fraction, street direction, street name, and apartment/unit number to obtain the exact address matched cases in the first phase.

For the remaining unmatched sample, the second phase involved merging the files by zip code, street number, street number fraction, and street name followed by a case-by-case inspection to select matches. In phase 2, master metered accounts were located along with addresses that may have a missing street direction or different apartment/unit number designation (e.g. D instead of 4). The customer name appearing in the sample frame as well as the SoCalGas master file was utilized in this phase to select the appropriate record.

For the remaining unmatched sample after phases 1 and 2, the third phase involved merging the files by zip code, street number, street number fraction, and the first 6 characters of the street name followed by a case by case inspection to select matches using the same approach as was described in phase 2. This phase generated only a few (less than 75) additional matches.

For the remaining unmatched sample after phases 1 through 3, the final phase involved merging the files by zip code and customer last name followed by a case by case inspection to select matches that may have slightly different street name spellings between data sources.

There were 8,621 returned RASS respondent surveys in SoCalGas service territory with 7,836 being matched and an account number and rate designation extracted. All of the targeted non-respondent surveys were also matched since the final non-response survey was not complete at the time of data transfer. This led to an additional 1,583 account numbers and rate designations.

- **Step 4—Download SoCalGas Account Number File:** The 9,419 merged records were placed into a SAS transport file and downloaded from the SoCalGas mainframe. Of the 784 un-matched records, 155 indicated

SoCalGas was there gas utility and those records were included for further investigation.

- **Step 5—SoCalGas Billing Data:** The SoCalGas Account Number File was merged with the billing data provided by SoCalGas. The billing data contained information on the addresses associated with the 9,419 RASS respondent and non-respondent surveys. The billing data included an account start data and termination data, a bill start data and a bill end date, a premise identifier and an account number, the gas tariff, and the therm consumption. SoCalGas's billing database included natural gas consumption from October 2001 to October 2003.

4.2.2 Billing Data Calendarization and Weather Data Incorporation

Calendarization of the billing data transformed billing cycle data into monthly data for the five utilities. Minor differences in the original database formats and the variables included in the billing databases led to slight differences in the calendarization routines used for each utility. The following steps were used to calendarize the data.

- Billing histories were merged with the survey identifier, selecting only those bills associated with a survey. This process dramatically reduced the size of the billing databases since the initial billing requests targeted bills from all sampled customers.
- Weather data were merged onto the billing databases using the CEUS climate zones and the meter read end dates from the billing records. If the billing data had both a bill start and a bill end date, weather data were merged on for both the start and the stop dates. Heating and cooling monthly degree days were created using either the start and stop dates or the stop date of the current bill and the stop date of the previous bill.
- If the utility provided a customer identification code, the customer code was checked to determine if the customer identification was constant during the billing period. If there was a change in customers during the billing period, billing records for the final customer were retained and the bills for previous customers were dropped from the billing database⁷.
- A daily database was created from the billing cycle data. To create the daily database, the first step was to determine the number of days in the billing period. The length of the billing period was calculated either as the difference between the start date and the end date, or the difference between the end of the previous bill and the current end date.⁸ Using the calculated number of

billing days, monthly consumption and monthly heating and cooling degree days were divided equally into daily consumption and daily heating and cooling degree days. The daily consumption and degree days were deposited into a data set by their calendar day, month, and year variable that was augmented from the start of the billing period. This process spread the billing data into calendar days.⁹

- The daily database was summed over the calendar months to create a data set with calendar monthly consumption and degree days.
- The calendarized consumption and degree data was normalized to a 30.4-day month. If the billing data contained less than 10 calendar days in the month, the consumption was set to missing.
- The RASS survey data used to generate the CDA models was based on an electric individual metered residential sample. The gas data matched to these data included natural gas master meters. During the calendarization routine, the gas master meter accounts are identified using the gas tariffs. These accounts were given a master meter flag and the residences' therm consumption was set to missing.

4.2.3 Merging SCG Billing Data into Billing Database

After the SCG billing data was calendarized, it was divided into four databases based on the survey's electric utility identification code. The SCG billing data was then merged onto the appropriate electricity billing record based on the survey code and the calendar month. During this process, special attention was paid to the labeling of the heating and cooling degree days associated with the SCG database. The heating and cooling degree days associated with SCG, PG&E gas data, and SDG&E gas data were carefully labeled as gas heating and cooling degree days. This terminology insured that the degree days associated with gas and electricity data would correctly represent the weather conditions during the billing period.

4.2.4 Billing Data Cleaning

The consumption data was derived directly from the utility billing files. Billing records, while reasonably accurate, contained some anomalies that can be very troublesome in the application of conditional demand analysis. Billing records were inspected closely for the following problems:

- Erroneous billing days and/or read dates.
- Abnormal monthly consumption.
- Missing or zero electricity usage (the latter may indicate an inactive account).

These errors were corrected, or the observation's consumption was set equal to missing. To limit problems with short billing months that were a result of the calendarization routine, the first and last calendar month for each billing record were deleted.

During the cleaning process close attention was paid to PG&E's billing data. During the survey period, PG&E changed customer identification numbers. The new identification process created two issues. First, examination of the billing records indicated that several customers had a missing bill during the change-over period. These bills were identified, given a missing kWh or therm value, and assigned the start and stop date associated with the missing timeframe. Second, the change of identification numbers made it more difficult for PG&E to correctly match gas and electric records for a given residence. Unfortunately, the final billing data does not have gas records for some PG&E customers who receive both electric and gas service from PG&E.¹⁰

Electric bills are provided in the final survey and CDA database in annualized summary format to allow for analysis using the final billing values. The electric annual pre-cleaned value is *ELEMN12*. The cleaned annualize electric usage is *ELEMNCDA*. The corresponding pre-cleaned annual gas usage is *THMMN12* and the cleaned value is *THMMNCDA*

4.2.5 Integrating the Cleaned RASS Data with Billing Data

In order to run the CDA, the billing data was merged with the survey data using the individual identification code SFCODE. The resulting database contains 21,153 unique individuals with 365,864 individual monthly observations (Table 4-9). If an individual has both a gas and an electric bill, the consumption and monthly weather information for both bills were contained on a single monthly observation.

Table 4-9
Summary of Billing Data Availability

Utility	Individual Monthly Observations	Unique Individuals	Average Number of Monthly Observations
PG&E	172,982	9,265	19
SDG&E	40,878	2,527	16
SCE	126,818	7,979	16
LADWP	25,186	1,382	18

4.3 CDA Data Filling Process

This section describes the data filling used for variables included in the CDA. The data filling consists of four processes:

- Filling and estimating missing values
- Creating new fuel variables
- Creating indicator variables and continuous variables
- Creating refrigerator and freezer usage variables

It is important to recall that the RASS study included both individually metered and master metered customer results. Because of the need to tie responses to a customer bill, only individually metered customers were included in the CDA model development process and the UEC simulation process.

The following data filling process only includes survey responses from the individually metered electric customer frame.

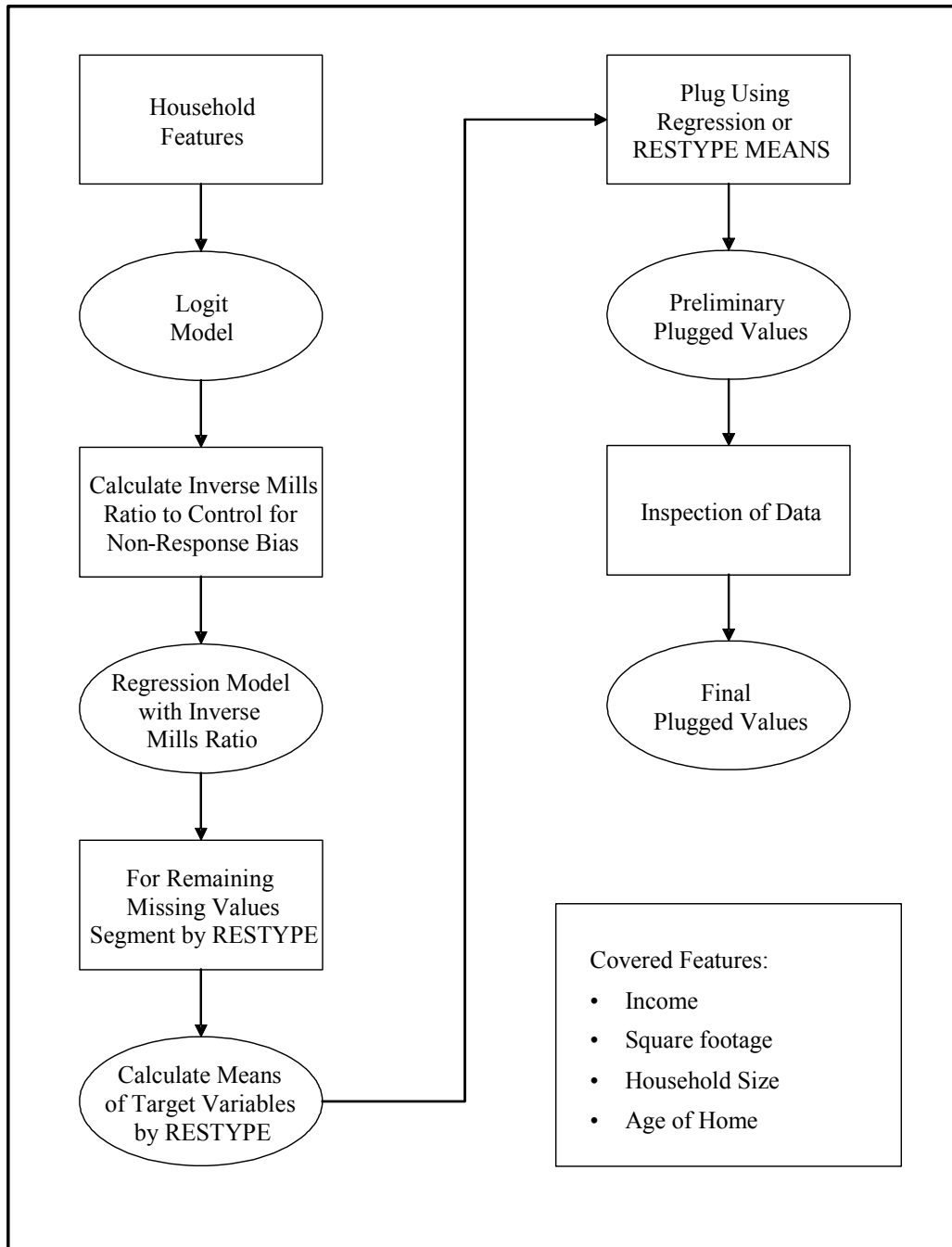
4.3.1 Filling Missing Values

The cleaned data from the RASS Survey contained a substantial number of missing values. Simply allowing these missing values to disqualify an observation from the CDA would create non-response bias in the estimation of model parameters. Replacing these missing values with overall means for the variables in question would also lead to biased estimates insofar as question-specific non-respondents tend to be different from respondents. In order to minimize non-response bias, a multi-step approach was used and can be seen in Figure 1.

- First, a set of logit equations, each explaining the likelihood of responding to a specific question, was estimated. Once estimated, these equations were used to calculate an inverse Mills' ratio.
- Second, a regression model was used to calculate the predicted value of the missing variable. The inverse Mills' ratio was used in this regression model, as an independent variable, to control for non-response bias.
- Third, remaining missing responses were replaced with means drawn from the specific housing segment into which the household in question falls.

- The following survey elements were covered by this "plugging" routine: income, square footage, household size, and age of home.

Figure 4-1
Filling Missing Values



Square Footage and Surface Area

The survey variable *SQFT* was transformed into the continuous variable *SQFT_A* using the mid-point of the survey range for the variable *SQFT* for all but the three following values.

- If the respondent indicated that their residence was less than 250 square feet, they were assigned a value of 200.
- If the survey response was 4001-5000 square feet, they were assigned a value of 4700.
- If the survey response was greater than 5000 square feet, they were assigned a value of 6000.

If *SQFT* was missing, the value was filled using the conditional means process described above.

The CDA requires a measure of residence surface area, *AREA*. Surface area was calculated using estimates of the relationship between surface area and square footage which were created using data collected for the Statewide Residential New Construction Energy Efficiency Baseline Study, Second-Year Report.¹¹ The relationship was estimated for single story, single family residences, multi story single family residences, and multi-family residences. Mobile homes were grouped with single story single family residences. The following equations list the relationship between surface area and *SQFT_A* for each residence type.

- For single story, single family residences and mobile homes

$$\text{surface area} = 5.9985 * SQFT_A^{0.8528}$$

- For multi story, single family residences

$$\text{surface area} = 13.9694 * SQFT_A^{0.7395}$$

- For multi-family residences

$$\text{surface area} = 0.5955 * SQFT_A^{1.1034}$$

Household Income

The survey variable *INCOME* was transformed to the continuous variable *AVGINC* by using the mid-point of the survey range for all but the upper most value. For respondents who indicated that their household income was \$150,000 or more,

AVGINC was set to \$175,000. If *INCOME* was missing, *AVGINC* was filled using the conditional means process described above.

Home Age

The survey variable *BUILTYR* was transformed into the year the home was built. Homes built between prior to 1940 were assigned a built year of 1935, homes built between 1940 and 1949 were assigned 1945, those built between 1950 and 1959 were assigned 1955, and those built between 1960 and 1969 were assigned 1965. The year the home was built was used to create the variable *HOMEAGE* where $HOMEAGE = 2003 - BUILTYR$. If *BUILTYR* was missing, *HOMEAGE* was filled using the conditional means process described above. In order to facilitate comparison across housing ages, a new home variable was created using *HOMEAGE*. If *HOMEAGE* indicated that the home had been built between 1997 and 2003, the home was flagged as a new home where *NEWHOME* was equal to one, zero otherwise.

Number of Household Residents

The resident count variables (A16) were summed to create a count of the number of people in the household, *RESCNT*. For the CDA analysis, a new variable was created to represent the number of people in the household, *NUMI*. If *RESCNT* was non-missing, *NUMI* was set equal to *RESCNT*. If *RESCNT* was missing, *NUMI* was filled using the conditional means process described above. In the CDA, the number of people in the household is included as the log transformation of *NUMI* (labeled there as *NHH*: $NHH = \log(\text{NUMI} + 1)$).

4.3.2 Creating New Fuel Variables

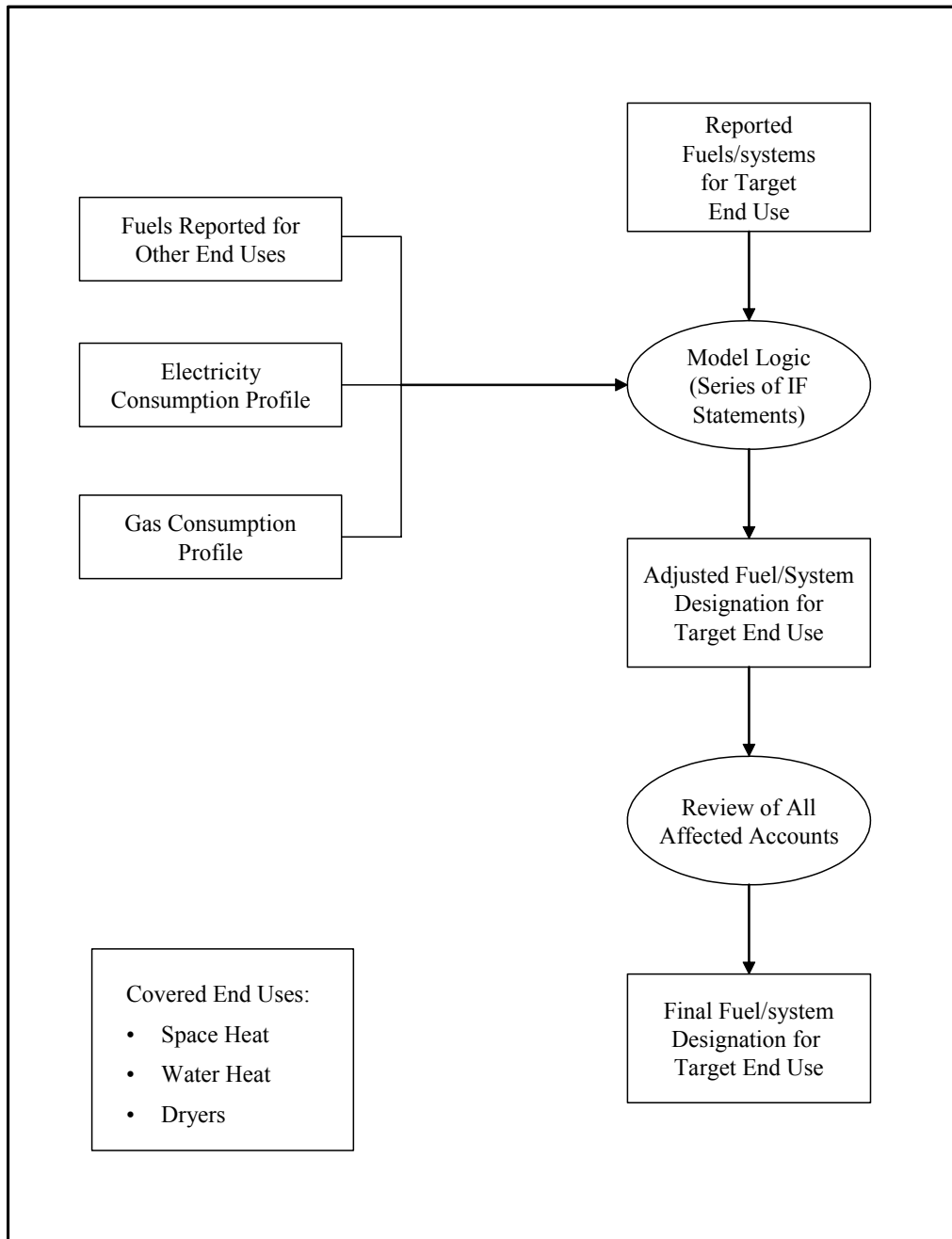
It is common knowledge that survey respondents often misreport fuels and system types. This type of misreporting can be troublesome for the process of disentangling end use consumption levels through the CDA modeling process. As a result, a considerable amount of care was taken to validate (and, where justified, to override) reported systems and fuels. As illustrated in Figure 2, and discussed in the data cleaning portion of this section, this process involved two steps:

- First, a series of logical overrides was developed. These overrides essentially checked the consistency of reported fuels/systems with other information and overrode responses when inconsistencies were found. For instance, if natural gas was reported as the heating fuel but no gas service was available, the household was assumed to have another heating fuel. If the electricity

consumption profile exhibited enough seasonality to suggest (with a reasonable absence of ambiguity) the presence of electric space heating, the fuel type was set equal to electric; otherwise, it was left missing.

- Once the overrides were affected, all account information was printed out for all households affected by this process, and the correspondence between observed seasonality and imposed fuel types was double-checked.

Figure 4-2
Correcting Fuel Misreporting



Heating Fuel Variables

During the fuel cleaning process, the survey variable *PAYHEAT* and the summary variable representing the home's primary heating fuel (*PHTFUEL*), were updated through the creation of new variables *PAYHEAT2* and *PHTFUEL2*. The survey variables were maintained for comparison purposes. Table 4-10 lists the percentage of respondents who pay for their heat. Missing values are included in the survey response *PAYHEAT*. The fuel cleaned variable, *PAYHEAT2*, has all missing values plugged. If the rate tariff information indicated that the residence is on a master meter gas account, and the residence has gas heat, *PAYHEAT2* has been set to zero. If the survey response lists wood as their primary heating fuel, and they indicate that they do not have a system, *PAYHEAT2* was set equal to one.

Table 4-10
Heating Payment Question Cleaning

Do you pay to heat your home?	<i>PAYHEAT</i>	<i>PAYHEAT2</i>
Yes	90.9%	94.8%
No, it is part of my rent	2.7%	3.9%
No, do not have a system	3.2%	0.7%
Missing	3.2%	-
Master Meter Gas	-	0.6%

Table 4-11 lists the percentage of homes with alternative primary heating fuels, conditional on the residence paying for their heat (*PAYHEAT* was set equal to one or *PAYHEAT2* was set equal to one) or on the presence of a gas master meter (*PAYHEAT2* was set equal to zero). If the home did not pay for heat, the primary heating fuel is set to not applicable (99).¹² During the fuel cleaning process, approximately 2.5% of the sample was switched into natural gas, and 2% were switched out of electric. Following the fuel cleaning process no primary heating fuels are listed as missing.

The CDA contains a gas and an electric heating fuel indicator variable, *DGHEAT* and *DEHEAT*, respectively. *DGHEAT* was set equal to one if the residence pays for their heat (*PAYHEAT2* was set equal to one) and the primary heating fuel is natural gas (*PHTFUEL2* was set equal to one). *DEHEAT* was set equal to one if the residence pays for their heat and primary heating fuel is electric (*PHTFUEL2* was set equal to two).

**Table 4-11
Primary Heating Fuel Cleaning**

Primary Heating Fuel	<i>PHTFUEL</i>	<i>PHTFUEL2</i>
Natural Gas	73.2%	76.9%
Electric	13.3%	11.3%
Bottled Gas	4.0%	4.4%
Wood	2.9%	2.5%
Solar	0.03%	0.01%
Other	0.4%	0.3%
Missing	2.8%	-
Not Applicable	3.5%	4.6%

The CDA model also accounts for the presence of backup electric and gas heaters. If the household has a primary electric heater and a non-electric backup, *NONELEBK* is set to one, zero otherwise. If the household has a primary electric heater and an additional electric heater, *DAUXHT* is set to one, zero otherwise. If the household has a primary gas heater and a non-gas backup, *NONGBU* is set to one in the gas CDA model, zero otherwise. If the household has a primary natural gas heater and an additional natural gas heater, *DAUXHT* was set equal to one, zero otherwise.

Room heat and central heat consume different quantities of energy. To allow the CDA to estimate different consumption patterns, indicators of room heat were developed. If the residence had gas heat, and the primary heater was a floor or wall furnace, *GROOM* was set equal to one, zero otherwise. If the residence had electric heat, and the primary heater was a resistance heater, a through the wall heat pump, or a portable heater, *ROOM* was set equal to one, zero otherwise.

The CDA also contained variables for the average thermostat temperature, *HTTSET*, and an indicator variable to account for thermostat setback. *HTTSET* represents a weighted average of the residence's survey responses to B6, the average thermostat temperature for each time period during the heating season. If the household did not have thermostat or if they left B6 blank, means were assigned by fuel type and household type (*single-family, multi-family, and mobile home*). *SETBK* is the heater thermostat setback variable. If the households nighttime heater setting (*HNITESET*) was lower than their average setting (*HTTSET*), *SETBK* was set to one, zero otherwise.

PHTFUEL3 was a variable that was added for the final dataset. It provides a combination of *PHTFUEL2* for all respondents who were included in the CDA modeling process. It adds in the previously established *PHTFUEL* variable for those who were not part of the CDA (primarily electrically master metered customers and

dwellings with problematic or insufficient billing data). *PHTFUEL3* provides a single variable to report final heating fuel for all study participants.

Water Heating Fuel Variables

During the fuel cleaning process, the survey variable *PAYWH* and the summary variable representing the home's primary water heating fuel (*PWHFUEL*), were updated through the creation of new variables *PAYWH2* and *PWHFUEL2*. The survey variables were maintained for comparison purposes. Table 4-12 lists the percentage of respondents who pay for their water heating. Missing values are included in the survey response *PAYWH*. If the rate tariff information indicates that the residence is on a master meter gas account, and the residence has gas water heat, *PAYWH2* was set to zero. During the fuel cleaning process, *PAYWH2* increased by approximate 7.5 percentage points. This increase was fairly evenly split between those who initially stated that their water heater was included in their rent and those who did not respond to the *PAYWH* survey question.

Table 4-12
Water Heating Payment Question Cleaning

Do you pay for water heat?	<i>PAYWH</i>	<i>PAYWH2</i>
Yes	84.0%	91.5%
No, it is part of my rent	11.8%	7.6%
No, do not have a system	1.2%	0.2%
Missing	3.0%	-
Master Meter Gas	-	0.7%

Table 4-13 lists the percentage of homes with alternative primary water heating fuels, conditional on the residence paying for their water heat (*PAYWH* was set equal to one or *PAYWH2* was set equal to one) or on the presence of a gas master meter (*PAYWH2* was set equal to zero). If the home did not pay for water heat, the primary water heating fuel is set to not applicable (99).¹³ The cleaned variable *PWHFUEL2* includes the plugged water heating variable for the CDA. During the fuel cleaning process, approximately 4.5% of the sample was switched into natural gas, 1% was switched out of electric and 3.4% was switched out of missing. Following the fuel cleaning process there are no missing primary water heating fuels.

**Table 4-13
Primary Water Heating Fuel Cleaning**

Primary Water Heating Fuel	PWHFUEL	PWHFUEL2
Natural Gas	72.6%	78.1%
Electric	9.6%	8.8%
Propane	4.7%	5.1%
Solar	0.03%	0.01%
Other	0.1%	0.1%
Missing	3.4%	-
Not Applicable	9.6%	7.9%

The CDA contains a gas, an electric, and a solar water heating fuel indicator variable, *DGWH*, *DEWH*, *DGWHSOLAR*, and *DWHSOLAR* respectively. Note, a solar water heater with an electric backup system will have two indicator variables set equal to one, *DEWH* and *DWHSOLAR*. A solar water heater with a natural gas backup system will also have two indicator variables set equal to one, *DGWH* and *DGWHSOLAR*. In addition, if the residence indicated that they had more than one electric water heater, the indicator variable *ADDWHEL* was set equal to one, zero otherwise.

PWHFUEL3 was a variable that was added for the final dataset. It provides a combination of *PWHFUEL2* for all respondents who were included in the CDA modeling process. It adds in the previously established *PWHFUEL* variable for those who were not part of the CDA (primarily electrically master metered customers and dwellings with problematic or insufficient billing data). *PWHFUEL3* provides a single variable to report final heating fuel for all study participants.

Dryers

During the fuel cleaning process, the survey dryer variable *CDTYP*, was updated with the creation of two new variables *GDRY* and *EDRY*. The survey variables were maintained for comparison purposes. Table 4-14 lists the percentage of survey responses for alternative dryer types. The table also contains the filled values for *GDRY* and *EDRY*. *GDRY* and *EDRY* are simple indicator (0-one) variables. After cleaning, there was an increase in both gas and electric dryers. This increase comes primarily from households with missing values for *CDTYP*.

**Table 4-14
Clothes Dryer Fuels**

Type of Dryer	CDTYPE	GDRY	EDRY
No Clothes Dryer	8.8%	-	-
Natural Gas	37.8%	38.8%	-
Electric	31.2%	-	32.6%
Bottled Gas	1.7%	-	-
Missing	2.3%	-	-
Not Appropriate	18.2%	-	-
Not Gas	-	61.2%	-
Not Electric	-	-	67.5%

Central Air Conditioners

During the fuel cleaning process, the central air conditioning survey variable *PAYCOOL*, was updated through the creation of *DCAC*, a zero-one indicator variable indicating the presence of a central air conditioner. The survey variables were maintained for comparison purposes. Table 4-15 lists the percentage of survey responses for *PAYCOOL*. The table also contains the filled values for *DCAC*. After cleaning, there was a very small increase in the percentage of households with air conditioning.

**Table 4-15
Central Air Conditioning Payment**

Do you pay for central air?	PAYCOOL	DCAC
Yes	45.0%	45.5%
No, it is part of my rent	2.5%	-
No, do not have central air	46.6%	-
Missing	6.0%	-
No, part of rent or no central air	-	54.5%

The CDA also contains a variable for the average central air conditioner thermostat temperature, *TSETC*. *TSETC* represents a weighted average of the residence's survey responses to C5, the average thermostat temperature for each time period during the cooling season. If the household had central air, and they did not have thermostat or they did not respond to the thermostat question, temperature means were assigned for *single-family, multi-family, and mobile home households* .

4.3.3 Creating Indicator and Continuous Variables

Many of the variables needed in the CDA require the creation of indicator variables (values of one, two, or three) or continuous variables (often taken as the mean of a range variable).

Housing Indicator

The *RESIDENCE* variable was used to create the CDA housing variable *RESTYPE1*. *RESTYPE1* reduces the five choice *RESIDENCE* variable to three residence types: single family, multifamily and mobile home. After using the data cleaning algorithm discussed above, a very small percentage of the responses to *RESIDENCE* remained missing. Examination of the responses to these surveys indicated that they most resembled single family residences. These households were coded as single family for the *RESTYPE1* variable. Table 4-16 summarizes the percentage of survey household in each category.

Table 4-16
Cleaned and Filled responses to type of residence building

Description	Residence	Restype1
Single Family	65.3%	65.4%
Multifamily: Townhouse	8.4%	29.99
Multifamily: 2-4 unit apartment	7.6%	
Multifamily: 5+ unit apartment	16.0%	
Mobile Home	2.7%	2.7%
Missing	0.1%	-

Seasonal Home Indicator

RASS question A4 asked respondents if their current residence was a seasonal home. Seasonal homes may use substantially less energy than year-round residences. The responses to the seasonal questions A4 and A5 were combined to create a seasonal home indicator variable. If the respondent indicated that the home was a seasonal residence, vacation home, or a vacation rental home, and they indicated that they did not always occupy the home, the *SEASONAL* variable was set to one, zero otherwise.

Double Pane Windows and an Indicator for Homes in Colder Zones

Homes in colder climate zones are often expected to use more energy for heating. These same homes, however, are frequently built with more insulation, double pane windows, and tighter window frames, reducing the impact of weather on energy usage. Prescriptive building requirements applying to CEUS weather zones 1, 161 and 162 suggest that new homes be built to withstand their colder climate. For the CDA, we created a Title 24 variable (T24) and set it to one if the home was located in zones 1, 161, or 162, zero otherwise. We also created an indicator of double pane windows. *DPWIN* was set equal to one if *WINDTYPE* was set equal to one (all or most double) or 2 (mixture of double and single), zero otherwise.

Fans

The CDA includes three types of fans; forced air fans, attic fans, and ceiling fans. Forced air fans are associated with central natural gas and central bottle gas furnaces. If *PHTFUEL2* was set equal to one or 3, and the heater is a central heater, then *DFFAN* was set equal to one, zero otherwise. Attic fans are used to cool the residence during the summer months. If the residence had an attic or a whole house fan, *DATTFAN* was set equal to one, zero otherwise. Ceiling fans were included in the electric CDA, in the miscellaneous term. *DCEILF* was set equal to one if the residence had at least one ceiling fan.

Room Air Conditioners

An indicator variable was created to indicate the presence of room air conditioners (*DRAC*) and a count variable was created to list the number of room air conditioners in the residence (*RACCNT*). The CDA also controls for room air conditioner usage. Using the responses to C8, room air conditioner usage, a usage variable *TSETUSE* was created. If the residence had a room air conditioner and C8 was missing, *TSETUSE* was filled using the mean by *RESTYPE1*.

Water Heater Usage

Energy usage for water heaters depends largely on the other systems in the residence, the number of individuals in the household, and the differential between the inflow water temperature and the desired temperature. The CDA model accounts for the other systems in the water heater usage analysis. *DWASHU* and *CWASHU* account for the water heater energy usage to run the dishwasher and the clothes washer. Both of these variables are usage variables, created respectively using the survey responses to F5, presence of a dishwasher, and E4, laundry load usage by

load temperature. If households with the specified system did not answer the frequency of use questions, *DWASHU* and *CWASHU* were filled using the mean by *RESTYPE1*.

In addition, the number of baths and showers taken in a typical day impacts the hot water heaters energy usage. *WHTSHWRS* is a count on the total number of baths and showers taken in the home on the typical day. If survey respondent did not respond to questions D6, number of baths and showers, *WHTSHWRS* was filled with the mean by *RESTYPE1*.

To account for the differential between the water inflow temperature and the desired water temperature, an inflow temperature was constructed. The constructed inflow temperature was a weighted moving average of the outside temperature during the previous two months. The water heater temperature differential, *WHTEMP_DIFF*, was created as the difference between the residences typical water heater setting (*WHTEMP*) and the constructed inflow temperature. If the household did not respond to *WHTEMP*, the *WHTEMP* variable was filled with the mean by *RESTYPE1*.

Kitchen Appliances

The kitchen appliances included in the CDA were ovens and ranges, microwave ovens, and dishwashers. If the residence indicated that they had an electric range or oven *DERGOV* was set equal to 1, zero otherwise. If the range or oven was natural gas, *DGRGOV* was set equal to one. If the residence had a microwave oven, *DMWV* was set to one, zero otherwise. The presence of a dishwasher was captured by the indicator variable *DDW*.

Laundry

The CDA included gas and electric dryers and electric clothes washers. If the household had a natural gas dryer or an electric dryer, *DGDYR* or *DEDYR* were set to one, respectively. The weekly usage of the dryer was captured by the variables *GDRYU* or *EDRYU*. If the survey response to *DRYLDS* was missing, and the residence had a dryer, *GDRYU* or *EDRYU* was filled using the mean by *RESTYPE1*.

The indicator variable for electric clothes washers was set to one if the residence indicated that they use laundry equipment in their home (*LNDRYEQP*) and they chose either a top loading or a front loading washer (*CWTYP*). The variable indicating the presence of a clothes washer was *DCW*.

Outdoor Lighting

The CDA estimated the energy usage of outdoor lighting using information on both the presence of outdoor lights and the types of fixtures and bulbs. Survey question L2 asked the resident the number and type of fixtures on the outside of their home (Exterior Fixtures). The responses to this question were expanded to continuous variables and then summed to determine the total number of exterior fixtures (*OLTFIX*). If the sum of exterior fixtures was greater than zero, *DOLT* was set equal to one, zero otherwise. If the respondent left the entire series of questions on exterior fixtures missing, they were assumed to have no outdoor lighting.

Outdoor fixtures often employ bulbs that use less energy than incandescent bulbs and outdoor lighting controls are also common. Variables were created to represent the proportion of outdoor fixtures containing compact fluorescents (*ONOCFL*), the proportion on timers (*OPROPTIM*), and the proportion on motion detector or dusk to dawn sensors (*OPROPSENS*).

Televisions

The energy usage of televisions is a function of the number of televisions, the size of the televisions, and the total hours of usage. The RASS Survey questioned respondents about the number of large screen televisions, the number of standard size televisions, and the total number of hours of television usage per day. If the household had either a conventional screen TV or a big screen TV, DTV was set equal to one, zero otherwise. The number of hours of usage was *TVHRS*.

Big screen and conventional televisions use different quantities of electricity for a set number of hours of usage. The CDA accounts for the differential electricity usage with the variable *TVKW*. *TVKW* was set to 0.1 kWh per hour for conventional televisions and 0.25 per hour for big screen televisions. If the individual had both big and conventional television, the usage numbers were multiplied by the proportion of TVs of that type.

Personal Computers and Home Offices

The dramatic growth in the number of personal computers and the proportion of the population working from home, led to the inclusion of these end-uses in the CDA. If the respondent used a personal computer in their home, *DPC* was set equal to one, zero otherwise. Both the hours of usage and the number of PCs were included. PCs are often not turned off and are commonly connected to modems for Internet usage. *PCNUM* indicated the number of PCs and *PCHRS* represented the total number of hours the PCs were turned on each day.

The home office survey questions were asked separately from the PC questions. The number of PCs represented the total number in the residence. The home office energy usage represented the additional energy associated with running an office from home. *DHMOFF* was set equal to one if the individual indicated that someone in the home operated a business or worked from home. *HMOFFHRS* indicated the numbers of hours a week someone works out of the home.

Pools

If the respondent had a pool at their home and they pay for its energy use, *DPLPMP* was set equal to one. Only individuals living in single family residences were allowed to have pools. All other pools listed in the survey were assume to be pools located in common areas, and were disallowed in the CDA.¹⁴ The number of hours per day used to filter the pool was captured by the variable *PLFILT*. This variable differs between summer months (May-October) and winter months (November-April). The pool size variable (*PLSIZE*) was set to 18,000 gallons for small pools, 30,000 for medium sized pools, and 42,000 for large pools.

If the pool was heated with electric heat, *EPLHT* was set to one, zero otherwise. If the pool was heated with natural gas, *DGPLHT* was set to one. The gas CDA also analyzed the impact of the frequency of pool heating, *GPLHTFREQ*. This variable was allowed to differ between summer and winter months. *PLCOV* indicates that the household used a pool cover. A pool cover may reduce the heating needs due to an increase in pool temperature or it may indicate a pool that was used more frequently, leading to an increase in heating needs.

Spas and Hot Tubs

If the respondent had a spa or hot tub at their home and they paid for its energy use, *DSPA* was set equal to one. Only individuals living in single family residences, town houses, or mobile homes were allowed to have spas and/or hot tubs. If the spa was heated with electricity or solar with electric backup, *DEHTSPA* was set to one. Spas heated by solar with electric backup also received an additional indicator variable, *SPASOLAR*. If the spa was heated with natural gas or solar with natural gas backup, *DGHTSPA* was set to one. Spas heated by solar with natural gas backup received an additional indicator variable, *SPAGSOLAR*.

The frequency of spa filtering (*SPAFREQ*) and electric (*SPAHTFREQ*) and natural gas (*SPAGHTFREQ*) heating were allowed to differ between summer and winter months. The spa size variable was based on the number of people the spa holds. If

the spa was small *SPASIZE* was set to 2, medium spas were set for 5 people, and large size spas for 8. *SPCOV* was set to one if the spa had an insulated cover.

4.3.4 Energy Usage for Refrigerators and Freezers

CDA models have difficulty accurately estimating end-uses with near 100% saturation. To improve the accuracy of refrigerator and freezer UECs, engineering estimates of refrigerator and freezer energy usage for each household were calculated.

Engineering Estimates of Refrigerator Energy Usage

The information collected about the refrigerators in the home was relatively extensive. The survey asked the age of the refrigerator, the door style (i.e., single-door, top freezer - bottom refrigerator, top refrigerator - bottom freezer, or side-by-side), whether the refrigerator was Frost Free or Manual Defrost, the size of the refrigerator (i.e., Mini (< 13 cu ft), Small (13 to 16 cu ft), Medium (17 to 19 cu ft), Large (20 to 23 cu ft), or Very Large (> 23 cu ft)), and whether the refrigerator had a through-the-door ice and water dispenser.

To formulate an engineering estimate of refrigerator energy usage, all of the refrigerator survey questions had to have non-missing responses. If the household did not respond to all of the refrigerator characteristic questions (G2), these variables were filled in order to facilitate engineering modeling. The following is the list of algorithms used to fill the refrigerator characteristics.

- If the survey did not contain information on the door style, the most common door style for the *RESTYPE1* , *RFNUM* combination was assigned.
- If the survey did not contain information on through-the-door ice, this was assigned based on door style. If the refrigerator was a side-by-side unit, *RFOTH* was set to one (ice), otherwise *RFOTH* was set to zero (no ice).
- If the survey did not contain information on the age of the refrigerator, it was filled with the mean age by *RESTYPE1* , *RFSTY*, and *RFNUM*.
- If the survey did not contain information on the size of the refrigerator, it was filled with the mean size by *RESTYPE1* , *RFSTY*, and *RFNUM*.
- If the survey did not contain information on the defrost style, it was assumed that the refrigerator was an automatic defrost unit unless the age of the

refrigerator was greater than 15 years. Additionally, we assumed that all side-by-side refrigerators were automatic defrost units.

The Association of Home Appliance Manufacturers (AHAM) website (www.aham.org) contains historic refrigerator usage data by size and type of unit. These data were compiled to estimate annual usage, controlling for door style, adjusted volume, defrost, and automatic icemakers. Using the parameters calculated from the AHAM data, and the respondent's refrigerator characteristics, base engineering estimates of refrigerator energy usage were calculated for first and second refrigerators. The base engineering estimates were then calibrated using two adjustment factors. The first adjustment factor was determined by AHAM. It accounts for improvements in energy usage per cubic foot through time. This factor allows us to explicitly adjust energy usage for the age of the refrigerator beyond the age range available in the larger AHAM dataset. The second adjustment factor helps to calibrate the engineering estimate of usage to differences in AHAM published data and our simulation model. The resulting engineering estimates of refrigerator energy usage were *REFUSAGE1* and *REFUSAGE2*.

Engineering Estimates of Freezer Usage

The information collected on freezers was also extensive. The survey asked the age of the freezer, whether the freezer was Frost Free or Manual Defrost, and the size of the freezer (i.e., Small (< 13 cu ft), Medium (13 to 16 cu ft), or Large (> 16 cu ft)).

To formulate an engineering estimate of freezer energy usage, all of the freezer characteristics had to have non-missing responses. If the household did not respond to all of the freezer characteristic questions (H2), these variables were filled. The following is the list of algorithms used to fill the freezer characteristics.

- If the respondent did not provide information on the freezer's style, the most prevalent style was assigned by *RESTYPE1* and *FZNUM*.
- If the respondent did not provide information on the freezer's age, the mean was assigned by *RESTYPE1*, *FZNUM*, and door style.
- If the respondent did not provide information on the freezer's size, the mean was assigned by *RESTYPE1*, *FZNUM*, and door style.

The AHAM freezer data were compiled to estimate annual usage, controlling for volume and defrost style. Using the parameters calculated from the AHAM data, and the respondent's freezer characteristics, base engineering estimates of freezer energy usage were calculated for first freezers. The base engineering estimates

were then calibrated using two adjustment factors which were similar to the refrigerator adjustment factors. This process was used to calculate *FZUSAGE*.

5: DATA ANALYSIS METHODOLOGY

5.1 Introduction

This section describes the statistical model used to estimate unit energy consumption (UEC) values for specific residential end uses. UECs were developed using a statistical technique called Conditional Demand Analysis (CDA).¹⁵ The CDA approach essentially makes use of the variation in appliance holdings and whole-house energy consumption across the study sample to econometrically disaggregate billed consumption into end use consumption values. Section 5.2 provides a general overview of the conditional demand framework. Sections 5.3 and 5.4 describe the derivation of the specific CDA model specifications used to characterize electricity and gas consumption for this project.

5.2 Overview of Conditional Demand Analysis

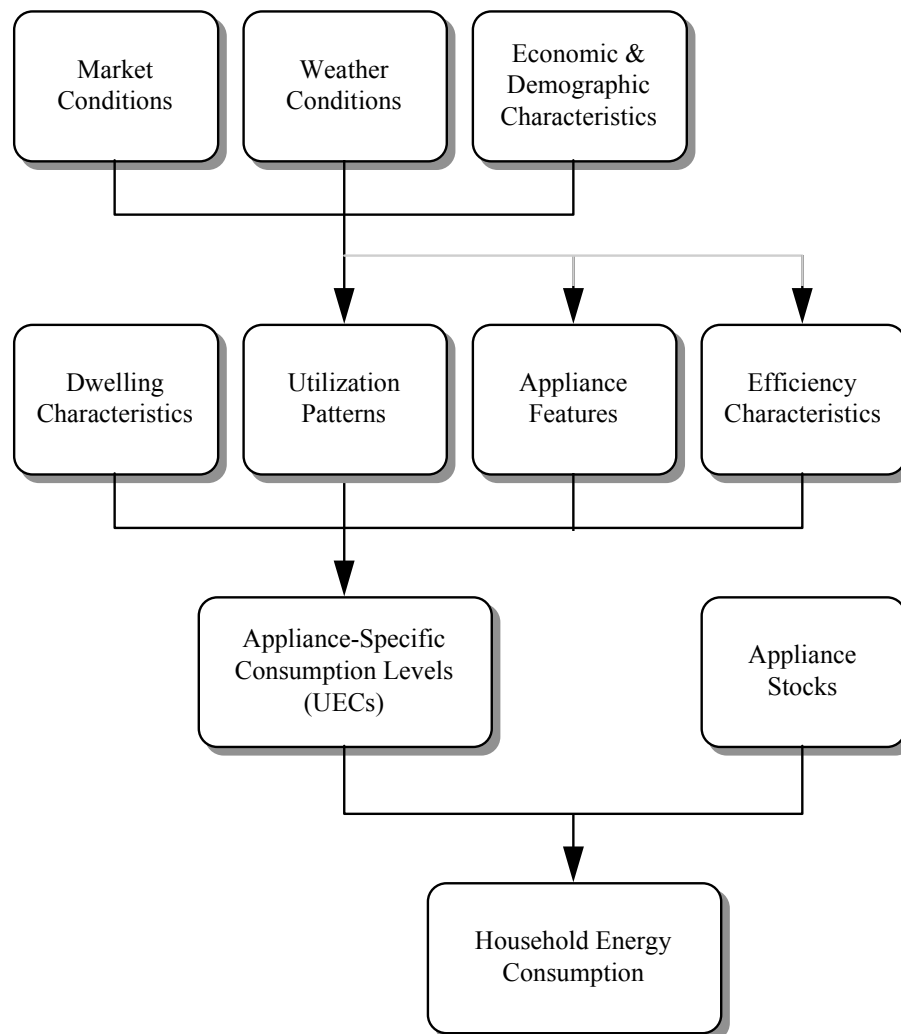
5.2.1 Graphical Overview

Figure 5-1 provides an overview of a basic conditional demand model. The underlying spirit of the approach is that a household's energy consumption is directly related to the stock of appliances present in the dwelling and the energy consumption levels associated with these appliances (unit energy consumption levels, or UECs). Unit consumption, in turn, is related to specific features of these appliances, dwelling characteristics, and the household's utilization patterns.

- Appliance stocks are typically represented in the CDA approach by a series of binary (0,1) or cardinal (1,2,3,..) indicators, generally defined for fairly specific appliance types. Binary indicators are used to indicate whether or not a particular system (e.g., central air conditioning) is present, whereas cardinal variables are used to represent appliances (say, TVs or refrigerators) where multiple units may be present.
- Appliance features include general characteristics like sizing (e.g., water heater capacities, air conditioner tonnage, etc.), as well as efficiencies and auxiliary equipment (e.g., intermittent ignition devices). Some direct information on these features can be available for the analysis. However, their roles can be recognized also indirectly by including variables that are expected to be correlated with the features (e.g. age of the structure, household size, etc.).

- Dwelling characteristics, which are most pertinent to space conditioning uses, can include surface area, insulation values, roofing materials, window areas, and other characteristics of the thermal shell.
- Utilization patterns include user-driven values such as cover thermostat settings on water heaters, pools/spas and space conditioning systems, as well as a variety of behavioral patterns relating to the use of other appliances. These utilization patterns are partially captured by surveys. When this information is unavailable, their effect can be incorporated indirectly into the model through the inclusion of market, weather, economic, and demographic variables likely to affect them.

Figure 5-1
Basic Overview of the Conditional Demand Model



5.2.2 A General Algebraic Specification of the Model

The basic conditional demand model can be represented in general algebraic form as:

$$(1) \quad \text{HEC}_{ht} = \sum_{a=1}^A \text{UEC}_{hat} \cdot S_{hat}$$

where the following variable definitions are used:

HEC_{ht} = energy consumption by household h in period t

UEC_{hat} = energy consumption through household h's appliance a in period t

S_{hat} = a binary indicator of household h's ownership of appliance a in period t.

Both HEC_{ht} and S_{hat} are observable. Information on appliance stocks (S_{hat}) is obtained through the survey database. This information is collected only once for each sampled household, so the time subscript (t) is dropped in the remainder of the discussion. Data on whole-house energy consumption (HEC_{ht}) is extracted from billing records in monthly, bimonthly, seasonal, or annual form. Values of end-use energy consumption (UEC_{hat}), however, are directly observable only for those sites that have been metered. Nonetheless, the CDA methodology allows the analyst to infer values of UEC_{hat} from the other information used to develop the model. This feature is the most direct benefit associated with the use of CDA.

The disaggregation of whole-house consumption is accomplished through the statistical association of consumption with the presence of appliances. To illustrate this, consider a very simple specification in which the UECs are treated as constants across households and over time. This type of model can be written as:

$$(2) \quad \text{HEC}_{ht} = \alpha_0 + \alpha_1 S_{h1} + \alpha_2 S_{h2} + \dots + \alpha_n S_{hn} + e_{ht}$$

where e_{ht} is an error term (the nature of which is discussed more fully below) and the terms are the UECs. Using standard regression analysis, the analyst can estimate the α_n 's. These estimates are based essentially on the tendency for household consumption to vary as appliance holdings vary. If homes with electric water heating tend to consume more energy than homes without this appliance, all other things equal, this tendency will be captured by the estimate of the coefficient on the water heating appliance variable. Each coefficient is interpreted as the increment in consumption due to the presence of the appliance in question, given the holdings of other appliances.

Of course, the above form of a conditional demand model is highly stylized, in that it treats UECs as constants across households. In fact, end-use consumption depends upon a variety of factors, as suggested earlier. This relationship can be formalized as:

$$(3) \text{UEC}_{\text{hat}} = f_a (\text{AF}_{\text{ha}}, \text{STRUC}_h, \text{EFF}_{\text{ha}}, \text{UP}_{\text{hat}}, e_{\text{hat}})$$

where: AF_{ha} = features of household h's appliance stock

STRUC_h = pertinent structural features

EFF_{ha} = factors relating to shell and equipment efficiencies

UP_{hat} = utilization patterns relating to appliance a

e_{hat} = a random error term for the end use.

As noted earlier, it seems reasonable to recognize the effect of weather conditions (call these WC_{ht}), market conditions (MC_{ht}), and the household's economic and demographic characteristics (EDC_h) on utilization patterns. So the model can be written as:

$$(4) \text{UP}_{\text{hat}} = g_a (\text{WC}_{\text{ht}}, \text{MC}_{\text{ht}}, \text{EDC}_h)$$

Explicit assumptions concerning the dependence of appliance features and structural characteristics on other variables could also be used, but assume for simplicity that data on these variables are available and that their values are taken as given for the purposes of the analysis.

Substituting (4) into (3) yields:

$$(5) \text{UEC}_{\text{hat}} = F_a (\text{AF}_{\text{ha}}, \text{STRUC}_h, \text{EFF}_{\text{ha}}, \text{WC}_{\text{ht}}, \text{MC}_{\text{ht}}, \text{EDC}_h, e_{\text{hat}})$$

where F_a is an estimated form of f_a . And, finally, substituting (5) into (1) provides the final general specification:

$$(6) \text{HEC}_{\text{ht}} = \sum_{a=1}^A F_a (\text{AF}_{\text{ha}}, \text{STRUC}_h, \text{EFF}_{\text{ha}}, \text{WC}_{\text{ht}}, \text{MC}_{\text{ht}}, \text{EDC}_h, e_{\text{hat}}) \cdot S_{\text{ha}}$$

5.2.3 Constructing Estimates of UECs

Once the Conditional Demand Model is estimated statistically, it can be used to infer unit energy consumption for individual households as well as designated subpopulations. Generally, these UEC values are defined for given reference values of time-dependent variables like weather and market conditions (call these W_{REF_h} and M_{REF_h} , respectively). Using the notation developed above, the UEC equation can be written as:

$$(7) \quad UEC_{ha} = G_a(AF_{ha}, STRUC_h, W_{REF_h}, M_{REF_h}, EDC_h, e_{hat}), \text{ for } S_h = 1$$

where G_a is an estimated form of F_a . As an example, suppose that the arguments of F_a include square footage ($SQFT_h$), heating degree-days (HDD_{ht}), and the marginal electricity price (MP_{ht}). Suppose also that the form of the function is linear. Then the UEC for this end use would be equal to an estimated form of F_a , which might look like:

$$(8) \quad UEC_{ha} = \alpha_0 + \alpha_1 SQFT_h + \alpha_2 HDD_t + \alpha_3 MP_{ht} \quad \text{for } S_h = 1$$

where the α_h 's are estimated coefficients.

The standard practice for evaluating UECs involves using the average price level over the period of estimation, although another price could be inserted. It is also common to use normal weather conditions to derive UECs. When this practice is followed, the resultant estimates are called weather-normalized UECs.

Deriving UECs on a household-by-household basis (by substituting each household's value of the variables in the UEC equation) can be a useful intermediate step, however, estimates are generally derived for households as a whole or for selected classes of households (single-family residences only, residents of a particular operating region, or geo-demographic segments). The derivation of group UECs (call a group mean UEC_a) is straightforward. Perhaps the most common approach to this calculation is to average household-level UEC estimates over the relevant group. Allowing for the use of sampling weights on individual households (w_h), we would have:

$$(9) \quad UEC_a = \frac{(\sum_h w_h UEC_{ha})}{\sum_h w_h}$$

where the summation is over the set of households with the appliance in question (i.e., for whom $S_{ha} = 1$). Once household-specific UECs are calculated, these values

are summarized very easily for household groupings using standard subroutines in various statistical programs.

5.3 Specification of the Electric CDA Model

5.3.1 Overview of End Uses

This section derives the California RASS CDA model for electricity consumption. The model is used to disaggregate whole-house electricity consumption into 25 end uses:

- Primary space heating
- Secondary space heating
- Central air conditioning
- Room air conditioning
- Evaporative coolers
- Forced air fans
- Water heating
- Primary refrigerators
- Secondary refrigerators
- Freezers
- Ranges and ovens
- Microwave ovens
- Dishwashers
- Clothes washers
- Dryers
- Outdoor lighting
- Televisions
- Home offices
- Personal computers
- Swimming pool pumps
- Spa pumps
- Spa heat
- Waterbed heaters
- Well pumps
- Miscellaneous

A considerable attempt was also made to develop UECs for indoor lighting as part of this project. However, the lack of variation in the presence of indoor lighting across homes, coupled with the lack of detailed indoor lighting inventories, made it impossible to use the CDA for this approach. In order for CDA to isolate

consumption associated with a specific end use, one of two conditions must be present: the presence of this end use varies across homes (that is, some homes have it and some do not), or the availability of detailed end use inventories allow the construction of engineering priors for end use consumption. Obviously, all homes in the sample have indoor lighting, so the first condition was not met. Moreover, as is common for mail surveys, the RASS survey did not yield detailed enough information on indoor lighting to support the development of reliable engineering estimates.

In the remainder of this section, we derive the end use elements of the electric CDA model.

5.3.2 Electric Model Derivation

Primary Electric Space Heating Model

The electric space heating UEC model is based on a fundamental balance equation:

$$(10) \quad EHEATUSE_{ht} = \frac{[HEATLOSS_{ht} - BUHT_{ht}]}{EFFH_h}$$

where primary space heating usage ($EHEATUSE_{ht}$) is assumed to be equal to net heat loss ($HEATLOSS_{ht}$), less the heat loss replaced by non-electric secondary heating systems ($BUHT_{ht}$), converted by a system efficiency ($EFFH_h$). The net heat loss from a structure can be written as:

$$(11) \quad HEATLOSS_{ht} = SURFLOSS_{ht} - SOLGAIN_{ht} - INTGAIN_{ht}$$

where $SURFLOSS_{ht}$ reflects losses through envelope surfaces and includes wall, floor, roof, chimney, and infiltration losses; $SOLGAIN_{ht}$ is solar gain through all surfaces during potential heating periods, and $INTGAIN_{ht}$ reflects internal gains during these periods.

Total surface losses can be determined from the familiar relation:

$$(12) \quad SURFLOSS_{ht} = \alpha_l U_h AREA_h TDIFF_{ht}$$

where U_h is the overall conductivity of the shell, $AREA_h$ is the total surface area, and $TDIFF_{ht}$ is the differential between inside and outside temperature levels, cumulated over all hours of the period for which the differential is positive.

Solar gain during potential heating periods is assumed to be related to surface area, minutes of sunlight (MINOFLIGHT_{ht}), and a variable indicating that the month is a winter month (WINTER_t):

$$(13) \quad SOLGAIN_{ht} = \alpha_2 AREA_h MINOFLIGHT_{ht} WINTER_t$$

Internal gain during the winter months is assumed to be proportional to surface area of the home:

$$(14) \quad INTGAIN_{ht} = \alpha_3 AREA_h WINTER_t$$

Shell surface area is modeled as a function of square footage where β is an elasticity of surface area with respect to square footage:

$$(15) \quad AREA_h = \alpha_4 SQFT_h^\beta$$

This relationship was estimated using on-site data from the Residential New Construction Survey, an effort being conducted by Itron. The area equation was estimated separately for each residence type.

Shell conductivity is assumed to be related to the presence of double-pane glass (DPWIN_h), a binary variable reflecting the location of the home in a Title 24 Standards Climate Zone with stringent insulation requirements (T24_h), and a binary variable indicating that the home is a multi-family dwelling (MF_h):

$$(16) \quad U_h = \alpha_5 + \alpha_6 T24_h + \alpha_7 DPWIN_h + \alpha_8 MF_h$$

The Title 24 variable was used to reflect differences in the expected shell integrity between zones with stringent standards and those with base standards. It was initially intended to use variables representing the presence of ceiling and wall insulation, but these variables did not perform well at all in the early process of model estimation. This is unsurprising, insofar as mail survey data on insulation tend to be unreliable. The multi-family variable is included to account for the influence of adiabatic walls in multi-family structures

The temperature differential is affected by both behavioral and weather factors. It can be written as:

$$(17) \quad TDIFF_{ht} \equiv \sum [TDES_{ht} - T_{ht}] \quad \text{for } TDES_{ht} \geq T_{ht}$$

where $TDES_{ht}$ is the desired internal temperature and T_{ht} is the outside temperature, and where the summation is across all hours of the period in question. The following specification was used to capture the influence of both outdoor temperatures and thermostat set points on effective temperature differentials:

$$(18) \quad TDIFF_{ht} = HDD_{ht} (\alpha_9 + \alpha_{10} INC_h + \alpha_{11} ROOM_h + \alpha_{12} SETBK_h + \alpha_{13} HTTSET_h + \alpha_{14} SEASONAL_h)$$

This specification is based on the notion that heating degree-days (HDD_{ht}), a variable that captures variations in outdoor temperatures but which is based on a single reference temperature for all homes, is a good proxy for the general temperature differential. However, the relation also recognizes the existence of household-specific variations in desired temperatures, as represented by reported daytime thermostat settings ($HTTSET_h$), nighttime setbacks ($SETBK_h$), the presence of room heating ($ROOM_h$), and a binary variable indicating that the home is a seasonal home ($SEASONAL_h$). Income (INC_h) is included in this expression to account for its influence on actual differences in operation across homes.

The contribution of non-electric secondary space heating can be modeled simply as:

$$(19) \quad BUHT_{ht} = \alpha_{15} NONELEBK_h HDD_{ht} AREA_h$$

where $NONELEBK_h$ is a binary variable indicating the presence of non-electric backup heat.

The variation in system efficiencies is accommodated through the recognition of specific electric heating technologies. In particular, we use the following specification in the model:

$$(20) \quad EFFH_h = CONV_h + \alpha_{16} HP_h$$

where $CONV_h$ and HP_h are binary variables indicating that the system is conventional or a heat pump, respectively. Note that conventional systems are assigned an efficiency of 1.0, while heat pumps are assumed to have relative heating efficiencies of α_{16} . For the purposes of our analysis, the value of the heat pump efficiency was taken to be 2.0. In our subsequent discussion of the model, note that these efficiency values are embedded in the other variables of the model (i.e., all heating cross-products are divided by 2.0 for heat pumps).

Combining equations (10) through (20), we obtain the full specification of the electric space heating model. This specification is presented below. Note that some cross-

product terms have been dropped as a consequence of their poor performance in the subsequent estimation process.

(21)

$$\begin{aligned}
 EHEATUSE_{ht} = & \left[\begin{aligned}
 & \alpha_1 HDD_{ht} AREA_h + \alpha_2 HDD_{ht} AREA_h T24_h \\
 & + \alpha_3 HDD_{ht} AREA_h DPWIN_h \\
 & + \alpha_4 HDD_{ht} AREA_h MF_h + \alpha_5 HDD_{ht} AREA_h AVGINC_h \\
 & + \alpha_6 HDD_{ht} AREA_h DPWIN_h INC \\
 & + \alpha_7 HDD_{ht} AREA_h MF_h INC_h \\
 & + \alpha_8 HDD_{ht} AREA_h ROOM_h \\
 & + \alpha_9 HDD_{ht} AREA_h DPWIN_h ROOM_h \\
 & + \alpha_{10} HDD_{ht} AREA_h MF_h ROOM_h \\
 & + \alpha_{11} HDD_{ht} AREA_h SETBK_h \\
 & + \alpha_{12} HDD_{ht} AREA_h DPWIN_h SETBK_h \\
 & + \alpha_{13} HDD_{ht} AREA_h MF_h SETBK_h \\
 & + \alpha_{14} HDD_{ht} AREA_h HTTSET_h \\
 & + \alpha_{15} HDD_{ht} AREA_h DPWIN_h HTTSET_h \\
 & + \alpha_{16} HDD_{ht} AREA_h MF_h HTTSET_h + \alpha_{17} AREA_h WINTER_{ht} \\
 & + \alpha_{18} AREA_h MINSUN_{ht} WINTER_{ht} \\
 & + \alpha_{19} HDD_{ht} SEASONAL_h \\
 & + \alpha_{20} NONEBU_h HDD_{ht} AREA
 \end{aligned} \right] / EFFH_h
 \end{aligned}$$

Note that all parameters in (21) are redefined relative to the values specified in the derivation of the model. We do this to conserve on parameter names.

Secondary Electric Space Heating

A simple specification is included in the model for auxiliary electric space heating ($EAUXHTUSE_{ht}$):

(22)

$$EAUXHTUSE_{ht} = \alpha_{21}HDD_{ht} + \alpha_{22}HDD_{ht}AREA_h + \alpha_{23}HDD_{ht}AREA_hMF_h + \alpha_{24}HDD_{ht}AREA_hADDFREQ_h$$

where $ADDFREQ_h$ is a variable representing the frequency with which auxiliary heating is used.

Central Air Conditioning

Central and room air conditioning are modeled separately. For homes with central air conditioning systems, cooling energy usage ($CACUSE_{ht}$) is assumed to be determined by a balance equation of the form:

$$(23) \quad CACUSE_{ht} = \frac{HEATGAIN_{ht} - AUXCOOL_{ht}}{EFFC_h}$$

where $HEATGAIN_{ht}$ represents both internal gains and heat gain through the structure, $AUXCOOL_{ht}$ reflects the use of auxiliary cooling (identified here as evaporative cooling) and where $EFFC_h$ represents the efficiency of the system. Total heat gain is specified as:

$$(24) \quad HEATGAIN_{ht} = SURFGAIN_{ht} + SOLGAINC_{ht} + INTGAINC_{ht}$$

where $SURFGAIN_{ht}$ is a measure of total convective heat gain through structural surfaces, $SOLGAINC_{ht}$ indicates total solar radiant gain during potential cooling periods, and $INTGAINC_{ht}$ is total internal gain during these periods. The total convective gain can be written as:

$$(25) \quad SURFGAIN_{ht} = \beta_{25}U_hAREA_hTDIFFC_{ht}$$

where $TDIFFC_{ht}$ is the differential between the outside temperatures (T_{ht}) and the desired indoor temperatures ($TDES_{ht}$), cumulated over hours when the differential is positive. That is:

$$(26) \quad [TDIFFC_{ht} \equiv \sum [T_{ht} - TDES_{ht}]] \quad \text{for } T_{ht} \geq TDES_{ht}$$

Solar gain during potential cooling periods are assumed to be related to minutes of sunlight, shell area and as an indicator of summertime (SUMMER_t):

$$(27) \quad SOLGAIN_{ht} = \beta_{26} AREA_h MINSUN_{ht} SUMMER_t$$

Internal gain during the summer is assumed to be proportional to surface area.

$$(28) \quad INTGAIN_{ht} = \beta_{27} AREA_h SUMMER_t$$

Shell surface area is modeled as a function of square footage where β is an elasticity of surface area with respect to square footage:

$$(29) \quad AREA_h = \beta_{28} SQFT_h^\beta$$

Shell conductivity is assumed to be related to the presence of ceiling and wall insulation, and indicated by the Title 24 stringency variable defined earlier, double-pane glass (DPWIN_h) and a binary variable indicating that the home is a multi-family dwelling (MF_h):

$$(30) \quad U_h = \beta_{29} + \beta_{30} T24_h + \beta_{31} DPWIN_h + \beta_{32} MF_h$$

The latter variable is included to account for the influence of adiabatic walls in multi-family structures.

The cooling temperature differential is assumed to be a function of cooling degree-days (CDD_{ht}), which is defined with a common reference temperature of 65°F, income, and the cooling system thermostat setting (TSETC_h). The inclusion of the thermostat setting and the income term is designed to capture differences in cooling system operation across homes.

$$(31) \quad TDIFFC_{ht} = (\beta_{33} + \beta_{34} INC_h + \beta_{35} TSETC_h) CDD_{ht}$$

Auxiliary cooling is specified as a function of the presence of evaporative cooling (DSWAMP), cooling degree-days, and the summer variable:

$$(32) \quad AUXCOOL_{ht} = \beta_{36} AREA_h CDD_{ht} DSWAMP_h + \beta_{37} AREA_h DSWAMP_h SUMMER_t$$

Inferences regarding air conditioner efficiency must be made similar to those for space heating where specific information is not available. Efficiency is assumed to

be related to system vintage, with newer units assumed to be more efficient in general than older units. In order to reflect this assumption, a set of incremental terms involving a binary variable representing new homes (homes six years old or newer) was added to the model.

Combining equations 23 through 32 and adding the new home terms yields the full central air conditioning model. This specification is presented below (note again that we reuse parameter subscripts for economy):

$$\begin{aligned}
 (33) \quad CACUSE_{ht} = & \left[\begin{aligned}
 & \beta_{25} CDD_{ht} AREA_h + \beta_{26} CDD_{ht} AREA_h T24_h \\
 & + \beta_{27} CDD_{ht} AREA_h DPWIN_h \\
 & + \beta_{28} CDD_{ht} AREA_h MF_h + \beta_{29} CDD_{ht} AREA_h INC_h \\
 & + \beta_{30} CDD_{ht} AREA_h DPWIN_h INC \\
 & + \beta_{31} CDD_{ht} AREA_h MF_h INC_h \\
 & + \beta_{32} CDD_{ht} AREA_h TSET_h \\
 & + \beta_{33} CDD_{ht} AREA_h DPWIN_h TSET_h \\
 & + \beta_{34} CDD_{ht} AREA_h MF_h TSET_h + \beta_{35} AREA_h SUMMER_t \\
 & + \beta_{36} AREA_h MINSOFLIGHT_{ht} SUMMER_t \\
 & + \beta_{37} CDD_{ht} AREA_h NEWHOME_h \\
 & + \beta_{38} CDD_{ht} AREA_h NEWHOME_h INC_h \\
 & + \beta_{39} CDD_{ht} AREA_h TSETC_h NEWHOME_h \\
 & + \beta_{40} AREA_h DSWAMP_h SUMMER_t \\
 & + \beta_{41} AREA_h CDD_{ht} DSWAMP_h
 \end{aligned} \right]
 \end{aligned}$$

Room Air Conditioning

A similar albeit more parsimonious specification will be used for room air conditioning ($RACUSE_{ht}$), except that a term will be used to reflect the number of room air conditioning units ($RACCNT_h$). This stems from the assumption that total usage depends on the number of room air conditioners.

$$(34) \quad RACUSE_{ht} = \left[\begin{array}{l} \beta_{42} CDD_{ht} AREA_h \\ + \beta_{43} CDD_{ht} AREA_h DPWIN_h \\ + \beta_{44} CDD_{ht} AREA_h MF_h \\ + \beta_{45} CDD_{ht} AREA_h AVGINC_h \\ + \beta_{46} CDD_{ht} AREA_h DPWIN_h INC_h \\ + \beta_{47} CDD_{ht} AREA_h MF_h INC_h \\ + \beta_{48} CDD_{ht} AREA_h TSETUSE_h \\ + \beta_{49} CDD_{ht} SQFT_h^\beta MF_h TSET_h \\ + \beta_{50} CDD_{ht} AREA_h RACCNT_h \\ + \beta_{51} CDD_{ht} AREA_h DSWAMP_h \end{array} \right]$$

Evaporative Coolers

Usage by evaporative coolers ($EVAPCUSE_{ht}$) is assumed to depend upon cooling degree-days and surface area:

$$(35) \quad EVAPCUSE_{ht} = \beta_{52} CDD_{ht} + \beta_{53} CDD_{ht} AREA_h$$

Forced Air Heating-Related Ventilation

Furnace fan usage ($FFANUSE_{ht}$) is assumed to be related to the presence of central forced air heating and to heating requirements. In order to economize on the number of parameters to be estimated, a simplified model for furnace fan usage is employed.

$$(36) \quad FFANUSE_{ht} = \gamma_0 HDD_{ht} SQFT_h$$

Electric Water Heating

The spirit of the electric water heating equation is captured by the expression:

$$(37) \quad EWHEATUSE_{ht} = \frac{[WHLOSS_{ht} + VUSE_{ht}]}{EFFWH_h}$$

where $EWHEATUSE_{ht}$ is total electricity consumption for water heating, $WHLOSS_{ht}$ reflects heat losses associated with standby losses from the heating unit, $VUSE_{ht}$ represents heat losses tied to water usage, and $EFFWH_h$ reflects the efficiency of the unit. Given the lack of survey information on unit efficiency, we assume that efficiency is constant across homes (except that the presence of solar assist is considered below).

