CALIFORNIA STATEWIDE RESIDENTIAL APPLIANCE SATURATION STUDY

VOLUME 2, STUDY RESULTS FINAL REPORT

Consultant Report

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California Energy Commission

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Southern California Gas Company (SoCalGas)
Los Angeles Department of Water and Power (LADWP)

1: RASS RESULTS 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 CEC 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.

Volume Two includes a detailed description of the CDA models and results followed by a series of cross tabulations depicting the results to all survey questions. The cross tabs are a series of tables that present weighted final results for the particular group in the set. All cross tab counts have been divided by 1,000 to save space on the page. As an example, the total study population is shown as 10,347 which is 10.347 million customers. Each banner contains answers to all of the questions on the survey (as well as some final plugged/cleaned values as noted in the survey documentation).

Banners consist of three types for the population at large and four for each utility as follows:

- **Banner 1** is by Education, Primary Language, Ethnicity, and Income.
- **Banner 2** is by Square Footage, Type of Occupant, Primary Heating Fuel, Type of Air Conditioning, and Water Heating Fuel.
- **Banner 3** is by Dwelling Type, Ownership, House Occupancy (full or part-time), Dwelling Age, and Gas Utility.
- **Climate** banners are by a combination of CEC Forecast climate zone and a condensed dwelling type (Single Family, Multi Family, and Mobile Home).

2: CONDITIONAL DEMAND ANALYSIS RESULTS

2.1 Introduction

This section presents the results of the CDA analysis. Estimated UECs were derived from the electric and gas models using the estimated model coefficients and the relevant values of the regressors. The final UECs were computed in four steps, as described below.

- First, the UECs were computed at the household level using the estimated UEC equations, the binary appliance variables representing the presence of each end use, and actual 2002 weather for each weather station.
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- Second, these estimated UEC values were calibrated to benchmark into utility information on overall usage per residential customer for all customers in 2002. This calibration process entailed the multiplication of all UECs for a specific service area by the ratio of two variables: (a) average usage per residential customer (for the overall service area population); and (b) model-based predictions of whole-house consumption for 2002 for the population of customers. Table 2-1 presents these calibration ratios. It should be noted that the application of these factors recognizes that average usage in the sample may differ from population average usage. Such differences may occur as a result of survey response bias, some of which may still be present in spite of considerable efforts to minimize it as part of the overall survey protocol. As shown, the ratios are reasonably close to 1.0, suggesting that response bias is fairly low.

Table 2-1
Calibration Ratios

	Type of Energy	
Utility Service Area	Electricity	Natural Gas
PG&E	1.020	0.935
SCE	1.044	-
SDG&E	0.958	0.924
SoCalGas	-	1.121
LADWP	1.089	-

- Third, the slightly larger SoCalGas calibration ratio, 1.121, may be due to the design of the survey. The reasons for this are as follows.

- The RASS survey was designed as an electric end-use survey. The strata and the resulting sample weights were based on electric service territory and electricity usage, while SoCalGas's weights were set equal to the household's electric weight. This is a simplified weighting method, but it may not accurately weight up to SoCalGas' population.

- The possible survey population for RASS households does not include all groups of homes served by SoCalGas. SoCalGas provides gas to customers from several different municipal electric utilities. The RASS survey population does not include households from small electric municipal service territories.

- Natural gas billing data matched to the RASS survey does not include all homes who believe that their gas company is SoCalGas. During the billing matching process, a concerted effort was made to match survey participants in SoCalGas's territory with their gas bills, however a small percentage of the bills for SoCalGas households may have been missed.

- SoCalGas's calibration ratio may be higher due to their prevalence in LADWP's service territory. The sample provided by LADWP has been found to have some gaps in coverage and there were some apparent problems with either the billing data or the strata definitions.

- Fourth, in a step applying only to weather-sensitive end uses, the UECs were weather normalized through the solution of the model using normal weather conditions for each of the weather stations used in the analysis. These weather-normalized UECs were calibrated using the same factors as derived in the second step. Table 2-2 lists the actual and weather normalized annual heating and cooling degrees for the four electric utilities.

Table 2-2
Actual and Normalized Weather

Utility	Actual Weather		Normalized Weather	
	Heating Degree Days	Cooling Degree Days	Heating Degree Days	Cooling Degree Days
PG&E	2697	777	2421	735
SDG&E	1457	433	1182	592
SCE	1609	1164	1431	1261
LADWP	1475	946	1235	1110

- Fifth, as a means of providing summary values of the UEC estimates, household values were used, along with the relevant case weights, to compute weighted averages for various customer segments. While the database of household-level UECs provided to the utilities as a project deliverable can be used to develop UECs for any customer segment, we confine our attention here to the following segmentation variables: residence type (single family homes, town homes, 2-4 unit apartments, 5+ unit apartments, and mobile homes); new home versus existing homes; utility service area; and, for weather-sensitive end uses only, CEC forecasting climate zones along with residence type.

In what follows, we discuss the estimated electric and gas UECs by customer segment. When analyzing these UECs, special care must be taken to account for the end use's saturation and the size of the segment. The estimated UEC for end uses with very low saturations, and/or in segments with very small populations, may not accurately represent the actual energy usage for the end use. We recommend that caution be used when examining UECs from end uses that are the result of fewer than thirty observations and that extreme care be employed if fewer than ten observations were used to calculate the segment's end use UEC. Finally, due to the statistical properties of Conditional Demand Analysis (especially the relative ease of disentangling weather-sensitive end-use consumption levels), the number of observations needed to accurately determine a segment's end use UEC, will be larger for non-weather sensitive end-uses than for space conditioning and weather sensitive end-uses.

2.1.1. Estimated Electric UECs

Estimated calibrated and weather-normalized electric UECs, segment frequencies, and the associated saturations are presented in Tables 2-3 through 2-18. Table 2-3 provides UECs, segment frequencies, and the associated saturations by residence type. Tables 2-4 and 2-5 provide estimates by structural vintage (dwelling age). Table 2-6 presents estimates by service area. Tables 2-7 and 2-8 provide estimates of weather-sensitive end uses by CEC Forecasting Climate Zone. Finally, Tables 2-9 through 2-18 present UECs, segment frequencies, and saturations of space conditioning end uses by CEC Forecasting Climate Zone and residence type.

