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Analysis of PG&E's Residential End-Use Metered Data to Improve Electricity Demand Forecasts

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Abstract

It is generally acknowledged that improvements to end-use load shape and peak demand forecasts for electricity are limited primarily by the absence of reliable end-use data. In this report, we analyze recent end-use metered data collected by the Pacific Gas and Electric Company from more than 700 residential customers to develop new inputs for the load shape and peak demand electricity forecasting models used by the Pacific Gas and Electric Company and the California Energy Commission. Hourly load shapes are normalized to facilitate separate accounting (by the models) of annual energy use and the distribution of that energy use over the hours of the day. Cooling electricity consumption by central air-conditioning is represented analytically as a function of climate. Limited analysis of annual energy use, including unit energy consumption (UEC), and of the allocation of energy use to seasons and system peak days, is also presented.

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Executive Summary

Forecasting electricity demand in an era of integrated resource planning requires detailed information on the end-use energy services provided by electricity. End-use detail on the hourly pattern of electricity use is especially important because electricity cannot be readily stored. As a result, electricity resource planning decisions (on both sides of the customer's meter) are strongly influenced by the expected timing and magnitude of system peak demands.

For this reason, the Pacific Gas & Electric Company (PG&E) and the California Energy Commission (CEC) rely upon a host of sophisticated end-use forecasting tools. However, both will agree that it is often differences in data and assumptions, rather than models, that lead to differences in forecasts. It is generally acknowledged that the empirical basis for the models is the weakest link in their forecasting capabilities. With respect to the peak demand forecasting models, the load shape data inputs are, for the most part, unverified, consisting of either engineering load simulations, borrowed end-use metered data, or class load studies. Extensive calibration efforts are often required to backcast historic system loads accurately.

The importance of more accurate peak demand and load shape forecasts, as well as the need to better assess demand-side resource opportunities, has led California utilities to initiate major end-use metering projects. These projects are extremely expensive and require years to complete. Data from the projects have only recently been incorporated into limited aspects of the peak demand and load shape forecasts by California utilities.

The current project represents a unique collaborative research effort by PG&E and CEC to develop a common set of residential sector end-use load shape forecasting inputs from the end-use metered data collected by PG&E from over 700 customers. While features of the forecasting models and approaches used by PG&E and CEC precluded development of an identical set of inputs for each, the application of consistent analytical approaches to a common data set ensured consistency of the model-specific results.

The motivation for this collaboration is the recognition that, within the Common Forecasting Methodology process, explicit agreement on the factual basis for competing forecasts offers significant benefits. First, it focuses subsequent discussion on issues where there are genuine differences of opinion, rather than on issues where there are simply different data sources, both of which require substantial staff resources to understand. Second, it provides opportunities for technical discussions between utility and CEC staff outside the formal setting of the hearing process.

The project was organized in three phases: (1) data review; (2) model-specific data input development; and (3) exploratory analysis, focusing on the CEC model framework.

As part of our initial review of the data, we calculated annual electricity consumption (also called a unit energy consumption or UEC in forecasting) for each end use (and by region for space cooling). Where available, statistical weights provided by PG&E's load research group were used in an effort to make the sample of end-use metered customers more representative of the population of PG&E customers. We found that the use of statistical weights tended to yield lower space cooling UECs. More importantly, we found that the UECs developed from metered data differed, often substantially, from the UECs assumed by both PG&E and CEC in the forecasts. While there are many appropriate reasons for the differences, examining these differences was outside the scope of the current project. It is clear, however, that the metered data provide a rich empirical basis for systematically assessing the sources of differences in the future.

For the CEC model, we analyzed five years of residential air-conditioning data to develop time-temperature matrices. Time-temperature matrices express hourly air-conditioning energy use as a function of both time of day and a measure of climatic severity called the temperature-humidity index (THI). A single matrix was developed from all five years of data. To ensure continuity between adjacent values and also to allow CEC to use the matrix to forecast conditions not observed in the original data, we developed an extrapolation and smoothing technique and applied it to the data.

We conducted limited evaluations of the accuracy of the time-temperature matrix in "predicting" the actual load observations that were used in its development. We found that the time-temperature matrix developed from all five years of central A/C data performed accurately in "predicting" average summer loads. The hour of the peak demand was predicted in a relatively un-biased manner, except for one region. But we found that peak daily loads were over-predicted.

These findings underlie what we believe to be important, but not well appreciated, trade-offs in accuracy between the different forecasting applications of the CEC time-temperature matrix (and, we believe, the PG&E model). That is, while forecasting system peak demands remains critically important for the planning process, other forecast quantities (such as hourly loads on non-system peak days and minimum load conditions) have increased in importance. Even for the system peak day, there are trade-offs in accuracy between forecasting the absolute kW value of the peak for the space cooling end use, the timing of that peak, and the load that is coincident with the time of the system peak. At the present time, the relative importance of these trade-offs has not been assessed.

For the PG&E model, we analyzed five years of residential air-conditioning data to develop daily weather response functions and binned hourly load shapes according to definitions established by PG&E in previous research. The weather response functions allocate forecasts of annual energy use (developed by a separate PG&E forecasting model) to the days of the year based on a combination of average temperature on the current and previous two days. The binned hourly load shapes spread daily energy use over the hours of the day, also based on average daily temperature. Both were developed separately for three of the four regions used by PG&E to forecast loads for its service territory. There were insufficient data to support analysis for PG&E's fourth region (in part, because the need for and saturation of air-conditioning is extremely low in this region). We also identified options for future enhancements to the specification of the functional form of the weather response function and its development from the metered data.

We also developed seasonal and daytype allocation factors, and load shapes for four non-space conditioning end uses (refrigeration, water heating, clothes drying, and cooking) for the CEC model. (PG&E does not forecast individual, non-space conditioning end uses in its load shape forecasting model.) These results were based on three years of metered data collected by PG&E. Our analysis of these data suggests that differences in energy use by daytype (e.g., weekend vs. weekday) are much more important to capture than differences by month (e.g., January vs. February).

We also initiated exploratory analysis to begin to address issues regarding the cost-effectiveness of end-use metering. Working within the framework of the CEC model, we considered (but by no means reached complete resolution of) two issues: how much geographic coverage was appropriate and how many years of data should be collected.

We found that the energy used by central air-conditioners in the different regions used by CEC for forecasting purposes exhibited variations that could not be accurately generalized using the CEC model framework. Backcasts of observed Fresno loads, using the time-temperature matrix developed from only Fresno data, were slightly more accurate than loads backcast from the matrix developed from data from all regions. We also found that the number of year of data used to develop the time temperature matrix did influence the accuracy of the matrix in predicting loads observed in other years.

Our results suggest that, at this time, relying on multiple years of data, but possibly analyzing them separately by geographic region may be appropriate. However, the larger question raised by our preliminary findings is; on the one hand, whether more accurate representations of the data can be developed, and, on the other, whether these findings can inform efforts to supplement or to more tightly focus future metering activities.

End-use metering is expensive. Its cost must be justified by the value that the information collected brings to the planning process and other uses of the data. We believe that this value is enhanced by cooperative research sponsored by the ultimate users of the data. We also believe that we have only begun to tap the wealth of information contained in them.

Our work to date suggests several areas for future research:

(1) Prioritization of the outputs forecast by load shape models (such as system peak demand and timing, end-use peak demand, average daily load shapes, and minimum load conditions) so that these priorities can be explicitly reflected in future analyses.

(2) Examination of alternative methods for representing load shape data in forecasting, starting with space cooling. These methods would examine

alternative measures of climate severity and alternative schemes for "normalizing" weather response.

(3) Examination of supplementary data (such as mail surveys and billing records) to evaluate alternative statistical weights for aggregating data to represent the PG&E population of customers within the disaggregate end-use framework used by CEC and PG&E for forecasting.

Chapter 1
Introduction

It is generally acknowledged that improvements to electricity load shape and peak demand forecasts are limited primarily by the absence of reliable end-use data. In the past, utility and state forecasters have relied on a combination of simulated, borrowed end-use, and class load research data. In part this situation results from the structure of existing load shape and peak demand forecasting methods, which take annual electricity use that has been calculated previously by a separate forecasting model and allocate this calculated use to the hours of the year. However, recent end-use metering by utilities promises to dramatically improve not only the data used by existing load shape forecasting models but also to provide the basis for the next generation of models to forecast end-use annual energy and hourly demand.

In this study, we report results from our analysis of end-use metered data collected by the Pacific Gas and Electric Company (PG&E) from more than 700 residential customers between 1985 and 1989. The analysis centered on developing new inputs to the load shape and peak demand forecasting models currently used by PG&E and the California Energy Commission (CEC) in their biennial forecasts of electricity demand.

The goal of the analysis is to provide a common set of inputs that both models can use to represent the hourly pattern of electricity use. Although unique features of the PG&E and CEC models make it impossible to develop a single set of inputs usable by both models, we applied consistent analysis procedures to the data up to the point at which model-specific data formatting was required to ensure that the resulting inputs are compatible with one another.

This report is organized in seven sections following this introduction. We begin by describing the PG&E and CEC load shape and peak demand forecasting models (Chapter 2) and the PG&E end-use metered data (Chapter 3). We provide an overview of data preparation and analysis procedures and discuss our evaluation criteria for the CEC model in Chapter 4. Because of the richness of the data set, the structure of the models, and especially because of the importance of residential cooling to forecasts of energy use, PG&E and CEC are keenly interested in this end use. Our analyses leading to revised cooling load shape data for the models are presented separately for CEC and PG&E in Chapters 5 and 6, respectively. The CEC model requires additional load shape data on individual non-space conditioning end uses; this analysis is presented in Chapter 7. Six appendices provide additional documentation for the analyses presented in the body of the report, including details of the data preparation procedures and tabular summaries of the load shape information presented in Chapters 3, 5, 6, and 7. We also present results from our exploratory analysis on subsets of the data based on the CEC model's representation of central air conditioning load shape.

Chapter 2
PG&E and CEC Load Shape and Peak Demand Forecasting Models

Existing hourly electricity load shape and peak demand models are essentially post-processors for end-use forecasting models, which separately develop annual forecasts of energy use. Equipment purchase and energy use decisions, stock turnover, and other economic and demographic factors are treated as influences primarily on annual energy use. In this framework, the goal of the load shape and peak demand model is to allocate the estimated annual total load to the hours of the year.

PG&E uses a load shape forecasting model called HELM, developed by ICF, Inc. for the Electric Power Research Institute (ICF 1991). The model is very flexible; it allows the user to define the number of end uses for which it will generate up to an 8,760-hour forecast of energy use. For a given end use and year, the user defines hourly load shapes for a limited number of day-types and assigns day-types to all the days in a calendar year. Then the model distributes annual energy use (a figure also supplied by the user) to the hours of the year, using allocation factors previously defined. For weather-sensitive end uses, such as cooling, the allocation procedure can also be based on measures of climatic variables, such as a three-day weighted average of mean daily temperature. In this case, the model also requires a daily weather file for the year. Daily energy use is allocated to the hours of the day using normalized load shapes. The choice of normalized load shape can be specified as a function of weather variables.

PG&E defines seven separate end uses for the residential sector: three separate space cooling and three non space cooling end uses corresponding to three geographic zones within the company's service territory, and a single combined end use for a fourth geographic zone (PG&E 1991).

CEC uses a peak demand model that was developed in-house in the late 1970's (Jaske and Paige 1979). The CEC model is more structured than HELM because it was designed in conjunction with end-use annual energy forecasting models that were also developed by CEC. For the residential sector, the CEC model requires annual energy forecasts for 14 non-space conditioning and five space conditioning end uses for each geographic region considered. In the past, the CEC model has been used mainly to produce system peak day load forecasts although the model is, in principle, capable of producing forecasts for non-peak days.

The CEC model allocates forecasts of annual energy use to the hours of the year in two steps. For non-space conditioning end uses, the allocation process closely resembles that of HELM. First, annual energy use is distributed by days according to factors that express daily average energy use (for a particular combination of season and day type) as a function of annual daily average energy use. Second, daily energy use is allocated to the hours of the day using average daily load shapes. For non-space-conditioning end uses, four seasonal allocation factors and a single day-type for each season are used. For space conditioning end uses, as with HELM, annual space conditioning energy use is first allocated to daily energy use using weather data: CEC uses a three-day weighted average of degree-days, rather than mean daily temperatures, as used by PG&E. For cooling, degree-days are based on a combined dry- and wet-bulb temperature variable called a temperature-humidity index or THI. For heating, dry-bulb degree-days are used. Unlike HELM, the CEC model does not spread daily energy use to the hours of the day using a fixed load shape. Instead hourly energy use is expressed as a function of time of day and THI (for cooling) or dry-bulb temperature (for heating), in what CEC refers to as a time-temperature matrix.

To forecast system peak demands for the PG&E planning area, the CEC model produces separate forecasts for five geographic regions in the PG&E service territory (CEC 1991). Because the same non-space-conditioning seasonal allocation factors and daily load shapes are used for all five regions, the forecasts differ qualitatively only for space-conditioning energy use. More precisely, while non-space-conditioning energy use forecasts differ substantially because of region-specific differences in end-use saturations and energy use, the allocation factors and load shapes used are identical.

Chapter 3
The PG&E Appliance Metering Project

PG&E's Appliance Metering Project (AMP) was the first large-scale end-use metering project in California (PG&E 1987). Since 1983, more than 700 single-family, owner-occupied residences have been continuously metered. In designing the project, PG&E was particularly interested in improving its understanding of the contribution of space cooling energy use to system loads. As a result, the geographic distribution of metered households is concentrated in the hot central valley of California where the demand for cooling is greatest.

For each household, two appliances were metered in addition to total household load. In the entire sample, a total of sixteen different appliance types were metered. Table 3-1 lists these appliances and the number metered. In this study, we analyze data for seven end uses: central air conditioning, room air conditioner, clothes dryer, a miscellaneous kitchen circuit, refrigerator, and water heater and another end use, made up of a combination of four metered appliances: range only, range with oven, oven only, and range with oven and microwave which we call "cooking". The miscellaneous kitchen circuit is a general kitchen end use that excludes cooking but may include refrigeration in addition to lights and miscellaneous appliances. We do not report results for heat pump compressor, nor are heat pump compressor data included in any of our cooling end uses. Table 3-2 shows the geographic distribution of cooling appliances by CEC Region and by PG&E Zone. Several regions do not have significant numbers of metered data (e.g., in the case of central air conditioning, CEC Region 1 and 5, and PG&E Zone T). As a result, we do not report separate analyses for these regions and zones.

PG&E provided LBL with three years of data for space conditioning end uses (1987-1989) and one year of data for non-space-conditioning end uses (1989). In an earlier project (see Ruderman et al. 1989), PG&E provided LBL with space-conditioning and non-space-conditioning AMP data for 1985 and 1986. Thus, in total, we examined five years of space-conditioning and three years of non-space-conditioning data from the AMP. PG&E replaced all information that might identify individual customers with a seven digit code that identified the households across data sets.

PG&E has developed weights to make the sample more representative of the entire residential class, and to account for the stratified nature of the AMP sample (Brodsky & Associates 1991). These weights were not available from PG&E in time for most of our analyses. Therefore, with the exception of the weighted mean UECs presented in this chapter, **the results presented in this report were developed through unweighted analyses of the data**. Our unweighted analyses are theoretically reflective only of loads for single-family owner-occupied residences; furthermore, for these loads, we cannot determine what biases may exist as a result of the process used to select participants for the project.

Descriptive statistics on the data analyzed in this project are summarized in Tables 3-3 through 3-7. For each end use (sometimes a combination of several appliances, see Table 3-1), we report the mean and standard deviation of unweighted annual energy use (or UEC for "unit energy consumption"), and the average number of appliances contributing each month to the UEC for the year. We also report weighted mean UECs for each case in which analysis weights were provided. The statistics are reported for each year separately and for all years together. For the space-conditioning end uses, we report these data by CEC Region (Tables 3-3 and 3-4) and by PG&E Zone (Tables 3-5 and 3-6), for each year separately and for all years together. For central air conditioners, weights were developed (by PG&E) only for summer months (May through October). In order to compute annual weighted UECs, we applied the summer weights to the energy use in winter months as well. Other computational details are discussed in Appendix A.

Statistics for CEC Regions 1 and 5 and statistics for room air conditioners in PG&E Zone R and CEC Region 2 are not tabulated separately because of the small number of appliances in each region; however, these data are included in the summaries for all regions. Below we compare UECs computed without analysis weights to those computed using the PG&E-supplied analysis weights and also compare the UECs we computed to those used by PG&E and CEC in their forecasts. We also discuss the variability from year to year of the annual mean UECs we computed.

Annual mean central air conditioner weighted UECs are lower than the corresponding unweighted UECs, in all cases but one (1987 PG&E Zone X, for which weighted UEC is 1.1 percent higher than the unweighted UEC). The effect is greatest for UECs for the hottest areas (Zone R and CEC Region 3, and to a lesser extent Zone S and CEC Region 2), with the level of effect in those regions fairly consistent over the three years considered.

For CEC Region 2, central air conditioner annual mean weighted UECs are 11.7, 12.4, and 10.5 percent lower than unweighted UECs for 1987, 1988, and 1989 respectively (see Table 3-3). Region 3 central air conditioner annual mean weighted UECs are 16.4, 14.4, and 10.3 percent lower, and Region 4 weighted UECs 1.5, 9.0, and 5.2 percent lower, than the corresponding unweighted UECs for 1987, 1988, and 1989 respectively. Patterns for PG&E Zones are similar, with annual mean weighted UECs ranging from 17.4 percent lower (1987 Zone R) to 1.1 percent higher (1987 Zone X) than corresponding unweighted UECs.

Analysis weights for room air conditioner were available only for 1989. For this year, weighted mean UECs for room air conditioner are again lower (from 3.0 to 12.1 percent) than the corresponding unweighted mean UECs (see Tables 3-4 and 3-6).

We also compared weighted to unweighted UECs for three non-conditioning end uses, clothes dryer, refrigerator, and water heater, for the year (1989) for which analysis weights for these end-uses were available. Weighted 1989 mean UECs are 11.5, 18.7, and 1.3 percent lower than unweighted 1989 mean UECs for clothes dryer, refrigerator, and water heater, respectively. (Analysis weights were not provided for range with oven and microwave, one of the components of the cooking end use, so that weighted UECs for cooking could not be computed, nor were analysis weights provided for the kitchen circuit end use.)

Table 3-8 shows 1989 UECs used by PG&E and CEC in their forecasts along with the unweighted and weighted UECs we computed from the metered data. To facilitate comparisons, we compare UECs for the total residential sector over the entire PG&E service area (although UECs are available by climate zone and, from CEC, also by housing type). The PG&E UECs are as reported in the Revised ER 92 Forecast of the Demand for Electricity (PG&E 1991). We computed UECs for the total residential sector, from UECs reported by CEC by housing type (single family, multi-family, and mobile home) and climate zone (CEC 1992). CEC's and PG&E's central air conditioner end use includes heat pump compressor whereas LBL's central air conditioner end use does not. CEC also reports water heating separately for clothes washer, dishwasher, and other water heating; we report the sum of these three UECs as well as the UEC for water heating excluding clothes washer and dishwasher. LBL UECs are from the all regions summaries in Tables 3-3 through 3-7.

Annual regional mean UECs for central air conditioner vary considerably from year to year. The ratio of the highest to the lowest annual UEC observed in the five years of data are 1.42, 1.32, and 1.53 for CEC Regions 2, 3, and 4, respectively (see Table 3-3). Annual UEC for room air conditioners also varies considerably from year to year, but since relatively few room air conditioners were metered, reliable comparisons are difficult. We also computed the mean UEC on a monthly basis for central and room air conditioners. These monthly statistics are reported, by CEC Region and by PG&E Zone, in Appendix B.

Annual mean UEC for clothes dryer, water heater, kitchen circuit, and cooking consistently decrease during the three study years (decreasing between 1985 and 1986 and again between 1986 and 1989). The changes are small, though, with UECs that are 6.0, 8.2, 5.2, and 3.9 percent lower in 1989 than in 1985 for clothes dryer, appliances, kitchen circuit, and water heater, respectively, and of questionable statistical significance.

The purpose of the comparisons of un-weighted and weighted UECs, and of the UECs used by PG&E and CEC in their forecasts is not to suggest that one of these UECs is the "best" UEC to use in forecasting. Rather, it is to point out that there are significant differences that need to be better understood by all parties. In particular, the conventions and definitions used to develop the UECs used in the forecasts and the sample weights for the AMP data, as well as biases that may exist within the AMP sample, should be subjected to comprehensive review. This review is outside the scope of the current project.

Table 3-1
Number of Appliances Metered

analyzed in this study	
Central Air Conditioner	415
Wall Air Conditioner	65
Clothes Dryer	396
Kitchen Circuit	60
Refrigerator	30
Water Heater	81
combined into a single end use "Cooking"	
Range Only	97
Range with Oven	208
Oven Only	32
Range with Oven and Microwave	20
Cooking (total)	351
not analyzed in this study	
Electric Space Heater	6
Microwave	2
Clothes Washer	1
Heat Pump Compressor	67
Heat Pump Strip	16
Freezer	3
TOTAL HOUSEHOLDS	773

Table 3-2
Number of Central and Room Air Conditioners Metered by CEC Region and PG&E Zone

End Uses Analyzed in this Study	
Central Air Conditioner (all regions)	415
CEC Region 1	3
CEC Region 2	65
CEC Region 3	186
CEC Region 4	133
CEC Region 5	6
PG&E zone R	149
PG&E zone S	157
PG&E zone T*	1
PG&E zone X	107
Room Air Conditioner (all regions)	65
CEC Region 1	2
CEC Region 2	6
CEC Region 3	13
CEC Region 4	39
CEC Region 5	2
PG&E zone R	9
PG&E zone S	20
PG&E zone T*	0
PG&E zone X	36

* PG&E zone T is not analyzed in this study

For a description of CEC regions 1-5 and PG&E zones R, S, T and X, please refer to Figures A-1, A-2, A-3, A-4 and A-5.

Table 3-3
Annual UEC for Central Air Conditioning, CEC Regions

APPLIANCE	*1985*	*1986*	*1987*	*1988*	*1989*	*all years*
all Regions						
mean	1,254	1,112	1,424	1,607	1,094	1,294
wt.mean	n/a	n/a	1,283	1,429	996	n/a
n	288	267	337	318	332	308
Region 2						
mean	1,149	1,098	1,250	1,400	989	1,174
wt.mean	n/a	n/a	1,104	1,227	885	n/a
std.dev.	443	373	486	449	362	445
n	48	42	56	49	50	49
Region 3						
mean	1,606	1,499	1,816	1,982	1,378	1,651
wt.mean	n/a	n/a	1,531	1,697	1,236	n/a
std.dev.	552	526	676	646	527	626
n	118	107	147	138	141	130
Region 4						
mean	946	724	936	1,051	688	849
wt.mean	n/a	n/a	922	956	652	n/a
std.dev.	480	425	779	586	435	563
n	103	98	108	105	120	107

Table 3-4
Annual UEC for Room Air Conditioning, CEC Regions

APPLIANCE	*1985*	*1986*	*1987*	*1988*	*1989*	*all years*
all Regions						
mean	344	363	476	668	477	475
wt.mean	n/a	n/a	n/a	n/a	514	n/a
n	41	40	50	51	48	46
Region 3						
mean	371	595	578	754	343	521
wt.mean	n/a	n/a	n/a	n/a	325	n/a
std.dev.	188	254	262	307	208	261
n	10	9	8	10	10	9
Region 4						
mean	296	226	433	502	393	373
wt.mean	n/a	n/a	n/a	n/a	381	n/a
std.dev.	134	120	474	181	151	275
n	103	98	108	105	120	107

Table 3-5
Annual UEC for Central Air Conditioning, PG&E Zones

APPLIANCE	*1985*	*1986*	*1987*	*1988*	*1989*	*all years*
all regions						
mean	1,254	1,112	1,424	1,607	1,094	1,294
wt.mean	n/a	n/a	1,283	1,429	996	n/a
n	288	267	337	318	332	308
Zone R						
mean	1,802	1,700	2,002	2,294	1,684	1,905
wt.mean	n/a	n/a	1,653	1,911	1,519	n/a
st.dev.	565	543	718	701	601	678
n	86	82	117	113	111	102
Zone S						
mean	1,277	1,188	1,367	1,538	1,018	1,265
wt.mean	n/a	n/a	1,270	1,380	895	n/a
st.dev.	553	495	576	580	479	438
n	116	102	132	118	123	118
Zone X						
mean	682	497	709	790	521	629
wt.mean	n/a	n/a	717	753	500	n/a
st.dev.	249	239	737	443	254	-
n	80	80	86	86	97	86

Table 3-6
Annual UEC for Room Air Conditioning PG&E Zones

APPLIANCE	*1985*	*1986*	*1987*	*1988*	*1989*	*all years*
all regions						
mean	344	363	476	668	477	475
wt. mean	n/a	n/a	n/a	n/a	514	n/a
n	41	40	50	51	48	46
Zone S						
mean	465	617	633	980	629	680
wt. mean	n/a	n/a	n/a	n/a	651	n/a
std. dev.	201	253	250	325	249	-
n	12	11	14	18	17	14
Zone X						
mean	286	217	425	495	395	369
wt. mean	n/a	n/a	n/a	n/a	362	n/a
std. dev.	130	120	487	186	149	-
n	23	23	31	27	26	26

Table 3-7
Annual UEC for Non-Conditioning Appliances

APPLIANCE	*1985*	*1986*	*1989*	*all years*
clothes dryer				
mean	905	878	851	877
wt. mean	n/a	n/a	753	n/a
std. dev.	198	197	198	n/a
n	290	270	324	295
cooking				
mean	389	365	357	371
wt. mean	n/a	n/a	n/a	n/a
std. dev.	84	82	113	n/a
n	262	251	279	264
kitchen circuit				
mean	2,044	2,013	1,937	2,002
wt. mean	n/a	n/a	n/a	n/a
std. dev.	263	274	275	n/a
n	58	57	51	55
refrigerator				
mean	1,659	1,896	1,763	1,784
wt. mean	n/a	n/a	1,434	n/a
std. dev.	240	372	278	n/a
n	16	14	19	16
water heater				
mean	4,106	3,997	3,945	4,013
wtd. mean	n/a	n/a	3,501	n/a
std. dev.	6,114	551	628	n/a
n	52	51	61	55

Table 3-8
Comparison of 1989 UECs assumed in PG&E and CEC forecasts and UECs Calculated by LBL
(UECs are in kWh/unit/year)

	UEC Total Residential Sector		
Central Air Conditioner *			
LBL - Weighted	996	LBL - Unweighted	1,094
PG&E	609		
CEC†	1,483	CEC Single Family	1,815
Room Air Conditioner			
LBL - Weighted	514	LBL - Unweighted	477
PG&E	373		
CEC	409	CEC Single Family	456
Clothes Dryer			
LBL - Weighted	753	LBL - Unweighted	851
PG&E	1,388		
CEC	1,003	CEC Single Family	1,126
Cooking			
LBL - Weighted	n/a	LBL - Unweighted††	357
PG&E	625		
CEC	639	CEC Single Family	723
Refrigerator			
LBL - Weighted	1,434	LBL - Unweighted	1,763
PG&E	1,388		
CEC	1,125	CEC Single Family	1,161
Water Heater			
LBL - Weighted	3,501	LBL - Unweighted	3,945
PG&E	3,518		
CEC **	4,075	CEC Single Family	4,238

* includes heat pump compressor for PG&E and CEC

** sum of CEC's water heater, hot water dishwasher, and hot water clothes washer UECs (2,157, 913 and 1,005 kWh respectively for total residential sector).

† total residential sector UEC reported for CEC are weighted averages of single-family, multi-family and multiple-home UECs.

†† LBL's cooking UEC is an average over combined appliance type, not a sum of UECs over individual appliance types.

Chapter 4
Method of Analysis

In this section, we summarize our preparation of the data for analysis, referring many of the technical details to Appendix A. We also provide an overview of the procedures common to all of our analyses, which are reported in detail in Chapters 5, 6, and 7. Finally, we define the procedures developed to assess our analysis, including backcasting and various measures of goodness of fit. At this time, these procedures apply only to our evaluation of the load shape representation used by the CEC model and presented in Chapter 5 and Appendix F.

The data provided by PG&E were subjected to extensive review by the PG&E load research group. In general, we relied on their efforts and used the data without extensive additional review, beyond treatment of missing data. To improve our familiarity with the data set and develop our missing data treatments, we subjected the 1989 space conditioning data to an additional internal review. We did range checks on hourly loads, compared air conditioner load to total household load, assessed data completeness, and visually examined a "three-dimensional" graph for each metered air conditioner showing the 8,760 hours of air conditioner load for the year, by hour of day. Appendix A contains a detailed technical summary of these activities. We reviewed the results of these procedures with PG&E's load research group. As a result, we recoded as missing 1989 cooling data for two residences, and removed duplicate data for a third residence.

A second part of our data validation was a review of CEC Region assignments. For each residence reporting metered air conditioner data, we evaluated the region assignment initially given (these were indirect assignments, as detailed in Appendix A) and proposed reassignments when indicated. We discussed these proposed reassignments with CEC staff, and, with their approval, recoded assignments to CEC Regions for residences in 41 zip code areas.

The basic procedure for all our analyses of the AMP data is aggregation. For non-space-conditioning end uses, we aggregated the cooking appliances as indicated in Table 3-1. For all end uses, aggregations were made both across years and, to differing degrees, within years. For space-conditioning, separate aggregations were made for each geographic region. As we will describe in Chapters 5 and 6, PG&E and CEC rely on different definitions for their geographic forecasting areas.

Following aggregation across appliances, years, and geographic regions, we then proceeded with analyses that were specific to the requirements of each model. These analyses are described separately in Chapters 5, 6, and 7.