For simplicity, we link standing tank losses to the number of household members (a proxy for tank size), tank temperature ($WHTEMP_h$), residence type (as indicated by the binary multi-family indicator, MF_h), and the presence of more than one tank ($ADDWHEL_h$):

$$(38) \quad \begin{aligned} WHLOSS_{ht} = & \delta_0 + \delta_1 \log(NUMI_h + 1) + \delta_2 \log(NUMI_h + 1)MF_h \\ & + \delta_3 ADDWHEL_h + \delta_5 DWHSOLAR_h \end{aligned}$$

This reflects the assumption that primary tank sizes are related to household size. The logarithmic functional form used for this relationship has been developed over a large number of CDA studies, and seems to best fit the data on water heating usage. The loss equation also reflects the likelihood that total piping lengths will be lower in multi-family dwellings than in single family structures, thus leading to lower losses. The last term in this expression is used to represent the replacement of heat loss through the presence of a solar system, where $DWHSOLAR_h$ indicates the presence of solar assist.

We assume that monthly usage-related fuel consumption depends upon the household size as well as the number of dishwasher loads ($DWASHU_h$), washing machine loads ($WMACHU_h$), showers ($TOTAL_SHTSHWRS_h$) reported by the households in question, and the temperature differential between the tank temperature and the inlet temperature ($WHTEMP_DIFF_{ht}$).

$$(39) \quad \begin{aligned} VUSE_h = & \delta_6 + \delta_7 DWASHU_h + \delta_8 WMACHU_h + \delta_9 WHTSHWRS_h \\ & + \delta_{10} \log(NUMI_h + 1) + \delta_{11} WHTEMP_DIFF_{ht} \end{aligned}$$

Substituting (38) and (39) into equation (37), we obtain our basic water heating relation:

$$\begin{aligned}
EWHEATUSE_{ht} = & (\delta_0 + \delta_6) + (\delta_1 + \delta_{10}) \log(NUMI_h + 1) + \delta_2 \log(NUMI_h + 1) MF_h \\
& + \delta_3 ADDWHEL_h + \delta_4 WHTEMP_DIFF_{ht} + \delta_5 DWHSOLAR_{h15} \\
& + \delta_7 DWASHU_h + \delta_8 WMACHU_h + \delta_9 WHTSHWRS_h \\
& + \delta_{10} \log(NUMI_h + 1) + \delta_{11} WHTEMP_DIFF_{ht}
\end{aligned}
\tag{40}$$

Primary Refrigerators

For primary refrigerator usage ($REF1USE_h$), we use the simple relation:

$$REF1USE_{ht} = \lambda_1 REFUSAGE1_h \tag{41}$$

where $REFUSAGE1$ is an engineering estimate of usage based on unit size and efficiency. Insofar as the survey did not provide information on efficiency, this characteristic was inferred from the unit type and age, coupled with AHAM shipments data on refrigerator efficiency by type and age. The algorithm used for this calculation was discussed in Section 4.3.4.

Secondary Refrigerators

Second refrigerator usage ($REF2USE_h$) is specified as:

$$REF2USE_{ht} = \left(\lambda_2 + \lambda_3 MF_h + \lambda_4 SUMMER_t \right) REFUSAGE2_h \tag{42}$$

where $REFUSAGE2_h$ is an engineering estimate of usage based on reported number, size, age and type of second and subsequent refrigerators, coupled with AHAM shipments data, and $SUMMER_t$ is an indicator that the period is a summer month. (See Section 4.3.4.)

Freezers

Freezer consumption ($FREEZUSE_h$) is modeled in terms of an engineering estimate of usage ($FRZRUSAGE_h$). This estimate is based on the number, type(s), size(s) and age(s) of the freezers owned by the household. Like refrigeration above, AHAM shipments data was used to obtain the engineering estimates for freezer usage. (See Section 4.3.4.) The freezer equation is a simple adjustment function given by:

$$(43) \quad FREEZUSE_{ht} = \lambda_5 FRZRUSAGE_h$$

Ranges and Ovens

Energy consumption through kitchen ranges and ovens ($RNGEOVNUSE_h$) will be specified as:

$$(44) \quad RNGEOVNUSE_h = \mu_1 + \mu_8 \log(NUMI_h + 1) + \mu_3 \log(NUMI_h + 1) INC_h - \mu_4 \log(NUMI_h + 1) MICRO_h$$

where $MICRO_h$ reflects the presence of a microwave oven. The negative sign on the microwave variable indicates our expectation that these units act as substitutes for ranges in at least some activities. The sign on real income is theoretically indeterminate but is probably negative. It is unlikely that increases in income cause increased range usage. Instead, higher income households may tend to use the range less because of a higher propensity to eat away from home and a lower likelihood of being home during lunch time.

Microwave Ovens

The impact of microwave ovens on range/oven consumption was addressed above. Of course, microwaves consume power and must be included in the electricity equation. We incorporate microwave consumption ($MICWAVUSE_{ht}$) as a function of household size:

$$(45) \quad MICWAVUSE_{ht} = \mu_5 \log(NUMI_h + 1)$$

Dishwashers

Dishwashers affect energy consumption both directly and indirectly. The indirect impacts operate through water heating requirements and have been treated above. The direct effects entail the use of electricity for operation of the units (motor loads and, in the case of some dishwashers, electric water heater boosters). We assume the following simple relation:

$$(46) \quad DWASHUSE_{ht} = \mu_6 + \mu_7 \log(NUMI_h + 1)$$

where $DWASHUSE_{ht}$ indicates direct consumption through dishwashers.

Clothes washers

Washing machines also affect energy consumption both directly and indirectly. The indirect impacts operate through water heating requirements and have been treated above. The direct effects entail the use of electricity for operation of the units. We assume the following simple relation:

$$(47) \quad WMASHUSE_{ht} = \mu_8 + \mu_9 \log(NUMI_h + 1)$$

where WMACHUSE_{ht} indicates direct consumption through washing machines (motor usage).

Electric Dryers

Energy consumption by clothes dryers (EDRYERUSE_{ht}) will be assumed to be related to household size and reported dryer loads (EDRYU_h)

$$(48) \quad EDRYERUSE_{ht} = \mu_{10} + \mu_{11} EDRYU_h + \mu_{12} \log(NUMI_h + 1)$$

Outdoor Lighting

The outdoor lighting model will explain outdoor lighting use (OLTUSE_{ht}) in terms of the total number of fixtures (OLTFIX_h) and the usage per fixture (OLTUT_{ht}). Usage per fixture is assumed to be a function of the proportion of CFLs (OPROPCFL_h), the proportion of fixtures using HID lamps (OPROPHID_h), the proportion of fixtures on motion sensors (OPROPSENS_h), the proportion on dusk-to-dawn sensors or timers (OPROPTIM_h), and the number of hours of darkness in the month in question (HRDK_{ht}). The outdoor lighting equation is thus:

$$(49) \quad OLTUSE_{ht} = (\eta_0 + \eta_1 OPROPCFL_h + \eta_2 OPROPHID_h + \eta_3 OPROPSENS_h + \eta_4 OPROPTIM_h + \eta_5 HRDK_{ht}) OLFIX_h$$

Proportions of CFLs, fixtures on dimmers, and fixtures on sensors were derived from the numbers of fixtures of these types and the total number of fixtures.

Televisions

Electricity consumption through televisions ($TVUSE_{ht}$) is assumed to be related to the total connected load for televisions ($TVKW_h$) as well as hours of use ($TVHRS_h$):

$$(50) \quad TVUSE_{ht} = \sigma_0 TVKW_h + \sigma_1 TVHRS_h TVKW_h$$

Connected loads were derived from the numbers of TVs (standard and big-screen) and prior estimates of the connected load per unit for these types of units.¹⁶

Home Office Equipment

Electricity use associated with home offices ($EHMOFFUSE_h$) will be modeled very simply as:

$$(51) \quad EHMOFFUSE_{ht} = \sigma_2 + \sigma_3 HMOFFHRS_h$$

where $HMOFFHRS_h$ is hours of use of the home office.

Personal Computers

Electricity use for personal computers ($PCUSE_{ht}$) is assumed to be related to number of personal computers ($PCNUM_h$) and the total number of hours of use per day ($PCHRS_h$):

$$(52) \quad PCUSE_{ht} = \sigma_4 + \sigma_5 PCNUM_h + \sigma_6 PCHRS_h PCNUM_h$$

Swimming Pool Pumps

Energy consumption through the operation of swimming pool pumps ($PLPUMPUSE_{ht}$) is assumed to be linked to household size, temperatures and the season in question.

$$(53) \quad PLPUMPUSE_{ht} = \sigma_7 + \sigma_8 PLFILT_{ht} + \sigma_9 PLFILT_{ht} PLSIZE_h$$

where $PLSIZE_h$ is pool size and $PLFILT_h$ is hours of use of filters (which is assumed to vary across seasons).

Spa Pumps

Electricity consumption through spa pumps ($SPAPUMPUSE_{ht}$) is assumed to depend upon spa size ($SPASIZE_h$) and frequency of use of the spa filter ($SPAFFREQ_h$):

$$(54) \quad SPAPUMPUSE_{ht} = \sigma_{10} + \sigma_{11} SPAFFREQ_h + \sigma_{12} SPAFFREQ_h SPASIZE_h$$

Electric Spa Heat

Electric spa heating usage ($SPAHTUSE_{ht}$) is assumed to be determined by spa size, the frequency with which the spa is heated in the season in question ($SPAHTEFREQ_h$), the presence of an insulated cover ($SPACOV_h$), and the presence of solar assist ($SPASOLAR_h$):

$$(55) \quad \begin{aligned} SPAHTUSE_{ht} = & \sigma_{13} + \sigma_{14} SPAHTEFREQ_h + \sigma_{15} SPAHTEFREQ_{ht} SPASIZE_h \\ & + \sigma_{16} SPACOV_h SPASIZE_h + \sigma_{17} SPASOLAR_h \end{aligned}$$

Waterbed Heaters

Consumption of electricity for heated waterbeds ($WBEDHTUSE_h$) is assumed to be proportional to the number of waterbeds ($WBEDHTN_h$):

$$(56) \quad WBEDHTUSE_h = \sigma_{18} WBEDHTN_h$$

Well Pumps

Well pump usage ($WELLPUSE_{ht}$) is assumed to be associated with the household size:

$$(57) \quad WELLPUSE_{ht} = \sigma_{19} + \sigma_{20} (NUMI_h + 1)$$

Miscellaneous

A variety of other electric appliances may be owned by households (fans, mixers, etc.). To account for consumption through these other specified and unspecified uses ($MISCUSE_{ht}$), we use the formulation:

(58)

$$\begin{aligned} MISCUSE_{ht} = & \omega_0 + \omega_1 AVGINC_h + \omega_2 SQFT_h + \omega_3 \log(NUMI_h + 1) \\ & + \omega_4 NEWHOME_h + \omega_5 MF_h + \omega_6 SEASONAL_h + \omega_7 EPLHT + \omega_8 DCEILF_h \\ & + \omega_9 DATTFAN_h CDD_{ht} + \omega_{10} DATTFAN_h AREA_h CDD_{ht} \end{aligned}$$

Where $SEASONAL_h$ reflects that the home is a seasonal home, $EPLHT_h$ indicates the presence of electric pool heat, $DATTFAN_h$ indicates the presence of an attic fan, and $DCEILF_h$ reflects the presence of ceiling fans.

Summary of Electric Model

The electric model is derived by summing the above usage specifications, each multiplied times a binary variable representing the presence of the electric end use in question:

(59)

$$\begin{aligned} ELECUSE_{ht} = & EHEATUSE_{ht} DEHEAT_h + EAUXHTUSE_{ht} DEAUXHT_h \\ & + CACUSE_{ht} DCAC_h + RACUSE_{ht} DRAC_h + FFANUSE_{ht} DFFAN_h \\ & + EWHEATUSE_{ht} EWHFRAC_t DEWH_h \\ & + REF1USE_{ht} DREF1_h + REF2USE_{ht} DREF2_h \\ & + FREEZUSE_{ht} DFRZ_h + RNGEOVNUSE_{ht} DERNGOV_h \\ & + MICWAVUSE_{ht} MICWVFRAC_t DMWV_h + DWASHUSE_{ht} DWFRAC_t DDW_h \\ & + EDRYERUSE_{ht} DRYFRAC_t DEDRY_h + OLTUSE_{ht} DOLT_h \\ & + TVUSE_{ht} DTV_h + EHMOFFUSE_{ht} DHMOFF_h + PCUSE_{ht} DPC_h \\ & + PLPUMPUSE_{ht} DPLPMP_h + EPLHEATUSE_{ht} DEPLHT_h + SPAPUMPUSE_{ht} DSPA_h \\ & + ESPAHTUSE_{ht} DESPAHT_h + WBEDHTUSE_{ht} DEWB_h + WELLPUSE_{ht} DWELLP_h \\ & + MISCUSE_{ht} \end{aligned}$$

where the variables beginning with the prefix D are binary indicators of the presence of the electric end use. and the variables with the suffix FRAC are relative usage variables defined for specific end uses on the basis of monthly shapes developed in previous studies. For some end uses these binary variables are further interacted with monthly fractions for the end use in question based on prior load research. Such fractions are used for water heat, microwave ovens, dryers, dishwashers, and clothes washers. The application of these fractions helps the model to distinguish seasonal patterns across end uses.

5.3.3 Estimated Electricity Model

The electric model was estimated using RASS survey data, billing records covering the period January 2002 through August 2003, and weather data for the same period. The model was estimated with least squares regression analysis, with a correction for autocorrelation (correlation of the error term across time). Early tests indicated a fairly high level of first order autocorrelation in the residuals, so a standard generalized least squares technique was used to transform the data as a means of correcting this problem.¹⁷

Electric model estimated coefficients and their respective standard errors are presented in Table5-1. The overall fit of the model was reasonably good, with an adjusted coefficient of determination (R-squared) of 0.49. The coefficients for first refrigerators, forced air fans, microwaves, and clothes washers were restricted during the estimation process. The coefficients for first refrigerators and microwaves are difficult to estimate due to the near one hundred percent saturation. The coefficients on forced air fans and clothes washers were restricted due to problems with multi-collinearity. The restricted parameter estimates are labeled with an (R) in Table 5-1.

**Table 5-1
Electric Model**

Variable	Parameter	SE	T-Value
Intercept	0.0443	1.45576	0.03
(1/EFFH)*DHEAT*HDD*AREA	0.000033	0.00005506	0.6
(1/EFFH)*DEHEAT*HDD*AREA*DPWIN	-0.00008386	0.00006554	-1.28
(1/EFFH)*DEHEAT*HDD*AREA*MF	-0.00112	0.00008599	-13.06
(1/EFFH)*DEHEAT*HDD*AREA*INC	-2.90E-10	1.07E-10	-2.71
(1/EFFH)*DEHEAT*HDD*AREA*INC*DPWIN	1.77E-10	1.26E-10	1.41
(1/EFFH)*DEHEAT*HDD*AREA*INC*MF	2.01E-11	1.74E-10	0.12
(1/EFFH)*DEHEAT*HDD*AREA*ROOM	-0.00003423	0.00001057	-3.24
(1/EFFH)*DEHEAT*HDD*AREA*ROOM*DPWIN	0.00002347	0.00001292	1.82
(1/EFFH)*DEHEAT*HDD*AREA*ROOM*MF	0.00015439	0.00001706	9.05
(1/EFFH)*DEHEAT*HDD*AREA*SETBK	-0.00000748	0.00001155	-0.65
(1/EFFH)*DEHEAT*HDD*AREA*SETBK*DPWIN	-0.00001515	0.00001361	-1.11
(1/EFFH)*DEHEAT*HDD*AREA*SETBK*MF	0.00005879	0.00001799	3.27
(1/EFFH)*DEHEAT*HDD*AREA*HTTSET	0.00000035	8.74E-07	4
(1/EFFH)*DEHEAT*HDD*AREA*HTTSET*DPWIN	-1.64E-07	0.00000105	-0.16
(1/EFFH)*DEHEAT*HDD*AREA*HTTSET*MF	0.00001861	0.00000014	13.26
(1/EFFH)*DEHEAT*HDD*AREA*NONELEBK	0.00004832	0.00000063	7.67
(1/EFFH)*DEHEAT*AREA*WINTER	0.18559	0.00632	29.37
(1/EFFH)*DEHEAT*AREA*WINTER*MINSOFLIGHT	-0.00025469	0.00000891	-28.6
(1/EFFH)*DEHEAT*AREA*HDD*T24	-0.00004063	0.00000074	-5.49
(1/EFFH)*DEHEAT*HDD*SEASONAL	-0.15854	0.02977	-5.33
DAUXHT*HDD	0.01261	0.01127	1.12
DAUXHT *HDD*AREA	0.00003403	0.00000332	10.24
DAUXHT *HDD*AREA*MF	-0.00001016	0.00000677	-1.5
DAUXHT *HDD*AREA*ADDFREQ	0.00000178	1.59E-07	11.19
DCAC*CDD*AREA	0.00149	0.00003898	38.09
DCAC*CDD*AREA*NEWHOME	0.0000485	0.00005925	0.82
DCAC*CDD*AREA*DPWIN	-0.0001195	0.00004688	-2.55
DCAC*CDD*AREA*MF	0.00105	0.00008713	12.1
DCAC*CDD*AREA*INC	9.42E-11	4.38E-11	2.15
DCAC*CDD*AREA*INC*NEWHOME	-1.68E-10	5.82E-11	-2.9
DCAC*CDD*AREA*INC*DPWIN	1.25E-10	4.98E-11	2.5
DCAC*CDD*AREA*INC*MF	-2.11E-09	8.78E-11	-24.01
DCAC*CDD*AREA*TSETC	-0.00001516	4.93E-07	-30.75
DCAC*CDD*AREA*TESTC*NEWHOME	-2.14E-07	7.53E-07	-0.28
DCAC*CDD*AREA*TSETC*DPWIN	9.03E-07	5.93E-07	1.52
DCAC*CDD*AREA*TSETC*MF	-0.00001014	0.00000111	-9.13
DCAC*AREA*MINSOFLIGHT*SUMMER	0.00010001	0.00000034	29.38
DCAC*AREA*DSWAMP*SUMMER	0.01272	0.00198	6.43
DCAC*CDD*DSWAMP*AREA	-0.00016875	0.00000612	-27.55
DCAC*AREA*SUMMER	-0.07495	0.00275	-27.21
DRAC*CDD*AREA	0.00005146	0.00000754	6.82
DRAC*CDD*AREA*DPWIN	-0.00001868	0.00000473	-3.95
DRAC*CDD*AREA*MF	0.00001129	0.00001076	1.05
DRAC*CDD*AREA*INC	-5.83E-10	5.72E-11	-10.2
DRAC*CDD*AREA*TSETC	0.00001805	0.00000141	12.82
DRAC*CDD*AREA*RACCNT	0.00001597	0.00000457	3.49

**Table 5-1
Electric Model (cont'd)**

Variable	Parameter	SE	T-Value
DRAC*CDD*DSWAMP*AREA	-0.00008934	0.00000589	-15.16
DSWAMP*AREA*CDD	0.00006345	0.00000767	8.27
DSWAMP*CDD	0.19156	0.01999	9.58
DFFAN*HDD*AREA (R)	0.000023	0	Infty
DRF1*REFUSAGE1 (R)	0.0833	0	Infty
DRF2*REFUSAGE2	0.1366	0.00202	67.69
DRF2*SUMMER*REFUSAGE2	-0.00404	0.00156	-2.58
DRF2*REFUSAGE2*MF	-0.053	0.00586	-9.04
DFRZR*FZUSAGE	0.12464	0.00219	56.79
DEWH*FACTAWH*DWASHU	28.89343	1.02908	28.08
DEWH*FACTAWH*CWASHU	9.98225	0.68911	14.49
DEWH*FACTAWH*WHTSHWRS	18.4293	1.86502	9.88
DEWH*FACTAWH*DWHSOLAR	-127.56103	11.68353	-10.92
DEWH*ADDWHEL*FACTAWH	15.96034	3.89104	4.1
DEWH*FACTAWH* Log(NUMI+1)	42.08176	7.24915	5.81
DEWH*FACTAWH* Log(NUMI+1)*MF	-73.10609	3.82932	-19.09
DEWH*FACTAWH*WHTEMP_DIFF	0.03581	0.00603	5.94
DEWH*FACTAWH	73.0256	7.01039	10.42
DERNGOV* Log(NUMI+1)	37.1557	5.11421	7.27
DERNGOV* Log(NUMI+1)*INC	0.00005195	0.0000188	2.76
DERNGOV* Log(NUMI+1)*MICRO	-5.78601	3.77348	-1.53
DERNGOV	-22.0967	4.0174	-5.5
DMWV *FACTAMI* Log(NUMI+1) (R)	8.33	0	Infty
DDW* Log(NUMI+1)*FACTADW	9.89775	2.98564	3.32
DDW*FACTADW	-6.41515	3.81725	-1.68
DCW*FACTACW* Log(NUMI+1) (R)	37.09798	3.17859	11.67
DCW*FACTACW (R)	-40.09798	3.17859	-12.62
DEDRY*FACTADR*EDRYU	16.78199	0.46556	36.05
DEDRY*FACTADR* Log(NUMI+1)	5.5022	3.53861	1.55
DEDRY*FACTADR	-27.02423	4.17348	-6.48
DOLT*OLTFIX*ONOCFL	-5.65594	0.57041	-9.92
DOLT*OLTFIX*OPROPHID	5.26879	1.19711	4.4
DOLT*OLTFIX*OPROPSENS	-4.17967	0.68911	-6.07
DOLT*OLTFIX*OPROPTIM	11.10408	0.47871	23.2
DOLT*OLTFIX*HRDK	2.11248	0.06226	33.93
DOLT*OLTFIX	-20.00278	0.75837	-26.38
DTV*TVKW*TVHRS	36.48776	0.96943	37.64
DTV*TVKW	99.84392	6.58883	15.15
DHMOFF*HMOFFHRS	0.80713	0.09919	8.14
DHMOFF	-0.712	2.05713	-0.35
DPC*PCNUM	16.48716	1.3221	12.47
DPC*PCNUM*PCHRS1	1.68823	0.0487	34.66
DPC	6.52058	2.04486	3.19
DPLPMP*PLFILT	-17.9017	1.64402	-10.89

**Table 5-1
Electric Model (cont'd)**

Variable	Parameter	SE	T-Value
DPLPMP*PLFILT*PLSIZE	0.00116	0.00005773	20.06
DPLPMP	177.43949	2.84182	62.44
DSPA*SPAFREQ	1.8575	0.61018	3.04
DSPA*SPAFREQ*SPASIZE	0.6434	0.11184	5.75
DEHTSPA*SPAEHTFREQ	4.11848	0.55963	7.36
DEHTSPA*SPAEHTFREQ*SPASIZE	-0.19491	0.11672	-1.67
DEHTSPA*SPASIZE*SPCOV	7.22828	0.80349	9
DEHTSPA*SPASOLAR	6.29138	17.02186	0.37
DWB*WBEDHTN	59.92947	3.1606	18.96
DWELLP* Log(NUMI+1)	55.41209	6.98169	7.94
DWELLP	0.64884	9.02897	0.07
INC	0.00030879	0.00002009	15.37
SQFT	0.04769	0.00105	45.45
Log(NUMI+1)	43.11824	3.05322	14.12
NEWHOME	-42.01492	2.42332	-17.34
MF	-8.54592	1.64028	-5.21
SEASONAL	-142.36973	4.49941	-31.64
DCEILF	19.19172	1.19237	16.1
DATTFAN*CDD	0.35164	0.02095	16.79
DATTFAN*CDD*AREA	-0.00007051	0.00000574	-12.28
EPLHT	88.18653	13.11469	6.72

In general, the estimated coefficients take on the expected signs, and most are highly significant. There are a few issues to point out with respect to these coefficients:

- First, due to the high level of interaction of the explanatory variables, the influence of some variables is dependent on the values of the others. For instance, in the electric space heating equation, the influence of AREA depends upon HDD, INC, MF, and the other variables with which AREA is interacted. Accordingly, the signs of the individual coefficients should be interpreted carefully. They relate only to the incremental effect of the term in question, not the overall effect of any of its components.
- Second, a few coefficients may appear to have inappropriate signs, but do not. In the electric range equation, for instance, the incremental income term takes on a negative sign. We have gotten this result in every conditional demand analysis we have done, and it probably indicates the effect of income on the propensity to eat out rather than cooking at home.
- Third, it should be understood that the sign of some coefficients may reflect the influence of confounding conditions associated with the term. For instance, the coefficient of the spa cover in the electric spa heating equation is positive and significant. We do not suggest that, all things given, spa covers

cause more heating energy to be used; rather, it is likely that households with spa covers probably use their spas more frequently in spite of the presence of the cover because of more frequent use. While we have included a spa use frequency variable to control for this factor, reported usage may not be a very good indicator of actual usage.

- Fourth, the coefficients of the outdoor lighting equation probably deserve some comment. As expected, usage is positively related to hours of darkness and negatively related to both the proportion of CFLs and the proportion on motion sensors. It is probably also reasonable that the influence of timers is positive, given that the installation of a timer probably indicates a greater preference of the use of outside lighting. The positive influence of the proportion of HIDs may also make sense. While HID lighting may be more efficient than incandescent, the presence of HIDs may indicate considerably higher lumens and, in spite of better efficiencies, greater total wattages than in homes without any HID lighting.

5.4 Specification of the Natural Gas CDA Model

5.4.1 Overview of Gas End Uses

This subsection derives the CDA model for natural gas consumption. The model is used to disaggregate whole-house natural gas consumption into eight end uses:

- Primary space heating
- Secondary space heating
- Water heating
- Ranges and ovens
- Dryers
- Swimming pool heat
- Spa heat
- Miscellaneous

End-use specifications are derived in the remainder of this subsection.

5.4.2 Derivation of the Gas Model

Primary Gas Space Heating

The gas space heating UEC model is based on a fundamental balance equation:

$$(60) \quad GHEATUSE_{ht} = \frac{[HEATLOSS_{ht} - BUHT_{ht}]}{EFFH_h}$$

where primary gas space heating usage ($GHEATUSE_{ht}$) is assumed to be equal to net heat loss ($HEATLOSS_{ht}$), less the heat loss replaced by non-gas secondary heating systems ($BUHT_{ht}$), converted by a system efficiency ($EFFH_h$). The net heat loss from a structure can be written as:

$$(61) \quad HEATLOSS_{ht} = SURFLOSS_{ht} - SOLGAIN_{ht} - INTGAIN_{ht}$$

where $SURFLOSS_{ht}$ reflects losses through envelope surfaces and includes wall, floor, roof, chimney, and infiltration losses; $SOLGAIN_{ht}$ is solar gain through all surfaces during potential heating periods, and $INTGAIN_{ht}$ reflects internal gains during these periods.

Total surface losses can be determined from the familiar relation:

$$(62) \quad SURFLOSS_{ht} = \theta_1 U_h AREA_h TDIFF_{ht}$$

where U_h is the overall conductivity of the shell, $AREA_h$ is the total surface area, and $TDIFF_{ht}$ is the differential between inside and outside temperature levels, cumulated over all hours of the period for which the differential is positive.

Solar gain during potential heating periods is assumed to be related to surface area, minutes of sunlight ($MINOFLIGHT_{ht}$), and a variable indicating that the month is a winter month ($WINTER_t$):

$$(63) \quad SOLGAIN_{ht} = \theta_2 AREA_h MINOFLIGHT_{ht} WINTER_t$$

where, as noted in the derivation of the electric model, surface area is modeled by residence type as a function of square footage. Internal gain during the winter months is assumed to be proportional to surface area of the home:

$$(64) \quad INTGAIN_{ht} = \theta_3 AREA_h WINTER_t$$

Shell conductivity is assumed to be related to the presence of double-pane glass (DPWIN_h), a binary variable representing a new home (homes six years old or newer), a binary variable reflecting the location of the home in a Title 24 Standards Climate Zone with stringent insulation requirements (T24_h), and binary variables indicating that the home is a multi-family dwelling (MF_h) or a mobile home (MH_h):

$$(65) \quad U_h = \theta_5 + \theta_6 NEWHOME + \theta_7 T24_h + \theta_8 DPWIN_h + \theta_9 MF_h + \theta_{10} MH_h$$

The rationale for the Title 24 variable was discussed earlier with reference to electric heating. Note that the gas model includes two residence type variables rather than one. This is the case because the higher saturation of gas space heating allows a more extensive specification.

The temperature differential is affected by both behavioral and weather factors. It can be written as:

$$(66) \quad TDIFF_{ht} \equiv \sum [TDES_{ht} - T_{ht}] \quad \text{for } TDES_{ht} \geq T_{ht}$$

where TDES_{ht} is the desired internal temperature and T_{ht} is the outside temperature, and where the summation is across all hours of the period in question. The following specification was used to capture the influence of both outdoor temperatures and thermostat set points on effective temperature differentials:

$$(67) \quad TDIFF_{ht} = HDD_{ht} (\theta_{11} + \theta_{12} INC_h + \theta_{13} ROOM_h + \theta_{14} SETBK_h + \theta_{15} HTTSET_h + \theta_{16} SEASONAL_h)$$

This specification is based on the rationale presented above for electric space heating.

The contribution of non-gas secondary space heating (NGBUHT_{ht}) can be modeled simply as:

$$(68) \quad NGBUHT_{ht} = \theta_{17} NONGBU_h HDD_{ht} AREA_h$$

where NONGBU_h is a binary variable indicating the presence of non-gas backup heat.

System efficiencies are represented indirectly in terms of the age of the system (GHTAGE_h):

$$(69) \quad 1/ EFF = \theta_{18} + \theta_{19} GHTAGE_h$$

The full gas space heating specification is derived from the combination of equations (60) through (69), although some cross-product terms are omitted to conserve on degrees of freedom. The model is presented below. Note that the parameters have been redefined to simplify the presentation.

$$\begin{aligned}
 GHEATUSE_{ht} = & \left[\begin{aligned}
 & \theta_1 HDD_{ht} AREA_h + \theta_2 HDD_{ht} NEWHOME + \theta_3 HDD_{ht} AREA_h DPWIN_h \\
 & + \theta_4 HDD_{ht} AREA_h T24_h + \theta_5 HDD_{ht} AREA_h MF_h + \theta_6 HDD_{ht} AREA_h MH_h \\
 & + \theta_7 HDD_{ht} AREA_h NEWHOME_h + \theta_8 HDD_{ht} AREA_h AVGINC_h \\
 & + \theta_9 HDD_{ht} AREA_h DPWIN_h INC + \theta_{10} HDD_{ht} AREA_h MF_h INC_h \\
 & + \theta_{11} HDD_{ht} AREA_h MH_h INC_h + \theta_{12} HDD_{ht} AREA_h NEWHOME_h INC_h \\
 & + \theta_{13} HDD_{ht} AREA_h ROOM_h + \theta_{14} HDD_{ht} AREA_h DPWIN_h ROOM_h \\
 & + \theta_{15} HDD_{ht} AREA_h MF_h ROOM_h + \theta_{16} HDD_{ht} AREA_h SETBK_h \\
 & + \theta_{17} HDD_{ht} AREA_h DPWIN_h SETBK_h + \theta_{18} HDD_{ht} AREA_h MF_h SETBK_h \\
 & + \theta_{19} HDD_{ht} AREA_h TSET_h + \theta_{20} HDD_{ht} AREA_h DPWIN_h TSET_h \\
 & + \theta_{21} HDD_{ht} AREA_h MF_h TSET_h \\
 & + \theta_{22} AREA_h WINTER_t + \theta_{23} AREA_h WINTER_t T24_h \\
 & + \theta_{24} AREA_h MINSOFLIGHT_{ht} WINTER_t \\
 & + \theta_{25} NONGBU_h HDD_{ht} AREA_h + \theta_{26} HDD_{ht} SEASONAL_h \\
 & + \theta_{27} HDD_{ht} GHTAGE_h + \theta_{28} HDD_{ht} AREA_h GHTAGE_h \\
 & + \theta_{29} HDD_{ht} AREA_h INC_h GHTAGE_h \\
 & + \theta_{30} HDD_{ht} AREA_h ROOM_h GHTAGE_h \\
 & + \theta_{31} HDD_{ht} AREA_h SETBK_h GHTAGE_h \\
 & + \theta_{32} HDD_{ht} AREA_h TSET_h GHTAGE_h
 \end{aligned} \right]_h
 \end{aligned}$$

Secondary Gas Space Heating

A simple specification will be included in the model for auxiliary gas space heating ($GAUXHTUSE_{ht}$):

$$(70) \quad GAUXHTUSE_{ht} = \theta_{33}HDD_{ht} + \theta_{34}HDD_{ht}AREA_h + \theta_{35}HDD_{ht}AREA_hMF_h$$

Gas Water Heating

The spirit of the gas water heating equation is captured by the expression:

$$(71) \quad GWHEATUSE_{ht} = WHLOSS_{ht} + VUSE_{ht}$$

where $GWHEATUSE_{ht}$ is total gas consumption for water heating, $WHLOSS_{ht}$ reflects heat losses associated with standby losses from the heating unit, $VUSE_{ht}$ represents heat losses tied to water usage. Given the improved efficiency of newer homes, we assume that efficiency is higher in newer homes than older homes.

For simplicity, we link standing tank losses to the number of household members, residence age, the difference between tank temperatures and inlet temperatures, and the presence of gas solar assist ($GWHGSOLAR_h$):

$$(72) \quad WHLOSS_{ht} = \rho_0 + \rho_1 \log(NUMI_h + 1) + \rho_2 WHTEMP_DIFF_{ht} + \rho_3 DWHGSOLAR_h + \rho_4 NEWHOME$$

The rationale for this specification is the same as for electric water heat, except that the multi-family incremental term was not found to be necessary for the model.

We assume that monthly usage-related fuel consumption depends upon the household size as well as the number of dishwasher loads, washing machine loads, the number of showers taken by the household, the temperature differential, and a variable representing that the home is a seasonal home:

$$(73) \quad VUSE_h = \rho_5 + \rho_6 \log(NUMI_h + 1)SEASONAL_h + \rho_7 DWASHU_h + \rho_8 WMACHU_h + \rho_9 WHTSHWRS_h + \rho_{10} \log(NUMI_h + 1) + \rho_{11} WHTEMP_DIFF_{ht}$$

Substituting (72) and (73) into equation (71), we obtain:

(74)

$$\begin{aligned} GWHEATUSE_{ht} = & (\rho_0 + \rho_5) + (\rho_1 + \rho_{10}) \log(NUMI_h + 1) + (\rho_2 + \rho_{11}) WHTEMP_DIFF_{ht} + \rho_3 DWHGSOLAR_h \\ & + \rho_6 \log(NUMI_h + 1) SEASONAL_h + \rho_7 DWASHU_h + \rho_8 WMACHU_h + \rho_9 WHTSHWR_h \\ & + \rho_4 NEWHOME_h \end{aligned}$$

Ranges and Ovens

Gas consumption through kitchen ranges and ovens ($GRNGEOVNUSE_h$) will be specified as:

$$(75) \quad \begin{aligned} GRNGEOVNUSE_h = & \pi_1 + \pi_2 \log(NUMI_h + 1) + \pi_3 \log(NUMI_h + 1) INC_h \\ & + \pi_4 \log(NUMI_h + 1) MICRO_h \end{aligned}$$

The rationale for this specification mirrors that of the electric cooking equation.

Gas Dryers

Gas consumption by clothes dryers ($GDRYERUSE_{ht}$) will be assumed to be related to household size and reported dryer loads ($EDRYU_h$)

$$(76) \quad GDRYERUSE_{ht} = \pi_5 + \pi_6 EDRYU_h + \pi_7 \log(NUMI_h + 1)$$

Gas Pool Heat

Gas pool heating usage ($GPLHEATUSE_{ht}$) is assumed to be related to pool size and $PLHTFREQ_{ht}$, an indicator of the frequency of pool heating (which varies by summer and winter).

(77)

$$GPLHEATUSE_{ht} = (\beta_{22} + \beta_{23} PLHEATFREQ_h + \beta_{24} PLHEATFREQ_{ht} PLSIZE_h) OCC_{ht}$$

Gas Spa Heat

Gas spa heating usage ($GSPAHTUSE_{ht}$) is assumed to be determined by spa size, the frequency with which the spa is heated in the season in question ($SPAHTFREQ_h$), and the presence of an insulated cover ($SPACOV_h$).

$$(78) \quad GSPAHTUSE_{ht} = \pi_{12} + \pi_{13} SPAHTFREQ_h + \pi_{14} SPAHTFREQ_{ht} SPASIZE_h + \pi_{15} SPACOV_h SPASIZE_h$$

Miscellaneous

Gas miscellaneous usage ($GMISC_h$) is limited to two pieces of identified equipment: medical equipment ($DGMED_h$) and barbeques ($DGBBQ_h$):

$$(79) \quad GMISC_h = \pi_{16} DGMED_h + \pi_{17} DGBBQ_h$$

Summary of Gas Model

The gas model is derived by summing the above usage specifications, each multiplied times a binary variable representing the presence of the electric end use in question:

$$(80) \quad \begin{aligned} GASUSE_{ht} = & GHEATUSE_{ht} DGHEAT_h + GAUXHTUSE_{ht} DGAUXHT_h \\ & + GWHEATUSE_{ht} GWHFRAC_t DGWH_h + GRNGEOVNUSE_{ht} RNGFRAC_t DGRNGOV_h \\ & + GDRYERUSE_{ht} DRYFRAC_t DGDRY_h + GPLHEATUSE_{ht} DGPLHT_h \\ & + GSPAHTUSE_{ht} DGSPAHT_h + GMISC_h \end{aligned}$$

where the variables beginning with the prefix D are binary indicators of the presence of the gas end use, and the variables with the suffix FRAC are relative usage variables defined for specific end uses on the basis of monthly shapes developed in previous studies.

5.4.3 Estimated Gas Model

The natural gas model was estimated with data on individually metered gas customers. The requisite data included billing records, survey data, and weather data. The overall fit of the natural gas model was quite good, with an adjusted coefficient of determination of 0.70. Natural gas model estimated coefficients and their respective standard errors are presented in Table 5-2. Again, a few comments with respect to these estimates.

- First, almost all coefficients take on the expected signs, and most are significant.
- Second, the coefficient on pool covers takes on the wrong sign and is significant. This probably indicates that homes with pool covers use more pool heating energy than others in spite of the conservation effect of the covers, due to higher preferences for more frequent pool use and perhaps bigger pools. Again, we have included size and frequency of use variables to control for these factors, but there may be significant reporting errors in these variables.
- The presence of solar assist appears to positively influence gas spa heat usage, a result that again probably reflects the result of this variable acting as a proxy for frequency of use.

**Table 5-2
Gas CDA Coefficients**

Label	Estimate	Error	t Value
DGHEAT*AREA*WINTER*T24	0.000238	0.000287	0.83
DGHEAT* HDD* AREA *T24	-1.6E-05	4.85E-07	-32.31
DGHEAT*HDD* AREA	-2.68E-07	1.06E-07	-2.53
DGHEAT*HDD* AREA *NEWHOME	-6.7E-06	1.13E-06	-5.91
DGHEAT*HDD* AREA *GHTAGE	-1.9E-06	7.08E-08	-26.33
DGHEAT*HDD* AREA *DPWIN	-2.5E-06	1.38E-06	-1.81
DGHEAT*HDD* AREA *MF	-4E-05	3.63E-06	-11.12
DGHEAT*HDD* AREA *INC	4.73E-11	4.08E-12	11.57
DGHEAT*HDD* AREA *INC*NEWHOME	6.42E-12	5.85E-12	1.1
DGHEAT*HDD* AREA *INC*GHTAGE	-6.31E-13	1.88E-13	-3.36
DGHEAT*HDD* AREA *INC*DPWIN	-1.97E-11	3.57E-12	-5.52
DGHEAT*HDD* AREA *INC*MF	-1.11E-11	7.92E-12	-1.4
DGHEAT*HDD* AREA *GROOM	2.26E-06	6.72E-07	3.35
DGHEAT*HDD* AREA *GROOM*GHTAGE	-3.13E-07	2.80E-08	-11.18
DGHEAT*HDD* AREA *GROOM*DPWIN	4.56E-06	5.82E-07	7.85
DGHEAT*HDD* AREA *GROOM*MF	2.27E-06	1.02E-06	2.23
DGHEAT*HDD* AREA *SETBK	-5.18E-07	4.35E-07	-1.19
DGHEAT*HDD* AREA *SETBK*GHTAGE	-1.32E-07	2.00E-08	-6.63
DGHEAT*HDD* AREA *SETBK*DPWIN	1.73E-06	3.80E-07	4.56
DGHEAT*HDD* AREA *SETBK*MF	4.95E-06	7.88E-07	6.29
DGHEAT*HDD* AREA *HTTSET	5.36E-07	8.69E-09	61.64
DGHEAT*HDD* AREA *HTTSET*GHTAGE	3.04E-08	1.13E-09	26.89
DGHEAT*HDD* AREA *HTTSET*DPWIN	-6.13E-08	2.25E-08	-2.72
DGHEAT*HDD* AREA *HTTSET*MF	5.96E-07	5.98E-08	9.97
DGHEAT*HDD* AREA *NONGBU	-1.7E-06	1.73E-07	-9.81
DGHEAT* AREA *WINTER	0.01694	0.000186	91.11
DGHEAT* AREA *WINTER*MINSOFLIGHT	-2.3E-05	2.65E-07	-86.05
DGHEAT*HDD*GHTAGE	-0.00847	0.00311	-2.73
DGHEAT*HDD*NEWHOME	0.00104	4.94E-05	21.03
DGHEAT*HDD*SEASONAL	-0.00771	0.00298	-2.59
DGHEAT*HDD*AREA *MH	5.23E-06	1.4E-06	3.72
DGHEAT*HDD*AREA*INC*MH	-4.42E-11	3.49E-11	-1.27
DNGAUXHT*HDD	0.65463	0.03224	20.3
DNGAUXHT*HDD* AREA	0.45847	0.01962	23.37
DNGAUXHT*HDD* AREA *MF	-2.67182	1.43665	-1.86
DGWH*FACTAWH* Log(NUMI+1)	-3.13922	0.25027	-12.54
DGWH*FACTAWH*DWASHU	-9.0196	0.64293	-14.03
DGWH*FACTAWH*CWASHU	13.98212	0.67417	20.74
DGWH*FACTAWH*DWHGSOLAR	0.00966	0.00778	1.24
DGWH*FACTAWH*LOG(NUMI+1)*NEWHOME	0.21075	0.05043	4.18
DGWH*FACTAWH* Log(NUMI+1)*SEASONAL	6.31861	0.45331	13.94
DGWH*FACTAWH	-3.1E-06	1.41E-06	-2.21
DGWH*FACTAWH*WHTEMP_DIFF	-1.23934	0.3011	-4.12
DGWH*FACTAWH*TOTAL_SHTSHWRS	-3.18378	0.41413	-7.69
DGRNGOV* Log(NUMI+1)	0.000238	0.000287	0.83
DGRNGOV* Log(NUMI+1)*INC	-1.6E-05	4.85E-07	-32.31
DGRNGOV* Log(NUMI+1)*MICRO	-2.68E-07	1.06E-07	-2.53

**Table 5-2
Gas CDA Coefficients (cont'd.)**

Label	Estimate	Error	t Value
DGRNGOV	-6.7E-06	1.13E-06	-5.91
DGDY*FACTADR*GDYU	0.6391	0.04373	14.62
DGDY*FACTADR* Log(NUMI+1)	0.50575	0.35162	1.44
DGDY*FACTADR	-1.53717	0.42913	-3.58
DGPLHT	-1.30781	1.78322	-0.73
DGPLHT*GPLHTFREQ	2.76838	0.06357	43.55
DGPLHT*PLSIZE	0.00046	6.2E-05	7.42
DGPLHT*PLSIZE*DPLCOV	0.000234	3.17E-05	7.39
DGHTSPA	3.5606	0.4036	8.82
DGHTSPA*SPAGHTFREQ	0.81287	0.12965	6.27
DGHTSPA*SPAGHTFREQ*SPASIZE	0.00161	0.02307	0.07
DGHTSPA*SPASIZE*SPCOV	-0.12805	0.10758	-1.19
DGHTSPA*SPAGSOLAR	1.64078	1.04384	1.57
DGMED	27.02511	5.89721	4.58
DGBBQ	2.22319	0.23987	9.27

ENDNOTES

¹ The population of concern is comprised of households in PG&E, SCE, SDG&E, and LADWP electric service territories.

² The population of concern is comprised of master-metered units in PG&E, SCE, SDG&E, and LADWP electric service territories.

³ The 30% success rate for gathering phone numbers is similar to that achieved by RoperASW and KEMA-XENERGY in California. "Do Not Call" lists and other customer privacy considerations have reduced the ability to match up phone numbers to customers in a given sample.

⁴ "Roughly" because the special handling of some Zip Codes and customers and the reassignment of cases from telephone interviewers to in-person staff resulted in a total base that could only be approximated.

⁵ Energy Commission provided results for LADWP from FERC filing were 7,345 GWh serving 1,378,725 customers for a total energy use per customer of 5,327 kWh. The RASS sample frame yielded 3,581 GWh serving 895,199 customers for a total energy use per customer of 4,064 kWh.

⁶ The fall in the percentage missing pre and post cleaning is due to the fall in sample observations which results from the elimination of invalid surveys.

⁷ SCE, SCG, and SDG&E provided customer identification variables. The RASS survey was in the field during the spring of 2003. For residences with a change in customers, the final customer was retained in an attempt to correctly match survey information with billing data. DWP and PG&E did not provide a customer identifier on their billing databases.

⁸ PG&E and SCG provided bill start and end dates. For SCE, SDG&E, and LADWP only end dates are identified. If the start date of the billing cycle was not provided, the start date was calculated as the end date minus the number of billing days in the billing cycle.

⁹ LADWP collects billing data on a bi-monthly basis. The calendarization routine follows the same basic steps for monthly or bi-monthly data. LADWP's daily dataset simply spreads over a two month period, instead of a one month period. The longer billing period, and the averaging that occurs during the calendarization process, is likely to decrease the estimated impact of degree days on consumption within LADWP's service territory.

¹⁰ While it is not possible to precisely determine the number of accounts with missing PG&E gas bills, Itron identified 56 customers who stated that they had PG&E gas and their electric bills did not appear to substantiate electric space heat. Upon examination, PG&E found that 37 of these customers had

PG&E gas accounts. While the number of missing gas bills is likely to exceed 37 customers, the relative number of customers with missing gas bills is believed to be very small.

¹¹ Regional Economic Research, Inc. 2002. *Statewide Residential New Construction Energy Efficiency Baseline Study, Second-Year Report*. Prepared for Pacific Gas & Electric. San Diego, CA, Sept (2002).

¹² Prior to the fuel cleaning and plugging process, homes could state that they did not pay for their heat (*PAYHEAT* = 2, 3, or 97) and still list a system type. This system information is included in *PHTFUEL*.

¹³ Prior to the fuel cleaning and plugging process, homes could state that they did not pay for their water heat (*PAYWH* = 2, 3, or 97) and still list a system type. This system information is included in *PWHFUEL*.

¹⁴ Individuals could have answered yes, I have a pool and I pay for its energy use, when pools were located in common areas. Home Owners' association fees often include a set amount for the expense of heating and filtering common area pools. To help reduce this possibility, we restricted the analysis of pools to single family homes.

¹⁵ For a more thorough description of the CDA process, refer to: "The Total and Appliance-Specific Conditional Demand for Electricity in the Household Sector" *The Rand Journal of Economics*, Spring 1980.

¹⁶ Standard TVs were assigned connected loads of 100 W, while big screen units were assigned connected loads of 250 W each.

¹⁷ The correction entails multiplying the lagged value of each variable by an autocorrelation coefficient, then subtracting the resulting product from the current value of the variable in question. The transformation is applied to both the dependent variable (whole-house consumption) as well as to all of the regressors (right-hand model variables).

A: CA STATEWIDE RASS PRETEST RESULTS PRETEST HELD JANUARY 16, 2003

Pretests were held on January 16, 2003 in XENERGY's Oakland office using the draft survey that is attached to this file. We initially solicited customer participation using the project sample frame. In order to make up a few slots where we had no shows, we recruited some people from an office located near the testing facilities. This follow-up recruiting also allowed us to find customers who had specific situations (vacation homes and air conditioning) that were not covered by the respondents who could come to the office for the pretest.

Participants were provided with the survey and a brief description of the project objectives and the goals of the pretest. We asked participants to complete the survey and note any questions that they had in the margins. We then interviewed each participant while going through his or her survey. The interviewer looked for oddities in their survey and clarified any misunderstood questions. Once participants were done with the survey and interview process, they were given a \$35 honorarium.

We tested the survey on a total of twenty customers. Fifteen of the customers were from the RASS sample and the remaining five were general PG&E customers. The twenty responses broke down as follows:

- 11 single-family residences; 9 multi-family residences
- 6 homes with children; 4 homes with seniors
- 9 with education levels lower than a college degree; 6 with a college degree; 4 with a post graduate degree
- 3 with second homes

Overall the survey was well received and customers provided data that matched their verbal responses. The following table includes the issues that came up in the test as well as our recommended modifications to the survey. We have made the changes listed here and enclosed a revised survey draft with this correspondence.

Survey Section	Customer's Question or Other Pre Test Issue	Suggested Survey Modification or Data Cleaning Issue
Cover	<p>Need better explanation of what to do when you don't know the answer to a question. Many customers asked us to add "Don't know" or "Unsure" to the responses.</p> <p>Allowing "Don't know" type responses gives respondents an out. Without that response, users typically guessed as best they could or left the question blank. For several "unknown" responses, upon asking the customer what they would have replied, they gave an answer that we would want to hear if the "unknown" was not listed.</p>	<p>Remove "unsure" responses throughout. Revised the cover instructions to be clearer and more helpful. Included the following revised instructions to assist customers:</p> <p>"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 5 p.m. Monday through Friday."</p>
Cover	<p>Customers expressed concern about time it took to finish survey – several people kept track of the time which seems less likely if the "promise" of ½ hour was not listed.</p>	<p>Remove recommended time sentence from cover page. Sentence read: "For most households, it takes a half hour or less."</p>
Throughout	<p>One user requested more details on which questions allowed multiples and which only allowed a single response. In general, people missed more often when instruction notes were in blue. Questions with red instructions seemed to fare better.</p>	<p>Insured that all questions with multiple responses allowed were noted as such. Checked survey and revised all color highlights so that instructions are all in red and blue is used for "Go to" details and Headlines only.</p>
Throughout	<p>Several questions include an option to write-in a response. Although this is useful for gathering additional information, the scanning process does not provide for a mechanism to record the responses. Some utilities choose to allow the information to be entered knowing that they can go back to the paper surveys for more detail. Others remove the write-in line since in many cases respondents can find a provided answer that is close enough for their needs.</p>	<p>Leave "Describe" text in as long as utility sponsors recognize the limited availability of any responses that are recorded. Responses will be checked to determine if their answer fits one of the existing responses and will be modified accordingly.</p>
Home and Lifestyle	<p>A1 – With need to gather information from residents with more than one residence, change question to ask for "service" address to avoid confusion.</p>	<p>Add "service" to question. Note that the customer's service street will be listed on the front in addition to their mailing address.</p>

Survey Section	Customer's Question or Other Pre Test Issue	Suggested Survey Modification or Data Cleaning Issue
Home and Lifestyle	A1 – Numerous multi-family homes answered the number of stories for their building even though it is a single-family sub-question.	Move Number of Stories so it is directly next to the single-family question. Alternatively, could add a separate question to gather stories for all building types (although space is tight here).
Home and Lifestyle	A3 – Grammatical change	Change last option to “More than 30 years” instead of “Greater than....”
Home and Lifestyle	A9 – “Unsure” response caused confusion because it was not an option for A10 or others in the section. Several would have guessed insulated because they know most other areas are or would have left question blank.	Remove “Unsure” as noted at start of comments.
Home and Lifestyle	A15 – One person had a complicated remodel that included several different changes. They suggested adding an “Other” category.	Add “Other” and add “(Choose all that apply.)” to the end of the sub-question.
Home and Lifestyle	A16 – A few people got confused about the need to include number of people by age group. They answered all in the first category or placed their answers in the “0” category.	Change “categories” in question text to “age groups”. Change age groups to correspond to census groupings as previously requested. Changed “0” to “None” for consistency.
Home and Lifestyle	A17 – A few people did not see that this question applied only to electric appliances.	Bold the word “electric” in the question.
Home and Lifestyle	A20 – Again, users sometimes answered for their electric bill (in the PG&E case, this is fine).	Bold the word “natural gas” in the question for clarification.
Heating	B2 – Some confusion on where to answer certain questions. Individuals provided answers in more than one fuel category or missed the fuel category.	Put category headers in blue and add space in table to make it easier to read. Insure that all additional instructions are in red.
Heating	B3 – Confusion over pilot lights made people guess if they had one. Many “don’t know” responses described.	Switch question so it flows more like other standard questions. What is the main value of this question and is there something that could be added to help describe the options to customers?
Heating	B5 – Several people answered more than once for their various heating systems.	Add “main” into question and remove option for multiples to collect information for primary heating system so that thermostat can be better matched to system.
Heating	B5 – A couple people had steam valves and were not sure if they should indicate “no thermostat”.	Add “...or steam valve” to the end of the No thermostat response description.

Survey Section	Customer's Question or Other Pre Test Issue	Suggested Survey Modification or Data Cleaning Issue
Heating	B6 – Again, some questions about how to handle multiple systems.	Use this question to provide results for main heating system. B9 provides information about additional heating.
Heating	B6 – Some customers had difficulty answering the question because their use changes a lot depending on the time of year.	<p>Another option would be to change this question to a more behavioral question describing ways customers use heating.</p> <p>For example: Which of the following statements best describes how the <u>primary</u> heating system is used when someone is home?</p> <p>1 <input type="checkbox"/> The thermostat(s) is kept at a constant setting or temperature 2 <input type="checkbox"/> The thermostat setting changes based on the time of day 3 <input type="checkbox"/> The heater is turned on only when someone is cold 4 <input type="checkbox"/> We rarely use this heating system</p>
Heating	B7 – Consistency	Change “Central” to “Main” for consistency.
Cooling	C2	Remove “not sure” response per previous discussion.
Cooling	C4 and C5 – Focus response on primary system	Insert “main” into sentences to avoid duplicate responses.
Water Heating	D2 – Several people confused sections and answered in the wrong fuel section.	Change headers to blue (as in heating and all other tables) to highlight the sections.
Water Heating	D4 – Typo	Remove “0” at end of 1-5 years.
Water Usage	Question number consistency	It would be clearer to have a new heading number (A, B, C, etc.) for each section. Currently Water Usage falls under the Water Heating letter. Propose to change this, but will not make the change until okayed since it has a big impact on all skip patterns from here on out.
Water Usage	D6 - Problems answering for small homes where there is a mix of showers and baths. Users answer so that it appears that there is both a bath and a shower for each person daily.	Could change the question to two parts: one with number of baths or showers, and the second with percentage baths. Because of space limitations, recommend leaving the question as it is.
Water Usage	D7 and D8	Remove “Don’t know” response per previous discussion.
Water Usage	D8 - Need to clarify what a faucet aerator is. Many customers thought it is the screen on the faucet.	Add “(Aerators are add-on devices that reduce the water usage by mixing air into the water stream.)”

Survey Section	Customer's Question or Other Pre Test Issue	Suggested Survey Modification or Data Cleaning Issue
Laundry	Need consistent approach with water heating and heating. Several multi-family users answered the laundry section for common laundry without noticing the instructions.	Add a question on the laundry section so that it mirrors the other sections with respect to common services. Keep existing notes about not responding to for common area units. E1 Do you own your laundry equipment and pay for the energy to run either a washer or dryer? <input type="radio"/> Yes <input type="radio"/> No, laundry facilities are located in a common area of the building. <input type="radio"/> No laundry facilities in my building <i>(Go to D6.)</i>
Food Preparation	F1 – Several people were confused on the outdoor barbeque question. Several people answered the fuel part of the question, but missed the age section.	Could remove outdoor barbeque, but likely good to leave in. Change instructions to read about “Choose all that apply.” This should help clarify the two parts.
Food Preparation	F2 – Customer felt that the difference between Never and Rarely was too great as they do several meals less than once per week, but not “never”.	Added another column. Difference is probably minimal overall, so could revert back if preferred.
Refrigerators and Freezers	Heading problem. Several people answered for their freezer on the refrigerator section.	Although this does indeed happen, if we cannot get the two sections on the same page, we should separate the headers to help differentiate. Otherwise, cleaning code can handle most common errors.
Refrigerators and Freezers	G2 – Some people only answered for the first section (door style). Also had confusion over the abbreviations for refrigerator and particularly “discarded ref.”.	Change color to highlight different section headings in blue. Spell out titles in column headers and include more detail (“Old Refrigerator Discarded in the Last 12 Months”) for last column title.
Refrigerators and Freezers	G2 – Some people answered both a top bottom and a single door.	Use cleaning logic to handle this case. No survey change.
Spa	H3 – grammatical change	Change “less” to “fewer” in note about small size spas.
Spa	H6 – Need consistency with other questions.	Change order of responses to flow from smallest to biggest as in other cases in this and pool section.

Survey Section	Customer's Question or Other Pre Test Issue	Suggested Survey Modification or Data Cleaning Issue
Televisions	K1 – Several people indicated that they wanted a “none” column for consistency. Customers were not sure if Personal video recorder included VCR or DVD players.	Remove “Number” header – self explanatory. Add “None” column. Add VCR and DVD players.
Personal Computers and Home Office	K3 – Heading Issue	As with water heating/water usage, if a second header appears, question letters should reset. To save space and allow for more data recording, we combined both sections into “Entertainment and Technology”.
Personal Computers and Home Office	K3 – Customers were confused as to whether or not they should include laptop computers.	Added phrase to clarify: “(Include both desktops and laptops.)”
Personal Computers and Home Office	K5 – A few customers felt that “never” and “rarely” were too close.	Split first column into two.
Personal Computers and Home Office	K6 – A couple people stated that they did not operate a business, but someone else in their home did.	Add “(or someone else in your home)” to question. Also change K7 to read: “How many hours a week is someone working out of your home?”
Personal Computers and Home Office	K6 – Missing skip pattern.	Add (Go to K8.) to be sure we get answers to these questions.
Personal Computers and Home Office	K8 – Customers who had a multi-function machine answered all components and then had to go back and erase each when they came to multi-function.	Move multi-function to first position in add-on components.
Personal Computers and Home Office	Customers with answering service through the phone company were not sure what to answer.	No change. No electrical impact of these services.
Personal Computers and Home Office	Customers with traditional internet service (via phone line) were not sure what to answer.	Added an option for traditional phone line access. This is good information for potential customer communication options.
Personal Computers and Home Office		Additional space available on form. Added stereo and cell phones to gauge market penetration. Customers brought these up.
Lighting	L1 and L2 – Confusion over interior or exterior lighting. Customers not sure how to count up timers (number of timers or number of bulbs that are on that timer).	Add more color/header info for all sections to clarify. Remove headers about “Number of ... Bulbs or Fixtures” as it made people try too hard to count bulbs associated with devices.

Survey Section	Customer's Question or Other Pre Test Issue	Suggested Survey Modification or Data Cleaning Issue
Lighting	L2 – Customer who had combined dusk-to-dawn and motion detector answered both for one unit.	Leave as is.
Lighting	L2 – Several multi-family residents wondered if they should include common area lighting. Most did.	Add instruction to include only items that you pay for.
Misc. Appliances	M1 – Need “None” for consistency. Title (Number of Appliances) does not fit for all items (i.e. security systems – customer wondered if they were to count sensors or systems).	Add “None” column. Remove title since numbers are self-explanatory.
Misc. Appliances	M1 – No stereo system – one respondent included stereo as an additional appliance.	Added to K8 in Entertainment and Technology section.
Misc. Appliances	M2 – Missing Go to...	Add (Go to M5.)
Misc. Appliances	M5 – Clarification change	Change question text to: Select any of the equipment and its fuel from the list that you use three or more hours per week
Misc. Appliances	M6 – Customer had an electric wheelchair. Should be included in description. Another customer had a hybrid car. Might be interesting to collect even if electricity is not charged at the home.	Add “electric wheelchair” to the response. Add detail about hybrid car. For space conservation, may want to consider removing the voltage question. If you want additional details about the car’s charging system, it might be best to make a follow-up call instead.
Misc. Appliances	M10 – Several people missed the “added a new unit without discarding.” section.	Input “added without discarding” to question text. Move “added” column to the end of the table so that it is not in the middle of other responses.
Misc. Appliances	M10 – Many missed the “Have not replaced...” bubble.	Put bubble at bottom of table since users have to read all responses before they can answer this one.
Misc. Appliances	M10 – Several fuel boxes were not correctly displayed.	Revised fuel boxes as appropriate.
Misc. Appliances	M10 – Several people did not understand the a/c abbreviation. One person answered “Wall or window a/c” because he had done window repairs.	Spell out air conditioning. Re-order responses so that they follow the basic order of the survey and are more logically grouped with large impact items early in the list.

Survey Section	Customer's Question or Other Pre Test Issue	Suggested Survey Modification or Data Cleaning Issue
Household Information (and throughout)	Customers expressed concern about confidentiality issues.	Stress confidential nature in cover letter as planned. Add confidentiality sentence at the start of the "Household Information" section: "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."
Household Information	N2 – One person missed the time-share exclusion. In general, table is very large and likely to be underutilized. Couple of people had responses to the number of days questions that would add up to be misleading responses (i.e. 25 days each for their family and another – 50 total).	Simplify table and condense instructions. Remove Home #3, condense responses, added another duration category, condensed service provider into one question, and provide more concise table to allow better page break while collecting pertinent information.
Household Information	Need thank you at end.	Added thank you and place for users to write-in phone number and fill in values in phone grid. Actual phone grid will be done with bubbles around each number. This will be important for follow-up calls if necessary.

Please note that the survey mock-ups are all made at 8.5 x 11 size for now. We are proposing a slightly smaller booklet (6.75 x 9.75) and will provide final size information once we finalize processing and printing prices with our vendors.

The following pdf document includes the survey that was used for the pretest in Oakland on January 16th.

<<LOGOS>>

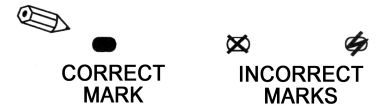
HOME ENERGY SURVEY



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 and return it in the enclosed postage-paid envelope to the address below:

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

Please fill out this survey with a **PENCIL**, filling in the oval completely as illustrated to the right. For most households, it takes a half hour or less. Information **in red helps to clarify questions**. Information in **blue directs you to skip to another question** based on your response or provides instructions for answering the question.



After you complete your survey, return it in the enclosed postage-paid envelope. If you have questions, you can call our toll-free number at 800-331-8786.

Thank you for participating!

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



Sponsored by:

California Energy Commission
Pacific Gas and Electric

San Diego Gas and Electric
Southern California Edison

Southern California Gas
Los Angeles Dept. Water and Power

Your Home & Lifestyle

A1 What type of building exists at the address on the front cover of this survey?

- Single-family detached house
Number of stories: 1 2 3 or more
- Townhouse, duplex, or row house (*shares exterior walls with neighboring unit, but not a roof or floor*)
- Apartment or condominium (2 – 4 units)
- Apartment or condominium (5 or more units)
- Mobile home
- Other (*Describe:* _____)

A2 Do you own or rent this home?

- Own / buying
- Rent / lease

A3 How long have you lived at this address?

- 1 year or less
- 2 years
- 3 years
- 4 years
- 5 years
- 6 years
- 7 years
- 8 years
- 9 years
- 10 years
- 11 years
- 12 years
- 13 years
- 14 years
- 15 years
- 16 – 20 years
- 21 – 30 years
- Greater than 30 years

A4 What best describes this residence?

- This is my permanent year-round residence. (*Go to question A6.*)
- This is my partial-year or seasonal residence.
- This is my vacation home and is generally used only by my family.
- 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.*)

- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December

A6 Approximately what year was this residence built?

- Before 1940
- 1940-1949
- 1950-1959
- 1960-1969
- 1970
- 1971
- 1972
- 1973
- 1974
- 1975
- 1976
- 1977
- 1978
- 1979
- 1980
- 1981
- 1982
- 1983
- 1984
- 1985
- 1986
- 1987
- 1988
- 1989
- 1990
- 1991
- 1992
- 1993
- 1994
- 1995
- 1996
- 1997
- 1998
- 1999
- 2000
- 2001
- 2002
- 2003

A7 How many bedrooms are in your home?

- No bedrooms (studio apartment)
- 1 bedroom
- 2 bedrooms
- 3 bedrooms
- 4 bedrooms
- 5 bedrooms
- 6 bedrooms
- 7 bedrooms
- 8 bedrooms
- 9 bedrooms
- 10 bedrooms
- 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.*)

- Less than 250
- 250 – 500
- 501 – 750
- 751 – 1000
- 1001 – 1250
- 1251 – 1500
- 1501 – 2000
- 2001 – 2500
- 2501 – 3000
- 3001 – 4000
- 4001 – 5000
- Greater than 5000

A9 Are your home's **exterior walls** insulated?

- Yes, all walls
- Yes, some walls
- No
- Unsure

A10 Is your home's **attic/ceiling** insulated?

- Yes **➔ A11** If yes, estimate the number of inches of **attic/ceiling** insulation.
- No
- 0 – 3 inches (*R-value less than R-10*)
- 4 – 6 inches (*R-11 to R-19*)
- 7 – 10 inches (*R-20 to R-30*)
- More than 10 inches (*R-31 or higher*)

A12 Choose the statement that best describes your **windows**.

- All or most are double pane windows
- All or most are single pane windows
- My home has a mixture of single pane and double pane windows

A13 Choose the statement that best describes the frames on your **windows**.

- All or most have vinyl window frames
- All or most have wood window frames
- All or most have metal window frames

A14 Has your home been remodeled in the past 12 months?

- No (*Go to A16.*)
- Yes **➔ A15** If YES, what type of remodel did you do?
 - Room addition, added square footage to home
 - Kitchen or bath re-model
 - Re-built most of the home

A16 For each of the following categories, how many people, including yourself, usually live in this home?

	Number of People Usually Living In This Home									
	0	1	2	3	4	5	6	7	8	Over 8
Children (<i>5 & under</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Children (<i>6 – 12</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Children (<i>13 – 18</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adults (<i>19 – 35</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adults (<i>36 – 54</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adults (<i>55 – 65</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seniors (<i>over 65</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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**?

- Frequently (*3 – 5 weekdays per week*)
- Occasionally (*1 – 2 weekdays per week*)
- 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?

- Yes
- No (*Go to B1.*)
- Not Sure

A19 Do you have a natural gas line or hook-up to any part of your home?

- Yes
- No
- Not Sure

- A20** What utility do you pay for natural gas service to your home?
- | | |
|--|--|
| <input type="checkbox"/> Pacific Gas & Electric (PG&E) | <input type="checkbox"/> City of Coalinga |
| <input type="checkbox"/> San Diego Gas & Electric | <input type="checkbox"/> City of Long Beach Gas Department |
| <input type="checkbox"/> Southern California Gas ("The Gas Company") | <input type="checkbox"/> Not sure |
| <input type="checkbox"/> Southwest Gas Corporation | |

Space Heating

- B1** Do you pay to heat your home?
- Yes No, it is part of my rent/condo fee
 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.")