These UEC estimates are discussed briefly below, with special emphasis on values that may differ appreciably from values used by the CEC and/or the utilities in prior work. The discussion is organized by end use groupings, and focuses on the results by residence type. Prior to Table 2-4 is a discussion of the estimates by structural vintage. As discussed above, care must be used when interpreting the UEC estimates for smaller segments with low saturations.

Space Heating

UECs were developed for both conventional (resistance) electric space heating and heat pump space heating. As shown in Table 2-3, weather-normalized conventional space heating varies from 584 kWh for 2-4 unit apartments to just under 1,500 kWh per year for single family homes. Heat pump space heating (note that this excludes the cooling side of heat pump usage) ranges from 315 kWh for 2-4 unit apartments to 1,077 kWh for single family residences. It should be noted here that comparisons of the conventional and heat pump heating UECs should not be used to infer savings associated with replacing resistance heating with heat pump heating, insofar as the characteristics of the households with these two types of systems differ considerably. Homes with heat pumps tend to be newer and larger than those of their counterparts with conventional electric heating.

The UECs for CEC Forecast Climate Zone 7, presented in Tables 2-7 and 2-9 through 2-18, help to demonstrate the care that needs to be used when end use UECs are divided into population segments. The segment frequencies presented in Table 2-7 shows that the RASS survey included 384 households from Forecast Climate Zone 7. The weighted saturations in Table 2-7 for this zone indicate that only one percent of these households had conventional electric heating. While the UEC for this end use appears to be reasonable, it was calculated using household characteristics from five or fewer households. Tables 2-9 through 2-18 further cut Zone 7 into residence types. The conventional electric heating UECs for Zone 7 by residence type were calculated using, at most, two to three households for each residence type. If these few households differ substantially from the norm for their residence type, these UECs will be unreliable estimates of the energy consumption for this population segment.

Ventilation

UECs were derived for furnace fans. Furnace fan usage (defined as the forced air fan energy used to distribute gas space heating, but not electric space heating and not central air conditioning) varies from 51 kWh for apartment units in buildings with 5+ units to 162 kWh for single family homes.

Air Conditioning

Three air conditioning UECs were developed: central air conditioning, room air conditioning, and evaporative coolers. Central air UECs range from to just over 700 kWh for town homes to just over 1,400 kWh per year for single family dwellings. In general, these values are lower than expected based on prior research relating to

residential energy usage in California. However, our confidence in these results is high, given the relative ease of isolating air conditioning usage through statistical analyses like CDA. Remembering that the billing data reflecting summer usage were from 2002, one could hypothesize that the lower than expected central air conditioning UECs reflects the influence of the energy crisis of 2001 and the programs promoting conservation(e.g., the 20/20 program) in the summer of 2002. Room air conditioning UECs are also fairly low relative to prior estimates, varying from105 kWh for multi-family units in buildings with 5+ units to 227 kWh for single family homes and mobile homes. Evaporative cooling UECs vary from 374 kWh to 688 kWh across residence types. Again, we caution the reader that comparisons of evaporative cooling UECs with air conditioning UECs should not be used to infer potential savings from replacing the latter with the former, since the characteristics of households with these appliances vary.

Water Heating

Conventional electric water heating UECs vary from 1,567 for multi-family units in large buildings to 3,079 kWh per year for single family homes. These results are generally consistent with the results of metering studies, but lower than often derived from engineering calculations. A considerable effort was made in cleaning data relating to water heating and trying different model specifications for this end use, so we are reasonably confident in the reasonableness of these results. Unsurprisingly, solar electric water heating UECs tend to be considerably lower than conventional electric UECs; however, nothing should be inferred from these estimates about the electric consumption impact of adding solar assist. Care should also be used when using the solar water heat UECs due to extremely low saturations.

Dishwashers, Clothes Washers and Dryers

Dishwasher UECs range from 47 kWh for mobile homes to 84 kWh for single family dwellings. Clothes washer UECs, which include only motor loads and not incremental water heating usage, vary from 11 kWh in mobile homes to 127 kWh in single family residences. While the single family and multi-family estimates are probably reasonable, the mobile home estimated may be anomalous. Electric dryer UECs range from 429 kWh to 713 kWh across residence types.

Refrigerators and Freezers

First refrigerator UECs fall in the range of 721 to 824 kWh for the represented residence types. Second refrigerator UECs (which reflect the usage of all secondary units) are higher than primary unit UECs for single family homes and mobile homes

(as a result of both multiple units and lower efficiencies), but slightly lower for multi-family homes (where secondary units may be very small). Freezer UECs all fall in the range between 877 and 964 kWh.

Pools and Spas

The pool pump UEC for single family homes is 2,671 kWh. Spa pumps use from 180 kWh for mobile homes to 467 kWh for single family homes. Note that the RASS survey included 563 mobile homes, and that only three percent of these residences have a spa. The mobile home spa pump UEC is based on the characteristics of fewer than twenty households, and should not be taken too literally. Spa electric heating ranges from 694 for town homes to over 3,500 for mobile homes. Again, though, note that fewer than fifteen mobile homes have an electric spa. With a sample this small, the electric spa UECs should only be used with extreme caution.

Outdoor Lighting

Outdoor lighting UECs vary from 173 kWh to 284 kWh. We are unaware of other estimates of UECs for this end use, so it is difficult to assess the reasonableness of these estimates. However, the single family estimate would be consistent with three 75 Watt bulbs being used 3.5 hours per night, and this seems to be a reasonable order of magnitude.

Cooking

The Electric range/oven UEC varies from 191 to 301 kWh across residence types. Microwave oven UECs range from 113 kWh to 140 kWh.

Televisions

Television UECs (usage from all units, rather than usage per unit) fall into the range of 436 to 519 kWh. These estimates are slightly lower than estimates derived in some previous studies, but seem reasonable.

Personal Computers and Home Offices

Personal computer UECs vary from 458 to 591 kWh. Home office UECs are considerably smaller than this (ranging from 121 to 158 kWh), and they should be

interpreted as the incremental effects of home office equipment over and above personal computers.