As noted in Chapter 2, historically, the CEC model had been used to produce load forecasts for only system peak days. However, we have developed new time-temperature matrices is based on cooling loads for all days. We evaluate the performance of the matrix for predicting load shapes on summer days as well as for the hottest days. Our primary strategy for evaluating the CEC matrices involved using them to backcast the observed conditions upon which the analyses were originally based. Specifically, we used the matrices along with historic weather to predict daily load shapes. We then compare our prediction to the mean load shape of the AMP sample on the day from which the historic weather was taken. Thus, for each CEC Region we derive a pair of load shapes for each day during the period from 1985 to 1989. Each pair consists of a backcast load shape derived from applying the hourly THI values for the CEC Region's NOAA weather station to the time-temperature matrix, and a sample mean load shape derived from all metered central air conditioner data for that region and day. For the purposes of the comparisons described below, we expressed both the backcast and sample load shapes on an energy-normalized scale (so that a day's 24 hourly loads add up to 1). Because of the small number of air conditioners metered in CEC Regions 1 and 5, we compared load shape pairs for only Regions 2, 3, and 4.

In comparing load shapes, we relied on both visual inspection and more formal, quantitative measures of goodness of fit. For each day's pair of load shapes we computed measures describing four aspects of the daily load shape:

- timing of peak hour
- magnitude of peak
- magnitude of load at time of an exogenously specified system peak hour (4 p.m.)
- the square root of the daily sum of the square of deviations from the recorded value

We discuss these measures below. Figure 4-1 illustrates the measures for a sample comparison of load shapes.[1]

To compare **Timing of Peak Hour**, we computed the difference between the hour of day of the peak load for the sample mean load shape and the hour of day of the peak hour for the backcast load shape. For example, if the peak hour of the backcast load shape was 5 p.m., and the peak hour of the sample mean load shape was 4 p.m., we defined the backcast load shape peak as being one hour late. This is shown as the difference **a** in Figure 4-1. We report the percentage of days for which the backcast load shape peak is one hour late, one hourly early, etc.

To compare **Magnitude of Peak**, we computed the difference between the peak hourly load of the sample load shape and the peak hourly load of the backcast load shape. The hours compared are not necessarily the same hour of day, as indicated by the previous measure. We computed these peak load level differences on an energy normalized scale. This difference is illustrated as difference **b** in Figure 4-1.

[1] Loads are expressed as % daily load in the figure, but as proportion of daily load (%/100) for computations reported in Chapter 5 and Appendix F tables.

In recent years, 4 p.m. has often been the peak system demand hour for PG&E, so we also compared backcast and sample **Magnitude of 4 p.m. Load** by computing the difference between sample 4 p.m. load and backcast 4 p.m. load. This is the difference **c** in Figure 4-1.

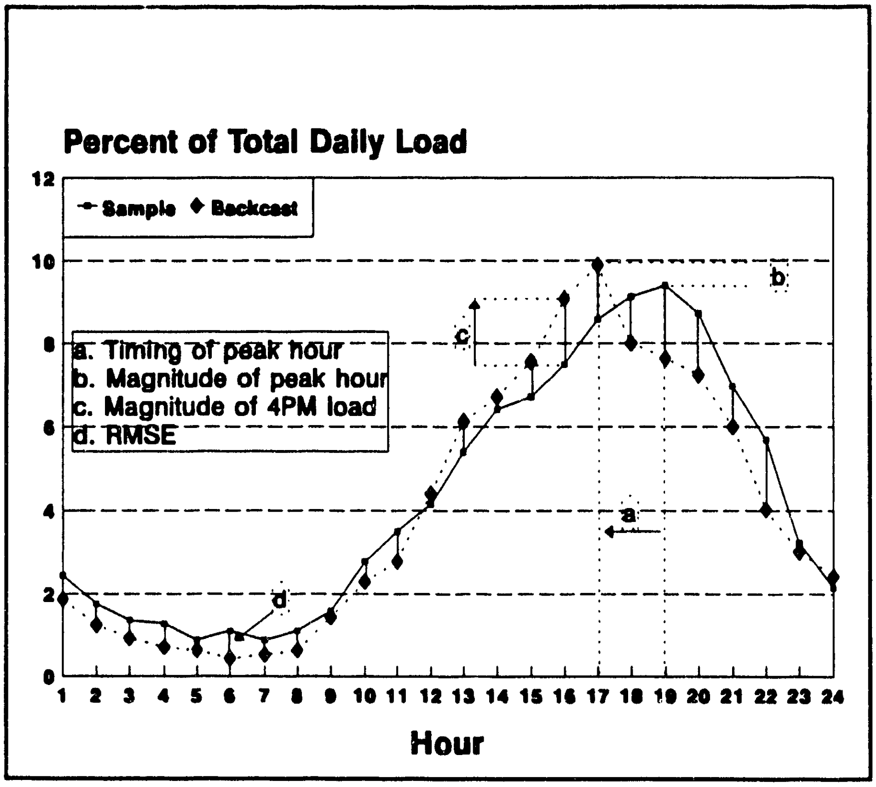

Figure 4-1
Illustration of Measures Used for Load Shape Comparisons

Finally, we computed a general measure of load shape similarity called root-mean-square-error or **RMSE**, which is the square root of the mean squared difference between backcast and sample load over the 24 hours of the day. Squaring the difference exaggerates large errors more than an absolute-difference measure would. RMSE is the sum of the sequence of the differences **d** in the figure. Formally,

$$RMSE = \left[\sum_{h=1}^{24} (sample\ [h]\ -\ backcast\ [h])^2 \right]^{1/2}$$

Chapter 5
Cooling Electricity Use Analysis for CEC Peak Demand Model

Using all five years of AMP data, we developed central air conditioner time-temperature matrices, following the format used by the CEC Peak Demand Model. In this section, we summarize the construction of these matrices and discuss the match between backcasts based on the new all-region time-temperature matrix and the sample load shapes. As noted in Chapter 2, our results are based on unweighted analyses of the data.

The time-temperature matrix defines a correspondence between a cell, defined as a combination of: hour of day (1 through 24), value of a temperature-humidity index (or THI), and an average load in kWh for a particular end use. The matrix is used by the CEC space-conditioning demand model to generate a daily load shape, which is subsequently scaled by other factors, as described in Chapter 2 of this report. We developed a single time-temperature matrix based on data from all regions for all five years.[2] We developed the matrix in two steps: first we prepared a "raw" time-temperature matrix, and second, we derived a "smoothed" time-temperature matrix based on the raw matrix.

To prepare the raw time-temperature matrix, we calculated a THI for each reported hour of the 1985-1989 data record at each of the following five NOAA weather stations: Blue Canyon, Fresno, Sacramento, San Francisco, and San Jose. Because NOAA data for the San Jose station were not available for 1985, we substituted data from nearby Sunnyvale for San Jose for 1985. These THI values, rounded to the nearest integer, ranged from 45 to 89. Next we assigned each hour of central air conditioner load for each residence to a hour-THI cell, based on hour of day and value of THI for the NOAA station corresponding to the residence's CEC Region assignment. We then computed a cell mean for each observed hour-THI combination. This mean load is estimated across all hours, using the residences and dates assigned to the cell.

Figure 5-1 shows the resulting raw time-temperature matrix. Tabular summaries of these data are presented in Appendix C. The raw data do not fill every cell in the matrix. Moreover, the plot looks uneven, varying from the smooth surface we might expect because of the small number of data used to compute the values for some of the cells on the graph, particularly at time-temperature combinations expected to have high loads. Intuition suggests that the time-temperature matrices ought to behave smoothly across time-temperature load surface. Assuming that this intuition is correct, one could theoretically, obtain better estimates of mean load for a given cell of the time-temperature matrix by using information from neighboring cells. This approach is particularly appealing if a cell contains few observations. For example, only 39 hours of metered results of data contributed to the hour-19-THI-88 cell, while 1,945 hours of

[2] Appendix F reports findings from exploratory analyses to develop matrices from subsets of the data.

metered data contributed to the hour 19-THI-87-cell, and 165 hours contributed to the hour-18-THI-88 cell, etc. (see Table C-3). Therefore, information from the cells neighboring the hour-19-THI-88 cell might be used to obtain more reliable estimates of an average load for that cell.

Relying on the intuition that air conditioning energy use is "linked" to adjacent hours and climatic conditions, we used an algorithm based on a parametric model to smooth the surface of the raw time-temperature matrix. For this smoothing, we assumed that, for a given hour, average central air conditioner load increases monotonically with THI. Further, we assumed that there is a finite maximum energy demand. (This demand would normally occur at a level far higher than any observed in the data. The assumption does have some intuitive appeal, since demand is limited by population and appliance inventory.) This maximum demand is invariant across the day, but, for various periods of the day, different (possibly infinite) levels of THI are necessary to bring about that maximum demand. Under these assumptions, we modeled average central air conditioner demand for any given hour as being predicted by a maximum demand level that is weighted by a two-parameter Weibull probability distribution on THI (see Ruderman et al. 1989 for details).[3]

Figure 5-2 shows the smoothed version of the raw matrix depicted in Figure 5-1. Although the smoothing procedure extrapolates loads for time-temperature bins for which no data were observed, we only depict loads for hour-THI bins for which data were observed for purposes of comparison to Figure 5-1.

The smoothed time-temperature matrix can be used to generate a day's load shape based on 24 hourly values of THI, with each hourly value a predicted load in energy units. The resulting load shape can then be normalized (as it is for the purposes of the CEC space-conditioning demand model) by first summing the predicted hourly loads and then dividing each hourly load by that sum, so that the 24 rescaled hourly loads add up to one.

In Chapter 4 we discussed the use of backcasts to assess the time-temperature matrix. Tables 5-1, 5-2, and 5-3 summarize results for the measures of backcast fit for CEC Regions 2, 3, and 4 respectively. We report the mean, median, standard deviation and mean absolute value of each measure. We evaluated the performance of the matrix considering the hottest summer days as well as the entire summer seasonal. The hottest days were selected as the days in the highest 5 % of degree-days of THI (THI-DD; see appendix A). We believe that the results of the hottest days are of most importance: summers typically include many relatively cool days on which little cooling energy use is expected. Summaries for the entire summer are included for completeness. A closer examination of our results for the entire summer indicated poor predictive capability for these cool days in general, in part because small absolute differences in recorded energy use on these days can result in large differences in the normalized load shapes used for comparison. Predictions for these cool days can have considerable influence on the Summer summaries.

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[3] Other alternative include non-parametric smoothing algorithms. Also, the more sample data available to model the raw time-temperature matrix, the less justified smoothing may be.

For CEC Region 2 (Sacramento weather station), the peak hour of the backcast load shape is the same as the peak hour of the sample load shape for 27% of the 920 summer days examined, and for 23% of the hottest five percentile summer days. For the hottest days the matrix tends to predict peak loads an hour too early (32%). Peak load is predicted an average of 2.2% (of total daily load) too high for both the summer and hottest days. The average production error ("mean absolute" in the table) for peak load is 3.8% for summer days and 2.2% for the hottest days. The median difference between sample and backcast peaks is 1.7% for summer days and -2.0% for the hottest days. With regard to loads at the time of system peak (4 p.m.), the average Summer load is over-predicted by 2.6%, while the load on the hottest days is over-predicted by 1.4%. It is difficult to draw specific conclusions from RMSE. The normalized RMSE is on average, considerable lower for the hottest days than for the entire summer.

For CEC Region 3 (Fresno weather station), the peak hour of the backcast load shape is the same as the peak hour of the sample load shape for 31% of all summer days and 27% of the hottest days. Normalized peak loads are predicted quite accurately. They are on average high by 1% for the summer and high by less than 1% for the hottest days. Load predictions for 4 p.m. are similarly accurate. As was found for Region 2, RMSE is lower for the hottest days than it is for the entire Summer.

For CEC Region 4 (San Jose weather station) the timing of the peak hour of the backcast load shape matches the observed peak hour on about one-fourth of summer days (26%). The time of peak tends to be predicted one hour early for both the entire summer and for the hottest days. The magnitude of the predicted peak is, on average, high by 1.6% both for the summer and the hottest days, with the median difference also too high, by 1.2% and 1.8% for the summer and hottest days respectively. The average prediction error is higher for summer days (3.3%) than the average prediction error for the hottest days (2.1%). The loads at 4 p.m. are high, an average of about 2% for both the summer and the hottest days. As with the other regions, RMSE is lower for the hottest days than is for the entire summer.

In summary, Tables 5-1 through 5-3 indicate regional differences in the performance of the grand matrix, with relatively good performance for Region 3, and poorer performance and substantial bias in peak prediction for Region 2 and Region 4. Appendix F addresses regional differences in matrix performance. Overall, predictions for the hottest days are considerable better than predictions for other summer days.

The measures give an indication of how well the time-temperature model fits the sample load data but must be interpreted with caution. First, the same data used to construct the time-temperature matrix are used to evaluate fit. This may lead to somewhat exaggerated description of goodness of fit. The sub-sampling strategies examined in Appendix F begin to address this issue.

Second, the backcast load shape is based on long-term, system-wide averages because many dates from each of the five stations may have an hour assigned to a given THI-hour bin. That is, the single-date, single-region loads falling into a particular hour-THI bin are selected on the basis of the hour-THI only. For a given set of weather conditions, the sample data shows considerable variation. The backcast load shape, which is based on long-term region-wide averages, cannot capture this variation, nor should it necessarily, since our objective is to predict system, not sample, loads. In effect, we compare time-temperature cell loads, which are based on long-term system-wide averages, with single-date single-region averages (as moderated by loads for other hours of the day for the normalized load shape comparisons). Our sample-to-backcast comparisons have been evaluated in relationship to this inherent variance, by considering overall performance rather than the performance for any single day. To the extent that accurate forecasts for individual days (system peak days, for example) are of greater importance, different modeling procedures may be appropriate.

These findings underlie what we believe to be important, but not well appreciated, trade-offs in accuracy between the different forecasting applications of the CEC time-temperature matrix (and, we believe, the PG&E model). That is, while forecasting system peak demands remains critically important for the planning process, other forecast quantities (such as hourly loads on non-system peak days and minimum load conditions) have increased in importance. Even for the system peak day, there are trade-offs in accuracy between forecasting the absolute kW value of the peak for the space cooling end use, the timing of that peak, and the load that is coincident with the time of the system peak. At the present time, the relative importance of these trade-offs has not been assessed.

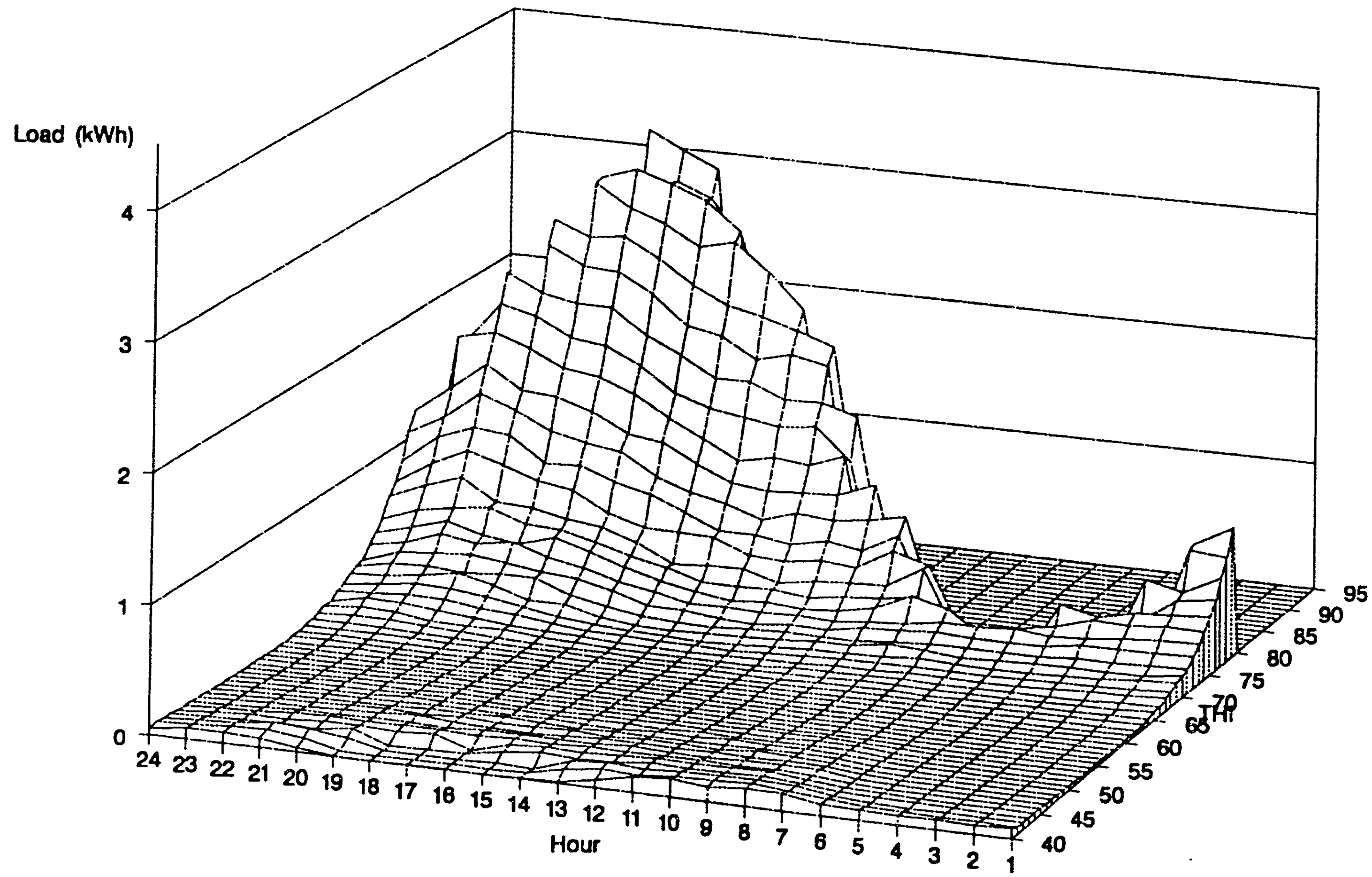

Figure 5–1
Raw Time–Temperature Matrix for Central Conditioning
Based on 1985–1989 AMP Data from All Regions

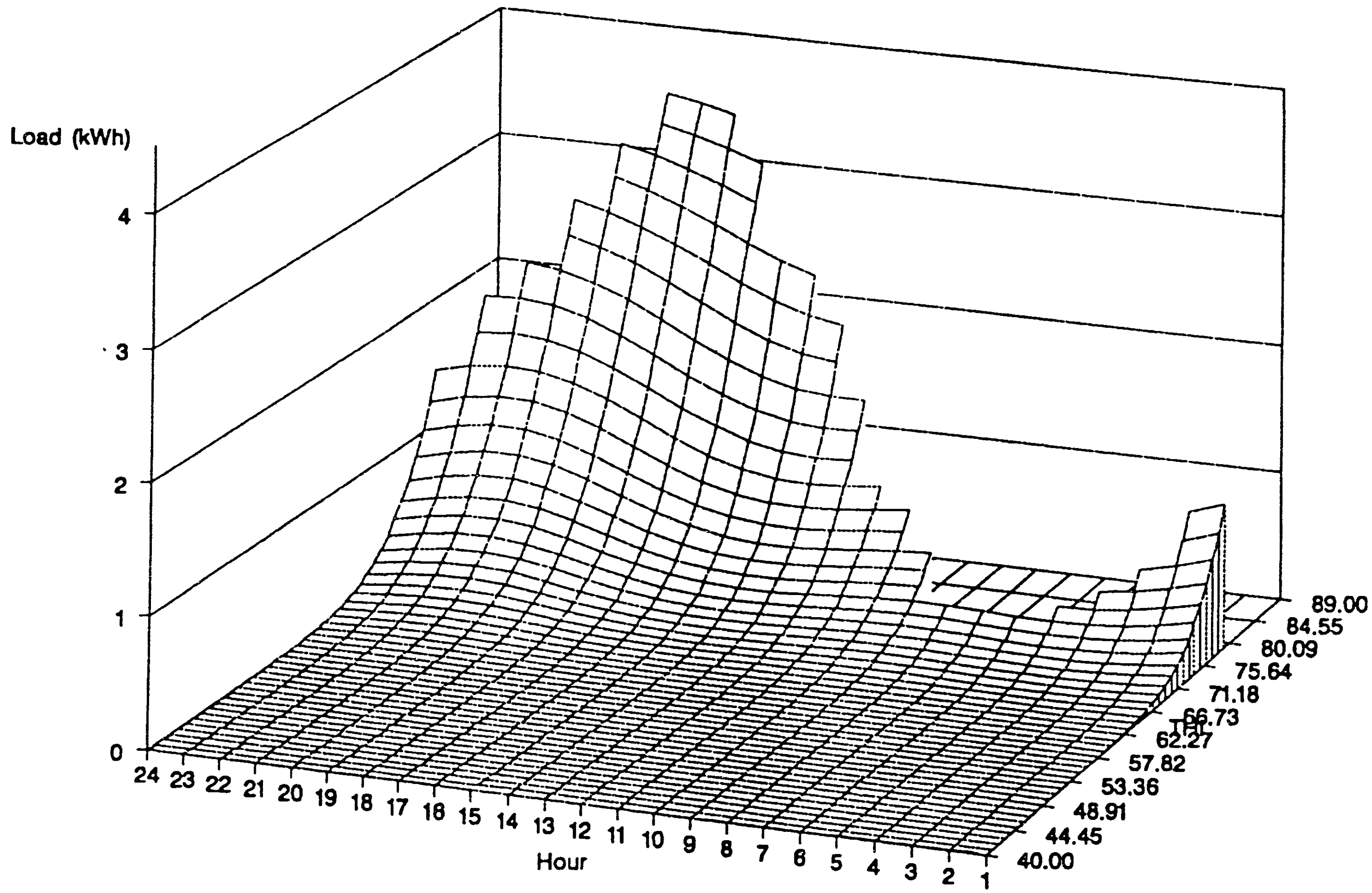

Figure 5-2
Smoothed Time-Temperature Matrix for Central Conditioning
Based on 1985-1989 AMP Data from All Regions

Table 5-1
Summary of Measures from Comparisons of Daily Backcast Load Shape to Sample
CEC Region 2

	Summer	Hottest 5%**
*Timing of Peak Hour**		
% same	27	23
% 1 hour late	18	28
% 1 hour early	21	32
% > 2 hours off	20	4
Magnitude of Peak (sample-backcast)		
mean	-0.022	-0.022
mean absolute	0.038	0.022
median	0.017	-0.020
standard deviation	0.047	0.013
Magnitude of 4 p.m. Load (sample-backcast)		
mean	-0.026	-0.014
mean absolute	0.037	0.017
median	-0.021	-0.014
standard deviation	0.042	0.015
RMSE		
mean	0.029	0.013
median	0.023	0.013
standard deviation	0.017	0.003
Number of day pairs	920	47

* backcast relative to sample
** in terms of THI-DD (see text)

Table 5-2
Summary of Measures From Comparison of Daily Backcast Load Shape to Sample
CEC Region 3

	Summer	Hottest 5%**
Timing of Peak Hour*		
% same	31	27
% 1 hour late	22	25
% 1 hour early	16	23
% > 2 hours off	19	10
Magnitude of Peak (sample-backcast)		
mean	-0.010	-0.004
mean absolute	0.026	0.007
median	-0.001	-0.004
standard deviation	0.037	0.007
Magnitude of 4 p.m. Load (sample-backcast)		
mean	-0.011	-0.001
mean absolute	0.021	0.007
median	-0.006	-0.001
standard deviation	0.027	0.008
RMSE		
mean	0.021	0.007
median	0.014	0.007
standard deviation	0.017	0.002
Number of day pairs	920	48

* backcast relative to sample
** in terms of THI-DD (see text)

Table 5-3
Summary of Measures from Comparison of Daily Backcast Load Shape to Sample
CEC Region 4

	Summer	Hottest 5%**
Timing of Peak Hour*		
% same	26	30
% 1 hour late	15	10
% 1 hour early	26	40
% > 2 hours off	17	3
Magnitude of Peak (sample-backcast)		
mean	-0.016	-0.016
mean absolute	0.033	0.021
median	-0.012	-0.018
standard deviation	0.042	0.021
Magnitude of 4 p.m. Load (sample-backcast)		
mean	-0.022	-0.020
mean absolute	0.033	0.022
median	-0.021	-0.018
standard deviation	0.033	0.018
RMSE		
mean	0.025	0.014
median	0.021	0.014
standard deviation	0.014	0.004
Number of day pairs	735	40

* backcast relative to sample
** in terms of THI-DD (see text)

Chapter 6
Cooling Electricity Use Analysis for PG&E Load Shape Model

The basis of PG&E's load shape forecasts for cooling end uses is a set of load curves corresponding to combinations of day type and average daily temperature and a set of weather response functions (WRFs) that are used to scale the load curves. These load curves and WRFs are used along with weather data as inputs to the load shape forecasting model, HELM. We developed a set of load curves and a set of WRFs using the 1985-1989 AMP data, based on the functional form of the WRFs and the load curve definitions developed previously by PG&E. The methods and results of this development are discussed in this section.

PG&E's model for air conditioning demand expresses daily load as a function of a weather index, which we call WAVGTEMP. Based on previous in-house analysis, PG&E defined WAVGTEMP as a fixed function of daily average temperature on a given day and the two previous days:

$$WAVGTEMP[i] = 0.1 * AVGTEMP[i-2] + 0.2 * AVGTEMP[i-1] + 0.7 * AVGTEMP[i],$$

where AVGTEMP[i] is the average of the 48 half-hourly temperatures reported for that day. Air conditioning demand is modeled using linear least squares regression as a function of WAVGTEMP in linear and quadratic terms:

$$DEMAND = \alpha_0 + \alpha_1 * WAVGTEMP + \alpha_2 * WAVGTEMP^2$$

Regression coefficients are estimated separately for Zones R, S, and X. The regressions are based only on summer (June through September) days. We estimated coefficients for a weather response function of PG&E's regression equation (shown above) for each Zone R, S, and X, using all five years of AMP data. We also computed coefficient WRF coefficients based on 1989 data only, for comparison to PG&E's original WRF coefficients which were also computed only on data from 1989.

To compute the coefficients, we determined zone average daily central air conditioner load and zone average daily room air conditioner load from the AMP data for each summer day of 1985-1989. We computed the value of the average temperature function WAVGTEMP for PG&E's Fresno, Sacramento, and San Ramon weather stations. We then regressed WAVGTEMP and the square of WAVGTEMP on daily demand using ordinary linear least squares regression.

Table 6-1 shows the coefficient estimates for the weather response function for each zone along with standard errors for the estimates and the coefficient of determination (r^2) for the model. The regressions explain 95 percent of the variance of summer daily energy use about the mean for Zone R, 84 percent for Zone S, and 85 percent for Zone X. We found that our estimated coefficients differed from PG&E's by a nearly constant scaling factor across the three coefficients (the factor depending on the zone), implying that the PG&E and LBL WRFs were based on different scaling factors for daily energy. Another possible source of difference between LBL and PG&E regressions is that LBL daily energy estimates were formed as the sum of scaled central air conditioner and room air conditioner loads whereas PG&E may have used a different procedure.

An issue of interest to both CEC and PG&E is whether it is appropriate to use distinct weather response functions for peak load days rather than using the same weather response functions developed for the entire air conditioning season. Although the levels of percent variance explained (r^2) are nominally impressive, good energy predictions for the relatively large number of low-load, mild-weather days contribute substantially to this measure of fit. In the future, it may be appropriate to further stratify regressions on weather severity, instead of using all summer days, to arrive at a single weather response function for each zone; that is, days could be stratified according to weather severity (weighted average daily temperature, for example), with separate regressions computed for each stratum. To the extent that high and peak load days are of interest, it seems reasonable to base evaluation of such models on their performance in predicting loads for the hottest days. One approach would omit the mild-weather days from the regression.

There are other possibilities for determining air conditioning demand response to weather while retaining the basic form of the WRFs currently in use. These are: computing regressions for weekends and weekdays separately, computing regressions for central air conditioner separately, estimating weights for terms of the weighted average daily temperature index (rather than using prespecified weights), and using some measure of daily temperature extreme in addition to (or instead of) daily temperature average. Other alternatives include using a different form for the regression, for example, using transformations for WAVGTEMP other than the quadratic transformation used in the current WRFs.

To allocate daily energy to the hours of the day, PG&E specifies load curve bins by geographic area (PG&E Zones R, S, and X), daily average temperature, and day type. Table 6-2 shows the bin definitions used by PG&E. For their load shape model, PG&E identifies a single cooling end use that represents cooling for all residential buildings (single-family, multi-family, and mobile homes). We developed two sets of load curves, one for central air conditioning, and a separate set for a combined cooling end use (averaging central and room air conditioners).

Load data were first aggregated to PG&E Zone according to zone assignments provided by PG&E. Numbers of central and room air conditioners metered in each zone are given in Table 3-2. Based on day type (Weekday, or Weekend/Holiday) and weather data reported at the PG&E weather station assigned to the zone (Fresno weather for Zone R, Sacramento weather for Zone S, and San Ramon weather for Zone X), each summer day (June through September) was assigned to a bin. An average load curve was computed by end use for each of these bins by averaging over days and residences to each hour. Because of their late arrival, PG&E-developed sample weights were not used in our analysis. Load curves were energy-normalized so that each hourly value expresses that hour's contribution to total daily energy consumption.

Figures 6-1 to 6-6 show the normalized central air conditioner load curves for each bin for zones R, S, and X, with weekday and weekend curves appearing on separate graphs. The data for these load curves are tabulated in Appendix D.