	Main Heating System <i>(Mark only ONE BOX below)</i>	Additional Heating System(s) <i>(Mark ALL BOXES that apply)</i>
NATURAL GAS (from gas utility)		
Central forced-air furnace <i>(fan circulates heated air through air ducts)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Floor or wall heater/furnace	<input type="checkbox"/>	<input type="checkbox"/>
Hot water radiator	<input type="checkbox"/>	<input type="checkbox"/>
Other system type	<input type="checkbox"/>	<input type="checkbox"/>
ELECTRIC		
Resistance (baseboard/ceiling/floor/wall)	<input type="checkbox"/>	<input type="checkbox"/>
Central forced air furnace <i>(fan circulates heated air through air ducts)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Central heat pump <i>(both heats and cools)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Through-the-wall heat pump <i>(looks like a window/wall air conditioner, but also provides heat)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Portable heaters	<input type="checkbox"/>	<input type="checkbox"/>
Other system type	<input type="checkbox"/>	<input type="checkbox"/>
BOTTLED GAS (propane, butane, LP)		
Central forced air furnace <i>(fan circulates heated air through air ducts)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Floor or wall heater/furnace	<input type="checkbox"/>	<input type="checkbox"/>
Hot water radiator	<input type="checkbox"/>	<input type="checkbox"/>
Other system type	<input type="checkbox"/>	<input type="checkbox"/>
WOOD		
Woodstove/fireplace insert	<input type="checkbox"/>	<input type="checkbox"/>
Fireplace	<input type="checkbox"/>	<input type="checkbox"/>
SOLAR		
Solar – no backup	<input type="checkbox"/>	<input type="checkbox"/>
Solar – natural gas backup	<input type="checkbox"/>	<input type="checkbox"/>
Solar – propane backup	<input type="checkbox"/>	<input type="checkbox"/>
Solar – electric backup	<input type="checkbox"/>	<input type="checkbox"/>
OTHER		
<i>(Describe):</i> _____	<input type="checkbox"/>	<input type="checkbox"/>

- B3** If your heating system(s) use natural gas for fuel, indicate whether it has a pilot light(s).

	Main Heating System <i>(Mark only ONE BOX below)</i>	Additional Heating System(s) <i>(Mark ALL BOXES that apply)</i>
Heating system has a pilot light	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

- B4** How old is your main heating system?
- Less than one year 6 – 10 years 16 – 30 years
 1 – 5 years 11 – 15 years Over 30 years

- B5** What type of thermostat does your heating system(s) use?
- Programmable thermostat *(A programmable thermostat may be digital or mechanical. Digital units usually have a digital readout and buttons to set the on/off times and temperatures. Mechanical models usually have a clock or rotary timer and tabs, pins or levers to set temperatures and on/off times.)*
- Standard thermostat *(A standard thermostat allows you to set the temperature and turn the heater on or off. With this thermostat you cannot set on/off times.)*
- No thermostat *(simply an on/off control) (Go to B7.)*

- B6** If one or more of your heating systems is controlled by a thermostat, what is the average thermostat temperature usually set for each time period?
(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 <i>(6am-9am)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Day <i>(9am-5pm)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Evening <i>(5pm-9pm)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Night <i>(9pm-6am)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- B7** Has maintenance been performed on your central heating system in the past 12 months?
- Yes No

- B8** How many electric portable heaters do you use?
- I don't use portable heaters 2 portable heaters
 1 portable heater 3 or more portable heaters

- B9** How often do you use any additional heating system(s), including portable heaters, during the winter months?
- No additional heating Often *(2 to 4 days per week)*
 Rarely *(about once per month)* Always *(5 to 7 days per week)*
 Sometimes *(about once per week)*

Space Cooling

CENTRAL AIR CONDITIONING/COOLING

- C1** Do you pay for central air conditioning/cooling for your home?
- Yes No, it is part of my rent/condo fee
 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?

	Number of Central Cooling Systems		
	1	2	3 or more
Central air conditioning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Central evaporative cooler <i>(swamp cooler)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heat pump <i>(heats and cools)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Not sure what type	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- C3** How old is your main central air conditioning/cooling unit?
- Less than one year 6 – 10 years 16 – 30 years
 1 – 5 years 11 – 15 years Over 30 years

- C4** What type of thermostat does your cooling system(s) use?
- Programmable thermostat *(A programmable thermostat may be digital or mechanical. Digital units usually have a digital readout and buttons to set the on/off times and temperatures. Mechanical models usually have a clock or rotary timer and tabs, pins or levers to set temperatures and on/off times.)*
 Standard thermostat *(A standard thermostat allows you to set the temperature and turn the heater on or off. With this thermostat you cannot set on/off times.)*
 No thermostat *(simply an on/off control) (Go to C6.)*

- C5** What is the typical thermostat temperature setting of your central cooling system for each time period? *(Choose one answer per time period.)*

	Off	Below 70°F	70 – 73°F	74 – 76°F	77 – 80°F	Over 80°F
Morning <i>(6am–9am)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Day <i>(9am–5pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Evening <i>(5pm–9pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Night <i>(9pm–6am)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- C6** Has maintenance been performed on your central air conditioning system in the past 12 months?
- Yes No

ROOM AIR CONDITIONING/COOLING (Window / Wall Units)

- C7** Please tell us the characteristics of each room air conditioning/cooling unit below.
- No room air conditioning/cooling units *(Go to D1.)*

	Unit 1	Unit 2	Unit 3
Type of Room Air Conditioning/Cooling Unit			
Window/wall air conditioner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Window/wall heat pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Window/wall evaporative cooler (swamp cooler)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Age of Room Air Conditioning/Cooling Unit			
Less than one year	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 – 2 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 – 7 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 – 13 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
More than 14 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- C8** Please indicate how often your room air conditioning/cooling unit(s) is/are turned on during the summer. *(Choose one answer for each time period.)*

Time Period	Never	Rarely <i>(1-2 days per week)</i>	Sometimes <i>(3-4 days per week)</i>	Often <i>(5-6 days per week)</i>	Always <i>(7 days per week)</i>
Morning <i>(6am–9am)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Day <i>(9am–5pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Evening <i>(5pm–9pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Night <i>(9pm–6am)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hot weekday afternoon <i>(12 noon–6pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Water Heating

- D1** Do you pay for heating water at your residence?
- Yes No, it is part of my rent/condo fee
 No hot water heater (*Go to E1.*)

D2 What type of water heating systems do you use in your home?

	Main Water Heater <i>(Mark only ONE BOX in this column)</i>	Additional Water Heater(s) <i>(Mark ALL BOXES that apply in this column)</i>
NATURAL GAS		
Standard tank	<input type="checkbox"/>	<input type="checkbox"/>
Whole house tankless system	<input type="checkbox"/>	<input type="checkbox"/>
ELECTRIC		
Standard tank	<input type="checkbox"/>	<input type="checkbox"/>
Heat pump	<input type="checkbox"/>	<input type="checkbox"/>
Whole house tankless system	<input type="checkbox"/>	<input type="checkbox"/>
Point-of use tankless system	<input type="checkbox"/>	<input type="checkbox"/>
PROPANE		
Standard tank	<input type="checkbox"/>	<input type="checkbox"/>
Whole house tankless system	<input type="checkbox"/>	<input type="checkbox"/>
SOLAR		
With no backup system	<input type="checkbox"/>	<input type="checkbox"/>
With natural gas backup	<input type="checkbox"/>	<input type="checkbox"/>
With propane backup	<input type="checkbox"/>	<input type="checkbox"/>
With electric backup	<input type="checkbox"/>	<input type="checkbox"/>
OTHER		
<i>Describe:</i> _____	<input type="checkbox"/>	<input type="checkbox"/>

D3 What is the typical hot water heater temperature setting? (*Medium is the standard factory setting.*)

- Low (*below 130°F*) Medium (*130°F – 150°F*) High (*over 150°F*)

D4 How old is your primary water heating system?

- Less than one year 6 – 10 years 16 – 30 years
 1 – 5 years 11 – 15 years Over 30 years

D5 Does your hot water heater(s) have an insulation blanket(s)?

- Yes No

Water Usage

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
Number of showers / day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Number of baths / day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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.)

- Yes, all showers No
 Yes, some showers Don't know

D8 Do the faucets in your home have water-saving aerators?

- Yes, all faucets No
 Yes, some faucets Don't know

Laundry

E1 What type of clothes washer do you have? *(Do not include coin-operated machines or machines in common areas that serve more than one household.)*

- Top loading washer Front loading washer
 I do not have a clothes washer *(Go to F1.)*

E2 How old is your clothes washer?

- Less than one year 6 – 8 years 16 – 30 years
 1 – 5 years 9 – 15 years Over 30 years

E3 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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warm water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cold water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E4 What type of clothes dryer do you have? *(Do not include coin-operated machines or machines in common areas that serve more than one household.)*

- I do not have a clothes dryer Electric dryer
 Natural gas dryer Bottled Gas *(Propane, Butane, LP)*

E5 How many loads of clothes do you dry in your clothes dryer during a **typical week**?

- None 2 4 6 8 10 or more
 1 3 5 7 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			
	Natural Gas	Electric	Bottled Gas	Other	0–5 years	6–10 years	11–15 years	Over 15 years
Cooktop, stovetop or range	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oven(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor barbecue	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

F2 During a typical **week**, how often do you use your range or oven?

	Never	Rarely <i>(1 – 2 times per week)</i>	Sometimes <i>(3 – 4 times per week)</i>	Often <i>(5 – 7 times per week)</i>
Breakfast	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lunch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dinner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- F3** Do you have a **microwave oven**?
 Yes, and it is used often (7 or more times per week)
 Yes, and it is used less than 7 times per week
 No
- F4** Do you have a **dishwasher**?
 Yes No (*Go to G1.*)
- F5** How many dishwasher loads are run in a **typical week**?
 0 loads 2 loads 4 loads 6 loads 8 loads
 1 load 3 loads 5 loads 7 loads 9 or more

Refrigerators & Freezers

- G1** How many refrigerators do you have plugged in?
 0 (*Go to G3.*) 1 2 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.

	Ref. 1	Ref. 2	Ref. 3	Discarded Ref.
Door Style				
Single-door	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Top Freezer – Bottom Refrigerator	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Top Refrigerator – Bottom Freezer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Side-by-side	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Size, in Cubic Feet				
Mini (<i>under 13 cu. ft.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Small (<i>13 – 16 cu. ft.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medium (<i>17 – 19 cu. ft.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Large (<i>20 – 23 cu. ft.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Very large (<i>over 23 cu. ft.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Frost-free or Manual Defrost?				
Automatic (frost-free)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Age of your Refrigerator				
Less than two years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3 – 7 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8 – 10 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11 – 20 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
More than 20 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other Features				
Through-the-door ice and water dispenser	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

G3 How many **stand-alone** freezers do you have plugged in?
(Do not include freezers that are part of your refrigerator.)
 0 *(Go to H1.)* 1 2 or more

G4 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	Discarded Freezer
Style			
Upright, frost-free	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Upright manual defrost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chest frost-free	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chest manual defrost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Size, in Cubic Feet			
Small <i>(under 13 cu. ft.)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medium <i>(13 – 16 cu. ft.)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Large <i>(over 16 cu. ft.)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Age of your Freezer			
Less than two years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3 – 7 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8 – 10 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11 – 20 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
More than 20 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Spas and Hot Tubs

H1 Do you have a spa or hot tub at your home?
(Do not include whirlpool tubs in your bathroom.)
 Yes, and **I pay for its energy use**
 Yes, but it is in a **common area** and **I do not pay for its energy use** *(Go to J1.)*
 No spa or hot tub *(Go to J1.)*

H2 What fuel do you use to heat the spa or hot tub?
 Electricity Solar and electricity Bottled gas *(propane, butane, LP)*
 Natural gas Solar and natural gas Other

H3 How large is the spa or hot tub?
 Small *(3 people or less)* Medium *(4 – 6 people)* Large *(7 or more people)*

H4 Where is the spa located?
 Outside, in the ground Outside, above ground Inside our home

H5 Do you have an insulated cover on your spa or hot tub?
 Yes No

H6 How often do you run the filter pump on your spa or hot tub?

	Summer <i>(May – Oct.)</i>	Winter <i>(Nov. – April)</i>
4 – 6 hours every day	<input type="radio"/>	<input type="radio"/>
1 – 3 hours every day	<input type="radio"/>	<input type="radio"/>
Only when we use it	<input type="radio"/>	<input type="radio"/>
Rarely	<input type="radio"/>	<input type="radio"/>
Never	<input type="radio"/>	<input type="radio"/>

H7 Please indicate how often you **heat** your spa or hot tub in the winter and summer.

	Summer (May – Oct.)	Winter (Nov. – April)
Never	<input type="radio"/>	<input type="radio"/>
0 – 2 times per month	<input type="radio"/>	<input type="radio"/>
3 – 8 times per month	<input type="radio"/>	<input type="radio"/>
9 or more times per month	<input type="radio"/>	<input type="radio"/>
Maintain set temperature	<input type="radio"/>	<input type="radio"/>

Pools

J1 Do you have a swimming pool? *(Do not include a swimming pool that is in a central common area of an apartment complex or homeowners association and is used by more than one home.)*

- Yes, and **I pay for its energy use**
- Yes, but it is in a **common area** and **I do not pay for its energy use** *(Go to K1.)*
- 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.)*

- Less than 20,000 gallons
- 20,000 – 40,000 gallons
- More than 40,000 gallons

J3 How many **hours per day** do you operate your **swimming pool filter**?

	Summer (May – Oct.)	Winter (Nov. – April)
None	<input type="radio"/>	<input type="radio"/>
1 – 2	<input type="radio"/>	<input type="radio"/>
3 – 4	<input type="radio"/>	<input type="radio"/>
5 – 7	<input type="radio"/>	<input type="radio"/>
8 – 11	<input type="radio"/>	<input type="radio"/>
12 – 15	<input type="radio"/>	<input type="radio"/>
16 – 20	<input type="radio"/>	<input type="radio"/>
21 or more	<input type="radio"/>	<input type="radio"/>

J4 Which fuel do you use to heat your pool?

- Pool is not heated
- Natural gas only
- Bottled gas only *(propane, butane, LP)*
- Electricity only
- Electric heat pump only
- Solar heater (using solar collectors)
- Other

J5 Please indicate how often you **heat** your pool in the summer and winter.

	Summer (May – Oct.)	Winter (Nov. – April)
Never	<input type="radio"/>	<input type="radio"/>
Once a month	<input type="radio"/>	<input type="radio"/>
Once a week	<input type="radio"/>	<input type="radio"/>
2 – 4 times per week	<input type="radio"/>	<input type="radio"/>
Keep pool heated continuously	<input type="radio"/>	<input type="radio"/>

J6 Which of the following attributes does your pool have? *(Fill in all that apply.)*

- Pool cover
- Pool timer
- Pool sweep
- Pool is indoors

Televisions

K1 How many televisions and accessories do you **use** in this home?

	Number		
	One	Two	Three or more
Television (color)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Television (black & white)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digital cable box	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digital satellite box	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personal video recorders (e.g., TiVo, ReplayTV)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

K2 How many total hours are all your **televisions** on each day?

(Add up time for each television.)

- Less than 1 hour 5 – 8 hours 13 – 16 hours 21 – 30 hours
 1 – 4 hours 9 – 12 hours 17 – 20 hours more than 30 hours

Personal Computers and Home Office

K3 How many **personal computer(s)** (PC, Macintosh and/or other) do you **use** in this home?

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

K4 If 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.)*

- Less than 1 hour 5 – 8 hours 13 – 16 hours 21 – 30 hours
 1 – 4 hours 9 – 12 hours 17 – 20 hours more than 30 hours

K5 How often does anyone in your home perform any of the following activities on your computer?

	Rarely or Never <i>(less than once a week)</i>	Occasionally <i>(several times a week)</i>	Frequently <i>(several times a day)</i>
Send or receive e-mail	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Browse the Internet for information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make purchases using the Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pay bills on-line	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

K6 Do you operate a business and/or work from your home?

- No
 Yes → **K7** How many hours a week do you spend working at your home?
 0 – 10 hours per week
 11 – 30 hours per week
 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	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Printer for computer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scanner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Copier	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FAX machine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Multifunction machine (PC printer, fax, copier)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cable modem for Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DSL modem for Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Home network (LAN)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Lighting

L1 How many of the following lighting products do you use **inside** your home?

	Number of Interior Bulbs or Fixtures				
	None	1 – 2	3 – 5	6 – 10	11 or More
Compact fluorescent lamps	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on Timers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on Motion Detectors or Occupancy Sensors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on a Dimming Switch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

L2 How many of the following lighting products do you use **outside** your home? *(Include items in your garage.)*

	Number of Exterior Bulbs or Fixtures			
	None	1 – 2	3 – 5	6 or More
FIXTURE TYPES				
Exterior incandescent fixtures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exterior compact fluorescent fixtures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low voltage landscape light system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HID (sodium vapor, metal halide) fixture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
LIGHTING CONTROLS				
Fixtures on Timers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on Dusk-to-Dawn Sensors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on Motion Detectors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Miscellaneous Appliances

M1 How many of each of the following appliances or equipment do you **use** in your home? *(Fill in all that apply.)*

	Number of Appliances		
	One	Two	Three or more
Electronic security system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electronic household air cleaner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humidifier	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dehumidifier	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Water purification system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pond or water garden pump	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heated waterbed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electric blanket	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aquarium	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Portable fan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ceiling fan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wind turbine attic ventilator (non-electric)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electric attic fan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whole-house fan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sauna – electric	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electric garage door opener	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trash compactor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lawn mower – electric	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- M2** Do you use an electric well water pump to provide water for your home?
 No
 Yes ➔ **M3** Does your home also have access to city/county water sources?
 Yes
 No
M4 How do you use your well water?
 Only for gardening and landscaping
 Only for household use
 Both household and gardening/landscape use

M5 Select any of the equipment listed below you use three or more hours per week?
(Please also indicate if the equipment uses electricity or natural gas.)

	Electric	Natural Gas	Bottled Gas
Sump pump	<input type="checkbox"/>		
Shop tools	<input type="checkbox"/>		
Electric welding equipment	<input type="checkbox"/>		
Electric air compressor	<input type="checkbox"/>		
Large battery charger	<input type="checkbox"/>		
Kiln for ceramics and pottery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medical equipment (e.g., respirator)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- M6** Do you have an electric vehicle or golf cart at your home?
 No *(Go to M9.)*
 Yes, Golf cart ➔ **M7** Do you charge your golf cart or electric vehicle at home?
 Yes, Electric car or vehicle ➔ No
 Yes ➔ **M8** What is the voltage used for charging?
 108 – 120 volts
 208 – 240 volts
 other or unknown voltage

M9 Do you use any other equipment or large appliance that consumes a significant amount of electricity or natural gas in your home?
 Yes No
(Please describe equipment and fuel.): _____

M10 Please indicate if you have replaced or discarded any of the following appliances in the past 12 months. *(Fill in all that apply.)*

Have not replaced, discarded nor added any of the following appliances.

Appliance	Please Mark Each Replaced or Discarded Unit		Age of Replaced or Discarded Unit			Added A New Unit Without Discarding	Fuel Type		
	Replaced Unit	Discarded Unit Without Replacing	1 – 10 years	11 – 20 years	Over 20 years		Elec	Nat. Gas	Other
Stove top	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oven	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Microwave oven	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Dishwasher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Clothes washer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Clothes dryer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Central a/c	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Central space heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Wall or window a/c	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Swimming pool heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Swimming pool pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Hot tub or spa heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Household Information

N1 In addition to the home described in this survey, do you own any other homes in California that are 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.)

Yes No *(Go to N3.)*

N2 Please provide the following information for each seasonal or vacation home that you own in California?

(Please do not provide information on any full-time rental property or time-share units.)

(Please do not answer this question for the home at the address on the back of this survey.)

	Home #1	Home #2	Home #3
Location of Home	<input type="checkbox"/> In Mountains <input type="checkbox"/> In Desert <input type="checkbox"/> Near Ocean <input type="checkbox"/> Near Lake or River <input type="checkbox"/> Other	<input type="checkbox"/> In Mountains <input type="checkbox"/> In Desert <input type="checkbox"/> Near Ocean <input type="checkbox"/> Near Lake or River <input type="checkbox"/> Other	<input type="checkbox"/> In Mountains <input type="checkbox"/> In Desert <input type="checkbox"/> Near Ocean <input type="checkbox"/> Near Lake or River <input type="checkbox"/> Other
Number of Days per Year that the Home is Typically Occupied by Your Family	<input type="checkbox"/> 10 days or less <input type="checkbox"/> 11-120 days <input type="checkbox"/> 121-240 days <input type="checkbox"/> More than 240 days	<input type="checkbox"/> 10 days or less <input type="checkbox"/> 11-120 days <input type="checkbox"/> 121-240 days <input type="checkbox"/> More than 240 days	<input type="checkbox"/> 10 days or less <input type="checkbox"/> 11-120 days <input type="checkbox"/> 121-240 days <input type="checkbox"/> More than 240 days
Number of Days per Year that the Home is Typically Occupied by Others	<input type="checkbox"/> 10 days or less <input type="checkbox"/> 11-120 days <input type="checkbox"/> 121-240 days <input type="checkbox"/> More than 240 days	<input type="checkbox"/> 10 days or less <input type="checkbox"/> 11-120 days <input type="checkbox"/> 121-240 days <input type="checkbox"/> More than 240 days	<input type="checkbox"/> 10 days or less <input type="checkbox"/> 11-120 days <input type="checkbox"/> 121-240 days <input type="checkbox"/> More than 240 days
Electric Service Provider	<input type="checkbox"/> PG&E <input type="checkbox"/> LADWP <input type="checkbox"/> SCE <input type="checkbox"/> Other <input type="checkbox"/> SDG&E	<input type="checkbox"/> PG&E <input type="checkbox"/> LADWP <input type="checkbox"/> SCE <input type="checkbox"/> Other <input type="checkbox"/> SDG&E	<input type="checkbox"/> PG&E <input type="checkbox"/> LADWP <input type="checkbox"/> SCE <input type="checkbox"/> Other <input type="checkbox"/> SDG&E
Natural Gas Service Provider	<input type="checkbox"/> None <input type="checkbox"/> PG&E <input type="checkbox"/> SDG&E <input type="checkbox"/> Southern Cal Gas <input type="checkbox"/> Other	<input type="checkbox"/> None <input type="checkbox"/> PG&E <input type="checkbox"/> SDG&E <input type="checkbox"/> Southern Cal Gas <input type="checkbox"/> Other	<input type="checkbox"/> None <input type="checkbox"/> PG&E <input type="checkbox"/> SDG&E <input type="checkbox"/> Southern Cal Gas <input type="checkbox"/> Other

N3 What was the highest level of education completed by any head of household in the home?

- | | |
|---|---|
| <input type="checkbox"/> Elementary (grades 1 – 8) | <input type="checkbox"/> Some college/trade/vocational school |
| <input type="checkbox"/> Some high school (grades 9 – 12) | <input type="checkbox"/> College graduate |
| <input type="checkbox"/> High school graduate | <input type="checkbox"/> Postgraduate degree |

N4 What is the primary language spoken in this home?

- | | |
|---|---|
| <input type="checkbox"/> English | <input type="checkbox"/> Spanish |
| <input type="checkbox"/> Asian (describe) _____ | <input type="checkbox"/> Other (describe) _____ |

N5 Are any of the occupants of your home permanently disabled?

- No Yes, 1 permanently disabled person Yes, 2 or more permanently disabled people

N6 Which of the following ethnic groups are represented by your head(s) of household?

(Fill in all that apply.)

	Head of Household # 1	Head of Household # 2
American Indian, Alaska Native	<input type="checkbox"/>	<input type="checkbox"/>
Asian or Pacific Islander	<input type="checkbox"/>	<input type="checkbox"/>
Black, African American	<input type="checkbox"/>	<input type="checkbox"/>
Hispanic / Latino	<input type="checkbox"/>	<input type="checkbox"/>
White, Caucasian	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

N7 Please check the range that best describes your household's total annual income.

- | | | |
|--|--|--|
| <input type="checkbox"/> Less than \$10,000 | <input type="checkbox"/> \$30,000 – \$34,999 | <input type="checkbox"/> \$60,000 – \$74,999 |
| <input type="checkbox"/> \$10,000 – \$19,999 | <input type="checkbox"/> \$35,000 – \$39,999 | <input type="checkbox"/> \$75,000 – \$99,999 |
| <input type="checkbox"/> \$20,000 – \$24,999 | <input type="checkbox"/> \$40,000 – \$49,999 | <input type="checkbox"/> \$100,000 – \$149,999 |
| <input type="checkbox"/> \$25,000 – \$29,999 | <input type="checkbox"/> \$50,000 – \$59,999 | <input type="checkbox"/> \$150,000 or more |

The following document is the revised survey which XENERGY proposes to use for the study. Based on a few open ended issues discussed above, we propose an additional round of feedback prior to sending the survey off to the print shop to get it type set. At that point, we will do another round of proofing which members can decide whether or not to be involved in.

<<LOGOS>>

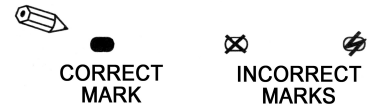
HOME ENERGY SURVEY



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 and return it in the enclosed postage-paid envelope to the address below:

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

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 5 p.m. Monday through Friday.

Thank you for participating!

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



Sponsored by:
California Energy Commission
Pacific Gas and Electric

San Diego Gas and Electric
Southern California Edison

Southern California Gas
Los Angeles Dept. Water and Power

Your Home & Lifestyle

- A1** What type of building exists at the service address on the front cover of this survey?
 Single-family detached house **➔** Number of stories: 1 2 3 or more
 Townhouse, duplex, or row house (*shares exterior walls with neighboring unit, but not roof or floor*)
 Apartment or condominium (2 – 4 units)
 Apartment or condominium (5 or more units)
 Mobile home
 Other (*Describe:* _____)
- A2** Do you own or rent this home?
 Own / buying Rent / lease
- A3** How long have you lived at this address?
 1 year or less 6 years 11 years 16 – 20 years
 2 years 7 years 12 years 21 – 30 years
 3 years 8 years 13 years More than 30 years
 4 years 9 years 14 years
 5 years 10 years 15 years
- A4** What best describes this residence?
 This is my permanent year-round residence. ([Go to A6.](#))
 This is my partial-year or seasonal residence.
 This is my vacation home and is generally used only by my family.
 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.*)
 January March May July September November
 February April June August October December
- A6** Approximately what year was this residence built?
 Before 1940 1973 1980 1987 1994 2001
 1940-1949 1974 1981 1988 1995 2002
 1950-1959 1975 1982 1989 1996 2003
 1960-1969 1976 1983 1990 1997
 1970 1977 1984 1991 1998
 1971 1978 1985 1992 1999
 1972 1979 1986 1993 2000
- A7** How many bedrooms are in your home?
 No bedrooms (studio apartment) 3 bedrooms 6 bedrooms 9 bedrooms
 1 bedroom 4 bedrooms 7 bedrooms 10 bedrooms
 2 bedrooms 5 bedrooms 8 bedrooms 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.*)
 Less than 250 751 – 1000 1501 – 2000 3001 – 4000
 250 – 500 1001 – 1250 2001 – 2500 4001 – 5000
 501 – 750 1251 – 1500 2501 – 3000 Greater than 5000

A9 Are your home's **exterior walls** insulated?
 Yes, all walls Yes, some walls No

A10 Is your home's **attic/ceiling** insulated?
 Yes **➔** **A11** If yes, estimate the number of inches of **attic/ceiling** insulation.
 No 0 – 3 inches (*R-value less than R-10*)
 4 – 6 inches (*R-11 to R-19*)
 7 – 10 inches (*R-20 to R-30*)
 More than 10 inches (*R-31 or higher*)

A12 Choose the statement that best describes your **windows**.
 All or most are double pane windows
 All or most are single pane windows
 My home has a mixture of single pane and double pane windows

A13 Choose the statement that best describes the frames on your **windows**.
 All or most have vinyl window frames
 All or most have wood window frames
 All or most have metal window frames

A14 Has your home been remodeled in the past 12 months?
 No (*Go to A16.*)
 Yes **➔** **A15** If yes, what type of remodel did you do? (*Choose all that apply.*)
 Room addition, added square footage to home
 Kitchen or bath re-model
 Re-built most of the home
 Other

A16 For each of the following age groups, how many people, including yourself, usually live in this home?

	Number of People Usually Living In This Home									
	None	1	2	3	4	5	6	7	8	Over 8
Children (<i>5 and under</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Children (<i>6 – 18</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adults (<i>19 – 34</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adults (<i>35 – 54</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adults (<i>55 – 64</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seniors (<i>65 and over</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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**?
 Frequently (*3 – 5 weekdays per week*)
 Occasionally (*1 – 2 weekdays per week*)
 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?
 Yes No (*Go to B1.*)

A19 Do you have a natural gas line or hook-up to any part of your home?
 Yes No

- A20** What utility do you pay for **natural gas** service to your home?
- | | |
|--|--|
| <input type="checkbox"/> Pacific Gas & Electric (PG&E) | <input type="checkbox"/> City of Coalinga |
| <input type="checkbox"/> San Diego Gas & Electric | <input type="checkbox"/> City of Long Beach Gas Department |
| <input type="checkbox"/> Southern California Gas ("The Gas Company") | <input type="checkbox"/> Not sure |
| <input type="checkbox"/> Southwest Gas Corporation | |

Space Heating

- B1** Do you pay to heat your home?
- Yes No, it is part of my rent/condo fee *(Go to B8.)*
 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.")

	Main Heating System <i>(Mark only ONE BOX below)</i>	Additional Heating System(s) <i>(Mark ALL BOXES that apply)</i>
NATURAL GAS (from gas utility)		
Central forced-air furnace <i>(fan circulates heated air through air ducts)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Floor or wall heater/furnace	<input type="checkbox"/>	<input type="checkbox"/>
Hot water radiator	<input type="checkbox"/>	<input type="checkbox"/>
Other system type	<input type="checkbox"/>	<input type="checkbox"/>
ELECTRIC		
Resistance (baseboard/ceiling/floor/wall)	<input type="checkbox"/>	<input type="checkbox"/>
Central forced air furnace <i>(fan circulates heated air through air ducts)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Central heat pump <i>(both heats and cools)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Through-the-wall heat pump <i>(looks like a window/wall air conditioner, but also provides heat)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Portable heaters	<input type="checkbox"/>	<input type="checkbox"/>
Other system type	<input type="checkbox"/>	<input type="checkbox"/>
BOTTLED GAS (propane, butane, LP)		
Central forced air furnace <i>(fan circulates heated air through air ducts)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Floor or wall heater/furnace	<input type="checkbox"/>	<input type="checkbox"/>
Hot water radiator	<input type="checkbox"/>	<input type="checkbox"/>
Other system type	<input type="checkbox"/>	<input type="checkbox"/>
WOOD		
Woodstove/fireplace insert	<input type="checkbox"/>	<input type="checkbox"/>
Fireplace	<input type="checkbox"/>	<input type="checkbox"/>
SOLAR		
Solar – no backup	<input type="checkbox"/>	<input type="checkbox"/>
Solar – natural gas backup	<input type="checkbox"/>	<input type="checkbox"/>
Solar – propane backup	<input type="checkbox"/>	<input type="checkbox"/>
Solar – electric backup	<input type="checkbox"/>	<input type="checkbox"/>
OTHER		
<i>(Describe):</i> _____	<input type="checkbox"/>	<input type="checkbox"/>

- B3** If your heating system(s) use natural gas for fuel, indicate whether it has a pilot light(s).
- | | | |
|---|--|--|
| Main natural gas heating system | <input type="checkbox"/> Yes, has pilot light | <input type="checkbox"/> No pilot light |
| Secondary natural gas heating system(s) | <input type="checkbox"/> Yes, has pilot light(s) | <input type="checkbox"/> No pilot light(s) |

- B4** How old is your main heating system?
- | | | |
|---|--|--|
| <input type="checkbox"/> Less than one year | <input type="checkbox"/> 6 – 10 years | <input type="checkbox"/> 16 – 30 years |
| <input type="checkbox"/> 1 – 5 years | <input type="checkbox"/> 11 – 15 years | <input type="checkbox"/> Over 30 years |

- B5** What type of thermostat does your main heating system(s) use?
- Programmable thermostat *(A programmable thermostat may be digital or mechanical. Digital units usually have a digital readout and buttons to set the on/off times and temperatures. Mechanical models usually have a clock or rotary timer and tabs, pins or levers to set temperatures and on/off times.)*
 - Standard thermostat *(A standard thermostat allows you to set the temperature and turn the heater on or off. With this thermostat you cannot set on/off times.)*
 - No thermostat *(simply an 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?
(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 <i>(6am-9am)</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Day <i>(9am-5pm)</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Evening <i>(5pm-9pm)</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Night <i>(9pm-6am)</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
- B7** Has maintenance been performed on your main heating system in the past 12 months?
- Yes No
- B8** How many electric portable heaters do you use?
- I don't use portable heaters 2 portable heaters
 - 1 portable heater 3 or more portable heaters
- B9** How often do you use any additional heating system(s), including portable heaters, during the winter months?
- No additional heating Often *(2 to 4 days per week)*
 - Rarely *(about once per month)* Always *(5 to 7 days per week)*
 - Sometimes *(about once per week)*

Space Cooling

CENTRAL AIR CONDITIONING/COOLING

- C1** Do you pay for central air conditioning/cooling for your home?
- Yes No, it is part of my rent/condo fee *(Go to C7.)*
 - 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?
- | | Number of Central Cooling Systems | | |
|--|-----------------------------------|--------------------------|--------------------------|
| | 1 | 2 | 3 or more |
| Central air conditioning | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Central evaporative cooler <i>(swamp cooler)</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Heat pump <i>(heats and cools)</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
- C3** How old is your main central air conditioning/cooling unit?
- Less than one year 6 – 10 years 16 – 30 years
 - 1 – 5 years 11 – 15 years Over 30 years

- C4** What type of thermostat does your main cooling system(s) use?
- Programmable thermostat *(A programmable thermostat may be digital or mechanical. Digital units usually have a digital readout and buttons to set the on/off times and temperatures. Mechanical models usually have a clock or rotary timer and tabs, pins or levers to set temperatures and on/off times.)*
 - Standard thermostat *(A standard thermostat allows you to set the temperature and turn the heater on or off. With this thermostat you cannot set on/off times.)*
 - No thermostat *(simply an on/off control) (Go to C6.)*

- C5** What is the typical thermostat temperature setting of your main central cooling system for each time period? *(Choose one answer for each time period.)*

	Off	Below 70°F	70 – 73°F	74 – 76°F	77 – 80°F	Over 80°F
Morning <i>(6am–9am)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Day <i>(9am–5pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Evening <i>(5pm–9pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Night <i>(9pm–6am)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- C6** Has maintenance been performed on your central air conditioning system in the past 12 months?
- Yes
 - No

ROOM AIR CONDITIONING/COOLING (Window / Wall Units)

- C7** Please tell us the characteristics of each room air conditioning/cooling unit below.
- No room air conditioning/cooling units *(Go to D1.)*

	Unit 1	Unit 2	Unit 3
Type of Room Air Conditioning/Cooling Unit			
Window/wall air conditioner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Window/wall heat pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Window/wall evaporative cooler <i>(swamp cooler)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Age of Room Air Conditioning/Cooling Unit			
Less than one year	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 – 2 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 – 7 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 – 13 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
More than 14 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- C8** Please indicate how often your room air conditioning/cooling unit(s) is/are turned on during the summer. *(Choose one answer for each time period.)*

Time Period	Never	Rarely <i>(1-2 days per week)</i>	Sometimes <i>(3-4 days per week)</i>	Often <i>(5-6 days per week)</i>	Always <i>(7 days per week)</i>
Morning <i>(6am–9am)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Day <i>(9am–5pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Evening <i>(5pm–9pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Night <i>(9pm–6am)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hot weekday afternoon <i>(12 noon–6pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Water Heating

- D1** Do you pay for heating water at your residence?
- Yes No, it is part of my rent/condo fee *(Go to D6.)*
 No hot water heater *(Go to D6.)*

D2 What type of water heating systems do you use in your home?

	Main Water Heater <i>(Mark only ONE BOX in this column)</i>	Additional Water Heater(s) <i>(Mark ALL BOXES that apply in this column)</i>
NATURAL GAS		
Standard tank	<input type="radio"/>	<input type="radio"/>
Whole house tankless system	<input type="radio"/>	<input type="radio"/>
ELECTRIC		
Standard tank	<input type="radio"/>	<input type="radio"/>
Heat pump	<input type="radio"/>	<input type="radio"/>
Whole house tankless system	<input type="radio"/>	<input type="radio"/>
Point-of use tankless system	<input type="radio"/>	<input type="radio"/>
PROPANE		
Standard tank	<input type="radio"/>	<input type="radio"/>
Whole house tankless system	<input type="radio"/>	<input type="radio"/>
SOLAR		
With no backup system	<input type="radio"/>	<input type="radio"/>
With natural gas backup	<input type="radio"/>	<input type="radio"/>
With propane backup	<input type="radio"/>	<input type="radio"/>
With electric backup	<input type="radio"/>	<input type="radio"/>
OTHER FUEL		
Describe: _____	<input type="radio"/>	<input type="radio"/>

D3 What is the typical hot water heater temperature setting? *(Medium is the standard factory setting.)*
 Low *(below 130°F)* Medium *(130°F – 150°F)* High *(over 150°F)*

D4 How old is your primary water heating system?
 Less than one year 6 – 10 years 16 – 30 years
 1 – 5 years 11 – 15 years Over 30 years

D5 Does your hot water heater(s) have an insulation blanket(s)?
 Yes No

Water Usage

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
Number of showers / day	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Number of baths / day	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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.)
 Yes, all showers Yes, some showers 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.)*
 Yes, all faucets Yes, some faucets No

Laundry

E1 Do you **own** your laundry equipment and pay for the **energy** to run either a washer or dryer?
 Yes No, laundry facilities are located in a common area of the building. *(Go to F1.)*
 I do not use laundry facilities in my building *(Go to F1.)*

E2 What type of clothes washer do you have? *(Do not include coin-operated machines or machines in common areas.)*
 Top loading washer Front loading washer

E3 How old is your clothes washer?
 Less than one year 6 – 8 years 16 – 30 years
 1 – 5 years 9 – 15 years 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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warm water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cold water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E5 What type of clothes dryer do you have? *(Do not include coin-operated machines or machines in common areas.)*
 I do not have a clothes dryer Electric dryer
 Natural gas dryer Bottled Gas *(Propane, Butane, LP)*

E6 How many loads of clothes do you dry in your clothes dryer during a **typical week**?
 None 2 4 6 8 10 or more
 1 3 5 7 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			
	Natural Gas	Electric	Bottled Gas	Other	0-5 years	6-10 years	11-15 years	Over 15 years
Cooktop, stovetop or range	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oven(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor barbecue	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

F2 During a typical **week**, how often do you use your range or oven?

	Never	Rarely <i>(less than once per week)</i>	Occasionally <i>(1 – 2 times per week)</i>	Sometimes <i>(3 – 4 times per week)</i>	Often <i>(5 – 7 times per week)</i>
Breakfast	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lunch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dinner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

F3 Do you have a **microwave oven**?
 Yes, and it is used often (7 or more times per week)
 Yes, and it is used less than 7 times per week
 No

F4 Do you have a **dishwasher**?
 Yes No (*Go to G1.*)

F5 How many dishwasher loads are run in a **typical week**?
 0 loads 2 loads 4 loads 6 loads 8 loads
 1 load 3 loads 5 loads 7 loads 9 or more

Refrigerators

G1 How many refrigerators do you have plugged in?
 0 (*Go to G3.*) 1 2 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				
Single-door	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Top Freezer – Bottom Refrigerator	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Top Refrigerator – Bottom Freezer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Side-by-side	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Size, in Cubic Feet				
Mini (<i>under 13 cu. ft.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Small (<i>13 – 16 cu. ft.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medium (<i>17 – 19 cu. ft.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Large (<i>20 – 23 cu. ft.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Very large (<i>over 23 cu. ft.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Frost-free or Manual Defrost?				
Automatic (frost-free)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Age of your Refrigerator				
Less than two years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3 – 7 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8 – 10 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11 – 20 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
More than 20 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other Features				
Through-the-door ice and water dispenser	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Freezers

G3 How many **stand-alone** freezers do you have plugged in?

(Do not include freezers that are part of your refrigerator.)

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

G4 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			
Upright, frost-free	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Upright manual defrost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chest frost-free	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chest manual defrost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Size, in Cubic Feet			
Small <i>(under 13 cu. ft.)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medium <i>(13 – 16 cu. ft.)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Large <i>(over 16 cu. ft.)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Age of your Freezer			
Less than two years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3 – 7 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8 – 10 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11 – 20 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
More than 20 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Spas and Hot Tubs

H1 Do you have a spa or hot tub at your home? *(Do not include whirlpool tubs in your bathroom.)*

Yes, and **I pay for its energy use**

Yes, but it is in a **common area** and **I do not pay for its energy use** *(Go to J1.)*

No spa or hot tub *(Go to J1.)*

H2 What fuel do you use to heat the spa or hot tub?

Electricity Solar and electricity Bottled gas *(propane, butane, LP)*

Natural gas Solar and natural gas Other

H3 How large is the spa or hot tub?

Small *(3 people or fewer)* Medium *(4 – 6 people)* Large *(7 or more people)*

H4 Where is the spa located?

Outside, in the ground Outside, above ground Inside our home

H5 Do you have an insulated cover on your spa or hot tub?

Yes No

H6 How often do you run the filter pump on your spa or hot tub?

	Summer <i>(May – Oct.)</i>	Winter <i>(Nov. – April)</i>
Never	<input type="radio"/>	<input type="radio"/>
Rarely	<input type="radio"/>	<input type="radio"/>
Only when we use it	<input type="radio"/>	<input type="radio"/>
1 – 3 hours every day	<input type="radio"/>	<input type="radio"/>
4 – 6 hours every day	<input type="radio"/>	<input type="radio"/>

H7 Please indicate how often you **heat** your spa or hot tub in the winter and summer.

	Summer (May – Oct.)	Winter (Nov. – April)
Never	<input type="radio"/>	<input type="radio"/>
0 – 2 times per month	<input type="radio"/>	<input type="radio"/>
3 – 8 times per month	<input type="radio"/>	<input type="radio"/>
9 or more times per month	<input type="radio"/>	<input type="radio"/>
Maintain set temperature	<input type="radio"/>	<input type="radio"/>

Pools

J1 Do you have a swimming pool? *(Do not include a swimming pool that is in a central common area of an apartment complex or homeowners association and is used by more than one home.)*

- Yes, and **I pay for its energy use**
- Yes, but it is in a **common area** and **I do not pay for its energy use** *(Go to K1.)*
- 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.)*

- Less than 20,000 gallons
- 20,000 – 40,000 gallons
- More than 40,000 gallons

J3 How many **hours per day** do you operate your **swimming pool filter**?

	Summer (May – Oct.)	Winter (Nov. – April)
None	<input type="radio"/>	<input type="radio"/>
1 – 2	<input type="radio"/>	<input type="radio"/>
3 – 4	<input type="radio"/>	<input type="radio"/>
5 – 7	<input type="radio"/>	<input type="radio"/>
8 – 11	<input type="radio"/>	<input type="radio"/>
12 – 15	<input type="radio"/>	<input type="radio"/>
16 – 20	<input type="radio"/>	<input type="radio"/>
21 or more	<input type="radio"/>	<input type="radio"/>

J4 Which fuel do you use to heat your pool?

- Pool is not heated
- Natural gas only
- Bottled gas only *(propane, butane, LP)*
- Electricity only
- Electric heat pump only
- Solar heater *(using solar collectors)*
- Other

J5 Please indicate how often you **heat** your pool in the summer and winter.

	Summer (May – Oct.)	Winter (Nov. – April)
Never	<input type="radio"/>	<input type="radio"/>
Once a month	<input type="radio"/>	<input type="radio"/>
Once a week	<input type="radio"/>	<input type="radio"/>
2 – 4 times per week	<input type="radio"/>	<input type="radio"/>
Keep pool heated continuously	<input type="radio"/>	<input type="radio"/>

J6 Which of the following attributes does your pool have? *(Choose all that apply.)*

- Pool cover
- Pool timer
- Pool sweep
- Pool is indoors

Entertainment and Technology

K1 How many televisions and accessories do you **use** in this home?

	None	One	Two	Three or more
Television (color)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Television (black & white)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digital cable box	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digital satellite box	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DVD Player (or combined DVD/VCR)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
VCR	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personal video recorders (e.g., TiVo, ReplayTV)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

K2 How many total hours are all your **televisions** on each day? *(Add up time for each television.)*

- Less than 1 hour
 5 – 8 hours
 13 – 16 hours
 21 – 30 hours
 1 – 4 hours
 9 – 12 hours
 17 – 20 hours
 more than 30 hours

K3 How many **personal computer(s)** (PC, Macintosh, etc.) do you **use** in this home? *(Include both desktops and laptops.)*

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

K4 If 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.)*

- Less than 1 hour
 5 – 8 hours
 13 – 16 hours
 21 – 30 hours
 1 – 4 hours
 9 – 12 hours
 17 – 20 hours
 more than 30 hours

K5 How often does anyone in your home perform any of the following activities on your computer?

	Never	Rarely <i>(less than once a week)</i>	Occasionally <i>(several times a week)</i>	Frequently <i>(several times a day)</i>
Send or receive e-mail	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Browse the Internet for information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make purchases using the Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pay bills on-line	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

K6 Do you (or someone else in your home) operate a business and/or work from your home?

No *(Go to K8.)*

Yes → **K7** How many hours a week is someone working out of your home?

- 0 – 10 hours per week
 11 – 30 hours per week
 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	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Multifunction machine <i>(PC printer, fax, copier)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FAX machine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Printer for computer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scanner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Copier	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internet access via traditional phone line	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DSL modem for Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cable modem for Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Home network <i>(LAN)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cell phone <i>(used by occupants of this home)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stereo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on Timers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on Motion Detectors or Occupancy Sensors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on a Dimming Switch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exterior compact fluorescent fixtures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low voltage landscape light system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HID (sodium vapor, metal halide) fixture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exterior Lighting Controls				
Fixtures on Timers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on Dusk-to-Dawn Sensors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on Motion Detectors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Miscellaneous Appliances

M1 How many of each of the following appliances or equipment do you **use** in your home?
(Choose all that apply.)

	None	One	Two	Three or more
Electronic security system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electronic household air cleaner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humidifier	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dehumidifier	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Water purification system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pond or water garden pump	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heated waterbed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electric blanket	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aquarium	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Portable fan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ceiling fan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wind turbine attic ventilator (non-electric)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electric attic fan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whole-house fan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sauna – electric	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electric garage door opener	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trash compactor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lawn mower – electric	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- M2** Do you use an electric well water pump to provide water for your home?
 No (*Go to M5.*)
 Yes → **M3** Does your home also have access to city/county water sources?
 Yes
 No
M4 How do you use your well water?
 Only for gardening and landscaping
 Only for household use
 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	<input type="checkbox"/>		
Shop tools	<input type="checkbox"/>		
Electric welding equipment	<input type="checkbox"/>		
Electric air compressor	<input type="checkbox"/>		
Large battery charger	<input type="checkbox"/>		
Kiln for ceramics and pottery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medical equipment (e.g., respirator)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- M6** Do you have an electric vehicle, electric wheelchair, or golf cart at your home?
 No (*Go to M9.*)
 Yes, but it is a hybrid vehicle and does not need to be charged at home. (*Go to M9.*)
 Yes, electric wheelchair/cart → **M7** Do you charge your electric vehicle at home?
 Yes, electric car/vehicle → No
 Yes → **M8** What is the voltage used for charging?
 108 – 120 volts
 208 – 240 volts
 other or unknown voltage

M9 Do you use any other equipment or large appliance that consumes a significant amount of electricity or natural gas in your home?
 Yes No
(Please describe equipment and fuel.): _____

M10 Please indicate if you have **replaced, discarded, or added without discarding** any of the following appliances in the past 12 months. *(Choose all that apply.)*

Appliance	Mark Each Replaced or Discarded Unit		Age of Replaced or Discarded Unit			Fuel Type of Discarded or Replaced Unit			Added a New Unit Without Discarding
	Replaced Unit	Discarded Without Replacing	1 – 10 years	11 – 20 years	Over 20 years	Elec	Nat. Gas	Other	
Central heating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Central cooling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>
Wall or window air conditioner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>
Water heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stove top	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oven	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Microwave oven	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>
Dishwasher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>
Clothes washer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>
Clothes dryer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pool heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pool pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>
Hot tub/spa heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Have not replaced, discarded, nor added any of the following appliances.

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 homes in California that are 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.)
 Yes No *(Go to N3.)*

N2 Please provide the following information for each 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.)*

	Home #1		Home #2	
Location	<input type="checkbox"/> Mountains <input type="checkbox"/> Desert <input type="checkbox"/> Other	<input type="checkbox"/> Near Lake or River <input type="checkbox"/> Near Ocean	<input type="checkbox"/> Mountains <input type="checkbox"/> Desert <input type="checkbox"/> Other	<input type="checkbox"/> Near Lake or River <input type="checkbox"/> Near Ocean
Days per year the home is typically occupied	<input type="checkbox"/> 0 - 10 days <input type="checkbox"/> 11-60 days <input type="checkbox"/> 60 - 120 days	<input type="checkbox"/> 121 - 240 days <input type="checkbox"/> 240 - 365 days	<input type="checkbox"/> 0 - 10 days <input type="checkbox"/> 11-60 days <input type="checkbox"/> 60 - 120 days	<input type="checkbox"/> 121 - 240 days <input type="checkbox"/> 240 - 365 days
Electricity is provided to this vacation home by:	<input type="checkbox"/> PG&E <input type="checkbox"/> SCE <input type="checkbox"/> SDG&E	<input type="checkbox"/> LADWP <input type="checkbox"/> Other	<input type="checkbox"/> PG&E <input type="checkbox"/> SCE <input type="checkbox"/> SDG&E	<input type="checkbox"/> LADWP <input type="checkbox"/> Other

N3 What was the highest level of education completed by any head of household in the home?

- Elementary (*grades 1 – 8*)
- Some high school (*grades 9 – 12*)
- High school graduate
- Some college/trade/vocational school
- College graduate
- Postgraduate degree

N4 What is the primary language spoken in this home?

- English
- Asian (*describe*) _____
- Spanish
- Other (*describe*) _____

N5 Are any of the occupants of your home permanently disabled?

- No
- Yes, 1 permanently disabled person
- Yes, 2 or more permanently disabled people

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	<input type="checkbox"/>	<input type="checkbox"/>
Asian or Pacific Islander	<input type="checkbox"/>	<input type="checkbox"/>
Black, African American	<input type="checkbox"/>	<input type="checkbox"/>
Hispanic / Latino	<input type="checkbox"/>	<input type="checkbox"/>
White, Caucasian	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

N7 Please check the range that best describes your household's **total annual income**.

- Less than \$10,000
- \$10,000 – \$19,999
- \$20,000 – \$24,999
- \$25,000 – \$29,999
- \$30,000 – \$34,999
- \$35,000 – \$39,999
- \$40,000 – \$49,999
- \$50,000 – \$59,999
- \$60,000 – \$74,999
- \$75,000 – \$99,999
- \$100,000 – \$149,999
- \$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 fill out the circles to match each letter in the box below)

			-				-				
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

Best Time to Call:

- Weekday mornings
- Weekday afternoons
- Weekday early evening
- Weekday evening
- Weekend

Thank you very much for your cooperation and assistance!

B: SURVEY WITH VARIABLES

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.




CORRECT
MARK




INCORRECT
MARKS

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
Pacific Gas and Electric
San Diego Gas and Electric

Southern California Edison
Southern California Gas Company
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)

- 1 Single-family detached house → Number of stories: 1 1 1 2 1 3 or more (STORIES)
- 2 Townhouse, duplex, or row house (*Shares exterior walls with neighboring unit, but not roof or floor*)
- 3 Apartment or condominium (2 – 4 units)
- 4 Apartment or condominium (5 or more units)
- 5 Mobile home
- 6 Other (*Describe:* (DWLOTRD) _____)

A2 Do you own or rent this home? (OWNRENT)

- 1 Own / buying 2 Rent / lease

A3 How long have you lived at this address? (YRS_RES)

- | | | | |
|---|--------------------------------------|--------------------------------------|--|
| 1 <input type="checkbox"/> 1 yr or less | 6 <input type="checkbox"/> 6 years | 11 <input type="checkbox"/> 11 years | 16 <input type="checkbox"/> 16 – 20 years |
| 2 <input type="checkbox"/> 2 years | 7 <input type="checkbox"/> 7 years | 12 <input type="checkbox"/> 12 years | 17 <input type="checkbox"/> 21 – 30 years |
| 3 <input type="checkbox"/> 3 years | 8 <input type="checkbox"/> 8 years | 13 <input type="checkbox"/> 13 years | 18 <input type="checkbox"/> More than 30 years |
| 4 <input type="checkbox"/> 4 years | 9 <input type="checkbox"/> 9 years | 14 <input type="checkbox"/> 14 years | |
| 5 <input type="checkbox"/> 5 years | 10 <input type="checkbox"/> 10 years | 15 <input type="checkbox"/> 15 years | |

A4 What best describes this residence? (SEASOCC)

- 1 This is my permanent year-round residence. (Go to A6.)
- 2 This is my partial-year or seasonal residence.
- 3 This is my vacation home and is generally used only by my family.
- 4 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.*)

- | | | | | | |
|---|---|---|---|--|---|
| 1 <input type="checkbox"/> Jan
(SEASJAN) | 1 <input type="checkbox"/> Mar
(SEASMAR) | 1 <input type="checkbox"/> May
(SEASMAY) | 1 <input type="checkbox"/> Jul
(SEASJUL) | 1 <input type="checkbox"/> Sept
(SEASSEP) | 1 <input type="checkbox"/> Nov
(SEASNOV) |
| 1 <input type="checkbox"/> Feb
(SEASFEB) | 1 <input type="checkbox"/> Apr
(SEASAPR) | 1 <input type="checkbox"/> Jun
(SEASJUN) | 1 <input type="checkbox"/> Aug
(SEASAUG) | 1 <input type="checkbox"/> Oct
(SEASOCT) | 1 <input type="checkbox"/> Dec
(SEASDEC) |

A6 Approximately what year was this residence built? (BUILTYR)

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

- | | | | | | |
|--|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| 1 <input type="checkbox"/> Before 1940 | 8 <input type="checkbox"/> 1973 | 15 <input type="checkbox"/> 1980 | 22 <input type="checkbox"/> 1987 | 29 <input type="checkbox"/> 1994 | 36 <input type="checkbox"/> 2001 |
| 2 <input type="checkbox"/> 1940-1949 | 9 <input type="checkbox"/> 1974 | 16 <input type="checkbox"/> 1981 | 23 <input type="checkbox"/> 1988 | 30 <input type="checkbox"/> 1995 | 37 <input type="checkbox"/> 2002 |
| 3 <input type="checkbox"/> 1950-1959 | 10 <input type="checkbox"/> 1975 | 17 <input type="checkbox"/> 1982 | 24 <input type="checkbox"/> 1989 | 31 <input type="checkbox"/> 1996 | 38 <input type="checkbox"/> 2003 |
| 4 <input type="checkbox"/> 1960-1969 | 11 <input type="checkbox"/> 1976 | 18 <input type="checkbox"/> 1983 | 25 <input type="checkbox"/> 1990 | 32 <input type="checkbox"/> 1997 | |
| 5 <input type="checkbox"/> 1970 | 12 <input type="checkbox"/> 1977 | 19 <input type="checkbox"/> 1984 | 26 <input type="checkbox"/> 1991 | 33 <input type="checkbox"/> 1998 | |
| 6 <input type="checkbox"/> 1971 | 13 <input type="checkbox"/> 1978 | 20 <input type="checkbox"/> 1985 | 27 <input type="checkbox"/> 1992 | 34 <input type="checkbox"/> 1999 | |
| 7 <input type="checkbox"/> 1972 | 14 <input type="checkbox"/> 1979 | 21 <input type="checkbox"/> 1986 | 28 <input type="checkbox"/> 1993 | 35 <input type="checkbox"/> 2000 | |

A7 How many bedrooms are in your home? (NUMROOM)

- | | | | |
|---|------------------------------|------------------------------|--|
| 1 <input type="checkbox"/> No bedrooms (studio apartment) | 4 <input type="checkbox"/> 3 | 7 <input type="checkbox"/> 6 | 10 <input type="checkbox"/> 9 |
| 2 <input type="checkbox"/> 1 bedroom | 5 <input type="checkbox"/> 4 | 8 <input type="checkbox"/> 7 | 11 <input type="checkbox"/> 10 |
| 3 <input type="checkbox"/> 2 bedrooms | 6 <input type="checkbox"/> 5 | 9 <input type="checkbox"/> 8 | 12 <input type="checkbox"/> 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)

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

A9 Are your home’s **exterior walls** insulated? (EXTWLINS)

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

A10 Is your home’s **attic/ceiling** insulated? (ACEILINS)

- 1 Yes → **A11** If yes, estimate the number of inches of **attic/ceiling** insulation. (CEILINCH)
 - 1 0 – 3 inches (*R-value less than R-10*)
 - 2 4 – 6 inches (*R-11 to R-19*)
 - 3 7 – 10 inches (*R-20 to R-30*)
 - 4 More than 10 inches (*R-31 or higher*)
- 2 No

A12 Choose the statement that best describes your **windows**. (WINDTYPE)

- 1 All or most are double pane windows
- 2 All or most are single pane windows
- 3 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)

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

A14 Has your home been remodeled in the past 12 months? (REMOD)

- 1 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)

Age	Number of People Usually Living In This Home								
	None	1	2	3	4	5	6	7	Over 7
5 and under (NR0_5)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
6 – 18 (NR6_18)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
19 – 34 (NR19_34)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
35 – 54 (NR35_54)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
55 – 64 (NR55_64)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
65 and over (NR65_99)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>

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)
- 2 San Diego Gas & Electric
- 3 Southern California Gas Company (“The Gas Company”)
- 4 Southwest Gas Corporation
- 5 City of Coalinga
- 6 City of Long Beach Gas Department
- 7 Not sure

Space Heating

B1 Do you pay to heat your home? (PAYHEAT)

- Yes
 No, it is part of my rent/condo fee (Go to B8.)
 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 <i>(Mark only ONE BOX below)</i>	Additional Heating <i>(Mark ALL BOXES that apply)</i>
NATURAL GAS (from gas utility)		
Central forced-air furnace <i>(fan circulates hot air through air ducts)</i>	<input type="checkbox"/> (PHTNGCNT)	<input type="checkbox"/> (AHTNGCNT)
Floor or wall heater/furnace	<input type="checkbox"/> (PHTNGFWL)	<input type="checkbox"/> (AHTNGFWL)
Hot water radiator	<input type="checkbox"/> (PHTNGRAD)	<input type="checkbox"/> (AHTNGRAD)
Other system type	<input type="checkbox"/> (PHTNGOTH)	<input type="checkbox"/> (AHTNGOTH)
ELECTRIC		
Resistance (baseboard/ceiling/floor/wall)	<input type="checkbox"/> (PHTELBSB)	<input type="checkbox"/> (AHTELBSB)
Central forced air furnace <i>(fan circulates hot air through air ducts)</i>	<input type="checkbox"/> (PHTELCRH)	<input type="checkbox"/> (AHTELCRH)
Central heat pump <i>(heats and cools)</i>	<input type="checkbox"/> (PHTELCHP)	<input type="checkbox"/> (AHTELCHP)
Through-the-wall heat pump <i>(looks like a window/wall air conditioner, but also provides heat)</i>	<input type="checkbox"/> (PHTELWHP)	<input type="checkbox"/> (AHTELWHP)
Portable heaters	<input type="checkbox"/> (PHTELPOR)	<input type="checkbox"/> (AHTELPOR)
Other system type	<input type="checkbox"/> (PHTELOTH)	<input type="checkbox"/> (AHTELOTH)
BOTTLED GAS (propane, LP)		
Central forced air furnace <i>(fan circulates hot air through air ducts)</i>	<input type="checkbox"/> (PHTBGCNT)	<input type="checkbox"/> (AHTBGCNT)
Floor or wall heater/furnace	<input type="checkbox"/> (PHTBGFWL)	<input type="checkbox"/> (AHTBGFWL)
Hot water radiator	<input type="checkbox"/> (PHTBGRAD)	<input type="checkbox"/> (AHTBGRAD)
Other system type	<input type="checkbox"/> (PHTBGOTH)	<input type="checkbox"/> (AHTBGOTH)
WOOD		
Woodstove/fireplace insert	<input type="checkbox"/> (PHTWDWS)	<input type="checkbox"/> (AHTWDWS)
Fireplace	<input type="checkbox"/> (PHTWDFP)	<input type="checkbox"/> (AHTWDFP)
SOLAR		
Solar – no backup	<input type="checkbox"/> (PHTSLRN)	<input type="checkbox"/> (AHTSLRN)
Solar – natural gas backup	<input type="checkbox"/> (PHTSLRG)	<input type="checkbox"/> (AHTSLRG)
Solar – propane backup	<input type="checkbox"/> (PHTSLRP)	<input type="checkbox"/> (AHTSLRP)
Solar – electric backup	<input type="checkbox"/> (PHTSLRE)	<input type="checkbox"/> (AHTSLRE)
OTHER		
<i>(Describe):</i> (HTOTSYS)_____	<input type="checkbox"/> (PHTOTSYS)	<input type="checkbox"/> (AHTOTSYS)

B3 If your heating system(s) use natural gas for fuel, indicate whether it has a pilot light(s).

Main gas heating (MAINPILT)	<input type="checkbox"/> Yes, pilot light	<input type="checkbox"/> No pilot light
Secondary gas heating (SECPILT)	<input type="checkbox"/> Yes, pilot light(s)	<input type="checkbox"/> 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 <i>(6am-9am)</i> (HMRNSET)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Day <i>(9am-5pm)</i> (HDAYSET)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Evening <i>(5pm-9pm)</i> (HEVNSET)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Night <i>(9pm-6am)</i> (HNITESET)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

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)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Central evaporative cooler <i>(swamp cooler)</i> (CTEVPAGE)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heat pump <i>(heats and cools)</i> (HPAGE)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 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 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Day (9am–5pm) (CDAYSET)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Evening (5pm–9pm) (CEVNSET)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Night (9pm–6am) (CNITESET)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>

- C6** Has maintenance been performed on your central air conditioning system in the past 12 months? (CLMAINTN)
- 1 Yes 2 No

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 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Window/wall heat pump	2 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>
Window/wall evaporative cooler (<i>swamp cooler</i>)	3 <input type="checkbox"/>	3 <input type="checkbox"/>	3 <input type="checkbox"/>
Age of Room AC/Cooling Unit (ACAGE1) (ACAGE2) (ACAGE3)			
Less than one year	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
1 – 3 years	2 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>
4 – 8 years	3 <input type="checkbox"/>	3 <input type="checkbox"/>	3 <input type="checkbox"/>
9 – 13 years	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>
More than 13 years	5 <input type="checkbox"/>	5 <input type="checkbox"/>	5 <input type="checkbox"/>

- 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 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Day (9am–5pm) (CDAYUSE)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Evening (5pm–9pm) (CEVNUSE)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Night (9pm–6am) (CNITEUSE)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Hot weekday afternoon (noon–6pm) (CHOTUSE)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>

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 <i>(Mark only ONE BOX in this column)</i>	Additional Water Heater(s) <i>(Mark ALL BOXES that apply)</i>
NATURAL GAS		
Standard tank	1 <input type="checkbox"/> (PWHNGTNK)	1 <input type="checkbox"/> (AWHNGTNK)
Whole house tankless system	1 <input type="checkbox"/> (PWHNGWHT)	1 <input type="checkbox"/> (AWHNGWHT)
ELECTRIC		
Standard tank	1 <input type="checkbox"/> (PWHELTKN)	1 <input type="checkbox"/> (AWHELTKN)
Heat pump	1 <input type="checkbox"/> (PWHELHP)	1 <input type="checkbox"/> (AWHELHP)
Whole house tankless system	1 <input type="checkbox"/> (PWHELWHT)	1 <input type="checkbox"/> (AWHELWHT)
Point-of use tankless system	1 <input type="checkbox"/> (PWHELPNT)	1 <input type="checkbox"/> (AWHELPNT)
PROPANE		
Standard tank	1 <input type="checkbox"/> (PWHLPTNK)	1 <input type="checkbox"/> (AWHLPTNK)
Whole house tankless system	1 <input type="checkbox"/> (PWHLPWHT)	1 <input type="checkbox"/> (AWHLPWHT)
SOLAR		
With no backup system	1 <input type="checkbox"/> (PWHSLRN)	1 <input type="checkbox"/> (AWHSLRN)
With natural gas backup	1 <input type="checkbox"/> (PWHSLRG)	1 <input type="checkbox"/> (AWHSLRG)
With propane backup	1 <input type="checkbox"/> (PWHSLRP)	1 <input type="checkbox"/> (AWHSLRP)
With electric backup	1 <input type="checkbox"/> (PWHSLRE)	1 <input type="checkbox"/> (AWHSLRE)
OTHER FUEL		
Describe: (WHOTSYS) _____	1 <input type="checkbox"/> (PWHOTSYS)	1 <input type="checkbox"/> (AWHOTSYS)

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 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Baths / day (BATHSDAY)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>

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)
 Yes No, laundry facilities are located in a common area of the building. (Go to F1.)
 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.)
 Top loading washer Front loading washer

E3 How old is your clothes washer? (CWAGE)
 Less than one year 6 – 8 years 16 – 30 years
 1 – 5 years 9 – 15 years 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)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Warm water (CWWWLD)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cold water (CWCWLD)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

E5 What type of clothes dryer do you have? (CDTYP)
(Do not include coin-operated machines or machines in common areas.)
 I do not have a clothes dryer Electric dryer
 Natural gas dryer Bottled gas (*Propane, Butane, LP*)

E6 How many loads of clothes do you dry in your clothes dryer during a typical week? (DRYLDS)
 None 2 4 6 8 10 or more
 1 3 5 7 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	<input type="radio"/> (CKRNTYP)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> (CKRNA)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Oven(s)	<input type="radio"/> (CKOVTYP)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> (CKOVA)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Outdoor barbecue	<input type="radio"/> (CKBBTYP)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> (CKBBQA)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

F2 During a typical week, how often do you use your range or oven?

	Never	Rarely <i>(less than once per week)</i>	Occasionally <i>(1 – 2 times per week)</i>	Sometimes <i>(3 – 4 times per week)</i>	Often <i>(5 – 7 times per week)</i>
	Breakfast (BRNOVUSE)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lunch (LRNOVUSE)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dinner (DRNOVUSE)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (ORNOVUSE)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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
- 2 1
- 3 2
- 4 3
- 5 4
- 6 5
- 7 6
- 8 7
- 9 8
- 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 (RF1STY)	Refrig 2 (RF2STY)	Refrig 3 (RF3STY)	Old Refrigerator Discarded in the Last 12 Months (RFDSCSTY)
Door Style				
Single-door	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
Top Freezer – Bottom Refrigerator	2 <input type="radio"/>	2 <input type="radio"/>	2 <input type="radio"/>	2 <input type="radio"/>
Top Refrigerator – Bottom Freezer	3 <input type="radio"/>	3 <input type="radio"/>	3 <input type="radio"/>	3 <input type="radio"/>
Side-by-side	4 <input type="radio"/>	4 <input type="radio"/>	4 <input type="radio"/>	4 <input type="radio"/>
Size, in Cubic Feet	(RF1SZ)	(RF2SZ)	(RF3SZ)	(RFDCSZ)
Mini (<i>under 13 cu. ft.</i>)	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
Small (<i>13 – 16 cu. ft.</i>)	2 <input type="radio"/>	2 <input type="radio"/>	2 <input type="radio"/>	2 <input type="radio"/>
Medium (<i>17 – 19 cu. ft.</i>)	3 <input type="radio"/>	3 <input type="radio"/>	3 <input type="radio"/>	3 <input type="radio"/>
Large (<i>20 – 23 cu. ft.</i>)	4 <input type="radio"/>	4 <input type="radio"/>	4 <input type="radio"/>	4 <input type="radio"/>
Very large (<i>over 23 cu. ft.</i>)	5 <input type="radio"/>	5 <input type="radio"/>	5 <input type="radio"/>	5 <input type="radio"/>
Frost-free or Manual Defrost?	(RF1DEF)	(RF2DEF)	(RF3DEF)	(RFDCDEF)
Automatic (frost-free)	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
Manual	2 <input type="radio"/>	2 <input type="radio"/>	2 <input type="radio"/>	2 <input type="radio"/>
Age of your Refrigerator	(RF1AGE)	(RF2AGE)	(RF3AGE)	(RFDCAGE)
Less than two years	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
2 – 7 years	2 <input type="radio"/>	2 <input type="radio"/>	2 <input type="radio"/>	2 <input type="radio"/>
8 – 10 years	3 <input type="radio"/>	3 <input type="radio"/>	3 <input type="radio"/>	3 <input type="radio"/>
11 – 20 years	4 <input type="radio"/>	4 <input type="radio"/>	4 <input type="radio"/>	4 <input type="radio"/>
More than 20 years	5 <input type="radio"/>	5 <input type="radio"/>	5 <input type="radio"/>	5 <input type="radio"/>
Other Features	(RF1OTH)	(RF2OTH)	(RF3OTH)	(RFDCOTH)
Through-the-door ice and water dispenser	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>

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 J1.)