Water Beds

Water bed heating UECs are in the range of 732 to 840 kWh.

Well Pumps

Well pumps are estimated to use, on average, anywhere from 724 to 862 kWh. While we did allow multi-family homes to have well pumps, we are suspicious of the positive responses in these residence types and would suggest that the associated UECs not be considered particularly reliable.

Miscellaneous

Miscellaneous usage is estimated to fall in the range of 1,257 to 2,147 kWh per year. A major element of miscellaneous usage would be interior lighting; other elements would be various plug loads and ceiling and attic fan. Ceiling and attic fans have been included in the miscellaneous term due to unreliable survey responses and unrealistic UEC estimates for these end uses.

It was not possible to disentangle indoor lighting usage from the other loads covered by miscellaneous usage. However, we believe that a good estimate of indoor lighting usage is approximately sixty percent of the residence types miscellaneous usage. Given this assumption, indoor lighting usage would range from 754 kWh in 5+ unit apartment residences to 1288 kWh in single family homes.

Table 2-4 lists the electric UECs for new and old homes. Estimates show that older homes use an average of 5,846 kWh while newer homes use 7,035 kWh. Much of this increased energy usage is due to the increased size of newer homes. New dwellings are 42% larger than the average for the existing housing stock, 2,061 and 1,448 square foot, respectively. The increased size is due in part to the preponderance of single-family homes among the newer housing stock. 74% of newer homes are single family residences while only 58% of the existing housing stock are single family residence. Residents of newer homes also have a substantially higher average household income than residents of older homes, $87,402 verses $58,978. Finally, the saturation of central air conditioners, pools, and computers is much higher for newer homes than for the existing housing stock.

Table 2-3
Electric UECS Calibrated and Normalized, by Residence Type

	Single Family		Town Home		2-4 Unit Apt		5+ Unit Apt		Mobile Home	
	UEC	Sat.	UEC	Sat.	UEC	Sat.	UEC	Sat.	UEC	Sat.
All Household	7,105	13,824 homes	4,469	1,780 homes	3,877	1,608 homes	3,807	3,377 homes	5,662	563 homes
Conv. Eheat	1,494	0.04	724	0.06	584	0.15	658	0.23	1,150	0.10
HP Eheat	1,077	0.01	392	0.01	315	0.02	335	0.05	1,031	0.03
Aux Eheat	296	0.28	114	0.21	85	0.19	74	0.13	298	0.31
Furnace Fan	162	0.68	73	0.54	65	0.32	51	0.26	118	0.58
Central Air	1,423	0.46	713	0.41	1,019	0.28	749	0.32	1,143	0.39
Room Air	227	0.15	148	0.14	120	0.16	105	0.22	227	0.34
Evap Cooling	688	0.05	595	0.02	374	0.02	403	0.02	537	0.27
Water Heat	3,079	0.05	1,723	0.04	1,657	0.09	1,567	0.10	3,258	0.17
Solar Water Heater	1,708	0.00	407	0.00	.	0.00	32	0.00	.	0.00
Dryer	713	0.34	591	0.32	429	0.17	548	0.17	549	0.42
Clothes Washer	127	0.95	63	0.76	62	0.37	14	0.26	11	0.86
Dish Washer	84	0.70	63	0.61	66	0.38	59	0.48	47	0.55
First Refrigerator	824	1.00	769	1.00	722	1.00	721	1.00	809	1.00
Second Refrigerator	1,245	0.25	739	0.11	700	0.06	586	0.04	1,143	0.13
Freezer	937	0.24	877	0.09	964	0.07	908	0.04	951	0.30
Pool Pump	2,671	0.14	.	0.00	.	0.00	.	0.00	.	0.00
Spa	467	0.13	270	0.03	.	0.00	.	0.00	180	0.03
Outdoor Lighting	284	0.67	173	0.56	228	0.32	206	0.25	232	0.56
Range/Oven	301	0.41	240	0.44	191	0.41	207	0.49	208	0.27
TV	519	0.96	465	0.92	439	0.92	436	0.96	457	0.93
Spa Electric Heat	1,719	0.07	694	0.02	.	0.00	.	0.00	3,550	0.02
Microwave	140	0.97	125	0.92	125	0.91	122	0.92	113	0.96
Home Office	148	0.20	158	0.19	145	0.17	144	0.15	121	0.13
PC	578	0.75	591	0.68	521	0.54	532	0.59	458	0.45
Water Bed	840	0.02	748	0.02	732	0.00	757	0.01	773	0.03
Well Pump	862	0.05	842	0.01	911	0.01	816	0.01	724	0.18
Miscellaneous	2,147		1,532		1,339		1,257		1,462	

Table 2-4
Electric UEC by House Age

	New House		Old House	
	UEC	Saturation	UEC	Saturation
All Household	7,035	1,393 homes	5,846	19,760 homes
Conv. Eheat	1,167	0.05	861	0.09
HP Eheat	414	0.01	595	0.02
Aux Eheat	319	0.19	240	0.24
Furnace Fan	167	0.82	136	0.53
Central Air	1,411	0.77	1,215	0.39
Room Air	302	0.06	178	0.17
Evap Cooling	1,013	0.01	616	0.04
Water Heat	2,858	0.04	2,371	0.07
Solar Water Heater	.	0.00	1,345	0.00
Dryer	746	0.33	657	0.29
Clothes Washer	131	0.90	107	0.73
Dish Washer	84	0.92	76	0.60
First Refrigerator	763	1.00	791	1.00
Second Refrigerator	999	0.24	1,193	0.17
Freezer	861	0.19	940	0.18
Pool Pump	2,712	0.13	2,667	0.08
Spa	455	0.14	461	0.08
Outdoor Lighting	418	0.64	253	0.54
Range/Oven	316	0.41	260	0.42
TV	542	0.96	486	0.95
Spa Electric Heat	988	0.06	1,761	0.04
Microwave	137	0.98	133	0.95
Home Office	152	0.23	147	0.18
PC	580	0.84	564	0.68
Water Bed	762	0.03	823	0.01
Well Pump	858	0.04	849	0.04
Miscellaneous	1,820		1,833	

Table 2-5 lists the whole household electric UEC by utility and residence type. These calculations show that the statewide increase in electricity usage in newer homes is due to the increased usage in single family homes. All four of the electric utilities experienced an increase in electricity usage in newer single family homes. Three out of the four utilities, however, have a reduction in usage for newer multi-family homes (town homes, 2-4 unit apts, and 5+ unit apts) as compared to their existing multi-family housing stock.