To get an indication of the statistical precision of these load shapes we computed 95 percent confidence limits for the hourly means comprising each binned load shape. Depending on the bin, this entails computing a standard deviation of hourly demand over days which can have somewhat different average temperature, (e.g. in the 70-100°F Zone X Weekend bin).

Figure 6-7 shows the weekday load shape corresponding to the hottest temperature bin (daily average temperature 87.5-100°F) for Zone R along with dashed lines connecting the bounds of the hourly confidence limits. The bounds are quite narrow, indicating that the relative precision of the hourly means is high. Figure 6-8 shows the hourly confidence bounds for the Weekend 87.5-100°F average daily temperature bin. These bounds are somewhat broader than those for weekday as would be expected because of the smaller number of days falling into this bin.

Table 6-1
LBL Coefficient Estimates for PG&E Weather Response Functions

$$load[i] = a_0 + a_1T^*[i] + a_2(T^*[i])^2$$

PG&E Zone	*Regression Coefficients* a_0	a_1	a_2	r^2
R				
estimate	198,089	-5,991.61	45.33	0.95
standard error	7,629	198.19	1.28	
S				
estimate	23,947	783.17	6.40	0.84
standard error	2,194	60.56	0.42	
X				
estimate	37,960	-1,280.36	10.83	0.85
standard error	2,327	69.48	0.52	

*T is referred to as WAVGTEMP in text

Table 6-2
PG&E Cooling Load Bins by Zone for Ranges of Average Temperature (°F)

ZONE	*WEEKDAY*	*WEEKEND*
R	0.0 - 66.2	0.0 - 66.2
	66.2 - 75.0	66.2 - 75.0
	75.0 - 80.0	75.0 - 80.0
	80.0 - 85.0	80.0 - 85.0
	85.0 - 87.5	85.0 - 87.5
	87.5 - 100.0	87.5 - 100.0
S	0.0 - 62.1	0.0 - 62.1
	62.1 - 70.0	62.1 - 70.0
	70.0 - 75.0	70.0 - 75.0
	75.0 - 80.0	75.0 - 100.0
	80.0 - 85.0	
	85.0 - 100.0	
X	0.0 - 58.6	0.0 - 58.6
	58.6 - 67.5	58.6 - 70.0
	67.5 - 72.5	70.0 - 100.0
	72.5 - 77.5	
	77.5 - 100.0	

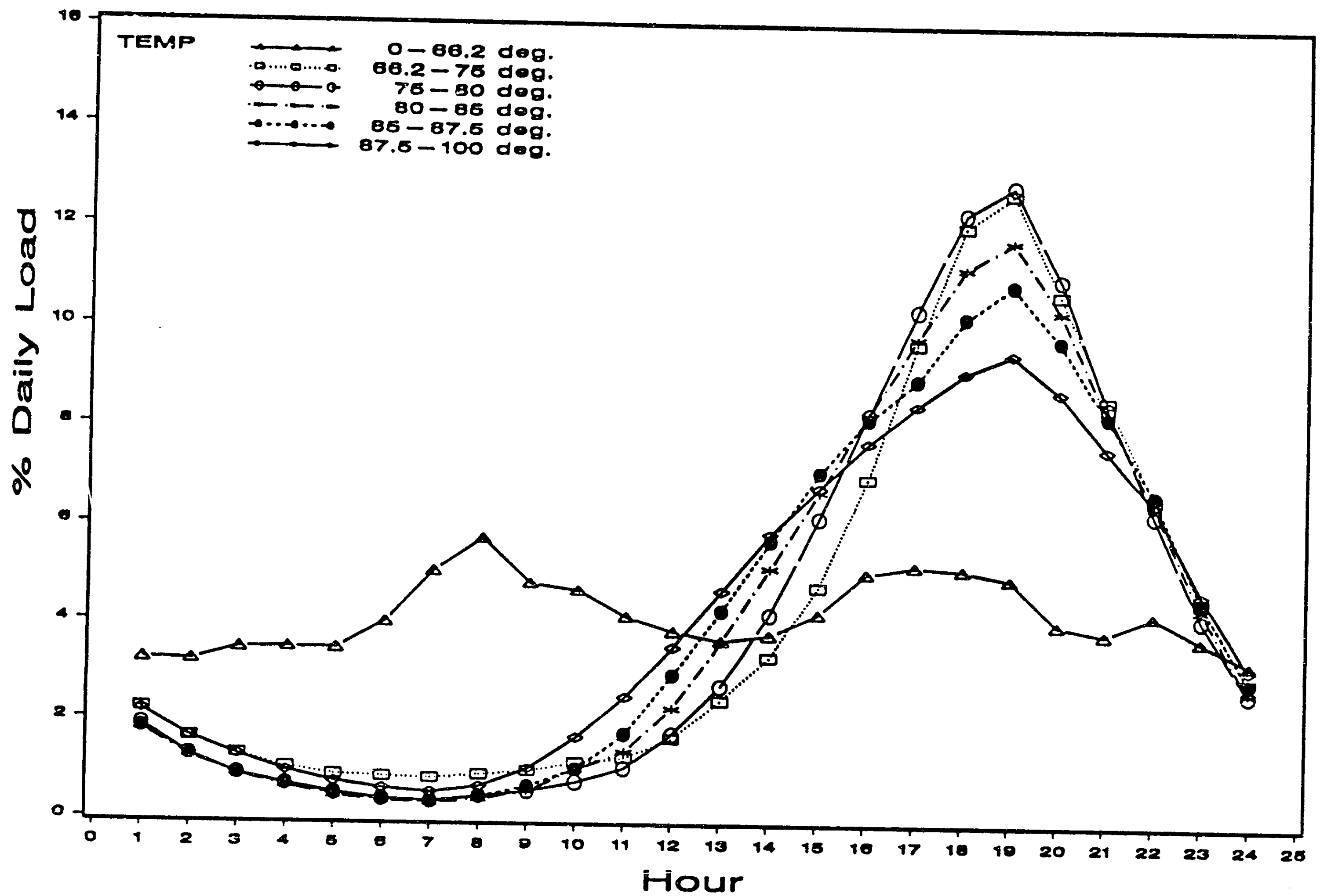

Figure 6-1 Central AC Load Shapes for PG&E Average Temperature Bins Zone R Weekdays

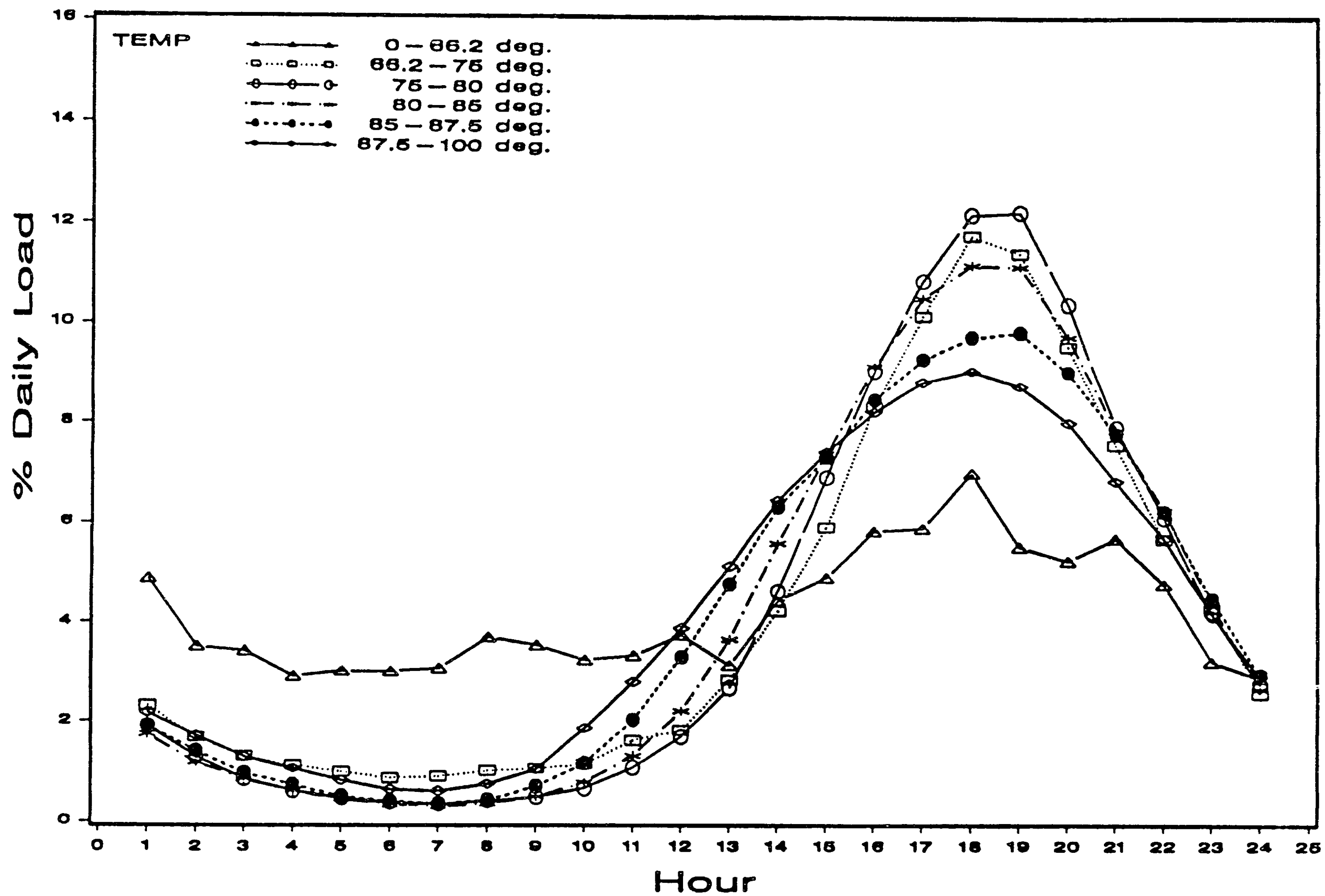

Figure 6-2 Central AC Load Shapes for PG&E Average Temperature Bins
Zone R Weekends

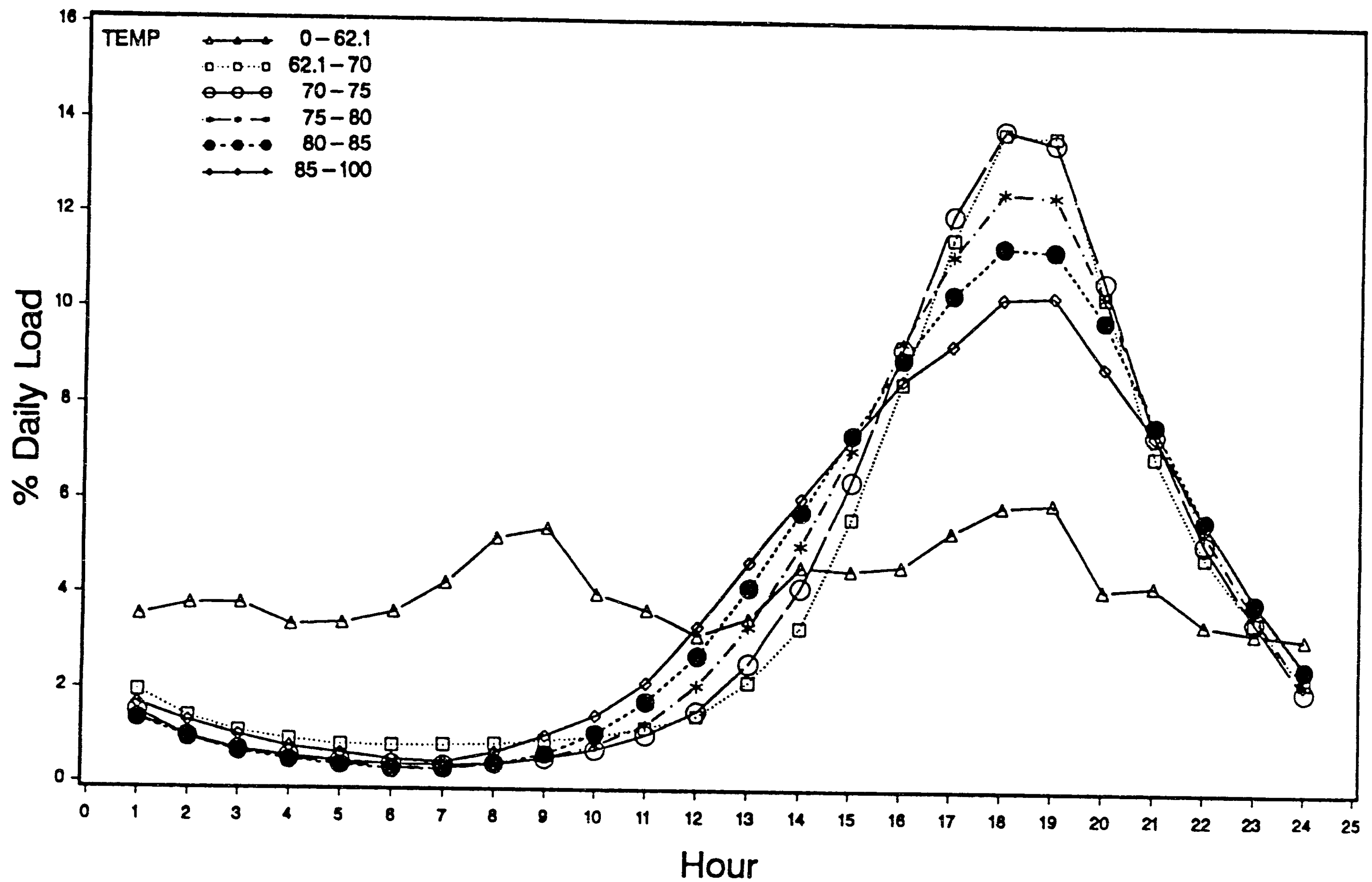

**Figure 6-3 Central AC Load Shapes for PG&E Average Temperature Bins
Zone S Weekday**

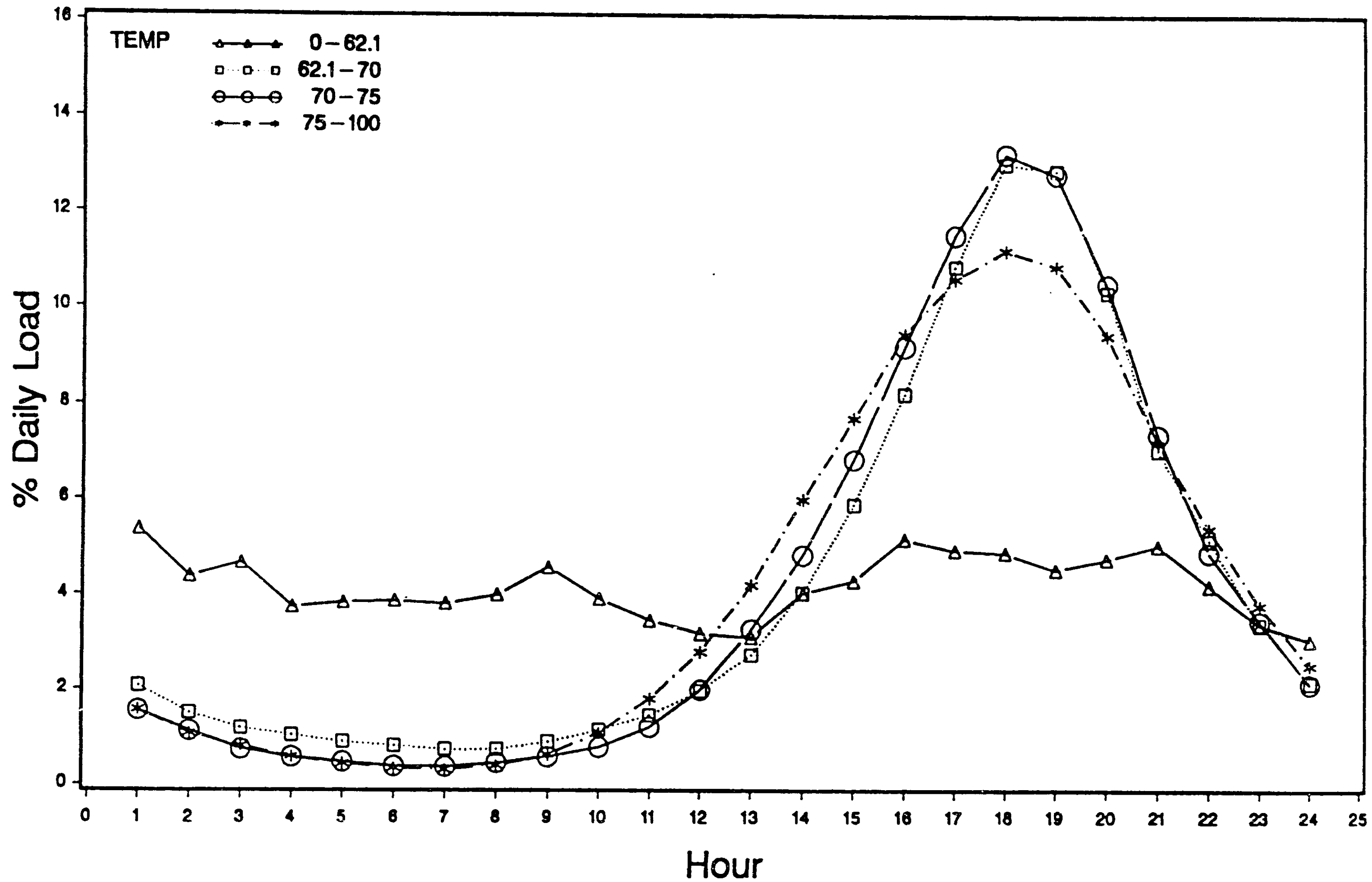

Figure 6-4 Central AC Load Shapes for PG&E Average Temperature Bins Zone S Weekend

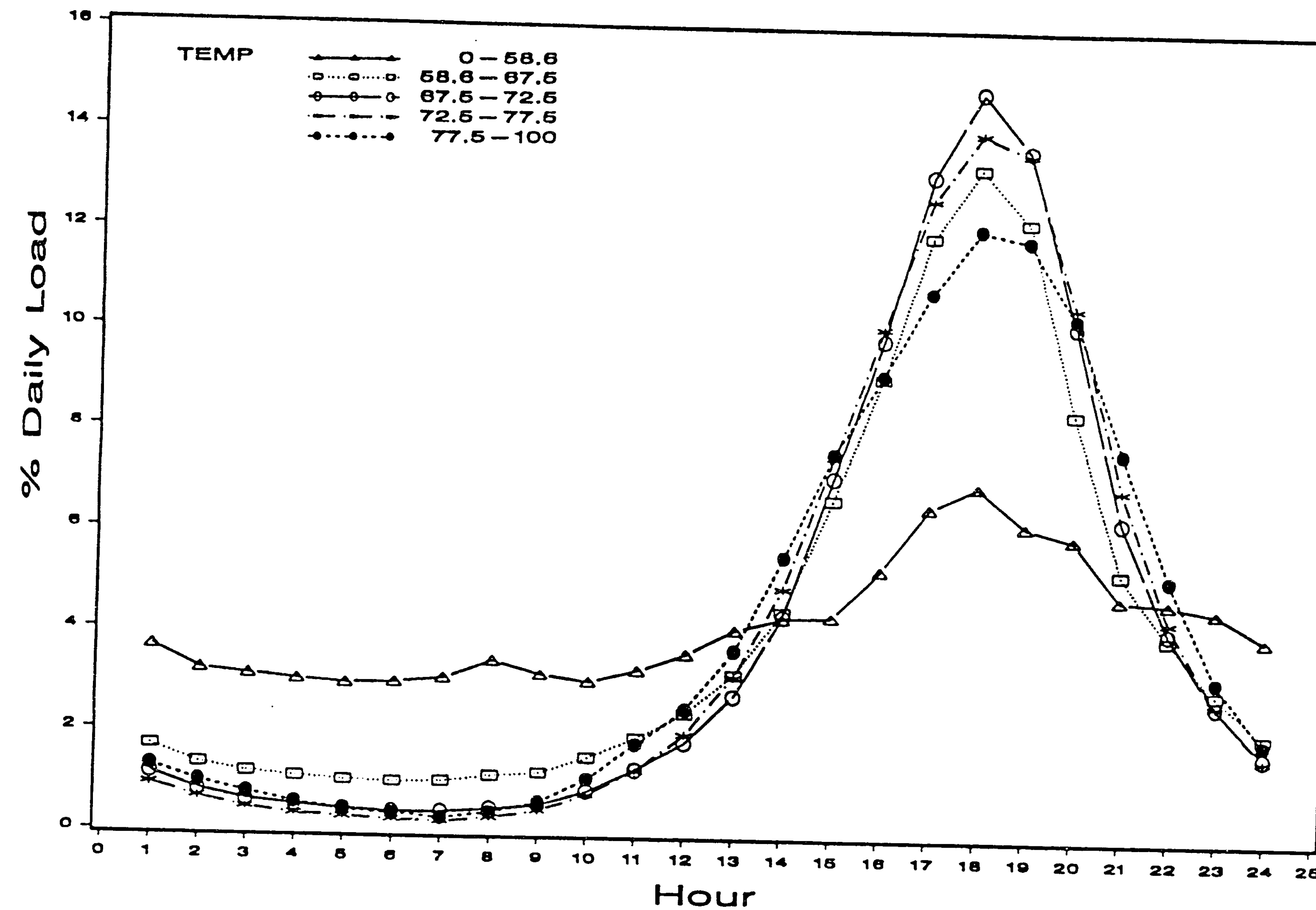

Figure 6-5 Central AC Load Shapes for PG&E Average Temperature Bins Zone X Weekday

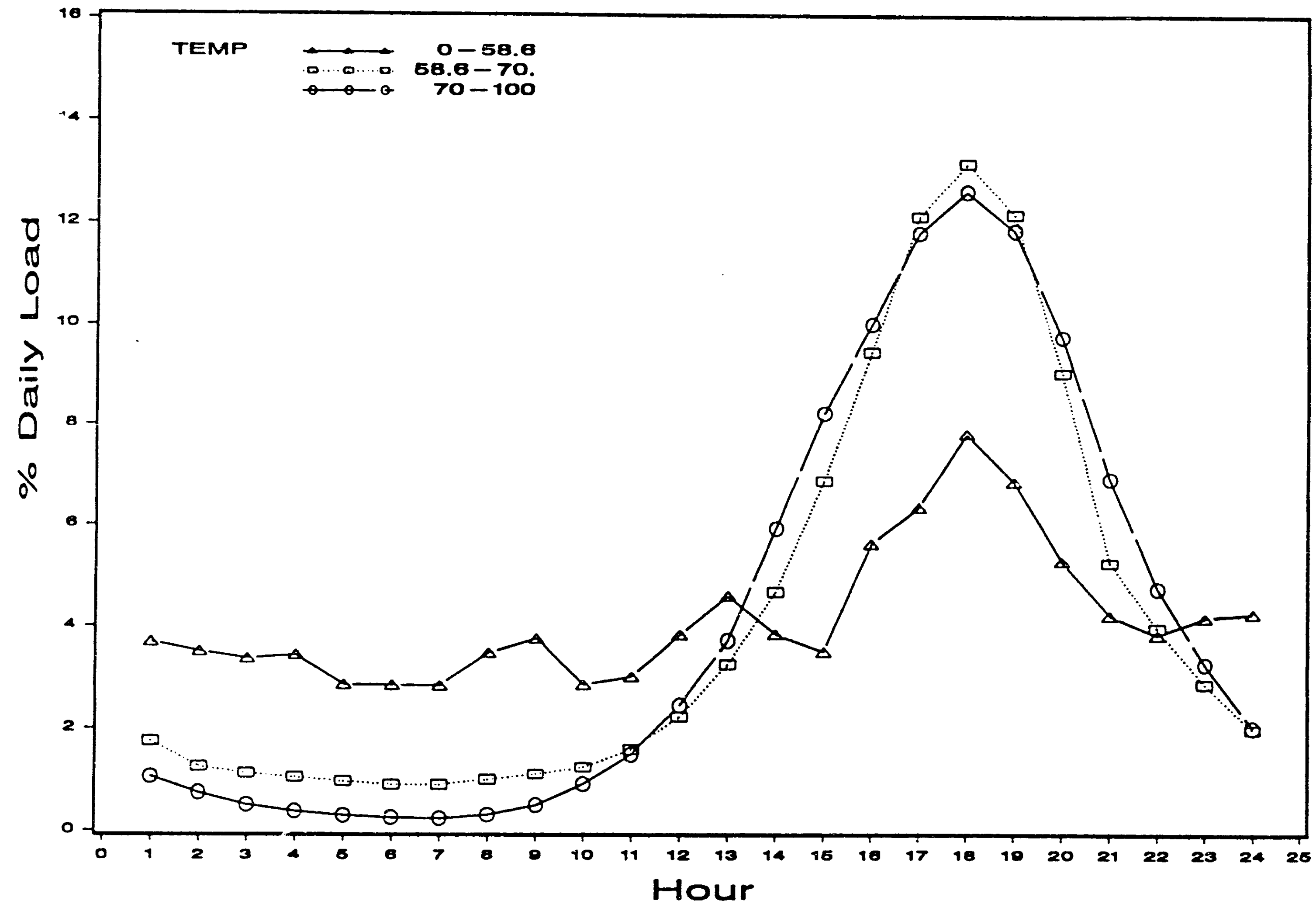

Figure 6-6 Central AC Load Shapes for PG&E Average Temperature Bins Zone X Weekend

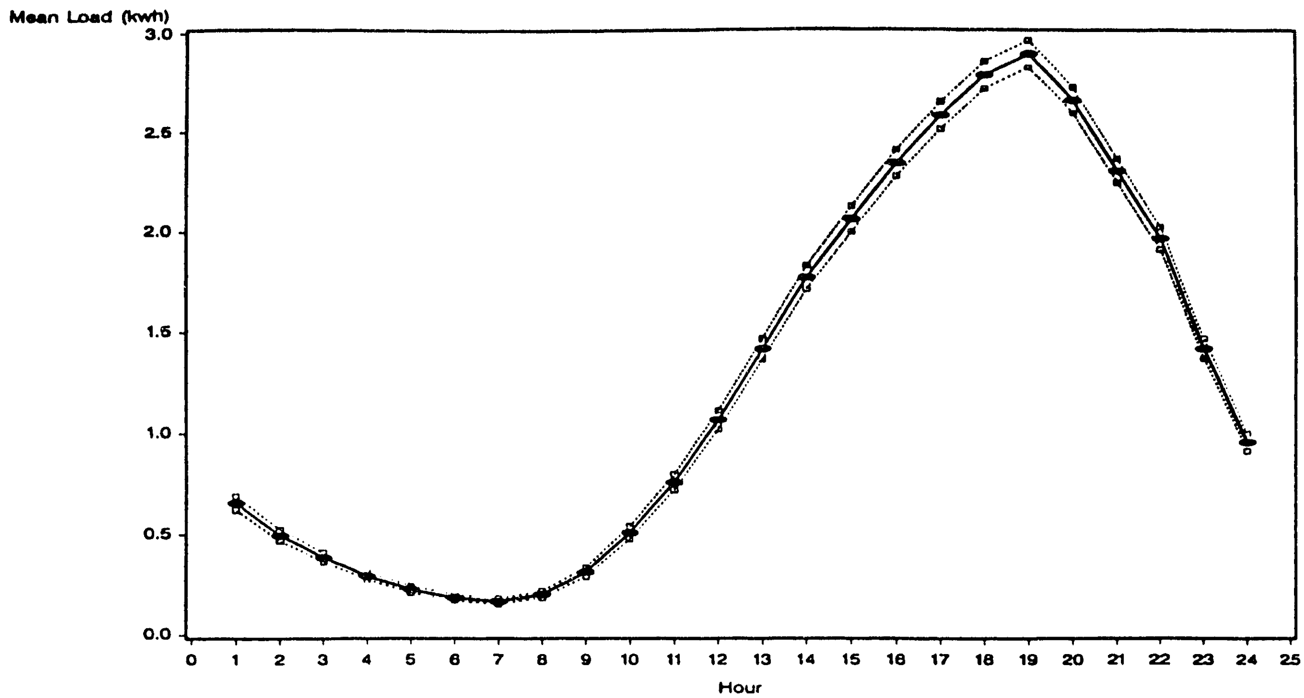

Figure 6-7. Cooling Load Shape for One R 87.5-100°F Weekday Bin with 95% CI on Hourly Means

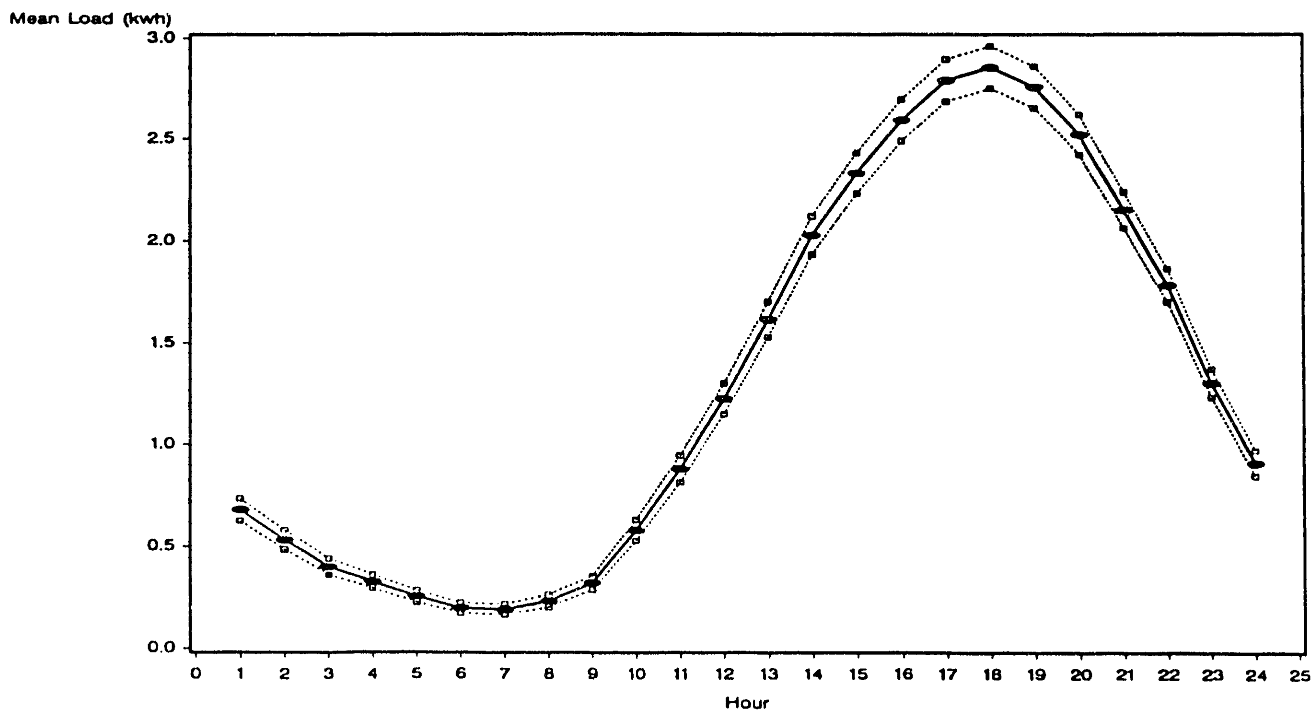

Figure 6-8. Cooling Load Shape for Zone R 87.5-100°F Weekend Bin with 95% CI on Hourly Means

Chapter 7
Non-Space-Conditioning Data Analysis for CEC Peak Demand Model

CEC's residential peak demand model uses fixed allocation factors defined by day type and season to allocate the annual total energy consumed by non-space conditioning end uses to each day of the year. Hourly energy use is determined by using normalized daily load shapes to allocate daily energy use to each hour. In this section we present allocation factors and average daily load shapes by season and day type, based on the three years of AMP non-conditioning data that we studied. We present the average daily load results graphically, with tabular summaries in Appendix E.