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 (FZ1STY)	Freezer 2 (FZ2STY)	Old Freezer Discarded in the Last 12 Months (FZDSCSTY)
Style			
Upright, frost-free	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
Upright manual defrost	2 <input type="radio"/>	2 <input type="radio"/>	2 <input type="radio"/>
Chest frost-free	3 <input type="radio"/>	3 <input type="radio"/>	3 <input type="radio"/>
Chest manual defrost	4 <input type="radio"/>	4 <input type="radio"/>	4 <input type="radio"/>
Size, in Cubic Feet	(FZ1SZ)	(FZ2SZ)	(FZDSCSZ)
Small (<i>under 13 cu. ft.</i>)	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
Medium (<i>13 – 16 cu. ft.</i>)	2 <input type="radio"/>	2 <input type="radio"/>	2 <input type="radio"/>
Large (<i>over 16 cu. ft.</i>)	3 <input type="radio"/>	3 <input type="radio"/>	3 <input type="radio"/>
Age of your Freezer	(FZ1AGE)	(FZ2AGE)	(FZDSCAGE)
Less than two years	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
2 – 7 years	2 <input type="radio"/>	2 <input type="radio"/>	2 <input type="radio"/>
8 – 10 years	3 <input type="radio"/>	3 <input type="radio"/>	3 <input type="radio"/>
11 – 20 years	4 <input type="radio"/>	4 <input type="radio"/>	4 <input type="radio"/>
More than 20 years	5 <input type="radio"/>	5 <input type="radio"/>	5 <input type="radio"/>

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 <input type="radio"/>	1 <input type="radio"/>
Rarely	2 <input type="radio"/>	2 <input type="radio"/>
Only when we use it	3 <input type="radio"/>	3 <input type="radio"/>
1 – 3 hours every day	4 <input type="radio"/>	4 <input type="radio"/>
4 – 6 hours every day	5 <input type="radio"/>	5 <input type="radio"/>

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 <input type="radio"/>	1 <input type="radio"/>
0 – 2 times per month	2 <input type="radio"/>	2 <input type="radio"/>
3 – 8 times per month	3 <input type="radio"/>	3 <input type="radio"/>
9 or more times per month	4 <input type="radio"/>	4 <input type="radio"/>
Maintain set temperature	5 <input type="radio"/>	5 <input type="radio"/>

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 <input type="radio"/>	1 <input type="radio"/>
1 – 2	2 <input type="radio"/>	2 <input type="radio"/>
3 – 4	3 <input type="radio"/>	3 <input type="radio"/>
5 – 7	4 <input type="radio"/>	4 <input type="radio"/>
8 – 11	5 <input type="radio"/>	5 <input type="radio"/>
12 – 15	6 <input type="radio"/>	6 <input type="radio"/>
16 – 20	7 <input type="radio"/>	7 <input type="radio"/>
21 or more	8 <input type="radio"/>	8 <input type="radio"/>

J4 Which fuel do you use to heat your pool? (PLHTF)

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

J5 Please indicate how often you **heat** your pool in the summer and winter.

	Summer (May – Oct.) (SMHTPL)	Winter (Nov. – April) (WNHTPL)
Never	1 <input type="radio"/>	1 <input type="radio"/>
Once a month	2 <input type="radio"/>	2 <input type="radio"/>
Once a week	3 <input type="radio"/>	3 <input type="radio"/>
2 – 4 times per week	4 <input type="radio"/>	4 <input type="radio"/>
Keep pool heated continuously	5 <input type="radio"/>	5 <input type="radio"/>

J6 Which of the following attributes does your pool have? *(Choose all that apply.)*

- Cover (PLCOV)
 Pool timer (PLTIMR)
 Pool sweep (PLSWEEP)
 Pool is indoors (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 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
Large screen television (greater than 36 inches) (BSTV)	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
Standard size television (36 inches or less) (CLTV)	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
Analog cable box (CABLE)	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
Digital cable box (DIGCABLE)	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
Digital satellite box (DSS)	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
DVD Player (or combined DVD/VCR) (DVD)	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
VCR (VCR)	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
Personal video recorders (e.g., TiVo, ReplayTV) (TIVO)	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>
Stereo (MUSIC)	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>	1 <input type="radio"/>

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)

- 1 We have no computers in this home *(Go to K7.)*
 3 2 computers
 2 1 computer
 4 3 or more computers

K4 If 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)

- 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

K5 How often does anyone in your home perform any of the following activities on your computer?

	Never	Rarely <i>(less than once a week)</i>	Occasionally <i>(several times a week)</i>	Frequently <i>(several times a day)</i>
Send or receive e-mail (EMAIL)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Browse the Internet for information (BRWSONLN)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make purchases using the Internet (BUYONLN)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pay bills on-line (BILLONLN)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

K6 Do you (or someone else in your home) operate a business and/or work from your home? (WORKHOME)

No (Go to K8.)

Yes ➔ **K7** How many hours a week is someone working out of your home? (WKHRSHM)

0 – 10 hours per week

11 – 30 hours per week

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)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Multifunction machine (printer, fax, scanner, copier) (MULTMCHN)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FAX machine (FAX)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Printer for computer (PRTLAS)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scanner (SCAN)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Copier (COPIER)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internet access via traditional phone line (PHINT)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DSL modem for Internet (DSLINT)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cable modem for Internet (CBLINT)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Satellite communication for Internet (SATCMINT)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Home network (LAN) (NETWK)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cell phone (used by occupants of this home) (CELL)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on Timers (ICTLTIMR)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on Motion Detectors or Occupancy Sensors (ICTLOCCS)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on a Dimming Switch (ICTLDIM)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exterior compact fluorescent fixtures (EXCFL)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low voltage landscape light system (EXLOWV)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HID (sodium vapor, metal halide) fixture (EXHID)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exterior Lighting Controls				
Fixtures on Timers (ECTLTIMR)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on Dusk-to-Dawn Sensors (ECTLDSK)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on Motion Detectors (ECTLMOTN)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ceiling fan (FNCEIL)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wind turbine attic ventilator (non-electric) (WNDATV)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electric attic fan (FNATTIC)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whole-house fan (FNWHOLE)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electronic household air cleaner (AIRCLEAN)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humidifier (HUM)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dehumidifier (DEH)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Water purification system (WHPURIFY)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heated waterbed (WBED)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electric blanket (ELBLNKET)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aquarium (AQUAR)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trash compactor (TRSHCOMP)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sauna – electric (SAUNA)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electronic security system (SCRTYSYS)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pond or water garden pump (POND)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electric garage door opener (GRGDROPN)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lawn mower – electric (LAWNMOWR)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

M2 Do you use an electric well water pump to provide water for your home?
 (WLWTRPMP)

No *(Go to M5.)*

Yes

M3 Does your home also have access to city/county water sources? (WTRSRCES) Yes No

M4 How do you use your well water? (WLWTUSE)

Only for gardening and landscaping

Only for household use

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 <input type="checkbox"/>		
Shop tools (SHOPTLS)	1 <input type="checkbox"/>		
Electric welding equipment (WELD)	1 <input type="checkbox"/>		
Electric air compressor (AIRCOMP)	1 <input type="checkbox"/>		
Large battery charger (BATCHARGE)	1 <input type="checkbox"/>		
Kiln for ceramics and pottery (KILN)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Medical equipment (e.g., respirator) (MEDICAL)	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>

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? (CHRGVEH)

4 Yes, electric car/vehicle 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 <input type="checkbox"/> (CHADD)	(CHFUEL) 1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Central cooling	1 <input type="checkbox"/> (CCADD)	(CCFUEL) 1 <input type="checkbox"/>		
Wall or window air conditioner	1 <input type="checkbox"/> (WWADD)	(WWFUEL) 1 <input type="checkbox"/>		
Water heater	1 <input type="checkbox"/> (WHADD)	(WHFUEL) 1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Stove top	1 <input type="checkbox"/> (STADD)	(STFUEL) 1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Oven	1 <input type="checkbox"/> (OVADD)	(OVFUEL) 1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Microwave oven	1 <input type="checkbox"/> (MWADD)	(MWFUEL) 1 <input type="checkbox"/>		
Dishwasher	1 <input type="checkbox"/> (DWADD)	(DWFUEL) 1 <input type="checkbox"/>		
Clothes washer	1 <input type="checkbox"/> (CWADD)	(CWFUEL) 1 <input type="checkbox"/>		
Clothes dryer	1 <input type="checkbox"/> (CDADD)	(CDFUEL) 1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Pool heater	1 <input type="checkbox"/> (PHADD)	(PHFUEL) 1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Pool pump	1 <input type="checkbox"/> (PPADD)	(PPFUEL) 1 <input type="checkbox"/>		
Hot tub/spa heater	1 <input type="checkbox"/> (TBADD)	(TBFUEL) 1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>

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

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)

Yes 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)	<input type="checkbox"/> In the mountains	<input type="checkbox"/> Near the ocean
	<input type="checkbox"/> In the desert	<input type="checkbox"/> Other
	<input type="checkbox"/> Near a lake or river	
Electricity is provided to this vacation home by: (PTHMEUTL)	<input type="checkbox"/> PG&E	<input type="checkbox"/> LADWP
	<input type="checkbox"/> SCE	<input type="checkbox"/> Other
	<input type="checkbox"/> SDG&E	

N3 What was the highest level of education completed by any head of household in the home? (EDUC)

Elementary (*grades 1 – 8*) Some college/trade/ vocational school
 Some high school (*grades 9 – 12*) College graduate
 High school graduate Postgraduate degree

N4 What is the primary language spoken in this home? (ETHNIC)

- English
 Asian (describe) (ASIAETHD) _____
 Spanish
 Other (describe) (OTHETHD) _____

N5 Are any of the occupants of your home permanently disabled? (DISABLED)

- No Yes, 1 permanently disabled 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	<input type="checkbox"/> (HOHIND1)	<input type="checkbox"/> (HOHIND2)
Asian or Pacific Islander	<input type="checkbox"/> (HOHASN1)	<input type="checkbox"/> (HOHASN2)
Black, African American	<input type="checkbox"/> (HOHBLK1)	<input type="checkbox"/> (HOHBLK2)
Hispanic / Latino	<input type="checkbox"/> (HOHLAT1)	<input type="checkbox"/> (HOHLAT2)
White, Caucasian	<input type="checkbox"/> (HOHWHT1)	<input type="checkbox"/> (HOHWHT2)
Other	<input type="checkbox"/> (HOHOTH1)	<input type="checkbox"/> (HOHOTH2)

N7 Please check the range that best describes your household's total annual income. (INCOME) (AVGINC – Plugged continuous income, not including MM)

- Less than \$10,000 \$30,000 – \$34,999 \$60,000 – \$74,999
 \$10,000 – \$19,999 \$35,000 – \$39,999 \$75,000 – \$99,999
 \$20,000 – \$24,999 \$40,000 – \$49,999 \$100,000 – \$149,999
 \$25,000 – \$29,999 \$50,000 – \$59,999 \$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.)

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

Best Time to Call (TIMECALL)

- Weekday mornings
 Weekday afternoons
 Weekday early evening
 Weekday evening
 Weekend

Thank you very much for your cooperation and assistance!

C: SPANISH SURVEY

ENCUESTA DE LA ENERGIA EN EL HOGAR

¡Gracias por su ayuda! Su participación es muy importante para nosotros. La información que Usted nos dá nos ayuda a planear las necesidades de electricidad y gas natural suyas y las de todos los californianos. Por favor complete esta encuesta para esta dirección:

Por favor,
llene esta
encuesta
para la
residencia
indicada en
esta
dirección



SU PARTICIPACIÓN ES MUY IMPORTANTE

Por favor, llene esta encuesta con un **LÁPIZ**, rellenando completamente el óvalo como se muestra a la derecha. La información en rojo ayuda a aclarar preguntas. La información en azul le indica que basado en su respuesta, debe pasar a otra pregunta.



**MARCA
CORRECTA**



**MARCAS
INCORRECTAS**

Trate de responder a todas las preguntas. Si no sabe la respuesta a una de las preguntas, por favor continúe con la siguiente. Si desea que le ayuden a completar la encuesta, por favor llame sin cargo a nuestro número 1-800-331-8786, de 8:30 de la mañana a 7:00 de la noche. Fuera de este horario, por favor deje un mensaje y nosotros le llamaremos.

Cuando termine, por favor envíe la encuesta en el sobre adjunto de porte pagado a la siguiente dirección:

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

¡Gracias por participar!

Patrocinado por:

California Energy Commission
Pacific Gas and Electric
San Diego Gas and Electric

Southern California Edison
Southern California Gas Company
Los Angeles Dept. of Water and Power

Su casa y estilo de vida

A1 ¿Qué tipo de construcción es la dirección impresa en la primer página de esta encuesta?

- Casa individual Número de pisos: 1 2 3 o más
- Townhouse, duplex o casa en hilera (*Comparte con una unidad vecina las paredes exteriores, pero no el techo o el piso*)
- Departamento o condominio (2 – 4 unidades)
- Departamento o condominio (5 o más unidades)
- Casa rodante
- Otro (*Describe:* _____)

A2 ¿Es propietario de esta vivienda o la renta?

- Propietario / la está pagando Renta / alquiler

A3 ¿Cuánto tiempo ha vivido Ud. en esta dirección?

- | | | | |
|--|----------------------------------|----------------------------------|---|
| <input type="checkbox"/> 1 año o menos | <input type="checkbox"/> 6 años | <input type="checkbox"/> 11 años | <input type="checkbox"/> 16 – 20 años |
| <input type="checkbox"/> 2 años | <input type="checkbox"/> 7 años | <input type="checkbox"/> 12 años | <input type="checkbox"/> 21 – 30 años |
| <input type="checkbox"/> 3 años | <input type="checkbox"/> 8 años | <input type="checkbox"/> 13 años | <input type="checkbox"/> más de 30 años |
| <input type="checkbox"/> 4 años | <input type="checkbox"/> 9 años | <input type="checkbox"/> 14 años | |
| <input type="checkbox"/> 5 años | <input type="checkbox"/> 10 años | <input type="checkbox"/> 15 años | |

A4 ¿Cuál es la mejor descripción de esta residencia?

- Esta es mi residencia permanente. (*Pase a A6.*)
- Esta es mi residencia por parte del año o en temporada.
- Esta es mi casa de vacaciones y generalmente la usa solo mi familia.
- Esta es una casa vacaciones que se renta a otros.

A5 Si esta es una casa parte del año o de vacaciones, por favor marque los meses en que típicamente está ocupada (*Marque los meses que aplican.*)

- | | | | | | |
|----------------------------------|--------------------------------|--------------------------------|---------------------------------|-------------------------------|------------------------------|
| <input type="checkbox"/> Enero | <input type="checkbox"/> Marzo | <input type="checkbox"/> Mayo | <input type="checkbox"/> Julio | <input type="checkbox"/> Sept | <input type="checkbox"/> Nov |
| <input type="checkbox"/> Febrero | <input type="checkbox"/> Abril | <input type="checkbox"/> Junio | <input type="checkbox"/> Agosto | <input type="checkbox"/> Oct | <input type="checkbox"/> Dec |

A6 Aproximadamente, en qué año fué construída esta vivienda?

- | | | | | | |
|-------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| <input type="checkbox"/> Antes 1940 | <input type="checkbox"/> 1973 | <input type="checkbox"/> 1980 | <input type="checkbox"/> 1987 | <input type="checkbox"/> 1994 | <input type="checkbox"/> 2001 |
| <input type="checkbox"/> 1940-1949 | <input type="checkbox"/> 1974 | <input type="checkbox"/> 1981 | <input type="checkbox"/> 1988 | <input type="checkbox"/> 1995 | <input type="checkbox"/> 2002 |
| <input type="checkbox"/> 1950-1959 | <input type="checkbox"/> 1975 | <input type="checkbox"/> 1982 | <input type="checkbox"/> 1989 | <input type="checkbox"/> 1996 | <input type="checkbox"/> 2003 |
| <input type="checkbox"/> 1960-1969 | <input type="checkbox"/> 1976 | <input type="checkbox"/> 1983 | <input type="checkbox"/> 1990 | <input type="checkbox"/> 1997 | |
| <input type="checkbox"/> 1970 | <input type="checkbox"/> 1977 | <input type="checkbox"/> 1984 | <input type="checkbox"/> 1991 | <input type="checkbox"/> 1998 | |
| <input type="checkbox"/> 1971 | <input type="checkbox"/> 1978 | <input type="checkbox"/> 1985 | <input type="checkbox"/> 1992 | <input type="checkbox"/> 1999 | |
| <input type="checkbox"/> 1972 | <input type="checkbox"/> 1979 | <input type="checkbox"/> 1986 | <input type="checkbox"/> 1993 | <input type="checkbox"/> 2000 | |

A7 ¿Cuántos dormitorios hay en su casa?

- | | | | |
|---|----------------------------|----------------------------|------------------------------------|
| <input type="checkbox"/> No tiene (es un estudio) | <input type="checkbox"/> 3 | <input type="checkbox"/> 6 | <input type="checkbox"/> 9 |
| <input type="checkbox"/> 1 dormitorio | <input type="checkbox"/> 4 | <input type="checkbox"/> 7 | <input type="checkbox"/> 10 |
| <input type="checkbox"/> 2 dormitorios | <input type="checkbox"/> 5 | <input type="checkbox"/> 8 | <input type="checkbox"/> Más de 10 |

- A8** ¿Cuántos pies cuadrados o espacio de uso tiene su vivienda, incluidos los cuartos, vestíbulo y pasillos? *(Excluidos los garages, sótanos y entrada sin calefacción)*
- Menos de 250 1001 – 1250 2501 – 3000
 250 – 500 1251 – 1500 3001 – 4000
 501 – 750 1501 – 2000 4001 – 5000
 751 – 1000 2001 – 2500 Más de 5000

- A9** ¿Tienen aislamiento las **paredes exteriores** de su casa?
- Si, todas Si, algunas No

- A10** ¿Tiene aislamiento el **ático/techo** de su casa?
- Si ➔ **A11** En caso afirmativo, estime las pulgadas de aislamiento del **ático/techo**.
 No 0 – 3 pulgadas *(Valor R menos de R-10)*
 4 – 6 pulgadas *(R-11 a R-19)*
 7 – 10 pulgadas *(R-20 a R-30)*
 Más de 10 pulgadas *(R-31 o mayor)*

- A12** Seleccione la opción que mejor describe sus **ventanas**
- Todas o la mayoría tienen vidrio doble
 Todas o la mayoría tienen vidrio simple
 Mi casa tiene una mezcla de ventanas con vidrios dobles y simples

- A13** Seleccione la opción que mejor describe los marcos de sus **ventanas**
- Todas o la mayoría tienen marcos de vinílico
 Todas o la mayoría tienen marcos de madera
 Todas o la mayoría tienen marcos de metal

- A14** ¿Ha sido remodelada su casa en los últimos 12 meses?
- No *(Pase a A16.)*
 Si ➔ **A15** En casi afirmativo, que clase de remodelación hizo? *(Elija todas las apropiadas)*
 Adición de un cuarto, agregó pies cuadrados a la casa
 Remodelación de baño o cocina
 Reconstruímos casi toda la casa
 Otra

- A16** ¿Cuántas personas, incluido/a Usted, viven en la casa? Por favor, especifique por grupos de edades.

Edad	Número de personas que usualmente viven en esta casa								
	Nadie	1	2	3	4	5	6	7	Más de 7
5 y menores	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6 – 18	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19 – 34	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
35 – 54	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
55 – 64	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
65 y mayores	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

A17 En general, con qué frecuencia un miembro de esta casa usa aparatos o equipos eléctricos (por ej. lavarropas, cocina eléctrica, lavaplatos, aire acondicionado, etc) los días hábiles de **12 del mediodía a 6 de la tarde**?

- Frecuentemente *(3 – 5 días a la semana)*
- Ocasionalmente *(1 – 2 días a la semana)*
- Nunca o casi nunca *(Menos de 1 día a la semana)*

A18 ¿Hay en su vecindario un servicio de gas natural a través de tuberías?

- Si
- No *(Pase a B1.)*

A19 ¿Tiene una línea de gas natural o conexión en alguna parte de su casa?

- Si
- No

A20 ¿A qué compañía paga Usted por el servicio de **gas natural** en su casa?

- Pacific Gas & Electric (PG&E)
- San Diego Gas & Electric
- Southern California Gas Company (“The Gas Company”)
- Southwest Gas Corporation
- City of Coalinga
- City of Long Beach Gas Department
- No estoy seguro

Calefacción

B1 ¿Paga Usted por la calefacción de su casa?

- Si No, es parte de la renta/cuota de condominio *(Pase a B8.)*
 No, no tiene un sistema de calefacción *(Pase a B8.)*

B2 ¿Qué tipo de sistema de calefacción utiliza para calentar su casa?

(Si Ud. utiliza más de un sistema de calefacción marque el sistema que más utiliza como "Principal" y marque todos los otros sistemas como "Adicional")

	Calefacción Principal <i>(Marque solo UNA caja)</i>	Calefacción Adicional <i>(Marque TODAS las apropiadas)</i>
GAS NATURAL (del servicio de gas)		
Calefacción central por aire a presión <i>(un ventilador circula el aire caliente a través de los conductos)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Calefacción de pared/piso	<input type="checkbox"/>	<input type="checkbox"/>
Radiador de agua caliente	<input type="checkbox"/>	<input type="checkbox"/>
Otro tipo de sistema	<input type="checkbox"/>	<input type="checkbox"/>
ELÉCTRICO		
Resistencia (zócalo/techo/piso/pared)	<input type="checkbox"/>	<input type="checkbox"/>
Calefacción central por aire a presión <i>(un ventilador circula el aire caliente a través de los conductos)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Bomba de calor central <i>(calienta y enfría)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Bomba de calor en la pared <i>(Parece un aire acondic. de ventana/pared pero también dá calor)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Calefactor portátil	<input type="checkbox"/>	<input type="checkbox"/>
Otro tipo de sistema	<input type="checkbox"/>	<input type="checkbox"/>
GAS EN TANQUE (propano, LP)		
Calefacción central con aire a presión <i>(un ventilador circula el aire caliente a través de los conductos)</i>	<input type="checkbox"/>	<input type="checkbox"/>
Calefacción de pared/piso	<input type="checkbox"/>	<input type="checkbox"/>
Radiador de agua caliente	<input type="checkbox"/>	<input type="checkbox"/>
Otro tipo de sistema	<input type="checkbox"/>	<input type="checkbox"/>
MADERA		
Estufa de leña, chimenea inserta	<input type="checkbox"/>	<input type="checkbox"/>
Chimenea	<input type="checkbox"/>	<input type="checkbox"/>
SOLAR		
Solar – sin suplemento	<input type="checkbox"/>	<input type="checkbox"/>
Solar – con suplemento de gas natural	<input type="checkbox"/>	<input type="checkbox"/>
Solar – con suplemento de propano	<input type="checkbox"/>	<input type="checkbox"/>
Solar – con suplemento eléctrico	<input type="checkbox"/>	<input type="checkbox"/>
OTRO		
<i>(Describe):</i> _____	<input type="checkbox"/>	<input type="checkbox"/>

B3 Si su(s) sistema(s) de calefacción usa(n) gas natural indique si tiene(n) piloto(s) de encendido

Calefacción primaria a gas	<input type="checkbox"/> Si, tiene piloto	<input type="checkbox"/> No tiene piloto
Calefacción secundaria a gas	<input type="checkbox"/> Si, tiene pilotos	<input type="checkbox"/> No tiene pilotos(s)

B4 ¿Cuántos años tiene su sistema de calefacción?

- Menos de 1 año 4 – 8 años 14 – 30 años
 1 – 3 años 9 – 13 años Más de 30 años

B5 ¿Qué clase de termostato tiene su sistema principal de calefacción?

- Termostato programable *(Los digitales usualmente tienen un reloj digital y botones. Los mecánicos usualmente tienen un reloj rotativo y lenguetas, clavijas, o palancas.)*
 Termostato standard *(Le permite ajustar la temperatura y encender o apagar la calefacción. No se pueden ajustar los tiempos para encendido y apagado)*
 No tiene termostato *(Válvula/control simple de apagado/encendido) (Pase a B7.)*

B6 Si su sistema de calefacción principal está controlado por un termostato, cuál es la temperatura promedio a la que está ajustado en cada período durante el invierno? *(Elija una respuesta por cada período de tiempo. Seleccione la temperatura típica en que está puesto si ésta varía)*

	Apa- gado	Debajo 55°F	55 – 60°F	61 – 65°F	66 – 70°F	71 – 75°F	Sobre 75°F
Mañana <i>(6am-9am)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Día <i>(9am-5pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tarde <i>(5pm-9pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noche <i>(9pm-6am)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B7 ¿Se le ha hecho un servicio de mantenimiento a su sistema de calefacción principal en los pasados 12 meses?

- Si No

B8 ¿Cuántos calentadores eléctricos portátiles utiliza?

- No uso calentadores portátiles 2 calentadores portátiles
 1 calentador portátil 3 o más calentadores portátiles

B9 ¿Con qué frecuencia utiliza otro(s) sistema(s) de calefacción adicional(es) incluyendo calentadores portátiles, durante el invierno?

- No uso sistema adicional Con frecuencia *(2 a 4 días a la semana)*
 Raramente *(una vez al mes)* Siempre *(5 a 7 días a la semana)*
 A veces *(una vez a la semana)*

Aire acondicionado

AIRE ACONDICIONADO/ENFRIAMIENTO CENTRAL

C1 ¿Paga Ud. por el aire acondicionado central/enfriamiento de su casa?

- Si No, es parte de la renta/cuota de condominio *(Pase a C7.)*
 No, no tengo aire acondicionado central *(Pase a C7.)*

C2 ¿Qué clase y cuántos sistemas centrales de aire acondicionado/enfriamiento tiene Ud. en su casa?

	Número de sistemas centrales		
	1	2	3 o más
Aire acondicionado central	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enfriamiento por evaporación <i>(swamp cooler)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bomba de calor <i>(calienta y enfría)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- C3** ¿Cuántos años tiene su unidad de aire acondicionado central principal?
- Menos de un año 4 – 8 años 14 – 30 años
 1 – 3 años 9 – 13 años Más de 30 años

- C4** ¿Qué clase de termostato tiene su sistema de aire acondicionado?
- Termostato programable *(Los digitales usualmente tienen un reloj digital y botones. Los mecánicos usualmente tienen un reloj rotativo y lenguetas, clavijas, o palancas.)*
 Termostato standard *(Le permite ajustar la temperatura y encender y apagar el aire acondicionado. No se pueden ajustar los tiempos de encendido o apagado)*
 No tiene termostato *(Control simple de encendido/apagado) (Pase a C6.)*

- C5** ¿Cuál es la temperatura promedio a la que está ajustado en cada período durante el verano? *(Elija una respuesta para cada período de tiempo.)*

	Apa- gado	Menos de 70°F	70 – 73°F	74 – 76°F	77 – 80°F	Más de 80°F
Mañana <i>(6am–9am)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Día <i>(9am–5pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tarde <i>(5pm–9pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noche <i>(9pm–6am)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- C6** ¿Se le ha hecho un servicio de mantenimiento a su sistema de aire acondicionado central en los últimos 12 meses?
- Si No

AIRE ACONDICIONADO/ENFRIAMIENTO (Unidades de ventana/pared)

- C7** Indique abajo las características del aire acondicionado/enfriamiento en cada habitación.

No hay habitaciones con unidades de aire acondicionado/enfriamiento *(Pase a D1.)*

Unidad 1 Unidad 2 Unidad 3

Tipo de aire acondicionado/unidad de enfriamiento en la habitación

Aire acondicionado de ventana/pared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bomba a calor de ventana/pared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Evaporador de ventana/pared <i>(swamp cooler)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Edad de la unidad en la habitación

Menos de un año	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 – 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 – 8 años	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9 – 13 años	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Más de 13 años	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- C8** Indique con qué frecuencia las unidades de aire acondicionado/enfriamiento están encendidas en el verano. *(Seleccione una respuesta por cada período.)*

Período de tiempo	Nunca	Rara vez <i>1-2 días por sem.</i>	A veces <i>3-4 días por semana</i>	Con frec. <i>5-6 días por sem.</i>	Siempre <i>7 días por semana</i>
Mañana <i>(6am–am)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Día <i>(9am–5pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tarde <i>(5pm–9pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noche <i>(9pm–6am)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tarde de calor <i>(12-6pm)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Calentamiento de agua

D1 ¿Paga Ud. por calentar el agua en su casa?

- Sí No, es parte de la renta/cuota de condominio *(Pase a D6.)*
 No hay calentador de agua *(Pase a D6.)*

D2 ¿Qué sistema usa Ud. para calentar el agua en su casa?

	Calentador de agua principal <i>(Marque solo UNA caja en esta columna)</i>	Calentador(es) de agua adicional(es) <i>(Marque TODAS l,as cajas apropiadas)</i>
--	--	--

GAS NATURAL

Tanque standard	<input type="checkbox"/>	<input type="checkbox"/>
Sistema sin tanque en toda la casa	<input type="checkbox"/>	<input type="checkbox"/>

ELECTRICO

Tanque standard	<input type="checkbox"/>	<input type="checkbox"/>
Bomba de calor	<input type="checkbox"/>	<input type="checkbox"/>
Sistema sin tanque en toda la casa	<input type="checkbox"/>	<input type="checkbox"/>
Sistema sin tanque al momento de uso	<input type="checkbox"/>	<input type="checkbox"/>

PROPANO

Tanque standard	<input type="checkbox"/>	<input type="checkbox"/>
Sistema sin tanque en toda la casa	<input type="checkbox"/>	<input type="checkbox"/>

SOLAR

Sin suplemento	<input type="checkbox"/>	<input type="checkbox"/>
Con suplemento de gas natural	<input type="checkbox"/>	<input type="checkbox"/>
Con suplemento de propano	<input type="checkbox"/>	<input type="checkbox"/>
Con suplemento eléctrico	<input type="checkbox"/>	<input type="checkbox"/>

OTRO COMBUSTIBLE

Describe: _____

D3 ¿Cuál es la temperatura típica que ajusta el calentador de agua? *(Mediano es el ajuste standard de fábrica.)*

- Bajo *(menos de 130°F)* Mediano *(130°F–150°F)* Alto *(sobre 150°F)*

D4 ¿Cuántos años tiene su sistema principal para calentar el agua?

- Menos de 1 año 4 – 8 años 14 – 30 años
 1 – 3 años 9 – 13 años Más de 30 años

D5 ¿Tiene(n) cobertor(es) de insulación su(s) calentador(es) de agua?

- Sí No

D6 En un **día típico**, cuántas duchas y baños se toman en su casa?

	0	1	2	3	4	5	6	7	8	9	10 or más
Duchas / día	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baños / día	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D7 ¿Tiene regadera(s) de bajo flujo instalada(s) en su(s) ducha(s)? *(Las regaderas de bajo flujo usan 2.5 galones por minuto o menos y son standard desde 1993)*

- Sí, todas las duchas Sí, algunas duchas No

D8 ¿Tienen aereadores los grifos de su casa? *(Aereadores son agregados para reducir el uso de agua mezclando aire con el flujo de agua)*

- Sí, todos los grifos Sí, algunos grifos No

Lavado y secado de ropa

- E1** ¿Tiene lavadora y secadora de ropa en su casa?
- Sí No, la lavadora está en el área común del edificio. *(Pase a F1.)*
 Yo no uso lavadora en mi edificio. *(Pase a F1.)*
- E2** ¿Que tipo de lavarropas tiene?
- (No incluya los lavarropas que funcionan con monedas o están en áreas comunes.)*
- Lavarropas con abertura arriba Lavarropas con abertura al frente
- E3** ¿Cuántos años tiene su lavarropas?
- Menos de 1 año 6 – 8 años 16 – 30 años
 1 – 5 años 9 – 15 años Más de 30 años

E4 En promedio, cuántas veces a la semana lava ropa con cada una de estas temperaturas?

	Número de lavados de ropa por semana										
	0	1	2	3	4	5	6	7	8	9	10 o más
En caliente	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
En tibio	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
En frío	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E5 ¿Qué tipo de secadora de ropa tiene?
(No incluya las secadoras que funcionan con monedas o están en áreas comunes.)

- No tengo una secadora Secadora eléctrica
 Secadora a gas natural A gas envasado (*Propano, Butano, LP*)

E6 ¿Cuántos cargas de ropa se secan en su secadora durante una **semana típica**?

- Ninguna 2 4 6 8 10 o más
 1 3 5 7 9

Preparación de comida

F1 ¿Cuál de las siguientes aparatos para cocinar se utilizan en su casa? (*Elija todos los apropiados.*)

Aparatos para cocinar	Tipo de combustible				Edad en años			
	Gas Nat.	Elec trico	Gas Envas.	Otro	0-5 a.	6-10 a.	11-15 años	Más de 15 años
Estufa de hornillas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Horno(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parrilla/asador exterior ("al aire libre")	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

F2 Durante una **semana típica**, cuándo utiliza su estufa/cocina o su horno?

	Nunca	Raramente (menos de una en la semana)	En ocasión (1 - 2 veces en la semana)	A veces (3 - 4 veces en la semana)	Frecuente (5 - 7 veces en la semana)
Desayuno	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Almuerzo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cena	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Otro	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

F3 ¿Tiene **horno de microondas**?

- Sí, y se utiliza con frecuencia (7 o más veces por semana)
 Sí, y se utiliza menos de 7 veces por semana
 No

F4 ¿Tiene **lavaplatos**?

- Sí No (*Pase a G1.*)

F5 ¿Cuántas veces utiliza el lavaplatos en una **semana típica**?

- Ninguna 2 4 6 8
 1 3 5 7 9 o más

Refrigeradores

G1 ¿Cuántos refrigeradores tiene conectados?

0 (*Pase a H1.*) 1 2 3 o más

G2 Por favor, indique en la tabla de abajo las características de cada refrigerador, y de cualquier refrigerador que descartó en los últimos 12 meses.

	Refrig 1	Refrig 2	Refrig 3	Refrigerador anterior descartado en los últimos 12 meses
Estilo de la puerta				
Una puerta	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Congelador arriba – Refrig. abajo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Refrigerador arriba – Cong. abajo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Uno al lado del otro	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tamaño, en pies cúbicos				
Mini (<i>menos de 13 pies cu.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pequeño (<i>13 – 16 pies cu.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mediano (<i>17 – 19 pies cu.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grande (<i>20 – 23 pies cu.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Muy grande (<i>over 23 pies cu.</i>)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sin descongelador o descongelador manual?				
Automático (sin descongelador)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Edad de su refrigerador				
Menos de 2 años	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2 – 7 años	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8 – 10 años	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11 – 20 años	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Más de 20 años	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Otras características				
Dispensador de hielo y agua en la puerta	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Congeladores individuales

- H1** ¿Cuántos congeladores individuales tiene conectados?
(No incluya los congeladores que son parte del refrigerador.)
 0 *(Pase a I1.)* 1 2 o más

- H2** Por favor, indique en la tabla de abajo las características de cada congelador y de cualquier congelador que descartó en los últimos 12 meses

	Congelador 1	Congelador 2	Congelador descartado en últimos 12 meses
Estilo			
Vertical, sin descongelador	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vertical, descong. manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
De baúl, sin descongelador	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
De baúl, descong. manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tamaño en pies cúbicos			
Pequeño <i>(menos de 13 p. c.)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mediano <i>(13 – 16 p. c.)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grande <i>(más de 16 p. c.)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Edad de su congelador			
Menos de 2 años	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 – 7 años	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 – 10 años	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11 – 20 años	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Más de 20 años	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Spas y jacuzzis

- I1** ¿Tiene un spa o jacuzzi en su casa?
(No incluya las bañeras con hidromasaje.)
 Sí, y **pago por la energía que consume**
 Sí, pero está en un **área común y no pago por su consumo de energía** *(Pase a J1.)*
 No tengo spa o jacuzzi *(Pase a J1.)*
- I2** ¿Qué energía usa para calentar el spa o jacuzzi?
 Electricidad Solar y eléctrica Gas en tanque *(propano, LP)*
 Gas natural Solar y gas natural Otro
- I3** De qué tamaño es su spa o jacuzzi?
 Pequeño *(3 pers. o menos)* Mediano *(4 – 6 personas)* Grande *(7 o más personas)*
- I4** ¿Dónde está el spa o jacuzzi?
 Afuera, en el terreno Afuera, elevado Spa en el interior
- I5** ¿Utiliza una cobertura aislante para su spa o jacuzzi?
 Sí No

I6 ¿Con qué frecuencia funciona la bomba de filtro en su spa o jacuzzi?

	Verano (Mayo– Oct.)	Invierno (Nov. – Abril)
Nunca	<input type="radio"/>	<input type="radio"/>
Raramente	<input type="radio"/>	<input type="radio"/>
Solo cuando lo usamos	<input type="radio"/>	<input type="radio"/>
1 – 3 horas todos los días	<input type="radio"/>	<input type="radio"/>
4 – 6 horas todos los días	<input type="radio"/>	<input type="radio"/>

I7 Por favor indique con qué frecuencia **calienta** el spa o jacuzzi en invierno y verano.

	Verano (Mayo – Oct.)	Invierno (Nov. – Abril)
Nunca	<input type="radio"/>	<input type="radio"/>
0 – 2 veces por semana	<input type="radio"/>	<input type="radio"/>
3 – 8 veces por mes	<input type="radio"/>	<input type="radio"/>
9 o más veces por mes	<input type="radio"/>	<input type="radio"/>
Mantiene la temperatura	<input type="radio"/>	<input type="radio"/>

Piscinas

J1 ¿Usa Ud. una piscina en su casa?

- Si, y pago por su consumo de energía
- Si, pero está en un área común y yo no pago su consumo de energía (Pase a K1.)
- No tengo piscina (Pase a K1.)

J2 ¿De qué tamaño es su piscina? (Una piscina de tamaño regular tiene 5 pies de profundidad por 40 pies de largo por 20 pies de ancho y contiene 30.000 galones de agua.)

- Menos de 20.000 galones
- 20.000 – 40.000 galones
- Más de 40.000 galones

J3 ¿Cuántas horas por día funciona el filtro de su piscina?

	Verano (Mayo – Oct.)	Invierno (Nov. – Abril)
Ninguna	<input type="radio"/>	<input type="radio"/>
1 – 2	<input type="radio"/>	<input type="radio"/>
3 – 4	<input type="radio"/>	<input type="radio"/>
5 – 7	<input type="radio"/>	<input type="radio"/>
8 – 11	<input type="radio"/>	<input type="radio"/>
12 – 15	<input type="radio"/>	<input type="radio"/>
16 – 20	<input type="radio"/>	<input type="radio"/>
21 o más	<input type="radio"/>	<input type="radio"/>

J4 ¿Qué energía utiliza para calentar su piscina?

- No se calienta
- Solo gas natural
- Solo electricidad
- Solo bomba eléctrica
- Calentador solar (panel recolector de calor)
- Solo gas en tanque (propano, butano, LP)
- Otro

J5 Por favor, indique con qué frecuencia **caliente** Ud. la piscina en verano e invierno.

	Verano (Mayo – Oct.)	Invierno (Nov. – Abril)
Nunca	<input type="radio"/>	<input type="radio"/>
Una vez al mes	<input type="radio"/>	<input type="radio"/>
Una vez a la semana	<input type="radio"/>	<input type="radio"/>
2 – 4 veces por semana	<input type="radio"/>	<input type="radio"/>
Mantengo la piscina caliente	<input type="radio"/>	<input type="radio"/>

J6 ¿Cuál de los siguientes atributos tiene su piscina? (*Seleccione todos los apropiados.*)

- Cober. Reloj Barredora Piscina en el interior de la casa

Entretenimiento y Tecnología

K1 ¿Cuántos televisores y accesorios **utiliza** en su casa?

	No	1	2	3 o más
Home theater	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
T.V. de pantalla grande (más de 36 pulgadas)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TV de tamaño standard (36 pulgadas o menos)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Caja de cable análoga	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Caja de cable digital	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Caja de satélite digital	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DVD (o combinación de DVD/VCR)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
VCR	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grabado personal de video (ej., TiVo, ReplayTV)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stereo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

K2 ¿Cuántas horas por día están todos sus televisores encendidos ?

(*Sume las horas de cada TV.*)

- Menos de 1 hora 9 – 12 horas 21 – 30 horas
 1 – 4 horas 13 – 16 horas Más de 30 horas
 5 – 8 horas 17 – 20 horas

K3 ¿Cuántas **computadoras personales** (PC, Macintosh, etc.) **utiliza** en su casa?

(*Incluya ambas las de escritorio y las portátiles.*)

- No tenemos computadoras en casa (*Pase a K7.*) 2 computadoras
 1 computadora 3 o más computadoras

K4 Si tiene una o más computadoras personales en su casa, cuántas horas por día están encendidas? (*Sume las horas de cada computadora.*)

- Menos de 1 hora 9 – 12 horas 21 – 30 horas
 1 – 4 horas 13 – 16 horas Más de 30 horas
 5 – 8 horas 17 – 20 horas

K5 ¿Con qué frecuencia alguien en su casa hace una de estas actividades en la computadora?

	Nunca	Raramente (<i>menos de 1 vez por sem.</i>)	Ocasional-mente (<i>varias veces por sem.</i>)	Frecuente (<i>varias veces al día</i>)
Envía o recibe e-mail	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Busca información en Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hace compras en Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Paga cuentas en Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- K6** ¿Tiene Usted (o alguien en su casa) un negocio o trabajo desde la casa?
 No *(Pase a K8.)*
 Si ➔ **K7** ¿Cuántas horas por semana trabaja alguien desde su casa?
 0 – 10 horas por semana
 11 – 30 horas por semana
 Más de 30 horas por semana

K8 ¿Cuántos de los siguientes productos utiliza en su casa?

	No	Uno	Dos	Tres o más
Contestadora o servicio de contestadora	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Máquina multifuncional <i>(impresora, fax, scanner, fotocopidora)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FAX	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impresora de computadora	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scanner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fotocopidora	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acceso al Internet via línea telefónica	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Modem DSL para Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Modem de cable para Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comunicación satélite por Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Network en la casa <i>(LAN)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tel. celular <i>(usado por ocupantes de esta casa)</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Iluminación

L1 ¿Cuántos de los siguientes productos de iluminación utiliza **en el interior** de su casa?

Productos de interior	No uso	1 – 2	3 – 5	6 – 10	11 o más
Foco fluorescente compacto	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lámparas con relojes automáticos	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lámparas con detectores o sensores de movimiento	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lámparas con control de intensidad de luz (“dimmers”)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

L2 ¿Cuántos de los siguientes productos de iluminación utiliza **en el exterior** de su casa?
(Incluya los artefactos en su garage. Solo incluya las luces ext. incluidos en su factura.)

	No	1 – 2	3 – 5	6 o más
Iluminación de exteriores				
Lámparas incandescentes de exteriores	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Focos compactos fluorescentes de exterior	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sistema de jardines de bajo voltaje	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Focos HID (sodium vapor, metal halide)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Controles exteriores de iluminación				
Focos en relojes automáticos	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Focos en sensores de atardecer/amanecer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Focos en detectores de movimiento	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Otros aparatos eléctricos

M1 ¿Cuántos de los siguientes aparatos o equipos eléctricos se utilizan en su casa?
(*Seleccione todos los apropiados.*)

	No	1	2	3 o más
Ventilador portátil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ventilador de techo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ventilador de ático a turbina (no eléctrico)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ventilador de ático eléctrico	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ventilador para toda la casa	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Purificador de aire electrónico	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Humidificador	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Deshumidificador	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sistema de purificación de agua	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Colchón de agua caliente	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Frazada eléctrica	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Acuario	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compactador de basura	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sauna – eléctrico	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sistema de seguridad electrónico	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bomba para jardín acuático o estanque	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abridor eléctrico de garage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cortadora de césped – eléctrica	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

M2 ¿Utiliza una bomba eléctrica de pozo para sacar agua para su casa?

No (*Pase a M5.*)

si **➡**

M3 ¿Tiene también su casa acceso al agua de la ciudad/
condado? Si No

M4 ¿Como utiliza el agua de pozo?

Solo para regar el jardín

Solo para uso en la casa

Ambos para la casa y para regar el jardín

M5 Seleccione de la lista aquellos equipos y su energía que se **utilizan** tres o más horas por semana

	Eléctrico	Gas natural	Gas envasado
Bombeador de desechos	<input type="checkbox"/>		
Herramientas de trabajo	<input type="checkbox"/>		
Equipo eléctrico de soldaduras	<input type="checkbox"/>		
Compresor eléctrico de aire	<input type="checkbox"/>		
Cargador grande de baterías	<input type="checkbox"/>		
Horno para cerámica	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Equipo médico (ej., respirador)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

M6 ¿Tiene un vehículo eléctrico, silla de ruedas eléctrica o carro de golf en su casa?

No (*Pase a M8.*)

Si, pero es un vehículo híbrido y no necesita cargarse en la casa. (*Pase a M8.*)

Si, una silla de ruedas

Si, un vehículo eléctrico **➡**

M7 ¿Carga su vehículo eléctrico en su casa?

Si

No

M8 ¿Se utiliza en su casa algún otro equipo o aparato grande que consume una cantidad importante de electricidad o gas natural?

Sí No

(Por favor describa el equipo y su energía.): _____

M9 Por favor indique si Ud. ha añadido alguno de los siguientes aparatos en los últimos 12 meses. Si el nuevo aparato reemplazó una unidad existente, por favor responda también a la pregunta **M10**. (Seleccione todas las apropiadas.)

Aparatos	Nueva unidad añadida	Tipo de energía de la nueva unidad		
		Elec.	Gas Nat.	Otro
Calefacción central	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enfriamiento central	<input type="checkbox"/>	<input type="checkbox"/>		
Aire acond. de pared/ventana	<input type="checkbox"/>	<input type="checkbox"/>		
Calentador de agua	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Estufa	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Horno	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Horno de microondas	<input type="checkbox"/>	<input type="checkbox"/>		
Lavadora de platos	<input type="checkbox"/>	<input type="checkbox"/>		
Lavarropas	<input type="checkbox"/>	<input type="checkbox"/>		
Secadora de ropas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Calentador de piscina	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bomba de piscina	<input type="checkbox"/>	<input type="checkbox"/>		
Calentador de spa/jacuzzi	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

No he **añadido** ninguno de los aparatos de más arriba.

M10 Por favor indique si Ud. ha descartado alguna de los siguientes aparatos en los pasados 12 meses. Incluya ambos los que fueron reemplazados y aquellos que fueron descartados sin ser reemplazados. (Seleccione todos los apropiados.)

Aparatos	Edad de la unidad desc.			Tipo de energ. Unidad desc.		
	1-10 años	11-20 años	Más de 20 años	Elec.	Gas Nat.	Otro
Calefacción central	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enfriamiento central	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Aire acondicionado de pared/ventana	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Calentador de agua	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Estufa	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Horno	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Horno de microondas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Lavadora de platos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Lavarropas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Secadora de ropas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Calentador de piscina	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bomba de piscina	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Calentador de spa	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

No he **descartado** ninguno de los aparatos de más arriba.

Información de la casa

Por favor, provea las respuestas a las siguientes preguntas. Sus respuestas serán confidenciales y los datos se usarán en forma individual. La información se usa para permitirnos comparar el uso de la energía entre los diferentes grupos.

N1 Además de la casa descrita en este cuestionario, tiene Ud. alguna otra propiedad en California que su familia ocupa parte del tiempo o que renta en las vacaciones?
 Si No (Pase a N3.)

N2 Por favor, provea la siguiente información de la casa de vacaciones o de veraneo que Ud. tiene en California. (Por favor, **no provea información de la casa descrita en este cuestionario, cualquier propiedad de renta continua, o de una propiedad compartida.**)

Lugar	<input type="radio"/> En las montañas	<input type="radio"/> Cerca del océano
	<input type="radio"/> En el desierto	<input type="radio"/> Otro
	<input type="radio"/> Cerca de un lago o río	
La electricidad de esta casa de vacaciones la provee:	<input type="radio"/> PG&E	<input type="radio"/> LADWP
	<input type="radio"/> SCE	<input type="radio"/> Otro
	<input type="radio"/> SDG&E	

N3 ¿Cuál es el nivel más alto de educación que ha completado cualquier miembro de la familia en su casa?

- Primario (*grados 1 – 8*) Algo de college/un oficio/escuela vocacional
 Algo de secundario (*grados 9 – 12*) Graduado/a de college
 Graduado/a de secundario Post-graduado/a

N4 ¿Cuál es el lenguaje principal en la casa?

- Inglés Español
 Asiático (*describa*) _____ Otro (*describa*) _____

N5 ¿Está alguno de los ocupantes de su casa incapacitado en forma permanente?

- No Si, 1 incapacitado permanente Si, 2 o más inc. permanentes

N6 ¿Cuál de los siguientes grupos étnicos está representado por el jefe de familia?
 (*Seleccione todos los apropiados.*)

	Jefe de familia # 1	Jefe de familia # 2
Indio Amer., Nativo de Alaska	<input type="checkbox"/>	<input type="checkbox"/>
Asiático o de Islas del Pacífico	<input type="checkbox"/>	<input type="checkbox"/>
Negro, Afro-americano	<input type="checkbox"/>	<input type="checkbox"/>
Hispano / Latino	<input type="checkbox"/>	<input type="checkbox"/>
Blanco / Caucásico	<input type="checkbox"/>	<input type="checkbox"/>
Otro	<input type="checkbox"/>	<input type="checkbox"/>

N7 Por favor, indique su grupo de **ingreso total anual** de su casa.

- | | | |
|--|--|--|
| <input type="checkbox"/> Menos de \$10.000 | <input type="checkbox"/> \$30.000 – \$34.999 | <input type="checkbox"/> \$60.000 – \$74.999 |
| <input type="checkbox"/> \$10.000 – \$19.999 | <input type="checkbox"/> \$35.000 – \$39.999 | <input type="checkbox"/> \$75.000 – \$99.999 |
| <input type="checkbox"/> \$20.000 – \$24.999 | <input type="checkbox"/> \$40.000 – \$49.999 | <input type="checkbox"/> \$100.000 – \$149.999 |
| <input type="checkbox"/> \$25.000 – \$29.999 | <input type="checkbox"/> \$50.000 – \$59.999 | <input type="checkbox"/> \$150.000 o más |

Nosotros podríamos necesitar llamarle para verificar la información que Ud. nos ha dado en esta encuesta. Por favor, escriba su número de teléfono y las horas más convenientes para llamarle. Su número de teléfono no se le dará a nadie y solo será usado para este proyecto de investigación. Solo le llamaremos si necesitamos preguntarle sobre alguna información de la encuesta.

Número de teléfono *(Por favor escriba su respuesta y rellene los círculos que corresponden a cada número.)*

			-				-				
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

Mejores horas para llamar

- Mañana-día de semana
- Tarde-día de semana
- Atardecer-día de sem.
- Noche-día de semana
- Fin de semana

¡Muchas gracias por su cooperación y ayuda!

D: DIRECT MAIL MATERIALS

D.1 Single-family Cover Letter

Dear California Energy Customer:



We need your help. Your household is one of a group of Californians randomly selected to participate in the "Home Energy Survey" and represent the many different types of households in California. This study is sponsored by the California Energy Commission, Pacific Gas and Electric, San Diego Gas and Electric, Southern California Edison, Southern California Gas Company, and Los Angeles Department of Water and Power. These organizations have teamed up to perform a common study to minimize costs and insure a central set of information is collected to assist in statewide energy planning. The information collected in this study is very important to the sponsors. It will help us to identify opportunities for energy efficiency, and better plan for customers' future energy needs.

Your participation is very important to us. Please take a moment and fill out the enclosed survey. Please fill out the survey in pencil and completely fill in your responses to assure we capture all of your important information. Please do your best to answer all of the questions. Answer the questions as they pertain to your residence or unit only. If you do not know the answer to a question, please move on to the next one.

Your answers will be held in the strictest confidence, and will be reported only in anonymous or summary form in order to hide individual identity. We do have an identification number on your survey so that we can track who has responded and refrain from sending additional materials.

The study sponsors have hired XENERGY, Inc., a professional energy research firm to help conduct this study. Please return your completed survey in the enclosed postage paid envelope. If you have any questions, please call us at 1-800-331-8786.

The sponsors value your participation. This study will help us continue to serve your energy needs now and in the future. Thank you for taking the time to complete the survey.

Sincerely,

A handwritten signature in black ink that reads "Valerie T. Hall".

VALERIE T. HALL
Deputy Director for
Energy Efficiency and Demand Analysis
California Energy Commission

Las respuestas de la comunidad hispana son muy importantes para las compañías proveedoras de energía en California. Si usted gusta completar su formulario en español, por favor llame al 1-800-331-8786.

D.2 Multi-family (2–4 Units) Cover Letter

Dear California Energy Customer:



We need your help. Your household is one of a group of Californians randomly selected to participate in the “Home Energy Survey” and represent the many different types of households in California. This study is sponsored by the California Energy Commission, Pacific Gas and Electric, San Diego Gas and Electric, Southern California Edison, Southern California Gas Company, and Los Angeles Department of Water and Power. These organizations have teamed up to perform a common study to minimize costs and insure a central set of information is collected to assist in statewide energy planning. The information collected in this study is very important to the sponsors. It will help us to identify opportunities for energy efficiency, and better plan for customers’ future energy needs.

Your participation is very important to us. Please take a moment and fill out the enclosed survey. Please fill out the survey in pencil and completely fill in your responses to assure we capture all of your important information. Please do your best to answer all of the questions. If you do not know the answer to a question, please move on to the next one.

Our records show that you live in a multi-family dwelling. Please be sure to fill out the survey for your own residence or unit only.

Your answers will be held in the strictest confidence, and will be reported only in anonymous or summary form in order to hide individual identity. We do have an identification number on your survey so that we can track who has responded and refrain from sending additional materials.

The study sponsors have hired XENERGY, Inc., a professional energy research firm to help conduct this study. Please return your completed survey in the enclosed postage paid envelope. If you have any questions, please call us at 1-800-331-8786.

The sponsors value your participation. This study will help us continue to serve your energy needs now and in the future. Thank you for taking the time to complete the survey.

Sincerely,

A handwritten signature in black ink that reads "Valerie T. Hall".

VALERIE T. HALL
Deputy Director for
Energy Efficiency and Demand Analysis
California Energy Commission

Las respuestas de la comunidad hispana son muy importantes para las compañías proveedoras de energía en California. Si usted gusta completar su formulario en español, por favor llame al 1-800-331-8786.

D.3 Multi-family (5+ Units) Cover Letter

Dear California Energy Customer:



We need your help. Your household is one of a group of Californians randomly selected to participate in the "Home Energy Survey" and represent the many different types of households in California. This study is sponsored by the California Energy Commission, Pacific Gas and Electric, San Diego Gas and Electric, Southern California Edison, Southern California Gas Company, and Los Angeles Department of Water and Power. These organizations have teamed up to perform a common study to minimize costs and insure a central set of information is collected to assist in statewide energy planning. The information collected in this study is very important to the sponsors. It will help us to identify opportunities for energy efficiency, and better plan for customers' future energy needs.



A Sempra Energy utility™



An EDISON INTERNATIONAL® Company



A Sempra Energy utility™

Your participation is very important to us. Please take a moment and fill out the enclosed survey. Please fill out the survey in pencil and completely fill in your responses to assure we capture all of your important information. Please do your best to answer all of the questions. Answer the questions as they pertain to your residence or unit only. If you do not know the answer to a question, please move on to the next one.

In cases where your landlord or building manager provides services, we have requested that information from them and pre-filled out your survey with the appropriate response. You may skip the sections that have been completed.

Your answers will be held in the strictest confidence, and will be reported only in anonymous or summary form in order to hide individual identity. We do have an identification number on your survey so that we can track who has responded and refrain from sending additional materials.



The study sponsors have hired XENERGY, Inc., a professional energy research firm to help conduct this study. Please return your completed survey in the enclosed postage paid envelope. If you have any questions, please call us at 1-800-331-8786.

The sponsors value your participation. This study will help us continue to serve your energy needs now and in the future. Thank you for taking the time to complete the survey.

Sincerely,

A handwritten signature in black ink that reads "Valerie T. Hall".

VALERIE T. HALL
Deputy Director for
Energy Efficiency and Demand Analysis
California Energy Commission

Las respuestas de la comunidad hispana son muy importantes para las compañías proveedoras de energía en California. Si usted gusta completar su formulario en español, por favor llame al 1-800-331-8786.

D.4 Second Mailing

Dear California Energy Customer:

Please help us.



We recently sent you a "Home Energy Use Survey". I am pleased that many households have returned their survey, but I would still like to hear from you. If you have recently mailed your survey back to use, please accept this letter as an additional "thank you".



Your response continues to be very important to us. We need as many customers as possible to complete and return their survey since the group that was selected is designed to accurately represent the energy needs of the whole California customer base. The information we are collecting will help the sponsors, including the California Energy Commission, plan for the future energy needs of customers throughout California.



A Sempra Energy utility



An EDISON INTERNATIONAL Company

It is possible that you may not know the answers to all of the questions. Of course, you do not need to answer a question if you are unsure of the correct answer. **Please complete as much of the survey as you can and return it to us in the enclosed postage paid envelope.**



A Sempra Energy utility

Your answers will be held in the strictest confidence, and will be reported only in anonymous or summary form. We will not disclose the information that will identify you personally in any way.

The sponsors have hired XENERGY, Inc., a professional energy research firm to help conduct this study. If you have any questions, please call us at 1-800-331-8786.



Your cooperation in this study is greatly appreciated!

Sincerely,

A handwritten signature in black ink that reads "Valerie T. Hall".

VALERIE T. HALL
Deputy Director for
Energy Efficiency and Demand Analysis
California Energy Commission

Las respuestas de la comunidad hispana son muy importantes para las compañías proveedoras de energía en California. Si usted gusta completar su formulario en español, por favor llame al 1-800-331-8786.

D.5 Survey (Cover Only)



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:



D.6 Outer Envelope

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

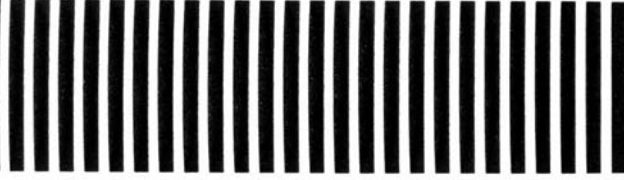
PRSR STD
U.S. POSTAGE
PAID
SAN LEANDRO CA
PERMIT #169



D.7 Business Reply Envelope



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



CEC Survey Processing Center
492 Ninth St., Suite 220
Oakland, CA 94609-9969

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 213 OAKLAND CA

POSTAGE WILL BE PAID BY ADDRESSEE

CEC SURVEY PROCESSING CENTER
492 9TH ST STE 220
OAKLAND CA 94609-9969



E: DATA COLLECTION PROTOCOLS

This document includes the materials and protocols used during the California Statewide Residential Appliance Saturation Study (RASS). Further details on sampling strategies for each of the groups and overall project methodology are included in the Final Research Plan.

E.1 Phase One Phone Solicitations

Master-metered accounts serving more than 4 dwelling units will be surveyed using a two-stage method. In the first stage, we conduct telephone surveys with a facility manager of the multi-family complex or mobile home park to obtain data on the common area equipment and to obtain mail addresses for the dwelling units served by the account.

For complexes with between 5 and 20 units, we collect detailed data on the common areas and names and address for four units within each complex. For complexes with over 20 units, we use essentially the same survey as was developed for the 5 to 20 unit complexes, but gather customer information for eight units in the complex. For mobile homes, we collect a simpler set of information about the common services in the mobile home park and information on 10 of the units.

Soliciting phone calls will be made using the phone scripts provided in this document. Calls will be tracked in utility specific databases so that one caller can focus on a given utility and unit type to facilitate data collection. Each phone surveyor will enter customer names and addresses as provided by the facility manager into a central address spreadsheet for each utility/unit type grouping. Address files will be combined to create a central mailing database for each of the specific types.

Master metered homes with 2-4 units will not be included in the stage one phone calls, but will be sent customized letters requesting that they fill out the survey for only one of the units. Mobile homes will be surveyed using the standard individually metered mailing with the same cover letter. Mobile homes are included in the stage one process primarily to obtain correct addresses for residents of a particular mobile home park.

The calling process uses scripts as provided in the next section.

E.1.1 Master Meter Stage One Phone Survey Scripts and Surveys

Three different types of master metered accounts will require a stage-one telephone survey. A script is provided for each type of account.

1. Trailer / Mobile Home Parks with 5 or more units
2. Master metered dwellings with 5-20 units
3. Master metered dwellings with over 20 units

Please note that the study is a statewide effort sponsored by:

The California Energy Commission
Pacific Gas and Electric
San Diego Gas and Electric
Southern California Edison
Southern California Gas Company; and
Los Angeles Department of Water and Power

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. If customers have questions about the validity of the study, they can call _____ <Need number for each sponsor> _____.

Note that surveys are numbered to correspond to the actual RASS survey instrument to facilitate transfer of survey responses to the final surveys which will then be sent directly to customers.

E.1.2 Mobile Home Parks: TEN surveys sent to each Mobile Home Park

Hi, my name is _____. I am working with <LOCAL UTILITY NAME> and the California Energy Commission to perform a study of energy use in California. Your mobile home park is included on our list of sites to survey.

I have your address as: _____.

Is this correct? YES NO <note change or if totally different, end call>.

We need to send surveys to ten residents of your mobile home park. Do you have addresses for ten occupants in your park that you think would be willing to participate in this important research study? Please provide me with their names and addresses:

Name	Street Address	City	State	Zip
1.			CA	
2.			CA	
3.			CA	
4.			CA	
5.			CA	
6.			CA	
7.			CA	
8.			CA	
9.			CA	
10.			CA	

If you do not have names and addresses of specific residences, can you provide me with information about the street name and numbering scheme for your park so that we may randomly send surveys to ten of your occupants? <Note address information below and then create addresses for mailing labels in table above. Address generic surveys to: California Energy User.>

Could you please answer the following questions about your mobile home park?

How many mobile home units are in this park?	
Does each mobile home have a separate electric meter?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Does each mobile home unit have a separate gas meter?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Does the park have a central laundry facility?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Does the park have a central pool?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Does the park have a central spa or hot tub?	<input type="checkbox"/> Yes <input type="checkbox"/> No

May I please get your name:

Name: _____ Thanks you very much for your time.

FROM SPREADSHEET:

Utility: _____ Control Number: _____

Phone Number: _____ Date Completed: _____

E.1.3 Master Metered with 5-20 Units: FOUR surveys sent to each building

Hi, my name is _____. I am working with <LOCAL UTILITY NAME> and the California Energy Commission to perform a study of energy use in California. Your building is included on our list of sites to survey.

I have your address as: _____.
Is this correct? YES NO <note change or if totally different, end call>.

We need to send surveys to four residents of your building. Do you have addresses for four occupants in your building that you think would be willing to participate in this important research study?

Please provide me with their names and addresses:

Name	Street Address	City	State	Zip
1.			CA	
2.			CA	
3.			CA	
4.			CA	

If you do not have names and addresses of specific residences, can you provide me with information about the unit numbering scheme for your building so that we may randomly send surveys to four of your occupants? <Note address information below and then create addresses for mailing labels in table above. Address generic surveys to: California Energy User.>

Could you please answer the following questions about your building? Most of these sections are only applicable if you are providing central service for your occupants.

Note that surveys are numbered to correspond to the actual RASS survey instrument to facilitate transfer of survey responses to the final surveys which will then be sent directly to customers.

GENERAL BUILDING INFO

How many units are there in the building?	
Does each unit have a separate electric meter?	<input type="checkbox"/> Yes <input type="checkbox"/> No

A6 Approximately what year was this *building* built?

- | | | | | | |
|--------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| <input type="checkbox"/> Before 1940 | <input type="checkbox"/> 1973 | <input type="checkbox"/> 1980 | <input type="checkbox"/> 1987 | <input type="checkbox"/> 1994 | <input type="checkbox"/> 2001 |
| <input type="checkbox"/> 1940-1949 | <input type="checkbox"/> 1974 | <input type="checkbox"/> 1981 | <input type="checkbox"/> 1988 | <input type="checkbox"/> 1995 | <input type="checkbox"/> 2002 |
| <input type="checkbox"/> 1950-1959 | <input type="checkbox"/> 1975 | <input type="checkbox"/> 1982 | <input type="checkbox"/> 1989 | <input type="checkbox"/> 1996 | <input type="checkbox"/> 2003 |
| <input type="checkbox"/> 1960-1969 | <input type="checkbox"/> 1976 | <input type="checkbox"/> 1983 | <input type="checkbox"/> 1990 | <input type="checkbox"/> 1997 | |
| <input type="checkbox"/> 1970 | <input type="checkbox"/> 1977 | <input type="checkbox"/> 1984 | <input type="checkbox"/> 1991 | <input type="checkbox"/> 1998 | |
| <input type="checkbox"/> 1971 | <input type="checkbox"/> 1978 | <input type="checkbox"/> 1985 | <input type="checkbox"/> 1992 | <input type="checkbox"/> 1999 | |
| <input type="checkbox"/> 1972 | <input type="checkbox"/> 1979 | <input type="checkbox"/> 1986 | <input type="checkbox"/> 1993 | <input type="checkbox"/> 2000 | |

A9 Are your *building's* **exterior walls** insulated?

- Yes, all walls Yes, some walls No

A10 Is your *building's* **attic/ceiling** insulated?

- Yes → **A11** If yes, estimate the number of inches of **attic/ceiling** insulation.
- No 0 – 3 inches (*R-value less than R-10*)
- 4 – 6 inches (*R-11 to R-19*)
- 7 – 10 inches (*R-20 to R-30*)
- More than 10 inches (*R-31 or higher*)

A12 Choose the statement that best describes your *building's* **windows**.

- All or most are double pane windows
- All or most are single pane windows
- My home has a mixture of single pane and double pane windows

A13 Choose the statement that best describes the frames on your **windows**.

- All or most have vinyl window frames
- All or most have wood window frames
- All or most have metal window frames

A18 Is natural gas service from underground pipes from the gas utility available in your neighborhood?

- Yes No (*Go to HEATING.*)

A19 Do you have a natural gas line or hook-up to any part of your *building*?

- Yes No

A20 <<Ask in So. Cal only>>

What utility do you pay for **natural gas** service to your *building*?

- | | |
|---|--|
| <input type="checkbox"/> Pacific Gas & Electric (PG&E) | <input type="checkbox"/> Southwest Gas Corporation |
| <input type="checkbox"/> San Diego Gas & Electric | <input type="checkbox"/> City of Coalinga |
| <input type="checkbox"/> Southern California Gas Company
("The Gas Company") | <input type="checkbox"/> City of Long Beach Gas Department |
| | <input type="checkbox"/> Not sure |

HEATING

Is heating provided to the building occupants from a central heating system?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (<i>Go to Cooling</i>)
--	------------------------------	--

B2 What type of heating system do you use to centrally heat this building?

Main Heating
(Mark only ONE BOX below)

NATURAL GAS (from gas utility)

Central forced-air furnace (<i>fan circulates hot air through air ducts</i>)	<input type="checkbox"/>
Floor or wall heater/furnace	<input type="checkbox"/>
Hot water radiator	<input type="checkbox"/>
Other system type	<input type="checkbox"/>

ELECTRIC

Resistance (baseboard/ceiling/floor/wall)	<input type="checkbox"/>
Central forced air furnace (<i>fan circulates hot air through air ducts</i>)	<input type="checkbox"/>
Central heat pump (<i>heats and cools</i>)	<input type="checkbox"/>
Through-the-wall heat pump (<i>looks like a window/wall air conditioner, but also provides heat</i>)	<input type="checkbox"/>
Portable heaters	<input type="checkbox"/>
Other system type	<input type="checkbox"/>

BOTTLED GAS (propane, LP)

Central forced air furnace (<i>fan circulates hot air through air ducts</i>)	<input type="checkbox"/>
Floor or wall heater/furnace	<input type="checkbox"/>
Hot water radiator	<input type="checkbox"/>
Other system type	<input type="checkbox"/>

WOOD

Woodstove/fireplace insert	<input type="checkbox"/>
Fireplace	<input type="checkbox"/>

SOLAR

Solar – no backup	<input type="checkbox"/>
Solar – natural gas backup	<input type="checkbox"/>
Solar – propane backup	<input type="checkbox"/>
Solar – electric backup	<input type="checkbox"/>

OTHER

(Describe): _____

B3 If your heating system(s) use natural gas for fuel, indicate whether it has a pilot light(s).

Main gas heating	<input type="checkbox"/> Yes, pilot light	<input type="checkbox"/> No pilot light
------------------	---	---

B4 How old is your main heating system?