Table 2-5
Electric Household UEC by House Age, Utility and Residence Type

	New House		Old House	
	Household UEC	**Count**	**Household UEC**	**Count**
All	7,035	1,393	5,846	19,760
All PG&E	7,013	689	6,215	8,576
SF PG&E	8,117	537	7,278	5,926
MF PG&E	3,451	145	4,134	2,395
All SDG&E	6,340	199	5,358	2,328
SF SDG&E	7,170	163	6,456	1,515
MF SDG&E	3,060	36	3,612	779
All SCE	7,659	468	6,018	7,511
SF SCE	8,203	354	7,082	4,895
MF SCE	4,430	104	4,089	2,370
All LADWP	3,219	37	4,084	1,345
SF LADWP	6,128	8	5,437	426
MF LADWP	2,888	28	3,598	909

Table 2-6
Electric UECs by Utility

	PG&E		SDG&E		SCE		LADWP	
	UEC	**Saturation**	**UEC**	**Saturation**	**UEC**	**Saturation**	**UEC**	**Saturation**
All Household	6,265	9,265 homes	5,445	2,527 homes	6,102	7,979 homes	4,071	1,382 homes
Conv. Eheat	1,113	0.10	581	0.13	734	0.06	542	0.09
HP Eheat	799	0.02	458	0.03	555	0.01	201	0.03
Aux Eheat	331	0.26	156	0.24	192	0.23	103	0.17
Furnace Fan	180	0.58	91	0.60	115	0.56	71	0.26
Central Air	1,108	0.39	644	0.35	1,494	0.48	1,075	0.29
Room Air	181	0.14	63	0.09	202	0.20	158	0.25
Evap Cooling	469	0.05	277	0.01	797	0.05	372	0.02
Water Heat	2,585	0.09	2,151	0.06	2,342	0.05	1,387	0.05
Solar Water Heater	1,193	0.00	1,501	0.01	1,508	0.00	.	0.00
Dryer	652	0.45	648	0.26	717	0.18	474	0.07
Clothes Washer	97	0.78	75	0.77	129	0.77	125	0.36
Dish Washer	77	0.67	69	0.71	80	0.60	73	0.27
First Refrigerator	788	1.00	780	1.00	801	1.00	754	1.00
Second Refrigerator	1,201	0.19	1,054	0.19	1,210	0.19	933	0.06
Freezer	928	0.23	841	0.17	983	0.15	880	0.05
Pool Pump	2,580	0.08	2,557	0.12	2,772	0.10	3,096	0.02
Spa	428	0.08	445	0.12	495	0.10	423	0.02
Outdoor Lighting	260	0.56	268	0.53	276	0.55	218	0.42
Range/Oven	268	0.61	241	0.49	271	0.27	200	0.17
TV	474	0.95	446	0.94	520	0.96	479	0.94
Spa Electric Heat	1,346	0.05	903	0.06	2,514	0.04	895	0.01
Microwave	131	0.95	119	0.96	139	0.96	140	0.89
Home Office	152	0.20	159	0.19	141	0.16	134	0.18
PC	602	0.72	614	0.78	515	0.66	516	0.55
Water Bed	787	0.02	925	0.01	818	0.02	848	0.00
Well Pump	829	0.08	831	0.01	952	0.02	890	0.01
Miscellaneous	1,852		1,750		1,912		1,495	

Table 2-7
Electric UEC for Weather Sensitive End Uses in Forecast Zones 1-7

	Forecast 1		Forecast 2		Forecast 3		Forecast 4		Forecast 5		Forecast 7	
	UEC	Sat.	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat
All Hhold	7,519	780 homes	6,668	804 homes	7,052	1,676 homes	6,544	3,314 homes	4,971	2,691 homes	7,088	384 homes
Conv. Eheat	1,580	0.15	1,306	0.08	1,232	0.09	1,107	0.09	915	0.13	1,235	0.01
HP Eheat	1,225	0.03	664	0.04	1,148	0.02	605	0.01	572	0.02	953	0.00
Aux Eheat	464	0.26	394	0.22	285	0.26	338	0.25	310	0.28	434	0.29
Furnace Fan	274	0.43	170	0.63	152	0.57	180	0.68	189	0.48	194	0.70
Central Air	941	0.41	1,082	0.69	1,548	0.67	885	0.42	226	0.06	1,902	0.57
Room Air	106	0.18	176	0.24	326	0.25	94	0.12	20	0.04	247	0.12
Evap Cooling	313	0.11	375	0.05	618	0.12	320	0.03	46	0.00	606	0.26
Water Heat	2,668	0.35	2,361	0.10	3,010	0.13	2,592	0.05	1,913	0.06	2,979	0.07
Solar Water Heater	932	0.00	1,587	0.00	1,711	0.00	794	0.00	.	0.00	.	0.00

Table 2-8
Electric UECs for Weather Sensitive End Uses in Forecast Zones 8 to 13

	Forecast 8		Forecast 9		Forecast 10		Forecast 11		Forecast 12		Forecast 13	
	UEC	Sat.	UEC	Sat	UEC	Sat	UEC	Sat.	UEC	Sat	UEC	Sat
All Hhold	5,417	3,175 homes	5,660	2,461 homes	7,529	1,959 homes	3,736	951 homes	4,849	431 homes	5,445	2,527 homes
Conv. Eheat	571	0.08	837	0.05	969	0.05	560	0.07	515	0.12	581	0.13
HP Eheat	445	0.01	495	0.01	769	0.01	177	0.03	254	0.03	458	0.03
Aux Eheat	153	0.19	170	0.30	220	0.21	95	0.20	134	0.12	156	0.24
Furnace Fan	94	0.52	112	0.45	127	0.73	64	0.19	77	0.43	91	0.60
Central Air	848	0.36	1,509	0.40	1,908	0.74	915	0.15	1,169	0.61	644	0.35
Room Air	126	0.15	215	0.26	262	0.21	153	0.19	164	0.39	63	0.09
Evap Cooling	286	0.01	772	0.03	934	0.12	369	0.02	379	0.02	277	0.01
Water Heat	1,955	0.06	2,392	0.03	2,800	0.05	1,399	0.03	1,377	0.10	2,151	0.06
Solar Water Heater	3,586	0.00	.	0.00	1,370	0.00	.	0.00	.	0.00	1,501	0.01