An end use's allocation factor (AF) for period i, day type j, is defined as,

$$AF\ [i,j] = average\ daily\ load\ [i,j] / average\ annual\ daily\ load.$$

We calculated seasonal allocation factors for three day types (Weekday, Weekend, and All Days) for each of the five non-conditioning end uses analyzed in this study. For these computations, we defined Winter as December through February, Spring as March through May, Summer as June through September, and Fall as October and November. The averages were taken over all three years of data (see Table 3-7).

Table 7-1 shows the seasonal allocation factors for each day type by end use. Seasonal ratios of average weekday energy use to average weekend daily energy use are also tabulated. Annual weekday-to-weekend energy use ratios are reported in Table 7-2.

Clothes dryer, water heater, and cooking loads are relatively high in winter and low in summer, while refrigerator load is relatively high in summer and low in winter. The kitchen circuit end use shows little seasonal variation, with loads slightly (about six percent) higher in summer than on average.

Mean weekday energy use is slightly below mean weekend energy use for refrigerator, water heater, and kitchen circuit, with little seasonal variation. Mean energy use for cooking is on average about 15 percent lower on weekdays than on weekends, with somewhat more seasonal variation than the aforementioned end uses. Weekday-to-weekend ratios for the cooking end use range from 0.785 for Fall to 0.894 for Winter. Mean energy use for clothes dryer is on average about 15 percent lower on weekday than on weekends, and the relative difference between weekday and weekend energy use is least pronounced in the summer (ratio 0.846) and most pronounced in the fall (ratio 0.775).

We also computed allocation factors for the end uses on a monthly basis for each of three day types. These factors, and monthly weekday-to-weekend energy use ratios, are tabulated in Appendix F. Because months comprise fewer data than seasons, fewer observations contribute to each monthly mean than would contribute to a seasonal mean. As a result, differences among the monthly factors are less reliable indicators of actual (i.e., system-wide) differences in energy use than are the seasonal factors.

We derived average daily load shapes for non-conditioning end uses by day type for two seasons, Summer (June through October) and Winter (November through May). Figures 7-1 through 7-5 show these four average daily load shapes for each end use. The load shapes are represented on an energy-normalized scale, with hourly loads expressed as a percentage of daily energy use. Weekday load shapes differ noticeably from weekend load shapes for three of these end uses.

The sample average weekday load shapes for clothes dryer are different than the weekend load shapes. The load shapes for both Summer and Winter weekends have highest loads at hours 11 and 12, with each of these two hours contributing about 8 percent to total daily use. The weekday load shapes peak higher and later, with highest daily loads at hours 12 and 13 each contributing about 9 percent to total daily energy use. For a given day type, the observed Summer and Winter load shapes have similar but not identical patterns.

Weekday cooking load shapes also differ from weekend cooking load shapes. Both Winter and Summer load shapes are highest at hours 18 and 19 (hour 18 in the Winter, hours 18 and 19 in the Summer), but the weekday loads are considerably more concentrated on these peak hours than are the weekend loads.

The four average daily load shapes for kitchen circuit are nearly identical, each gradually increasing between 9 a.m. and the peak load hour 7 p.m. The four load shapes for refrigerator are also nearly identical, each with highest loads at hours 19 and 20.

The water heater load shapes each have two peaks. For weekdays, the morning peak is at hour 8, and the lower, evening peak is at hours 19 and 20. On weekends, the morning peak occurs later than on weekdays, at hours 9 and 10, with the weekend load shape less concentrated at the morning peak than is the weekday load shape.

Table 7-1
Seasonal Allocation Factors Non-Conditioning End Uses

SEASON	*WEEKDAY*	*WEEKEND*	*ALL DAYS*	*WEEKDAY/WEEKEND*
Clothes Dryer				
Winter	1.081	1.362	1.169	0.794
Spring	0.918	1.180	0.994	0.778
Summer ...	0.817	0.965	0.863	0.846
Fall	0.943	1.217	1.028	0.775
Cooking				
Winter	1.044	1.154	1.116	0.820
Spring	0.937	1.273	0.981	0.863
Summer ...	0.874	1.087	0.907	0.894
Fall	0.955	0.978	1.036	0.785
Kitchen Circuit				
Winter	0.954	0.973	0.960	0.980
Spring	0.964	0.984	0.970	0.979
Summer ...	1.060	1.069	1.063	0.991
Fall	0.975	1.013	0.987	0.962
Refrigerator				
Winter	0.864	0.892	0.873	0.970
Spring	0.947	0.978	0.956	0.968
Summer ...	1.117	1.131	1.121	0.987
Fall	0.992	1.030	1.004	0.963
Water Heater				
Winter	1.221	1.262	1.233	0.968
Spring	1.017	1.065	1.031	0.955
Summer ...	0.795	0.808	0.799	0.984
Fall	0.996	1.035	1.008	0.963

Table 7-2
Energy Use Ratios Non-Conditioning End Uses

APPLIANCE	*WEEKDAY/WEEKEND ENERGY USE*
Clothes Dryer	0.796
Cooking	0.854
Kitchen	0.981
Refrigerator	0.978
Water Heater	0.979

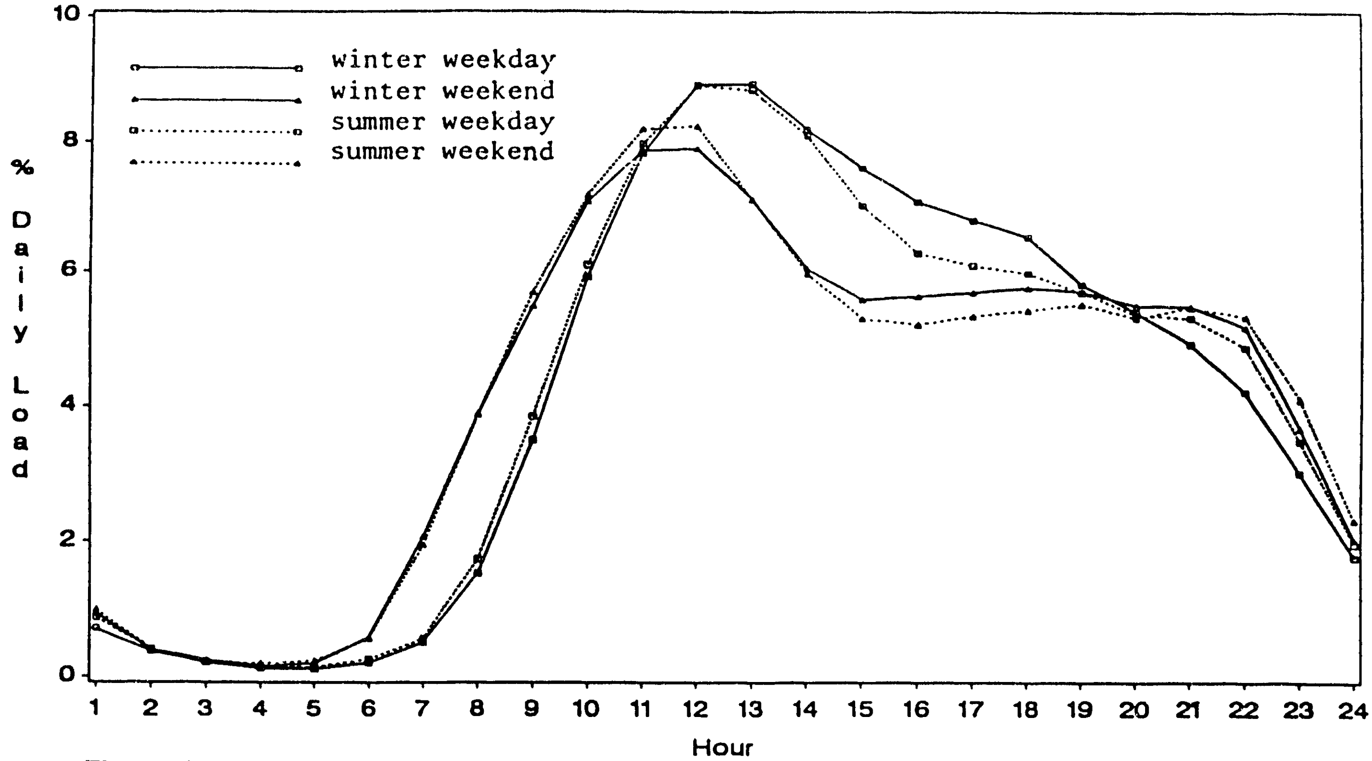

Figure 7-1 Average Load Profiles by Season and Day Type for Clothes Dryer

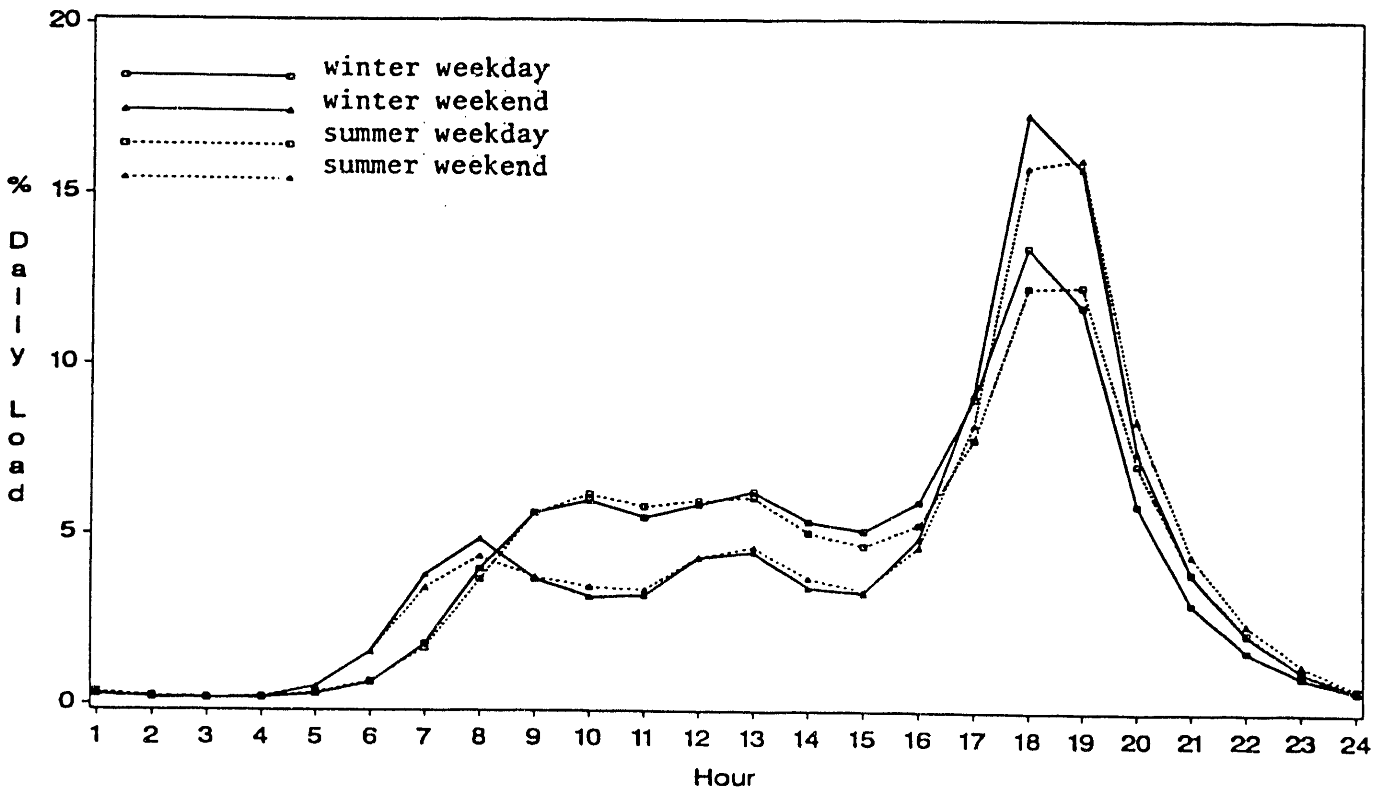

Figure 7-2 Average Load Profiles by Season and Day Type for Cooking

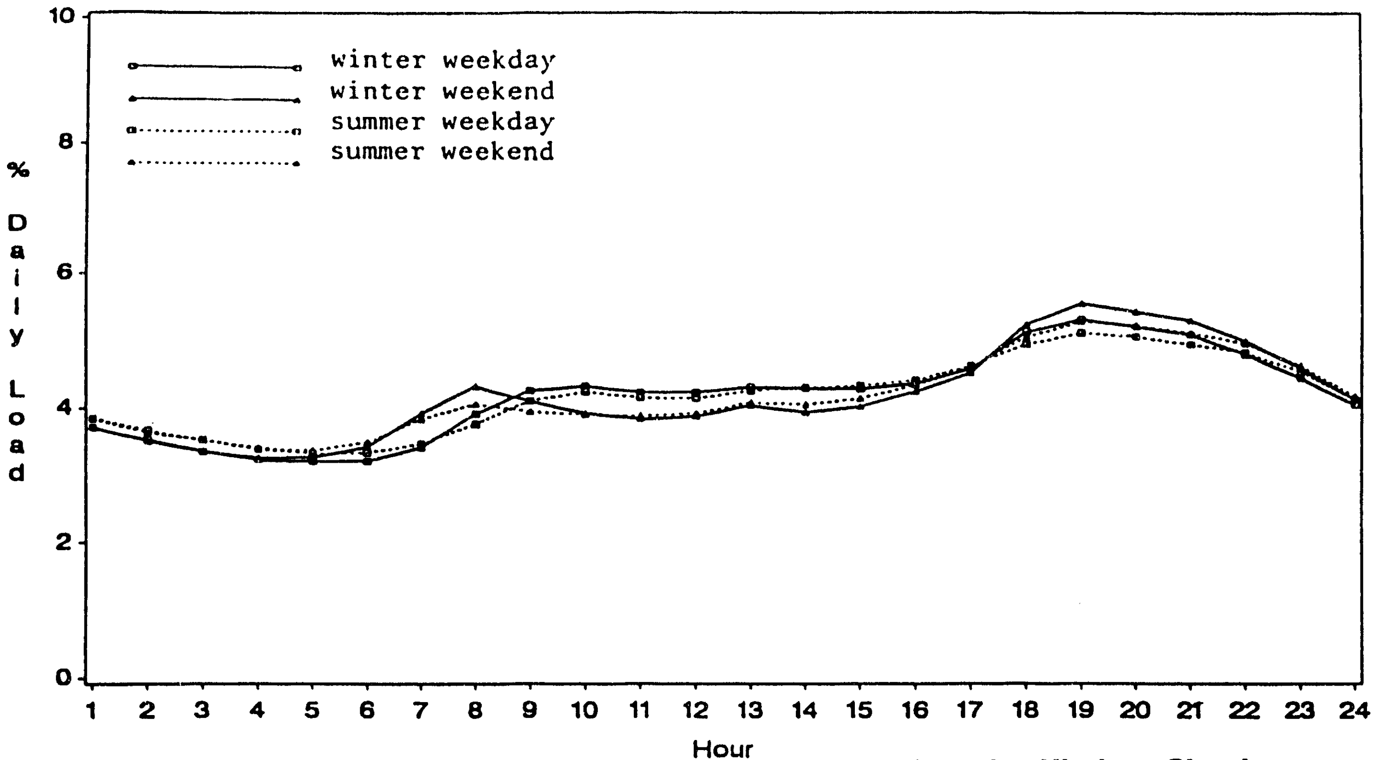

Figure 7-3 Average Load Profiles by Season and Day Type for Kitchen Circuit

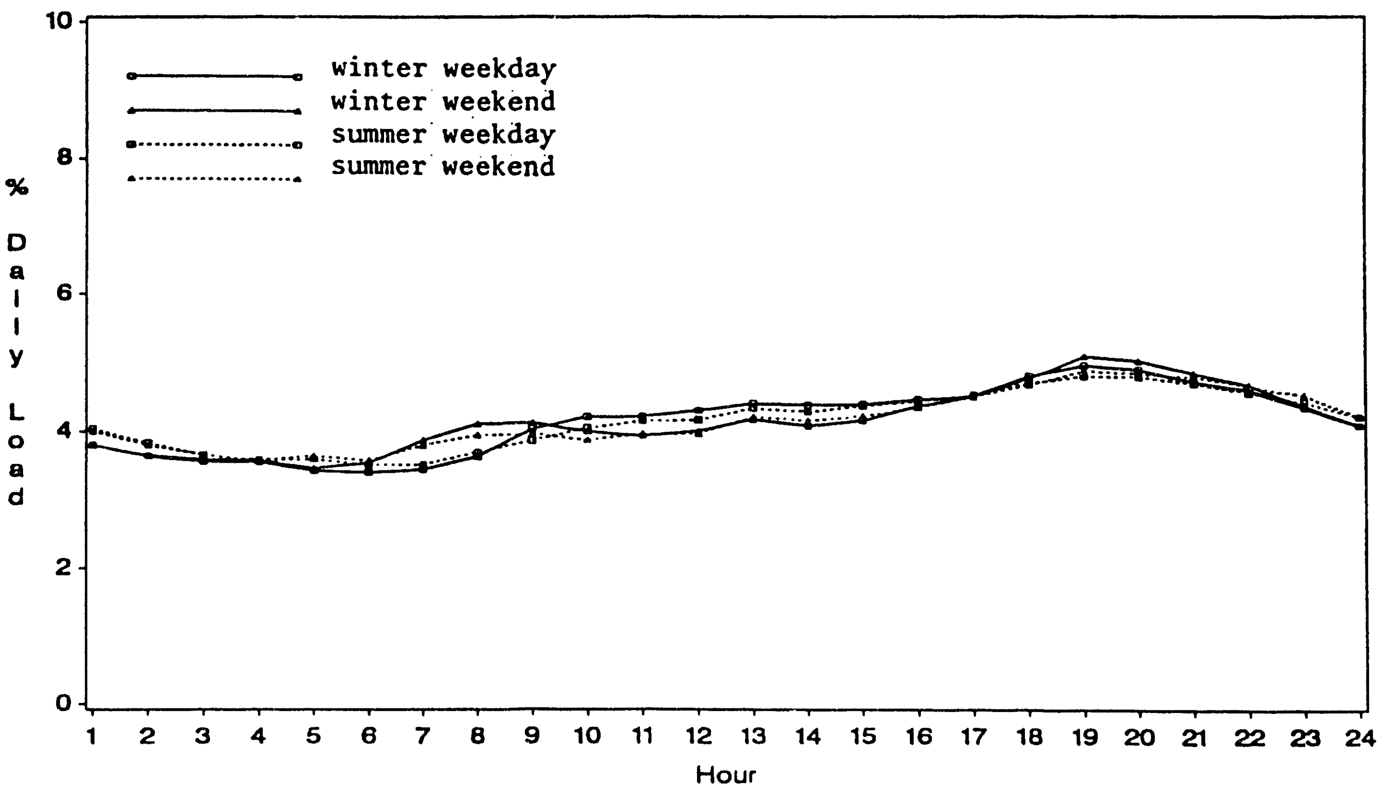

Figure 7-4 Average Load Profiles by Season and Day Type for Refrigerator

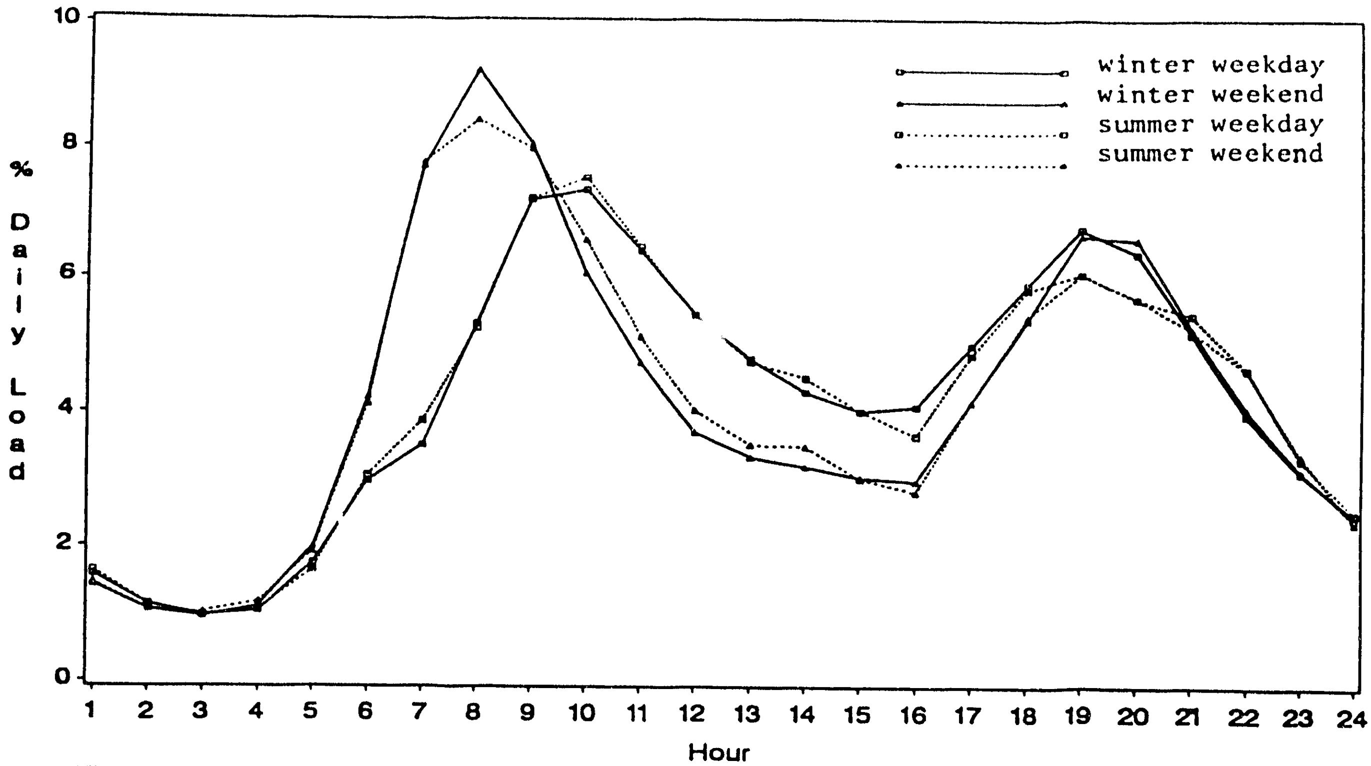

Figure 7-5 Average Load Profiles by Season and Day Type for Water Heater

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Appendix A
Data Handling Conventions and Review

Prior to our analysis, we developed a number of conventions for handling data. These included the assignment of individual households to the CEC and PG&E geographic regions or zones used in our analysis, the aggregation of half-hourly loads to hours and the alignment of these loads with the weather data, and definition of day types and treatment of missing values when developing UECs. We describe development of these conventions in this appendix along with our exploratory review of the 1989 space conditioning data (mentioned in Chapter 4).

Geographic Coding

We used two distinct sets of geographic aggregations: a set of five climate regions used by CEC, and a set of four climate zones used by PG&E. To avoid confusion we refer to these geographic aggregations as CEC Regions and PG&E Zones, respectively. Figure A-1 is a map of CEC Regions. Figure A-2, A-3, A-4 and A-5 are maps of PG&E Zones R, S, T and X respectively. Region and zone-specific analyses were conducted only for the two weather-sensitive end uses analyzed, central air conditioning and room air conditioning. We used CEC Regions along with associated NOAA weather data to develop the time-temperature matrices for CEC's peak model, and PG&E Zones with weather data from PG&E weather stations to develop inputs for use in the PG&E load shape model.

To make CEC Climate Region assignments for metered air conditioners, we used the zip code of the residence (which PG&E provided to LBL in the file LBLID.DAT) and then selected a CEC Climate Region according to the zip code/climate region correspondence given to us by CEC in the file ZIPZONE.DAT. We reviewed these initial assignments by comparing the county of each zip code as given in ZIPZONE.DAT to the county as given by U.S. census and postal information to determine cases for which there was a discrepancy in county coding. Based on zip code location and our inspection of the CEC map of geographic climate zones, we proposed climate region reassignments for residences in 41 zip codes. We carried out these proposed reassignments for the analyses discussed in this report, with the concurrence of CEC. Details on these reassignments are discussed in our data review memorandum (June 1991).

Each residence was also assigned to one of four PG&E climate Zones, R, S, T, or X with corresponding PG&E weather stations Fresno, Sacramento, Salinas, and San Ramon. These assignments were made according to the LBLID-Zone assignments provided by PG&E in the file CLIMZONE.LBL. Each of these four zones is associated with a PG&E weather station: Fresno for Zone R, Sacramento for Zone S, San Ramon for Zone X, and Salinas for Zone T. Zone T is not used for cooling demand forecasts. Of the 775 LBLIDs, 183 were assigned to Zone R, 243 were assigned to Zone S, 267 were assigned to Zone X, and 82 were assigned to Zone T.

The number of central and room air conditioners metered in each of these zones is given in Table 3-2.

Weather Data

We used two sets of weather data in this study, one set derived from NOAA weather data, and a second set of data from PG&E weather stations. Each CEC Region is associated with a NOAA weather station. Each PG&E Zone is associated with a PG&E weather station. The weather stations were used to provide weather data for corresponding regions and zones for weather-sensitive analyses such as those for cooling. As described previously, PG&E forecasts space conditioning loads separately for only three Zones (R,S, and X).

CEC provided LBL with a modified NOAA weather data set consisting of hourly wet- and dry-bulb temperature measurements for 1985-1989 at six weather stations: Blue Canyon, Fresno, San Jose, San Francisco, Sacramento, and Sunnyvale. Data missing from the original NOAA weather data sets had been filled in by CEC. According to NOAA documentation, hourly weather data are observed within ten minutes to the hour for which the data are reported. The Blue Canyon weather station is assigned to CEC Region 1, the Sacramento weather station is assigned to CEC Region, the Fresno weather station is assigned to CEC Region 3, the San Jose (1986-1989) and Sunnyvale (1985) weather stations are assigned to CEC Region 4, and the San Francisco Airport weather station is assigned to CEC Region 5.

No weather data were available for CEC Region 1 for 1985, so 1985 CEC Region 1 data were not used in constructing the time-temperature matrix.

Each of the PG&E weather data sets contains half-hourly measurements of dry-bulb temperature and relative humidity for 25 weather stations for each of five years, 1985-1989. In this report we use data from only three of these stations, Fresno, Sacramento, and San Ramon. We considered daily average temperature missing if fewer than 24 of the 48 possible half-hourly temperatures were reported for that day.

For each station-hour of the NOAA data, we computed an index of climatic severity called the temperature-humidity index (THI). This index was used in developing the time-temperature matrices and in the allocation of annual to peak day energy use. The definition we used to compute THI is:

$$THI = 0.4 * (dry\text{-}bulb\ temperature + wet\text{-}bulb\ temperature) + 15,$$

with dry-bulb and wet-bulb temperatures given in degrees Fahrenheit. The CEC model for air conditioning demand uses the THI degree-days, or **THI-DD,** to allocate annual demand to peak day demand. We computed THI-DD with a base temperature of 68 degrees:

$$THI\text{-}DD\ [day\ k] = \sum_{i=1}^{24} \max\left\{THI\ [hour\ i,\ day\ k] - 68, 0\right\}$$

THI-DD serves as a measure of those hours that contribute to cooling loads (CEC defines these as hours with THI temperatures in excess of 68° Fahrenheit).