<input type="checkbox"/> Less than one year	<input type="checkbox"/> 4 – 8 years	<input type="checkbox"/> 14 – 30 years
<input type="checkbox"/> 1 – 3 years	<input type="checkbox"/> 9 – 13 years	<input type="checkbox"/> Over 30 years

B5 What type of thermostat does your main heating system(s) use?

<input type="checkbox"/> Programmable thermostat (<i>Digital units usually have a digital readout and buttons. Mechanical units usually have a clock or rotary timer and tabs, pins or levers.</i>)
<input type="checkbox"/> Standard thermostat (<i>Allows you to set the temperature and turn the heater on or off. You cannot set on/off times.</i>)
<input type="checkbox"/> No thermostat (<i>Simple on/off control or steam valve</i>)

B7 Has maintenance been performed on your main heating system in the past 12 months?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
------------------------------	-----------------------------

COOLING

Is central air conditioning provided to the building occupants from a central cooling system?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (<i>Go to Water Heating</i>)
---	------------------------------	--

C2 What type of *central* air conditioning/cooling system(s) do you have in your building?

	Number of Central Cooling Systems		
	1	2	3 or more
Central air conditioning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Central evaporative cooler (<i>swamp cooler</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heat pump (<i>heats and cools</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C3 How old is your main central air conditioning/cooling unit?

- Less than one year 4 – 8 years 14 – 30 years
 1 – 3 years 9 – 13 years Over 30 years

C4 What type of thermostat does your main cooling system(s) use?

- 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.*)
 Standard thermostat (*Allows you to set the temperature and turn the air conditioner on or off. You cannot set on/off times.*)
 No thermostat (*Simple on/off control*)

C6 Has maintenance been performed on your central air conditioning system in the past 12 months?

- Yes No

WATER HEATING

Is water heating provided to the building occupants?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (<i>Go to Laundry</i>)
--	------------------------------	--

D2 What type of *central* water heating systems do you have in this building?

Main Water Heater

(Mark only ONE BOX in this column)

NATURAL GAS

Standard tank	<input type="checkbox"/>
Whole house tankless system	<input type="checkbox"/>

ELECTRIC

Standard tank	<input type="checkbox"/>
Heat pump	<input type="checkbox"/>
Whole house tankless system	<input type="checkbox"/>
Point-of use tankless system	<input type="checkbox"/>

PROPANE

Standard tank	<input type="checkbox"/>
Whole house tankless system	<input type="checkbox"/>

SOLAR

With no backup system	<input type="checkbox"/>
With natural gas backup	<input type="checkbox"/>
With propane backup	<input type="checkbox"/>
With electric backup	<input type="checkbox"/>

OTHER FUEL Describe: _____

D3 What is the typical hot water heater temperature setting? (*Medium is the standard factory setting.*)

Low (*below 130°F*) Medium (*130°F – 150°F*) High (*over 150°F*)

D4 How old is your primary water heating system?

Less than one year 4 – 8 years 14 – 30 years
 1 – 3 years 9 – 13 years Over 30 years

LAUNDRY

Does the building have a central laundry facility?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (<i>Go to Refrigerators</i>)
--	------------------------------	--

E2 What type of clothes washer do you provide to building occupants?

Top loading washer Front loading washer

E3 What is the average age of your clothes washer(s)?

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

E5 What type of clothes dryer(s) do you have?

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

REFRIGERATORS

<p>Does the building provide refrigerators in each of the units? <i>Please provide average refrigerator information. If refrigerators differ significantly by unit, the occupant can complete this section.</i></p>	<input type="checkbox"/> Yes <input type="checkbox"/> No (<i>Go to Spas</i>)
--	---

G2 Please tell us the characteristics of *your average building supplied* refrigerator, and for any refrigerator you discarded in the past 12 months, in the table below.

	Refrig 1	Old Refrigerator Discarded in the Last 12 Months
Door Style		
Single-door	<input type="checkbox"/>	<input type="checkbox"/>
Top Freezer – Bottom Refrigerator	<input type="checkbox"/>	<input type="checkbox"/>
Top Refrigerator – Bottom Freezer	<input type="checkbox"/>	<input type="checkbox"/>
Side-by-side	<input type="checkbox"/>	<input type="checkbox"/>
Size, in Cubic Feet		
Mini (<i>under 13 cu. ft.</i>)	<input type="checkbox"/>	<input type="checkbox"/>
Small (<i>13 – 16 cu. ft.</i>)	<input type="checkbox"/>	<input type="checkbox"/>
Medium (<i>17 – 19 cu. ft.</i>)	<input type="checkbox"/>	<input type="checkbox"/>
Large (<i>20 – 23 cu. ft.</i>)	<input type="checkbox"/>	<input type="checkbox"/>
Very large (<i>over 23 cu. ft.</i>)	<input type="checkbox"/>	<input type="checkbox"/>
Frost-free or Manual Defrost?		
Automatic (frost-free)	<input type="checkbox"/>	<input type="checkbox"/>
Manual	<input type="checkbox"/>	<input type="checkbox"/>
Age of your Refrigerator		
Less than two years	<input type="checkbox"/>	<input type="checkbox"/>
2 – 7 years	<input type="checkbox"/>	<input type="checkbox"/>
8 – 10 years	<input type="checkbox"/>	<input type="checkbox"/>
11 – 20 years	<input type="checkbox"/>	<input type="checkbox"/>
More than 20 years	<input type="checkbox"/>	<input type="checkbox"/>
Other Features		
Through-the-door ice and water dispenser	<input type="checkbox"/>	<input type="checkbox"/>

SPAS

Does the building have a central spa or hot tub?	<input type="checkbox"/> Yes <input type="checkbox"/> No (<i>Go to Pools</i>)
--	---

I2 What fuel do you use to heat the spa or hot tub?

Electricity Solar and electricity Bottled gas (*propane, butane, LP*)
 Natural gas Solar and natural gas Other

I3 How large is the spa or hot tub?
 Small (*3 people or fewer*) Medium (*4 – 6 people*) Large (*7 or more people*)

I4 Where is the spa located?
 Outside, in the ground Outside, above ground Indoor spa

I5 Do you have an insulated cover on your spa or hot tub?
 Yes No

I6 How often do you run the filter pump on your spa or hot tub?

	Summer (<i>May – Oct.</i>)	Winter (<i>Nov. – April</i>)
Never	<input type="radio"/>	<input type="radio"/>
Rarely	<input type="radio"/>	<input type="radio"/>
Only when we use it	<input type="radio"/>	<input type="radio"/>
1 – 3 hours every day	<input type="radio"/>	<input type="radio"/>
4 – 6 hours every day	<input type="radio"/>	<input type="radio"/>

I7 Please indicate how often you **heat** your spa or hot tub in the winter and summer.

	Summer (<i>May – Oct.</i>)	Winter (<i>Nov. – April</i>)
Never	<input type="radio"/>	<input type="radio"/>
0 – 2 times per month	<input type="radio"/>	<input type="radio"/>
3 – 8 times per month	<input type="radio"/>	<input type="radio"/>
9 or more times per month	<input type="radio"/>	<input type="radio"/>
Maintain set temperature	<input type="radio"/>	<input type="radio"/>

POOLS

Does the building have a central pool?	<input type="radio"/> Yes	<input type="radio"/> No (<i>Go to Lighting</i>)
--	---------------------------	--

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.*)
 Less than 20,000 gallons 20,000 – 40,000 gallons More than 40,000 gallons

J3 How many **hours per day** do you operate your **swimming pool filter**?

	Summer (<i>May – Oct.</i>)	Winter (<i>Nov. – April</i>)
None	<input type="radio"/>	<input type="radio"/>
1 – 2	<input type="radio"/>	<input type="radio"/>
3 – 4	<input type="radio"/>	<input type="radio"/>
5 – 7	<input type="radio"/>	<input type="radio"/>
8 – 11	<input type="radio"/>	<input type="radio"/>
12 – 15	<input type="radio"/>	<input type="radio"/>
16 – 20	<input type="radio"/>	<input type="radio"/>
21 or more	<input type="radio"/>	<input type="radio"/>

J4 Which fuel do you use to heat your pool?
 Pool is not heated Solar heater (*using solar collectors*)
 Natural gas only Bottled gas only (*propane, butane, LP*)
 Electricity only Other
 Electric heat pump only

J5 Please indicate how often you **heat** your pool in the summer and winter.

	Summer (May – Oct.)	Winter (Nov. – April)
Never	<input type="checkbox"/>	<input type="checkbox"/>
Once a month	<input type="checkbox"/>	<input type="checkbox"/>
Once a week	<input type="checkbox"/>	<input type="checkbox"/>
2 – 4 times per week	<input type="checkbox"/>	<input type="checkbox"/>
Keep pool heated continuously	<input type="checkbox"/>	<input type="checkbox"/>

J6 Which of the following attributes does your pool have? *(Choose all that apply.)*
 Cover Pool timer Pool sweep Pool is indoors

EXTERIOR LIGHTING

L2 How many of the following lighting products do you use **outside** your building?

	None	1 – 2	3 – 5	6 or More
Exterior Fixtures				
Exterior incandescent fixtures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exterior compact fluorescent fixtures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Low voltage landscape light system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HID (sodium vapor, metal halide) fixture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exterior Lighting Controls				
Fixtures on Timers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fixtures on Dusk-to-Dawn Sensors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fixtures on Motion Detectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

May I please get your name:

Name: _____ Thanks you very much for your time.

FROM SPREADSHEET:

Utility: _____ Control Number: _____

Phone Number: _____ Date Completed: _____

E.1.4 Master Metered with over 20 units: EIGHT surveys sent to each building

Hi, my name is _____. I am working with <LOCAL UTILITY NAME> and the California Energy Commission to perform a study of energy use in California. Your building is included on our list of sites to survey.

I have your address as: _____.

Is this correct? YES NO <note change or if totally different, end call>.

We need to send surveys to eight residents of your building. Do you have addresses for eight occupants in your building that you think would be willing to participate in this important research study?

Please provide me with their names and addresses:

Name	Street Address	City	State	Zip
1.			CA	
2.			CA	
3.			CA	
4.			CA	
5.			CA	
6.			CA	
7.			CA	
8.			CA	

If you do not have names and addresses of specific residences, can you provide me with information about the unit numbering scheme for your building so that we may randomly send surveys to four of your occupants? <Note address information below and then create addresses for mailing labels in table above. Address generic surveys to: California Energy User.>

Could you please answer the following questions about your building? Most of these sections are only applicable if you are providing central service for your occupants.

Note that surveys are numbered to correspond to the actual RASS survey instrument to facilitate transfer of survey responses to the final surveys, which will then be sent directly to customers.

GENERAL BUILDING INFO.

How many units are there in the building?	
Does each unit have a separate electric meter?	<input type="checkbox"/> Yes <input type="checkbox"/> No

- A6** Approximately what year was this *building* built?
- | | | | | | |
|--------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| <input type="checkbox"/> Before 1940 | <input type="checkbox"/> 1973 | <input type="checkbox"/> 1980 | <input type="checkbox"/> 1987 | <input type="checkbox"/> 1994 | <input type="checkbox"/> 2001 |
| <input type="checkbox"/> 1940-1949 | <input type="checkbox"/> 1974 | <input type="checkbox"/> 1981 | <input type="checkbox"/> 1988 | <input type="checkbox"/> 1995 | <input type="checkbox"/> 2002 |
| <input type="checkbox"/> 1950-1959 | <input type="checkbox"/> 1975 | <input type="checkbox"/> 1982 | <input type="checkbox"/> 1989 | <input type="checkbox"/> 1996 | <input type="checkbox"/> 2003 |
| <input type="checkbox"/> 1960-1969 | <input type="checkbox"/> 1976 | <input type="checkbox"/> 1983 | <input type="checkbox"/> 1990 | <input type="checkbox"/> 1997 | |
| <input type="checkbox"/> 1970 | <input type="checkbox"/> 1977 | <input type="checkbox"/> 1984 | <input type="checkbox"/> 1991 | <input type="checkbox"/> 1998 | |
| <input type="checkbox"/> 1971 | <input type="checkbox"/> 1978 | <input type="checkbox"/> 1985 | <input type="checkbox"/> 1992 | <input type="checkbox"/> 1999 | |
| <input type="checkbox"/> 1972 | <input type="checkbox"/> 1979 | <input type="checkbox"/> 1986 | <input type="checkbox"/> 1993 | <input type="checkbox"/> 2000 | |

- A9** Are your *building's* **exterior walls** insulated?
- Yes, all walls Yes, some walls No

- A10** Is your *building's* **attic/ceiling** insulated?
- Yes ➔ **A11** If yes, estimate the number of inches of **attic/ceiling** insulation.
- No 0 – 3 inches (*R-value less than R-10*)
- 4 – 6 inches (*R-11 to R-19*)
- 7 – 10 inches (*R-20 to R-30*)
- More than 10 inches (*R-31 or higher*)

- A12** Choose the statement that best describes your *building's* **windows**.
- All or most are double pane windows
- All or most are single pane windows
- My home has a mixture of single pane and double pane windows

- A13** Choose the statement that best describes the frames on your **windows**.
- All or most have vinyl window frames
- All or most have wood window frames
- All or most have metal window frames

- A18** Is natural gas service from underground pipes from the gas utility available in your neighborhood?
- Yes No (*Go to HEATING.*)

- A19** Do you have a natural gas line or hook-up to any part of your *building*?
- Yes No

- A20** <<Ask in So. Cal only>>
- What utility do you pay for **natural gas** service to your *building*?
- | | |
|--|--|
| <input type="checkbox"/> Pacific Gas & Electric (PG&E) | <input type="checkbox"/> Southwest Gas Corporation |
| <input type="checkbox"/> San Diego Gas & Electric | <input type="checkbox"/> City of Coalinga |
| <input type="checkbox"/> Southern California Gas Company | <input type="checkbox"/> City of Long Beach Gas Department |
| ("The Gas Company") | <input type="checkbox"/> Not sure |

HEATING

Is heating provided to the building occupants from a central heating system?	<input type="radio"/> Yes	<input type="radio"/> No (<i>Go to Cooling</i>)
--	---------------------------	---

B2 What type of heating system do you use to *centrally* heat this *building*?

Main Heating
(Mark only **ONE BOX** below)

NATURAL GAS (from gas utility)

Central forced-air furnace (<i>fan circulates hot air through air ducts</i>)	<input type="radio"/>
Floor or wall heater/furnace	<input type="radio"/>
Hot water radiator	<input type="radio"/>
Other system type	<input type="radio"/>

ELECTRIC

Resistance (baseboard/ceiling/floor/wall)	<input type="radio"/>
Central forced air furnace (<i>fan circulates hot air through air ducts</i>)	<input type="radio"/>
Central heat pump (<i>heats and cools</i>)	<input type="radio"/>
Through-the-wall heat pump (<i>looks like a window/wall air conditioner, but also provides heat</i>)	<input type="radio"/>
Portable heaters	<input type="radio"/>
Other system type	<input type="radio"/>

BOTTLED GAS (propane, LP)

Central forced air furnace (<i>fan circulates hot air through air ducts</i>)	<input type="radio"/>
Floor or wall heater/furnace	<input type="radio"/>
Hot water radiator	<input type="radio"/>
Other system type	<input type="radio"/>

WOOD

Woodstove/fireplace insert	<input type="radio"/>
Fireplace	<input type="radio"/>

SOLAR

Solar – no backup	<input type="radio"/>
Solar – natural gas backup	<input type="radio"/>
Solar – propane backup	<input type="radio"/>
Solar – electric backup	<input type="radio"/>

OTHER

(Describe): _____

B3 If your heating system(s) use natural gas for fuel, indicate whether it has a pilot light(s).

Main gas heating	<input type="radio"/> Yes, pilot light	<input type="radio"/> No pilot light
------------------	--	--------------------------------------

B4 How old is your main heating system?

<input type="radio"/> Less than one year	<input type="radio"/> 4 – 8 years	<input type="radio"/> 14 – 30 years
<input type="radio"/> 1 – 3 years	<input type="radio"/> 9 – 13 years	<input type="radio"/> Over 30 years

B5 What type of thermostat does your main heating system(s) use?

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.*)

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

No thermostat (*Simple on/off control or steam valve*)

B7 Has maintenance been performed on your main heating system in the past 12 months?

Yes No

COOLING

Is central air conditioning provided to the building occupants from a central cooling system?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (<i>Go to Water Heating</i>)
---	------------------------------	--

C2 What type of *central* air conditioning/cooling system(s) do you have in your building?

	Number of Central Cooling Systems		
	1	2	3 or more
Central air conditioning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Central evaporative cooler (<i>swamp cooler</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heat pump (<i>heats and cools</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C3 How old is your main central air conditioning/cooling unit?

- Less than one year 4 – 8 years 14 – 30 years
 1 – 3 years 9 – 13 years Over 30 years

C4 What type of thermostat does your main cooling system(s) use?

- 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.*)
 Standard thermostat (*Allows you to set the temperature and turn the air conditioner on or off. You cannot set on/off times.*)
 No thermostat (*Simple on/off control*)

C6 Has maintenance been performed on your central air conditioning system in the past 12 months?

- Yes No

WATER HEATING

Is water heating provided to the building occupants?	<input type="checkbox"/> Yes <input type="checkbox"/> No (<i>Go to Laundry</i>)
--	---

D2 What type of *central* water heating systems do you have in this building?

Main Water Heater

(Mark only ONE BOX in this column)

NATURAL GAS

Standard tank	<input type="checkbox"/>
Whole house tankless system	<input type="checkbox"/>

ELECTRIC

Standard tank	<input type="checkbox"/>
Heat pump	<input type="checkbox"/>
Whole house tankless system	<input type="checkbox"/>
Point-of use tankless system	<input type="checkbox"/>

PROPANE

Standard tank	<input type="checkbox"/>
Whole house tankless system	<input type="checkbox"/>

SOLAR

With no backup system	<input type="checkbox"/>
With natural gas backup	<input type="checkbox"/>
With propane backup	<input type="checkbox"/>
With electric backup	<input type="checkbox"/>

OTHER FUEL Describe: _____

D3 What is the typical hot water heater temperature setting? (*Medium is the standard factory setting.*)

Low (*below 130°F*) Medium (*130°F – 150°F*) High (*over 150°F*)

D4 How old is your primary water heating system?

Less than one year 4 – 8 years 14 – 30 years
 1 – 3 years 9 – 13 years Over 30 years

LAUNDRY

Does the building have a central laundry facility?	<input type="checkbox"/> Yes <input type="checkbox"/> No (<i>Go to Refrigerators</i>)
--	---

E2 What type of clothes washer do you provide to building occupants?

Top loading washer Front loading washer

E3 What is the average age of your clothes washer(s)?

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

E5 What type of clothes dryer(s) do you have?

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

REFRIGERATORS

<p>Does the building provide refrigerators in each of the units? <i>Please provide average refrigerator information. If refrigerators differ significantly by unit, the occupant can complete this section.</i></p>	<input type="checkbox"/> Yes <input type="checkbox"/> No (<i>Go to Spas</i>)
--	---

G2 Please tell us the characteristics of *your average building supplied* refrigerator, and for any refrigerator you discarded in the past 12 months, in the table below.

	Refrig 1	Old Refrigerator Discarded in the Last 12 Months
Door Style		
Single-door	<input type="checkbox"/>	<input type="checkbox"/>
Top Freezer – Bottom Refrigerator	<input type="checkbox"/>	<input type="checkbox"/>
Top Refrigerator – Bottom Freezer	<input type="checkbox"/>	<input type="checkbox"/>
Side-by-side	<input type="checkbox"/>	<input type="checkbox"/>
Size, in Cubic Feet		
Mini (<i>under 13 cu. ft.</i>)	<input type="checkbox"/>	<input type="checkbox"/>
Small (<i>13 – 16 cu. ft.</i>)	<input type="checkbox"/>	<input type="checkbox"/>
Medium (<i>17 – 19 cu. ft.</i>)	<input type="checkbox"/>	<input type="checkbox"/>
Large (<i>20 – 23 cu. ft.</i>)	<input type="checkbox"/>	<input type="checkbox"/>
Very large (<i>over 23 cu. ft.</i>)	<input type="checkbox"/>	<input type="checkbox"/>
Frost-free or Manual Defrost?		
Automatic (frost-free)	<input type="checkbox"/>	<input type="checkbox"/>
Manual	<input type="checkbox"/>	<input type="checkbox"/>
Age of your Refrigerator		
Less than two years	<input type="checkbox"/>	<input type="checkbox"/>
2 – 7 years	<input type="checkbox"/>	<input type="checkbox"/>
8 – 10 years	<input type="checkbox"/>	<input type="checkbox"/>
11 – 20 years	<input type="checkbox"/>	<input type="checkbox"/>
More than 20 years	<input type="checkbox"/>	<input type="checkbox"/>
Other Features		
Through-the-door ice and water dispenser	<input type="checkbox"/>	<input type="checkbox"/>

SPAS

Does the building have a central spa or hot tub?	<input type="checkbox"/> Yes <input type="checkbox"/> No (<i>Go to Pools</i>)
--	---

12 What fuel do you use to heat the spa or hot tub?

- Electricity Solar and electricity Bottled gas (*propane, butane, LP*)
 Natural gas Solar and natural gas Other

13 How large is the spa or hot tub?

- Small (*3 people or fewer*) Medium (*4 – 6 people*) Large (*7 or more people*)

14 Where is the spa located?

- Outside, in the ground Outside, above ground Indoor spa

15 Do you have an insulated cover on your spa or hot tub?

- Yes No

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

	Summer (<i>May – Oct.</i>)	Winter (<i>Nov. – April</i>)
Never	<input type="checkbox"/>	<input type="checkbox"/>
Rarely	<input type="checkbox"/>	<input type="checkbox"/>
Only when we use it	<input type="checkbox"/>	<input type="checkbox"/>
1 – 3 hours every day	<input type="checkbox"/>	<input type="checkbox"/>
4 – 6 hours every day	<input type="checkbox"/>	<input type="checkbox"/>

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

	Summer (<i>May – Oct.</i>)	Winter (<i>Nov. – April</i>)
Never	<input type="checkbox"/>	<input type="checkbox"/>
0 – 2 times per month	<input type="checkbox"/>	<input type="checkbox"/>
3 – 8 times per month	<input type="checkbox"/>	<input type="checkbox"/>
9 or more times per month	<input type="checkbox"/>	<input type="checkbox"/>
Maintain set temperature	<input type="checkbox"/>	<input type="checkbox"/>

POOLS

Does the building have a central pool?	<input type="checkbox"/> Yes	<input type="checkbox"/> No (<i>Go to Lighting</i>)
--	------------------------------	---

- 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.*)
 Less than 20,000 gallons 20,000 – 40,000 gallons More than 40,000 gallons

- J3** How many **hours per day** do you operate your **swimming pool filter**?

	Summer (<i>May – Oct.</i>)	Winter (<i>Nov. – April</i>)
None	<input type="checkbox"/>	<input type="checkbox"/>
1 – 2	<input type="checkbox"/>	<input type="checkbox"/>
3 – 4	<input type="checkbox"/>	<input type="checkbox"/>
5 – 7	<input type="checkbox"/>	<input type="checkbox"/>
8 – 11	<input type="checkbox"/>	<input type="checkbox"/>
12 – 15	<input type="checkbox"/>	<input type="checkbox"/>
16 – 20	<input type="checkbox"/>	<input type="checkbox"/>
21 or more	<input type="checkbox"/>	<input type="checkbox"/>

- J4** Which fuel do you use to heat your pool?

- Pool is not heated Solar heater (*using solar collectors*)
 Natural gas only Bottled gas only (*propane, butane, LP*)
 Electricity only Other
 Electric heat pump only

- J5** Please indicate how often you **heat** your pool in the summer and winter.

	Summer (<i>May – Oct.</i>)	Winter (<i>Nov. – April</i>)
Never	<input type="checkbox"/>	<input type="checkbox"/>
Once a month	<input type="checkbox"/>	<input type="checkbox"/>
Once a week	<input type="checkbox"/>	<input type="checkbox"/>
2 – 4 times per week	<input type="checkbox"/>	<input type="checkbox"/>
Keep pool heated continuously	<input type="checkbox"/>	<input type="checkbox"/>

- J6** Which of the following attributes does your pool have? (*Choose all that apply.*)

- Cover Pool timer Pool sweep Pool is indoors

EXTERIOR LIGHTING

- L2** How many of the following lighting products do you use **outside** your *building*?

	None	1 – 2	3 – 5	6 or More
Exterior Fixtures				
Exterior incandescent fixtures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exterior compact fluorescent fixtures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Low voltage landscape light system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HID (sodium vapor, metal halide) fixture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exterior Lighting Controls				
Fixtures on Timers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fixtures on Dusk-to-Dawn Sensors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fixtures on Motion Detectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

May I please get your name:

Name: _____ Thanks you very much for your time.

FROM SPREADSHEET:

Utility: _____ Control Number: _____

Phone Number: _____ Date Completed: _____

E.1.5 Master Metered Data Transposition

Once customer names are obtained, a mailing list will be sent to the mailing house and solicitation packages will be made up for each of the master metered customers. KEMA-XENERGY staff then transposes the survey responses for the master metered customers onto the physical RASS surveys to assist master metered customers with their responses to the survey.

E.2 DIRECT MAIL SOLICITATION

Direct mail surveys will be pretested with a sample of 20 energy customers. Results of the pretest will be shared with the CEC and participating utilities, and all parties will together agree on modifications to be made. Copies of all solicitation materials are to be provided to the CEC and utility sponsors for review. The direct mail package consisted of:

- An outgoing envelope (7.5 x 10.5 inches) with a window opening
- A business reply envelope (7 x 10 inches)
- A scannable survey (6.75 x 9.75 inches)
- A cover letter - several different types of letters will be used:
- Standard first mailing letter
- First mailing letter for sites with 2-4 units
- First mailing letter for master metered sites
- Second mailing letter (same for all customers)

Surveys will be affixed with labels that include the customer tracking number in numeric and barcode format. Labels also include a code indicating the customer's utility and the customer's name and address.


Direct mail solicitation packages will be mailed third class to all customers on April 16th. As responses come into KEMA-XENERGY's office, we will barcode the surveys and create a list of completed surveys. Three weeks after the initial mailing, we will provide a second list to the mailing house with the names of those customers who have not yet replied to the mailing. These customers will be sent a second solicitation package at that time. The second package is identical to the first except for the letter describing this mailing as a second attempt.

KEMA-XENERGY will use the following internal steps to process incoming surveys: (Note: PG&E opted to perform an add-on study at the same time as the RASS. All materials and processing for the add-on project will be billed separately. However, their add-on surveys are included in the processing steps as PG&E special - gas only and load research customers.)

E.2.1 Production Process for Incoming CA RASS Surveys

1. Open envelopes using letter opener.
2. Extract surveys and separate surveys by utility using the survey codes listed below:

Utility	Identification Codes		
PG&E regular	1	A	W
PG&E special	2	6	7
SDG&E	3	B	X
SCE	4	C	Y
LADWP	5	D	Z



CODING DETAILS AND BREAKDOWN		
Utility	Category	Code
PGE		1
PGE-gas only		2
SDGE		3
SCE		4
LADWP		5
PGE-load research		6
PGE-load research		7
PGE	MF 5-20	A
SDGE	MF 5-20	B
SCE	MF 5-20	C
LADWP	MF 5-20	D
PGE	MF 20+	W
SDGE	MF 20+	X
SCE	MF 20+	Y
LADWP	MF 20+	Z

3. Bundle sorted surveys and label with the appropriate Tracking Sheet. Be sure to initial and date the Tracking Sheet for "First Sort".
4. Barcode received surveys into WordPad using desktop shortcut icon named: CEC RASS SurveyLogin. (Daily files are saved in g:\wcec0006\surveylogin) While barcoding, visually verify surveys have been separated appropriately.

5. Bundle barcoded surveys according to utility.
Be sure to initial the Tracking Sheet for "Barcode".

6. Place barcoded bundle (with Tracking Sheet) on appropriate processing shelf.

7. Perf and pen surveys:

DO PENS AS YOU PERF. DO NOT SEPARATE PENS.

Check areas mentioned below for handwritten information.

- In many cases, customers will write something in the "Describe" area that is covered by one of the other existing bubble choices. In these cases, either the customer did not see the option, or did not go back to insert the answer in the appropriate place. Our role is to insure that the proper bubble is answered, if available, since the hand-written information is not scanned/recorded:

Page 1 - A1Your Home and Lifestyle –

- Other house type description may match another house type bubble.

Page 4 - B2Space Heating –

- Other heating system may match another type. If fuel is indicated, but not type, respond with the "Other System Type" in the appropriate fuel category.

Page 7 - D2Water Heating –

- Other water heating system may match another type. If fuel is indicated, but not type, respond with the "Standard Tank" in the appropriate fuel category.

Page 15 - M8 Miscellaneous Appliances –

- Write-in answers may include items that are listed in questions K1 - K8 or questions M1 - M7. Complete the appropriate bubble if the customer missed the correct location. Be sure to remove the "Yes" response if the response belongs elsewhere.

Page 16 - N4Household Information / Language –

- If write-in for other can be categorized by one of the other responses, correct.

Page 17 - Phone Household Information / Phone Number –

- Be sure that the customer has filled out the bubble chart with their phone number so that it gets bubbled into the data file.
- Be sure to initial the Tracking Sheet for "Perf/Pen" upon completion of each bundle.

8. Scan surveys using the following naming conventions:

- a. PG&E regular WAymmdd#
- b. PG&E special RPymmdd#
- c. SDG&E XByymmdd#
- d. SCE YCymmdd#
- e. LADWP ZDymmdd#

(Example: First PG&E batch scanned on 4/30/2003 would be named - WA30430a)

- Collect the Tracking Sheets.
- When scanning is completed for a batch, gather all the collected Tracking Sheets and staple them together and place them inside the last folder of scanned surveys.
- Be sure to initial the Tracking Sheet for "Scanned" for top sheet only.

E.2.2 Toll Free Phone Center

KEMA-XENERGY has an 800 line dedicated to the RASS project. Callers will be provided with answers to their survey or program questions. The staff includes several native Spanish speakers who are available to assist Spanish speaking customers with their surveys or use the Spanish survey to do a phone based survey.

E.2.3 Format and Delivery to Itron

Itron is providing data cleaning for this project. Scanned survey batches are compiled by KEMA-XENERGY and provided to Itron as appropriate for their analytical needs. Itron's cleaning process and database development steps will be further documented in later deliverables for this project.

E.3 Onsite Meter Installations

E.3.1 Onsite Meter Target Group Definitions

A sub-sample of the initial sample will be used for on-site metering. On-site meter installations are going to be done on homes in the general population with an over-weighting of homes with air conditioning. Thus, the initial sub-sampling effort will take into consideration the need to target air conditioning users. The target number of installed on-site meters is 200. We plan to complete meter installations in 50 homes without air conditioning and 150 with air conditioning.

In order to achieve the results in a cost effective manner, we developed a grid that splits the state into six categories and parceled out the targets in such a way that we can pick 20 large geographic areas and target 10 customers in each area. The strategy attempts to capture a ratio of AC to non-AC customers in each area in a way that mirrors the split in that climate zone with an excess of targets to air conditioning customers. We also tried to spread the surveys around the state and amongst the utility sponsors and CEC climate zones.

	Hot Climate (AC most likely)	Moderate Climate (AC likely)	Cool Climate (AC least likely)
No Air Conditioning	12 (max. of 1 non-AC site per area)	24 (max. of 4 non-AC sites per area)	20
Air Conditioning	108	36	0
Number of Geographic Target Areas	12 (120 total sites)	6 (60 total sites)	2 (20 total sites)
Recruitment Strategy	Recruit with goal of meeting AC targets. Recruiters may get more AC customers than listed, but cannot exceed max. number of non-AC households by target area		Recruit whatever customers we get since there is a low probability we will get an AC customer

Our proposed targeting is roughly by three digit zip codes with some refinement in large areas. We used a table that matches the three digit zip codes with their CEC climate zones.

Target group	Climate category (from chart above)	Proposed three digit zip code of target area	CEC climate zones covered	Major town(s) in segment	Utilities with customers in target area
1	Hot	917	9,10	Covina, Pomona, Ontario, Upland	SCE
2	Hot	919	(9)** 13	La Mesa, Spring Valley, Lemon Grove	SDG&E
3	Hot	920	13	El Cajon, Poway, Escondido	SDG&E
4	Hot	922	10	Cathedral City, Desert Hot Springs, Palm Springs, 29 Palms, Yucca Valley	SCE
5	Hot	924	10	San Bernardino	SCE
6	Hot	925	10	Riverside, Hemet, Moreno Valley, Sun City	SCE
Target group	Climate category (from chart above)	Proposed three digit zip code of target area	CEC climate zones covered	Major town(s) in segment	Utilities with customers in target area
7	Hot	933	3	Bakersfield	PG&E
8	Hot	937	3	Fresno	PG&E
9	Hot	952	1,2	Stockton, French Camp, Valley Springs	PG&E
10	Hot	956	2,4	Davis, Vacaville, Winters	PG&E
11	Hot	959	1,3	Chico, Marysville, Grass Valley	PG&E
12	Hot	960	1,3	Redding, Red Bluff	PG&E
13	Moderate	900	11	Los Angeles	LADWP, SCE
14	Moderate	910/911	9,12,16	S. Pasadena, Sunland, Tujunga, Altadena, Monrovia	LADWP, SCE

15	Moderate	919	(9)** 13	Chula Vista	SDG&E
16	Moderate	921	13	San Diego	SDG&E
17	Moderate	927	8	Santa Ana, Fountain Valley, Tustin	SCE
18	Moderate	945	4,5	Concord, Hayward, Livermore	PG&E
19	Cool*	941/946	5	Oakland and East Bay Hills, San Francisco	PG&E
20	Cool*	952/953	1	Foothill areas (sites over 2,500 feet elevation, more electric): Areas above Sonora, Angel's Camp	PG&E

Table Notes:

* Depending on the availability of recruits in the foothill areas, we propose to shift the number of targets per area to 14 in the Oakland / SF area and 6 in the foothills. This will yield the 20 targeted cool area sites.

** Although some of the SDG&E customers appear to have climate zone of 9, there is some question of the validity of that climate zone in the SDG&E service territory. KEMA-XENERGY, Inc. will be reviewing the climate zones reported to us for these customers.

E.3.2 Onsite Metering Site Recruitment

Onsite recruitment is to occur using the sampling plan list above. The following script outlines the recruiting process. Recruiters will be provided with a sample that meets the three digit zip code requirements for each individual target group. Members of the potential group include homes where we were able to get phone numbers after processing potential customers through a phone look-up service. Customers in the group are randomly sorted and the recruiter will use the list in order (to insure randomness) and move down the list working on finding recruits. Recruiters will be trained about the program objectives, timing, and specific targeting and onsite requirements for participation. Recruiters schedule appointments for field staff several days in advance.

Screener for RASS Onsite Metering Installations and Surveys

Hello, I'm calling from KEMA-XENERGY on behalf of [read local utility name]. May I speak with [read name from sample]?

We recently contacted you about participating in a research study sponsored by the California Public Utilities Commission and [read local utility name]. The purpose of this study is to help better understand the amount of daily energy use in a home including air conditioning, and help prepare for future energy needs.

First, did you receive our energy survey booklet in the mail? If yes: Did you return it?

Do you have central air conditioning?

As a thank you for participating in the program, we are offering you \$50 - \$25 when we install the metering equipment, and another \$25 when we remove the equipment.

This is a simple monitoring program. We will not attempt to sell you anything, nor will you be contacted by anyone else interested in selling you anything. Will you be able to help us out and participate in this survey?

To monitor your usage, we will be attaching meters to your main power box and air conditioning unit. The meter will not affect your rate in any way and you will remain anonymous in the study.

We'd like to schedule an appointment to come out to your home in the next [read: few days/week]. The total visit should take no longer than an hour and a half. We would discuss the details about the study and ask you questions about your household energy use. The equipment is small and shouldn't interfere with any usage. The entire study will be for a full year, with a check-up on the meters every three months.

When would be a good day and time to come out to your home?

[SCHEDULE DAY AND TIME - Assume 2 hours needed per site.]

Great! Let me make sure I have your correct address. Is it: [read address, including city and zip.] And I'll be calling you a day or two before the visit; is this is the best phone number to reach you ? [if not, get correct number]

It is likely that the engineer will need to temporarily shut down your power for safety while installing the meters.

Thanks again for your interest and time! We'll see you on [read day/time]!

[GIVE UTILITY CONTACT INFO IF NEEDED TO VERIFY PURPOSE OF STUDY OR REASON FOR NEEDING ADDRESS INFORMATION]

CEC - Glen Sharp, 916-654-4764
SDG&E - Caillian Liao, 619-969-2046
SCE - Shahana Samiullah, 626-302-8293
PG&E - Dan Walker, 415-973-2766
LADWP - Don Cunningham, 213-367-1375

E.3.3 Onsite Metering Field Surveys

Fieldwork for the onsite RASS metering project consists of installing meters on the whole house circuits as well as air conditioning circuits if appropriate. Field personnel also work with the customer to complete (or verify, if the customer has already completed) the RASS direct mail survey. In addition, field personnel measure and record detailed HVAC and shell information about the home.

All field personnel will be trained in KEMA-XENERGY's Oakland office. Training consists of program overview training as well as detailed metering installation instructions (including a live demonstration at an employees home), detailed review of the onsite survey, and electrical safety training. Field personnel, with the exception of two CEUS auditors who served as field trainers, will all be accompanied on their first few site visits to complete the training process. The following section includes the program training materials.

RASS General Onsite Program Training Materials

The attached outline mirrors the general training slides to be used as part of the field staff training.

FIELD STAFF TRAINING
CA STATEWIDE RASS

Meter Installation and Field Data Collection
Oakland, CA

Program Overview

- Study managed by the CEC
- Sponsors include: PG&E, SCE, SDG&E, LADWP, and So. Cal. Gas
- Primary data collection done using mail survey
- Onsites will provide metered data on a small sample of customers throughout the state
- Meters are to stay in homes for one year

Onsite Goals

- 200 households
 - * 150 homes with air conditioning
 - * 50 homes with no air conditioning
- 20 clusters - 10 homes per cluster
 - * "Hot" clusters - 12 areas with a maximum of 1 non-AC customer per area
 - * "Moderate" clusters - 6 areas with a maximum of 4 non-AC customers per area
 - * "Cool" clusters - 2 areas with low probability of reaching customers with AC.

Onsite Goals by Region

- "Hot" clusters:
 - * 6 PG&E
 - * 4 SCE
 - * 2 SDG&E
- "Moderate" clusters:
 - * 1 PG&E
 - * 1 SCE
 - * 2 Shared SCE/LADWP
 - * 2 SDG&E
- "Cool" clusters:
 - * 2 PG&E

Project Timing

- Project underway
- Second mailing of surveys just sent out
- Onsites in field first week of June
- Goal is to complete installs by end of June
- Need to get AC meters in ASAP so AC load can be measured
- Subsequent visits will be made to read meters approximately every three months

Field Steps

- Recruit customer - screening for AC or not
- Schedule audits
 - * Expect 1-1/2 to 2 hours in the field
 - * Likely to require evening/weekend hours
- Site survey
 - * Meter installation (insure that it is possible)
 - * RASS mail survey (review if completed or fill out with customer)
 - * Onsite form - HVAC and shell details
 - * Incentive payment

Field Equipment

- Safety goggles
- Gauntlet style gloves

- Basic tools: screwdriver, wrench, wire pliers
- Meters, CTs
- Hand held voltage meter
- Do not use power tools

Meter Installation

- Safety MUST be first priority
- Locate main breaker box and identify initial state of all circuits
- Determine location of main and AC circuits as appropriate (use one meter for both if possible)
- Determine best fit of metering device
- Clearly note meter location to simplify return visits and identify if resident needs to be home to access our meter

Meter Installation (cont.)

- Shut down power where possible
- Insure that meter is turned on (green light on)
- Use channels 1 and 2 for whole house connection
- Use channels 3 and 4 for AC connection
- Obtain voltage reading from AC outlet. Not in breaker box.
- Record all information in the data logger tracking form.

Meter Installation (cont.)

- First data check in 1-2 months so double check your work:
 - * Check all wire to logger connections
 - * Check that CTs are completely closed
 - * Check that Whole House is channels 1 and 2 and AC is channels 3 and/or 4. Do not put AC on channels 1 or 2 even if separate logger is used for AC.
- Upon connection, turn power back on and put electrical box back in order.

Household Survey

- Complete RASS mail survey with customer
- Verify fuel for all appliances that could be gas or electric
- Collect detailed HVAC data on onsite form
- Collect detailed shell data on onsite form

Incentive

- Customer receives \$50 incentive for participation
 - * \$25 mailed after initial site visit and data collection effort
 - * \$25 mailed when meter is removed from site

Follow-up Visits

- Check in with customer if available and/or necessary - request information on any changes to AC or whole home since last visit
- Download metered data into formatted template

- Reset meter to clear existing data
- At final visit (one year after install) remove meter

Submittals to Oakland

- Completed RASS survey with customer tracking number
- Corresponding onsite survey with customer number
- Details of location of meter / access issues for subsequent visits
- Expense report documentation

In addition, the field training process included safety and meter installations using both classroom time and field training.

RASS Onsite Field Survey

The onsite field survey is focused on collecting detailed information about the HVAC equipment and site details. The survey also collects information about the customers billing meters and account information as well as details on the installation process, meter locations, and any other important notes that might assist the meter readers when they go back for a second visit.

Because the onsite survey has been provided previously to sponsors, it is being included as a linked PDF here.

RASS Onsite Field Survey Instructions

The RASS survey instructions are reviewed with the field team in detail to insure that field staff have a solid understanding of the survey needs. All field staff will be provided with a set of survey instructions to use for their reference as they are onsite.

This document discusses each question on the survey instrument and provides guidelines for completing those questions. The survey form will be filled out using a combination of (a) personal interview with the site contact, (b) direct observation, and (c) review of available documentation. Judgment should be used to determine which information source will provide the best estimate for any specific data field.

In several cases, the potential customer will have already completed a RASS survey. We will do our utmost to get a copy of that survey to the surveyor. However, in the event that we do not have the survey in our system at the time of the audit, we ask that the surveyor complete the survey again with the customer. Even if we do have the RASS survey, it is important that the surveyor verify key components of the survey to insure that the customer filled it out thoroughly and correctly.

The surveyor should make a courtesy call just prior to the site visit to ask the customer to have a utility bill handy, to remind the customer of the visit, to confirm the address, and to get any special instructions (e.g. access codes for a gated community).

General Guidelines

The following are general guidelines should be observed:

- The RASS Tracking ID # must be written at the top of every completed page. This is primarily for review and quality control purposes, but also assures that each page can be identified with the site with which it belongs even if an individual page is separated from the completed survey form (as can happen when coping).
- Every page of the survey form contains provisions for using multiples of that page via the footer label "Sheet ___ of ___", although this will most typically only be used for window inventories.
- After completing the interview portion of the survey form, inform your contact that you would like to conduct an inspection of the survey area to gather an inventory of equipment. If the site contact will not be accompanying you, inform him/her that you will check with him/her before you leave. If you have questions about what you see during your walk through, you can obtain the answers when you check out with your contact.
- Be sure to leave the house as clean as or cleaner than you found it, and with everything in working order. In the case where the attic is accessed, be sure to vacuum up any mess that is created. If it's a rainy day, be sure to bring two pairs of shoes so you can have one to wear inside the house. Regarding furnace blowers, if you have to take the access panel off, be sure to test the furnace after the panel is reinstalled to make sure it comes on.

Documenting the Information

All responses and field entries will be entered into a database. Therefore, many of your entries will have to be 'coded.' As much as possible, the appropriate codes are included as part of the question or in the response fields themselves. In some cases, codes are provided at the bottom of the form. When recording responses or data values, use the following guidelines:

- Please print legibly so that the data entry personnel do not have to struggle to read the data.

- Enter all values in the engineering units (e.g. ft², kBtuh, tons, etc.) indicated on the survey form. Do not cross out the units printed on the survey form and write new units in, because this will not be picked up during data entry. For example, if the field on the survey form asks for heating capacity in kBtuh, and the actual capacity from the furnace nameplate is 60,000 Btuh, make sure this is recorded as "60" and not "60,000" or "60,000 Btuh kBtuh".
- Write all zeroes with an overstrike (Ø) to differentiate them from the letter 'O'.
- Only use zero (Ø) values to indicate a confirmed null condition. For instance in the case of insulation R-value, if you observe a component (wall, roof, etc.) that had no insulation, a zero R-value would be appropriate. However, if you were just unable to determine an R-value, a zero would not be appropriate (instead just leave the field blank).
- If an "Other" type code is used, please record a brief description of the actual item either in the space provided, in a comment block, or on the comments page of the survey form.
- Write the number seven and last letter of the alphabet as 7 and Z, respectively.
- Use decimals (1.25), instead of fractions (11/4) when recording values.
- Equipment model number data fields are typically indicated by a series of boxes. Write only one character per box where characters include numbers, letters, commas, periods, spaces, brackets, etc. If the model number will not fit into the space provided, please continue on into the margin or record the entire number somewhere else so that it can be completely and clearly read and then note that this was done.
- Check and double-check all model numbers. It is critical that the correct number be obtained in order to be able to line the number up against manufacturer's equipment databases to obtain performance and energy usage values.
- Please use the comment blocks or comment sheet at the end of the survey form to record comments that should be a part of the permanent record for the site. Comments entered anywhere but in these locations will not be data entered and hence will be lost to reviewers of the electronic record for a surveyed site.

Cover Page

Site ID # / RASS Tracking

Every site will be identified by a unique Site ID number. This is called the RASS Tracking # on the schedule forms. This number must be written at the top of each page.

Contact Information

Be sure to confirm and record all contact information. Also, be sure to ask if the mailing address is different than the street address. Fields to be completed are:

Contact Name: Write in the name of the resident who is the primary contact for the survey. Be sure to double-check the spelling of the contact's name.

Phone Number: Record the telephone number including the extension number of the primary contact. This should be the active phone number at which the contact can be reached, in case it is necessary to phone the contact for additional information after the survey is complete.

Street Address, City, Zip Code: Write in the complete address of the surveyed site. This information should always be the same as the contact information supplied to the surveyor, and should be confirmed

Mailing Address, City, Zip Code: Be sure to ask the customer if the mailing address is different from the street address, and if so record here, otherwise record "SAME" in the Mailing Address field. This information will be used to mail the customer's incentive check to them.

CEC Climate Zone: This is one of the CEC forecast climate zones in which the home is located. It will be supplied on the contact sheet.

Survey Tracking Information

Completion dates of the primary steps of the survey process, and personnel who complete them, are recorded here. The events that are tracked include: completion of the actual site visit (Field Survey Performed:), review of the survey form by the survey team supervisor (Quality Control Check:), data entry (Data Entry Complete:), and the final transfer and receipt of the survey data by KEMA-XENERGY (Survey and Data Received by KEMA-XENERGY:).

Because some of the homes will have completed surveys available, please record if the RASS survey was completed on a new form or verified during the site visit.

Page 2: Energy Utility Meters and Accounts

The purpose of this page is to document the electric and gas utilities that serve the residence, and the associated meter and account numbers. The documentation of meter numbers found on-site is very important. These meter numbers may be used to confirm that the correct utility bills have been obtained for the surveyed residence. Although an attempt is made to identify all the electric and gas meters at the site prior to the survey, the procedure used to do this is not perfect. Therefore, it is critical that every attempt be made to identify the accounts and meters during the site visit.

Prior to obtaining the meter numbers, one initial question is asked of the resident:

Is customer responsible for the utility bills? It is important to determine this because if the person is not responsible for paying the utility bills, then they will not have usage information available.

Service and meter information can be obtained either from an electric/gas bill or from inspection of the meters themselves. One meter/account is entered per row in the table provided. Data to be gathered for each record includes:

Item #: This is just a counter/item number.

Service Type*: Circle the relevant service type (E=Electric, G=Gas or O=Other). If "Other" is selected, please describe what the other service type is (e.g., propane, oil, etc.) in the space provided.

Utility: Circle the utility (SDG&E, SCE, SCG, PG&E, DWP) that provides the service. If it is a utility or provider (such as for propane) other than those listed, use the OT (other) code, and record the name of the unlisted utility/provider in the space provided. Although the survey sample is drawn from exclusively from the investor-owned utilities, their service areas overlap with municipal utilities especially in Northern California in the LADWP service area.

Meter Number Document the meter numbers observed during the site visit. Enter a "-" if the meter can not be read or is inaccessible, and explain the issue/problem in the "Comments" block.

Account Number Obtain account numbers from energy bills if provided by the site contact.

Meter Location Briefly describe meter location. Detailed description to be included at the end of the survey with the meter installation details.

Page 3 - 4: Heating, Cooling, Fans, and Ducts

In this section you will record all relevant information about the HVAC systems found in the home. Pay special attention to recording the system type and the make and model numbers of the systems and/or components. If you need to remove the furnace / blower panels to obtain model numbers, be sure to test the system after re-installing the panel to make sure it still functions correctly. Also, if the unit is located in an attic, be sure to clean up any mess created by accessing the attic.

Heating and Cooling Systems

System ID: This is just a counter/item number.

Number of units: The number of these units that are installed.

System Information

System Type: Circle the appropriate system type from the following choices presented on the survey form. See additional descriptions of systems in Appendix HVAC. Note: If a home has two central units of differing sizes/capacities, then the first unit recorded in this table should be the "upstairs" unit and the second unit recorded should be the "downstairs" unit.

C = Central Unit is the typical ducted, split-system or package system, heating-only, heating and cooling, or cooling-only unit typically installed in most single-family homes and usually located in either the garage or attic. These are typically controlled by wall-mounted thermostats.

RT = Room Unit, Thru-the-wall is a non-ducted room-type unit that is installed through the wall. These are the types of units that are most typically installed in low-rise hotel/motels. It can be a heating-only, heating and cooling, or cooling-only unit that. Temperature and fan controls are usually mounted on the unit itself.

FR = Free-standing Room Unit is a non-ducted usually heating-only unit.

WF = Wall Furnace w/fan is a non-ducted wall furnace with a fan-assist.

HF = Hydronic (Fan Coil) systems are ducted heating systems that use heating coils supplied by a water heating system such as a boiler, or standard water heater in the case of a combined water heating/space heating unit. NOTE: For this type of system, be sure to enter performance information for the water heating system on Page 10.

BB = Baseboard/Radiant Heater these are also non-ducted heaters. Heating can be provided either by electricity or gas and heating is accomplished via radiation (i.e., gas element or electric coils are heated to red-hot and heat is radiated to space/occupants). Electric and gas wall heaters with small fans should also be included in this category.

P = Portable Unit would typically be a portable, electric or propane-fired heater, although this could also include a window unit that is installed only whenever needed.

EV = Evaporative Cooler or "swamp cooler" is typically either a roof-mounted or window-unit device. It essentially consists of a fan and a wetted pad through which air is blown, which cools and humidifies the air.

RW = Room Unit, Window is a non-ducted room-type unit located in a window. It can be a heating-only, heating and cooling, or cooling-only unit that. Temperature and fan controls are usually mounted on the unit itself.

WG = Wall Furnace, gravity is a non-ducted wall furnace that relies on natural convection rather than a fan to distribute the heat.

HR = Hydronic (Radiant) systems are non-ducted heating systems that heat radiatively. Hot water coils are located below the floor of the residence. Hot water is usually supplied by a boiler. NOTE: For this type of system, be sure to enter performance information for the water heating system on Page 10.

S = Shared central system is a system that supplies heating to more than a single unit and possibly an entire complex. NOTE: If this type of system is operating, then you do not need to complete any other HVAC information.

OT = Other type of unit would be any other type of system not specifically listed here. Be sure to include a brief description of the system in the space provided and describe in more detail in comments.

% of Residence Served by this System: For each separate HVAC system, record the approximate percentage of the total conditioned floor area that is served by this unit. A written description of the room or rooms served can also be included at the top or bottom of the column if desired.

Location Enter the appropriate code for where the HVAC air distribution unit is located. Most central units will be located either in the garage, in the attic, or in a "closet" with in the home itself. For the purpose of the survey, a closet could be considered a mechanical room and indicated with a code of M.

Heating Equipment

Manufacturer: Fill in the manufacturer's name.

Model Number: Fill in the model number and be sure to include all characters including spaces, dashes, etc. If more than one model number is indicated, record the first model number in this field, but record other model numbers on the comments page. Also, check the homeowner's warranty information for additional clues about the correct model number.

Equipment Type: Circle the applicable heating equipment type. See descriptions of systems in Appendix HVAC. If space heating is provided by a water heating system (HW), be sure to enter water heater performance data on page 10.

Fuel Type: Circle the applicable heating fuel type.

Input capacity Enter the heating input capacity in either kBtuh (not Btuh) or kW, and circle the appropriate units (kBtuh or kW).

Efficiency « Efficiency Units: Enter the heating equipment efficiency and circle the appropriate letter to indicate the value as either an AFUE for gas heating units, or an HSPF, EER, or COP for heat pump units (typically this should be HSPF).

HP only: -- Supplemental Heating Capacity (kW): For heat pumps, enter the value for the rated supplemental electric resistance heating.

-- **Soft Start?** Determine if the "soft start" option is a HP feature and circle either Y or N. This feature prevents cold air start-ups. Leave blank if unknown.

Cooling Equipment

Manufacturer: Fill in the manufacturer's name.

Model Number: Fill in the model number and be sure to include all characters including spaces, dashes, etc. If more than one model number is indicated, record the first model number in this field, but record other model numbers on the comments page. Also, check the homeowner's warranty information for additional clues about the correct model number.

Type: Circle the applicable cooling equipment type or None. See descriptions of systems in Appendix HVAC.

Output capacity (kBtuh): Enter the total output capacity in kBtuh (not Btuh).

Efficiency « Efficiency Units Enter the cooling equipment efficiency and circle the appropriate letter to indicate the value as either a SEER or n EER for mechanical AC units, or as % Sat. Eff. for evaporative cooling units.

Non-AirCooled Condenser Type: For air conditioning systems that utilize a condenser cooled by something other than ambient air, indicate whether the condenser is Evaporatively-cooled (water is sprayed on to the condenser), Ground-linked (i.e. a ground source heat pump), or Water-cooled (cooled directly by water).
AC or HP only: Split-system (S) or Package (P) unit? Indicate whether the system type is a split or package/unitary system.

-- **TXValve present?** Indicate whether a thermostatic expansion valve (TXV) is installed in the system (Y), is not installed in the system (N), can not be verified (DK=Don't Know), or is not applicable (NA). If TXV valve is verified by some means other than opening and access panel, please note this situation in comments. TXVs are only applicable to central-type air conditioning or heat pump units.

-- **TXV access panel present?** Indicate whether a TXV access panel is present (Y), is not present (N), or can not be verified (DK=Don't know) , or is not applicable (NA).

Nameplate volts / phase / amps: Record the details noted on the nameplate for each of these three measurements.

Fans/Ventilation

If the HVAC system is ducted, record the following information for the fan system.

Indoor Fan, hp: If readily available, record the fan size in hp. Use decimal fractions.

Supply Air Rate (CFM): If readily available, record the supply air rate in CFM. Do NOT guess or estimate this value.

Fan Type: Record the fan control type This information should be available either from the unit itself or the homeowners warranty package.

Special Features: If there are any special ventilation features designed in to the home, please record them here. Possibilities include but are not limited to:

SV=SmartVent/Economizer is a type of economizer system for residential applications. It consists of a separate vent into the duct system that allows the system to draw 100% outside air for cooling. In this respect, it is similar to a whole-house fan except it does not have any of the suction drawbacks.

WH=Whole-house fan is installed through the attic and draws air into the house and out through the attic.

OT=Other would include any other ventilation strategies or devices not specifically listed. These should be described in detail in the comments block at the bottom of the page.

Thermostats/Controls

Manufacturer: Fill in the manufacturer's name.

Model Number: Fill in the model number and be sure to include all characters including spaces, dashes, etc.

Zoned/Zonal Control System: Check this box to indicate if the system utilizes zonal controls (i.e. multiple thermostats controlling a single HVAC unit). These types of systems are typically only found on large, higher-end homes.

Thermostat Type: Circle the applicable thermostat type as one of the following:

Electromechanical thermostats typically have manual controls such as movable tabs to set a rotary timer and sliding levers for night and day temperature settings. Control is typically limited to settings for a single day. This thermostat type is not typically found on heat pumps.

Digital thermostats are characterized by their LED or LCD digital readout and data entry pads or buttons. They are compatible with most heating and cooling systems and usually provide the most flexibility in programming.

Hybrid thermostats combine the technology of digital controls with manual slides and knobs to simplify use and maintain flexibility.

Home Automation Systems is an integrated system that can potentially monitor and operate heating, cooling, and ventilation systems, as well as other household systems. In the context of this survey, these systems can be either:

a) A distributed-control system which utilizes control units installed in appliances or outlets, that are controlled via a local area network which uses standard power line wiring, telephone wire, video wire, radio frequency signals, or infrared signals.

b) A centrally controlled system which routes signals between a central computer and appliance controllers or environmental sensors.

c) "Smart" home systems which are central systems in which the outlets themselves have microchips and power is only provided upon request by a "smart" appliance.

Other Use this to note any other type of thermostat encountered and describe in the comments section.

Duct Systems

For ducted systems, you will be expected to determine where the duct system is located and physically access and inspect the system. You will need to record your observations of both the supply and return duct systems. If the HVAC systems are non-ducted systems, then check the N/A box to the right of the section header on the survey form. If there are more than two HVAC systems and the supply and return duct construction is drastically different for each one, then use a separate duct page for each system. A complete description of duct types, insulation requirements, and sealing materials is contained in the DUCT Appendix.

Does this residence have an accessible attic or crawl space? If the HVAC system is located in the attic, note whether or not the attic is accessible. If it is not accessible, please use extensive comments in the comments block to explain why it is not accessible.

Does this residence have an accessible floor crawl space? If the HVAC system is located in the floor crawl space, note whether or not the crawl space is accessible. If it is not accessible, please use extensive comments in the comments block to explain why it is not accessible.

Predominant Location of Registers: Indicate the most predominant location for supply and return registers. If none of these descriptions are suitable for describing the supply and/or return register locations, use the OT code and describe the configuration in comments.

Location of ducts (circle all that apply): Indicate where the supply and return systems ducts are located. Circle all that apply.

Duct Types: Circle all applicable duct types.

Duct Sealant Types: Carefully inspect supply and return duct joints for indications of the sealing methods used. Tapes and mechanical clamps should be obvious. Mastic may not be so obvious, except if there are traces of mastic around the joint or around registers. If you need to, carefully peel back the insulation to get a look at the joints. If the duct is so well sealed that it is impossible to examine the joints, document the situation in the comments block.

-- **Aerosol sealing used?** Indicate if aerosol sealing was used to seal the ducts. The best way to determine this is to look for the extensive documentation and certificates that are delivered as part of this process. This technique is currently used almost exclusively on existing homes, so will not likely be encountered.

-- **For tapes, list UL Label/Brand Name if visible:** If tape was used to seal the ducts and a brand name is visible on the tape, record the brand name here.

Duct Insulation R-Value: Enter the R-value of the insulation wrapped around the ducts as observed. Title 24 requires duct insulation to be labeled, so it should be easily obtained. If it is not labeled, enter -7. If the ducts are not insulated, enter 0.

Duct Condition: Give a general, brief description of the condition of the duct system. Examples: Any disconnects? System looks OK? If system was operating when inspected, were any leaks detected?

Plenum Condition: Give a general, brief description of the condition of the duct system. Examples: Any disconnects? System looks OK? Junctions a mess!

Page 5 - 7: Building Orientation and Construction

Building orientation and construction data may be used for performing building simulations with MICROPAS or other building simulation tools. As a result, the data being gathered is somewhat detailed. The general approach for specifying residence orientation and construction is as follows. Orientation of the residence is established by first specifying the orientation with respect to True North of the residence's entrance. All other walls are then referenced to the Front wall as Left, Right, and Back (reference position is facing the Front wall). A basic box shape is assumed for all residences. Data fields are described below.

Front Wall Orientation

Indicate the orientation of the front of the residence with respect to North in degrees measured clockwise from True North, as indicated in the figure contained on the survey form. Alternately, if the angle is measured in a counter-clockwise direction indicate the angle as a negative number. Because all other walls key off of this orientation, it is very important to get this right.

External Walls and Doors

The approach for specifying walls and doors is as follows. Data gathering is limited to external wall surfaces and demising walls (wall surfaces between conditioned and unconditioned space). Internal walls are excluded because there is no heat transfer across these walls between conditioned spaces. The general approach is to record the

dimensions of each external wall (Gross Wall Area) in each orientation, and then specify what portions of each wall are demising wall and door. Data fields are:

Wall orientation (Reference: facing the Front wall): This is a fixed field.

Shading: Indicate a qualitative shading type based on your assessment of shading from vegetation, self-shading, other homes, etc. for each wall orientation.

Gross Wall Area, ft² is the total wall area defined by the outer boundaries of the wall. That is, do not subtract out areas for windows, doors, or demising walls. For instance if the wall was 20 ft high by 40 ft long, the Gross Wall Area would be 800 ft².

Wall Surface Type: Select the type of wall finish from the choices given or choose OT for Other and include a description of the actual type in comments.

Exterior Wall Construction Type Select the type of wall construction type from the choices given or choose OT for Other and describe the construction type in the comments section.

Wall Insulation R-Value: Enter the wall insulation R-value if the Title 24 insulation certificate[BR1] is available. If available, this will typically be found stapled somewhere inside the garage, the attic, or possibly in the packet of materials the homeowner gets when they purchase the home. NOTE: Only enter "0" if the walls are uninsulated. Do NOT enter "0" if the insulation R-value is unknown.

Demising Wall Area, ft²: As explained previously, a demising wall is a wall between conditioned space and unconditioned, enclosed space such as that between a home and garage. Enter the approximate wall area in square feet.

Number of Wooden, -Insulated Metal, -Uninsulated Metal Doors: Enter the number of doors of each type for each wall orientation. Double doors in an entry way should be counted as 2 doors, not 1.

Door Shading: Patio Cover or Recessed Entry? Indicate whether or not the doors for each orientation are predominantly shaded by a patio cover or recessed entry. If some doors are shaded and some are not, indicate the predominant configuration and note deviations in comments.

Roof/Ceilings

The approach for specifying roofs is as follows. Roofs are considered to be external walls directly exposed to the outside environment while ceilings are not. Data fields include:

Ceiling (under Roof) Footprint Area, ft²: Enter the surface area of the ceiling directly under the roof. For a single-story home, this would be the same as the footprint of the home. For a two-story home, this would typically be the "footprint" of the second story.

Roof/Ceiling Type: Enter the roof and/or ceiling framework construction type. Use ADB (for adiabatic) for a ceiling that is located between two conditioned residences, such as is typically found in multifloor apartment buildings and condos.

-- **External Roof Surface** For external roofing surfaces only (i.e., not ADB types), circle the type of construction materials used on the roof surface.

-- **External Roof Color:** For external roofing surfaces only (i.e., not ADB types), circle the color of the roof surface.

Radiant barrier type: Indicated whether or not a radiant barrier is installed, and if one is installed how it is installed. Traditionally in new construction, the radiant barrier will be draped foil-face down across the roof tops of the roof framing before applying the roof sheathing. The barrier droops between the supports leaving an air gap between it and the sheathing. Alternately, the radiant barrier might be attached directly onto the roof sheathing. Options are:

N = None Use this code if the attic can be accessed and the absence of a radiant barrier positively confirmed.

NA = NoAccess Use this code if attic access is refused, preventing a determination of the absence or presence of a radiant barrier.

D = Attached to decking Use this code if the radiant barrier is attached directly to the roof decking and underneath the rafters.

R = Attached to rafters Use this code if the radiant barrier is attached to the rafters and is not directly attached to the decking.

Non-Vaulted Ceiling Height, ft: Enter the typical ceiling height in feet excluding vaulted ceilings.

Overall Average Ceiling Height, ft: Estimate the overall "average" ceiling height in feet that accounts for typical, raised, and vaulted ceiling types.

=> Vaulted Ceilings, Estimated % of Total Floor Area with Vaulted Ceilings?:
Enter the approximate percentage of the total conditioned floor area which has vaulted ceilings. A vaulted ceiling is a ceiling which spans multiple floors.

Ceiling Insulation R-Value: Enter the observed ceiling insulation R-value (Indicate R-value) as determined from either the Title 24 insulation certificate or a label on the insulation, or indicate the Insulation type and the thickness of insulation (Indicate inches of insulation in roof cavity). NOTE: Only enter "0" if the walls are uninsulated. Do NOT enter "0" if the insulation R-value is unknown.

Floor

Floors are also considered to be external and directly exposed to the outside environment. Floors between two conditioned spaces (such as in multi-level apartment complexes) are ignored. Data fields include:

Number of floors: Enter the total number of floors in the residence. If it is split level and this causes confusion about what to record for the number of floors, pick a number of floors, and then describe the situation in comments.

Total Conditioned Floor Area, ft²: Enter the total conditioned floor area including conditioned garages, basements, etc.

Ground Floor Area, ft²: Enter the conditioned ground floor area (same as total conditioned floor area for single-story homes).

-- **Ground Floor Construction Type:** Circle the appropriate floor construction type. Ignore this field if the floor is between two conditioned residences. If the floor type is a combination of two or more floor types (for example slab and crawl space/dirt room), choose the predominant type or choose "Other" (OT) and explain in comments. Floor types are:

Slab is a concrete slab.

Crawl/Raised is a crawl space or dirt room underneath a home..

Unheated basement is an unheated basement.

Open (Garage) is when an unconditioned garage is located beneath the residence.

ADB Cond. Space below floor type should be described in comments.

Other should be used when a floor type other than those listed is found, and the floor type should be described in comments.

-- **Ground Floor Insulation R-Value:** Enter the observed floor insulation R-value as determined from either the Title 24 insulation certificate or a label on the insulation. NOTE: Only enter "0" if the walls are uninsulated. Do NOT enter "0" if the insulation R-value is unknown.

-- **For Slab Floors: Exposed Slab:** Estimate the area of the ground floor that is covered by hard surfaces such as tile, wood flooring, marble, painted or treated concrete, etc. This could also be considered as the ground floor area that is not carpeted.

2nd Floor, Floor Area over an unconditioned garage: Estimate the floor area of the second story that is located above an unconditioned garage.

-- **Raised Floor Insulation R-Value** Enter the observed raised floor insulation R-value as determined from either the Title 24 insulation certificate or a label on the insulation. NOTE: Only enter "0" if the walls are uninsulated. Do NOT enter "0" if the insulation R-value is unknown.

Windows, Glass Doors, and Skylights

Windows, glass doors and doors with glass inserts, and skylights are key features that affect the energy performance of a home. As such, detailed information is required for each window in the home. Guidelines for identifying some features are listed below. Data fields include:

Item #: Just a reference counter/item number.

Unit Type: Indicate the primary function of each unit as a Window, Door, Skylight or Glass-in-door. A "D" (Door) code would be used for doors that are more than 50% glass, and the dimensions of the door would reflect the total door area, including any framing. A "G" (Glass-in-door) code would be used for doors that are less than 50% glass, and the dimensions of the door would reflect only the area of the glass.

Exterior Shading Device Type Indicate the type of exterior shading device applied to the outside of each glazing unit. Choices are:

S=Bug Screens These are the standard (usually vinyl mesh, aluminum framed) screens that are typically found on operable windows.

W=WovenShadeScreens These screens are much denser than standard bug screens and are usually metal instead of vinyl.

Louvered: A=LowSunAngle or L=Not LSA These are angled louvers that allow sunlight into the home when the sun is low in the sky (i.e., during the winter) but provide shade during the summer when the sun is higher in the sky.

R=Roll-down These are external blinds, awnings, or slats that can be physically moved into place to provide external shading when needed.

N=None if the windows have no exterior shading, as is usually the case for French doors and most fixed, non-operable windows.

Exterior Shading Features: Indicate the type of exterior shading provide by architectural features rather than devices. Choices are:

Architectural Overhang: If an architectural overhang is located above the window. Awning if an awning is installed above the window.

Patio Cover/Recessed Entry if the windows are located beneath a patio cover or recessed entry.

Other if the windows are externally shaded by an architectural feature other than those listed. Be sure to describe this system in comments.

Overhang height: For windows with overhangs, indicated the distance from the top of the window to the overhang in feet.

Overhang depth: For windows with overhangs, indicated the depth of the overhang in feet.

Style: Indicate the style of window. Selections include:

S=Slider windows are those that slide in a track either horizontally or vertically (but only one sash slides).

F=Fixed windows are those that can not be opened.

A=Art Glass windows include stained glass or other decorative glass type windows, and are typically single-paned.