Table 2-9
Space Conditioning Electric UEC for Single Family Residences in Forecast Zones 1-7

Residence 1	Forecast 1		Forecast 2		Forecast 3		Forecast 4		Forecast 5		Forecast 7	
Single Family	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat
All HHold	8,633	607 homes	7,390	653 homes	8,139	1208 homes	7,415	2409 homes	6,047	1586 homes	7,454	288 homes
Conv. Eheat	1,770	0.14	1,856	0.03	1,553	0.08	1,671	0.03	1,639	0.03	1,473	0.01
HP Eheat	1,305	0.03	1,102	0.02	1,325	0.02	1,190	0.00	1,217	0.01	1,403	0.00
Aux Eheat	570	0.25	432	0.25	353	0.26	388	0.29	393	0.36	395	0.30
Central Air	1,003	0.44	1,213	0.72	1,749	0.70	1,053	0.43	278	0.09	1,985	0.56
Room Air	117	0.17	210	0.22	407	0.21	110	0.12	24	0.05	263	0.11

Table 2-10
Space Conditioning Electric UEC for Single Family Residences in Forecast Zones 8-13

Residence 1	Forecast 8		Forecast 9		Forecast 10		Forecast 11		Forecast 12		Forecast 13	
Single Family	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat
All HHold	6,499	1850 homes	6,760	1692 homes	8,351	1419 homes	4,918	295 homes	7,484	139 homes	6,536	1678 homes
Conv. Eheat	1,152	0.01	1,197	0.03	1,550	0.03	1,115	0.03	1,437	0.01	1,182	0.04
HP Eheat	1,107	0.00	1,246	0.00	893	0.01	.	0.00	513	0.00	751	0.02
Aux Eheat	186	0.25	211	0.34	250	0.21	161	0.26	241	0.22	184	0.30
Central Air	1,119	0.36	1,674	0.49	1,941	0.76	1,623	0.17	1,715	0.82	784	0.38
Room Air	178	0.12	246	0.27	296	0.18	333	0.16	227	0.15	84	0.07

Table 2-11
Space Conditioning Electric UEC for Town Homes in Forecast Zones 1-7

Residence 2	Forecast 1		Forecast 2		Forecast 3		Forecast 4		Forecast 5		Forecast 7	
Town Home	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat
All HHold	3,475	25 homes	4,507	40 homes	4,495	70 homes	4,963	304 homes	4,280	281 homes	5,326	16 homes
Conv. Eheat	.	0.00	1,530	0.05	485	0.12	1,074	0.05	842	0.06	.	0.00
HP Eheat	678	0.04	401	0.05	505	0.02	.	0.00	.	0.00	157	0.04
Aux Eheat	190	0.12	107	0.20	100	0.20	185	0.25	169	0.26	184	0.21
Central Air	659	0.65	623	0.43	912	0.51	500	0.59	143	0.07	957	0.80
Room Air	25	0.01	53	0.15	245	0.44	51	0.07	6	0.01	144	0.32

Table 2-12
Space Conditioning Electric UEC for Town Homes in Forecast Zones 8-13

Residence 2	Forecast 8		Forecast 9		Forecast 10		Forecast 11		Forecast 12		Forecast 13	
Town Home	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat
All HHold	4,723	353 homes	4,218	212 homes	5,673	109 homes	3,414	89 homes	4,650	51 homes	3,930	230 homes
Conv. Eheat	623	0.06	824	0.05	943	0.09	395	0.09	185	0.02	549	0.08
HP Eheat	360	0.02	345	0.01	367	0.01	.	0.00	668	0.02	278	0.01
Aux Eheat	77	0.16	55	0.22	106	0.21	71	0.14	111	0.15	53	0.28
Central Air	523	0.47	872	0.44	1,514	0.84	877	0.04	1,066	0.62	356	0.28
Room Air	78	0.19	239	0.20	160	0.29	292	0.09	142	0.43	50	0.07

Table 2-13
Space Conditioning Electric UEC for 2-4 Unit Apartments in Forecast Zones 1-7

Residence 3	Forecast 1		Forecast 2		Forecast 3		Forecast 4		Forecast 5		Forecast 7	
2-4 Unti Apt	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat
All HHold	2,945	45 homes	4,285	38 homes	3,928	98 homes	4,674	181 homes	3,622	278 homes	8,064	22 homes
Conv. Eheat	207	0.11	1,035	0.23	709	0.15	903	0.19	814	0.15	368	0.06
HP Eheat	.	0.00	206	0.17	798	0.01	597	0.06	445	0.00	.	0.00
Aux Eheat	87	0.38	97	0.15	73	0.16	90	0.17	135	0.27	122	0.09
Central Air	725	0.22	517	0.79	931	0.58	533	0.32	103	0.01	2,818	0.68
Room Air	79	0.03	55	0.20	176	0.30	61	0.09	14	0.03	247	0.17

Table 2-14
Space Conditioning Electric UEC for 2-4 Unit Apartments in Forecast Zones 8-13

Residence 3	Forecast 8		Forecast 9		Forecast 10		Forecast 11		Forecast 12		Forecast 13	
2-4 Unit Apt	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat
All HHold	4,122	294 homes	3,397	159 homes	5,221	107 homes	3,155	168 homes	3,852	40 homes	3,368	179 homes
Conv. Eheat	487	0.21	492	0.05	311	0.17	269	0.05	335	0.06	342	0.26
HP Eheat	358	0.02	132	0.03	555	0.00	131	0.03	49	0.00	222	0.02
Aux Eheat	57	0.11	48	0.18	91	0.28	57	0.19	83	0.09	57	0.23
Central Air	457	0.26	1,063	0.19	2,326	0.69	836	0.05	1,244	0.60	354	0.27
Room Air	107	0.13	172	0.21	165	0.22	77	0.15	131	0.40	35	0.14