PG&E End-Use Load Data

Load data for 1985 and 1986 were obtained from PG&E in 1989 as SAS data sets AMPLBL1 and AMPLBL2. These data sets contained half-hourly loads for both conditioning and non-conditioning appliances and for total household. Cooling load data for 1987, 1988, and 1989 were received from PG&E in the SAS data sets CECRES87, CECRES88, and LBLRES89. Load data for heating and non-conditioning appliances for 1989 were received from PG&E in the SAS data set LBLNONAC. Data for 1987, 1988, and 1989 were reported on an hourly basis. Each data set contained data for total household load in addition to loads for specific appliances.

PG&E reports load data at the end of the measurement interval. For example, in the 1987, 1988, and 1989 hourly data provided by PG&E, the 1 a.m. hourly load is the load between 12 midnight and 1 a.m.. We used this convention to compute hourly average loads from the 1985 and 1986 half-hourly load data. For consistency with PG&E's reporting procedure, we defined the hourly load for a given hour as the average of the loads reported for the two preceding half-hours. For example, load demand for 1 a.m. was computed as the average of the 12:30 a.m. and 1 a.m. loads. If data for only one of the two half-hours was available, we estimated the corresponding hourly demand using only the demand for the half-hour.

As noted in Chapter 3, we combined the data for four appliance codes, range top only, range and oven, oven only and range and oven and microwave, into a single end use which we refer to as cooking.

Time Conventions

The NOAA weather data are always reported in Local Standard Time whereas the PG&E weather and load data are recorded using Daylight Savings Time. In creating the THI-hourly load matrix, we converted the NOAA data to Daylight Savings Time for consistency.

For this report Weekend is defined as Saturday, Sunday, or one of the eight holidays listed on the PG&E rate schedule: New Year's Day, President's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, and Christmas Day. A Weekday is any other day.

Calculation of UECs

To calculate the UECs reported in Chapter 3, we developed several conventions for treating incomplete records. The load data provided by PG&E had few "missing" values (denoted in SAS by "."). Instead, it appears that PG&E's policy was to delete entire daily records when missing or suspicious values were encountered in the raw metered data.

A residence's monthly UEC was considered missing if load data for more than seven days of that month were missing, excluded from the monthly mean. Otherwise, missing days were replaced with the mean daily energy use from the non-missing days of data.

Mean annual UEC is defined as the sum of monthly mean UECs. Standard deviation of the annual UEC is the square root of the sum of monthly variance of UEC over the 12 months of the year. (Variance is the square of standard deviation.) The basis of the computation is the mathematical fact that the variance of the sum of independent random variables is equal to the sum of the variance of the independent variables. Although the monthly UECs for a particular residence are probably not quite independent, we assume them to be independent for this computation. Direct computation of standard deviation of annual UEC is somewhat impractical due to incompleteness of the annual record for many residences.) Mean all-years UEC is the average of annual UEC taken without regard to year, and thus may differ slightly from an average of annual mean UECs because of small variations in the number of households contributing to annual mean from year to year.

As noted in Chapter 3, late into the project we received PG&E's recently developed household air conditioner weights in data sets DELNEW87, DELNEW88, and DELNEW89. These data sets contained summer (May - October) weights for central air conditioner, heat pump compressor, and total household load; and winter (November - April) weights for heat pump compressor and total household load. The 1989 analysis weight file also included weights for room air conditioner, clothes dryer, heat pump compressor, refrigerator, range and range with oven, oven, and water heater.

Data Review

The load data provided by PG&E had already been subjected to extensive review by the PG&E load research group. In general, we relied on their efforts and used the data without extensive additional review (beyond treatment of missing data).

As noted in Chapter 4, we subjected the 1989 space conditioning data to an extensive internal review in order to gain familiarity with the data set. The review included: completeness of records (number of missing days of load data); examination of outliers (we assumed outliers were data that did not fall within the following ranges: total household 0-20 kW; central A/C 0-10 kW; room A/C 0-5 kW); internal consistency of household and A/C loads (A/C load must be less than or equal to total household load; examination of households reporting no load; and finally, visual review of 3-D graphs of the load data to identify unusual load patterns.

The findings from this review were summarized in a memo (dated June 18, 1991) and reviewed with PG&E and CEC. The review provided additional insight into some of the metering issues underlying the load data (e.g., central AC often includes ventilation fans, whose loads can be detected in Winter) and an opportunity to determine how best to treat the data in our analyses. For example, based on the meeting, we decided not to include data from two households whose data were anomalous, and eliminated a duplicate, but apparently distinct, record from a single household.

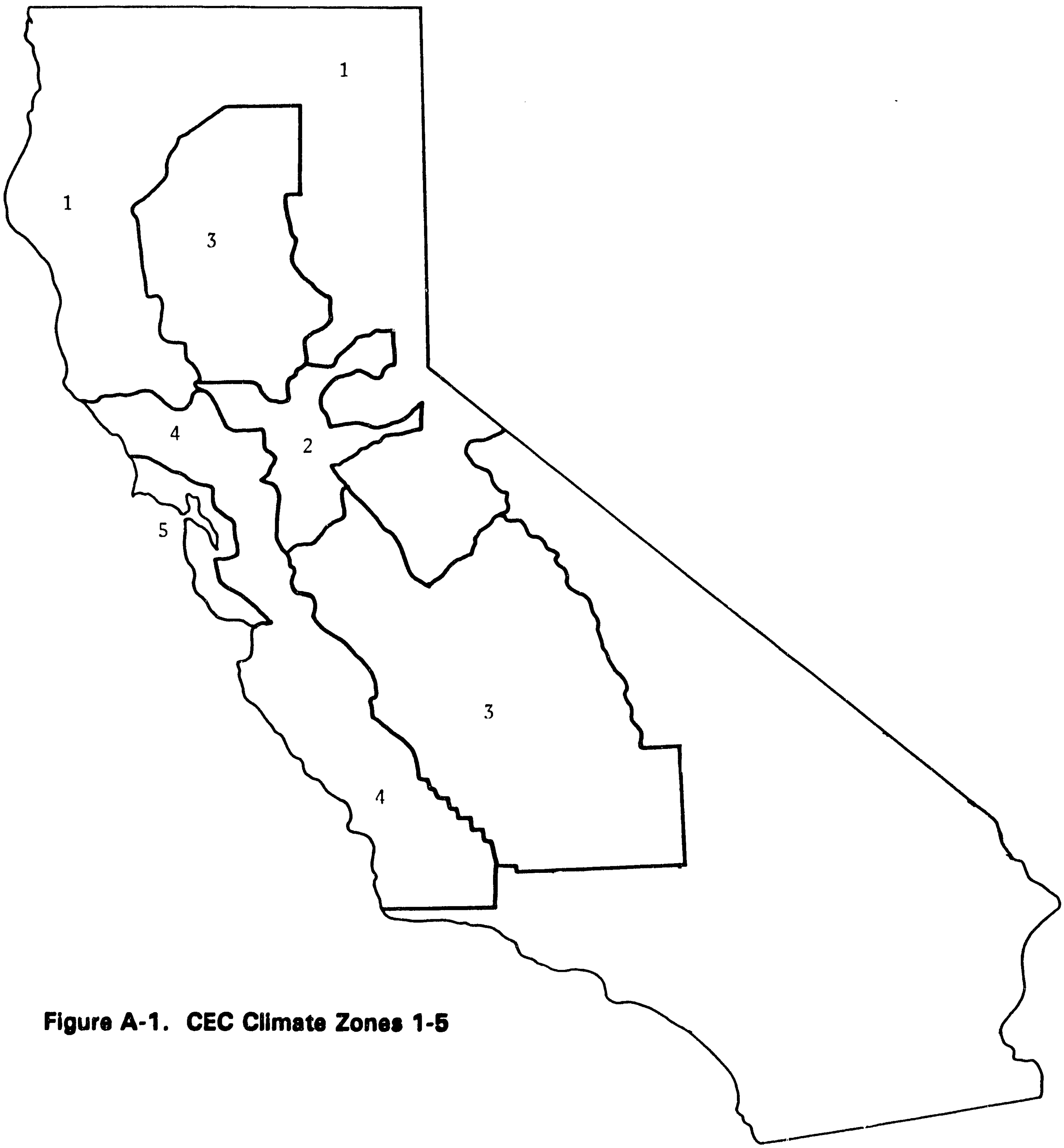

Figure A-1. CEC Climate Zones 1-5

XBL 874-8839

PG&E CLIMATE ZONE: R = DESERT/ MOUNTAIN (EXTREMELY HOT)

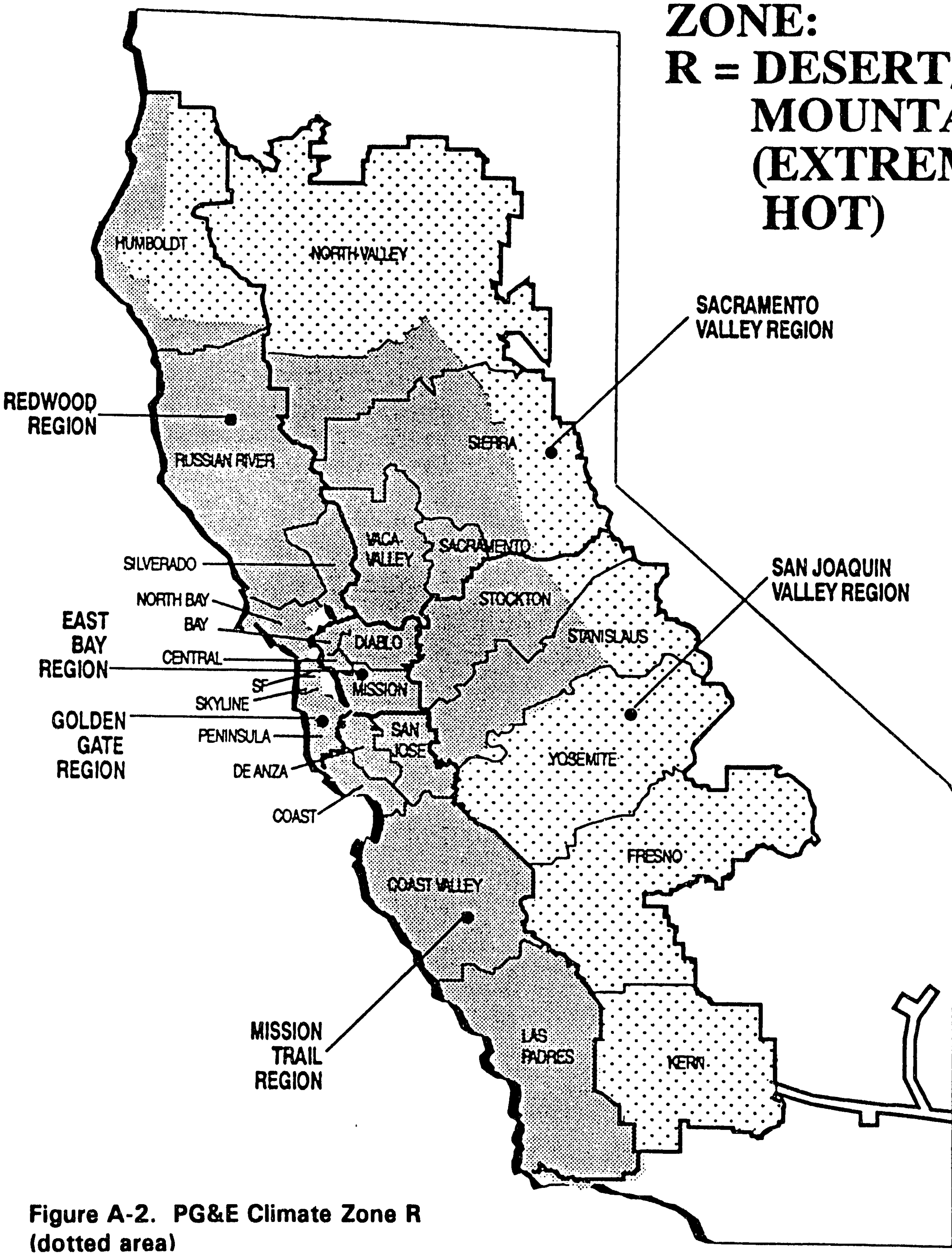

Figure A-2. PG&E Climate Zone R (dotted area)

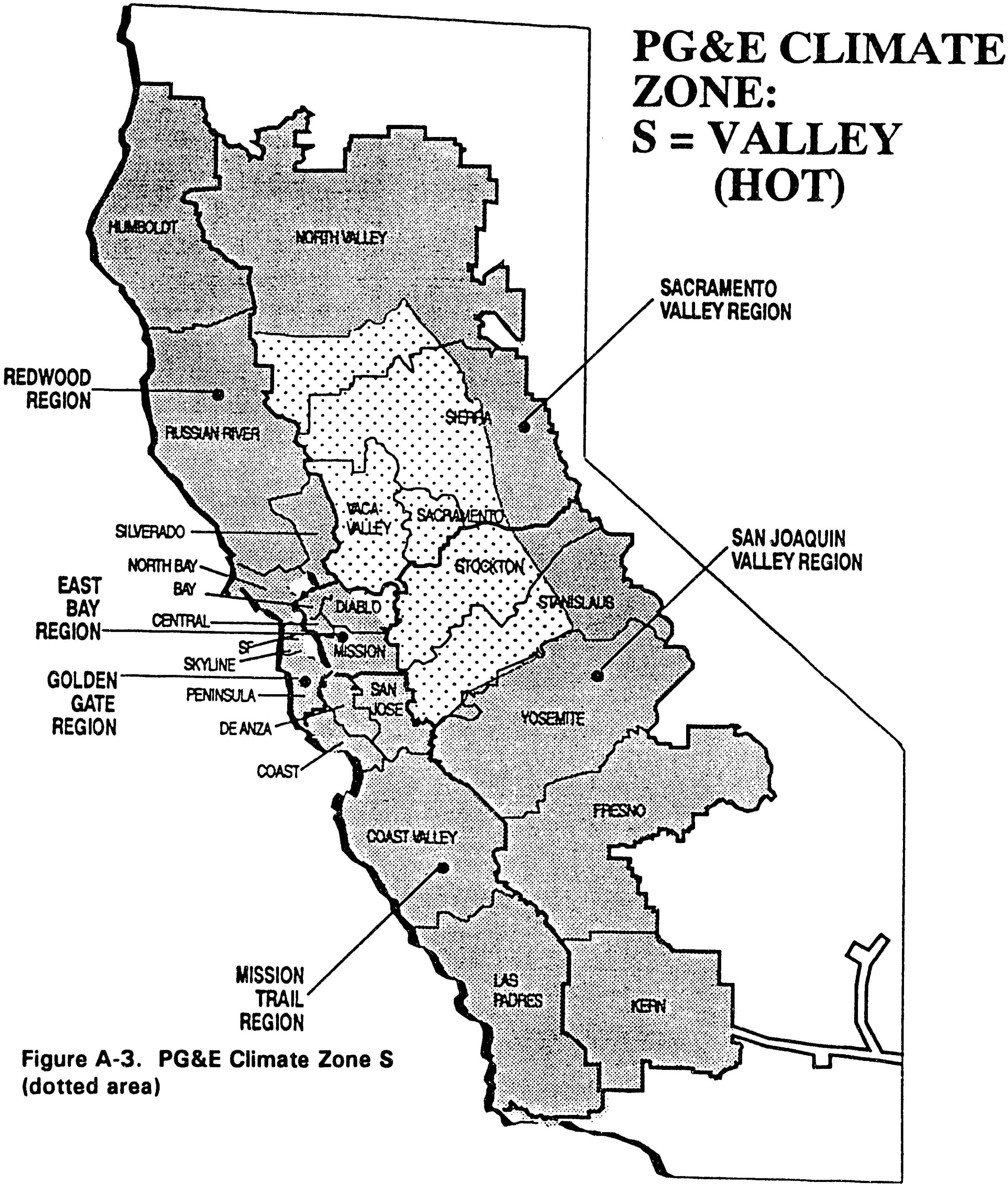

Figure A-3. PG&E Climate Zone S (dotted area)

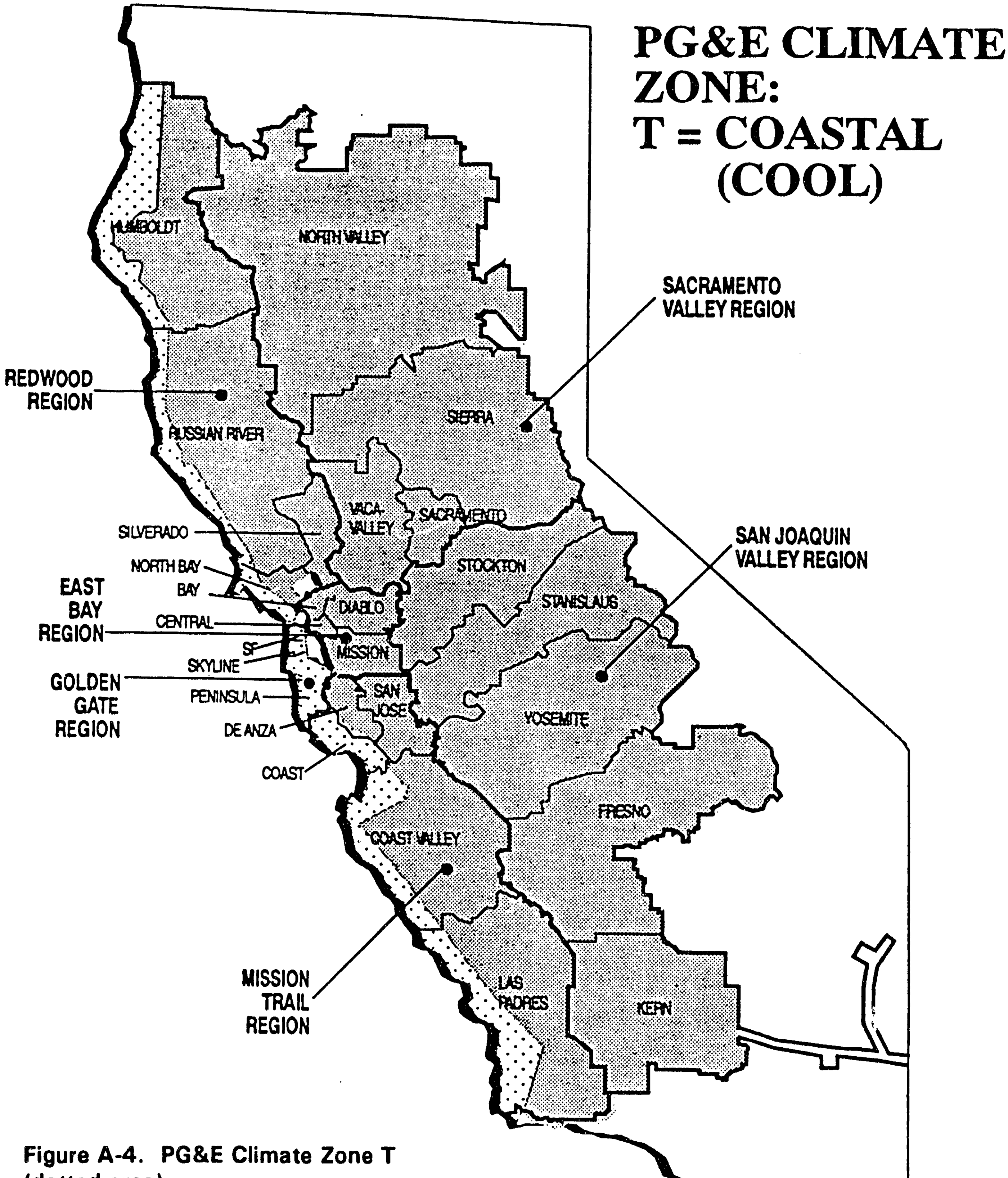

Figure A-4. PG&E Climate Zone T (dotted area)

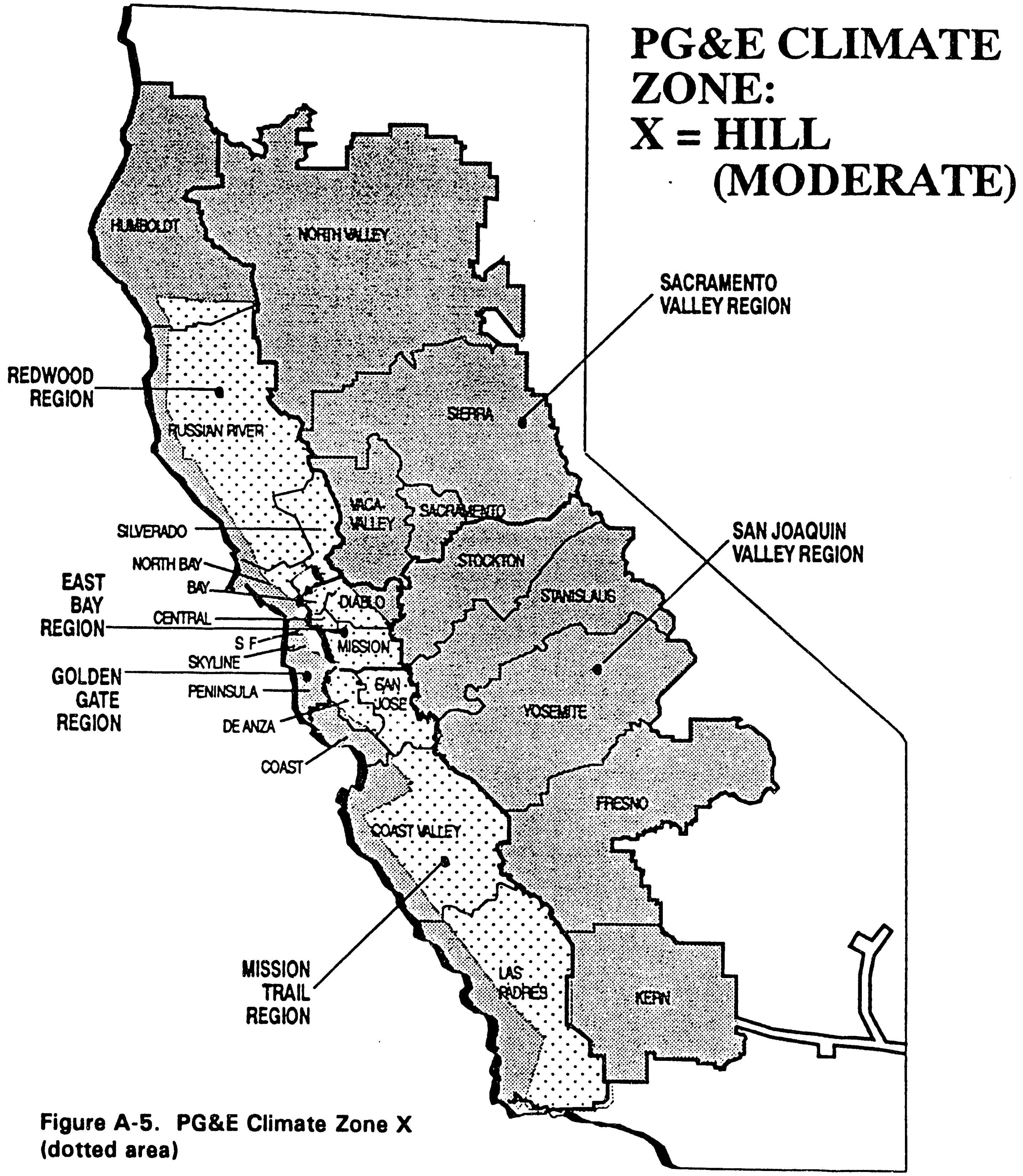

Figure A-5. PG&E Climate Zone X (dotted area)

Appendix B
Data Tables for Chapter 3

Mean, Standard Deviation, and N for Monthly UEC

Central Air Conditioner Region 2

MONTH	UEC85	UEC86	UEC87	UEC88	UEC89	UECALL
Jan	43	30	51	28	34	37
Feb	28	28	36	20	29	28
Mar	24	24	32	18	23	25
Apr	20	19	28	20	35	24
May	24	69	151	54	52	72
Jun	312	166	189	231	140	211
Jul	384	308	181	527	337	337
Aug	141	306	280	251	199	235
Sep	50	81	137	155	78	101
Oct	39	16	61	22	16	32
Nov	39	21	22	27	16	25
Dec	45	31	82	48	29	46

Central Air Conditioner Region 2

MONTH	SDUEC85	SDUEC86	SDUEC87	SDUEC88	SDUEC89	SDUECALL
Jan	60	42	113	40	51	69
Feb	39	37	74	28	42	48
Mar	34	34	61	24	43	42
Apr	27	23	36	29	58	37
May	32	71	122	62	62	89
Jun	224	130	151	184	133	181
Jul	312	218	169	314	231	273
Aug	158	236	198	197	191	202
Sep	64	75	121	109	83	101
Oct	46	19	59	37	22	44
Nov	82	28	26	48	25	48
Dec	61	44	298	86	44	133

Central Air Conditioner Region 2

MONTH	N85	N86	N87	N88	N89	NALL
Jan	29	45	57	52	52	235
Feb	58	54	60	52	53	277
Mar	48	50	59	48	52	257
Apr	52	53	60	50	51	266
May	56	41	60	50	51	258
Jun	53	30	57	47	50	237
Jul	29	39	60	48	49	225
Aug	44	33	59	48	49	233
Sep	53	43	55	50	47	248
Oct	53	44	55	49	48	249
Nov	50	45	54	50	50	249
Dec	47	29	34	49	49	208

Mean, Standard Deviation, and N for Monthly UEC

Wall Air Conditioner Region 2

MONTH	UEC85	UEC86	UEC87	UEC88	UEC89	UECALL
Jan	1	0	1	0	1	0
Feb	0	0	1	1	0	0
Mar	0	0	1	1	1	1
Apr	15	3	12	7	36	14
May	1	43	127	44	54	58
Jun	149	151	170	218	163	169
Jul	240	261	108	506	337	298
Aug	128	249	202	250	231	214
Sep	25	50	100	143	89	83
Oct	11	5	48	28	17	22
Nov	0	1	1	1	3	1
Dec	0	10	4	1	3	2

Wall Air Conditioner Region 2

MONTH	SDUEC85	SDUEC86	SDUEC87	SDUEC88	SDUEC89	SDUECALL
Jan	1	0	2	0	1	1
Feb	1	0	2	1	0	1
Mar	1	0	2	1	2	2
Apr	31	7	15	7	34	23
May	1	49	99	28	41	66
Jun	164	130	111	140	96	116
Jul	122	188	71	101	164	186
Aug	113	145	105	79	140	117
Sep	32	29	134	58	67	76
Oct	16	10	51	39	19	31
Nov	0	2	1	1	7	3
Dec	1	.	.	2	7	4

Wall Air Conditioner Region 2

MONTH	N85	N86	N87	N88	N89	NALL
Jan	3	6	6	6	6	27
Feb	6	5	6	6	6	29
Mar	5	3	6	6	6	26
Apr	5	6	6	6	6	29
May	4	5	6	6	6	27
Jun	4	4	6	4	6	24
Jul	4	3	6	6	6	25
Aug	5	5	6	6	6	28
Sep	5	5	4	6	6	26
Oct	5	4	4	6	6	25
Nov	5	6	5	6	6	28
Dec	5	1	1	6	6	19

Mean, Standard Deviation, and N for Monthly UEC

Central Air Conditioner Region 3

MONTH	UEC85	UEC86	UEC87	UEC88	UEC89	UECALL
Jan	46	31	79	43	48	51
Feb	30	24	58	29	35	36
Mar	26	21	53	21	21	29
Apr	20	17	33	17	29	24
May	33	87	168	57	52	82
Jun	440	250	323	267	205	299
Jul	612	396	274	777	475	492
Aug	244	468	433	414	316	378
Sep	49	128	158	245	117	142
Oct	29	18	71	34	14	34
Nov	27	19	47	28	23	30
Dec	49	40	119	50	42	54

Central Air Conditioner Region 3

MONTH	SDUEC85	SDUEC86	SDUEC87	SDUEC88	SDUEC89	SDUECALL
Jan	48	32	156	64	66	91
Feb	34	25	127	45	54	71
Mar	26	25	127	36	38	68
Apr	33	25	50	28	45	39
May	60	80	145	61	63	103
Jun	289	191	309	204	203	261
Jul	388	292	218	[illegible]	350	393
Aug	228	366	310	[illegible]16	274	309
Sep	63	93	150	192	134	152
Oct	33	30	77	70	25	56
Nov	27	21	95	42	37	56
Dec	62	42	319	70	60	121

Central Air Conditioner Region 3

MONTH	N85	N86	N87	N88	N89	NALL
Jan	111	120	162	143	142	678
Feb	143	138	164	145	147	737
Mar	119	126	158	134	143	680
Apr	126	128	162	138	144	698
May	137	114	161	138	141	691
Jun	126	101	159	134	131	651
Jul	64	112	162	143	141	622
Aug	92	82	158	140	143	615
Sep	130	99	137	142	143	651
Oct	130	108	136	140	135	649
Nov	123	103	156	121	138	641
Dec	117	56	54	134	139	500

Mean, Standard Deviation, and N for Monthly UEC

Wall Air Conditioner Region 3

MONTH	UEC85	UEC86	UEC87	UEC88	UEC89	UECALL
Jan	15	2	5	16	0	8
Feb	0	5	0	4	0	2
Mar	2	0	2	1	0	1
Apr	6	0	2	0	0	2
May	5	36	53	12	6	23
Jun	129	79	139	120	50	103
Jul	129	180	100	348	178	186
Aug	60	182	174	124	94	129
Sep	7	67	66	126	14	50
Oct	1	6	26	1	1	5
Nov	2	6	12	1	0	4
Dec	14	31	0	1	0	8