D=Double-hung windows consist of two sashes that slide vertically along side jambs with the bottom sash closing down on the sill and the top sash closing up against the top jamb.

B=Bay/Bow windows are more commonly know as "greenhouse" windows and they look like a glass box consisting of one or more center sashes with perpendicular side sashes that protrudes from the wall. Bay windows are box-shaped, whereas bow windows are framed to form a gradual arc.

C=Casement windows usually consist of one sash hinged to a side jamb and they usually open outward from the sill by crank handle or slider bar.

A=Awning windows consist of sash a hinged to the top jamb or the sill which tilts out when it is opened.

OT=Other windows are those that do not fit into any of the categories defined above. Be sure to provide a description of these windows in the comments block at the bottom of the page

Layers of glazing: Record the number of panes of glass in the window.

Muntins/grids? If the window has a paneled appearance, indicate whether the muntins or grids creating the panels are located internally, externally, or both. Grids are typically superficial and only create the appearance of a paneled window, whereas muntins are used to create truly separate panels or "lights" which are then assembled into the complete paneled window assembly.

Frame type: Determine the frame type through observation and lightly tapping on the frame as explained in the following frame type options:

Metal When tapped lightly with a coin, metal frames should make a metallic, ringing sound, and they will be noticeably colder to the touch than the indoor ambient temperature, unless they incorporate a thermal-break.

Wood When tapped lightly with a coin, wood frames should make a solid thud sound, and they should not be noticeably colder to the touch than the indoor ambient temperature.

Vinyl When tapped lightly with a coin, vinyl/fiberglass frames should make a hollow or solid thud sound, and they should not be noticeably colder to the touch than the indoor ambient temperature.

Other If the frame type is something other than metal, wood, or vinyl such as vinyl-clad aluminum or a mix of types - wood inside, metal outside - record the window as an "Other" window type and describe the frame type in the comments block at the bottom of the page.

Glass type: Indicate the type of glass, which is inclusive of any tints, coatings, or films, used in the window as one of the following.

Clear glass will be evident and is usually the default if no other information is available and no tints or coatings are observed.

Tinted glass involves a change to the glass chemistry, so there should be a noticeable difference in the color of the glass versus clear glass. Tints are not films, that is they are chemicals that are mixed into the glass when it is manufactured, not a coating or film that is added to the surface.

Reflective glass will either be coated but more typically has had an after-market film applied to it. The ETEKT+ meter can be used to determine if a film is present on the interior glass surface, where it is typically installed. However, this type of glass is not typically used in residential applications.

LowE: LN or LF: LowE coatings include both LowE and spectrally selective LowE (e.g., LowE2). LowE glass is a coating that is usually applied to one of the glass surfaces in the gap between panes. The ETEKT+ meter will be used to determine which of these surfaces, if any, contains the LowE coating. If a LowE coating is on the gap-side of the glass pane inside the home, then it should be specified as LN (LowE Near). If a LowE coating is found to be on the gap-side of the glass pane that is outside the residence, then it should be specified as LF (LowE Far).

-- Was this an aftermarket film/treatment? If a surface treatment coating is apparent and indicated by the ETEKT+ meter, ask the homeowner this question. Some homeowners will install aftermarket films on double-paned windows in west-facing glass if the sun is especially bright through these windows. However, if they do this it usually voids the window warranty. As a result, some homeowners may be hesitant to answer this question. Therefore, if they are hesitant to answer when you ask this question, be sure to let them know that you will not be relaying this information to anyone else.

Height/Diameter: Enter the window width in inches. Round to the nearest 1/2 inch. NOTE: One window of every size/shape must be measured with a tape measure.

Width: Enter the window width in inches. Round to the nearest 1/2 inch. NOTE: One window of every size/shape must be measured with a tape measure.

-- Estimated?: If the windows dimensions have to be estimated, as is the case for windows on high-walls, windows that are otherwise inaccessible, or windows that are irregularly shaped, and you have to estimate or approximate any dimensions, check this box.

Number of units installed: Enter the number of units installed for each wall orientation in their respective boxes. For skylights, enter the number of skylights into the Front/Roof field, which is the first box in this area.

Gas-filled (i.e. argon or krypton, not air)?: Check this box if the window is filled with argon or krypton gas.

NOTE: If an NFRC label for any of the windows is found in the homeowners documentation (i.e. Manufacturer, SHGC, U-value, etc.), be sure to copy the information and record this information on the comments page of the survey form.

Page 8 - 9: Site Sketch

The Site Sketch and Site Sketch, Additional Sheet provide a useful supplement to the quantitative data gathered in the data tables. The objective for these pages is not to

produce a blueprint or even to do a sketch with dimensions that will yield exactly the total floor area reported by the customer, but only to obtain a sketch of significant parameters that might not have been clearly captured by entries in the data tables. The site sketch should include the following information:

Outline/Floor plan: A basic layout of all floors of the home that can be used to determine an aspect ratio for the home, as well as to check all roof area, ground floor area, floor area above garage, and other values as indicated elsewhere on the survey form. If the home has multiple floors, both floors should be sketched, the first floor on the Site Sketch page and the second floor on the Additional Sheet. Sketches for both Elevation (view from Front/Back) and Plan (view from Top looking down) views should be included as a minimum. Be sure to also indicate garage area and vaulted ceiling areas and dimensions. Window locations should be noted using the Item #s specified in the Windows, Glass Doors, and Skylights table.

Orientation: The orientation of the front of the home with respect to True North provides a useful reference in determining shading. Notation of Left, Right, and Back walls along with minimal dimensional information may be used in the QC process to check wall, roof, and floor areas reported in the data tables.

Comments: Any comments in regards to short-cuts or difficulty taken in calculating wall areas for non-box shaped homes, and other relevant comments, should be recorded in the comments blocks at the bottom of these pages.

Page 10: Comments and Observations

It is important to make sure that any comments and observations that you want to be part of the permanent record be recorded on this page or one of the comment blocks scattered throughout the survey. Comments located anywhere else will not be data entered, and therefore will not be made a part of the permanent electronic data record.

Page 11: Data Logger Form

This page is used to record the details of the logger installation. Repeat visits will be made quarterly to the home during the one year duration in the field. Subsequent visits will be facilitated by carefully completing this form as a way to notify the meter readers of meter location and other details.

Number of loggers used at this site? Try to use a single logger if at all possible. If more than one logger is required, list that here.

Does the whole house data include AC? This will be used to determine if AC load is added to the whole house or separate. Very important to note this on the form.

Voltage at home: Measure the voltage at the house. Meters are measuring amperage, so voltage record is important for future calculations.

Logger serial number: record details of the specific logger installed at the home.

Channel 1 data: Use channel one for WHOLE HOUSE data

Channel 2 data: Use channel two for WHOLE HOUSE data

Channel 3 data: Use channel three for AC data only. If you use a second logger for the AC data, continue to use channels 3 and 4 to insure consistency in data collection across sites.

Channel 4 data: Use channel four for AC data only. If you use a second logger for the AC data, continue to use channels 3 and 4 to insure consistency in data collection across sites.

Can the meter be read if no one is home? Second visits may be facilitated if the meter reader knows that they can visit without requiring the homeowner to be available. We will still contact the home owner to alert them that we are coming. Also include details such as the presence of a dog or outside fence or locked gate that may impact accessibility.

Any special information about the meter installation? Describe anything that will facilitate follow-up visits or details that may be necessary for the data analysis.

E.4 Non-Response Follow-Up

The non-response follow-up portion of this study aims to use a combination of survey methods (mail, executive interviewing, and in-person interviewing) to complete 2,500 interviews from a sample of 5,000 nonrespondents. These households will have already received two mailings from XENERGY requesting their participation in the study. The interview is estimated to last 30 minutes.

KEMA-XENERGY will be subcontracting this portion of the RASS project to RoperASW.

The nonrespondent sample will be drawn from the customers in the RASS sample who have not responded to either of two mailings. The database for the nonrespondent sample will include information initially available as well as some additional phone numbers, which will be obtained by using an outside phone look-up firm. RoperASW will

conduct over-the-phone training sessions with all field interviewers and supervisors who will be recruited to work on RASS.

E.4.1 Data Collection

This study will use a multi-mode data collection methodology that includes mail, executive telephone interviewers, and in-person interviewers. In-person interviewers will work the sample both on the phone and in-person.

For the purposes of data collection, we have divided the State of California into four regions based on density of Zip Codes:

- Area One includes the Los Angeles - San Diego region.
- Area Two includes the San Francisco- San Jose - Oakland region.
- Area Three includes the Central Valley region.
- Area Four (representing 10% of the nonrespondent sample) includes Northern and Eastern, less densely populated regions.

Data collection in Areas One, Two, and Three will be done using First Class mail, executive interviewers, and in-person interviewers. Data collection in Area Four will be done with Priority Mail, and executive interviewers.

Data collection will attempt to obtain a 50% response rate overall and in each zip code selected for the follow-up. Work will be managed so that no zip code will be over or under worked. Upon completion of interviews with 50% of the householders in a zip code, resources will be redirected to other clusters that have not yet obtained the 50% target.

Mail Effort

RoperASW will send out a First Class mailing packet to all members of Areas One through Three, 4,500 nonrespondents. The mailing packet will include a questionnaire cover letter, a copy of the questionnaire, a BRE, and a \$1 incentive. We expect 338 completed questionnaires (7.5%RR) to result from this effort.

RoperASW will send out a Priority Mail packet to all members of Area Four, 500 nonrespondents. The packet will include the same materials as those sent to Areas One through Three, with the exception that a \$5 incentive will be provided and \$15 additional will be promised upon receipt of a completed questionnaire. We expect 125 completed questionnaires (25%) to result from this effort. This exceptional offer will be made because no in-person follow-up will be attempted in this low zip code density area.

Non-response letters will be printed on RoperASW letterhead with a computer-generated signature printed on each letter.

All households that do not respond to the mail effort (estimated to be 4,537 HHs) will receive a notification letter, informing them that they will be contacted by phone or in-person by one of our interviewers.

Following the first mailing, all nonrespondents for Areas One, Two, and Three, will be transferred to executive or in-person interviewers (see details in relevant section below).

Nonrespondents in Area Four will be transferred to executive interviewers for phone contact, but not to in-person interviewers. Area Four is a sparsely populated region of California and the cost of conducting in-person interviews would be high.

Executive Interviewers

Phone and in-person interviewing will begin approximately 3 weeks after the mailing effort. The non-respondent sample will be divided into cases that include a phone number and cases that do not have a phone number. All cases without a telephone number (expected to be approximately 1,606) will be transferred to in-person interviewers.

Of those cases that include a phone number, 1,789 (60%) will be given to executive interviewers. We expect them to complete 895 cases (50% RR). Executive interviewers will be instructed to mail back their completed cases once a week.

When Spanish language barrier cases are identified, they will be sent to a bilingual executive interviewer. Depending on the Area, we expect between 5-10% of all households to be linguistically isolated.

The phone field period is scheduled to last 6 weeks. Once this period has lapsed, all unresolved cases in Areas One, Two, and Three will be transferred to in-person interviewers.

In-person Interviewers

In-person interviewers will initially receive all the cases that do not include a telephone number (1,606) and 1,193 (40%) of the cases that do include a telephone number. None of the cases to be worked by in-person interviewers will be in Area Four.

Six weeks after initial assignment, all unresolved cases held by executive interviewers will be turned over to in-person interviewers. We expect to transfer approximately 700 cases to in-person interviewers.

We expect in-person interviewers to complete 1,194 interviews.

In-person interviewers will have a choice of completing the interview by phone or through an in-person visit to the household. An interview by telephone will be the preferred method because it is less expensive and less time consuming. Therefore, in-person interviewers will be instructed to work their sample first by phone and only after the phone effort has not yielded any results, to visit the household in person.

The same issues in terms of linguistic isolation that were discussed for executive interviewers hold true for in-person interviewers. We expect that 5-10% of the households will be linguistically isolated, but there is no way to verify this prior to the first call or visit to the home. Every effort will be made to recruit Spanish-English bilingual in-person interviewers.

In-person interviewers will be expected to make up to three visits to the household. In-person interviewers will visit only households that did not respond to the survey by either mail or phone.

Households that respond to the in-person effort will be offered a token gift. RoperASW will provide in-person interviewers with token gifts to use for this purpose.

Each time that they are unable to reach a respondent, in-person interviewers will leave a "Sorry to have missed you" card with their contact information on it.

On their final visit, if they are unable to complete an interview, they will be instructed to leave a hangerbag containing a questionnaire, a BRE, and a special letter requesting that they send in a completed questionnaire.

In-person interviewers will be instructed to mail back their completed cases once a week.

E.4.1 Check-in Process and Administration

Throughout data collection, KEMA-XENERGY and RoperASW will coordinate a weekly update file identifying all customers from whom they have received a completed questionnaire. The BRE used in the mailings and the hangerbag effort will deliver completed questionnaires directly to KEMA-XENERGY. The weekly file from KEMA-XENERGY will identify cases that require no additional follow-up and, for Area Four, those that require the additional incentive.

Completed questionnaires will arrive at KEMA-XENERGY directly from respondents (mail and door hanger requests) and from interviewers through RoperASW (executive

and in-person interviewer). RoperASW will ship to KEMA-XENERGY all completed questionnaires received from interviewers.

E.4.2 Non-Response Materials

Special cover letters will be used for the non-response mailings. These are being sent under separate cover for approval and will be incorporated in their final format into this document.. RoperASW will print letters with the CEC logo on RoperASW letterhead. The outer envelope used in the mailing will be printed with additional text to draw more attention to the mailing. The customer survey and business reply envelope will be identical to those used in the direct mail solicitation process. Interviewers who receive nonresponses for phone and in-person follow-ups will use the same direct mail RASS survey for data consistency.

F.2 Cover Letter for \$1 Incentive



RoperASW

Dear Current Householder:

The California Energy Commission is contacting households across the state in an effort to better understand energy use in California. I am writing to ask you to participate in this important study sponsored by the California Energy Commission and the State's utility companies, including Pacific Gas & Electric, San Diego Gas & Electric, Southern California Edison, Southern California Gas Company, and Los Angeles Department of Water & Power. The purpose of the "Home Energy Survey" is to assist in statewide energy planning to allow all utilities to better serve customers.

RoperASW, a national survey research company, has been asked to conduct this portion of the survey. Your participation is very important to us because your household was chosen as a representative of many California households with similar characteristics.

Enclosed, you will find a survey booklet. Please take time to read and answer the questions. In answering the survey, please use a pencil. Answer the questions as they pertain to your residence or unit only. If you do not know the answer to a question, move on to the next one. Please return your completed survey in the enclosed postage-paid envelope.

Your answers will be held in the strictest confidence, and will be reported only in anonymous or summary form in order to protect individual identity. We do have an identification number on your survey so that we can track who has responded and avoid sending additional materials.

The sponsors value your participation. We have enclosed \$1 as a token of our appreciation. This is a small way to say thank you for taking the time to complete and mail the survey. Should you have any questions, please call me toll-free at 1-800-888-9213.

Sincerely,

A handwritten signature in black ink, appearing to read "Alexandra Filindra".

Alexandra Filindra
Research Manager
RoperASW

RoperASW LLC
1030 State Road Princeton NJ 08540
T 609 683 6100 F 609 683 6211
info@roperasw.com www.roperasw.com

The logo for NOP World, featuring a stylized globe icon above the text "NOP World".

NOP World

F.3 Cover Letter for \$5 Incentive



RoperASW

Dear Current Householder:

The California Energy Commission is contacting households across the state in an effort to better understand energy use in California. I am writing to ask you to participate in this important study sponsored by the California Energy Commission and the State's utility companies, including Pacific Gas & Electric, San Diego Gas & Electric, Southern California Edison, Southern California Gas Company, and Los Angeles Department of Water & Power. The purpose of the "Home Energy Survey" is to assist in statewide energy planning to allow all utilities to better serve customers.

RoperASW, a national survey research company, has been asked to conduct this portion of the survey. Your participation is very important to us because your household was chosen as a representative of many California households with similar characteristics.

Enclosed, you will find a survey booklet. Please take time to read and answer the questions. In answering the survey, please use a pencil. Answer the questions as they pertain to your residence or unit only. If you do not know the answer to a question, move on to the next one. Please return your completed survey in the enclosed postage-paid envelope.

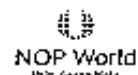
Your answers will be held in the strictest confidence, and will be reported only in anonymous or summary form in order to protect individual identity. We do have an identification number on your survey so that we can track who has responded and avoid sending additional materials.

The sponsors value your participation. We have enclosed \$5 as a token of our appreciation. This is a small way to say thank you for taking the time to complete and mail the survey. As a further thank you, if you mail the enclosed card, a check for \$15 will be sent to you after we receive the completed survey. Should you have any questions, please call me toll-free at 1-800-888-9213.

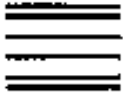
Sincerely,

Alexandra Filindra
Research Manager
RoperASW

RoperASW LLC
1060 State Road Princeton NJ 08540
T 609 683 6100 F 609 683 6211
info@roperasw.com www.roperasw.com



F.4 Business Reply Envelope (all mailings)



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



CEC Survey Processing Center
492 Ninth St., Suite 220
Oakland, CA 94609-9969

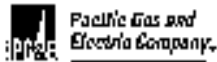
BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 213 OAKLAND CA

POSTAGE WILL BE PAID BY ADDRESSEE

CEC SURVEY PROCESSING CENTER
492 9TH ST STE 220
OAKLAND CA 94609-9969



F.5 Questionnaire



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:



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
Pacific Gas and Electric
San Diego Gas and Electric

Southern California Edison
Southern California Gas Company
Los Angeles Dept. of Water and Power

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Your Home & Lifestyle

- A1** What type of building exists at the service address on the front cover of this survey?
- Single-family detached house **Number of stories:** 1 2 3 or more
 Townhouse, duplex, or row house (*Shares exterior walls with neighboring unit, but not roof or floor*)
 Apartment or condominium (2 - 4 units)
 Apartment or condominium (5 or more units)
 Mobile home
 Other (*Describe:* _____)
- A2** Do you own or rent this home?
 Own / buying Rent / lease
- A3** How long have you lived at this address?
- | | | | |
|---|-----------------------------------|-----------------------------------|---|
| <input type="checkbox"/> 1 year or less | <input type="checkbox"/> 6 years | <input type="checkbox"/> 11 years | <input type="checkbox"/> 16 - 20 years |
| <input type="checkbox"/> 2 years | <input type="checkbox"/> 7 years | <input type="checkbox"/> 12 years | <input type="checkbox"/> 21 - 30 years |
| <input type="checkbox"/> 3 years | <input type="checkbox"/> 8 years | <input type="checkbox"/> 13 years | <input type="checkbox"/> More than 30 years |
| <input type="checkbox"/> 4 years | <input type="checkbox"/> 9 years | <input type="checkbox"/> 14 years | |
| <input type="checkbox"/> 5 years | <input type="checkbox"/> 10 years | <input type="checkbox"/> 15 years | |
- A4** What best describes this residence?
- This is my permanent year-round residence. (*Go to A6.*)
 This is my partial-year or seasonal residence.
 This is my vacation home and is generally used only by my family.
 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.*)
- | | | | | | |
|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|------------------------------|
| <input type="checkbox"/> Jan | <input type="checkbox"/> Mar | <input type="checkbox"/> May | <input type="checkbox"/> Jul | <input type="checkbox"/> Sept | <input type="checkbox"/> Nov |
| <input type="checkbox"/> Feb | <input type="checkbox"/> Apr | <input type="checkbox"/> Jun | <input type="checkbox"/> Aug | <input type="checkbox"/> Oct | <input type="checkbox"/> Dec |
- A6** Approximately what year was this residence built?
- | | | | | | |
|--------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| <input type="checkbox"/> Before 1940 | <input type="checkbox"/> 1973 | <input type="checkbox"/> 1980 | <input type="checkbox"/> 1987 | <input type="checkbox"/> 1994 | <input type="checkbox"/> 2001 |
| <input type="checkbox"/> 1940-1949 | <input type="checkbox"/> 1974 | <input type="checkbox"/> 1981 | <input type="checkbox"/> 1988 | <input type="checkbox"/> 1995 | <input type="checkbox"/> 2002 |
| <input type="checkbox"/> 1950-1959 | <input type="checkbox"/> 1975 | <input type="checkbox"/> 1982 | <input type="checkbox"/> 1989 | <input type="checkbox"/> 1996 | <input type="checkbox"/> 2003 |
| <input type="checkbox"/> 1960-1969 | <input type="checkbox"/> 1976 | <input type="checkbox"/> 1983 | <input type="checkbox"/> 1990 | <input type="checkbox"/> 1997 | |
| <input type="checkbox"/> 1970 | <input type="checkbox"/> 1977 | <input type="checkbox"/> 1984 | <input type="checkbox"/> 1991 | <input type="checkbox"/> 1998 | |
| <input type="checkbox"/> 1971 | <input type="checkbox"/> 1978 | <input type="checkbox"/> 1985 | <input type="checkbox"/> 1992 | <input type="checkbox"/> 1999 | |
| <input type="checkbox"/> 1972 | <input type="checkbox"/> 1979 | <input type="checkbox"/> 1986 | <input type="checkbox"/> 1993 | <input type="checkbox"/> 2000 | |
- A7** How many bedrooms are in your home?
- | | | | |
|---|----------------------------|----------------------------|---------------------------------------|
| <input type="checkbox"/> No bedrooms (studio apartment) | <input type="checkbox"/> 3 | <input type="checkbox"/> 6 | <input type="checkbox"/> 9 |
| <input type="checkbox"/> 1 bedroom | <input type="checkbox"/> 4 | <input type="checkbox"/> 7 | <input type="checkbox"/> 10 |
| <input type="checkbox"/> 2 bedrooms | <input type="checkbox"/> 5 | <input type="checkbox"/> 8 | <input type="checkbox"/> 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.)

- Less than 250 1001 - 1250 2501 - 3000
 250 - 500 1251 - 1500 3001 - 4000
 501 - 750 1501 - 2000 4001 - 5000
 751 - 1000 2001 - 2500 Greater than 5000

A9 Are your home's exterior walls insulated?

- Yes, all walls Yes, some walls No

A10 Is your home's attic/ceiling insulated?

- Yes **A11** If yes, estimate the number of inches of attic/ceiling insulation.
 No 0 - 3 inches (R-value less than R-10)
 4 - 6 inches (R-11 to R-19)
 7 - 10 inches (R-20 to R-30)
 More than 10 inches (R-31 or higher)

A12 Choose the statement that best describes your windows.

- All or most are double pane windows
 All or most are single pane windows
 My home has a mixture of single pane and double pane windows

A13 Choose the statement that best describes the frames on your windows.

- All or most have vinyl window frames
 All or most have wood window frames
 All or most have metal window frames

A14 Has your home been remodeled in the past 12 months?

- No (Go to A16.)
 Yes **A15** If yes, what type of remodel did you do? (Choose all that apply.)
 Room addition, added square footage to home
 Kitchen or bath re-model
 Re-built most of the home
 Other

A16 For each of the following age groups, how many people, including yourself, usually live in this home?

Age	Number of People Usually Living In This Home								
	None	1	2	3	4	5	6	7	Over 7
5 and under	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 - 18	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19 - 34	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35 - 54	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55 - 64	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
65 and over	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Space Heating

B1 Do you pay to heat your home?

- Yes No, it is part of my rent/condo fee (Go to B6.)
 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.")

	Main Heating <small>(Mark only ONE BOX below)</small>	Additional Heating <small>(Mark ALL BOXES that apply)</small>
NATURAL GAS (from gas utility)		
Central forced-air furnace (fan circulates hot air through air ducts)	<input type="checkbox"/>	<input type="checkbox"/>
Floor or wall heater/furnace	<input type="checkbox"/>	<input type="checkbox"/>
Hot water radiator	<input type="checkbox"/>	<input type="checkbox"/>
Other system type	<input type="checkbox"/>	<input type="checkbox"/>
ELECTRIC		
Resistance (baseboard/ceiling/floor/wall)	<input type="checkbox"/>	<input type="checkbox"/>
Central forced air furnace (fan circulates hot air through air ducts)	<input type="checkbox"/>	<input type="checkbox"/>
Central heat pump (heats and cools)	<input type="checkbox"/>	<input type="checkbox"/>
Through-the-wall heat pump (looks like a window/wall air conditioner, but also provides heat)	<input type="checkbox"/>	<input type="checkbox"/>
Portable heaters	<input type="checkbox"/>	<input type="checkbox"/>
Other system type	<input type="checkbox"/>	<input type="checkbox"/>
BOTTLED GAS (propane, LP)		
Central forced air furnace (fan circulates hot air through air ducts)	<input type="checkbox"/>	<input type="checkbox"/>
Floor or wall heater/furnace	<input type="checkbox"/>	<input type="checkbox"/>
Hot water radiator	<input type="checkbox"/>	<input type="checkbox"/>
Other system type	<input type="checkbox"/>	<input type="checkbox"/>
WOOD		
Woodstove/fireplace insert	<input type="checkbox"/>	<input type="checkbox"/>
Fireplace	<input type="checkbox"/>	<input type="checkbox"/>
SOLAR		
Solar - no backup	<input type="checkbox"/>	<input type="checkbox"/>
Solar - natural gas backup	<input type="checkbox"/>	<input type="checkbox"/>
Solar - propane backup	<input type="checkbox"/>	<input type="checkbox"/>
Solar - electric backup	<input type="checkbox"/>	<input type="checkbox"/>
OTHER		
(Describe: _____)	<input type="checkbox"/>	<input type="checkbox"/>

B3 If your heating system(s) use natural gas for fuel, indicate whether it has a pilot light(s).

- | | | |
|-----------------------|--|--|
| Main gas heating | <input type="checkbox"/> Yes, pilot light | <input type="checkbox"/> No pilot light |
| Secondary gas heating | <input type="checkbox"/> Yes, pilot light(s) | <input type="checkbox"/> No pilot light(s) |

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- B4** How old is your main heating system?
- Less than one year 4 - 8 years 14 - 30 years
 1 - 3 years 9 - 13 years Over 30 years

- B5** What type of thermostat does your main heating system(s) use?
- 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.)*
 Standard thermostat *(Allows you to set the temperature and turn the heater on or off. You cannot set on/off times.)*
 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 (8am-9am)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Day (9am-5pm)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Evening (5pm-9pm)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Night (9pm-6am)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- B7** Has maintenance been performed on your main heating system in the past 12 months?
- Yes No

- B8** How many electric portable heaters do you use?
- I don't use portable heaters 2 portable heaters
 1 portable heater 3 or more portable heaters

- B9** How often do you use any additional heating system(s), including portable heaters, during the heating season?
- No additional heating Often (2 to 4 days per week)
 Rarely (once per month) Always (5 to 7 days per week)
 Sometimes (once per week)

Space Cooling

CENTRAL AIR CONDITIONING/COOLING

- C1** Do you pay for central air conditioning/cooling for your home?
- Yes No, it is part of my rent/condo fee *(Go to C7.)*
 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?

	Number of Central Cooling Systems		
	1	2	3 or more
Central air conditioning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Central evaporative cooler <i>(swamp cooler)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heat pump <i>(heats and cools)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- C3** How old is your main central air conditioning/cooling unit?
- Less than one year 4 - 8 years 14 - 30 years
 1 - 3 years 9 - 13 years Over 30 years

- C4** What type of thermostat does your main cooling system(s) use?
- 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.*)
 Standard thermostat (*Allows you to set the temperature and turn the air conditioner on or off. You cannot set on/off times.*)
 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 - 79°F	74 - 76°F	77 - 80°F	Over 80°F
Morning (6am-9am)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Day (9am-5pm)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Evening (5pm-9pm)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Night (9pm-6am)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- C6** Has maintenance been performed on your central air conditioning system in the past 12 months?
- Yes No

ROOM AIR CONDITIONING/COOLING (Window / Wall Units)

- C7** Please tell us the characteristics of each room air conditioning/cooling unit below.
 No room air conditioning/cooling units (Go to D1.)

	Unit 1	Unit 2	Unit 3
Type of Room AC/Cooling Unit			
Window/wall air conditioner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Window/wall heat pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Window/wall evaporative cooler (<i>swamp cooler</i>)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Age of Room AC/Cooling Unit			
Less than one year	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 - 3 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 - 8 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9 - 13 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
More than 13 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 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)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Day (9am-5pm)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Evening (5pm-9pm)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Night (9pm-6am)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hot weekday afternoon (noon-6pm)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Water Heating

D1 Do you pay for heating water at your residence?

- Yes No, it is part of my rent/condo fee (Go to D6.)
 No hot water heater (Go to D6.)

D2 What type of water heating systems do you use in your home?

	Main Water Heater <i>(Mark only ONE BOX in this column)</i>	Additional Water Heater(s) <i>(Mark ALL BOXES that apply)</i>
NATURAL GAS		
Standard tank	<input type="checkbox"/>	<input type="checkbox"/>
Whole house tankless system	<input type="checkbox"/>	<input type="checkbox"/>
ELECTRIC		
Standard tank	<input type="checkbox"/>	<input type="checkbox"/>
Heat Pump	<input type="checkbox"/>	<input type="checkbox"/>
Whole house tankless system	<input type="checkbox"/>	<input type="checkbox"/>
Point-of use tankless system	<input type="checkbox"/>	<input type="checkbox"/>
PROPANE		
Standard tank	<input type="checkbox"/>	<input type="checkbox"/>
Whole house tankless system	<input type="checkbox"/>	<input type="checkbox"/>
SOLAR		
With no backup system	<input type="checkbox"/>	<input type="checkbox"/>
With natural gas backup	<input type="checkbox"/>	<input type="checkbox"/>
With propane backup	<input type="checkbox"/>	<input type="checkbox"/>
With electric backup	<input type="checkbox"/>	<input type="checkbox"/>
OTHER FUEL		
<i>(Describe: _____)</i>		

D3 What is the typical hot water heater temperature setting? *(Medium is the standard factory setting.)*

- Low (below 130°F) Medium (130°F - 150°F) High (over 150°F)

D4 How old is your primary water heating system?

- Less than one year 4 - 8 years 14 - 30 years
 1 - 3 years 9 - 13 years Over 30 years

D5 Does your hot water heater(s) have an insulation blanket(s)?

- Yes 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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baths / day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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.)*

- Yes, all showers Yes, some showers 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.)*

- Yes, all faucets Yes, some faucets No

Laundry

- E1** Do you have the use of laundry equipment in your home?
 Yes No, laundry facilities are located in a common area of the building (Go to F1.)
 I do not use laundry facilities in my building (Go to F1.)
- E2** What type of clothes washer do you have?
(Do not include coin-operated machines or machines in common areas.)
 Top loading washer Front loading washer
- E3** How old is your clothes washer?
 Less than one year 6 - 8 years 16 - 30 years
 1 - 5 years 9 - 15 years 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 of Clothes Washer Loads per Week | | | | | | | | | | |
|------------|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 or more |
| Hot water | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Warm water | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Cold water | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
- E5** What type of clothes dryer do you have?
(Do not include coin-operated machines or machines in common areas.)
 I do not have a clothes dryer Electric dryer
 Natural gas dryer Bottled gas (propane, butane, LP)
- E6** How many loads of clothes do you dry in your clothes dryer during a typical week?
 None 2 4 6 8 10 or more
 1 3 5 7 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 | Electric | Bottled Gas | Other | 0-5 years | 6-10 years | 11-15 years | Over 15 years |
| Cooktop, stovetop or range | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Oven(s) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Outdoor barbecue | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
- F2** During a typical week, how often do you use your range or oven?
- | | Never | Rarely
<i>(less than once per week)</i> | Occasionally
<i>(1 - 2 times per week)</i> | Sometimes
<i>(3 - 4 times per week)</i> | Often
<i>(5 - 7 times per week)</i> |
|-----------|--------------------------|--|---|--|--|
| Breakfast | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lunch | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Dinner | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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- F3** Do you have a **microwave oven**?
 Yes, and it is used often (7 or more times per week)
 Yes, and it is used less than 7 times per week
 No
- F4** Do you have a **dishwasher**?
 Yes No (Go to G1.)
- F5** How many dishwasher loads are run in a **typical week**?
 None 2 4 6 8
 1 3 5 7 9 or more

Refrigerators

- G1** How many refrigerators do you have plugged in?
 0 (Go to H1.) 1 2 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				
Single-door	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Top Freezer - Bottom Refrigerator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Top Refrigerator - Bottom Freezer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Side-by-side	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Size, in Cubic Feet				
Mini (under 13 cu. ft.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Small (13 - 16 cu. ft.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medium (17 - 19 cu. ft.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Large (20 - 23 cu. ft.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Very large (over 23 cu. ft.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Frost-free or Manual Defrost?				
Automatic (frost-free)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Age of your Refrigerator				
Less than two years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 - 7 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 - 10 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11 - 20 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
More than 20 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other Features				
Through-the-door ice and water dispenser	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Freezers

H1 How many stand-alone freezers do you have plugged in?

(Do not include freezers that are part of your refrigerator.)

- 0 (Go to J1.) 1 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			
Upright frost-free	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Upright manual defrost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chest frost-free	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chest manual defrost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Size, in Cubic Feet			
Small (under 13 cu. ft.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medium (13 - 16 cu. ft.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Large (over 16 cu. ft.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Age of your Freezer			
Less than two years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2 - 7 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8 - 10 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11 - 20 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
More than 20 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Spas and Hot Tubs

I1 Do you have the use of a spa or hot tub at your home?

(Do not include whirlpool tubs in your bathroom.)

- Yes, and I pay for its energy use
 Yes, but it is in a common area and I do not pay for its energy use (Go to J1.)
 No spa or hot tub (Go to J1.)

I2 What fuel do you use to heat the spa or hot tub?

- Electricity Solar and electricity Bottled gas (propane, butane, LP)
 Natural gas Solar and natural gas Other

I3 How large is the spa or hot tub?

- Small (3 people or fewer) Medium (4 - 6 people) Large (7 or more people)

I4 Where is the spa located?

- Outside, in the ground Outside, above ground Indoor spa

I5 Do you have an insulated cover on your spa or hot tub?

- Yes No

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

	Summer (May - Oct.)	Winter (Nov. - April)
Never	<input type="radio"/>	<input type="radio"/>
Rarely	<input type="radio"/>	<input type="radio"/>
Only when we use it	<input type="radio"/>	<input type="radio"/>
1 - 3 hours every day	<input type="radio"/>	<input type="radio"/>
4 - 6 hours every day	<input type="radio"/>	<input type="radio"/>

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

	Summer (May - Oct.)	Winter (Nov. - April)
Never	<input type="radio"/>	<input type="radio"/>
0 - 2 times per month	<input type="radio"/>	<input type="radio"/>
3 - 6 times per month	<input type="radio"/>	<input type="radio"/>
9 or more times per month	<input type="radio"/>	<input type="radio"/>
Maintain set temperature	<input type="radio"/>	<input type="radio"/>

Pools

J1 Do you have the use of a swimming pool at your home?

- Yes, and I pay for its energy use
- Yes, but it is in a common area and I do not pay for its energy use (Go to K1.)
- 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.)

- Less than 20,000 gallons
- 20,000 - 40,000 gallons
- More than 40,000 gallons

J3 How many hours per day do you operate your swimming pool filter?

	Summer (May - Oct.)	Winter (Nov. - April)
None	<input type="radio"/>	<input type="radio"/>
1 - 2	<input type="radio"/>	<input type="radio"/>
3 - 4	<input type="radio"/>	<input type="radio"/>
5 - 7	<input type="radio"/>	<input type="radio"/>
8 - 11	<input type="radio"/>	<input type="radio"/>
12 - 15	<input type="radio"/>	<input type="radio"/>
16 - 20	<input type="radio"/>	<input type="radio"/>
21 or more	<input type="radio"/>	<input type="radio"/>

J4 Which fuel do you use to heat your pool?

- Pool is not heated
- Natural gas only
- Electricity only
- Electric heat pump only
- Solar heater (using solar collectors)
- Bottled gas only (propane, butane, LP)
- Other

- J5** Please indicate how often you heat your pool in the summer and winter.
- | | Summer (May - Oct.) | Winter (Nov. - April) |
|-------------------------------|-----------------------|-----------------------|
| Never | <input type="radio"/> | <input type="radio"/> |
| Once a month | <input type="radio"/> | <input type="radio"/> |
| Once a week | <input type="radio"/> | <input type="radio"/> |
| 2 - 4 times per week | <input type="radio"/> | <input type="radio"/> |
| Keep pool heated continuously | <input type="radio"/> | <input type="radio"/> |
- J6** Which of the following attributes does your pool have? (Choose all that apply.)
- Cover Pool timer Pool sweep Pool is indoors

Entertainment and Technology

- K1** How many televisions and accessories do you use in this home?
- | | None | 1 | 2 | 3 or more |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
| Home theater | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Large screen television (greater than 36 inches) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Standard size television (36 inches or less) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Analog cable box | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Digital cable box | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Digital satellite box | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| DVD Player (or combined DVD/VCR) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| VCR | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Personal video recorders (e.g., TiVo, ReplayTV) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Stereo | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
- K2** How many total hours are all your televisions on each day? (Add up time for each television.)
- Less than 1 hour 9 - 12 hours 21 - 30 hours
 1 - 4 hours 13 - 16 hours More than 30 hours
 5 - 8 hours 17 - 20 hours
- K3** How many personal computer(s) (PC, Macintosh, etc.) do you use in this home? (Include both desktops and laptops.)
- We have no computers in this home (Go to K7.) 2 computers
 1 computer 3 or more computers
- K4** If 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.)
- Less than 1 hour 9 - 12 hours 21 - 30 hours
 1 - 4 hours 13 - 16 hours More than 30 hours
 5 - 8 hours 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 | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |
| Browse the Internet for information | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Make purchases using the Internet | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Pay bills on-line | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

K6 Do you (or someone else in your home) operate a business and/or work from your home?

No (Go to K8.)

Yes → **K7** How many hours a week is someone working out of your home?

0 - 10 hours per week

11 - 30 hours per week

More than 30 hours per week

K8 How many of the following products do you use in this home?

	None	1	2	3 or more
Answering machine or service	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Multifunction machine (printer, fax, scanner, copier)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FAX machine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Printer for computer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scanner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Copier	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internet access via traditional phone line	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DSL modem for Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cable modem for Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Satellite communication for Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Home network (LAN)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cell phone (used by occupants of this home)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on timers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on motion detectors or occupancy sensors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on a dimming switch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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.)

Exterior Fixtures	None	1 - 2	3 - 5	6 or more
Exterior incandescent fixtures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exterior compact fluorescent fixtures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low voltage landscape light system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HID (sodium vapor, metal halide) fixture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exterior Lighting Controls				
Fixtures on timers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on dusk-to-dawn sensors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fixtures on motion detectors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ceiling fan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wind turbine attic ventilator (non-electric)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electric attic fan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Whole-house fan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electronic household air cleaner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Humidifier	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dehumidifier	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water purification system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heated waterbed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electric blanket	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aquarium	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trash compactor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sauna - electric	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electronic security system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pond or water garden pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electric garage door opener	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lawn mower - electric	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

M2 Do you use an electric well water pump to provide water for your home?

No (Go to M5.)

Yes →

M3 Does your home also have access to city/county water sources? Yes No

M4 How do you use your well water?

Only for gardening and landscaping

Only for household use

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	<input type="checkbox"/>		
Shop tools	<input type="checkbox"/>		
Electric welding equipment	<input type="checkbox"/>		
Electric air compressor	<input type="checkbox"/>		
Large battery charger	<input type="checkbox"/>		
Kiln for ceramics and pottery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medical equipment (e.g., respirator)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

M6 Do you have an electric vehicle, electric wheelchair, or golf cart at your home?

No (Go to M8.)

Yes, but it is a hybrid vehicle and does not need to be charged at home. (Go to M8.)

Yes, electric wheelchair/cart →

Yes, electric car/vehicle →

M7 Do you charge your electric wheelchair, cart, or vehicle at home?

Yes No

M8 Do you use any other equipment or large appliance that consumes a significant amount of electricity or natural gas in your home?

Yes No

(Please describe

equipment and fuel. _____)

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		
		Electric	Nat. Gas	Other
Central heating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Central cooling	<input type="checkbox"/>	<input type="checkbox"/>		
Wall or window air conditioner	<input type="checkbox"/>	<input type="checkbox"/>		
Water heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stove top	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oven	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Microwave oven	<input type="checkbox"/>	<input type="checkbox"/>		
Dishwasher	<input type="checkbox"/>	<input type="checkbox"/>		
Clothes washer	<input type="checkbox"/>	<input type="checkbox"/>		
Clothes dryer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pool heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pool pump	<input type="checkbox"/>	<input type="checkbox"/>		
Hot tub/spa heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Have not added any of the above appliances.

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			Fuel Type of Discarded Unit		
	1-10 years	11-20 years	Over 20 years	Electric	Natural Gas	Other
Central heating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Central cooling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Wall or window air conditioner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Water heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stove top	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oven	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Microwave oven	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Dishwasher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Clothes washer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Clothes dryer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pool heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pool pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Hot tub/spa heater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Have not discarded any of the above appliances.

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.)*

- Yes 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 | <input type="checkbox"/> In the mountains | <input type="checkbox"/> Near the ocean |
| | <input type="checkbox"/> In the desert | <input type="checkbox"/> Other |
| | <input type="checkbox"/> Near a lake or river | |
| Electricity is provided to this vacation home by: | <input type="checkbox"/> PG&E | <input type="checkbox"/> LAOWP |
| | <input type="checkbox"/> SCE | <input type="checkbox"/> Other |
| | <input type="checkbox"/> SDG&E | |

N3 What was the highest level of education completed by any head of household in the home?

- | | |
|---|--|
| <input type="radio"/> Elementary <i>(grades 1 - 8)</i> | <input type="radio"/> Some college/trade/vocational school |
| <input type="radio"/> Some high school <i>(grades 9 - 12)</i> | <input type="radio"/> College graduate |
| <input type="radio"/> High school graduate | <input type="radio"/> Postgraduate degree |

N4 What is the primary language spoken in this home?

- English
- Spanish
- Asian
(Describe _____)
- Other
(Describe _____)

N5 Are any of the occupants of your home permanently disabled?

- No Yes, 1 permanently disabled 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	<input type="checkbox"/>	<input type="checkbox"/>
Asian or Pacific Islander	<input type="checkbox"/>	<input type="checkbox"/>
Black, African American	<input type="checkbox"/>	<input type="checkbox"/>
Hispanic / Latino	<input type="checkbox"/>	<input type="checkbox"/>
White, Caucasian	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

N7 Please check the range that best describes your household's total annual income.

- | | | |
|--|--|--|
| <input type="checkbox"/> Less than \$10,000 | <input type="checkbox"/> \$30,000 - \$34,999 | <input type="checkbox"/> \$60,000 - \$74,999 |
| <input type="checkbox"/> \$10,000 - \$19,999 | <input type="checkbox"/> \$35,000 - \$39,999 | <input type="checkbox"/> \$75,000 - \$99,999 |
| <input type="checkbox"/> \$20,000 - \$24,999 | <input type="checkbox"/> \$40,000 - \$49,999 | <input type="checkbox"/> \$100,000 - \$149,999 |
| <input type="checkbox"/> \$25,000 - \$29,999 | <input type="checkbox"/> \$50,000 - \$59,999 | <input type="checkbox"/> \$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 time(s) 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 fill out the circles to match each number in the box below.)

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

Best Time(s) to Call

- Weekday mornings
- Weekday afternoons
- Weekday early evening
- Weekday evening
- Weekend

Thank you very much for your cooperation and assistance!

F.6 White Spanish Card (all mailings)

Las respuestas de la comunidad hispana son muy importantes para las compañías proveedoras de energía en California. Si usted gusta completar su formulario en español, por favor llame al 1-800-331-8786.

F.7 Blue \$5 (+\$15) Incentive Card



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 491 PRINCETON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

RoperASW
PO BOX 158
PRINCETON NJ 08542-9872



Dear Householder,

Thank you for participating in the Home Energy Survey. To show our appreciation for your help, we will send you an additional gift. Please fill in the name and address to which we should send your check in the space provided below.

Remember, please do not enclose this name and address card in the confidentiality envelope with your completed survey. Instead, please mail this card separately to promptly receive your gift.

Name: _____

Street Address: _____

City, State, ZIP: _____

F.8 Advance Letter



RoperASW

Summer 2003

Dear Current Householder:

The California Energy Commission is contacting households across the state in an effort to better understand energy use in California. I am writing to ask you to participate in an important study sponsored by the California Energy Commission and the State's utility companies, including Pacific Gas & Electric, San Diego Gas & Electric, Southern California Edison, Southern California Gas Company, and Los Angeles Department of Water & Power. The purpose of the "Home Energy Survey" is to assist in statewide energy planning to allow all utilities to better serve customers.

RoperASW, a national survey research company, has been asked to conduct this portion of the survey. Your participation is very important to us because your household was chosen as a representative of many California households with similar characteristics.

In the next few weeks, you will be contacted either in person or on the telephone by a RoperASW staff member who will ask you for an interview about your energy use. Our in-person interviewers carry clearly marked identification associating them with this study, and under no circumstances will they attempt to sell you anything.

Your answers will be held in the strictest confidence, and will be reported only in anonymous or summary form in order to protect individual identity.

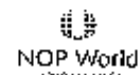
Thank you in advance for your participation in this very important study. Should you have any questions, please call me toll-free at 1-800-888-9213.

Sincerely,

A handwritten signature in black ink, appearing to read "Alexandra Filindra", with a horizontal line underneath.

Alexandra Filindra
Research Manager
RoperASW

RoperASW LLC
1060 State Road Princeton NJ 08540
T 609 683 6100 F 609 683 6211
info@roperasw.com www.roperasw.com



F.9 Hanger Bag Cover Letter



RoperASW

Summer 2003

Dear Current Householder:

The California Energy Commission is contacting households across the state in an effort to better understand energy use in California. I am writing to ask you to participate in an important study sponsored by the California Energy Commission and the State's utility companies, including Pacific Gas & Electric, San Diego Gas & Electric, Southern California Edison, Southern California Gas Company, and Los Angeles Department of Water & Power. The purpose of the "Home Energy Survey" is to assist in statewide energy planning to allow all utilities to better serve customers.

RoperASW, a national survey research company, has been asked to conduct this portion of the survey. Your participation is very important to us because your household was chosen as a representative of many California households with similar characteristics.

Our in-person interviewer made several attempts to reach you at home, but was not able to do so. He/she has thus left you a survey booklet to fill out. Please take time to read and answer the questions. In answering the survey, please use a pencil. Answer the questions as they pertain to your residence or unit only. If you do not know the answer to a question, move on to the next one. Please return your completed survey in the enclosed postage-paid envelope.

Your answers will be held in the strictest confidence, and will be reported only in anonymous or summary form in order to protect individual identity.

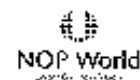
Thank you in advance for your participation in this very important study. Should you have any questions, please call me toll-free at 1-800-888-9213.

Sincerely,

A handwritten signature in cursive script, appearing to read "Alexandra Filindra". The signature is written in black ink and is positioned above a horizontal line.

Alexandra Filindra
Research Manager
RoperASW

RoperASW LLC
1060 State Road Princeton NJ 08540
T 609 683 6100 F 609 683 6211
info@roperasw.com www.roperasw.com



F.10 In-Person Interviewer Letter of Introduction

RoperASW

THIS LETTER SERVES AS AN INTRODUCTION TO Interviewer Name, AN INTERVIEWER FOR ROPER ASW OF PRINCETON NEW JERSEY.

ROPER ASW IS CONDUCTING A VERY IMPORTANT ENERGY STUDY. THIS STUDY IS SPONSORED BY THE CALIFORNIA ENERGY COMMISSION AND THE STATE'S UTILITY COMPANIES. THE STUDY IS BEING CONDUCTED ACROSS THE STATE OF CALIFORNIA.

NO ONE ELSE CAN BE SUBSTITUTED FOR YOU! ALL INFORMATION THAT YOU TELL THE INTERVIEWER WILL BE CONFIDENTIAL. HE/SHE WILL NOT TELL ANYONE WHAT YOU HAVE TO SAY. THE ONLY PEOPLE WHO WILL SEE YOUR ANSWERS WILL BE RESEARCHERS ASSOCIATED WITH THE STUDY.

IF YOU HAVE NOT BEEN SHOWN THE INTERVIEWER'S IDENTIFICATION CARD, PLEASE ASK FOR IT NOW.

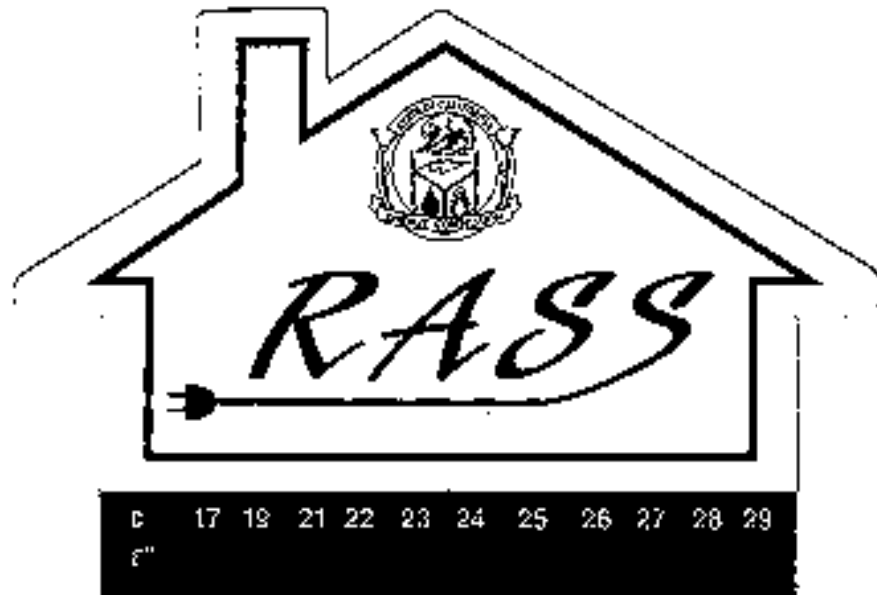
WE WOULD APPRECIATE YOUR TAKING THE TIME TO PARTICIPATE IN THIS STUDY!

If you have any questions after speaking with the interviewer, please call Denise Harmon at 1-800-950-7654 (weekdays, 9AM to 4PM, Eastern Time). This is a toll free number.

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F.11 Thermometer Magnet (In-person Incentive)



G: NON-RESPONSE RESULTS BY ZIP CODE

Service Zip	GROUP	Utility Provider	% Complete of Eligible	% Complete of Total N	Number Sampled
90002	A	LADWP & SCE	52.6%	50.0%	20
90004	A	LADWP	50.0%	45.0%	20
90007	A	LADWP	52.9%	45.0%	20
90013	B	LADWP	100.0%	100.0%	3
90014	B	LADWP	0.0%	0.0%	2
90015	A	LADWP	26.7%	26.7%	15
90019	A	LADWP	60.0%	60.0%	20
90021	B	LADWP	100.0%	100.0%	1
90022	A	SCE	57.9%	57.9%	19
90025	A	LADWP	31.6%	30.0%	20
90027	A	LADWP	52.6%	50.0%	20
90029	A	LADWP	52.6%	50.0%	20
90034	A	LADWP	63.2%	60.0%	20
90036	A	LADWP	40.0%	40.0%	20
90039	A	LADWP	45.0%	45.0%	20
90043	A	LADWP & SCE	40.0%	40.0%	20
90046	A	LADWP & SCE	36.8%	35.0%	20
90048	A	LADWP & SCE	26.3%	25.0%	20
90058	B	LADWP	0.0%	0.0%	1
90059	A	LADWP & SCE	47.4%	47.4%	19
90065	A	LADWP	55.0%	55.0%	20
90069	A	SCE	26.3%	26.3%	19
90077	B	LADWP	100.0%	100.0%	1
90212	A	SCE	25.0%	25.0%	20
90230	A	SCE	60.0%	60.0%	20
90241	A	SCE	45.0%	45.0%	20
90248	B	SCE	100.0%	100.0%	3
90249	A	SCE	50.0%	47.1%	17
90250	B	SCE	100.0%	100.0%	2
90254	A	SCE	60.0%	60.0%	20
90262	A	SCE	63.2%	60.0%	20
90270	A	SCE	47.4%	45.0%	20
90277	A	SCE	45.0%	45.0%	20
90280	A	SCE	60.0%	60.0%	20
90301	A	SCE	45.0%	45.0%	20
90305	A	SCE	50.0%	50.0%	20

Service Zip	GROUP	Utility Provider	% Complete of Eligible	% Complete of Total N	Number Sampled
90403	B	SCE	50.0%	50.0%	2
90404	A	SCE	60.0%	60.0%	20
90503	A	SCE	65.0%	65.0%	20
90601	A	SCE	45.0%	45.0%	20
90605	A	SCE	45.0%	45.0%	20
90630	A	SCE	42.1%	40.0%	20
90638	A	SCE	45.0%	45.0%	20
90650	A	SCE	50.0%	50.0%	20
90680	A	SCE	50.0%	50.0%	20
90704	B	SCE	0.0%	0.0%	1
90706	A	SCE	55.6%	52.6%	19
90716	A	SCE	75.0%	75.0%	20
90731	A	LADWP	31.6%	30.0%	20
90742	B	SCE	0.0%	0.0%	1
90743	B	SCE	100.0%	100.0%	1
90744	A	LADWP	50.0%	50.0%	18
90802	A	SCE	40.0%	40.0%	20
90804	A	SCE	57.9%	55.0%	20
90806	A	SCE	45.0%	45.0%	20
90813	A	SCE	57.9%	55.0%	20
90815	A	SCE	36.8%	35.0%	20
91010	A	SCE	50.0%	50.0%	20
91030	A	SCE	61.1%	55.0%	20
91104	A	SCE	60.0%	60.0%	5
91107	B	SCE	50.0%	50.0%	4
91108	A	SCE	80.0%	80.0%	5
91302	B	SCE	33.3%	33.3%	3
91304	A	LADWP	57.9%	55.0%	20
91307	B	SCE	100.0%	100.0%	1
91311	B	SCE	0.0%	0.0%	1
91320	A	SCE	50.0%	50.0%	20
91335	A	LADWP	50.0%	45.0%	20
91342	B	SCE	0.0%	0.0%	1
91343	A	LADWP	30.0%	30.0%	20
91354	A	SCE	50.0%	50.0%	22
91355	B	SCE	100.0%	100.0%	2
91361	A	SCE	45.0%	45.0%	20
91384	A	SCE	60.0%	60.0%	20
91387	B	SCE	33.3%	33.3%	3
91390	B	SCE	66.7%	66.7%	3
91402	A	LADWP	52.6%	50.0%	20

Service Zip	GROUP	Utility Provider	% Complete of Eligible	% Complete of Total N	Number Sampled
91411	A	LADWP	55.0%	55.0%	20
91604	A	LADWP	50.0%	50.0%	20
91701	A	SCE	47.4%	45.0%	20
91709	A	SCE	50.0%	45.0%	20
91715	B	SCE	100.0%	100.0%	1
91722	A	SCE	47.4%	47.4%	19
91731	A	SCE	50.0%	50.0%	20
91739	A	SCE	47.4%	45.0%	20
91745	A	SCE	50.0%	50.0%	20
91750	A	SCE	55.6%	50.0%	20
91759	B	SCE	100.0%	100.0%	1
91761	A	SCE	62.5%	52.6%	19
91765	A	SCE	47.4%	45.0%	20
91767	A	SCE	50.0%	50.0%	20
91773	A	SCE	55.6%	50.0%	20
91784	A	SCE	50.0%	50.0%	20
91790	A	SCE	52.6%	50.0%	20
91791	B	SCE	100.0%	100.0%	1
91801	A	SCE	52.6%	50.0%	20
91906	B	SDG&E	0.0%	0.0%	1
91910	A	SDG&E	43.8%	33.3%	21
91911	B	SDG&E	50.0%	50.0%	2
91913	B	SDG&E	100.0%	100.0%	2
91915	A	SDG&E	50.0%	50.0%	6
91917	B	SDG&E	100.0%	100.0%	1
91932	A	SDG&E	46.7%	35.0%	20
91942	A	SDG&E	25.0%	25.0%	20
91978	B	SDG&E	75.0%	75.0%	4
92003	B	SDG&E	50.0%	50.0%	2
92004	B	SDG&E	50.0%	50.0%	2
92007	A	SDG&E	36.4%	33.3%	12
92009	A	SDG&E	47.4%	45.0%	20
92014	B	SDG&E	100.0%	100.0%	1
92020	A	SDG&E	47.1%	36.4%	22
92025	A	SDG&E	50.0%	42.9%	21
92026	B	SDG&E	50.0%	50.0%	4
92028	A	SDG&E	30.0%	27.3%	22
92036	B	SDG&E	0.0%	0.0%	1
92037	B	SDG&E	0.0%	0.0%	2
92054	A	SDG&E	64.3%	45.0%	20
92057	A	SDG&E	50.0%	40.0%	20

Service Zip	GROUP	Utility Provider	% Complete of Eligible	% Complete of Total N	Number Sampled
92065	B	SDG&E	100.0%	100.0%	1
92067	B	SDG&E	50.0%	50.0%	2
92069	A	SDG&E	58.8%	52.6%	19
92075	B	SDG&E	0.0%	0.0%	3
92083	A	SDG&E	30.0%	30.0%	20
92084	B	SDG&E	50.0%	50.0%	2
92102	A	SDG&E	45.0%	45.0%	20
92104	A	SDG&E	41.2%	35.0%	20
92106	B	SDG&E	100.0%	100.0%	1
92107	A	SDG&E	41.2%	35.0%	20
92109	A	SDG&E	28.6%	28.6%	21
92114	A	SDG&E	52.6%	50.0%	20
92116	A	SDG&E	31.6%	30.0%	20
92119	A	SDG&E	5.0%	5.0%	20
92124	A	SDG&E	41.2%	35.0%	20
92128	A	SDG&E	20.0%	20.0%	20
92130	A	SDG&E	10.5%	10.0%	20
92154	B	SDG&E	0.0%	0.0%	1
92173	A	SDG&E	52.9%	45.0%	20
92210	B	SCE	33.3%	33.3%	3
92211	A	SCE	50.0%	50.0%	10
92239	B	SCE	0.0%	0.0%	1
92240	A	SCE	68.4%	65.0%	20
92252	B	SCE	100.0%	100.0%	1
92264	A	SCE	45.0%	45.0%	20
92282	B	SCE	0.0%	0.0%	1
92284	A	SCE	66.7%	62.5%	16
92285	B	SCE	0.0%	0.0%	3
92313	A	SCE	52.6%	50.0%	20
92336	A	SCE	55.0%	55.0%	20
92342	B	SCE	100.0%	100.0%	1
92345	A	SCE	63.2%	63.2%	19
92356	A	SCE	66.7%	60.0%	20
92376	A	SCE	57.9%	55.0%	20
92391	B	SCE	0.0%	0.0%	1
92392	A	SCE	55.6%	52.6%	19
92401	B	SCE	0.0%	0.0%	1
92404	A	SCE	62.5%	52.6%	19
92408	A	SCE	57.9%	55.0%	20
92508	B	SCE	50.0%	50.0%	2
92509	A	SCE	44.4%	44.4%	18

Service Zip	GROUP	Utility Provider	% Complete of Eligible	% Complete of Total N	Number Sampled
92536	B	SDG&E	0.0%	0.0%	1
92544	A	SCE	72.2%	65.0%	20
92553	A	SCE	85.0%	85.0%	20
92567	B	SCE	0.0%	0.0%	3
92570	A	SCE	76.5%	76.5%	17
92587	A	SCE	66.7%	60.0%	20
92604	A	SCE	36.8%	35.0%	20
92612	A	SCE	45.0%	45.0%	20
92626	A	SCE	35.0%	35.0%	20
92629	A	SDG&E	35.0%	35.0%	20
92646	A	SCE	47.4%	45.0%	20
92648	A	SCE	27.8%	25.0%	20
92651	B	SDG&E	100.0%	100.0%	1
92653	A	SCE & SDGE	46.7%	46.7%	30
92656	B	SDG&E	0.0%	0.0%	1
92660	A	SCE	55.6%	50.0%	20
92672	B	SDG&E	100.0%	100.0%	1
92673	A	SDG&E	50.0%	50.0%	20
92677	B	SCE	50.0%	50.0%	2
92679	B	SDG&E	50.0%	50.0%	2
92683	A	SCE	65.0%	65.0%	20
92688	B	SDG&E	100.0%	100.0%	1
92691	A	SCE & SDGE	50.0%	45.8%	24
92692	B	SCE	0.0%	0.0%	1
92703	A	SCE	60.0%	60.0%	20
92705	A	SCE	50.0%	50.0%	20
92708	A	SCE	50.0%	50.0%	20
92821	A	SCE	60.0%	60.0%	20
92833	A	SCE	50.0%	50.0%	20
92843	A	SCE	50.0%	50.0%	20
92867	A	SCE	68.4%	65.0%	20
92879	A	SCE	47.4%	45.0%	20
92883	A	SCE	47.4%	45.0%	20
93003	A	SCE	50.0%	50.0%	20
93013	A	SCE	45.0%	45.0%	20
93030	A	SCE	25.0%	25.0%	20
93040	B	SCE	50.0%	50.0%	2
93041	A	SCE	11.1%	11.1%	18
93065	A	SCE	61.1%	57.9%	19
93067	B	SCE	0.0%	0.0%	1
93108	A	SCE	20.0%	20.0%	20

Service Zip	GROUP	Utility Provider	% Complete of Eligible	% Complete of Total N	Number Sampled
93206	B	PG&E	0.0%	0.0%	3
93208	B	SCE	33.3%	33.3%	3
93210	A	PG&E	14.3%	14.3%	14
93215	B	SCE	100.0%	100.0%	1
93230	B	SCE	100.0%	100.0%	1
93238	B	SCE	25.0%	25.0%	4
93239	B	PG&E	0.0%	0.0%	3
93240	A	SCE	23.1%	23.1%	13
93252	B	PG&E	0.0%	0.0%	1
93256	B	SCE	0.0%	0.0%	1
93257	A	SCE	13.6%	13.6%	22
93274	B	SCE	100.0%	100.0%	1
93277	A	SCE	0.0%	0.0%	20
93292	B	SCE	0.0%	0.0%	1
93301	A	PG&E	61.1%	55.0%	20
93306	A	PG&E	52.6%	50.0%	20
93309	A	PG&E	50.0%	45.0%	20
93312	A	PG&E	45.0%	45.0%	20
93401	B	PG&E	14.3%	14.3%	7
93402	B	PG&E	0.0%	0.0%	2
93405	B	PG&E	33.3%	33.3%	3
93420	B	PG&E	71.4%	71.4%	7
93422	B	PG&E	75.0%	75.0%	8
93428	B	PG&E	50.0%	50.0%	2
93433	B	PG&E	100.0%	100.0%	2
93436	B	PG&E	25.0%	25.0%	4
93442	B	PG&E	66.7%	66.7%	3
93444	B	PG&E	0.0%	0.0%	1
93445	B	PG&E	0.0%	0.0%	1
93446	B	PG&E	50.0%	50.0%	4
93449	B	PG&E	100.0%	100.0%	1
93452	B	PG&E	100.0%	100.0%	1
93453	B	PG&E	100.0%	100.0%	1
93454	B	PG&E	20.0%	20.0%	5
93455	B	PG&E	50.0%	50.0%	6
93458	B	PG&E	33.3%	33.3%	6
93461	B	PG&E	0.0%	0.0%	1
93463	B	PG&E	100.0%	100.0%	2
93501	B	SCE	100.0%	100.0%	2
93505	B	SCE	66.7%	66.7%	3
93510	B	SCE	100.0%	100.0%	1

Service Zip	GROUP	Utility Provider	% Complete of Eligible	% Complete of Total N	Number Sampled
93514	B	SCE	57.1%	57.1%	7
93529	B	SCE	100.0%	100.0%	1
93534	B	SCE	37.5%	33.3%	9
93535	B	SCE	50.0%	44.4%	9
93536	B	SCE	66.7%	66.7%	9
93546	B	SCE	50.0%	50.0%	10
93550	B	SCE	50.0%	50.0%	8
93551	B	SCE	50.0%	50.0%	6
93552	B	SCE	66.7%	66.7%	3
93555	B	SCE	50.0%	50.0%	6
93560	B	SCE	100.0%	100.0%	1
93561	B	SCE	40.0%	40.0%	5
93591	B	SCE	50.0%	50.0%	2
93612	A	PG&E	45.0%	45.0%	20
93633	B	PG&E	100.0%	100.0%	1
93635	A	PG&E	47.4%	47.4%	19
93647	A	PG&E	63.2%	60.0%	20
93669	B	PG&E	0.0%	0.0%	1
93670	B	PG&E	0.0%	0.0%	1
93701	A	PG&E	76.9%	55.6%	18
93705	A	PG&E	52.6%	50.0%	20
93711	A	PG&E	5.0%	5.0%	20
93721	B	PG&E	0.0%	0.0%	1
93722	A	PG&E	10.5%	10.5%	19
93727	A	PG&E	15.0%	15.0%	20
93901	B	PG&E	83.3%	83.3%	6
93905	B	PG&E	50.0%	50.0%	6
93906	B	PG&E	55.6%	55.6%	9
93907	B	PG&E	100.0%	100.0%	2
93908	B	PG&E	75.0%	75.0%	4
93920	B	PG&E	0.0%	0.0%	1
93923	B	PG&E	80.0%	80.0%	5
93924	B	PG&E	50.0%	50.0%	2
93927	B	PG&E	0.0%	0.0%	1
93930	B	PG&E	100.0%	100.0%	2
93933	B	PG&E	75.0%	75.0%	8
93940	B	PG&E	80.0%	80.0%	5
93950	B	PG&E	50.0%	50.0%	2
93955	B	PG&E	83.3%	83.3%	6
93960	B	PG&E	33.3%	33.3%	3
94005	B	PG&E	100.0%	100.0%	2

Service Zip	GROUP	Utility Provider	% Complete of Eligible	% Complete of Total N	Number Sampled
94010	A	PG&E	50.0%	44.4%	18
94018	A	PG&E	50.0%	50.0%	6
94019	A	PG&E	7.1%	7.1%	14
94037	B	PG&E	0.0%	0.0%	1
94038	B	PG&E	#DIV/0!	0.0%	1
94040	A	PG&E	44.4%	44.4%	18
94044	A	PG&E	40.0%	40.0%	20
94065	A	PG&E	40.0%	40.0%	20
94080	A	PG&E	45.0%	45.0%	20
94086	A	PG&E	47.4%	45.0%	20
94103	A	PG&E	20.0%	20.0%	20
94109	A	PG&E	25.0%	25.0%	20
94110	A	PG&E	55.0%	55.0%	20
94115	A	PG&E	11.1%	10.0%	20
94117	A	PG&E	50.0%	50.0%	20
94121	A	PG&E	64.7%	55.0%	20
94123	A	PG&E	42.1%	40.0%	20
94133	A	PG&E	10.0%	10.0%	20
94401	A	PG&E	52.6%	50.0%	20
94503	A	PG&E	100.0%	100.0%	6
94506	A	PG&E	61.5%	57.1%	14
94511	B	PG&E	50.0%	50.0%	2
94513	A	PG&E	44.4%	44.4%	18
94520	A	PG&E	55.6%	50.0%	20
94525	B	PG&E	33.3%	33.3%	3
94526	A	PG&E	52.9%	52.9%	17
94533	A	PG&E	30.0%	30.0%	20
94538	A	PG&E	50.0%	50.0%	20
94541	A	PG&E	50.0%	50.0%	20
94544	A	PG&E	57.9%	55.0%	20
94549	A	PG&E	52.6%	50.0%	20
94553	A	PG&E	50.0%	30.0%	20
94558	A	PG&E	40.0%	40.0%	20
94563	A	PG&E	50.0%	50.0%	20
94566	A	PG&E	31.6%	30.0%	20
94578	A	PG&E	50.0%	50.0%	20
94583	A	PG&E	52.6%	50.0%	20
94588	A	PG&E	52.9%	45.0%	20
94591	A	PG&E	38.9%	35.0%	20
94598	A	PG&E	58.8%	55.6%	18
94599	B	PG&E	0.0%	0.0%	2

Service Zip	GROUP	Utility Provider	% Complete of Eligible	% Complete of Total N	Number Sampled
94605	A	PG&E	55.0%	55.0%	20
94608	A	PG&E	55.6%	50.0%	20
94611	A	PG&E	42.1%	40.0%	20
94621	A	PG&E	44.4%	40.0%	20
94706	A	PG&E	52.6%	50.0%	20
94804	A	PG&E	47.4%	45.0%	20
94901	B	PG&E	0.0%	0.0%	3
94903	B	PG&E	33.3%	33.3%	3
94920	B	PG&E	33.3%	33.3%	3
94923	B	PG&E	0.0%	0.0%	1
94924	B	PG&E	100.0%	100.0%	1
94925	B	PG&E	0.0%	0.0%	2
94928	B	PG&E	62.5%	62.5%	8
94930	B	PG&E	25.0%	25.0%	4
94931	B	PG&E	0.0%	0.0%	1
94939	B	PG&E	50.0%	50.0%	2
94941	B	PG&E	55.6%	55.6%	9
94945	B	PG&E	33.3%	33.3%	3
94947	B	PG&E	25.0%	25.0%	4
94949	B	PG&E	33.3%	33.3%	3
94951	B	PG&E	0.0%	0.0%	1
94952	B	PG&E	0.0%	0.0%	4
94954	B	PG&E	25.0%	25.0%	8
94960	B	PG&E	0.0%	0.0%	2
94965	B	PG&E	33.3%	33.3%	3
94970	B	PG&E	100.0%	100.0%	1
95003	A	PG&E	41.2%	35.0%	20
95014	A	PG&E	52.9%	45.0%	20
95023	A	PG&E	40.0%	40.0%	20
95035	A	PG&E	47.4%	45.0%	20
95062	A	PG&E	47.4%	45.0%	20
95076	A	PG&E	52.6%	50.0%	20
95112	A	PG&E	55.6%	50.0%	20
95118	A	PG&E	50.0%	50.0%	20
95123	A	PG&E	55.0%	55.0%	20
95125	A	PG&E	50.0%	50.0%	20
95127	A	PG&E	50.0%	45.0%	20
95132	A	PG&E	60.0%	60.0%	20
95136	A	PG&E	55.6%	50.0%	20
95204	A	PG&E	52.6%	50.0%	20
95206	B	PG&E	100.0%	100.0%	1

Service Zip	GROUP	Utility Provider	% Complete of Eligible	% Complete of Total N	Number Sampled
95207	A	PG&E	58.8%	50.0%	20
95220	A	PG&E	40.0%	40.0%	5
95222	A	PG&E	53.3%	53.3%	15
95245	B	PG&E	0.0%	0.0%	1
95252	B	PG&E	100.0%	100.0%	1
95258	B	PG&E	0.0%	0.0%	1
95304	B	PG&E	0.0%	0.0%	1
95321	A	PG&E	52.6%	50.0%	20
95336	B	PG&E	0.0%	0.0%	1
95337	B	PG&E	0.0%	0.0%	1
95340	A	PG&E	50.0%	50.0%	20
95363	A	PG&E	30.0%	30.0%	20
95377	A	PG&E	45.0%	42.9%	21
95401	B	PG&E	100.0%	100.0%	2
95403	B	PG&E	60.0%	60.0%	5
95404	B	PG&E	33.3%	33.3%	6
95405	B	PG&E	100.0%	100.0%	1
95407	B	PG&E	10.0%	10.0%	10
95409	B	PG&E	25.0%	25.0%	4
95422	B	PG&E	66.7%	66.7%	3
95424	B	PG&E	100.0%	100.0%	1
95425	B	PG&E	50.0%	50.0%	2
95426	B	PG&E	100.0%	100.0%	1
95435	B	PG&E	0.0%	0.0%	1
95436	B	PG&E	100.0%	100.0%	1
95437	B	PG&E	50.0%	50.0%	6
95441	B	PG&E	100.0%	100.0%	1
95442	B	PG&E	50.0%	50.0%	2
95445	B	PG&E	0.0%	0.0%	1
95446	B	PG&E	33.3%	33.3%	3
95448	B	PG&E	0.0%	0.0%	1
95451	B	PG&E	100.0%	100.0%	1
95453	B	PG&E	0.0%	0.0%	2
95458	B	PG&E	0.0%	0.0%	1
95461	B	PG&E	0.0%	0.0%	2
95469	B	PG&E	0.0%	0.0%	1
95470	B	PG&E	100.0%	100.0%	1
95472	B	PG&E	33.3%	33.3%	3
95476	B	PG&E	37.5%	37.5%	8
95482	B	PG&E	66.7%	66.7%	3
95490	B	PG&E	66.7%	66.7%	3

Service Zip	GROUP	Utility Provider	% Complete of Eligible	% Complete of Total N	Number Sampled
95492	B	PG&E	33.3%	33.3%	3
95501	B	PG&E	28.6%	28.6%	7
95503	B	PG&E	55.6%	55.6%	9
95519	B	PG&E	50.0%	50.0%	4
95521	B	PG&E	50.0%	50.0%	2
95525	B	PG&E	100.0%	100.0%	1
95536	B	PG&E	0.0%	0.0%	1
95540	B	PG&E	0.0%	0.0%	2
95542	B	PG&E	100.0%	100.0%	1
95562	B	PG&E	50.0%	50.0%	2
95602	B	PG&E	0.0%	0.0%	1
95614	B	PG&E	100.0%	100.0%	1
95615	B	PG&E	0.0%	0.0%	1
95616	A	PG&E	50.0%	40.0%	20
95631	B	PG&E	100.0%	100.0%	1
95642	B	PG&E	0.0%	0.0%	1
95648	B	PG&E	50.0%	50.0%	2
95650	B	PG&E	100.0%	100.0%	1
95658	B	PG&E	0.0%	0.0%	1
95665	B	PG&E	100.0%	100.0%	1
95666	B	PG&E	0.0%	0.0%	4
95667	A	PG&E	50.0%	50.0%	18
95672	B	PG&E	0.0%	0.0%	1
95687	A	PG&E	56.3%	45.0%	20
95691	B	PG&E	66.7%	66.7%	3
95695	A	PG&E	55.0%	55.0%	20
95697	B	PG&E	100.0%	100.0%	1
95701	B	PG&E	100.0%	100.0%	1
95713	B	PG&E	100.0%	100.0%	1
95746	A	PG&E	50.0%	50.0%	8
95762	B	PG&E	50.0%	50.0%	2
95765	B	PG&E	50.0%	50.0%	4
95776	B	PG&E	50.0%	50.0%	2
95901	A	PG&E	57.9%	55.0%	20
95943	B	PG&E	100.0%	100.0%	1
95945	A	PG&E	47.4%	42.9%	21
95962	B	PG&E	100.0%	100.0%	1
95963	A	PG&E	68.8%	57.9%	19
95971	B	PG&E	100.0%	100.0%	2
95974	B	PG&E	100.0%	100.0%	1
95975	B	PG&E	33.3%	33.3%	3

Service Zip	GROUP	Utility Provider	% Complete of Eligible	% Complete of Total N	Number Sampled
95977	B	PG&E	33.3%	33.3%	3
95978	B	PG&E	0.0%	0.0%	1
95979	B	PG&E	0.0%	0.0%	2
95981	B	PG&E	100.0%	100.0%	1
95982	A	PG&E	60.0%	60.0%	5
95983	B	PG&E	50.0%	50.0%	4
96001	B	PG&E	0.0%	0.0%	1
96003	B	PG&E	0.0%	0.0%	1
96007	B	PG&E	50.0%	50.0%	6
96011	B	PG&E	0.0%	0.0%	1
96013	B	PG&E	0.0%	0.0%	1
96020	B	PG&E	0.0%	0.0%	1
96021	B	PG&E	100.0%	100.0%	1
96022	B	PG&E	66.7%	66.7%	3
96040	B	PG&E	0.0%	0.0%	1
96074	B	PG&E	0.0%	0.0%	1
96080	B	PG&E	28.6%	28.6%	7
96088	B	PG&E	50.0%	50.0%	2
96137	B	PG&E	25.0%	25.0%	4

H: INTERVIEWER HANDBOOK

RASS

CA RESIDENTIAL APPLIANCE
SATURATION STUDY

INTERVIEWER HANDBOOK

**ROPERASW
PROJECT # C220-400154**

August 2003

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THE CALIFORNIA RESIDENTIAL APPLIANCE SATURATION STUDY (California RASS)

Overview

The purpose of the California RASS study is to generate data on Californians' residential energy usage and using that information to ensure that current and future energy needs are met. It is part of a larger program, the goals of which include educating energy customers in the state about energy usage in their homes and helping them to better understand their energy usage so they can save on their energy bills.