Table 2-15
Space Conditioning Electric UEC for 5+ Unit Apartments in Forecast Zones 1-7

Residence 4	Forecast 1		Forecast 2		Forecast 3		Forecast 4		Forecast 5		Forecast 7	
5+ Apt	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat
All HHold	3,503	51 homes	4,116	63 homes	4,238	159 homes	4,195	381 homes	3,748	526 homes	4,317	20 homes
Conv. Eheat	951	0.22	1,005	0.26	657	0.07	933	0.33	811	0.36	1,295	0.04
HP Eheat	910	0.04	313	0.02	386	0.02	434	0.04	443	0.06	546	0.02
Aux Eheat	137	0.35	132	0.06	98	0.26	95	0.10	107	0.12	117	0.14
Central Air	662	0.33	551	0.45	1,084	0.76	381	0.31	93	0.05	1,349	0.80
Room Air	64	0.09	108	0.40	165	0.19	63	0.20	13	0.04	217	0.09

Table 2-16
Space Conditioning Electric UEC for 5+ Unit Apartments in Forecast Zones 8-13

Residence 4	Forecast 8		Forecast 9		Forecast 10		Forecast 11		Forecast 12		Forecast 13	
5+ A[t	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat
All HHold	3,758	652 homes	3,478	355 homes	4,682	175 homes	3,229	396 homes	4,419	193 homes	3,550	406 homes
Conv. Eheat	540	0.20	497	0.10	467	0.13	539	0.11	534	0.18	414	0.38
HP Eheat	391	0.04	372	0.02	295	0.02	187	0.06	242	0.05	262	0.07
Aux Eheat	65	0.11	51	0.24	96	0.12	49	0.17	67	0.09	61	0.07
Central Air	503	0.35	860	0.19	1,716	0.74	518	0.21	892	0.55	326	0.32
Room Air	86	0.23	121	0.28	164	0.27	84	0.24	169	0.46	47	0.15

Table 2-17
Space Conditioning Electric UEC for Mobile Homes in Forecast Zones 1-7

Residence 5	Forecast 1		Forecast 2		Forecast 3		Forecast 4		Forecast 5		Forecast 7	
Mobile Home	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat
All HHold	6,384	52 homes	8,174	10 homes	6,328	141 homes	6,998	39 homes	4,724	20 homes	5,074	38 homes
Conv. Eheat	1,525	0.29	3,092	0.10	972	0.12	1,642	0.06	1,118	0.12	.	0.00
HP Eheat	1,095	0.02	923	0.04	1,056	0.08	.	0.00	582	0.05	.	0.00
Aux Eheat	402	0.33	406	0.42	221	0.42	172	0.41	281	0.29	796	0.42
Central Air	627	0.11	805	0.90	1,167	0.45	511	0.13	185	0.30	1,009	0.40
Room Air	81	0.58	.	0.00	252	0.48	85	0.10	18	0.05	207	0.17

Table 2-18
Space Conditioning Electric UEC for Mobile Homes in Forecast Zones 8-13

Residence 5	Forecast 8		Forecast 9		Forecast 10		Forecast 11		Forecast 12		Forecast 13	
Mobile Home	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat
All HHold	3,539	26 homes	4,816	43 homes	5,604	149 homes	4,903	3 homes	4,320	8 homes	4,307	34 homes
Conv. Eheat	690	0.02	1,189	0.03	940	0.02	.	0.00	.	0.00	902	0.23
HP Eheat	.	0.00	1,495	0.00	786	0.01	.	0.00	.	0.00	.	0.00
Aux Eheat	125	0.09	169	0.24	221	0.24	143	0.36	274	0.26	177	0.12
Central Air	830	0.28	1,132	0.49	1,580	0.47	492	0.36	808	0.50	553	0.35
Room Air	284	0.07	86	0.13	299	0.45	.	0.00	248	0.25	87	0.03

2.1.2. Estimated Natural Gas UECs

Estimated calibrated and weather-normalized natural gas UECs and the associated saturations are presented in Tables 2-19 through 2-25. Table 2-19 provides UECs and the associated saturations by residence type. Tables 2-20 and 2-21 provide estimates by structural vintage (home age). Table 2-22 presents estimates by service area. Finally, Tables 2-23 through 2-25 provide estimates of weather-sensitive end uses by CEC Forecasting Climate Zone. These UEC estimates are discussed briefly below, with special emphasis on values that may differ appreciably from values used by the CEC and/or the utilities in prior work. The discussion is organized by end use groupings, and concentrates strictly on the results by residence type.

The presentation of the Gas UECs and saturations differs slightly from the electric results. The RASS survey was designed as an electric survey. A total of 5,034 of the 21,153 individually metered households in the survey are households for which we have with no natural gas billing data. Some of the 5,034 households may have gas service. Some of these households may receive their gas from smaller municipal gas utilities not included in the survey or the billing matching process may have been unable to obtain and match their gas bills to the electric RASS frame. Gas UEC were calculated for 17,382, leaving 3,771 households as all electric households.

Tables 2-19 through 2-25 present Gas UECs and saturations for all RASS household by residence type and for gas RASS households by residence type. The gas RASS households are limited to RASS households with natural gas billing data from one of the three gas utilities, PG&E, SDG&E, or SoCal Gas. Examination of the two sets of results, the All Homes and the Homes w/Gas, indicates that the end-use saturations differ substantially while the end use UECs remain relatively constant. The saturations are higher for homes with gas bills and lower if all homes are used

to determine the saturation rates. To determine if a population segment is sufficiently large to produce reliable estimate of the end use UEC, analysts should use the Homes w/Gas saturations and population counts listed with the saturation data in the all household UEC row.