Wall Air Conditioner Region 3

MONTH	SDUEC85	SDUEC86	SDUEC87	SDUEC88	SDUEC89	SDUECALL
Jan	39	7	13	53	0	31
Feb	0	15	1	13	1	9
Mar	5	1	6	2	0	3
Apr	14	0	5	1	0	7
May	12	35	73	13	13	41
Jun	125	80	153	120	53	112
Jul	119	166	103	218	170	175
Aug	47	150	141	129	103	125
Sep	12	54	83	112	25	74
Oct	2	15	32	3	2	15
Nov	8	16	39	4	0	19
Dec	33	54	.	4	0	25

Wall Air Conditioner Region 3

MONTH	N85	N86	N87	N88	N89	NALL
Jan	7	9	8	11	8	43
Feb	11	12	10	11	9	53
Mar	7	11	9	9	9	45
Apr	11	11	10	11	9	52
May	10	11	10	10	9	50
Jun	9	10	10	11	10	50
Jul	8	12	10	9	10	49
Aug	8	9	10	8	10	45
Sep	11	8	6	8	10	43
Oct	10	7	6	10	10	43
Nov	11	8	10	10	10	49
Dec	12	3	1	9	10	35

Mean, Standard Deviation, and N for Monthly UEC

Central Air Conditioner Region 4

MONTH	UEC85	UEC86	UEC87	UEC88	UEC89	UECALL
Jan	36	27	30	20	23	27
Feb	21	21	22	15	18	19
Mar	26	18	23	15	12	19
Apr	32	23	28	21	46	30
May	30	47	137	55	42	63
Jun	229	111	113	139	110	140
Jul	332	188	96	401	227	235
Aug	93	149	165	185	111	141
Sep	37	53	97	123	46	71
Oct	41	27	128	33	17	49
Nov	30	20	25	20	14	22
Dec	38	41	71	23	22	32

Central Air Conditioner Region 4

MONTH	SDUEC85	SDUEC86	SDUEC87	SDUEC88	SDUEC89	SDUECALL
Jan	191	123	149	132	162	152
Feb	91	85	89	81	120	94
Mar	107	50	87	56	68	76
Apr	58	70	48	49	78	63
May	56	85	142	88	68	101
Jun	209	131	136	158	126	161
Jul	242	209	131	402	231	277
Aug	114	193	180	242	156	184
Sep	56	78	119	148	76	106
Oct	53	51	622	71	40	280
Nov	119	64	92	102	92	96
Dec	177	178	261	152	154	172

Central Air Conditioner Region 4

MONTH	N85	N86	N87	N88	N89	NALL
Jan	96	102	118	121	117	554
Feb	117	112	121	123	121	594
Mar	101	105	119	106	120	551
Apr	100	112	120	102	121	555
May	110	98	118	105	120	551
Jun	109	95	115	94	120	533
Jul	57	97	119	101	122	496
Aug	104	98	120	106	119	547
Sep	111	100	110	108	118	547
Oct	116	99	106	106	119	546
Nov	108	97	103	86	118	512
Dec	105	59	30	99	122	415

Mean, Standard Deviation, and N for Monthly UEC

Wall Air Conditioner Region 4

MONTH	UEC85	UEC86	UEC87	UEC88	UEC89	UECALL
ALL	296	226	433	502	393	376
Jan	7	6	8	10	11	8
Feb	4	2	5	11	11	7
Mar	4	2	7	9	13	7
Apr	13	2	12	14	32	14
May	7	11	137	29	24	47
Jun	87	54	59	66	59	65
Jul	103	71	38	168	109	93
Aug	33	45	77	91	65	64
Sep	15	16	41	58	36	34
Oct	12	8	25	15	12	15
Nov	5	4	8	14	9	8
Dec	4	5	15	18	12	11

Wall Air Conditioner Region 4

MONTH	SDUEC85	SDUEC86	SDUEC87	SDUEC88	SDUEC89	SDUECALL
Jan	19	16	18	25	28	21
Feb	10	5	13	33	27	21
Mar	14	6	18	22	33	21
Apr	21	6	21	24	34	25
May	12	18	452	32	30	228
Jun	71	62	80	46	46	64
Jul	92	78	47	124	92	98
Aug	48	50	72	76	65	67
Sep	23	25	50	49	39	42
Oct	16	13	31	23	24	23
Nov	15	15	21	33	21	21
Dec	10	18	34	42	28	29

Wall Air Conditioner Region 4

MONTH	N85	N86	N87	N88	N89	NALL
Jan	23	28	36	36	29	152
Feb	28	29	36	36	30	159
Mar	25	28	35	29	29	146
Apr	26	31	35	32	30	154
Mar	26	24	35	29	29	143
Jun	29	21	36	25	29	140
Jul	13	27	36	27	30	133
Aug	25	26	35	31	28	145
Sep	29	26	32	31	28	146
Oct	28	23	32	28	26	137
Nov	26	28	30	19	25	128
Dec	24	17	16	28	29	114

Mean, Standard Deviation, and N for Monthly UEC
Central Air Conditioner All Regions

MONTH	UEC85	UEC86	UEC87	UEC88	UEC89	UECALL
Jan	43	29	57	33	38	40
Feb	27	23	41	23	28	29
Mar	27	20	38	18	18	25
Apr	24	20	31	19	37	26
May	30	70	153	57	50	74
Jun	336	183	229	222	163	228
Jul	455	298	201	623	370	379
Aug	158	298	319	320	230	269
Sep	44	90	137	193	91	113
Oct	35	22	90	32	17	40
Nov	30	20	35	26	19	26
Dec	45	39	93	41	33	45

Central Air Conditioner All Regions

MONTH	SDUEC85	SDUEC86	SDUEC87	SDUEC88	SDUEC89	SDUECALL
Jan	123	78	144	92	109	113
Feb	60	54	104	58	82	75
Mar	68	36	101	42	52	66
Apr	43	45	47	36	62	48
May	54	83	139	74	65	100
Jun	268	177	256	200	181	230
Jul	347	269	211	474	339	370
Aug	186	313	288	310	250	281
Sep	61	93	144	184	121	139
Oct	43	38	362	66	32	172
Nov	81	43	84	67	62	70
Dec	116	113	283	105	104	139

Central Air Conditioner All Regions

MONTH	N85	N86	N87	N88	N89	NALL
Jan	255	291	366	342	335	1589
Feb	342	328	374	347	346	1737
Mar	289	306	365	314	335	1609
Apr	300	318	371	318	335	1642
May	326	275	367	320	335	1623
Jun	308	240	357	299	323	1527
Jul	158	271	365	319	335	1448
Aug	251	224	364	320	333	1492
Sep	304	261	325	328	331	1549
Oct	322	261	323	322	321	1549
Nov	304	269	337	278	325	1513
Dec	292	160	131	307	332	1222

Mean, Standard Deviation, and N for Monthly UEC

Wall Air Conditioner All Regions

MONTH	UEC85	UEC86	UEC87	UEC88	UEC89	UECALL
Jan	8	4	6	9	7	7
Feb	3	2	4	8	7	5
Mar	3	1	5	5	8	5
Apr	11	2	10	10	30	13
May	6	22	114	29	28	43
Jun	98	70	81	102	70	85
Jul	133	113	55	267	167	146
Aug	49	99	105	129	97	98
Sep	14	30	47	87	40	44
Oct	9	7	27	15	10	14
Nov	4	4	9	7	6	6
Dec	6	9	13	10	7	9

Wall Air Conditioner All Regions

MONTH	SDUEC85	SDUEC86	SDUEC87	SDUEC88	SDUEC89	SDUECALL
Jan	23	13	16	29	22	22
Feb	8	9	11	26	21	17
Mar	11	5	15	17	26	17
Apr	20	5	18	21	50	28
May	11	30	367	40	44	181
Jun	94	80	106	105	65	93
Jul	112	130	68	225	156	166
Aug	65	121	103	129	105	110
Sep	22	39	65	83	47	61
Oct	14	13	33	26	20	24
Nov	12	14	25	24	16	19
Dec	19	25	30	32	22	26

Wall Air Conditioner All Regions

MONTH	N85	N86	N87	N88	N89	NALL
Jan	35	44	54	59	47	239
Feb	46	48	56	59	49	258
Mar	39	43	54	50	48	234
Apr	44	49	54	54	49	250
May	42	41	54	51	48	236
Jun	44	36	56	46	46	228
Jul	25	43	56	48	50	222
Aug	40	41	55	51	48	235
Sep	47	40	46	51	48	232
Oct	45	34	45	50	46	220
Nov	44	42	47	40	45	218
Dec	42	21	21	49	49	182

Monthly Mean, Standard Deviation, and N for UEC

Central Air Conditioner PGE Zone R

MONTH	UEC85	UEC86	UEC87	UEC88	UEC89	UECALL
Jan	58	37	83	51	59	59
Feb	37	27	61	35	41	41
Mar	32	22	55	25	24	33
Apr	23	17	38	19	39	28
May	37	102	173	74	62	92
Jun	454	302	360	303	252	336
Jul	669	432	314	880	564	560
Aug	317	534	481	493	388	448
Sep	55	144	187	284	158	173
Oct	30	19	86	41	18	40
Nov	31	21	50	30	27	33
Dec	59	45	112	60	53	62

Central Air Conditioner PGE Zone R

MONTH	SDUEC85	SDUEC86	SDUEC87	SDUEC88	SDUEC89	SDUECALL
Jan	51	32	143	70	72	89
Feb	34	25	130	49	58	75
Mar	28	20	134	39	42	73
Apr	36	20	54	29	53	43
May	66	88	146	73	68	107
Jun	292	202	342	220	231	277
Jul	389	301	254	497	415	434
Aug	250	374	347	355	297	336
Sep	64	102	172	210	153	171
Oct	33	27	86	64	26	60
Nov	27	22	88	43	39	53
Dec	64	44	300	74	65	119

Central Air Conditioner PGE Zone R

MONTH	N85	N86	N87	N88	N89	NALL
Jan	84	94	130	112	114	534
Feb	88	96	126	115	116	541
Mar	84	95	128	108	112	527
Apr	93	99	129	112	109	542
Mar	107	87	128	113	111	546
Jun	98	68	127	114	101	508
Jul	45	89	126	116	113	489
Aug	55	58	125	112	113	463
Sep	89	77	109	114	113	502
Oct	99	76	111	114	108	508
Nov	93	86	120	112	109	520
Dec	94	53	47	112	109	415

Monthly Mean, Standard Deviation, and N for UEC

Wall Air Conditioner PGE Zone R

MONTH	UEC85	UEC86	UEC87	UEC88	UEC89	UECALL
Jan	17	0	0	0	1	4
Feb	0	7	0	0	1	2
Ma	0	0	0	1	0	0
Apr	8	0	1	11	59	15
Mar	10	24	25	40	57	30
Jun	117	37	53	106	36	70
Jul	131	155	43	321	142	161
Aug	32	130	80	141	35	88
Sep	8	58	35	111	23	44
Oct	0	10	35	21	1	12
Nov	0	15	8	1	0	4
Dec	12	94	12	1	0	10

Wall Air Conditioner PGE Zone R

MONTH	SDUEC85	SDUEC86	SDUEC87	SDUEC88	SDUEC89	SDUECALL
Jan	42	0	0	1	1	20
Feb	0	20	1	1	1	10
Mar	0	0	0	1	1	1
Apr	18	0	3	26	131	56
May	15	19	41	89	106	60
Jun	135	61	87	149	63	104
Jul	146	148	58	281	189	193
Aug	45	146	99	229	68	138
Sep	15	69	51	131	35	74
Oct	0	20	35	42	1	26
Nov	0	27	18	2	1	12
Dec	33	.	16	1	0	28

Wall Air Conditioner PGE Zone R

MONTH	N85	N86	N87	N88	N89	NALL
Jan	6	6	4	6	4	26
Feb	2	7	5	6	5	25
Mar	3	6	6	6	5	26
Apr	7	6	5	6	5	29
May	6	7	5	6	5	29
Jun	5	6	6	6	4	27
Jul	4	6	6	6	5	27
Aug	4	5	6	6	5	26
Sep	7	5	4	5	5	26
Oct	6	4	4	5	5	24
Nov	6	3	5	5	5	24
Dec	7	1	2	5	5	20

Monthly Mean, Standard Deviation, and N for UEC

Central Air Conditioner PGE Zone S

MONTH	UEC85	UEC86	UEC87	UEC88	UEC89	UECALL
Jan	50	34	60	36	41	44
Feb	27	27	37	24	32	30
Mar	29	22	36	19	22	26
Apr	24	23	27	19	34	26
May	31	75	161	47	53	76
Jun	354	187	203	224	146	225
Jul	446	309	192	598	348	366
Aug	145	318	302	283	198	249
Sep	46	92	137	187	70	107
Oct	38	25	66	27	17	35
Nov	36	24	34	30	21	29
Dec	50	50	113	44	36	53

Central Air Conditioner PGE Zone S

MONTH	SDUEC85	SDUEC86	SDUEC87	SDUEC88	SDUEC89	SDUECALL
Jan	193	120	183	130	160	159
Feb	90	84	103	80	120	96
Mar	97	50	98	53	72	78
Apr	52	66	45	45	72	57
May	54	89	143	67	75	105
Jun	262	171	166	177	154	204
Jul	317	240	172	394	260	314
Aug	159	270	224	231	198	226
Sep	69	91	134	163	95	126
Oct	53	51	81	67	40	63
Nov	120	66	101	98	92	98
Dec	172	184	336	153	155	193

Central Air Conditioner PGE Zone S

MONTH	N85	N86	N87	N88	N89	NALL
Jan	96	112	140	129	125	602
Feb	122	122	142	129	127	642
Mar	125	128	141	118	125	637
Apr	124	131	145	119	126	645
May	130	99	143	119	124	615
Jun	124	87	138	108	123	580
Jul	72	104	143	117	120	556
Aug	109	86	143	121	122	581
Sep	129	102	129	123	120	603
Oct	130	105	128	118	118	599
Nov	124	93	136	102	122	577
Dec	112	56	55	111	122	456

Monthly Mean, Standard Deviation, and N for UEC

Wall Air Conditioner PGE Zone S

MONTH	UEC85	UEC86	UEC87	UEC88	UEC89	UECALL
Jan	0	2	3	9	0	3
Feb	0	0	1	2	0	1
Ma	1	0	2	1	0	1
Apr	12	1	7	4	18	8
Ma	3	47	91	25	25	39
Jun	136	131	143	166	94	134
Jul	184	189	96	437	268	241
Aug	99	191	177	193	160	168
Sep	16	46	74	128	53	67
Oct	6	6	31	12	7	12
Nov	2	0	8	1	1	2
Dec	6	3	1	1	1	2

Wall Air Conditioner PGE Zone S

MONTH	SDUEC85	SDUEC86	SDUEC87	SDUEC88	SDUEC89	SDUECALL
Jan	1	6	9	39	1	21
Feb	1	2	1	9	1	5
Mar	4	1	5	2	1	3
Apr	24	4	12	6	27	18
May	4	44	88	24	34	56
Jun	126	101	135	130	86	117
Jun	123	170	92	241	180	206
Aug	87	146	128	136	129	129
Sep	24	35	96	96	59	79
Oct	11	13	38	24	13	23
Nov	7	1	32	3	4	14
Dec	22	6	2	3	4	11

Wall Air Conditioner PGE Zone S

MONTH	N85	N86	N87	N88	N89	NALL
Jan	7	13	16	20	17	73
Feb	12	13	15	20	17	77
Mar	13	12	15	17	17	74
Apr	13	15	16	19	17	80
May	12	10	16	18	17	73
Jun	12	9	16	15	16	68
Jul	8	12	16	15	18	69
Aug	10	13	16	17	18	74
Sep	13	12	12	18	18	73
Oct	13	9	12	20	18	72
Nov	13	13	15	20	18	79
Dec	13	3	3	19	18	56

Monthly Mean, Standard Deviation, and N for UEC

Central Air Conditioner PGE Zone X

MONTH	UEC85	UEC86	UEC87	UEC88	UEC89	UECALL
Jan	15	15	16	7	8	12
Feb	12	13	14	7	7	10
Mar	16	14	16	9	6	12
Apr	24	16	24	16	38	24
May	20	33	116	49	30	50
Jun	177	84	86	102	94	108
Jul	238	133	66	314	181	178
Aug	74	105	132	149	88	110
Sep	31	34	73	89	38	53
Oct	35	19	131	28	14	44
Nov	19	13	15	11	6	13
Dec	21	18	22	11	9	15

Central Air Conditioner PGE Zone X

MONTH	SDUEC85	SDUEC86	SDUEC87	SDUEC88	SDUEC89	SDUECALL
Jan	23	21	22	20	25	22
Feb	17	19	18	16	19	18
Mar	27	20	20	20	16	21
Apr	34	21	35	27	57	38
May	33	50	115	80	40	79
Jun	140	77	88	128	102	114
Jul	161	156	79	323	175	215
Aug	80	138	125	225	115	146
Sep	38	46	80	102	55	72
Oct	37	24	701	66	25	309
Nov	35	19	19	24	13	23
Dec	47	27	23	32	24	33

Central Air Conditioner PGE Zone X

MONTH	N85	N86	N87	N88	N89	NALL
Jan	74	84	95	100	95	448
Feb	75	75	96	102	98	446
Mar	79	82	95	88	97	441
Apr	82	87	96	86	99	450
May	88	88	95	87	99	457
Jun	85	84	91	76	98	434
Jul	40	77	95	85	101	398
Aug	86	79	95	86	97	443
Sep	86	81	86	90	97	440
Oct	92	79	83	89	94	437
Nov	86	89	80	64	93	412
Dec	85	50	29	83	100	347

Monthly Mean, Standard Deviation, and N for UEC

Wall Air Conditioner PGE Zone X

MONTH	UEC85	UEC86	UEC87	UEC88	UEC89	UECALL
Jan	8	6	8	11	13	9
Feb	5	2	6	12	12	8
Mar	5	2	7	9	15	8
Apr	11	2	12	14	33	14
May	6	11	138	30	25	48
Jun	78	54	57	63	60	63
Jul	103	66	38	161	104	91
Aug	32	40	74	88	64	61
Sep	14	16	37	55	33	32
Oct	13	7	24	15	14	15
Nov	6	5	9	18	10	9
Dec	4	5	15	20	13	12

Wall Air Conditioner PGE Zone X

MONTH	SDUEC85	SDUEC86	SDUEC87	SDUEC88	SDUEC89	SDUECALL
Jan	19	17	19	25	29	22
Feb	11	6	14	34	28	22
Mar	14	6	18	23	34	21
Apr	19	6	21	25	35	25
May	12	18	466	33	31	236
Jun	63	62	82	48	46	63
Jul	92	79	47	128	88	98
Aug	47	48	70	77	63	66
Sep	22	25	48	47	37	41
Oct	17	12	31	24	25	24
Nov	15	16	22	37	22	22
Dec	10	18	34	44	30	30

Wall Air Conditioner PGE Zone X

MONTH	N85	N86	N87	N88	N89	NALL
Jan	22	25	34	33	26	140
Feb	22	23	34	33	27	139
Mar	23	25	33	27	26	134
Apr	24	28	33	29	27	141
May	24	24	33	27	26	134
Jun	27	21	34	25	26	133
Jul	13	25	34	27	27	126
Aug	26	23	33	28	25	135
Sep	27	23	30	28	25	133
Oct	26	21	29	25	23	124
Nov	25	26	27	15	22	115
Dec	22	17	16	25	26	106

Appendix C
Data Tables for Chapter 5

Table C1: Central Air Conditioner Raw Time-Temperature Matrix
Mean Load in kWh for all CEC Regions

THI \ hour →	1	2	3	4	5	6	7	8	9	10	11	12
45	0.041	0.043	0.046	0.048	0.049	0.063	0.090	0.098	0.088	0.097	0.096	0.092
46	0.041	0.040	0.045	0.045	0.050	0.061	0.099	0.100	0.094	0.078	0.088	0.099
47	0.039	0.040	0.041	0.045	0.048	0.058	0.081	0.091	0.080	0.086	0.085	0.088
48	0.034	0.036	0.038	0.041	0.041	0.050	0.073	0.087	0.093	0.069	0.079	0.083
49	0.035	0.034	0.036	0.035	0.041	0.050	0.071	0.078	0.074	0.073	0.068	0.069
50	0.031	0.034	0.031	0.036	0.038	0.049	0.063	0.074	0.072	0.080	0.062	0.074
51	0.032	0.029	0.031	0.031	0.033	0.043	0.065	0.068	0.061	0.062	0.067	0.059
52	0.027	0.028	0.029	0.029	0.032	0.036	0.061	0.064	0.057	0.054	0.058	0.061
53	0.026	0.027	0.026	0.028	0.029	0.036	0.048	0.055	0.056	0.055	0.054	0.050
54	0.025	0.023	0.024	0.023	0.025	0.028	0.040	0.045	0.045	0.051	0.044	0.051
55	0.024	0.023	0.023	0.023	0.025	0.026	0.033	0.038	0.041	0.043	0.043	0.044
56	0.021	0.021	0.019	0.020	0.020	0.024	0.035	0.036	0.037	0.035	0.039	0.039
57	0.019	0.019	0.018	0.019	0.021	0.024	0.029	0.029	0.030	0.033	0.035	0.036
58	0.018	0.019	0.020	0.021	0.018	0.019	0.022	0.027	0.026	0.033	0.031	0.032
59	0.022	0.022	0.021	0.020	0.021	0.020	0.024	0.025	0.025	0.028	0.029	0.028
60	0.026	0.024	0.020	0.021	0.018	0.020	0.026	0.026	0.026	0.026	0.027	0.028
61	0.027	0.025	0.023	0.020	0.023	0.024	0.024	0.027	0.028	0.026	0.025	0.025
62	0.031	0.028	0.026	0.030	0.023	0.025	0.025	0.027	0.025	0.023	0.025	0.024
63	0.039	0.037	0.032	0.030	0.029	0.026	0.028	0.031	0.031	0.026	0.023	0.022
64	0.047	0.044	0.039	0.037	0.032	0.031	0.028	0.034	0.032	0.033	0.022	0.022
65	0.068	0.048	0.049	0.042	0.036	0.037	0.039	0.046	0.046	0.037	0.030	0.024
66	0.067	0.068	0.051	0.049	0.052	0.050	0.048	0.057	0.048	0.047	0.042	0.026
67	0.105	0.085	0.082	0.076	0.061	0.058	0.065	0.070	0.059	0.060	0.044	0.039
68	0.114	0.101	0.091	0.088	0.085	0.073	0.078	0.083	0.079	0.074	0.067	0.052
69	0.154	0.141	0.116	0.106	0.095	0.093	0.098	0.111	0.091	0.085	0.081	0.064
70	0.171	0.137	0.135	0.139	0.135	0.126	0.111	0.139	0.153	0.113	0.108	0.089
71	0.190	0.183	0.172	0.176	0.153	0.152	0.153	0.154	0.137	0.108	0.108	0.115
72	0.251	0.241	0.240	0.238	0.197	0.190	0.195	0.210	0.193	0.177	0.129	0.142
73	0.316	0.305	0.285	0.257	0.240	0.264	0.249	0.257	0.212	0.194	0.163	0.183
74	0.377	0.383	0.355	0.368	0.287	0.239	0.146	0.323	0.397	0.268	0.216	0.191
75	0.459	0.439	0.421	0.358	0.426	.nd	.nd	.nd	0.360	0.311	0.294	0.251
76	0.559	0.516	0.317	0.368	.nd	.nd	.nd	.nd	0.542	0.382	0.370	0.347
77	0.692	0.550	0.620	.nd	.nd	.nd	.nd	.nd	0.534	0.614	0.458	0.477
78	0.822	0.844	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.706	0.554	0.602
79	1.016	0.859	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.821	0.763	0.729
80	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.007	0.893
81	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.172
82	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.097
83	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.425
84	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C1 cont'd: Central Air Conditioner Raw Time-Temperature Matrix
Mean Load in kWh for all CEC Regions

THI \ hour →	1	2	3	4	5	6	7	8	9	10	11	12
45	0.099	0.084	0.095	0.083	0.097	0.098	0.094	0.100	0.092	0.076	0.063	0.047
46	0.085	0.084	0.091	0.091	0.077	0.083	0.090	0.082	0.083	0.066	0.055	0.045
47	0.089	0.076	0.063	0.075	0.085	0.104	0.089	0.080	0.067	0.068	0.053	0.043
48	0.070	0.087	0.079	0.077	0.093	0.077	0.085	0.077	0.067	0.063	0.052	0.041
49	0.075	0.069	0.077	0.088	0.080	0.083	0.072	0.069	0.065	0.055	0.049	0.038
50	0.060	0.063	0.073	0.068	0.071	0.076	0.068	0.065	0.062	0.054	0.048	0.036
51	0.066	0.064	0.062	0.067	0.068	0.069	0.072	0.060	0.054	0.052	0.042	0.034
52	0.057	0.062	0.054	0.055	0.065	0.065	0.063	0.053	0.053	0.049	0.040	0.032
53	0.055	0.055	0.053	0.055	0.058	0.062	0.053	0.051	0.051	0.044	0.036	0.030
54	0.047	0.048	0.047	0.047	0.050	0.059	0.056	0.050	0.046	0.037	0.032	0.027
55	0.045	0.044	0.046	0.045	0.051	0.051	0.047	0.045	0.040	0.035	0.030	0.025
56	0.040	0.043	0.040	0.047	0.045	0.047	0.051	0.039	0.037	0.031	0.028	0.024
57	0.035	0.035	0.036	0.038	0.039	0.047	0.039	0.038	0.032	0.029	0.025	0.021
58	0.035	0.033	0.036	0.033	0.043	0.040	0.036	0.030	0.028	0.025	0.023	0.020
59	0.030	0.031	0.031	0.034	0.035	0.037	0.033	0.029	0.029	0.026	0.026	0.024
60	0.026	0.028	0.030	0.030	0.034	0.033	0.033	0.030	0.029	0.032	0.025	0.021
61	0.027	0.026	0.027	0.027	0.029	0.030	0.028	0.027	0.030	0.034	0.033	0.031
62	0.022	0.025	0.023	0.024	0.026	0.032	0.031	0.031	0.035	0.038	0.039	0.032
63	0.021	0.022	0.025	0.024	0.027	0.031	0.032	0.037	0.043	0.048	0.047	0.044
64	0.022	0.023	0.022	0.023	0.030	0.032	0.037	0.042	0.050	0.062	0.063	0.061
65	0.024	0.023	0.021	0.026	0.026	0.034	0.041	0.059	0.069	0.090	0.090	0.080
66	0.021	0.024	0.024	0.028	0.036	0.044	0.073	0.065	0.077	0.115	0.125	0.100
67	0.033	0.027	0.031	0.034	0.050	0.058	0.075	0.099	0.131	0.157	0.161	0.105
68	0.040	0.044	0.044	0.056	0.061	0.089	0.122	0.143	0.182	0.188	0.170	0.153
69	0.052	0.040	0.052	0.061	0.076	0.106	0.153	0.201	0.232	0.242	0.206	0.174
70	0.076	0.072	0.061	0.066	0.100	0.173	0.174	0.256	0.321	0.276	0.240	0.223
71	0.108	0.087	0.090	0.112	0.152	0.207	0.315	0.316	0.288	0.312	0.304	0.252
72	0.112	0.122	0.154	0.161	0.245	0.304	0.330	0.368	0.402	0.379	0.356	0.259
73	0.170	0.178	0.170	0.235	0.281	0.358	0.414	0.499	0.451	0.502	0.400	0.351
74	0.219	0.191	0.237	0.285	0.365	0.452	0.533	0.450	0.491	0.573	0.487	0.413
75	0.284	0.273	0.277	0.360	0.415	0.494	0.561	0.579	0.673	0.643	0.591	0.487
76	0.303	0.380	0.374	0.354	0.490	0.583	0.614	0.671	0.685	0.851	0.757	0.638
77	0.438	0.454	0.562	0.574	0.579	0.660	0.807	0.852	0.943	1.029	0.899	0.720
78	0.539	0.585	0.581	0.696	0.806	0.876	0.974	0.956	1.152	1.182	1.075	0.847
79	0.751	0.670	0.763	0.824	0.915	1.083	1.122	1.180	1.317	1.424	1.202	1.046
80	0.881	0.861	0.896	1.015	1.154	1.192	1.339	1.427	1.449	1.630	1.414	1.195
81	1.069	1.097	1.037	1.179	1.321	1.479	1.587	1.629	1.756	1.854	1.790	.nd
82	1.344	1.311	1.353	1.396	1.490	1.679	1.811	1.841	1.985	2.053	1.709	.nd
83	1.503	1.496	1.608	1.604	1.761	1.890	2.085	2.087	2.135	2.276	.nd	.nd
84	1.770	1.832	1.756	1.914	1.965	2.187	2.343	2.358	2.495	.nd	.nd	.nd
85	1.888	1.983	2.073	2.128	2.262	2.444	2.596	2.560	2.671	.nd	.nd	.nd
86	.nd	2.122	2.397	2.607	2.541	2.696	2.793	2.966	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	2.664	2.880	2.985	3.075	2.984	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	2.474	2.868	2.973	2.908	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	3.069	3.193	3.328	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C2: Central Air Conditioner Raw Time-Temperature Matrix
Mean Load in kWh for CEC Region 2