Data Collection

- This study will use a multi-mode data collection methodology that includes mail, executive telephone interviewers, and in-person interviewers. In-person interviewers will work the sample both on the phone and in-person.
- For the purposes of data collection, we have divided the State of California into four regions based on density of Zip Codes:
 - ◆ Area One includes the Los Angeles – San Diego region.
 - ◆ Area Two includes the San Francisco- San Jose – Oakland region.
 - ◆ Area Three includes the Central Valley region.
 - ◆ Area Four (representing 10% of the nonrespondent sample) includes Northern and Eastern, less densely populated regions.
- Data collection in Areas One, Two, and Three will be done using First Class mail, executive interviewers, and in-person interviewers. Data collection in Area Four will be done with Priority Mail, and executive interviewers.
- Data collection will attempt to obtain a 50% response rate overall and in each zip code selected for the follow-up. Work will be managed so that no zip code will be over or under worked. Upon completion of interviews with 50% of the householders in a zip code, resources will be redirected to other clusters that have not yet obtained the 50% target.

Survey Plan

Data collection on RASS involves three methodologies. First, questionnaires are sent out to all of the 5,000 sample members with a \$1 bill. After two weeks, the non-responder sample will receive an Advance Letter alerting that they will be contacted by phone or mail to participate in the study. The sample by zip code will then be assigned to Field Interviewers for in person and phone interviews and to Phone Interviewers for telephone interviews only. After 6 weeks, the Telephone interviewers will turn in the zip codes they have not been able to complete by phone, to be passed to the Field Interviewers.

Field Interviewers will attempt to get the remaining completed interviews in the various zip codes in person along with their initial assignments. The survey focus is on the household address more that it is on the resident name that is attached. We want an interview with the current resident, male or female, who is knowledgeable about energy usage in the household.

In-person effort will consist of a maximum of three attempts at the door made at different times of the day or evening. After the third attempt and if the interview is not secured, the interviewer will leave a bag containing a questionnaire, business reply envelope, letter, Spanish language card, and incentive magnet on the door.

The Field interviewer may conduct interviews by phone, when possible.

The Field Period for the study will be 10 to 12 weeks. We must secure a 50% response rate in each zip code.

STUDY MATERIALS

- Letter of Introduction for Interviewer
- Interviewer ID Badge
- Canvas Bag
- Questionnaires, labeled for household
- Housing Unit Address Lists for each Zip Code
- “Sorry I Missed You Cards”
- Extra Advance Letters if Respondent did not receive
- Incentive Magnets
- Plastic Bags to leave Questionnaire at Door After 3 Visits
 - Spanish Language Cards
 - Business Reply Envelopes to return work & Invoices
 - “Sorry We Missed You” letters to go in plastic bags

Quality Assurance

Ensuring the quality of the data collection process requires consistent and thorough evaluation of all you do on this project. It begins with training and continues throughout the data collection period. Your own efforts to secure high quality interviews are critical to this effort.

- *REVIEW OF YOUR FIRST THREE COMPLETED INTERVIEWS*

We ask that you send us your first three completed interviews for review within the first week after you receive your assignment via Airborne Express. Continue to work your cases.

- *Validation of Interviewers*

To ensure quality control, a percentage of all interviewer work will be validated by phone or mail. The respondent is asked specific questions about how the interview was administered, and some of the data are confirmed. If any of your cases fail validation, you will be contacted to see if you can provide any additional information. Anyone found to be falsifying information would be removed from the project immediately.

WORKING THE FIELD

YOUR ASSIGNMENT

Your assignment will be made up of households within zip codes. Each zip code assignment will have an accompanying “Housing Unit Address List” that lists the name and address of each household in the zip.(See sample in Appendix) It will also tell you how many completed interviews you need to get in order to achieve the desired 50% response rate.

Remember that one or more households in a zip may have been completed by mail. Those completed households will not appear in your list of cases, so it is very important that you pay attention to the “number of completes needed” note on the top of the Housing Unit Address List. The Housing Unit Address List will also serve as your Call Record Sheet. You should use it to write the results of your calls or visits to a household, as well as to status your cases. When you complete a case, write “CM” in the status box. I know that you will not be getting very many refusals, but if you should, write “RF” for final status in the case box.

Other pieces of information that you get such as a telephone number, a new respondent name, and the like should also be recorded on the Housing Unit Address List. All the information you record will help you to keep track of the work that you have done and it will assist you in reporting to your supervisor.

When you complete a zip and return the materials, please include the Housing Unit Address List for that zip as well. In some situations, your supervisor may want to reassign a zip. The Housing Unit Address List should always accompany the returned zip.

Please note that you will have one questionnaire for each household. You will see a label on the front cover that contains the address and ID number of the household but not a respondent name. The respondent's name will only appear on your Housing Unit Address List and that is where you should note any new names. The questionnaire will only read "Current Resident". *It is very important that you use the correct questionnaire for the house that you are interviewing.*

In the Survey Plan we mentioned that some zips would be going directly to our Phone Interviewers. Six weeks into the study, zips that are not completed by our phone interviewers will be turned around and sent to our field interviewers. At that time, some of you may be notified that more zips are on the way.

- *WORKING AN ASSIGNMENT*

You will be receiving zips that contain cases with phone numbers and some without. We expect that you will attempt the phone number cases by phone. If you can get phone numbers for other cases, please do so. A phone complete pays less than an in-person complete, but it is still to your advantage to interview by phone because you are not leaving your house!

When you visit a house and no one is home, leave a "Sorry I Missed You Card" with your name and number. It is always a possibility that the respondent will call you and then you may conduct the interview by phone. **Any case that you complete by phone as a result of an in-person contact that you made is considered an in-person complete and will be paid as such.**

- *APPROACHING THE RESPONDENT*

Before you reach the door or pick up the phone, most of the respondents will have already received a questionnaire in the mail. If they did not return the mail questionnaire (and most of them will not have), it was followed by an advance letter mailing, letting the respondent know that someone will be calling or visiting soon. That someone is you! It will be your job to explain the study, screen the respondent and conduct the interview.

Always wear your ID badge when in the field. Keep your letter of introduction in your bag. Have your plastic coated copy of the Advance Letter as well as some extra copies of the Advance Letter with you in case the respondent says he did not receive one in the mail.

The best approach is to have a full understanding of the study – it’s goals, it’s importance and to make them clear to the respondents. Let them know that they are irreplaceable and very special people. *In the case of this particular study, it will be advantageous to mention that the study is being conducted jointly by the Energy Commission and the local utility companies.*

Be sincerely interested in what each respondent has to say. Be an attentive, respectful listener, yet guide the conversation toward your goal – for the respondent to complete an interview. *Always be professional.*

It is always more prudent to get the interview on the spot. **Honing your persuasive skills usually pays off.**

- AVOIDING REFUSALS

Even the best interviewer may get an occasional refusal despite his/her experience and skill. Your own motivation, persuasive skills, and the belief in the study’s value should increase your success at avoiding and converting refusals.

In general, it is best to head off a potential refusal before it occurs. Treat a refusal like a “don’t know”. Refusals need probing, not panic. First encourage the respondent to tell you why he or she is refusing, then listen carefully to what the hesitant person or refuser is saying, and then respond to those concerns. Don’t tell the respondent more than he or she is asking for.

Following are some of the most common reasons for refusals and suggested responses:

RESPONDENT: Who did you say you were with?

INTERVIEWER: RoperASW, a research company in Princeton, New Jersey but the study is being conducted on behalf of the CA Energy Commission and your local utility company.

RESPONDENT: I’m not interested

INTERVIEWER: The results of this study will help the Energy Commission & your utility company better understand energy usage in the state and to plan for future energy needs for you and all Californians.

RESPONDENT: I'm too busy. I don't have the time.

INTERVIEWER: I understand how valuable your time is. I'll be glad to wait until you finish what you are doing. I can come back tonight or tomorrow. Which would you prefer? (Always suggest two times so the respondent can choose one of them or suggest another time that is more convenient.

RESPONDENT: I don't feel well enough to do this.

INTERVIEWER: I'm sorry. Of course I can understand that you wouldn't want to be interviewed now. Shall I call you in a day or two, or would it be better if I waited a week?

(Always try to leave the door open for a return call or visit)

- SCREENING THE RESPONDENT

The screener script is on the back of your supervisor card in a plastic sleeve. There is a sample of it in the Appendix of this manual. You need not read it to the respondent and in fact, it would be better to use your own words. You will notice that you are asking for the head of household, it can be male or female, or the person in the house who is "most familiar" with the appliances. EVERY HOUSEHOLD QUALIFIES, NO MATTER WHO LIVES IN IT. You just need to get to the person knowledgeable about the appliances. That will not be too tough. It can even be an adult child, provided they are in the know.

- CONDUCTING THE INTERVIEW

The interview should take no more than 25 to 30 minutes to complete. It is not a difficult questionnaire to complete. **In the back of this manual there is a section called "Survey Questions". It provides an explanation of many of the questions that the respondent may not understand.** When you review the questionnaire, review these questions as well. It is critically important that you carry this manual with you when you are out in the field and keep it near you when you are on the phone. You will need to provide these explanations to the respondent when necessary.

When making an in-person visit, administering the questionnaire to the respondent is the ideal way to get the interview completed. That way, if there is a question that the respondent does not understand he/she may ask you for an explanation rather than skipping the question or fudging the answer.

If the respondent insists that he can do it himself, that's okay too. I wouldn't suggest leaving it and picking it up the next day, as you may find no one home and no completed questionnaire when you return. Strike while the iron is hot! If you leave the questionnaire, then let the respondent know you will be back in a half-hour. In the meantime, you may be able to get over to another household and get someone else going.

Upon completion of the in-person interview only, give the respondent a thermometer magnet.

We expect you to make three attempts at the door. Of course, you should vary the time of day that you make your attempts. On the third try, if you are unable to find someone home who can do the interview, please leave the questionnaire at the door.

- LEAVING THE QUESTIONNAIRE

You are being provided with plastic doorknob hanger-bags that will hold the questionnaire assigned to the particular household. You will need to assemble the bag materials including and in addition to the questionnaire, a business reply envelope, a letter, a Spanish Language Card, and a thermometer magnet. You will be given all the contents for your bags and you will also get an assembled sample bag with your assignment. *The hanging bags are clear (see-through) so we ask that when you assemble them you have the questionnaire facing out so that it is the first thing the householder sees. We don't want it to look like an advertisement that will be tossed out without a look inside.* You will be compensated for hanging the bag on your last visit. Once again, it is critically important to the study that you leave the correctly labeled questionnaire!

Once you have achieved the desired number of completes in a zip, stop working on it. We do not need any completes beyond 50% in each zip code.

ADMINISTRATION

- REPORTING to Your Supervisor

As part of your first assignment, you will receive a card that states the name of your supervisor and her/his toll free number. Your supervisor will be calling you to introduce herself and to be sure that you received your work.

At that time, she will set up an appointment with you for a weekly status report. Be prepared to give a full accounting of the activity for each zip during this update including completed interviews, refusals, etc. It is extremely important to your success and to the success of this study that this contact is made each week. Your field supervisor is your single largest supporter.

- RETURNING YOUR WORK

You must return your first three completed questionnaires within one week after you receive you assignment (If there is a reason why you will not be able to comply, please discuss with your supervisor in advance). You will be given an Airborne Express Letter Envelope with an air bill that is pre-addressed to Roper to return your first three completes and an invoice that reflects those completes. It's okay if it is not the end of a workweek. Include an invoice that reflects those three completes. We would like to have those first three as soon as possible for review. There is an 800 number on the air bill to call for a pick up at your home. This is the only time you will need to ship your work via Airborne unless otherwise instructed by your supervisor. ***Training invoices will be processed only upon receipt of your first three completed interviews.***

You will be provided with a supply of large white business reply envelopes in which to return your completed questionnaires, invoices, and housing unit address lists to the Princeton Office every week thereafter. Remember that a completed zip means a Housing Unit Address List should be included in the envelope as well.

- INVOICES

There is a sample invoice on the following page for you to review. Our standard interviewer invoices must be modified to work for this study, as you can see. We are not counting your hours for this study but rather the number of completes, field and phone. We have changed the column headings to reflect Field completes, Phone Completes, Bag Hanging Completes.

- Enter Date Worked
- Enter ID# of Completed Case
- Enter dollar amount for either field, phone, or bag hanging
- Total dollars down and across and be sure they match

- Enter number of completed interviews in row “Number of Interviews Completed” and total down
- Enter under Expenses for stamps to mail invoices to supervisor
- Lower right invoice box “Totals”
 - Enter total expenses in gray box titled, “Total mileage & Expenses” (you will not have mileage)
 - Add up total dollar amount and expenses in white space titled “Total Costs”
 - Re enter total in gray box titled “Total Due”
- Lower left invoice box
 - Enter your 4 digit Interviewer ID #
 - Enter “week ending date” in gray date box. Your workweek ends on a Sunday.
 - Fill out your name, address, phone and social security #
 - **SIGN YOUR INVOICE**
 - Keep the pink copy for your records and mail the remaining two copies to Princeton with your completed questionnaires. **Invoices that arrive without completed interviews will not be paid.**

Return your invoices in the large white business reply envelopes provided, together with your completed interviews. Please use the sample invoice provided here as a model. It is simple but gives us the information we need to keep track of study costs and to get you paid in a timely fashion. You should send an invoice weekly with your completed work.. That is how you will be assured of being paid promptly.

RoperASW pays interviewer invoices twice monthly, on the 15th and the 30th or 31st. There are cut off days for when we need to have the invoices to the accounting department for a specific pay period but if you send one every week, you should receive a check each pay period.

APPENDIX

SAMPLE INVOICE

RASS Screener Script for Interviewers

Hello, my name is _____ and I am with RoperASW, a national survey research company. We are conducting a study on behalf of the California Energy Commission and your local utility company. The purpose of this study is to better understand energy usage in the state and make sure that citizens' current and future energy needs are met. Your household has been randomly selected to participate in this study.

May I speak with the head of the household or the person most familiar with the appliances that you have in the home?

This will only take about 25 minutes of your time.

MOST OFTEN ASKED SURVEY QUESTIONS

HOME AND LIFESTYLE QUESTIONS

Q. I am a Renter is this survey for me?

R. Yes, as long as you are paying for the billing you can participate in the survey program.

Q. I don't know the age of our home or apartment.

R. Does your building or house look like it is old, new, from a certain era? Like the 50s, 60s, 70s, or 80s?

Q. How do I count Rooms?

R: Count only kitchens, bedrooms, living rooms, and dining rooms. Do not include bathrooms, hallways, or garages. Because they are significantly large areas that usually have heat ducts or vents in them.

Q. We have a mobile home or an in-law unit connected to the same meter.

R. If the mobile home or in-law unit is a studio off small space you can still participate in the survey. Please keep in mind, though, that the results will not be as accurate as they normally would be, because we do not have specific billing for this additional unit. And the survey does not ask questions about multiple systems or equipment. Please include a note in the survey that lists all the appliances that are in the unit and how much they are used.

Q. I don't know the square footage of my home/apartment.

R: Add up all the rooms in your home/apartment than multiply by 200.

Q. People are here for two hours or three hours per day. How do I fill in the number of people?

R. If you are not at home for at least 6 hours per day, then don't fill in any answers. We ask this question so we can verify the other information on the survey correlates. We also ask this

question for purposes of a certain kind of rate which is called TOU (time of use). This rate applies to people who are not home during these hours (10a.m.-6p.m.). If you are interested in this service you can call the number on your bill to find out about this rate.

HEATING QUESTIONS

Q. I don't know if my heating system is NG/Elec.?

R. If you look at the bottom portion of the heating system and you see a pilot light, than it is NG. Also check to see if there is a flue going from the heating system to the wall. If you only see an electric cord going into a socket, then it is electric.

Q. I don't know what kind of heating system I have.

R.

Central forced air: A heating system with heating vents in most rooms throughout home/apartment. It typically is NG, but it can be electric. It is one system, separate from the air conditioning.

Wall/Floor: One unit that is typically in one room. It is installed in the wall.

Resistance Baseboard/Ceiling: Resistance cables in the ceiling, which heats the ceiling. Baseboard heating is obvious, you can see the system along the baseboard on the floor.

Heat Pump: This unit is only electric. The system heats and cools. It is usually located outside in the backyard, or attic.

Q. I have propane. What should I mark?

R. Mark propane. But don't fill in anymore questions related to the heating section. Because we don't analyze Propane.

Q. We have a heat system, but we don't use it.

R. Mark no heating system, and don't fill out any of the other questions regarding heating. As long as you have not used it in the last year, then it's the same as if you don't have one.

Q. We only use our fire place or wood stove for heating. What do I put for main heating?

R Fill in fireplace or wood stove for main heating.

Q. I don't how old my heat system is.

R. If you know the age of your home/apartment then put this for the age of your heat system. or estimate the age.

AIR CONDITIONING QUESTIONS

Q. I don't know what kind of cooling system I have.

R:

Central: A separate unit that has vents that go into almost all the rooms.

Heat Pump: Just like central, but it is a system that, in addition to cooling, also heats your home or apartment. It is usually located in the backyard or attic.

Evaporative: If you live in a area that is dry, like the desert, and there is one system in one room then most likely this is an evaporative cooler. It uses water, and is also know as a "Swamp Cooler". **Window/wall:** One system in one room. Typically, it is installed in a window.

WATER HEATING QUESTIONS

Q. I don't know if the water heater is NG or electric.

R. If you look at the bottom of the water heater and see a pilot light, then it is NG. Look to see if there is a flue going from the water heater into the wall. If you only see electric cords coming from the water heater, then it is electric.

Q. I don't know the age of the water heater.

R. If you know the age of your home/apartment, then put this for the age of your heat system, or estimate the age.

Q. I don't know what the temp. setting is on the water heater.

R. You can look on the water heater and there should be a temperature knob. If you don't have access to it, then put "medium". Also, if when you are taking showers ask yourself if the water is extremely hot or warm. If it is extremely hot, then mark "high". If warm, "mark warm".

Q. I don't know if my water heater has a blanket.

R. If the water heater is under 15 years old, you probably have one that is wrapped on the inside. Mark "yes. Also, look on the water heater, there should be a sticker or label that list the R value for the insulation. Insulation on water heaters is usually about R=6.45.

Q. What is a low-flow water head?

R. It is a shower head that restricts the flow of water, without affecting the water pressure.

Q. I do only 1 load of laundry every other week.

R. Put down 1 load per week. Since it is only 1 load per week it won't make a difference. It is not a significant difference.

Q. I don't know if my dryer is NG or electric.

- R.** If your dryer is only plugged in the wall, it is electric. Also look for a pipe that is going from the dryer to the wall. Most dryers are NG.

REFRIGERATOR QUESTIONS

Q. I don't know the style of my refrigerator.

R:

Single door: There is only 1 door, and it typically stands upright.

Top-bottom: There are two doors. The freezer is on top, and the refrigerator is on the bottom typically.

Side by Side: There are two doors. The freezer is on the left, and the refrigerator is on the right.

Q. I don't know the size of my refrigerator?

- R.** Some refrigerators have the size printed on a label on the inside of the door. If you don't know, then just estimate.

Q. I don't know if the refrigerator is an automatic or manual defrost.

- R.** When you look in the freezer do you see any ice built up? If not, then it is automatic.

Q. What's a stand-alone freezer? Is this connected to the refrigerator?

- R.** A stand-alone freezer is a separate unit. It is by itself.

COOKING QUESTIONS

Q. Our range/oven is both natural gas/electric. What do I put?

- R.** Mark combination, gas and electric.

Q. How do I mark how many times per week I cook? I only microwave or cook toast.

- R.** If you are not using your oven or stove top, don't mark anything.

Q. I only run the dishwasher once a month, during the holidays, or when I have company. What should I put?

- R.** If you don't use your dishwasher on a regular basis, then put y "don't have one".

LIGHTING

Timers: They are programmed to come on and off at a certain time and they can be adjusted seasonally.

Motion detector: Comes on when it detects motion. Typically located outside.

Photo-electric eye: Senses the light (from the sun). It comes on at night, and goes off in the morning.

Dimmer: Can adjust to the amount of light being emitted. They are usually indoor lights.

Flood/Spotlight: Typically high-voltage lights. Located outside: used for porch lights, tennis courts, or grounds.

Standard incandescent: Standard “Edison” bulbs; they are the most popular kinds of bulbs. Used mostly indoors, for lamps.

High efficiency incandescent: Just like regular incandescents; it uses less energy. Sometimes called “watt misers”; they are 35-50watt bulbs.

Fluorescent tube: Energy efficient lighting. Typically in the kitchen or garage. They are long 4ft. to 8ft. white tubes.

Compact Fluorescent: Very efficient lighting. They have a very distinct shape, which is tube like. They typically have two coils or they are arranged in a circle, or pronged.

Halogens: They are usually over 100 watts. Used indoors or outdoors. They are standing lamps or called torchieres. They use a lot of energy. The smaller halogens are used for track lighting.

Mali lights: Low-voltage lighting. Typically located outside, on a patio, in the ground, along driveways, or used for decoration.

OTHER APPLIANCES

Humidifier: A small unit that is plugged into the wall. Used for people who have asthma or difficulty breathing. It puts moisture into the surrounding air.

Dehumidifier: A small unit that is plugged into the wall. Takes the moisture out of the room.

Well Pump: A unit that is used for pumping water out of the ground, these units are sometimes on separate meters not connected to the house meter. People who live on the outskirts of town have them sometimes.

Irrigation Pump: Typically used by people who have farms or large gardens or orchards to water their vegetation.

Attic Fan: A unit located in your attic that sucks all the hot air from the attic, and pushes it outside.

Whole house fan: A unit that is typically installed in a hallway ceiling. It is a large unit that is in the ceiling, it has vents that open up and draws all the hot air from the inside of the house and pushes the hot air outside through vents in the attic.

I: SURVEY DATA VARIABLES

NAME	VARNUM	LABEL
NCS_HEADER1	1	Scan file header 1 - placeholder
BATCHNO	2	Number of Survey within Scan Batch
NCS_HEADER2	3	Scan file header 2 - placeholder
dwltype1	4	Type of Dwelling A1
dwltype2	5	Type of Dwelling A1
dwltype3	6	Type of Dwelling A1
dwltype4	7	Type of Dwelling A1
dwltype5	8	Type of Dwelling A1
dwltype6	9	Type of Dwelling A1
stories1	10	Stories in SF Dwelling A1
stories2	11	Stories in SF Dwelling A1
stories3	12	Stories in SF Dwelling A1
ownrent1	13	Occupied by Owner or Renter A2
ownrent2	14	Occupied by Owner or Renter A2
YRS_RES1	15	Years lived in Dwelling A3
YRS_RES2	16	Years lived in Dwelling A3
YRS_RES3	17	Years lived in Dwelling A3
YRS_RES4	18	Years lived in Dwelling A3
YRS_RES5	19	Years lived in Dwelling A3
YRS_RES6	20	Years lived in Dwelling A3
YRS_RES7	21	Years lived in Dwelling A3
YRS_RES8	22	Years lived in Dwelling A3
YRS_RES9	23	Years lived in Dwelling A3
YRS_RES10	24	Years lived in Dwelling A3
YRS_RES11	25	Years lived in Dwelling A3
YRS_RES12	26	Years lived in Dwelling A3
YRS_RES13	27	Years lived in Dwelling A3
YRS_RES14	28	Years lived in Dwelling A3
YRS_RES15	29	Years lived in Dwelling A3
YRS_RES16	30	Years lived in Dwelling A3
YRS_RES17	31	Years lived in Dwelling A3
YRS_RES18	32	Years lived in Dwelling A3
SEASOCC1	33	Permanent or Seasonal Residence A4
SEASOCC2	34	Permanent or Seasonal Residence A4
SEASOCC3	35	Permanent or Seasonal Residence A4
SEASOCC4	36	Permanent or Seasonal Residence A4
SEASJAN1	37	Seasonal Residence, Occupied Jan A5
SEASFEB1	38	Seasonal Residence, Occupied Feb A5
SEASMAR1	39	Seasonal Residence, Occupied Mar A5

NAME	VARNUM	LABEL
SEASAPR1	40	Seasonal Residence, Occupied Apr A5
SEASMAY1	41	Seasonal Residence, Occupied May A5
SEASJUN1	42	Seasonal Residence, Occupied Jun A5
SEASJUL1	43	Seasonal Residence, Occupied Jul A5
SEASAUG1	44	Seasonal Residence, Occupied Aug A5
SEASSEP1	45	Seasonal Residence, Occupied Sep A5
SEASOCT1	46	Seasonal Residence, Occupied Oct A5
SEASNOV1	47	Seasonal Residence, Occupied Nov A5
SEASDEC1	48	Seasonal Residence, Occupied Dec A5
BUILTYR1	49	Year Residence built A6
BUILTYR2	50	Year Residence built A6
BUILTYR3	51	Year Residence built A6
BUILTYR4	52	Year Residence built A6
BUILTYR5	53	Year Residence built A6
BUILTYR6	54	Year Residence built A6
BUILTYR7	55	Year Residence built A6
BUILTYR8	56	Year Residence built A6
BUILTYR9	57	Year Residence built A6
BUILTYR10	58	Year Residence built A6
BUILTYR11	59	Year Residence built A6
BUILTYR12	60	Year Residence built A6
BUILTYR13	61	Year Residence built A6
BUILTYR14	62	Year Residence built A6
BUILTYR15	63	Year Residence built A6
BUILTYR16	64	Year Residence built A6
BUILTYR17	65	Year Residence built A6
BUILTYR18	66	Year Residence built A6
BUILTYR19	67	Year Residence built A6
BUILTYR20	68	Year Residence built A6
BUILTYR21	69	Year Residence built A6
BUILTYR22	70	Year Residence built A6
BUILTYR23	71	Year Residence built A6
BUILTYR24	72	Year Residence built A6
BUILTYR25	73	Year Residence built A6
BUILTYR26	74	Year Residence built A6
BUILTYR27	75	Year Residence built A6
BUILTYR28	76	Year Residence built A6
BUILTYR29	77	Year Residence built A6
BUILTYR30	78	Year Residence built A6
BUILTYR31	79	Year Residence built A6
BUILTYR32	80	Year Residence built A6
BUILTYR33	81	Year Residence built A6

NAME	VARNUM	LABEL
BUILTYR34	82	Year Residence built A6
BUILTYR35	83	Year Residence built A6
BUILTYR36	84	Year Residence built A6
BUILTYR37	85	Year Residence built A6
BUILTYR38	86	Year Residence built A6
NUMROOM1	87	Number of Bedrooms in Residence A7
NUMROOM2	88	Number of Bedrooms in Residence A7
NUMROOM3	89	Number of Bedrooms in Residence A7
NUMROOM4	90	Number of Bedrooms in Residence A7
NUMROOM5	91	Number of Bedrooms in Residence A7
NUMROOM6	92	Number of Bedrooms in Residence A7
NUMROOM7	93	Number of Bedrooms in Residence A7
NUMROOM8	94	Number of Bedrooms in Residence A7
NUMROOM9	95	Number of Bedrooms in Residence A7
NUMROOM10	96	Number of Bedrooms in Residence A7
NUMROOM11	97	Number of Bedrooms in Residence A7
NUMROOM12	98	Number of Bedrooms in Residence A7
SQFT1	99	Square Foot of Living Space in Residence A8
SQFT2	100	Square Foot of Living Space in Residence A8
SQFT3	101	Square Foot of Living Space in Residence A8
SQFT4	102	Square Foot of Living Space in Residence A8
SQFT5	103	Square Foot of Living Space in Residence A8
SQFT6	104	Square Foot of Living Space in Residence A8
SQFT7	105	Square Foot of Living Space in Residence A8
SQFT8	106	Square Foot of Living Space in Residence A8
SQFT9	107	Square Foot of Living Space in Residence A8
SQFT10	108	Square Foot of Living Space in Residence A8
SQFT11	109	Square Foot of Living Space in Residence A8
SQFT12	110	Square Foot of Living Space in Residence A8
EXTWLINS1	111	Homes Exterior Walls Insulated A9
EXTWLINS2	112	Homes Exterior Walls Insulated A9
EXTWLINS3	113	Homes Exterior Walls Insulated A9
ACEILINS1	114	Homes Attic Insulated A10
ACEILINS2	115	Homes Attic Insulated A10
CEILINCH1	116	Inches of Attic Insulation A11
CEILINCH2	117	Inches of Attic Insulation A11
CEILINCH3	118	Inches of Attic Insulation A11
CEILINCH4	119	Inches of Attic Insulation A11
WINDTYPE1	120	Window Pane Type A12
WINDTYPE2	121	Window Pane Type A12
WINDTYPE3	122	Window Pane Type A12
WINFRAME1	123	Window Frame Type A13

NAME	VARNUM	LABEL
WINFRAME2	124	Window Frame Type A13
WINFRAME3	125	Window Frame Type A13
REMOD1	126	Has Home been Remodeled A14
REMOD2	127	Has Home been Remodeled A14
RMDROOM1	128	Remodel was room additon A15
RMDKTBTH1	129	Bath or Kitchen Remodel A15
RMDREBLT1	130	Rebuilt most of house remodel A15
RMDOTHR1	131	Remodel Other A15
NR0_51	132	Number under 5 year of age in home A16
NR0_52	133	Number under 5 year of age in home A16
NR0_53	134	Number under 5 year of age in home A16
NR0_54	135	Number under 5 year of age in home A16
NR0_55	136	Number under 5 year of age in home A16
NR0_56	137	Number under 5 year of age in home A16
NR0_57	138	Number under 5 year of age in home A16
NR0_58	139	Number under 5 year of age in home A16
NR0_59	140	Number under 5 year of age in home A16
NR6_181	141	Number 6-18 years of age in home A16
NR6_182	142	Number 6-18 years of age in home A16
NR6_183	143	Number 6-18 years of age in home A16
NR6_184	144	Number 6-18 years of age in home A16
NR6_185	145	Number 6-18 years of age in home A16
NR6_186	146	Number 6-18 years of age in home A16
NR6_187	147	Number 6-18 years of age in home A16
NR6_188	148	Number 6-18 years of age in home A16
NR6_189	149	Number 6-18 years of age in home A16
NR19_341	150	Number 19-34 years of age in home A16
NR19_342	151	Number 19-34 years of age in home A16
NR19_343	152	Number 19-34 years of age in home A16
NR19_344	153	Number 19-34 years of age in home A16
NR19_345	154	Number 19-34 years of age in home A16
NR19_346	155	Number 19-34 years of age in home A16
NR19_347	156	Number 19-34 years of age in home A16
NR19_348	157	Number 19-34 years of age in home A16
NR19_349	158	Number 19-34 years of age in home A16
NR35_541	159	Number 35-54 years of age in home A16
NR35_542	160	Number 35-54 years of age in home A16
NR35_543	161	Number 35-54 years of age in home A16
NR35_544	162	Number 35-54 years of age in home A16
NR35_545	163	Number 35-54 years of age in home A16
NR35_546	164	Number 35-54 years of age in home A16
NR35_547	165	Number 35-54 years of age in home A16

NAME	VARNUM	LABEL
NR35_548	166	Number 35-54 years of age in home A16
NR35_549	167	Number 35-54 years of age in home A16
NR55_641	168	Number 55-64 years of age in home A16
NR55_642	169	Number 55-64 years of age in home A16
NR55_643	170	Number 55-64 years of age in home A16
NR55_644	171	Number 55-64 years of age in home A16
NR55_645	172	Number 55-64 years of age in home A16
NR55_646	173	Number 55-64 years of age in home A16
NR55_647	174	Number 55-64 years of age in home A16
NR55_648	175	Number 55-64 years of age in home A16
NR55_649	176	Number 55-64 years of age in home A16
NR65_991	177	Number 65-99 years of age in home A16
NR65_992	178	Number 65-99 years of age in home A16
NR65_993	179	Number 65-99 years of age in home A16
NR65_994	180	Number 65-99 years of age in home A16
NR65_995	181	Number 65-99 years of age in home A16
NR65_996	182	Number 65-99 years of age in home A16
NR65_997	183	Number 65-99 years of age in home A16
NR65_998	184	Number 65-99 years of age in home A16
NR65_999	185	Number 65-99 years of age in home A16
ONPKUSE1	186	Peak Time use of Electrical Appliances A17
ONPKUSE2	187	Peak Time use of Electrical Appliances A17
ONPKUSE3	188	Peak Time use of Electrical Appliances A17
NGSERV1	189	Natural Gas Service Available in Area A18
NGSERV2	190	Natural Gas Service Available in Area A18
NGLINE1	191	Natural Gas Service Available in Home A19
NGLINE2	192	Natural Gas Service Available in Home A19
NGUTIL1	193	Natural Gas Utility A20
NGUTIL2	194	Natural Gas Utility A20
NGUTIL3	195	Natural Gas Utility A20
NGUTIL4	196	Natural Gas Utility A20
NGUTIL5	197	Natural Gas Utility A20
NGUTIL6	198	Natural Gas Utility A20
NGUTIL7	199	Natural Gas Utility A20
PAYHEAT1	200	Pay to heat home B1
PAYHEAT2	201	Pay to heat home B1
PAYHEAT3	202	Pay to heat home B1
PHTNGCNT1	203	Central Forced Air Gas Furnace B2
PHTNGFWL1	204	Floor or Wall Gas furnace B2
PHTNGRAD1	205	Hot Water Gas radiator B2
PHTNGOTH1	206	Other Gas Heater B2
PHTELBSB1	207	Resistance Ele Heater B2

NAME	VARNUM	LABEL
PHTELCRH1	208	Central forced air Ele furnace B2
PHTELCHP1	209	Central Ele Heat Pump B2
PHTELWHP1	210	Through the wall Ele heat pump B2
PHTELPOR1	211	Portable Ele heater B2
PHTELOTH1	212	Other Electric heater B2
PHTBGCNT1	213	Central forced air bottle gas furnace B2
PHTBGFWL1	214	Floor or wall bottle gas heater B2
PHTBGRAD1	215	Hot water bottle gas radiator B2
PHTBGOTH1	216	Bottle Gas Heater Other B2
PHTWDWS1	217	Wood stove insert B2
PHTWDFP1	218	Fireplace B2
PHTSLRN1	219	Solar heat no backup B2
PHTSLRG1	220	Solar heat, NG backup B2
PHTSLRP1	221	Solar Heat, Propane backup B2
PHTSLRE1	222	Solar Heat, ele backup B2
PHTOTSYS1	223	Other Heat B2
AHTNGCNT1	224	Additional Central Forced Air gas Furnace B2
AHTNGFWL1	225	Additional Floor or Wall gas furnace B2
AHTNGRAD1	226	Additional Hot Water gas radiator B2
AHTNGOTH1	227	Additional Other Gas Heater B2
AHTELBSB1	228	Additional Resistance Ele Heater B2
AHTELCRH1	229	Additional Central forced air Ele furnace B2
AHTELCHP1	230	Additional Central Ele Heat Pump B2
AHTELWHP1	231	Additional Through the wall Ele heat pump B2
AHTELPOR1	232	Additional Portable Ele heater B2
AHTELOTH1	233	Additional Other Electric heater B2
AHTBGCNT1	234	Additional Central forced air bottle gas furnace B2
AHTBGFWL1	235	Additional Floor or wall bottle gas heater B2
AHTBGRAD1	236	Additional Hot water bottle gas radiator B2
AHTBGOTH1	237	Additional Bottle Gas Heater Other B2
AHTWDWS1	238	Additional Wood stove insert B2
AHTWDFP1	239	Additional Fireplace B2
AHTSLRN1	240	Additional Solar heat no backup B2
AHTSLRG1	241	Additional Solar heat, NG backup B2
AHTSLRP1	242	Additional Solar Heat, Propane backup B2
AHTSLRE1	243	Additional Solar Heat, ele backup B2
AHTOTSYS1	244	Additional Other Heat B2
MAINPILT1	245	Main Heater has gas pilot light B3
MAINPILT2	246	Main Heater has gas pilot light B3
SECPILT1	247	Secondary Heater has gas pilot light B3
SECPILT2	248	Secondary Heater has gas pilot light B3
HTSYSAGE1	249	Age of main heating system B4

NAME	VARNUM	LABEL
HTSYSAGE2	250	Age of main heating system B4
HTSYSAGE3	251	Age of main heating system B4
HTSYSAGE4	252	Age of main heating system B4
HTSYSAGE5	253	Age of main heating system B4
HTSYSAGE6	254	Age of main heating system B4
HTCTLTYP1	255	Thermostat type for main heating system B5
HTCTLTYP2	256	Thermostat type for main heating system B5
HTCTLTYP3	257	Thermostat type for main heating system B5
HMRNSET1	258	Heater thermostat setting in morning B6
HMRNSET2	259	Heater thermostat setting in morning B6
HMRNSET3	260	Heater thermostat setting in morning B6
HMRNSET4	261	Heater thermostat setting in morning B6
HMRNSET5	262	Heater thermostat setting in morning B6
HMRNSET6	263	Heater thermostat setting in morning B6
HMRNSET7	264	Heater thermostat setting in morning B6
HDAYSET1	265	Heater thermostat setting in day B6
HDAYSET2	266	Heater thermostat setting in day B6
HDAYSET3	267	Heater thermostat setting in day B6
HDAYSET4	268	Heater thermostat setting in day B6
HDAYSET5	269	Heater thermostat setting in day B6
HDAYSET6	270	Heater thermostat setting in day B6
HDAYSET7	271	Heater thermostat setting in day B6
HEVNSET1	272	Heater thermostat setting in evening B6
HEVNSET2	273	Heater thermostat setting in evening B6
HEVNSET3	274	Heater thermostat setting in evening B6
HEVNSET4	275	Heater thermostat setting in evening B6
HEVNSET5	276	Heater thermostat setting in evening B6
HEVNSET6	277	Heater thermostat setting in evening B6
HEVNSET7	278	Heater thermostat setting in evening B6
HNITESET1	279	Heater thermostat setting in night B6
HNITESET2	280	Heater thermostat setting in night B6
HNITESET3	281	Heater thermostat setting in night B6
HNITESET4	282	Heater thermostat setting in night B6
HNITESET5	283	Heater thermostat setting in night B6
HNITESET6	284	Heater thermostat setting in night B6
HNITESET7	285	Heater thermostat setting in night B6
HTMAINTN1	286	Maintenance preformed on heating system B7
HTMAINTN2	287	Maintenance preformed on heating system B7
NPORHTRS1	288	Number of portable heaters B8
NPORHTRS2	289	Number of portable heaters B8
NPORHTRS3	290	Number of portable heaters B8
NPORHTRS4	291	Number of portable heaters B8

NAME	VARNUM	LABEL
USEADDHT1	292	Use of additional heating systems B9
USEADDHT2	293	Use of additional heating systems B9
USEADDHT3	294	Use of additional heating systems B9
USEADDHT4	295	Use of additional heating systems B9
USEADDHT5	296	Use of additional heating systems B9
PAYCOOL1	297	Pay for central air conditioning C1
PAYCOOL2	298	Pay for central air conditioning C1
PAYCOOL3	299	Pay for central air conditioning C1
CTLACAGE1	300	number of central air conditioners C2
CTLACAGE2	301	number of central air conditioners C2
CTLACAGE3	302	number of central air conditioners C2
CTEVPAGE1	303	Number of central evaporative coolers C2
CTEVPAGE2	304	Number of central evaporative coolers C2
CTEVPAGE3	305	Number of central evaporative coolers C2
HPAGE1	306	Number of heat pumps C2
HPAGE2	307	Number of heat pumps C2
HPAGE3	308	Number of heat pumps C2
CLCNTAGE1	309	Age of main central air conditioner C3
CLCNTAGE2	310	Age of main central air conditioner C3
CLCNTAGE3	311	Age of main central air conditioner C3
CLCNTAGE4	312	Age of main central air conditioner C3
CLCNTAGE5	313	Age of main central air conditioner C3
CLCNTAGE6	314	Age of main central air conditioner C3
CLCTLTYP1	315	Thermostat type for main central air C4
CLCTLTYP2	316	Thermostat type for main central air C4
CLCTLTYP3	317	Thermostat type for main central air C4
CMRNSET1	318	AC thermostat setting in morning C5
CMRNSET2	319	AC thermostat setting in morning C5
CMRNSET3	320	AC thermostat setting in morning C5
CMRNSET4	321	AC thermostat setting in morning C5
CMRNSET5	322	AC thermostat setting in morning C5
CMRNSET6	323	AC thermostat setting in morning C5
CDAYSET1	324	AC thermostat setting in day C5
CDAYSET2	325	AC thermostat setting in day C5
CDAYSET3	326	AC thermostat setting in day C5
CDAYSET4	327	AC thermostat setting in day C5
CDAYSET5	328	AC thermostat setting in day C5
CDAYSET6	329	AC thermostat setting in day C5
CEVNSET1	330	AC thermostat setting in evening C5
CEVNSET2	331	AC thermostat setting in evening C5
CEVNSET3	332	AC thermostat setting in evening C5
CEVNSET4	333	AC thermostat setting in evening C5

NAME	VARNUM	LABEL
CEVNSET5	334	AC thermostat setting in evening C5
CEVNSET6	335	AC thermostat setting in evening C5
CNITESET1	336	AC thermostat setting in nite C5
CNITESET2	337	AC thermostat setting in nite C5
CNITESET3	338	AC thermostat setting in nite C5
CNITESET4	339	AC thermostat setting in nite C5
CNITESET5	340	AC thermostat setting in nite C5
CNITESET6	341	AC thermostat setting in nite C5
CLMAINTN1	342	Maintenance preformed on AC system C6
CLMAINTN2	343	Maintenance preformed on AC system C6
NOROOMAC1	344	No room AC C7
ACTYP11	345	Type room AC1 C7
ACTYP12	346	Type room AC1 C7
ACTYP13	347	Type room AC1 C7
ACTYP21	348	Type room AC2 C7
ACTYP22	349	Type room AC2 C7
ACTYP23	350	Type room AC2 C7
ACTYP31	351	Type room AC3 C7
ACTYP32	352	Type room AC3 C7
ACTYP33	353	Type room AC3 C7
ACAGE11	354	Age of room AC1 C7
ACAGE12	355	Age of room AC1 C7
ACAGE13	356	Age of room AC1 C7
ACAGE14	357	Age of room AC1 C7
ACAGE15	358	Age of room AC1 C7
ACAGE21	359	Age of room AC2 C7
ACAGE22	360	Age of room AC2 C7
ACAGE23	361	Age of room AC2 C7
ACAGE24	362	Age of room AC2 C7
ACAGE25	363	Age of room AC2 C7
ACAGE31	364	Age of room AC3 C7
ACAGE32	365	Age of room AC3 C7
ACAGE33	366	Age of room AC3 C7
ACAGE34	367	Age of room AC3 C7
ACAGE35	368	Age of room AC3 C7
CMRNUSE1	369	Use of room AC in morning C8
CMRNUSE2	370	Use of room AC in morning C8
CMRNUSE3	371	Use of room AC in morning C8
CMRNUSE4	372	Use of room AC in morning C8
CMRNUSE5	373	Use of room AC in morning C8
CDAYUSE1	374	Use of room AC in day C8
CDAYUSE2	375	Use of room AC in day C8

NAME	VARNUM	LABEL
CDAYUSE3	376	Use of room AC in day C8
CDAYUSE4	377	Use of room AC in day C8
CDAYUSE5	378	Use of room AC in day C8
CEVNUSE1	379	Use of room AC in evening C8
CEVNUSE2	380	Use of room AC in evening C8
CEVNUSE3	381	Use of room AC in evening C8
CEVNUSE4	382	Use of room AC in evening C8
CEVNUSE5	383	Use of room AC in evening C8
CNITEUSE1	384	Use of room AC in nite C8
CNITEUSE2	385	Use of room AC in nite C8
CNITEUSE3	386	Use of room AC in nite C8
CNITEUSE4	387	Use of room AC in nite C8
CNITEUSE5	388	Use of room AC in nite C8
CHOTUSE1	389	Use of room AC hot weekday C8
CHOTUSE2	390	Use of room AC hot weekday C8
CHOTUSE3	391	Use of room AC hot weekday C8
CHOTUSE4	392	Use of room AC hot weekday C8
CHOTUSE5	393	Use of room AC hot weekday C8
PAYWH1	394	Pay for water heater D1
PAYWH2	395	Pay for water heater D1
PAYWH3	396	Pay for water heater D1
PWHNGTNK1	397	Standard tank gas WH D2
PWHNGWHT1	398	Whole house tankless gas WH D2
PWHELTK1	399	Standard tank ele WH D2
PWHELHP1	400	Heat pump ele WH D2
PWHELWHT1	401	Whole house tankless ele WH D2
PWHELPNT1	402	Point of use tankless ele WH D2
PWHLPTNK1	403	Standard tank propane WH D2
PWHLPWHT1	404	Whole house tankless propane WH D2
PWHSLRN1	405	Solar WH, no backup D2
PWHSLRG1	406	Solar WH, NG backup D2
PWHSLRP1	407	Solar WH, Propane backup D2
PWHSLRE1	408	Solar WH, ele backup D2
PWHOTSYS1	409	WH, other fuel D2
AWHNGTNK1	410	Additional Standard tank gas WH D2
AWHNGWHT1	411	Additional Whole house tankless gas WH D2
AWHELTK1	412	Additional Standard tank ele WH D2
AWHELHP1	413	Additional Heat pump ele WH D2
AWHELWHT1	414	Additional Whole house tankless ele WH D2
AWHELPNT1	415	Additional Point of use tankless ele WH D2
AWHLPTNK1	416	Additional Standard tank propane WH D2
AWHLPWHT1	417	Additional Whole house tankless propane WH D2

NAME	VARNUM	LABEL
AWHSLRN1	418	Additional Solar WH, no backup D2
AWHSLRG1	419	Additional Solar WH, NG backup D2
AWHSLRP1	420	Additional Solar WH, Propane backup D2
AWHSLRE1	421	Additional Solar WH, ele backup D2
AWHOTSYS1	422	Additional WH, other fuel D2
WHTEMP1	423	Water heater temperature D3
WHTEMP2	424	Water heater temperature D3
WHTEMP3	425	Water heater temperature D3
PRWHAGE1	426	Water heater age D4
PRWHAGE2	427	Water heater age D4
PRWHAGE3	428	Water heater age D4
PRWHAGE4	429	Water heater age D4
PRWHAGE5	430	Water heater age D4
PRWHAGE6	431	Water heater age D4
TANKINS1	432	Water heater insulation blanket D5
TANKINS2	433	Water heater insulation blanket D5
SHWRDAY1	434	Number of showers D6
SHWRDAY2	435	Number of showers D6
SHWRDAY3	436	Number of showers D6
SHWRDAY4	437	Number of showers D6
SHWRDAY5	438	Number of showers D6
SHWRDAY6	439	Number of showers D6
SHWRDAY7	440	Number of showers D6
SHWRDAY8	441	Number of showers D6
SHWRDAY9	442	Number of showers D6
SHWRDAY10	443	Number of showers D6
SHWRDAY11	444	Number of showers D6
BATHSDAY1	445	Number of baths D6
BATHSDAY2	446	Number of baths D6
BATHSDAY3	447	Number of baths D6
BATHSDAY4	448	Number of baths D6
BATHSDAY5	449	Number of baths D6
BATHSDAY6	450	Number of baths D6
BATHSDAY7	451	Number of baths D6
BATHSDAY8	452	Number of baths D6
BATHSDAY9	453	Number of baths D6
BATHSDAY10	454	Number of baths D6
BATHSDAY11	455	Number of baths D6
SHOWERHD1	456	Low flow shower head D7
SHOWERHD2	457	Low flow shower head D7
SHOWERHD3	458	Low flow shower head D7
AERATORS1	459	Faucet awrators D8

NAME	VARNUM	LABEL
AERATORS2	460	Faucet awrators D8
AERATORS3	461	Faucet awrators D8
LNDRYEQP1	462	Laundry equipment in home E1
LNDRYEQP2	463	Laundry equipment in home E1
LNDRYEQP3	464	Laundry equipment in home E1
CWTYP1	465	Type of clothes washer E2
CWTYP2	466	Type of clothes washer E2
CWAGE1	467	Clothes washer age E3
CWAGE2	468	Clothes washer age E3
CWAGE3	469	Clothes washer age E3
CWAGE4	470	Clothes washer age E3
CWAGE5	471	Clothes washer age E3
CWAGE6	472	Clothes washer age E3
CWHWLD1	473	Number of hot water washes per week E4
CWHWLD2	474	Number of hot water washes per week E4
CWHWLD3	475	Number of hot water washes per week E4
CWHWLD4	476	Number of hot water washes per week E4
CWHWLD5	477	Number of hot water washes per week E4
CWHWLD6	478	Number of hot water washes per week E4
CWHWLD7	479	Number of hot water washes per week E4
CWHWLD8	480	Number of hot water washes per week E4
CWHWLD9	481	Number of hot water washes per week E4
CWHWLD10	482	Number of hot water washes per week E4
CWHWLD11	483	Number of hot water washes per week E4
CWWWLD1	484	Number of warm water washes per week E4
CWWWLD2	485	Number of warm water washes per week E4
CWWWLD3	486	Number of warm water washes per week E4
CWWWLD4	487	Number of warm water washes per week E4
CWWWLD5	488	Number of warm water washes per week E4
CWWWLD6	489	Number of warm water washes per week E4
CWWWLD7	490	Number of warm water washes per week E4
CWWWLD8	491	Number of warm water washes per week E4
CWWWLD9	492	Number of warm water washes per week E4
CWWWLD10	493	Number of warm water washes per week E4
CWWWLD11	494	Number of warm water washes per week E4
CWCWLD1	495	Number of cold water washes per week E4
CWCWLD2	496	Number of cold water washes per week E4
CWCWLD3	497	Number of cold water washes per week E4
CWCWLD4	498	Number of cold water washes per week E4
CWCWLD5	499	Number of cold water washes per week E4
CWCWLD6	500	Number of cold water washes per week E4
CWCWLD7	501	Number of cold water washes per week E4

NAME	VARNUM	LABEL
CWCWLD8	502	Number of cold water washes per week E4
CWCWLD9	503	Number of cold water washes per week E4
CWCWLD10	504	Number of cold water washes per week E4
CWCWLD11	505	Number of cold water washes per week E4
CDTYP1	506	Type of clothes dryer E5
CDTYP2	507	Type of clothes dryer E5
CDTYP3	508	Type of clothes dryer E5
CDTYP4	509	Type of clothes dryer E5
DRYLDS1	510	Number of dryer loads per week E6
DRYLDS2	511	Number of dryer loads per week E6
DRYLDS3	512	Number of dryer loads per week E6
DRYLDS4	513	Number of dryer loads per week E6
DRYLDS5	514	Number of dryer loads per week E6
DRYLDS6	515	Number of dryer loads per week E6
DRYLDS7	516	Number of dryer loads per week E6
DRYLDS8	517	Number of dryer loads per week E6
DRYLDS9	518	Number of dryer loads per week E6
DRYLDS10	519	Number of dryer loads per week E6
DRYLDS11	520	Number of dryer loads per week E6
CKRNTYP1	521	Fuel for cooktop F1
CKRNTYP2	522	Fuel for cooktop F1
CKRNTYP3	523	Fuel for cooktop F1
CKRNTYP4	524	Fuel for cooktop F1
CKRNA1	525	Age of cooktop F1
CKRNA2	526	Age of cooktop F1
CKRNA3	527	Age of cooktop F1
CKRNA4	528	Age of cooktop F1
CKOVTYP1	529	Fuel for oven F1
CKOVTYP2	530	Fuel for oven F1
CKOVTYP3	531	Fuel for oven F1
CKOVTYP4	532	Fuel for oven F1
CKOVA1	533	Age of oven F1
CKOVA2	534	Age of oven F1
CKOVA3	535	Age of oven F1
CKOVA4	536	Age of oven F1
CKBBTYP1	537	Fuel for barbecue F1
CKBBTYP2	538	Fuel for barbecue F1
CKBBTYP3	539	Fuel for barbecue F1
CKBBTYP4	540	Fuel for barbecue F1
CKBBQA1	541	Age of barbecue F1
CKBBQA2	542	Age of barbecue F1
CKBBQA3	543	Age of barbecue F1

NAME	VARNUM	LABEL
CKBBQA4	544	Age of barbecue F1
BRNOVUSE1	545	How often use range/oven for breakfast F2
BRNOVUSE2	546	How often use range/oven for breakfast F2
BRNOVUSE3	547	How often use range/oven for breakfast F2
BRNOVUSE4	548	How often use range/oven for breakfast F2
BRNOVUSE5	549	How often use range/oven for breakfast F2
LRNOVUSE1	550	How often use range/oven for lunch F2
LRNOVUSE2	551	How often use range/oven for lunch F2
LRNOVUSE3	552	How often use range/oven for lunch F2
LRNOVUSE4	553	How often use range/oven for lunch F2
LRNOVUSE5	554	How often use range/oven for lunch F2
DRNOVUSE1	555	How often use range/oven for dinner F2
DRNOVUSE2	556	How often use range/oven for dinner F2
DRNOVUSE3	557	How often use range/oven for dinner F2
DRNOVUSE4	558	How often use range/oven for dinner F2
DRNOVUSE5	559	How often use range/oven for dinner F2
ORNOVUSE1	560	How often use range/oven for other F2
ORNOVUSE2	561	How often use range/oven for other F2
ORNOVUSE3	562	How often use range/oven for other F2
ORNOVUSE4	563	How often use range/oven for other F2
ORNOVUSE5	564	How often use range/oven for other F2
MWUSE1	565	Do you have microwave oven F3
MWUSE2	566	Do you have microwave oven F3
MWUSE3	567	Do you have microwave oven F3
DISHWASH1	568	Do you have dishwasher F4
DISHWASH2	569	Do you have dishwasher F4
DWLOADS1	570	Number of dishwasher loads per week F5
DWLOADS2	571	Number of dishwasher loads per week F5
DWLOADS3	572	Number of dishwasher loads per week F5
DWLOADS4	573	Number of dishwasher loads per week F5
DWLOADS5	574	Number of dishwasher loads per week F5
DWLOADS6	575	Number of dishwasher loads per week F5
DWLOADS7	576	Number of dishwasher loads per week F5
DWLOADS8	577	Number of dishwasher loads per week F5
DWLOADS9	578	Number of dishwasher loads per week F5
DWLOADS10	579	Number of dishwasher loads per week F5
RFNUM1	580	Number of refrigerators G1
RFNUM2	581	Number of refrigerators G1
RFNUM3	582	Number of refrigerators G1
RFNUM4	583	Number of refrigerators G1
RF1STY1	584	Door style of first refrig G2
RF1STY2	585	Door style of first refrig G2

NAME	VARNUM	LABEL
RF1STY3	586	Door style of first refrig G2
RF1STY4	587	Door style of first refrig G2
RF2STY1	588	Door style of second refrig G2
RF2STY2	589	Door style of second refrig G2
RF2STY3	590	Door style of second refrig G2
RF2STY4	591	Door style of second refrig G2
RF3STY1	592	Door style of third refrig G2
RF3STY2	593	Door style of third refrig G2
RF3STY3	594	Door style of third refrig G2
RF3STY4	595	Door style of third refrig G2
RFDSCSTY1	596	Door style of discarded refrig G2
RFDSCSTY2	597	Door style of discarded refrig G2
RFDSCSTY3	598	Door style of discarded refrig G2
RFDSCSTY4	599	Door style of discarded refrig G2
RF1SZ1	600	Size of first refrig G2
RF1SZ2	601	Size of first refrig G2
RF1SZ3	602	Size of first refrig G2
RF1SZ4	603	Size of first refrig G2
RF1SZ5	604	Size of first refrig G2
RF2SZ1	605	Size of second refrig G2
RF2SZ2	606	Size of second refrig G2
RF2SZ3	607	Size of second refrig G2
RF2SZ4	608	Size of second refrig G2
RF2SZ5	609	Size of second refrig G2
RF3SZ1	610	Size of third refrig G2
RF3SZ2	611	Size of third refrig G2
RF3SZ3	612	Size of third refrig G2
RF3SZ4	613	Size of third refrig G2
RF3SZ5	614	Size of third refrig G2
RFDSCSZ1	615	Size of discarded refrig G2
RFDSCSZ2	616	Size of discarded refrig G2
RFDSCSZ3	617	Size of discarded refrig G2
RFDSCSZ4	618	Size of discarded refrig G2
RFDSCSZ5	619	Size of discarded refrig G2
RF1DEF1	620	defrost type of first refrig G2
RF1DEF2	621	defrost type of first refrig G2
RF2DEF1	622	defrost type of second refrig G2
RF2DEF2	623	defrost type of second refrig G2
RF3DEF1	624	defrost type of third refrig G2
RF3DEF2	625	defrost type of third refrig G2
RFDSCDEF1	626	defrost type of discarded refrig G2
RFDSCDEF2	627	defrost type of discarded refrig G2

NAME	VARNUM	LABEL
RF1AGE1	628	Age of first refrig G2
RF1AGE2	629	Age of first refrig G2
RF1AGE3	630	Age of first refrig G2
RF1AGE4	631	Age of first refrig G2
RF1AGE5	632	Age of first refrig G2
RF2AGE1	633	Age of second refrig G2
RF2AGE2	634	Age of second refrig G2
RF2AGE3	635	Age of second refrig G2
RF2AGE4	636	Age of second refrig G2
RF2AGE5	637	Age of second refrig G2
RF3AGE1	638	Age of third refrig G2
RF3AGE2	639	Age of third refrig G2
RF3AGE3	640	Age of third refrig G2
RF3AGE4	641	Age of third refrig G2
RF3AGE5	642	Age of third refrig G2
RFDSCAGE1	643	Age of discarded refrig G2
RFDSCAGE2	644	Age of discarded refrig G2
RFDSCAGE3	645	Age of discarded refrig G2
RFDSCAGE4	646	Age of discarded refrig G2
RFDSCAGE5	647	Age of discarded refrig G2
RF1OTH1	648	Door ice in first refrig G2
RF2OTH1	649	Door ice in second refrig G2
RF3OTH1	650	Door ice in third refrig G2
RFDSCOTH1	651	Door ice in discarded refrig G2
FZNUM1	652	Number of stand alone freezers H1
FZNUM2	653	Number of stand alone freezers H1
FZNUM3	654	Number of stand alone freezers H1
FZ1STY1	655	Style of first freezer H2
FZ1STY2	656	Style of first freezer H2
FZ1STY3	657	Style of first freezer H2
FZ1STY4	658	Style of first freezer H2
FZ2STY1	659	Style of second freezer H2
FZ2STY2	660	Style of second freezer H2
FZ2STY3	661	Style of second freezer H2
FZ2STY4	662	Style of second freezer H2
FZDSCSTY1	663	Style of discarded freezer H2
FZDSCSTY2	664	Style of discarded freezer H2
FZDSCSTY3	665	Style of discarded freezer H2
FZDSCSTY4	666	Style of discarded freezer H2
FZ1SZ1	667	Size of first freezer H2
FZ1SZ2	668	Size of first freezer H2
FZ1SZ3	669	Size of first freezer H2

NAME	VARNUM	LABEL
FZ2SZ1	670	Size of second freezer H2
FZ2SZ2	671	Size of second freezer H2
FZ2SZ3	672	Size of second freezer H2
FZDSCSZ1	673	Size of discarded freezer H2
FZDSCSZ2	674	Size of discarded freezer H2
FZDSCSZ3	675	Size of discarded freezer H2
FZ1AGE1	676	Age of first freezer H2
FZ1AGE2	677	Age of first freezer H2
FZ1AGE3	678	Age of first freezer H2
FZ1AGE4	679	Age of first freezer H2
FZ1AGE5	680	Age of first freezer H2
FZ2AGE1	681	Age of second freezer H2
FZ2AGE2	682	Age of second freezer H2
FZ2AGE3	683	Age of second freezer H2
FZ2AGE4	684	Age of second freezer H2
FZ2AGE5	685	Age of second freezer H2
FZDSCAGE1	686	Age of discarded freezer H2
FZDSCAGE2	687	Age of discarded freezer H2
FZDSCAGE3	688	Age of discarded freezer H2
FZDSCAGE4	689	Age of discarded freezer H2
FZDSCAGE5	690	Age of discarded freezer H2
SPTYP1	691	Spa or hot tub, pay for energy I1
SPTYP2	692	Spa or hot tub, pay for energy I1
SPTYP3	693	Spa or hot tub, pay for energy I1
SPHTF1	694	Spa fuel I2
SPHTF2	695	Spa fuel I2
SPHTF3	696	Spa fuel I2
SPHTF4	697	Spa fuel I2
SPHTF5	698	Spa fuel I2
SPHTF6	699	Spa fuel I2
SPSZ1	700	Spa size I3
SPSZ2	701	Spa size I3
SPSZ3	702	Spa size I3
SPLOC1	703	Spa Location I4
SPLOC2	704	Spa Location I4
SPLOC3	705	Spa Location I4
SPCOV1	706	Spa cover I5
SPCOV2	707	Spa cover I5
SMFLTPMP1	708	Frequency of spa filtration summer I6
SMFLTPMP2	709	Frequency of spa filtration summer I6
SMFLTPMP3	710	Frequency of spa filtration summer I6
SMFLTPMP4	711	Frequency of spa filtration summer I6