As stated above, the Homes w/Gas Data columns are restricted to homes with gas billing data from PG&E, SDG&E, and SoCalGas. Homes that receive their natural gas service from other, small providers, have estimated UECs, but the lack of gas billing data eliminated these households from the Homes w/Gas column. Unfortunately, due to the difficulty of identifying SoCal Gas customers, some SoCal Gas customers also lack gas billing data. Gas UECs have been estimated for these customers, but those without billing data are not included in the Homes w/Gas columns.

Space Heating

Primary gas Heating UECs vary quite a bit across residence types, from 95 therms per year for multi-family units in large apartment buildings to 243 therms for single family homes. Auxiliary gas space heat UECs range from 37 to 73 therms.

Water Heating

Conventional (non-solar) gas water heat UECs fall in the range of 183 to 206 therms. Solar assisted gas water hear UECs are only modestly below these values, but it should again be kept in mind that the homes with solar heating are very different from those with conventional gas water heat. While the gas solar water heating UECs appear reasonable, caution is called for when using them. Extremely low saturation rates may reduce their reliability.

Dryers

Gas dryers are estimated to use between 13 and 31 therms per year, depending on residence type.

Ranges/Ovens

Gas range/oven UECs are estimated to be between 28 and 46 therms.

Pool and Spa Heat

The overall average gas pool heating UEC is 222 therms, while the spa heating UECs vary from 81 to 114 therms per year. Given the samples sizes, 11,273 single family homes and 247 mobile homes with gas data, and the extremely low saturation rates, the single family spa heating UEC may be a more reliable estimate of the true gas spa usage.

Miscellaneous

Miscellaneous gas usage is estimated to be 1 or 2 therms per year.

Table 2-20 lists the Gas UECs for new and existing homes. While the data appear to indicate that newer homes use slightly more gas than older homes, the correct interpretation of the estimates is more complicated. Table 2-21 lists the whole household UEC for new and existing homes by utility and residence. These data show that newer homes in PG&E and SoCalGas use less gas than existing homes, while new single family homes in SDG&E use more gas than older homes. New homes in Table 2-20 appear to use more gas than older homes because most new homes are more predominantly single family homes and because SDG&E's new single family homes use substantially more gas than their older homes. These two characteristics of the data appear to dominate the statewide averages, hiding the fact that newer homes in PG&E's and SoCal Gas' service territories use less gas than older homes.

Table 2-19
Gas UECs and Saturations, by Residence Type, for all Households and for Homes w/Gas Account Data

	Single Family				Town Home				2-4 Unit Apt				5+ Unit Apt				Mobile Home			
	All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data	
	UEC	Sat.	UEC	Sat.	UEC	Sat.	UEC	Sat.	UEC	Sat.	UEC	Sat.	UEC	Sat.	UEC	Sat.	UEC	Sat.	UEC	Sat.
All Household UEC	454	13,824 homes	508	11,273 homes	300	1,780 homes	326	1,496 homes	222	1,608 homes	284	1,195 homes	151	3,377 homes	232	1,908 homes	235	563 homes	433	247 homes
Primary Heat	242	0.87	243	0.98	114	0.85	114	0.95	101	0.66	102	0.85	92	0.49	95	0.75	216	0.53	209	0.99
Auxiliary Heat	71	0.00	73	0.00	40	0.00	44	0.00	37	0.00	41	0.00	36	0.00	37	0.00	72	0.00	72	0.00
Conv. Gas Water Heat	206	0.89	206	0.99	195	0.87	194	0.95	184	0.69	183	0.89	185	0.46	186	0.71	192	0.53	193	0.99
Solar Water Heat w/Gas Backup	162	0.00	160	0.00	170	0.00	170	0.00	138	0.00	148	0.00	117	0.00	114	0.00	.	0.00	.	0.00
Dryer	31	0.50	31	0.55	24	0.32	23	0.35	24	0.14	23	0.17	21	0.07	20	0.11	13	0.19	13	0.39
Range/Oven	46	0.66	46	0.73	39	0.57	38	0.60	40	0.58	42	0.73	38	0.48	37	0.69	26	0.49	28	0.90
Pool Heat	220	0.03	222	0.04	.	0.00	.	0.00	.	0.00	.	0.00	.	0.00	.	0.00	.	0.00	.	0.00
Spa Heat	81	0.06	81	0.07	90	0.01	89	0.01	.	0.00	.	0.00	.	0.00	.	0.00	114	0.01	114	0.03
Miscellaneous	2		2		3		1		1		1		0		0		1		2	

Table 2-20
Gas End Use UECs and Saturations by House Age for all Households and for Homes w/Gas Account Data

	New House				Old House			
	All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data	
	UEC	Saturation	UEC	Saturation	UEC	Saturation	UEC	Saturation
All Household	370	1,393 homes	434	1,107 homes	355	19,760 homes	431	16,119 homes
Primary Heat	198	0.83	199	0.96	201	0.76	202	0.93
Auxiliary Heat	82	0.00	82	0.00	61	0.00	65	0.00
Conv. Gas Water Heat	160	0.84	162	0.97	203	0.77	203	0.93
Solar Water Heat w/Gas Backup	142	0.00	142	0.00	152	0.00	157	0.00
Dryer	31	0.49	31	0.57	30	0.35	30	0.42
Range/Oven	42	0.77	42	0.89	43	0.60	43	0.70
Pool Heat	259	0.05	261	0.06	214	0.02	215	0.02
Spa Heat	85	0.08	84	0.10	80	0.04	81	0.04
Miscellaneous	4		5		1		2	

Table 2-21
Gas Household UECs by House Age By Utility and by Residence type

	New Homes		Older Homes	
	Gas Household UEC	Count	Gas Household UEC	Count
All Utilities	434	1,107	431	15,012
All PG&E	427	490	436	6,255
SF PG&E	489	391	516	4,431
MF PG&E	224	98	267	1750
All SDG&E	377	142	349	1,544
SF SDG&E	423	122	399	1,149
MF SDG&E	183	20	223	375
All SoCalGas	457	475	443	7,213
SF SoCalGas	508	362	529	4,818
MF SoCalGas	243	105	283	2,251

Table 2-22
Gas UECs and Saturations by Utility for all Households and for Homes w/Gas Account Data[1]