THI \ hour →	1	2	3	4	5	6	7	8	9	10	11	12
45	0.031	0.037	0.038	0.039	0.043	0.047	0.070	0.089	0.085	0.074	0.081	0.082
46	0.036	0.035	0.040	0.030	0.041	0.049	0.083	0.095	0.083	0.084	0.077	0.082
47	0.031	0.029	0.034	0.042	0.047	0.052	0.074	0.079	0.077	0.078	0.069	0.084
48	0.027	0.030	0.032	0.039	0.034	0.039	0.066	0.078	0.077	0.068	0.076	0.065
49	0.028	0.029	0.031	0.031	0.032	0.041	0.055	0.073	0.069	0.071	0.065	0.067
50	0.025	0.025	0.025	0.027	0.029	0.034	0.053	0.064	0.063	0.080	0.060	0.072
51	0.024	0.025	0.024	0.025	0.028	0.034	0.046	0.062	0.060	0.064	0.059	0.056
52	0.021	0.022	0.023	0.024	0.027	0.031	0.055	0.060	0.056	0.059	0.064	0.060
53	0.024	0.024	0.021	0.024	0.025	0.028	0.038	0.053	0.053	0.051	0.053	0.058
54	0.019	0.018	0.020	0.020	0.019	0.021	0.032	0.040	0.042	0.050	0.052	0.058
55	0.017	0.019	0.017	0.019	0.020	0.022	0.029	0.035	0.044	0.042	0.055	0.050
56	0.017	0.016	0.015	0.016	0.016	0.017	0.024	0.030	0.038	0.039	0.040	0.059
57	0.016	0.016	0.015	0.015	0.019	0.023	0.028	0.025	0.031	0.032	0.037	0.041
58	0.015	0.016	0.017	0.016	0.020	0.017	0.021	0.037	0.034	0.043	0.032	0.038
59	0.024	0.020	0.025	0.025	0.018	0.018	0.017	0.021	0.022	0.029	0.038	0.030
60	0.029	0.038	0.024	0.019	0.018	0.023	0.028	0.021	0.020	0.022	0.024	0.038
61	0.034	0.031	0.026	0.025	0.023	0.021	0.023	0.028	0.027	0.021	0.023	0.024
62	0.048	0.034	0.030	0.031	0.027	0.023	0.027	0.026	0.024	0.018	0.021	0.023
63	0.052	0.043	0.039	0.035	0.030	0.033	0.036	0.035	0.030	0.025	0.019	0.021
64	0.082	0.067	0.056	0.050	0.056	0.045	0.041	0.044	0.032	0.023	0.021	0.019
65	0.097	0.084	0.079	0.066	0.061	0.051	0.073	0.057	0.037	0.028	0.022	0.019
66	0.132	0.117	0.107	0.106	0.101	0.069	0.063	0.059	0.068	0.034	0.031	0.019
67	0.200	0.171	0.131	0.133	0.100	0.056	0.104	0.142	0.081	0.052	0.031	0.020
68	0.230	0.180	0.160	0.185	0.107	0.206	0.090	0.074	0.072	0.064	0.042	0.029
69	0.311	0.331	0.316	0.258	0.162	0.054	0.501	0.234	0.146	0.112	0.063	0.040
70	0.270	0.260	0.212	0.065	.nd	.nd	.nd	.nd	0.195	0.120	0.098	0.048
71	0.488	0.353	0.107	.nd	.nd	0.411	.nd	.nd	0.157	0.151	0.149	0.081
72	0.544	.nd	.nd	.nd	0.466	.nd	.nd	.nd	0.262	0.226	0.170	0.095
73	0.231	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.435	0.204	0.224	0.225
74	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.248	0.216
75	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.487	0.427	0.341
76	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.335	0.496	0.453
77	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.843	0.509
78	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.864	0.746
79	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.975
80	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
81	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
82	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
83	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
84	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C2 cont'd: Central Air Conditioner Raw Time-Temperature Matrix Mean Load in kWh for CEC Region 2

THI \ hour →	13	14	15	16	17	18	19	20	21	22	23	24
45	0.097	0.096	0.093	0.102	0.089	0.090	0.082	0.085	0.085	0.071	0.049	0.045
46	0.071	0.076	0.096	0.080	0.082	0.092	0.069	0.084	0.072	0.059	0.044	0.034
47	0.085	0.065	0.057	0.070	0.080	0.077	0.082	0.070	0.062	0.060	0.049	0.041
48	0.078	0.087	0.073	0.068	0.080	0.062	0.071	0.073	0.060	0.052	0.041	0.031
49	0.066	0.071	0.075	0.079	0.067	0.073	0.062	0.058	0.054	0.056	0.046	0.035
50	0.076	0.058	0.071	0.067	0.066	0.065	0.062	0.057	0.060	0.047	0.043	0.030
51	0.061	0.067	0.067	0.058	0.066	0.065	0.065	0.054	0.055	0.053	0.037	0.028
52	0.065	0.060	0.056	0.051	0.061	0.059	0.058	0.052	0.057	0.044	0.039	0.022
53	0.058	0.052	0.047	0.056	0.052	0.060	0.052	0.053	0.052	0.050	0.033	0.029
54	0.052	0.057	0.048	0.045	0.052	0.052	0.056	0.053	0.043	0.035	0.028	0.023
55	0.056	0.053	0.052	0.046	0.048	0.050	0.050	0.045	0.040	0.035	0.027	0.020
56	0.043	0.045	0.051	0.041	0.042	0.050	0.051	0.041	0.038	0.030	0.025	0.019
57	0.039	0.038	0.037	0.040	0.041	0.048	0.043	0.037	0.032	0.027	0.021	0.019
58	0.052	0.037	0.033	0.037	0.041	0.041	0.035	0.030	0.027	0.021	0.023	0.017
59	0.036	0.044	0.032	0.032	0.035	0.047	0.036	0.029	0.035	0.026	0.021	0.025
60	0.033	0.035	0.047	0.058	0.050	0.033	0.045	0.037	0.025	0.032	0.031	0.023
61	0.035	0.025	0.026	0.027	0.027	0.032	0.027	0.023	0.021	0.026	0.032	0.038
62	0.024	0.025	0.025	0.026	0.027	0.027	0.026	0.038	0.027	0.045	0.049	0.038
63	0.021	0.027	0.028	0.020	0.023	0.034	0.033	0.022	0.034	0.047	0.052	0.073
64	0.019	0.020	0.018	0.018	0.031	0.022	0.021	0.026	0.052	0.047	0.099	0.081
65	0.018	0.018	0.018	0.025	0.020	0.018	0.022	0.028	0.042	0.079	0.121	0.107
66	0.021	0.020	0.020	0.024	0.017	0.024	0.037	0.034	0.079	0.138	0.156	0.147
67	0.024	0.019	0.018	0.018	0.029	0.033	0.037	0.063	0.096	0.176	0.229	0.212
68	0.028	0.028	0.021	0.027	0.033	0.033	0.054	0.108	0.150	0.258	0.264	0.245
69	0.028	0.027	0.033	0.032	0.035	0.055	0.050	0.123	0.220	0.295	0.363	0.373
70	0.047	0.037	0.045	0.043	0.052	0.062	0.088	0.124	0.278	0.396	0.493	0.502
71	0.056	0.054	0.050	0.058	0.070	0.087	0.147	0.255	0.379	0.526	0.605	0.407
72	0.070	0.075	0.069	0.066	0.088	0.089	0.260	0.292	0.508	0.670	0.631	0.697
73	0.113	0.115	0.123	0.134	0.155	0.255	0.332	0.426	0.646	0.771	0.736	0.843
74	0.201	0.148	0.165	0.198	0.251	0.291	0.396	0.574	0.682	0.941	0.703	.nd
75	0.300	0.232	0.224	0.278	0.333	0.454	0.513	0.708	0.883	0.992	1.120	.nd
76	0.396	0.323	0.380	0.325	0.445	0.539	0.674	0.835	0.978	1.308	1.643	0.452
77	0.498	0.496	0.427	0.506	0.625	0.745	0.982	1.013	1.240	1.391	.nd	.nd
78	0.701	0.620	0.608	0.697	0.827	0.990	1.028	1.280	1.482	1.483	.nd	.nd
79	0.938	0.879	0.827	0.916	1.011	1.200	1.292	1.429	1.453	1.253	.nd	.nd
80	1.148	1.062	1.114	1.077	1.269	1.355	1.605	1.768	1.706	.nd	.nd	.nd
81	1.246	1.275	1.257	1.421	1.534	1.681	1.821	1.796	1.680	.nd	.nd	.nd
82	1.663	1.777	1.601	1.586	1.622	1.921	2.102	1.915	1.965	.nd	.nd	.nd
83	.nd	1.780	1.745	1.807	1.994	2.213	2.171	2.085	1.724	.nd	.nd	.nd
84	.nd	2.050	2.137	2.025	2.143	2.347	2.480	2.263	2.275	.nd	.nd	.nd
85	.nd	.nd	2.250	2.128	2.255	2.444	2.400	2.421	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	2.693	2.326	2.477	2.450	2.782	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	2.383	2.654	2.630	2.679	2.150	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	2.493	2.838	2.908	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	3.069	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C3: Central Air Conditioner Raw Time-Temperature Matrix
Mean Load in kWh for CEC Region 3

THI \ hour →	1	2	3	4	5	6	7	8	9	10	11	12
45	0.043	0.043	0.048	0.051	0.051	0.080	0.126	0.125	0.111	0.115	0.103	0.098
46	0.042	0.043	0.049	0.051	0.056	0.075	0.147	0.132	0.121	0.097	0.107	0.104
47	0.039	0.042	0.044	0.049	0.053	0.070	0.106	0.119	0.108	0.106	0.100	0.102
48	0.034	0.039	0.041	0.043	0.042	0.064	0.097	0.118	0.125	0.089	0.085	0.094
49	0.036	0.033	0.036	0.035	0.047	0.063	0.094	0.099	0.097	0.086	0.082	0.075
50	0.031	0.036	0.029	0.039	0.044	0.063	0.087	0.098	0.094	0.104	0.068	0.084
51	0.032	0.028	0.033	0.035	0.038	0.056	0.106	0.090	0.076	0.077	0.085	0.067
52	0.027	0.029	0.031	0.030	0.034	0.042	0.083	0.091	0.072	0.065	0.067	0.076
53	0.025	0.026	0.027	0.030	0.031	0.047	0.069	0.074	0.074	0.074	0.065	0.057
54	0.027	0.023	0.021	0.022	0.027	0.031	0.053	0.058	0.057	0.065	0.052	0.066
55	0.024	0.021	0.024	0.022	0.027	0.029	0.041	0.042	0.053	0.053	0.051	0.050
56	0.022	0.021	0.019	0.019	0.018	0.029	0.048	0.040	0.038	0.044	0.047	0.039
57	0.019	0.017	0.017	0.018	0.018	0.023	0.035	0.034	0.034	0.038	0.039	0.041
58	0.016	0.015	0.016	0.015	0.014	0.020	0.023	0.023	0.027	0.035	0.040	0.036
59	0.015	0.016	0.016	0.016	0.019	0.018	0.027	0.028	0.022	0.026	0.031	0.032
60	0.017	0.015	0.014	0.018	0.016	0.019	0.029	0.027	0.027	0.028	0.029	0.028
61	0.014	0.015	0.019	0.016	0.017	0.016	0.017	0.019	0.025	0.022	0.024	0.027
62	0.016	0.021	0.019	0.018	0.018	0.020	0.019	0.020	0.017	0.018	0.021	0.022
63	0.023	0.018	0.015	0.020	0.023	0.020	0.024	0.023	0.023	0.023	0.020	0.021
64	0.018	0.021	0.026	0.029	0.020	0.023	0.024	0.029	0.021	0.019	0.016	0.022
65	0.027	0.026	0.036	0.032	0.031	0.034	0.033	0.034	0.034	0.023	0.020	0.020
66	0.031	0.046	0.030	0.041	0.040	0.041	0.042	0.047	0.033	0.025	0.024	0.019
67	0.060	0.058	0.067	0.061	0.053	0.053	0.049	0.057	0.042	0.036	0.024	0.020
68	0.067	0.082	0.076	0.079	0.081	0.055	0.074	0.073	0.064	0.043	0.029	0.023
69	0.104	0.106	0.093	0.092	0.087	0.091	0.088	0.098	0.069	0.051	0.036	0.031
70	0.149	0.126	0.125	0.132	0.129	0.113	0.103	0.117	0.137	0.062	0.061	0.034
71	0.164	0.172	0.165	0.168	0.142	0.134	0.145	0.146	0.127	0.081	0.071	0.052
72	0.223	0.230	0.236	0.226	0.181	0.182	0.167	0.189	0.181	0.144	0.092	0.092
73	0.301	0.297	0.274	0.248	0.221	0.232	0.225	0.238	0.194	0.171	0.110	0.119
74	0.366	0.370	0.340	0.339	0.283	0.228	0.144	0.288	0.360	0.249	0.179	0.146
75	0.443	0.425	0.404	0.342	0.343	.nd	.nd	.nd	0.355	0.288	0.256	0.204
76	0.540	0.500	0.335	0.331	.nd	.nd	.nd	.nd	0.514	0.367	0.351	0.292
77	0.675	0.527	0.567	.nd	.nd	.nd	.nd	.nd	0.528	0.579	0.436	0.413
78	0.783	0.784	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.681	0.494	0.562
79	0.937	0.730	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.712	0.723	0.675
80	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.961	0.851
81	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.106
82	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.091
83	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.342
84	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C3 cont'd: Central Air Conditioner Raw Time-Temperature Matrix
Mean Load in kWh for CEC Region 3

THI \ hour →	13	14	15	16	17	18	19	20	21	22	23	24
45	0.100	0.080	0.101	0.077	0.109	0.112	0.104	0.113	0.101	0.081	0.067	0.048
46	0.086	0.086	0.089	0.098	0.081	0.081	0.100	0.086	0.089	0.073	0.058	0.048
47	0.096	0.083	0.074	0.083	0.088	0.117	0.104	0.086	0.072	0.069	0.054	0.042
48	0.078	0.088	0.087	0.082	0.110	0.090	0.095	0.090	0.073	0.071	0.057	0.042
49	0.079	0.070	0.082	0.095	0.086	0.089	0.081	0.077	0.075	0.061	0.054	0.040
50	0.062	0.071	0.080	0.071	0.077	0.083	0.079	0.071	0.072	0.062	0.054	0.037
51	0.076	0.070	0.062	0.076	0.082	0.081	0.086	0.071	0.064	0.062	0.049	0.035
52	0.061	0.075	0.065	0.062	0.070	0.075	0.075	0.066	0.065	0.060	0.043	0.035
53	0.062	0.057	0.063	0.061	0.065	0.073	0.065	0.060	0.060	0.052	0.039	0.028
54	0.059	0.056	0.049	0.057	0.058	0.071	0.068	0.058	0.058	0.045	0.037	0.026
55	0.051	0.051	0.053	0.049	0.059	0.062	0.057	0.060	0.056	0.041	0.032	0.027
56	0.043	0.048	0.046	0.055	0.056	0.059	0.062	0.050	0.045	0.035	0.029	0.025
57	0.041	0.037	0.040	0.045	0.047	0.058	0.048	0.047	0.036	0.033	0.030	0.021
58	0.038	0.037	0.041	0.035	0.054	0.047	0.046	0.036	0.032	0.031	0.026	0.020
59	0.034	0.034	0.035	0.040	0.041	0.042	0.040	0.035	0.036	0.028	0.025	0.018
60	0.028	0.032	0.028	0.030	0.032	0.037	0.036	0.035	0.028	0.029	0.017	0.017
61	0.028	0.030	0.031	0.028	0.033	0.033	0.031	0.028	0.026	0.021	0.022	0.015
62	0.025	0.023	0.025	0.027	0.030	0.034	0.034	0.025	0.026	0.023	0.017	0.014
63	0.020	0.021	0.026	0.026	0.028	0.032	0.022	0.023	0.018	0.017	0.017	0.019
64	0.022	0.022	0.017	0.021	0.025	0.023	0.022	0.020	0.024	0.018	0.015	0.019
65	0.019	0.018	0.019	0.020	0.022	0.018	0.018	0.019	0.020	0.020	0.023	0.025
66	0.014	0.018	0.017	0.017	0.018	0.022	0.025	0.021	0.016	0.020	0.033	0.031
67	0.018	0.018	0.016	0.017	0.017	0.021	0.019	0.020	0.023	0.035	0.041	0.044
68	0.018	0.015	0.020	0.020	0.021	0.022	0.024	0.022	0.036	0.046	0.076	0.081
69	0.020	0.020	0.018	0.018	0.021	0.02[illegible]	0.020	0.033	0.051	0.079	0.083	0.097
70	0.034	0.023	0.020	0.024	0.023	0.032	0.038	0.045	0.098	0.134	0.142	0.142
71	0.046	0.029	0.029	0.032	0.035	0.036	0.057	0.081	0.115	0.173	0.184	0.202
72	0.061	0.051	0.042	0.041	0.042	0.066	0.064	0.092	0.176	0.234	0.288	0.221
73	0.078	0.078	0.058	0.058	0.075	0.090	0.114	0.166	0.264	0.370	0.342	0.311
74	0.133	0.094	0.107	0.096	0.084	0.112	0.164	0.250	0.376	0.497	0.437	0.406
75	0.188	0.164	0.133	0.160	0.207	0.240	0.255	0.386	0.487	0.566	0.554	0.467
76	0.256	0.247	0.236	0.224	0.244	0.319	0.433	0.518	0.587	0.791	0.722	0.612
77	0.368	0.311	0.395	0.348	0.381	0.438	0.595	0.653	0.876	0.982	0.879	0.711
78	0.456	0.502	0.443	0.566	0.612	0.671	0.764	0.849	1.071	1.153	1.073	0.816
79	0.678	0.586	0.636	0.677	0.778	0.923	0.988	1.113	1.285	1.405	1.179	1.012
80	0.844	0.772	0.818	0.883	0.961	1.071	1.261	1.351	1.420	1.602	1.399	1.124
81	1.010	1.041	0.928	1.082	1.228	1.398	1.529	1.582	1.738	1.810	1.716	.nd
82	1.298	1.231	1.275	1.323	1.421	1.582	1.750	1.816	1.976	2.028	1.686	.nd
83	1.454	1.441	1.564	1.546	1.688	1.826	2.036	2.079	2.119	2.226	.nd	.nd
84	1.741	1.761	1.731	1.885	1.926	2.140	2.329	2.369	2.460	.nd	.nd	.nd
85	1.821	1.925	2.008	2.116	2.259	2.433	2.614	2.538	2.623	.nd	.nd	.nd
86	.nd	2.210	2.357	2.538	2.528	2.704	2.838	2.922	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	2.638	2.870	2.985	3.076	3.026	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	2.530	2.841	3.058	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	3.133	3.264	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C4: Central Air Conditioner Raw Time-Temperature Matrix Mean Load in kWh for CEC Region 4

THI \ hour →	1	2	3	4	5	6	7	8	9	10	11	12
45	0.047	0.046	0.046	0.049	0.051	0.053	0.054	0.062	0.054	0.052	0.043	0.039
46	0.042	0.042	0.045	0.046	0.046	0.048	0.048	0.066	0.052	0.047	0.046	0.039
47	0.045	0.045	0.043	0.043	0.043	0.044	0.045	0.051	0.052	0.050	0.052	0.042
48	0.039	0.040	0.038	0.042	0.043	0.043	0.046	0.048	0.044	0.043	0.052	0.045
49	0.040	0.038	0.040	0.039	0.042	0.041	0.043	0.050	0.045	0.041	0.041	0.044
50	0.036	0.037	0.037	0.040	0.038	0.038	0.038	0.040	0.040	0.044	0.043	0.048
51	0.037	0.036	0.036	0.034	0.034	0.036	0.037	0.042	0.038	0.040	0.039	0.041
52	0.034	0.032	0.031	0.032	0.033	0.035	0.038	0.040	0.037	0.037	0.040	0.036
53	0.030	0.030	0.029	0.030	0.031	0.032	0.034	0.037	0.035	0.036	0.037	0.031
54	0.028	0.027	0.028	0.027	0.027	0.030	0.030	0.034	0.033	0.034	0.034	0.033
55	0.027	0.027	0.026	0.027	0.028	0.027	0.028	0.037	0.030	0.031	0.029	0.032
56	0.026	0.024	0.024	0.024	0.024	0.023	0.029	0.036	0.035	0.025	0.028	0.027
57	0.021	0.023	0.022	0.022	0.025	0.027	0.026	0.027	0.025	0.026	0.029	0.026
58	0.022	0.024	0.027	0.029	0.021	0.022	0.023	0.027	0.022	0.026	0.020	0.022
59	0.025	0.029	0.025	0.022	0.025	0.025	0.026	0.025	0.028	0.027	0.022	0.022
60	0.033	0.026	0.024	0.027	0.021	0.021	0.025	0.028	0.026	0.025	0.025	0.022
61	0.034	0.028	0.026	0.022	0.028	0.030	0.029	0.031	0.028	0.028	0.024	0.023
62	0.033	0.032	0.030	0.037	0.025	0.026	0.027	0.031	0.030	0.025	0.028	0.025
63	0.042	0.049	0.043	0.034	0.032	0.029	0.031	0.033	0.035	0.026	0.024	0.021
64	0.060	0.053	0.045	0.042	0.041	0.033	0.026	0.034	0.041	0.044	0.025	0.020
65	0.097	0.062	0.054	0.045	0.032	0.031	0.046	0.053	0.060	0.052	0.037	0.026
66	0.095	0.074	0.054	0.038	0.077	0.076	0.057	0.084	0.049	0.073	0.059	0.031
67	0.162	0.099	0.095	0.124	0.105	0.091	0.270	0.104	0.087	0.092	0.070	0.053
68	0.177	0.113	0.154	0.013	.nd	0.281	.nd	0.184	0.149	0.148	0.120	0.082
69	0.335	0.475	0.519	0.496	0.302	.nd	.nd	0.326	0.180	0.191	0.160	0.113
70	0.198	.nd	.nd	.nd	.nd	.nd	.nd	0.311	0.337	0.170	0.244	0.175
71	0.666	.nd	.nd	.nd	.nd	.nd	.nd	nd	0.383	0.192	0.250	0.239
72	0.928	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.454	0.235	0.378
73	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.639	0.456	0.329
74	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.561	0.470	0.504	0.461
75	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.788	0.919	0.367
76	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.575
77	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.559	1.126
78	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.255	1.596
79	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
80	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
81	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
82	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
83	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C4 cont'd: Central Air Conditioner Raw Time-Temperature Matrix
Mean Load in kWh for CEC Region 4

THI \ hour →	13	14	15	16	17	18	19	20	21	22	23	24
45	.nd	0.025	.nd	.nd	.nd	.nd	.nd	.nd	0.045	0.049	0.046	0.051
46	.nd	0.035	.nd	.nd	.nd	.nd	0.047	0.049	0.048	0.050	0.057	0.050
47	0.030	0.020	0.026	0.025	0.024	0.041	0.040	0.048	0.051	0.065	0.052	0.048
48	0.040	.nd	.nd	0.029	0.027	0.039	0.032	0.052	0.052	0.047	0.048	0.045
49	0.044	0.036	0.033	0.024	0.027	0.038	0.050	0.050	0.051	0.045	0.046	0.041
50	0.040	0.041	0.040	0.031	0.043	0.045	0.054	0.053	0.045	0.045	0.042	0.039
51	0.038	0.041	0.039	0.040	0.041	0.050	0.044	0.045	0.044	0.041	0.040	0.038
52	0.043	0.032	0.034	0.037	0.044	0.048	0.041	0.041	0.040	0.040	0.039	0.036
53	0.038	0.043	0.035	0.036	0.039	0.046	0.040	0.039	0.038	0.035	0.037	0.034
54	0.030	0.030	0.032	0.033	0.041	0.043	0.037	0.038	0.037	0.035	0.032	0.031
55	0.033	0.031	0.032	0.035	0.038	0.035	0.036	0.034	0.032	0.031	0.031	0.028
56	0.028	0.032	0.028	0.031	0.029	0.035	0.034	0.030	0.032	0.030	0.029	0.027
57	0.024	0.026	0.028	0.027	0.029	0.033	0.030	0.029	0.027	0.027	0.024	0.024
58	0.023	0.023	0.026	0.024	0.028	0.029	0.028	0.026	0.025	0.023	0.022	0.023
59	0.021	0.020	0.020	0.025	0.025	0.027	0.026	0.024	0.020	0.024	0.030	0.029
60	0.020	0.019	0.021	0.021	0.023	0.027	0.023	0.021	0.025	0.028	0.024	0.024
61	0.020	0.019	0.021	0.021	0.022	0.024	0.023	0.022	0.027	0.042	0.038	0.036
62	0.018	0.022	0.019	0.018	0.018	0.023	0.025	0.025	0.033	0.040	0.048	0.041
63	0.020	0.018	0.020	0.020	0.021	0.022	0.026	0.036	0.052	0.062	0.061	0.048
64	0.020	0.018	0.021	0.019	0.024	0.025	0.034	0.046	0.061	0.084	0.076	0.071
65	0.024	0.022	0.019	0.025	0.024	0.036	0.038	0.082	0.097	0.120	0.125	0.119
66	0.021	0.024	0.025	0.028	0.037	0.042	0.106	0.099	0.104	0.194	0.180	0.157
67	0.040	0.028	0.033	0.037	0.066	0.078	0.109	0.148	0.208	0.277	0.283	0.178
68	0.057	0.062	0.064	0.080	0.083	0.117	0.178	0.224	0.295	0.317	0.291	0.275
69	0.078	0.055	0.071	0.079	0.106	0.169	0.259	0.318	0.408	0.549	0.425	0.325
70	0.126	0.109	0.089	0.107	0.161	0.268	0.278	0.419	0.577	0.477	0.830	0.491
71	0.187	0.141	0.154	0.187	0.259	0.377	0.530	0.575	0.745	0.801	0.661	0.604
72	0.218	0.207	0.248	0.258	0.404	0.532	0.618	0.814	0.836	1.243	0.525	.nd
73	0.354	0.329	0.318	0.410	0.526	0.592	0.755	1.073	1.094	1.011	.nd	1.187
74	0.502	0.343	0.396	0.499	0.683	0.898	1.053	1.194	1.082	.nd	1.743	.nd
75	0.576	0.561	0.525	0.663	0.779	0.958	1.287	1.288	1.672	.nd	.nd	.nd
76	0.404	0.807	0.671	0.780	1.107	1.349	1.345	1.309	1.250	2.063	.nd	.nd
77	0.806	0.872	1.066	1.008	1.052	1.256	1.496	1.728	.nd	.nd	.nd	.nd
78	0.840	0.877	0.989	1.072	1.279	1.481	1.847	2.055	2.572	.nd	.nd	.nd
79	1.822	0.962	1.298	1.400	1.330	1.673	1.999	1.567	.nd	.nd	.nd	.nd
80	.nd	1.344	1.113	1.522	2.052	1.901	1.832	.nd	.nd	.nd	.nd	.nd
81	2.099	.nd	1.488	2.296	1.906	2.445	1.785	2.967	.nd	.nd	.nd	.nd
82	.nd	.nd	.nd	1.362	1.704	1.911	.nd	.nd	.nd	.nd	.nd	.nd
83	.nd	2.644	.nd	1.778	.nd	.nd	3.177	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	2.811	.nd	.nd	3.118	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	2.976	3.050	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C5: Central Air Conditioner Raw Time-Temperature Matrix
Number of Observations for all CEC Regions

THI / hour →	1	2	3	4	5	6	7	8	9	10	11	12
45	12172	13295	13543	14843	13905	14703	16538	15577	14516	8920	6179	4557
46	8[illegible]04	8718	8847	10075	10317	9848	10167	10669	9512	8182	3881	3341
47	13402	15058	14193	13370	17839	18592	20795	19134	13121	11135	6690	4176
48	10804	9114	11231	12092	12532	13214	12497	11571	11251	6944	6279	2954
49	16101	18166	20649	21490	18004	19931	22971	20909	16291	16036	10983	7214
50	12912	14741	13349	14713	15465	17758	15740	15488	13579	11023	7832	6196
51	20939	19612	22374	23095	24017	26221	22500	24925	16828	15558	15044	11087
52	12483	15633	16716	17034	18232	17133	21267	15562	14039	12379	10859	10057
53	27179	27265	27391	29272	29826	29933	29016	29152	25223	19921	18505	16722
54	17139	18688	18982	21473	20369	21247	21616	19222	18569	13576	12982	9847
55	27088	29321	32123	29344	30041	31449	34122	33461	30961	24084	21202	19261
56	21683	21986	21398	22434	23337	26111	25701	24762	20548	19615	16840	13493
57	30404	33252	34293	35827	38637	36674	38804	40071	37010	31103	22875	24430
58	22844	22781	22447	21785	24856	24072	2[illegible]497	30675	24804	19826	17046	13754
59	31974	33369	33745	37093	36969	41700	4[illegible]153	35881	39929	36864	30211	27102
60	21844	23300	25147	27223	28145	28090	2[illegible]300	30006	27339	27028	23011	17792
61	40589	37038	38238	38214	36770	36520	37593	36475	42620	40707	39596	32957
62	25840	24652	24088	24186	25792	23697	23121	23405	27525	27176	22423	19116
63	37330	36884	36506	35505	34738	32412	31175	32316	36188	43539	42648	36117
64	23584	21600	21410	20446	15880	15655	14131	15240	19950	25977	24103	24364
65	26559	27796	23666	22710	20727	20593	15783	16265	22916	34297	38268	34692
66	12657	12746	13333	10337	11369	8117	7583	9767	11880	16098	22770	26376
67	17078	15922	13042	15950	13180	7870	6244	8149	16212	22968	33698	35323
68	9726	10069	9827	7087	3584	4432	5009	3702	8737	11850	17653	18678
69	12224	13055	11562	7236	7765	8002	5289	7032	8482	15587	22535	33843
70	7449	7611	4298	4727	4412	2378	2488	3289	4393	7683	11396	17144
71	13700	8296	8683	5881	3267	2945	2439	3050	7109	11511	16454	23250
72	6911	5657	4395	2816	2764	2394	1299	1513	4102	4855	9189	12230
73	7979	6100	3830	3682	2551	1075	1425	2108	4066	9069	12327	15946
74	4206	2967	1946	1271	1196	611	182	241	1345	5355	6727	11330
75	6396	3299	3056	839	164	.nd	.nd	.nd	957	5243	10640	13168
76	3286	2472	271	346	.nd	.nd	.nd	.nd	491	2166	4411	7945
77	2734	939	328	.nd	.nd	.nd	.nd	.nd	165	1646	5522	9823
78	966	164	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1013	2579	5149
79	328	164	.nd	.nd	.nd	.nd	.nd	.nd	.nd	165	3188	6473
80	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1340	2656
81	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	2475
82	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1005
83	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	165
84	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C5 cont'd: Central Air Conditioner Raw Time-Temperature Matrix
Number of Observations for all CEC Regions