NAME	VARNUM	LABEL
SMFLTPMP5	712	Frequency of spa filtration summer I6
WNFLTPMP1	713	Frequency of spa filtration winter I6
WNFLTPMP2	714	Frequency of spa filtration winter I6
WNFLTPMP3	715	Frequency of spa filtration winter I6
WNFLTPMP4	716	Frequency of spa filtration winter I6
WNFLTPMP5	717	Frequency of spa filtration winter I6
SMHTSPA1	718	Frequency of spa heat in summer I7
SMHTSPA2	719	Frequency of spa heat in summer I7
SMHTSPA3	720	Frequency of spa heat in summer I7
SMHTSPA4	721	Frequency of spa heat in summer I7
SMHTSPA5	722	Frequency of spa heat in summer I7
WNHTSPA1	723	Frequence of spa heat in winter I7
WNHTSPA2	724	Frequence of spa heat in winter I7
WNHTSPA3	725	Frequence of spa heat in winter I7
WNHTSPA4	726	Frequence of spa heat in winter I7
WNHTSPA5	727	Frequence of spa heat in winter I7
PLTYP1	728	Pool, pay for energy J1
PLTYP2	729	Pool, pay for energy J1
PLTYP3	730	Pool, pay for energy J1
PLSZ1	731	Pool size J2
PLSZ2	732	Pool size J2
PLSZ3	733	Pool size J2
SMFLTHR1	734	hours per day filter pool summer J3
SMFLTHR2	735	hours per day filter pool summer J3
SMFLTHR3	736	hours per day filter pool summer J3
SMFLTHR4	737	hours per day filter pool summer J3
SMFLTHR5	738	hours per day filter pool summer J3
SMFLTHR6	739	hours per day filter pool summer J3
SMFLTHR7	740	hours per day filter pool summer J3
SMFLTHR8	741	hours per day filter pool summer J3
WNFLTHR1	742	hours per day filter pool winter J3
WNFLTHR2	743	hours per day filter pool winter J3
WNFLTHR3	744	hours per day filter pool winter J3
WNFLTHR4	745	hours per day filter pool winter J3
WNFLTHR5	746	hours per day filter pool winter J3
WNFLTHR6	747	hours per day filter pool winter J3
WNFLTHR7	748	hours per day filter pool winter J3
WNFLTHR8	749	hours per day filter pool winter J3
PLHTF1	750	fuel to heat pool J4
PLHTF2	751	fuel to heat pool J4
PLHTF3	752	fuel to heat pool J4
PLHTF4	753	fuel to heat pool J4

NAME	VARNUM	LABEL
PLHTF5	754	fuel to heat pool J4
PLHTF6	755	fuel to heat pool J4
PLHTF7	756	fuel to heat pool J4
SMHTPL1	757	Frequency heat pool summer J5
SMHTPL2	758	Frequency heat pool summer J5
SMHTPL3	759	Frequency heat pool summer J5
SMHTPL4	760	Frequency heat pool summer J5
SMHTPL5	761	Frequency heat pool summer J5
WNHTPL1	762	Frequency heat pool winter J5
WNHTPL2	763	Frequency heat pool winter J5
WNHTPL3	764	Frequency heat pool winter J5
WNHTPL4	765	Frequency heat pool winter J5
WNHTPL5	766	Frequency heat pool winter J5
PLCOV1	767	Pool cover J6
PLTIMR1	768	Pool timer J6
PLSWEEP1	769	Pool sweep J6
PLINDOOR1	770	Pool indoor J6
THEATER1	771	Number of home theaters K1
THEATER2	772	Number of home theaters K1
THEATER3	773	Number of home theaters K1
THEATER4	774	Number of home theaters K1
BSTV1	775	Number of big screen TV K1
BSTV2	776	Number of big screen TV K1
BSTV3	777	Number of big screen TV K1
BSTV4	778	Number of big screen TV K1
CLTV1	779	Number of standard TV K1
CLTV2	780	Number of standard TV K1
CLTV3	781	Number of standard TV K1
CLTV4	782	Number of standard TV K1
CABLE1	783	Number of analog cable boxes K1
CABLE2	784	Number of analog cable boxes K1
CABLE3	785	Number of analog cable boxes K1
CABLE4	786	Number of analog cable boxes K1
DIGCABLE1	787	Number of digital cable boxes K1
DIGCABLE2	788	Number of digital cable boxes K1
DIGCABLE3	789	Number of digital cable boxes K1
DIGCABLE4	790	Number of digital cable boxes K1
DSS1	791	Number of digital satellite K1
DSS2	792	Number of digital satellite K1
DSS3	793	Number of digital satellite K1
DSS4	794	Number of digital satellite K1
DVD1	795	Number of DVD K1

NAME	VARNUM	LABEL
DVD2	796	Number of DVD K1
DVD3	797	Number of DVD K1
DVD4	798	Number of DVD K1
VCR1	799	Number of VCR K1
VCR2	800	Number of VCR K1
VCR3	801	Number of VCR K1
VCR4	802	Number of VCR K1
TIVO1	803	Number of Tivo K1
TIVO2	804	Number of Tivo K1
TIVO3	805	Number of Tivo K1
TIVO4	806	Number of Tivo K1
MUSIC1	807	Number of stereos K1
MUSIC2	808	Number of stereos K1
MUSIC3	809	Number of stereos K1
MUSIC4	810	Number of stereos K1
TVUSE1	811	Hours of TV usage per day K2
TVUSE2	812	Hours of TV usage per day K2
TVUSE3	813	Hours of TV usage per day K2
TVUSE4	814	Hours of TV usage per day K2
TVUSE5	815	Hours of TV usage per day K2
TVUSE6	816	Hours of TV usage per day K2
TVUSE7	817	Hours of TV usage per day K2
TVUSE8	818	Hours of TV usage per day K2
NPCS1	819	Number of personal computers K3
NPCS2	820	Number of personal computers K3
NPCS3	821	Number of personal computers K3
NPCS4	822	Number of personal computers K3
PCHRS1	823	Hours of computer usage per day K4
PCHRS2	824	Hours of computer usage per day K4
PCHRS3	825	Hours of computer usage per day K4
PCHRS4	826	Hours of computer usage per day K4
PCHRS5	827	Hours of computer usage per day K4
PCHRS6	828	Hours of computer usage per day K4
PCHRS7	829	Hours of computer usage per day K4
PCHRS8	830	Hours of computer usage per day K4
EMAIL1	831	Frequency of email use K5
EMAIL2	832	Frequency of email use K5
EMAIL3	833	Frequency of email use K5
EMAIL4	834	Frequency of email use K5
BRWSONLN1	835	Frequency of browse internet K5
BRWSONLN2	836	Frequency of browse internet K5
BRWSONLN3	837	Frequency of browse internet K5

NAME	VARNUM	LABEL
BRWSONLN4	838	Frequency of browse internet K5
BUYONLN1	839	Frequency of buy on internet K5
BUYONLN2	840	Frequency of buy on internet K5
BUYONLN3	841	Frequency of buy on internet K5
BUYONLN4	842	Frequency of buy on internet K5
BILLONLN1	843	Frequency of pay bill on internet K5
BILLONLN2	844	Frequency of pay bill on internet K5
BILLONLN3	845	Frequency of pay bill on internet K5
BILLONLN4	846	Frequency of pay bill on internet K5
WORKHOME1	847	Work from home K6
WORKHOME2	848	Work from home K6
WKHRSHM1	849	Hours per week work from home K7
WKHRSHM2	850	Hours per week work from home K7
WKHRSHM3	851	Hours per week work from home K7
ANSRMCHN1	852	Number of answering machines K8
ANSRMCHN2	853	Number of answering machines K8
ANSRMCHN3	854	Number of answering machines K8
ANSRMCHN4	855	Number of answering machines K8
MULTMCHN1	856	Number of multifunction machines K8
MULTMCHN2	857	Number of multifunction machines K8
MULTMCHN3	858	Number of multifunction machines K8
MULTMCHN4	859	Number of multifunction machines K8
FAX1	860	Number of FAX machines K8
FAX2	861	Number of FAX machines K8
FAX3	862	Number of FAX machines K8
FAX4	863	Number of FAX machines K8
PRTLAS1	864	Number of printers K8
PRTLAS2	865	Number of printers K8
PRTLAS3	866	Number of printers K8
PRTLAS4	867	Number of printers K8
SCAN1	868	Number of Scanners K8
SCAN2	869	Number of Scanners K8
SCAN3	870	Number of Scanners K8
SCAN4	871	Number of Scanners K8
COPIER1	872	Number of copier K8
COPIER2	873	Number of copier K8
COPIER3	874	Number of copier K8
COPIER4	875	Number of copier K8
PHINT1	876	Number of phone internet access K8
PHINT2	877	Number of phone internet access K8
PHINT3	878	Number of phone internet access K8
PHINT4	879	Number of phone internet access K8

NAME	VARNUM	LABEL
DSLINT1	880	Number of DSL modem K8
DSLINT2	881	Number of DSL modem K8
DSLINT3	882	Number of DSL modem K8
DSLINT4	883	Number of DSL modem K8
CBLINT1	884	Number of Cabel Model K8
CBLINT2	885	Number of Cabel Model K8
CBLINT3	886	Number of Cabel Model K8
CBLINT4	887	Number of Cabel Model K8
SATCMINT1	888	Number Satellite communication for internet K8
SATCMINT2	889	Number Satellite communication for internet K8
SATCMINT3	890	Number Satellite communication for internet K8
SATCMINT4	891	Number Satellite communication for internet K8
NETWK1	892	Number of home networks K8
NETWK2	893	Number of home networks K8
NETWK3	894	Number of home networks K8
NETWK4	895	Number of home networks K8
CELL1	896	Number of cell phones K8
CELL2	897	Number of cell phones K8
CELL3	898	Number of cell phones K8
CELL4	899	Number of cell phones K8
ICFL1	900	Number of Interior CFL L1
ICFL2	901	Number of Interior CFL L1
ICFL3	902	Number of Interior CFL L1
ICFL4	903	Number of Interior CFL L1
ICFL5	904	Number of Interior CFL L1
ICTLTIMR1	905	Number of Interior timers L1
ICTLTIMR2	906	Number of Interior timers L1
ICTLTIMR3	907	Number of Interior timers L1
ICTLTIMR4	908	Number of Interior timers L1
ICTLTIMR5	909	Number of Interior timers L1
ICTLOCCS1	910	Number of interior motion detectors L1
ICTLOCCS2	911	Number of interior motion detectors L1
ICTLOCCS3	912	Number of interior motion detectors L1
ICTLOCCS4	913	Number of interior motion detectors L1
ICTLOCCS5	914	Number of interior motion detectors L1
ICTLDIM1	915	Number of interior dimmers L1
ICTLDIM2	916	Number of interior dimmers L1
ICTLDIM3	917	Number of interior dimmers L1
ICTLDIM4	918	Number of interior dimmers L1
ICTLDIM5	919	Number of interior dimmers L1
EXINC1	920	Number of exterior incandescent L2
EXINC2	921	Number of exterior incandescent L2

NAME	VARNUM	LABEL
EXINC3	922	Number of exterior incandescent L2
EXINC4	923	Number of exterior incandescent L2
EXCFL1	924	Number of exterior CFL L2
EXCFL2	925	Number of exterior CFL L2
EXCFL3	926	Number of exterior CFL L2
EXCFL4	927	Number of exterior CFL L2
EXLOWV1	928	Number of exterior low volt landscape L2
EXLOWV2	929	Number of exterior low volt landscape L2
EXLOWV3	930	Number of exterior low volt landscape L2
EXLOWV4	931	Number of exterior low volt landscape L2
EXHID1	932	Number of exterior metal halide L2
EXHID2	933	Number of exterior metal halide L2
EXHID3	934	Number of exterior metal halide L2
EXHID4	935	Number of exterior metal halide L2
ECTLTIMR1	936	Number of exterior timers L2
ECTLTIMR2	937	Number of exterior timers L2
ECTLTIMR3	938	Number of exterior timers L2
ECTLTIMR4	939	Number of exterior timers L2
ECTLDSK1	940	Number of exterior light sensors L2
ECTLDSK2	941	Number of exterior light sensors L2
ECTLDSK3	942	Number of exterior light sensors L2
ECTLDSK4	943	Number of exterior light sensors L2
ECTLMOTN1	944	Number of exterior motion detectors L2
ECTLMOTN2	945	Number of exterior motion detectors L2
ECTLMOTN3	946	Number of exterior motion detectors L2
ECTLMOTN4	947	Number of exterior motion detectors L2
FNPORT1	948	Number of portable fans M1
FNPORT2	949	Number of portable fans M1
FNPORT3	950	Number of portable fans M1
FNPORT4	951	Number of portable fans M1
FNCEIL1	952	Number of Ceiling fans M1
FNCEIL2	953	Number of Ceiling fans M1
FNCEIL3	954	Number of Ceiling fans M1
FNCEIL4	955	Number of Ceiling fans M1
WNDATV1	956	Number of wind turbine attic ventilators M1
WNDATV2	957	Number of wind turbine attic ventilators M1
WNDATV3	958	Number of wind turbine attic ventilators M1
WNDATV4	959	Number of wind turbine attic ventilators M1
FNATTIC1	960	Number of electric attic fans M1
FNATTIC2	961	Number of electric attic fans M1
FNATTIC3	962	Number of electric attic fans M1
FNATTIC4	963	Number of electric attic fans M1

NAME	VARNUM	LABEL
FNWHOLE1	964	Number of whole house fans M1
FNWHOLE2	965	Number of whole house fans M1
FNWHOLE3	966	Number of whole house fans M1
FNWHOLE4	967	Number of whole house fans M1
AIRCLEAN1	968	Number of household air cleaners M1
AIRCLEAN2	969	Number of household air cleaners M1
AIRCLEAN3	970	Number of household air cleaners M1
AIRCLEAN4	971	Number of household air cleaners M1
HUM1	972	Number of Humidifiers M1
HUM2	973	Number of Humidifiers M1
HUM3	974	Number of Humidifiers M1
HUM4	975	Number of Humidifiers M1
DEH1	976	Number of dehumidifiers M1
DEH2	977	Number of dehumidifiers M1
DEH3	978	Number of dehumidifiers M1
DEH4	979	Number of dehumidifiers M1
WHPURIFY1	980	Number of water purification systems M1
WHPURIFY2	981	Number of water purification systems M1
WHPURIFY3	982	Number of water purification systems M1
WHPURIFY4	983	Number of water purification systems M1
WBED1	984	Number of heated waterbeds M1
WBED2	985	Number of heated waterbeds M1
WBED3	986	Number of heated waterbeds M1
WBED4	987	Number of heated waterbeds M1
ELBLNKET1	988	Number of electric blankets M1
ELBLNKET2	989	Number of electric blankets M1
ELBLNKET3	990	Number of electric blankets M1
ELBLNKET4	991	Number of electric blankets M1
AQUAR1	992	Number of aquariums M1
AQUAR2	993	Number of aquariums M1
AQUAR3	994	Number of aquariums M1
AQUAR4	995	Number of aquariums M1
TRSHCOMP1	996	Number of trash compactors M1
TRSHCOMP2	997	Number of trash compactors M1
TRSHCOMP3	998	Number of trash compactors M1
TRSHCOMP4	999	Number of trash compactors M1
SAUNA1	1000	Number of electric Saunas M1
SAUNA2	1001	Number of electric Saunas M1
SAUNA3	1002	Number of electric Saunas M1
SAUNA4	1003	Number of electric Saunas M1
SCRYSYS1	1004	Number of security systems M1
SCRYSYS2	1005	Number of security systems M1

NAME	VARNUM	LABEL
SCRTYSYS3	1006	Number of security systems M1
SCRTYSYS4	1007	Number of security systems M1
POND1	1008	Number of pond pumps M1
POND2	1009	Number of pond pumps M1
POND3	1010	Number of pond pumps M1
POND4	1011	Number of pond pumps M1
GRGDROPN1	1012	Number of electric garage door openers M1
GRGDROPN2	1013	Number of electric garage door openers M1
GRGDROPN3	1014	Number of electric garage door openers M1
GRGDROPN4	1015	Number of electric garage door openers M1
LAWNMOWR1	1016	Number of electric lawn mowers M1
LAWNMOWR2	1017	Number of electric lawn mowers M1
LAWNMOWR3	1018	Number of electric lawn mowers M1
LAWNMOWR4	1019	Number of electric lawn mowers M1
WLWTRPMP1	1020	Use of Electric Well Water Pump M2
WLWTRPMP2	1021	Use of Electric Well Water Pump M2
WTRSRCES1	1022	access to city water M3
WTRSRCES2	1023	access to city water M3
WLWTUSE1	1024	How do you use well water M4
WLWTUSE2	1025	How do you use well water M4
WLWTUSE3	1026	How do you use well water M4
SUMPPMP1	1027	Use sump pump M5
SHOPTLS1	1028	Use shop tools M5
WELD1	1029	Use electric welding equipment M5
AIRCOMP1	1030	Use electric air compressor M5
BATCHRGE1	1031	Use large battery charger M5
KILN1	1032	Pottery kiln M5
KILN2	1033	Pottery kiln M5
KILN3	1034	Pottery kiln M5
MEDICAL1	1035	Use medical equipment M5
MEDICAL2	1036	Use medical equipment M5
MEDICAL3	1037	Use medical equipment M5
ELVEH1	1038	Electric vehicle, golf cart, wheelchair M6
ELVEH2	1039	Electric vehicle, golf cart, wheelchair M6
ELVEH3	1040	Electric vehicle, golf cart, wheelchair M6
ELVEH4	1041	Electric vehicle, golf cart, wheelchair M6
CHRGVEH1	1042	Charge electric vehicle at home M7
CHRGVEH2	1043	Charge electric vehicle at home M7
OLRGAPP1	1044	Other large electric or gas appliances M8
OLRGAPP2	1045	Other large electric or gas appliances M8
CHADD1	1046	Added Central Heating M9
CHFUEL1	1047	Fuel for added central heating M9

NAME	VARNUM	LABEL
CHFUEL2	1048	Fuel for added central heating M9
CHFUEL3	1049	Fuel for added central heating M9
CCADD1	1050	Added Central Cooling M9
CCFUEL1	1051	Fuel for added central cooling M9
WWADD1	1052	Added window or wall cooling M9
WWFUEL1	1053	Fuel for added window or wall cooling M9
WHADD1	1054	Added water heater M9
WHFUEL1	1055	Fuel for added water heater M9
WHFUEL2	1056	Fuel for added water heater M9
WHFUEL3	1057	Fuel for added water heater M9
STADD1	1058	Added Stove top M9
STFUEL1	1059	Fuel for added stove top M9
STFUEL2	1060	Fuel for added stove top M9
STFUEL3	1061	Fuel for added stove top M9
OVADD1	1062	Added oven M9
OVFUEL1	1063	Fuel for added oven M9
OVFUEL2	1064	Fuel for added oven M9
OVFUEL3	1065	Fuel for added oven M9
MWADD1	1066	Added Microwave M9
MWFUEL1	1067	Fuel for added Microwave M9
DWADD1	1068	Added Dishwasher M9
DWFUEL1	1069	Fuel for added dishwasher M9
CWADD1	1070	Added Clothes Washer M9
CWFUEL1	1071	Fuel for added clothes washer M9
CDADD1	1072	Added Clothes Dryer M9
CDFUEL1	1073	Fuel for added clothes dryer M9
CDFUEL2	1074	Fuel for added clothes dryer M9
CDFUEL3	1075	Fuel for added clothes dryer M9
PHADD1	1076	Added pool heater M9
PHFUEL1	1077	Fuel for added pool heater M9
PHFUEL2	1078	Fuel for added pool heater M9
PHFUEL3	1079	Fuel for added pool heater M9
PPADD1	1080	Added pool pump M9
PPFUEL1	1081	Fuel for added pool pump M9
TBADD1	1082	Added hot tub M9
TBFUEL1	1083	Fuel for added hot tub M9
TBFUEL2	1084	Fuel for added hot tub M9
TBFUEL3	1085	Fuel for added hot tub M9
NOADD1	1086	Have not added major appliance M9
DCHAGE1	1087	Age of discarded Central Heater M10
DCHAGE2	1088	Age of discarded Central Heater M10
DCHAGE3	1089	Age of discarded Central Heater M10

NAME	VARNUM	LABEL
DCHFL1	1090	Fuel of discarded central heater M10
DCHFL2	1091	Fuel of discarded central heater M10
DCHFL3	1092	Fuel of discarded central heater M10
DCCAGE1	1093	age of discarded central cooling M10
DCCAGE2	1094	age of discarded central cooling M10
DCCAGE3	1095	age of discarded central cooling M10
DCCFL1	1096	Fuel of discarded central cooling M10
DWWAGE1	1097	Age of discarded wall cooling M10
DWWAGE2	1098	Age of discarded wall cooling M10
DWWAGE3	1099	Age of discarded wall cooling M10
DWWFL1	1100	Fuel of discarded wall cooling M10
DWHAGE1	1101	Age of discarded water heater M10
DWHAGE2	1102	Age of discarded water heater M10
DWHAGE3	1103	Age of discarded water heater M10
DWHFL1	1104	Fuel of discarded water heater M10
DWHFL2	1105	Fuel of discarded water heater M10
DWHFL3	1106	Fuel of discarded water heater M10
DSTAGE1	1107	Age of discarded stove top M10
DSTAGE2	1108	Age of discarded stove top M10
DSTAGE3	1109	Age of discarded stove top M10
DSTFL1	1110	Fuel of discarded stove top M10
DSTFL2	1111	Fuel of discarded stove top M10
DSTFL3	1112	Fuel of discarded stove top M10
DOVAGE1	1113	Age of discarded oven M10
DOVAGE2	1114	Age of discarded oven M10
DOVAGE3	1115	Age of discarded oven M10
DOVFL1	1116	Fuel of discarded oven M10
DOVFL2	1117	Fuel of discarded oven M10
DOVFL3	1118	Fuel of discarded oven M10
DMWAGE1	1119	age of discarded microwave M10
DMWAGE2	1120	age of discarded microwave M10
DMWAGE3	1121	age of discarded microwave M10
DMWFL1	1122	Fuel of discarded microwave M10
DDWAGE1	1123	Age of discarded dishwasher M10
DDWAGE2	1124	Age of discarded dishwasher M10
DDWAGE3	1125	Age of discarded dishwasher M10
DDWFL1	1126	Fuel of discarded dishwasher M10
DCWAGE1	1127	Age of discarded clothes washer M10
DCWAGE2	1128	Age of discarded clothes washer M10
DCWAGE3	1129	Age of discarded clothes washer M10
DCWFL1	1130	Fuel of discarded clothes washer M10
DCDAGE1	1131	Age of discarded clothes dryer M10

NAME	VARNUM	LABEL
DCDAGE2	1132	Age of discarded clothes dryer M10
DCDAGE3	1133	Age of discarded clothes dryer M10
DCDFL1	1134	Fuel of discarded clothes dryer M10
DCDFL2	1135	Fuel of discarded clothes dryer M10
DCDFL3	1136	Fuel of discarded clothes dryer M10
DPHAGE1	1137	Age of discarded pool heater M10
DPHAGE2	1138	Age of discarded pool heater M10
DPHAGE3	1139	Age of discarded pool heater M10
DPHFL1	1140	Fuel of discarded pool heater M10
DPHFL2	1141	Fuel of discarded pool heater M10
DPHFL3	1142	Fuel of discarded pool heater M10
DPPAGE1	1143	Age of discarded pool pump M10
DPPAGE2	1144	Age of discarded pool pump M10
DPPAGE3	1145	Age of discarded pool pump M10
DPPFL1	1146	Fuel of discarded pool pump M10
DTBAGE1	1147	Age of discarded hot tub M10
DTBAGE2	1148	Age of discarded hot tub M10
DTBAGE3	1149	Age of discarded hot tub M10
DTBFL1	1150	Fuel of discarded hot tub M10
DTBFL2	1151	Fuel of discarded hot tub M10
DTBFL3	1152	Fuel of discarded hot tub M10
NODISCRD1	1153	Have not discarded above appliances M10
PTHME1	1154	Other homes in california occupied by family N1
PTHME2	1155	Other homes in california occupied by family N1
PTHMELOC1	1156	Location of other home N2
PTHMELOC2	1157	Location of other home N2
PTHMELOC3	1158	Location of other home N2
PTHMELOC4	1159	Location of other home N2
PTHMELOC5	1160	Location of other home N2
PTHMEUTL1	1161	Utility of other home N2
PTHMEUTL2	1162	Utility of other home N2
PTHMEUTL3	1163	Utility of other home N2
PTHMEUTL4	1164	Utility of other home N2
PTHMEUTL5	1165	Utility of other home N2
EDUC1	1166	Education of head of household N3
EDUC2	1167	Education of head of household N3
EDUC3	1168	Education of head of household N3
EDUC4	1169	Education of head of household N3
EDUC5	1170	Education of head of household N3
EDUC6	1171	Education of head of household N3
ETHNIC1	1172	Primary language N4
ETHNIC2	1173	Primary language N4

NAME	VARNUM	LABEL
ETHNIC3	1174	Primary language N4
ETHNIC4	1175	Primary language N4
DISABLED1	1176	Is Occupant Disabled N5
DISABLED2	1177	Is Occupant Disabled N5
DISABLED3	1178	Is Occupant Disabled N5
HOHIND11	1179	Is head 1 an American Indian N6
HOHIND21	1180	Is head 2 an American Indian N6
HOHASN11	1181	Is head 1 Asian or Pac. Island N6
HOHASN21	1182	Is head 2 Asian or Pac. Island N6
HOHBLK11	1183	Is head 1 black N6
HOHBLK21	1184	Is head 2 black N6
HOHLAT11	1185	Is head 1 latino N6
HOHLAT21	1186	Is head 2 latino N6
HOHWHT11	1187	Is head 1 white N6
HOHWHT21	1188	Is head 2 white N6
HOHOTH11	1189	Is head 1 Other N6
HOHOTH21	1190	Is head 2 Other N6
INCOME1	1191	Household total income N7
INCOME2	1192	Household total income N7
INCOME3	1193	Household total income N7
INCOME4	1194	Household total income N7
INCOME5	1195	Household total income N7
INCOME6	1196	Household total income N7
INCOME7	1197	Household total income N7
INCOME8	1198	Household total income N7
INCOME9	1199	Household total income N7
INCOME10	1200	Household total income N7
INCOME11	1201	Household total income N7
INCOME12	1202	Household total income N7
PHONE1	1203	household phone N7
PHONE2	1204	household phone N7
PHONE3	1205	household phone N7
PHONE4	1206	household phone N7
PHONE5	1207	household phone N7
PHONE6	1208	household phone N7
PHONE7	1209	household phone N7
PHONE8	1210	household phone N7
PHONE9	1211	household phone N7
PHONE10	1212	household phone N7
PHONE11	1213	household phone N7
PHONE12	1214	household phone N7
PHONE13	1215	household phone N7

NAME	VARNUM	LABEL
PHONE14	1216	household phone N7
PHONE15	1217	household phone N7
PHONE16	1218	household phone N7
PHONE17	1219	household phone N7
PHONE18	1220	household phone N7
PHONE19	1221	household phone N7
PHONE20	1222	household phone N7
PHONE21	1223	household phone N7
PHONE22	1224	household phone N7
PHONE23	1225	household phone N7
PHONE24	1226	household phone N7
PHONE25	1227	household phone N7
PHONE26	1228	household phone N7
PHONE27	1229	household phone N7
PHONE28	1230	household phone N7
PHONE29	1231	household phone N7
PHONE30	1232	household phone N7
PHONE31	1233	household phone N7
PHONE32	1234	household phone N7
PHONE33	1235	household phone N7
PHONE34	1236	household phone N7
PHONE35	1237	household phone N7
PHONE36	1238	household phone N7
PHONE37	1239	household phone N7
PHONE38	1240	household phone N7
PHONE39	1241	household phone N7
PHONE40	1242	household phone N7
PHONE41	1243	household phone N7
PHONE42	1244	household phone N7
PHONE43	1245	household phone N7
PHONE44	1246	household phone N7
PHONE45	1247	household phone N7
PHONE46	1248	household phone N7
PHONE47	1249	household phone N7
PHONE48	1250	household phone N7
PHONE49	1251	household phone N7
PHONE50	1252	household phone N7
PHONE51	1253	household phone N7
PHONE52	1254	household phone N7
PHONE53	1255	household phone N7
PHONE54	1256	household phone N7
PHONE55	1257	household phone N7

NAME	VARNUM	LABEL
PHONE56	1258	household phone N7
PHONE57	1259	household phone N7
PHONE58	1260	household phone N7
PHONE59	1261	household phone N7
PHONE60	1262	household phone N7
PHONE61	1263	household phone N7
PHONE62	1264	household phone N7
PHONE63	1265	household phone N7
PHONE64	1266	household phone N7
PHONE65	1267	household phone N7
PHONE66	1268	household phone N7
PHONE67	1269	household phone N7
PHONE68	1270	household phone N7
PHONE69	1271	household phone N7
PHONE70	1272	household phone N7
PHONE71	1273	household phone N7
PHONE72	1274	household phone N7
PHONE73	1275	household phone N7
PHONE74	1276	household phone N7
PHONE75	1277	household phone N7
PHONE76	1278	household phone N7
PHONE77	1279	household phone N7
PHONE78	1280	household phone N7
PHONE79	1281	household phone N7
PHONE80	1282	household phone N7
PHONE81	1283	household phone N7
PHONE82	1284	household phone N7
PHONE83	1285	household phone N7
PHONE84	1286	household phone N7
PHONE85	1287	household phone N7
PHONE86	1288	household phone N7
PHONE87	1289	household phone N7
PHONE88	1290	household phone N7
PHONE89	1291	household phone N7
PHONE90	1292	household phone N7
PHONE91	1293	household phone N7
PHONE92	1294	household phone N7
PHONE93	1295	household phone N7
PHONE94	1296	household phone N7
PHONE95	1297	household phone N7
PHONE96	1298	household phone N7
PHONE97	1299	household phone N7

NAME	VARNUM	LABEL
PHONE98	1300	household phone N7
PHONE99	1301	household phone N7
PHONE100	1302	household phone N7
TIMECALL1	1303	Best time to call N7
TIMECALL2	1304	Best time to call N7
TIMECALL3	1305	Best time to call N7
TIMECALL4	1306	Best time to call N7
TIMECALL5	1307	Best time to call N7
IDENTIFIER	1308	Tracking number of physical survey
BATCH_NAME	1309	Name of sub-group of surveys scanned together
RECODE_ID	1310	Recoded Tracking number of survey
SFCODE	1311	Sample frame tracking number
nonresponse	1312	survey from initial nonrespondent
all	1313	Placeholder

***J: CLEANED SURVEY VARIABLES
(INCLUDING CDA RESULTS)***

CONT

NAME	VARNUM	LABEL
sfcode	1	Sample frame tracking number
cecsamp	2	old cec forecast zone
cecfast	3	New forecast climate zone
UTILSDGE	4	utility specific zone - sdge
wt	5	weight
BATCHNO	6	batchno
DWLTYPE	7	Type of dwelling - A1
STORIES	8	Stories in SF dwelling - A1
OWNRENT	9	Occupied by owner or renter - A2
YRS_RES	10	Years lived in dwelling - A3
SEASOCC	11	Permanent or seasonal residence - A4
SEASJAN	12	Seasonal residence, occupied in Jan - A5
SEASFEB	13	Seasonal residence, occupied in Feb - A5
SEASMAR	14	Seasonal residence, occupied in Mar - A5
SEASAPR	15	Seasonal residence, occupied in Apr - A5
SEASMAY	16	Seasonal residence, occupied in May - A5
SEASJUN	17	Seasonal residence, occupied in Jun - A5
SEASJUL	18	Seasonal residence, occupied in Jul - A5
SEASAUG	19	Seasonal residence, occupied in Aug - A5
SEASSEP	20	Seasonal residence, occupied in Sep - A5
SEASOCT	21	Seasonal residence, occupied in Oct - A5
SEASNOV	22	Seasonal residence, occupied in Nov - A5
SEASDEC	23	Seasonal residence, occupied in Dec - A5
BUILTYR	24	Year residence built - A6
NUMROOM	25	Number of bedrooms in residence - A7
SQFT	26	Square foot of living space in residence - A8
EXTWLINS	27	Home has insulated exterior walls - A9
ACEILINS	28	Home has insulated attic - A10
CEILINCH	29	Inches of attic insulation - A11
WINDTYPE	30	Window pane type - A12
WINFRAME	31	Window frame type - A13
REMOD	32	Home has been remodeled - A14
RMDROOM	33	Remodel was room additon - A15
RMDKTBTH	34	Bath or kitchen remodel - A15
RMDREBLT	35	Rebuilt most of house during remodel - A15
RMDOTHR	36	Remodel other - A15
NR0_5	37	Number under 5 years of age in home - A16
NR6_18	38	Number 6-18 years of age in home - A16
NR19_34	39	Number 19-34 years of age in home - A16
NR35_54	40	Number 35-54 years of age in home - A16
NR55_64	41	Number 55-64 years of age in home - A16
NR65_99	42	Number 65-99 years of age in home - A16
ONPKUSE	43	Peak time use of electrical appliances - A17
NGSERV	44	Natural gas service available in area - A18
NGLINE	45	Natural gas service available in home - A19
NGUTIL	46	Natural gas utility - A20
PAYHEAT	47	Pay to heat home - B1
PHTNGCNT	48	Central forced air gas furnace - B2
PHTNGFWL	49	Floor or wall gas furnace - B2
PHTNGRAD	50	Hot water gas radiator - B2
PHTNGOTH	51	Other gas heater - B2

CONT

NAME	VARNUM	LABEL
PHTELBSB	52	Resistance electric heater - B2
PHTELCRH	53	Central forced air electric furnace - B2
PHTELCHP	54	Central electric heat pump - B2
PHTELWHP	55	Through the wall electric heat pump - B2
PHTELPOR	56	Portable electric heater - B2
PHTELOTH	57	Other electric heater - B2
PHTBGCNT	58	Central forced air bottle gas furnace - B2
PHTBGFWL	59	Floor or wall bottle gas heater - B2
PHTBGRAD	60	Hot water bottle gas radiator - B2
PHTBGOTH	61	Bottle gas heater other - B2
PHTWDWS	62	Wood stove insert - B2
PHTWDFP	63	Fireplace - B2
PHTSLRN	64	Solar heat no backup - B2
PHTSLRG	65	Solar heat, natural gas backup - B2
PHTSLRP	66	Solar heat, propane backup - B2
PHTSLRE	67	Solar heat, electric backup - B2
PHTOTSYS	68	Other heat - B2
AHTNGCNT	69	Additional central forced air gas furnace - B2
AHTNGFWL	70	Additional floor or wall gas furnace - B2
AHTNGRAD	71	Additional hot water gas radiator - B2
AHTNGOTH	72	Additional other gas heater - B2
AHTELBSB	73	Additional resistance electric heater - B2
AHTELCRH	74	Additional central forced air electric furnace - B2
AHTELCHP	75	Additional central electric heat pump - B2
AHTELWHP	76	Additional through the wall electric heat pump - B2
AHTELPOR	77	Additional portable electric heater - B2
AHTELOTH	78	Additional other electric heater - B2
AHTBGCNT	79	Additional central forced air bottle gas furnace - B2
AHTBGFWL	80	Additional floor or wall bottle gas heater - B2
AHTBGRAD	81	Additional hot water bottle gas radiator - B2
AHTBGOTH	82	Additional bottle gas heater other - B2
AHTWDWS	83	Additional wood stove insert - B2
AHTWDFP	84	Additional fireplace - B2
AHTSLRN	85	Additional solar heat no backup - B2
AHTSLRG	86	Additional solar heat, natural gas backup - B2
AHTSLRP	87	Additional solar heat, propane backup - B2
AHTSLRE	88	Additional solar heat, electric backup - B2
AHTOTSYS	89	Additional other heat - B2
MAINPILT	90	Main heater has gas pilot light - B3
SECPILT	91	Secondary heater has gas pilot light - B3
HTSYSAGE	92	Age of main heating system - B4
HTCTLTYP	93	Thermostat type for main heating system - B5
HMRNSET	94	Heater thermostat setting in morning - B6
HDAYSET	95	Heater thermostat setting in day - B6
HEVNSET	96	Heater thermostat setting in evening - B6
HNITESET	97	Heater thermostat setting in night - B6
HTMAINTN	98	Maintenance preformed on heating system - B7
NPORHTRS	99	Number of portable heaters - B8
USEADDHT	100	Use of additional heating systems - B9
PAYCOOL	101	Pay for central air conditioning - C1
CTLACAGE	102	Number of central air conditioners - C2

CONT

NAME	VARNUM	LABEL
CTEVPAGE	103	Number of central evaporative coolers - C2
HPAGE	104	Number of heat pumps - C2
CLCNTAGE	105	Age of main central air conditioner - C3
CLCTLTYP	106	Thermostat type for main central air - C4
CMRNSET	107	AC thermostat setting in morning - C5
CDAYSET	108	AC thermostat setting in day - C5
CEVNSET	109	AC thermostat setting in evening - C5
CNITESET	110	AC thermostat setting in night - C5
CLMAINTN	111	Maintenance preformed on ac system - C6
NOROOMAC	112	No room air conditioner - C7
ACTYP1	113	Type room air conditioner 1 - C7
ACTYP2	114	Type room air conditioner 2 - C7
ACTYP3	115	Type room air conditioner 3 - C7
ACAGE1	116	Age of room air conditioner 1 - C7
ACAGE2	117	Age of room air conditioner 2 - C7
ACAGE3	118	Age of room air conditioner 3 - C7
CMRNUSE	119	Use of room air conditioner in morning - C8
CDAYUSE	120	Use of room air conditioner in day - C8
CEVNUSE	121	Use of room air conditioner in evening - C8
CNITEUSE	122	Use of room air conditioner at night - C8
CHOTUSE	123	Use of room air conditioner on a hot weekday - C8
PAYWH	124	Pay for water heater - D1
PWHNGTNK	125	Standard tank gas water heater - D2
PWHNGWHT	126	Whole house tankless gas water heater - D2
PWHELTKN	127	Standard tank electric water heater - D2
PWHELHP	128	Heat pump electric water heater - D2
PWHELWHT	129	Whole house tankless ele water heater - D2
PWHELPNT	130	Point of use tankless ele water heater - D2
PWHLPTNK	131	Standard tank propane water heater - D2
PWHLPWHT	132	Whole house tankless propane water heater - D2
PWHLRN	133	Solar water heater, no backup - D2
PWHLRG	134	Solar water heater, natural gas backup - D2
PWHLRP	135	Solar water heater, propane backup - D2
PWHLRE	136	Solar water heater, electric backup - D2
PWHOTSYS	137	Water heater, other fuel - D2
AWHNGTNK	138	Additional standard tank gas water heater - D2
AWHNGWHT	139	Additional water heaterole house tankless gas water h
AWHELTKN	140	Additional standard tank electric water heater - D2
AWHELHP	141	Additional heat pump electric water heater - D2
AWHELWHT	142	Additional whole house tankless electric water heater
AWHELPNT	143	Additional point of use tankless electric water heater -
AWHLPTNK	144	Additional standard tank propane water heater - D2
AWHLPWHT	145	Additional whole house tankless propane water heater
AWHLRN	146	Additional solar water heater, no backup - D2
AWHLRG	147	Additional solar water heater, natural gas backup - D2
AWHLRP	148	Additional solar water heater, propane backup - D2
AWHLRE	149	Additional solar water heater, electric backup - D2
AWHOTSYS	150	Additional water heater, other fuel - D2
WHTEMP	151	Water heater temperature - D3
PRWHAGE	152	Water heater age - D4
TANKINS	153	Water heater insulation blanket - D5

CONT

NAME	VARNUM LABEL
SHWRDAY	154 Number of showers - D6
BATHSDAY	155 Number of baths - D6
SHOWERHD	156 Low flow shower head - D7
AERATORS	157 Faucet airators - D8
LNDRYEQP	158 Laundry equipment in home - E1
CWTYP	159 Type of clothes washer - E2
CWAGE	160 Clothes washer age - E3
CWHWLD	161 Number of hot water washes per week - E4
CWWWLD	162 Number of warm water washes per week - E4
CWCWLD	163 Number of cold water washes per week - E4
CDTYP	164 Type of clothes dryer - E5
DRYLDS	165 Number of dryer loads per week - E6
CKRNTYP	166 Fuel for cooktop - F1
CKRNA	167 Age of cooktop - F1
CKOVTYP	168 Fuel for oven - F1
CKOVA	169 Age of oven - F1
CKBBTYP	170 Fuel for barbecue - F1
CKBBQA	171 Age of barbecue - F1
BRNOVUSE	172 How often use range/oven for breakfast - F2
LRNOVUSE	173 How often use range/oven for lunch - F2
DRNOVUSE	174 How often use range/oven for dinner - F2
ORNOVUSE	175 How often use range/oven for other - F2
MWUSE	176 Have microwave oven - F3
DISHWASH	177 Have dishwasher - F4
DWLOADS	178 Number of dishwasher loads per week - F5
RFNUM	179 Number of refrigerators - G1
RF1STY	180 Door style of first refrigerator - G2
RF2STY	181 Door style of second refrigerator - G2
RF3STY	182 Door style of third refrigerator - G2
RFDSCSTY	183 Door style of discarded refrigerator - G2
RF1SZ	184 Size of first refrigerator - G2
RF2SZ	185 Size of second refrigerator - G2
RF3SZ	186 Size of third refrigerator - G2
RFDSCSZ	187 Size of discarded refrigerator - G2
RF1DEF	188 Defrost type of first refrigerator - G2
RF2DEF	189 Defrost type of second refrigerator - G2
RF3DEF	190 Defrost type of third refrigerator - G2
RFDSCDEF	191 Defrost type of discarded refrigerator - G2
RF1AGE	192 Age of first refrigerator - G2
RF2AGE	193 Age of second refrigerator - G2
RF3AGE	194 Age of third refrigerator - G2
RFDSCAGE	195 Age of discarded refrigerator - G2
RF1OTH	196 Door ice in first refrigerator - G2
RF2OTH	197 Door ice in second refrigerator - G2
RF3OTH	198 Door ice in third refrigerator - G2
RFDSCOTH	199 Door ice in discarded refrigerator - G2
FZNUM	200 Number of stand alone freezers - H1
FZ1STY	201 Style of first freezer - H2
FZ2STY	202 Style of second freezer - H2
FZDSCSTY	203 Style of discarded freezer - H2
FZ1SZ	204 Size of first freezer - H2

CONT

NAME	VARNUM	LABEL
FZ2SZ	205	Size of second freezer - H2
FZDSCSZ	206	Size of discarded freezer - H2
FZ1AGE	207	Age of first freezer - H2
FZ2AGE	208	Age of second freezer - H2
FZDSCAGE	209	Age of discarded freezer - H2
SPTYP	210	Spa or hot tub - I1
SPHTF	211	Spa fuel - I2
SPSZ	212	Spa size - I3
SPLOC	213	Spa location - I4
SPCOV	214	Spa cover - I5
SMFLTPMP	215	Frequency of spa filtration summer - I6
WNFLTPMP	216	Frequency of spa filtration winter - I6
SMHTSPA	217	Frequency of spa heat in summer - I7
WNHTSPA	218	Frequency of spa heat in winter - I7
PLTYP	219	Pool, pay for energy - J1
PLSZ	220	Pool size - J2
SMFLTHR	221	Hours per day filter pool summer - J3
WNFLTHR	222	Hours per day filter pool winter - J3
PLHTF	223	Fuel to heat pool - J4
SMHTPL	224	Frequency heat pool summer - J5
WNHTPL	225	Frequency heat pool winter - J5
PLCOV	226	Pool cover - J6
PLTIMR	227	Pool timer - J6
PLSWEEP	228	Pool sweep - J6
PLINDOOR	229	Pool is indoors - J6
THEATER	230	Number of home theaters - K1
BSTV	231	Number of big screen TV - K1
CLTV	232	Number of standard TV - K1
CABLE	233	Number of analog cable boxes - K1
DIGCABLE	234	Number of digital cable boxes - K1
DSS	235	Number of digital satellite - K1
DVD	236	Number of DVD - K1
VCR	237	Number of VCR - K1
TIVO	238	Number of TiVo - K1
MUSIC	239	Number of stereos - K1
TVUSE	240	Hours of TV usage per day - K2
NPCS	241	Number of personal computers - K3
PCHRS	242	Hours of computer usage per day - K4
EMAIL	243	Frequency of email use - K5
BRWSONLN	244	Frequency of browse internet - K5
BUYONLN	245	Frequency of buy on internet - K5
BILLONLN	246	Frequency of pay bill on internet - K5
WORKHOME	247	Work from home - K6
WKHRSHM	248	Hours per week work from home - K7
ANSRMCHN	249	Number of answering machines - K8
MULTMCHN	250	Number of multifunction machines - K8
FAX	251	Number of FAX machines - K8
PRTLAS	252	Number of printers - K8
SCAN	253	Number of scanners - K8
COPIER	254	Number of copier - K8
PHINT	255	Number of phone internet access - K8

CONT

NAME	VARNUM	LABEL
DSLINT	256	Number of DSL modem - K8
CBLINT	257	Number of cabel model - K8
SATCMINT	258	Number satellite communication for internet - K8
NETWK	259	Number of home networks - K8
CELL	260	Number of cell phones - K8
ICFL	261	Number of interior CFL - L1
ICTLTIMR	262	Number of interior timers - L1
ICTLOCCS	263	Number of interior motion detectors - L1
ICTLDIM	264	Number of interior dimmers - L1
EXINC	265	Number of exterior incandescent - L2
EXCFL	266	Number of exterior CFL - L2
EXLOWV	267	Number of exterior low volt landscape - L2
EXHID	268	Number of exterior metal halide - L2
ECLTIMR	269	Number of exterior timers - L2
ECLDSK	270	Number of exterior light sensors - L2
ECLMOTN	271	Number of exterior motion detectors - L2
FNPORT	272	Number of portable fans - M1
FNCEIL	273	Number of ceiling fans - M1
WNDATV	274	Number of wind turbine attice ventilators - M1
FNATTIC	275	Number of electric attic fans - M1
FNWHOLE	276	Number of whole house fans - M1
AIRCLEAN	277	Number of household air cleaners - M1
HUM	278	Number of humidifiers - M1
DEH	279	Number of dehumidifiers - M1
WHPURIFY	280	Number of water purification systems - M1
WBED	281	Number of heated waterbeds - M1
ELBLNKET	282	Number of electric blankets - M1
AQUAR	283	Number of aquariums - M1
TRSHCOMP	284	Number of trash compactors - M1
SAUNA	285	Number of electric saunas - M1
SCRYSYS	286	Number of security systems - M1
POND	287	Number of pond pumps - M1
GRGDROPN	288	Number of electric garage door openers - M1
LAWNMOWR	289	Number of electric lawn mowers - M1
WLWTRPMP	290	Use of electric well water pump - M2
WTRSRCES	291	Access to city water - M3
WLWTUSE	292	How do you use well water - M4
SUMPPMP	293	Use sump pump - M5
SHOPTLS	294	Use shop tools - M5
WELD	295	Use electric welding equipment - M5
AIRCOMP	296	Use electric air compressor - M5
BATCHRGE	297	Use large battery charger - M5
KILN	298	Pottery kiln - M5
MEDICAL	299	Use medical equipment - M5
ELVEH	300	Electric vehicle, golf cart, wheelchair - M6
CHRGVEH	301	Charge electric vehicle at home - M7
OLRGAPP	302	Other large electric or gas appliances - M8
CHADD	303	Added central heating - M9
CHFUEL	304	Fuel for added central heating - M9
CCADD	305	Added central cooling - M9
CCFUEL	306	Fuel for added central cooling - M9

CONT

NAME	VARNUM	LABEL
WWADD	307	Added window or wall cooling - M9
WWFUEL	308	Fuel for added window or wall cooling - M9
WHADD	309	Added water heater - M9
WHFUEL	310	Fuel for added water heater - M9
STADD	311	Added stove top - M9
STFUEL	312	Fuel for added stove top - M9
OVADD	313	Added oven - M9
OVFUEL	314	Fuel for added oven - M9
MWADD	315	Added microwave - M9
MWFUEL	316	Fuel for added microwave - M9
DWADD	317	Added dishwasher - M9
DWFUEL	318	Fuel for added dishwasher - M9
CWADD	319	Added clothes washer - M9
CWFUEL	320	Fuel for added clothes washer - M9
CDADD	321	Added clothes dryer - M9
CDFUEL	322	Fuel for added clothes dryer - M9
PHADD	323	Added pool heater - M9
PHFUEL	324	Fuel for added pool heater - M9
PPADD	325	Added pool pump - M9
PPFUEL	326	Fuel for added pool pump - M9
TBADD	327	Added hot tub - M9
TBFUEL	328	Fuel for added hot tub - M9
NOADD	329	Have not added major appliance - M9
DCHAGE	330	Age of discarded central heater - M10
DCHFL	331	Fuel of discarded central heater - M10
DCCAGE	332	Age of discarded central cooling - M10
DCCFL	333	Fuel of discarded central cooling - M10
DWWAGE	334	Age of discarded wall cooling - M10
DWWFL	335	Fuel of discarded wall cooling - M10
DWHAGE	336	Age of discarded water heater - M10
DWHFL	337	Fuel of discarded water heater - M10
DSTAGE	338	Age of discarded stove top - M10
DSTFL	339	Fuel of discarded stove top - M10
DOVAGE	340	Age of discarded oven - M10
DOVFL	341	Fuel of discarded oven - M10
DMWAGE	342	Age of discarded microwave - M10
DMWFL	343	Fuel of discarded microwave - M10
DDWAGE	344	Age of discarded dishwasher - M10
DDWFL	345	Fuel of discarded dishwasher - M10
DCWAGE	346	Age of discarded clothes washer - M10
DCWFL	347	Fuel of discarded clothes washer - M10
DCDAGE	348	Age of discarded clothes dryer - M10
DCDFL	349	Fuel of discarded clothes dryer - M10
DPHAGE	350	Age of discarded pool heater - M10
DPHFL	351	Fuel of discarded pool heater - M10
DPPAGE	352	Age of discarded pool pump - M10
DPPFL	353	Fuel of discarded pool pump - M10
DTBAGE	354	Age of discarded hot tub - M10
DTBFL	355	Fuel of discarded hot tub - M10
NODISCRD	356	Have not discarded above appliances - M10
PTHME	357	Other homes in California occupied by family - N1

CONT

NAME	VARNUM	LABEL
PTHMELOC	358	Location of other home - N2
PTHMEUTL	359	Utility of other home - N2
EDUC	360	Education of head of household - N3
ETHNIC	361	Primary language - N4
DISABLED	362	Occupant is disabled - N5
HOHIND1	363	Head of household 1 is American Indian - N6
HOHIND2	364	Head of household 2 is American Indian - N6
HOHASN1	365	Head of household 1 is Asian/Pacific Islander - N6
HOHASN2	366	Head of household 2 is Asian/Pacific Islander - N6
HOHBLK1	367	Head of household 1 is African American - N6
HOHBLK2	368	Head of household 2 is African American - N6
HOHLAT1	369	Head of household 1 is Hispanic/Latino - N6
HOHLAT2	370	Head of household 2 is Hispanic/Latino - N6
HOHWHT1	371	Head of household 1 is Caucasian - N6
HOHWHT2	372	Head of household 2 is Caucasian - N6
HOHOTH1	373	Head of household 1 - Other - N6
HOHOTH2	374	Head of household 2 - Other - N6
INCOME	375	Household total income - N7
TIMECALL	376	Best time to call - N7
phone	377	Household phone number - N7
eutil	378	electric utility
scg	379	have scg account data
htngcnt	380	count of ng heaters
htelbsb	381	primary or secondary elbsb
htelwhp	382	primary or secondary elwhp
htcnt	383	count of primary and secondary heaters
phtcnt	384	count of primary heaters
ahtcnt	385	count of additional heaters
othcnt	386	count of other heaters
ngcnt	387	count of ng heaters
elcnt	388	number of ele heaters
wdcnt	389	number of wood heaters
bgcnt	390	Count of bg heaters
slcnt	391	number of solar heaters
payheat1	392	payheat ne 1 but systems answered
htng	393	primary or secondary ht ng
phtng	394	have a primary ng heater
ahtng	395	have an additional ng heater
htelec	396	have a primary or secondar ele ht
phtelec	397	have a primary elec heater
ahtelec	398	have an additional elec heaters
htbg	399	primary or secondary bg heater
phtbg	400	have a primary bg heater
ahtbg	401	have an additional bg heaters
htwdfp2	402	primary or secondary heat wood
phtwdfp2	403	have a primary wood heater
ahtwdfp2	404	have an additional wood fireplace
htsolar	405	primary or secondary heat solar
phtsolar	406	have a primary solar heater
ahtsolar	407	have an additional solar heater
htother	408	primary or secondary ht other

CONT

NAME	VARNUM	LABEL
phtother	409	have a primary other heater
ahtother	410	have an additional heater with other fuel
havesec	411	have a secondary heater
phtfuel	412	fuel for the primary heater
caccnt	413	number of types of cac
paycool1	414	paycool ne 1 but systems answered
RACCNT	415	number of rac
whngtnk	416	have a primary or secondary whngtnk
whngwht	417	have a primary or secondary whngwht
wheltnk	418	have a primary or secondary wheltnk
whelhp	419	have a primary or secondar whelhp
whelwht	420	have a primary or secondary whelwht
whelpnt	421	have a primary or secondary whelpnt
whlptnk	422	have a primary or secondary whlptnk
whlpwht	423	have a primary or secondary whlpwht
whslrn	424	have a primary or secondary whslrn
whslrg	425	have a primary or secondary whslrg
whslrp	426	have a primary or secondary whslrp
whslre	427	have a primary or secondary whslre
whotsys	428	have a primary or secondary whotsys
paywh1	429	paywh ne 1 but systems answered
whng	430	have a ng water heater
whelec	431	have a elec water heater
whbg	432	have a bg water heater
whsl	433	have a solar water heater
whoth	434	have an other water heater
prwhfuel	435	primary wh fuel
numwash	436	total number of clothes washes per week
tvcnt	437	count of all tvs
rescnt	438	count of the num of residents in dwelling
kids	439	number of residents 0-18
adults	440	number of residents 19-64
seniors	441	number of residents 65+
samEth	442	Heads are same ethnicity
mixedeth	443	Heads are different ethnicity
sfcode2	444	sfcode2
strata	445	sample selection strata
sfcode1	446	sfcode1
cecpge	447	PGE utility zone
cooling	448	combination of CAC and RAC
Annkwh	449	Annual kwn - 12*mean
elemn12	450	2002 pre-clean mean ele*12 data
anntherm	451	Annual therm - 12*mean
thmmn12	452	2002 pre-clean mean thm*12 data
avginc	453	Plugged income
SQFT_A	454	Plugged square footage
homeage	455	Plugged home age
numi	456	Plugged continuous number in household
phtfuel2	457	Plugged heating fuel
payheat2	458	Plugged pay heating
paywh2	459	Plugged pay wh

CONT

NAME	VARNUM	LABEL
paycool2	460	Plugged pay cool, 0 or 1
edry	461	Plugged electric dryer
gdry	462	Plugged gas dryer
fzUsage1	463	Estimate kwh usage for first freezer
sqft_b	464	Calculated and Plugged surface area
rfusage1	465	Estimate kwh usage for first refrig
rfusage2	466	Estimate kwh usage for second refrig
PWHFUEL2	467	Plugged wh fuel
thmcda	468	2002 post-clean sum thm data
thmmncda	469	2002 post-clean mean thm*12 data
msthmcda	470	2002 post-clean missing months thm
ele02sum	471	2002 pre-clean sum ele data
mselesum	472	2002 pre-clean missing months ele
thm02sum	473	2002 pre-clean sum thm data
msthmsum	474	2002 pre-clean missing months thm
elecda	475	2002 post-clean sum ele data
elemncda	476	2002 post-clean mean ele*12 data
mselecda	477	2002 post-clean missing months ele
hdd65	478	Uec hdd65 weather for 2002
cdd65	479	Uec cdd65 weather for 2002
ght_uec	480	gas heat uec
gwh_uec	481	gas, non-solar, wh uec
gsw_uec	482	solar wh with gas backup uec
gdry_uec	483	gas dryer uec
grng_uec	484	gas range and/or oven uec
gpht_uec	485	gas pool heat uec
gspa_uec	486	gas spa heat uec
ghh_uec	487	gas household uec
eht_uec	488	coventional ele heat uec
ehp_uec	489	heat pump uec
vnt1_uec	490	forced air fan uec
vnt2_uec	491	attic fan uec
cac_uec	492	central air uec
rac_uec	493	room air uec
swp_uec	494	swamp cooler uec
wht_uec	495	non-solar ele wh uec
whs_uec	496	solar with ele backup wh uec
edy_uec	497	ele dryer uec
cws_uec	498	clothes washer uec
dwh_uec	499	dish washer uec
ref1_uec	500	first refrigerator uec
ref2_uec	501	second refrigerator uec
fz_uec	502	freezer uec
pmp_uec	503	pool pump uec
spa_uec	504	spa pump uec
olt_uec	505	outdoor lighting uec
rng_uec	506	ele range and/or over uec
ctv_uec	507	television uec
sph_uec	508	ele spa heat uec
mwv_uec	509	microwave oven uec
off_uec	510	home office uec

CONT

NAME	VARNUM	LABEL
pcs_uec	511	pc uec
wbh_uec	512	water bed uec
wpm_uec	513	well pump uec
msc_uec	514	misscellaneous ele uec
hh_uec	515	total household ele uec
gasMM	516	gas master meter account
ceuscz	517	Ceus weather station number
ident	518	identification code
recodeid	519	scan identification2
rfdiscrd	520	refrigerator discard
fzdiscrd	521	freezer discard
res	522	dwltype using the cleaning process
nonresp1	523	survey from initial nonrespondent
servzip	524	SERVICE ZIP
pwhfuel3	525	Plugged wh fuel - including mm
phtfuel3	526	Plugged heating fuel - including mm

K: BILLING DATA VARIABLES

NAME	VARNUM	LABEL
sfcode	1	identification
NGUTIL	2	ng utility from data and survey
scg	3	scg billing data
yearmo	4	year and month of consumption
thm	5	calendarized monthly thm consumption
ele	6	calanderized monthly kwh consumption
newmast	7	master meter account

L: DESCRIPTION OF SAS FILES/CODE

L.1 Overview

This appendix provides a description of the SAS code used to clean, plug, calendarize, and fill the Home Energy Survey data and the Billing data provided by the five utilities.

L.1.1 Home Energy Survey Cleaning Code

This subsection lists the code used to clean the Home Energy Survey for individual and master-meter customers. The code is listed sequentially.

- **RDSAMPLE and RDSAMPLE_MM.** These programs read in the text file of data for individually and electric master-metered customers, respectively. The program creates a variable for each bubble on the survey.
- **MIN_MAX and MIN_MAX_MM.** These programs read in the expanded data sets created by RDSAMPLE and RDSAMPLE_MM and uses an algorithm to choose the most likely response, if more than one response was provided for the question.
- **TOOMANYRESPONSES.** This program reads in the expanded data set created by RDSAMPLE. The program counts the number of questions for which the individual provided multiple responses.
- **GAS_ACCOUNTS:** This program uses the gas billing data to create a gas count variable that is used to help clean the natural gas line question.
- **CLEANSAMPLE and CLEANSAMPLE_MM.** These programs are the primary cleaning codes for the Home Energy Survey.
- **MISSING_DWELTYPE and MISSING_DWELTYPE_MM.** These programs read in data from CLEANSAMPLE and CLEANSAMPLE_MM, carefully examining the survey response to the variable DWELTYPE. The survey response was compared to the strata variables used to design the home energy survey. Inconsistent surveys were retained for further analysis.
- **MISSING_PAGES.** This program determines the identification codes of individuals who have too many missing values.

- **CONVERT_MISSING_DWELTYPE and CONVERT_MISSING_DWELTYPE_MM.** These programs read in observations with problem DWLTYPE coding identified in MISSING_DWELTYPE and MISSING_DWELTYPE_MM, respectively. Using information on the street address (for the individual-metered customers) and the algorithm discussed in the Cleaning and Processing Section, the code reassigns dwelling types and creates a new variable, RESIDENCE. The program also deletes observations found to be invalid because of too many missing responses, multiple responses, or logical inconsistencies. The code then merges into the cleaned dataset information from the strata variables, normalized weather, CEC forecast and CEUS weather zone information, energy consumption variables used in the CDA models, and household and end-use UECs calculated using the CDA model. The code also assigns format codes.
- **NEWFORMAT.** This program is the format code library used to transform the numbers from the survey responses into formatted responses.
- **ADDITIONALVARIABLES.** This program adds weights, the new CEC forecast zone, and an updated non-response code for both the individual and master-meter data sets.
- **SET_IM_MM.** This program sets together the individual and the master-meter data sets to make one Cleaned and CDA dataset.

L.1.2 Billing Data

The process of cleaning, calendarizing, and merging the billing data is discussed in the following subsection. Each utility's unique set of consumption data necessitated its own unique set of cleaning and calendarizing code. Gas consumption data from SoCalGas required the team to merge consumption data from up to two utilities onto a single calendarized billing record.

The following list is the SAS code used to clean, calendarize, and combine the billing data from the five participating utilities.

- **RdSCE.** This reads in the SCE billing data into a SAS file;
- **SCECalendar.** This reads in the SCE SAS billing data. The program eliminates all records other than those who returned a Home Energy Survey Form. Using the billing records zip code, the record is assigned weather data from the CEUS climates zones. The consumption and weather data are calendarized.

- **RdPG&EEarlydata, RdPG&E, and MrgPG&E.** These first two programs create two SAS files by reading in the two PG&E billing data files. The latter program, MrgPG&E, merges the SAS files by their utility identification code.
- **Problem_billing_days and Problem_PGE_gas_billing.** During the first pass at cleaning the PG&E billing data, the team found inconsistencies in the bills. These observations were output to Excel spreadsheets and manually analyzed.
- **PG&ECalendar, PG&ECalendar_Gas, and PGE_Mastermeter.** The Calendar programs read in the PG&E SAS electric and gas billing databases. The program eliminates all records that did not return a Home Energy Survey Form. The first two programs read in the corrected data from the Problem_billing programs. The Calendar programs append weather data from the CEUS climate zone to the individual customer's record. The consumption and weather data were calendarized. The PGE_Mastermeter code checks the billing data tariffs and creates a binary variable for gas master-meter accounts.
- **RdSDG&E.** This program reads in the SDG&E gas and electric billing data and creates a SAS data file.
- **SDG&ECalendar.** The calendar code reads in the SDG&E SAS billing data. The program first reduces the billing file to those customers who responded to the Home Energy Survey. The program appends weather data specific to the customer's read dates and CEUS climate zone. The consumption and weather data were calendarized.
- **RdDWP.** This program reads in the LADWP billing data and creates a SAS data file.
- **LADWP_Duplicates.** After initial cleaning of LADWP bills, it was determined that there were a very limited number of cases in which duplicate bills were sent for a customer. This program eliminates the duplicate bills.
- **DWPCalendar.** The calendar code reads in the LADWP bills after the removal of duplicate bills. First, the program eliminated the billing data for customers who did not respond to the Home Energy Survey. The program appends weather data specific to the customer's read dates and CEUS climate zone. The data were calendarized.

L.1.1.3 Fuel Plugging

The process of correcting fuel misreporting required several steps. Some steps were due to the timing of data arrival-both survey data and billing data. Some steps were necessary due to standard survey fuel reporting errors.

The survey data were delivered to Itron as soon as the data were received and processed by Xenergy. Four data files were received prior to receipt of the final database. This process allowed the analysis team to begin the cleaning process promptly. Unfortunately, it also led to the creation of multiple cleaning codes to perform the same data analysis.

The billing data for the three electric IOUs and LADWP were delivered to Itron shortly after receipt of the initial batch of survey data. The billing data from SoCalGas were received later due to the difficulty associated with identifying SoCalGas respondents. The process of correcting fuel misreporting requires consumption data. Due to the lack of SoCalGas data, initial analysis was started on data from SDG&E and PG&E. These data would later be included in additional analyses to insure these customers did not receive gas from SoCalGas.

The following is a list and description of the programs used to clean and plug fuel misreporting. Additional fuel plugging routines were used during the CDA data analysis process and will be listed where needed.

- **SDGE_MATCHING1-2 and PGE_MATCHING1-2.** These programs combine survey data and billing data for SDG&E and PG&E. These programs extracted surveys with natural gas billings but no major natural gas systems and surveys with no natural gas bills but natural gas systems.
- **SDGE_FUELPLUG1-2 and PGE_FUELPLUG1-2.** These programs input the data after the manual fuel checks associated with the programs above and create new primary fuel variables for space heating and water heating.
- **NOPAY_HT_CL.** The program creates a dataset containing the consumption data and system data that were integrated into later programs.
- **NEWHeating_Cooling_WH.** This program extracts data for individuals who did not provide an answer to the payheat, paycool, and paywh questions on the Home Energy Survey.
- **Heat_Cool_WH_Fuelfix.** This program inputs the data after the manual fuel check associated with individuals who did not answer the heating, cooling, or water heating questions.

- **SCG_Accounts.** The program creates a data set with the SoCalGas Consumption data. These data were used in later fuel plugs.
- **ALL_Matching3.** This program uses survey data and billing data from all five utilities included in the study. The program creates two sets of utility specific spreadsheets. The first set looks at survey respondents who state that they have gas appliances but no gas consumption data. The second set looks at survey respondents who have gas consumption data but do not choose natural gas as their primary heating or water heating fuel.
- **Heating_Cooling_WH_SCG.** This program extracts data for individuals who did not provide an answer to the payheat, paycool, and paywh questions on the Home Energy Survey. The program created a spreadsheet to look at individuals who report that they pay for their heat, but provide no information on the primary heating fuel. Finally, the program created a spreadsheet to look at individuals who provide information on their primary fuel, but do not answer the payheat question.
- **SCG_HT_WH_Plugs.** This program reads in the manually cleaned data from Heating_Cooling_WH_SCG and All_Matching3.

L.1.4 Conditional Demand Preparations

The process of preparing for the CDA includes merging the fuel plugs into the database, construction of the saturation variables, and filling missing data. The following subsection list the program used during this process.

- **Merge_FuelPlug, FuelPlug_MissingData, and SCG_FuelPlug.** These program read in the survey data and the fuel plug information. They create new fuel and payment variables, retaining the survey values if the household's responses were not plugged during the fuel checking programs.
- **MakeVars.** The program plugs missing values and makes the saturation variables used during the CDA analysis.
- **Plug_income, Plug_SQFT, Plug_Numi, and Plug_Builtage.** These programs estimate conditional means models to plug missing values for income, square footage, number of residents in the household, and the home's age.
- **Plug_Refrig and Plug_Freezer.** These programs use the AHAM refrigerator and freezer data to produce engineering estimates for refrigerator and freezer energy usage.

- **Fix_Occupancy.** This program fixed the monthly seasonal housing occupancy variable.
- **Merge_Survey_Billing.** This program merges the survey data with the billing data.
- **NoGas_Fixes, FuelChecking_Output, SpaceHeat_check, FuelPlugging_Late, Fuel_check_020404, Fuel_plug_020404, Fuel_check_021004, Fuel_plug_021004, Pge_fuel_check, Pge_fuel_plug, Sce_fuel_check, and Sce_fuel_plug.** These programs fuel checked and plugged fuel types and systems as results from the CDA analysis necessitated.
- **Xproduct, Xproduct_Ele_Seasonal, and Xproduct_Gas_Seasonal.** These programs create the variables used during the CDA program. The seasonal programs have eliminated the occupancy variables and created a seasonal variable.
- **CDA_Gas_Seasonal_Newh and CDA_Ele_Seasonal.** These programs run the gas and electric CDA analysis.
- **UEC_Gas_Seasonal_Newh and UEC_Ele_Seasonal.** These programs run the gas and electric UEC simulations.
- **UEC_Gas_Seasonal_Calibrate_Newh and UEC_Ele_Seasonal_Calibrate.** These programs calibrate and weather normalize the gas and electric UEC simulations.