	PG&E				SDG&E				SCG				Other	
	All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data			
	UEC	Sat.	UEC	Sat.	UEC	Sat.	UEC	Sat.	UEC	Sat.	UEC	Sat.	UEC	Sat.
All Household	343	8789 homes	436	6747 homes	279	2275 homes	351	1686 homes	407	8773 homes	443	7688 homes	179	1316 homes
Primary Heat	245	0.74	245	0.94	135	0.74	136	0.91	181	0.85	181	0.93	188	0.38
Auxiliary Heat	84	0.00	85	0.00	33	0.01	34	0.01	52	0.00	57	0.00	40	0.00
Conv. Gas Water Heat	183	0.74	183	0.94	180	0.76	181	0.96	219	0.85	219	0.93	197	0.42
Solar Water Heat w/Gas Backup	133	0.00	144	0.00	149	0.00	155	0.00	176	0.00	176	0.00	167	0.00
Dryer	25	0.22	25	0.28	23	0.43	23	0.54	33	0.48	33	0.53	26	0.21
Range/Oven	37	0.42	37	0.53	35	0.58	35	0.71	48	0.80	48	0.86	38	0.41
Pool Heat	224	0.02	225	0.02	218	0.03	217	0.04	218	0.03	222	0.03	206	0.00
Spa Heat	76	0.02	76	0.03	86	0.05	86	0.07	82	0.05	83	0.06	69	0.01
Miscellaneous	1		1		2		2		2		2		1	

[1]For households w/"other" gas utility providers, the California Statewide Energy Survey did not collect gas account data.

Table 2-23
Gas UECs for Forecast Zones 1-4

	Zone 1				Zone 2				Zone 3				Zone 4			
	All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data	
	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat
All Household	117	780 homes	420	208 homes	352	804 homes	435	603 homes	317	1,676 homes	416	1,121 homes	403	3,314 homes	467	2,844 homes
Primary Heat	226	0.27	215	0.97	253	0.74	252	0.91	220	0.73	218	0.97	262	0.82	261	0.96
Auxiliary Heat	138	0.01	138	0.03	88	0.00	88	0.00	78	0.01	80	0.01	72	0.00	73	0.00
Conv. Gas Water Heat	172	0.26	173	0.96	182	0.75	182	0.93	182	0.73	182	0.96	191	0.81	191	0.94
Solar Water Heat w/Gas Backup	.	0.00	.	0.00	84	0.00	84	0.00	141	0.00	141	0.00	121	0.00	150	0.00
Dryer	25	0.08	25	0.31	32	0.15	32	0.19	30	0.21	30	0.28	26	0.27	26	0.31
Range/Oven	30	0.18	30	0.67	39	0.47	39	0.59	40	0.36	40	0.47	40	0.40	40	0.46
Pool Heat	144	0.02	142	0.06	283	0.01	283	0.01	173	0.01	174	0.01	225	0.03	226	0.04
Spa Heat	70	0.02	68	0.08	77	0.01	77	0.02	75	0.02	73	0.03	84	0.03	84	0.04
Miscellaneous	1		2		1		1		1		1		1		1	

Table 2-24
Gas UECs for Forecast Zones 5-9

	Zone 5				Zone 7				Zone 8				Zone 9			
	All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data	
	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat
All Household	361	2,691 homes	425	2,344 homes	416	384 homes	521	186 homes	369	3,175 homes	437	2,607 homes	391	2,461 homes	447	1,808 homes
Primary Heat	244	0.77	244	0.91	275	0.77	253	0.99	163	0.80	164	0.95	167	0.83	173	0.94
Auxiliary Heat	71	0.00	71	0.00	90	0.00	90	0.00	30	0.00	32	0.00	41	0.00	62	0.00
Conv. Gas Water Heat	182	0.79	182	0.94	220	0.75	224	0.96	224	0.79	225	0.93	216	0.86	221	0.95
Solar Water Heat w/Gas Backup	161	0.00	161	0.00	.	0.00	.	0.00	172	0.00	171	0.00	175	0.00	181	0.00
Dryer	23	0.26	23	0.31	30	0.42	38	0.47	32	0.48	32	0.56	35	0.51	36	0.58
Range/Oven	35	0.56	35	0.67	34	0.61	41	0.76	46	0.71	46	0.82	50	0.82	51	0.90
Pool Heat	244	0.01	244	0.01	196	0.01	189	0.01	240	0.03	240	0.04	218	0.01	229	0.01
Spa Heat	71	0.02	71	0.02	58	0.04	70	0.02	76	0.06	76	0.07	74	0.04	78	0.04
Miscellaneous	0		1		2		2		3		3		2		2	

Table 2-25
Gas UECs for Forecast Zones 10-13

	Zone 10				Zone 11				Zone 12				Zone 13			
	All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data		All Homes		Homes w/Gas Data	
	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat	UEC	Sat
All Household	452	1,959 homes	528	1,401 homes	271	951 homes	316	759 homes	226	431 homes	329	319 homes	298	2,527 homes	368	1,919 homes
Primary Heat	232	0.85	237	0.98	110	0.66	113	0.78	138	0.55	143	0.81	142	0.76	143	0.92
Auxiliary Heat	77	0.00	112	0.00	36	0.00	37	0.00	34	0.00	34	0.00	33	0.01	34	0.01
Conv. Gas Water Heat	217	0.86	219	0.98	200	0.75	201	0.87	211	0.50	211	0.73	185	0.77	186	0.96
Solar Water Heat w/Gas Backup	.	0.00	.	0.00	188	0.00	188	0.00	162	0.00	148	0.00	149	0.00	155	0.00
Dryer	34	0.52	35	0.61	28	0.24	27	0.27	26	0.22	25	0.30	24	0.44	24	0.55
Range/Oven	50	0.76	50	0.86	45	0.86	44	0.96	46	0.69	47	0.94	36	0.59	36	0.71
Pool Heat	190	0.03	192	0.04	274	0.00	274	0.00	262	0.01	262	0.02	215	0.03	214	0.04
Spa Heat	89	0.06	88	0.08	112	0.01	112	0.01	77	0.01	77	0.02	88	0.06	88	0.08
Miscellaneous	2		3		0		0		2		2		2		3	