THI \ hour →	13	14	15	16	17	18	19	20	21	22	23	24
45	3618	3355	1780	1439	1333	2141	3344	4371	6078	7608	9425	8811
46	3058	2604	2612	1577	1213	2165	2984	4119	4170	4657	5361	8857
47	4000	3419	2938	3469	4510	4627	5297	5726	7241	9824	11648	12620
48	2178	2777	1951	2337	2525	2760	3778	4166	6107	8291	9506	10738
49	5023	3893	4436	3722	3721	4945	7138	10090	11210	13691	15372	16883
50	4766	3866	3087	2919	2998	2983	4447	7451	9188	10139	11549	10828
51	7474	6354	6466	6088	6019	8236	10160	14489	15860	16389	16285	18403
52	6686	4758	4915	4886	4640	6374	10025	9702	11244	13011	13141	13640
53	11964	10544	8642	8548	9134	11216	16609	19709	20545	20695	22327	24275
54	10900	6051	6661	5912	6342	9444	11200	13351	15234	14131	18572	17804
55	18846	16010	11181	11917	12819	17406	19922	19350	19806	26341	24903	25665
56	11761	13316	13615	11893	13873	15157	15873	15164	17125	19409	19717	19292
57	21917	19842	19742	19867	18725	19052	18932	21879	28156	26086	28108	31034
58	12471	13310	12775	12938	13250	11711	13465	16462	17865	18526	19417	20273
59	23527	21086	20273	21889	20985	22617	21066	26110	23364	27840	29968	32546
60	15805	14411	13344	12615	14276	14211	16381	15561	19100	20953	20636	21460
61	28892	25659	19507	18899	20189	20789	25186	24522	31237	30669	32394	34258
62	16192	17686	19923	15038	14264	16596	17691	20254	16089	20894	25289	27398
63	34219	28215	28203	28603	28433	28493	24459	27189	28646	32537	36132	37513
64	19696	17415	17860	18667	17397	14603	16026	14415	19096	20715	22228	22433
65	31740	31749	29993	29105	28376	26090	23963	25883	28759	31567	31709	30630
66	20602	20251	19605	18716	17162	16002	14742	17273	18448	20528	16320	15148
67	34208	32429	28056	27283	27852	27538	26023	25012	28316	24962	24764	18177
68	24159	19697	18805	18752	17791	16029	14520	17428	16626	14753	10592	10716
69	33408	29517	31336	28612	26582	26280	26152	24246	23567	20796	14346	14800
70	16591	20570	19475	21079	19431	16205	15171	14811	13173	9574	9438	6982
71	30787	29101	26372	27167	27945	25406	25687	21565	19610	14240	12711	12592
72	16263	17605	17715	14852	15713	17138	13437	15200	10455	8332	8137	8082
73	23316	29296	26094	26094	24857	22067	22945	18065	13549	11887	13056	11704
74	13049	15772	18104	15204	16494	17258	11783	10614	9321	9405	7219	6037
75	14975	20654	26316	25531	22332	19599	19927	15331	9398	13386	10500	7429
76	13117	12295	13935	17421	16217	14103	12970	8577	10724	7025	7399	3335
77	14051	17407	16967	18711	18458	17407	15180	12155	14059	10612	6664	6538
78	7917	9746	12030	11747	10851	11586	8898	10344	8169	5185	3457	1367
79	11197	14201	15859	16853	18210	15964	15212	14002	9640	6139	4158	2733
80	4937	7316	10586	10755	10198	11469	10889	7389	4958	3275	2697	816
81	5700	10302	11975	14681	16317	15793	13485	11092	7138	3902	1142	.nd
82	3419	3995	6119	6869	8274	7291	6205	4724	3087	1414	77	.nd
83	1596	6569	8665	9636	8890	9008	8868	8149	4244	562	.nd	.nd
84	484	1961	4092	5720	6141	5935	5363	4409	1260	.nd	.nd	.nd
85	165	1352	3586	6586	7630	7034	6923	2787	733	.nd	.nd	.nd
86	.nd	156	1382	1147	2450	3619	1483	1234	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	1409	2117	2189	1945	524	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	282	368	292	39	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	50	165	164	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C6: Central Air Conditioner Raw Time-Temperature Matrix
Number of Observations for CEC Region 2

THI \ hour →	1	2	3	4	5	6	7	8	9	10	11	12
45	2492	1945	2330	2442	2745	2947	3021	2992	2347	1649	1608	1006
46	1515	2053	1778	1986	1904	1583	1986	1709	1298	1514	617	708
47	2305	2730	3074	2383	2585	2967	2930	2428	2155	2356	1308	1119
48	1946	2010	1889	1656	2289	2515	2598	2830	2012	1033	1329	722
49	3429	3234	3150	3924	3825	3996	4322	3749	2872	2653	2286	1244
50	2377	2607	2351	2899	2945	3635	2726	2760	2491	2100	1481	1500
51	3191	3141	4524	4274	4536	4225	4122	4368	2942	2324	2212	1879
52	2606	3335	2960	3613	3010	2959	3993	2526	2350	2061	1915	1423
53	4284	5021	4603	4578	4615	4823	4753	4694	4829	3580	2994	2505
54	3063	3182	3098	2974	3127	3346	3277	3423	2556	2498	2028	1858
55	5111	4750	5290	5604	6098	6114	6204	6045	5456	3660	3332	3540
56	4310	4094	4382	4881	4415	4205	3980	4556	3304	3828	2078	2521
57	5014	5891	6054	6252	7183	7516	8364	7692	6747	5001	4831	3414
58	4024	4562	5078	4864	4601	4821	5945	5571	4379	2859	2982	1990
59	7261	7140	6726	7476	8535	8858	8577	7133	6790	6380	4597	4561
60	4165	4168	5692	5311	5008	4732	3994	4748	4371	4426	3485	3044
61	6661	7079	6639	6559	5643	5324	5162	5589	6546	5338	5740	4512
62	3828	4514	4139	3636	3671	3270	2398	3086	4182	4271	3924	2942
63	6690	5358	4716	3894	3128	2475	2797	3242	5310	6249	5791	5329
64	3579	2870	2113	1898	1848	2032	1423	1774	3244	4196	2995	4066
65	3083	2704	2096	2467	2058	1263	893	1573	3142	5580	5608	4402
66	2287	1890	1834	1053	704	639	361	488	1757	3635	3851	3724
67	2154	1881	1196	731	510	343	322	555	1784	3614	5564	4667
68	1308	792	450	395	196	142	86	116	963	2050	3322	3066
69	1197	939	573	290	191	108	49	240	632	2420	4953	6025
70	488	204	167	50	.nd	.nd	.nd	.nd	310	994	2296	3228
71	504	109	50	.nd	.nd	49	.nd	.nd	108	1471	2338	4580
72	119	.nd	.nd	.nd	49	.nd	.nd	.nd	47	491	1370	2403
73	50	.nd	.nd	.nd	.nd	.nd	.nd	.nd	108	288	1997	3437
74	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	717	1139
75	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	216	874	2142
76	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	47	115	1353
77	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	99	988
78	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	106	263
79	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	567
80	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
81	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
82	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
83	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
84	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C6 cont'd: Central Air Conditioner Raw Time-Temperature Matrix
Number of Observations for CEC Region 2

THI \ hour →	13	14	15	16	17	18	19	20	21	22	23	24
45	742	966	586	426	430	803	1115	1377	1807	1831	1493	1783
46	649	433	581	427	526	512	775	976	703	1014	1214	1984
47	1209	828	774	990	848	953	1228	1163	1483	1541	2147	2128
48	282	597	522	446	536	732	737	845	1624	1830	1696	1840
49	1150	729	795	865	766	978	1125	1819	2559	3109	3357	3568
50	1000	932	450	443	620	463	1208	1522	1491	1564	1965	1992
51	1518	1396	1301	935	1236	1837	1790	3074	2816	2993	3223	3390
52	1053	933	1104	1518	998	1140	1950	1586	1775	1871	2109	2350
53	2151	1812	1430	1315	1684	1987	2841	3015	3366	3042	3544	3302
54	1903	1436	1464	1327	1359	1489	1461	1791	2196	3123	2900	3374
55	2317	2136	2289	2292	2180	2912	3131	3318	3514	3946	4507	5180
56	2874	1558	1620	1412	1668	1781	2269	2536	2381	3141	3375	3435
57	3087	3846	3351	3115	2969	3594	3366	3801	4320	4915	5111	4916
58	2036	2261	1933	2285	2165	1291	2424	1750	3378	2500	2735	3114
59	3725	3206	3245	3739	3576	4124	3055	4273	3948	5063	5621	6902
60	1840	2372	2165	1416	1983	1770	2314	2698	2724	3776	4008	4958
61	4264	3531	3440	2892	3467	4024	3487	4000	4704	4814	5756	5780
62	3224	2530	2564	2799	1845	2439	2959	2324	3589	3384	3878	4261
63	5238	5082	4635	3753	4509	3379	3438	4041	2999	4740	6440	6007
64	2977	2785	3239	3226	2727	2598	2163	2450	3086	3794	3349	4161
65	4585	4123	3266	4026	3281	2991	2803	3352	3894	4816	5254	4271
66	3221	2775	2957	2580	2742	2464	2404	2745	2969	3665	3046	2635
67	4674	4631	3745	3976	3661	3765	3498	2453	4041	4042	4294	2556
68	3156	2694	2693	2410	2478	2226	1736	2451	3019	2871	1882	1964
69	4766	4366	3999	3664	3674	3243	3061	3548	4062	4094	2372	1963
70	2738	2623	2828	2776	2387	1834	1857	2589	2430	2011	1223	815
71	5444	4525	3928	3186	3647	3338	3929	3366	3679	1960	1866	922
72	2795	3141	2356	2365	2110	2037	2648	2217	2008	1378	834	257
73	4114	4903	4977	4363	3655	3758	3794	4365	3041	1662	822	207
74	2076	2511	3045	2994	2969	3587	2453	1968	1280	917	160	.nd
75	4025	3703	4246	4058	4804	4014	3604	2891	1729	1330	203	.nd
76	2093	2566	2216	3122	2250	2076	2648	1815	1203	143	49	50
77	1882	3449	2810	2895	3160	3163	2830	2818	1747	210	.nd	.nd
78	1358	2130	3084	2716	2182	2497	2124	1276	733	145	.nd	.nd
79	1346	2261	3343	3433	3693	3631	2902	2121	997	50	.nd	.nd
80	440	904	1415	2021	2184	1908	1772	942	255	.nd	.nd	.nd
81	438	1316	1950	2225	2575	2276	1721	1196	254	.nd	.nd	.nd
82	97	360	1049	1379	1113	1508	821	570	58	.nd	.nd	.nd
83	.nd	472	1079	1359	1906	1078	1813	983	49	.nd	.nd	.nd
84	.nd	97	361	932	757	1234	657	185	49	.nd	.nd	.nd
85	.nd	.nd	190	648	1027	797	413	97	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	99	224	385	212	49	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	175	316	232	188	39	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	39	128	39	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	50	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C7: Central Air Conditioner Raw Time-Temperature Matrix Number of Observations for CEC Region 3

THI \ hour →	1	2	3	4	5	6	7	8	9	10	11	12
45	6902	7625	6976	6808	5767	5823	6716	6328	6195	4975	3664	2857
46	4253	3339	3037	4207	4707	4384	4157	4023	4397	3517	2063	2170
47	6224	6700	5969	5623	8204	8394	9283	8629	4969	5153	3747	2200
48	4203	3552	5376	5737	5104	5201	4893	4521	5255	2860	3210	1462
49	6973	8279	8367	9311	6952	7414	9898	8672	6723	7853	5134	3855
50	5428	5227	5454	5830	6057	7984	6171	6838	5912	4693	3650	2840
51	8857	8875	9316	8481	8803	9900	7739	10219	7277	6279	7066	5606
52	4531	5622	5197	4806	5738	5498	8980	5531	5804	5252	4343	4543
53	9813	8477	8744	11066	11772	11831	10295	11031	9818	7009	7892	7455
54	5359	5559	5594	7654	6876	8246	8510	7320	7502	5100	4594	3332
55	7492	9385	12235	10572	11260	10731	12664	12656	10265	9407	7724	7985
56	6793	7971	8073	6326	7663	9675	9362	8595	8648	6504	6702	4380
57	11184	12361	12245	14347	14508	13640	14091	14788	13641	12589	7164	9537
58	8865	6560	6732	6538	8745	7172	8621	12064	8651	7026	5776	5143
59	8807	10089	10243	11691	10951	14022	14461	10567	13482	12529	11140	8285
60	6616	7399	7572	9239	9639	10585	8942	10334	9389	8930	8160	5898
61	11702	10147	11547	12438	12352	10920	11967	10841	12366	12513	12255	10469
62	5849	7372	8040	7301	8540	8586	7929	8166	9074	8044	7163	5921
63	8877	12593	12783	13550	13660	14321	14980	13768	11863	14547	14319	13224
64	8615	6670	7920	8485	7507	6646	7132	7647	7995	8164	7319	7775
65	10362	11932	11984	11618	10280	12663	10435	9864	10763	13383	11610	11078
66	6550	6413	6489	5958	8220	5736	5484	6804	7108	6042	7501	9530
67	10236	9962	9017	12005	10301	6172	5187	6438	10359	10761	13989	10304
68	6394	7341	7808	5925	3065	3796	4435	3118	6298	6651	7242	6805
69	9067	10569	9757	6219	6781	7131	4724	6074	6178	10114	9946	13893
70	6171	6703	3742	4212	3974	2161	2264	2781	3579	5594	6240	7210
71	11867	7419	7840	5336	2953	2613	2187	2761	6235	8305	11286	10833
72	6071	5104	3963	2524	2450	2144	1163	1363	3666	3749	6092	7240
73	7170	5539	3454	3318	2281	957	1280	1885	3560	7779	8577	8978
74	3827	2676	1758	1136	1073	549	163	220	1123	4730	5219	8307
75	5770	2962	2745	769	145	.nd	.nd	.nd	861	4482	8704	9156
76	2956	2235	250	308	.nd	.nd	.nd	.nd	434	1895	3888	5744
77	2476	842	290	.nd	.nd	.nd	.nd	.nd	146	1470	4786	7608
78	867	145	.nd	.nd	.nd	.nd	.nd	.nd	.nd	903	2178	4382
79	290	145	.nd	.nd	.nd	.nd	.nd	.nd	.nd	146	2850	5337
80	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1192	2386
81	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	2222
82	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	902
83	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	146
84	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C7 cont'd: Central Air Conditioner Raw Time-Temperature Matrix
Number of Observations for CEC Region 3

THI \ hour →	13	14	15	16	17	18	19	20	21	22	23	24
45	2473	1938	981	833	720	1080	1857	2519	3432	4417	6443	5319
46	2071	1770	1754	971	543	1378	1795	2383	2879	2604	2963	4938
47	2159	2108	1510	1891	3052	3038	2941	3746	4163	6529	6844	5966
48	1197	1849	1189	1494	1451	1502	2404	2090	3195	4360	4744	5189
49	2965	2299	2713	2320	2418	3194	3811	5787	5695	5999	6037	6838
50	2242	1906	2021	1873	1783	1789	1917	3919	4755	4556	5550	5069
51	3799	3157	3857	3560	2779	3818	5246	6353	6437	6868	6129	7223
52	3147	2317	2020	2039	2366	2809	4748	3342	4355	5285	5499	5532
53	5319	5599	4278	4530	4971	4926	6005	8221	9824	8265	8568	9016
54	4180	1815	2978	1972	1970	4196	5229	5896	5656	3859	5782	4938
55	7834	6145	3958	4650	6203	7265	7120	6246	5408	9129	7875	8369
56	4525	5892	5965	6126	6386	5693	7356	5351	5851	6067	5638	5788
57	8942	7376	7443	7895	6819	7050	6122	8147	9794	8085	8954	10743
58	5231	5500	5232	5208	5292	4973	4505	5372	5323	5421	6596	5649
59	7989	8488	8567	8490	7606	7639	6712	9130	6785	8697	9042	10547
60	5055	4968	4251	3701	5352	4760	6124	4959	7058	6141	6705	6210
61	9121	8140	5491	6868	5935	5887	7966	6526	7530	8474	7235	8016
62	3932	6103	7391	3871	4227	6243	5366	6288	4213	5255	6892	7737
63	12658	8562	8785	9665	10248	10340	7899	8102	8920	8885	9129	9919
64	6254	5402	5231	6863	6159	3643	5095	4210	5765	4836	5725	4730
65	10952	11135	11357	9083	8564	7983	7165	8181	7528	6909	9700	11555
66	6289	8066	7118	7014	5711	5225	4746	5486	5048	7448	5308	6133
67	10580	9635	8265	8967	8855	9964	8423	7526	8706	9849	10731	10128
68	8684	6121	7064	6482	6029	4301	3899	5315	5059	5860	5377	6251
69	10966	10283	10116	7905	7684	8636	8388	6939	8648	10621	8298	10005
70	6585	6710	6393	8134	6717	4528	5089	4034	5129	4927	7009	5159
71	11566	10100	9746	10151	9475	9016	7690	8325	11173	9603	8783	10148
72	7746	6690	5513	4202	4635	5934	4786	7174	5452	5874	6350	7123
73	11153	12531	10472	8841	9661	7177	8899	7605	8201	8428	11074	10330
74	7711	7193	7024	5495	6122	6368	4630	6506	6625	7643	6305	5458
75	7924	11352	12560	11385	9612	8930	10299	9436	6289	10927	9333	6723
76	9356	6672	7526	9932	8966	8089	7726	5375	8153	6110	6640	2974
77	9884	9967	9371	9434	10150	9810	9264	7426	11125	9404	6063	5917
78	5490	6076	6559	6304	5816	6646	5121	7896	6628	4613	3114	1230
79	8825	10344	9826	10473	10836	9562	10275	10470	7798	5512	3750	2440
80	4098	5456	7758	6756	6293	7924	8013	5830	4295	2945	2438	736
81	4672	8191	8551	10942	11809	11783	10505	8887	6219	3520	1012	.nd
82	2985	3314	4611	4657	6048	4935	4896	3780	2754	1267	75	.nd
83	1426	5383	6898	7454	6390	7246	6334	6500	3782	506	.nd	.nd
84	430	1687	3352	4334	4893	4285	4257	3824	1083	.nd	.nd	.nd
85	146	1199	2952	5361	5950	5508	5885	2417	655	.nd	.nd	.nd
86	.nd	140	1231	833	1918	2921	1151	1054	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	1096	1598	1737	1555	431	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	250	291	145	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	146	145	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C8: Central Air Conditioner Raw Time-Temperature Matrix Number of Observations for CEC Region 4

THI \ hour →	1	2	3	4	5	6	7	8	9	10	11	12
45	1733	2643	3219	4534	4429	4960	5742	5183	4996	1575	343	223
46	2393	2755	3468	3158	2923	3117	3228	4198	3090	2554	861	119
47	3842	4414	4023	4243	5517	5687	6949	6580	5026	2769	972	463
48	3855	2779	2986	3701	4182	4528	4083	3392	3042	2486	1190	443
49	4406	5261	7601	6600	5864	7126	7031	6913	5450	4271	2669	1446
50	4155	5951	4602	4971	5442	4749	5670	4645	4115	3390	2069	1339
51	7260	5954	6799	8619	8875	10224	9115	8484	5232	5713	4549	2629
52	4353	5568	7447	7572	8309	7488	6618	6268	4818	4133	3782	3255
53	11150	11916	12174	11416	11185	10975	11770	11300	8719	7863	6127	5395
54	7447	8653	9016	9305	8856	8031	8249	7114	7196	4952	5434	3901
55	12586	12952	12005	10860	10375	12340	12832	12288	13234	9257	8641	6292
56	8856	8241	7223	9565	9578	10238	10404	9856	6859	7970	6801	5610
57	11450	12101	13098	12207	13749	12556	13232	14410	13825	11025	9263	9662
58	8061	9960	8941	8704	9654	10359	10035	10770	9924	8403	6962	5511
59	13482	13587	14264	15215	14936	15892	17207	15617	16691	15241	12058	12346
60	9368	10045	10254	10949	11711	10937	11767	12950	11406	11700	9625	7402
61	19984	17849	17945	17097	16661	18434	18535	18242	21203	20159	19010	15680
62	15067	11491	10625	12145	12390	10676	11799	11009	12799	13092	9609	8873
63	20393	17270	17370	16310	16308	13997	11614	13717	17242	19997	19672	14684
64	10327	11158	10388	9095	5647	6163	4742	4923	7719	12295	12212	10818
65	11828	11785	8288	7370	7267	5305	3318	3723	7748	13532	19007	16944
66	3035	3724	4220	2658	1584	1134	1202	1735	2146	5681	10232	11454
67	3517	2977	1910	1938	1277	710	187	444	2897	7294	12365	18596
68	1375	1186	747	119	.nd	110	.nd	114	804	2315	6128	7812
69	997	429	197	110	110	.nd	.nd	77	1021	1899	6440	12194
70	120	.nd	.nd	.nd	.nd	.nd	.nd	199	112	496	2079	5796
71	87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	114	819	1556	6619
72	110	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	220	1070	1704
73	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	197	787	2498
74	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	87	114	215	932
75	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	87	197	888
76	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	207
77	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	114	433
78	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	87	110
79	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
80	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
81	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
82	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
83	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C8 cont'd: Central Air Conditioner Raw Time-Temperature Matrix
Number of Observations for CEC Region 4

THI \ hour →	13	14	15	16	17	18	19	20	21	22	23	24
45	.nd	118	.nd	.nd	.nd	.nd	.nd	.nd	269	683	567	891
46	.nd	118	.nd	.nd	.nd	.nd	118	374	120	589	720	1194
47	238	119	355	236	118	118	595	170	907	764	1595	3538
48	456	.nd	.nd	119	237	269	238	855	783	1430	2297	2864
49	344	446	455	118	118	222	1514	1566	1986	3545	4856	5200
50	1107	668	255	255	240	364	932	1369	2107	3185	3068	2861
51	1506	1180	647	950	1449	1841	2192	3889	5359	5236	5691	6373
52	1830	1015	1349	917	786	1870	2500	3996	4244	4809	4517	4694
53	3460	2089	2053	1841	1609	3336	6446	6899	5557	7731	8500	10147
54	3944	2298	1614	2143	2444	2833	3487	4545	6199	6186	8563	8295
55	7362	6551	4006	3925	3243	5863	8226	8346	9397	11245	10703	10173
56	3387	4820	5007	3284	4654	6573	4863	5993	7543	8735	9192	8456
57	8126	7098	7480	7318	7506	6922	7891	8007	11717	10761	11740	12782
58	4165	4456	4586	4437	4737	4269	5400	8055	7710	9190	8423	9914
59	1009	77731	6755	7943	8161	9096	9636	10541	10634	11687	12881	12466
60	7619	5859	5893	6516	5705	6481	6565	6563	7634	9308	8000	8595
61	13516	12080	9008	7427	9092	9264	11759	12041	16781	15096	17390	18527
62	7921	7685	8413	7230	7163	6493	8033	10150	6920	10923	13179	14065
63	13655	12613	12754	13052	11400	12464	11082	12991	14903	17317	19026	19995
64	8904	7924	8077	7010	6961	7187	7442	6666	9129	11339	12323	12862
65	13876	14120	13035	13984	14602	13191	12776	12772	16264	18838	15461	13383
66	9680	7652	8069	7579	7259	7084	6574	8107	9718	8483	7313	5622
67	16864	16087	13937	12333	13456	11928	12566	13975	14451	9910	8466	4325
68	10913	9619	7661	8530	8112	8544	8169	8942	7918	5279	2699	1797
69	16088	13161	15425	15487	13789	13034	13562	12842	9755	4883	2771	1725
70	6388	10244	9238	8982	9261	9171	7568	7636	5031	2088	435	453
71	12326	13075	11276	12297	13481	11887	13097	8885	3515	1608	1093	415
72	4820	6979	9094	7713	8291	8394	5374	5033	2391	419	234	.nd
73	6705	10337	9394	11721	10380	10292	9228	5240	1379	895	.nd	110
74	2334	5208	7163	6077	6674	6571	4149	1358	677	.nd	110	.nd
75	2133	4239	8019	8725	6772	5589	4852	1944	729	.nd	.nd	.nd
76	653	2246	3276	3196	3963	3011	1702	765	467	110	.nd	.nd
77	1191	2919	3712	5287	3975	3311	2077	1118	.nd	.nd	.nd	.nd
78	470	876	1663	2000	2227	1699	1086	321	110	.nd	.nd	.nd
79	110	455	1631	1821	2461	1718	907	240	.nd	.nd	.nd	.nd
80	.nd	350	547	1213	1034	787	203	.nd	.nd	.nd	.nd	.nd
81	110	.nd	588	296	603	395	120	110	.nd	.nd	.nd	.nd
82	.nd	.nd	.nd	349	469	360	.nd	.nd	.nd	.nd	.nd	.nd
83	.nd	110	.nd	120	.nd	.nd	110	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	110	.nd	.nd	110	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	110	110	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C9: Central Air Conditioner Raw Time-Temperature Matrix Standard Deviation of Load for all CEC Regions

THI \ hour →	1	2	3	4	5	6	7	8	9	10	11	12
45	0.205	0.207	0.226	0.239	0.235	0.304	0.399	0.368	0.332	0.346	0.299	0.303
46	0.207	0.238	0.257	0.234	0.224	0.255	0.504	0.449	0.352	0.294	0.331	0.307
47	0.198	0.204	0.213	0.227	0.238	0.281	0.373	0.365	0.302	0.336	0.322	0.357
48	0.179	0.197	0.189	0.210	0.198	0.268	0.325	0.348	0.379	0.278	0.317	0.354
49	0.185	0.183	0.194	0.182	0.216	0.244	0.308	0.315	0.285	0.252	0.262	0.277
50	0.166	0.194	0.172	0.193	0.193	0.263	0.285	0.321	0.288	0.343	0.211	0.364
51	0.168	0.151	0.166	0.166	0.168	0.234	0.358	0.306	0.243	0.245	0.308	0.251
52	0.144	0.147	0.152	0.154	0.183	0.183	0.350	0.278	0.232	0.228	0.223	0.231
53	0.144	0.155	0.146	0.156	0.168	0.206	0.260	0.291	0.240	0.266	0.234	0.222
54	0.133	0.127	0.124	0.125	0.138	0.145	0.228	0.212	0.194	0.223	0.191	0.254
55	0.119	0.118	0.122	0.123	0.154	0.149	0.207	0.191	0.200	0.176	0.244	0.174
56	0.105	0.103	0.085	0.095	0.098	0.158	0.280	0.293	0.304	0.157	0.169	0.330
57	0.088	0.094	0.090	0.089	0.210	0.272	0.317	0.160	0.180	0.212	0.233	0.146
58	0.078	0.099	0.212	0.258	0.183	0.226	0.178	0.367	0.230	0.328	0.150	0.143
59	0.259	0.262	0.233	0.230	0.295	0.237	0.283	0.243	0.237	0.257	0.262	0.187
60	0.367	0.306	0.212	0.310	0.136	0.249	0.261	0.250	0.194	0.252	0.264	0.305
61	0.315	0.249	0.298	0.169	0.313	0.276	0.275	0.280	0.380	0.288	0.259	0.239
62	0.204	0.282	0.223	0.352	0.134	0.192	0.162	0.174	0.175	0.165	0.285	0.274
63	0.276	0.316	0.289	0.190	0.246	0.211	0.247	0.237	0.253	0.286	0.197	0.130
64	0.265	0.245	0.254	0.259	0.241	0.227	0.155	0.267	0.234	0.309	0.131	0.172
65	0.337	0.269	0.290	0.255	0.201	0.210	0.215	0.252	0.296	0.263	0.213	0.199
66	0.330	0.383	0.265	0.232	0.278	0.266	0.231	0.297	0.273	0.286	0.350	0.178
67	0.470	0.383	0.355	0.356	0.303	0.293	0.309	0.317	0.294	0.354	0.270	0.256
68	0.460	0.410	0.387	0.375	0.401	0.352	0.352	0.344	0.334	0.382	0.365	0.303
69	0.550	0.549	0.500	0.450	0.398	0.360	0.401	0.429	0.401	0.410	0.420	0.391
70	0.570	0.512	0.473	0.475	0.422	0.420	0.361	0.490	0.553	2.721	0.483	0.446
71	0.634	0.579	0.534	0.509	0.475	0.454	0.454	0.491	0.476	0.468	0.502	0.525
72	0.715	0.666	0.607	0.588	0.575	0.554	0.579	0.593	0.591	0.607	0.500	0.562
73	0.788	0.718	0.711	0.597	0.555	0.602	0.611	0.671	0.635	0.623	0.607	0.667
74	0.835	0.833	0.740	0.749	0.659	0.542	0.470	0.807	0.855	0.732	0.687	0.671
75	0.918	0.868	0.810	0.741	0.857	.nd	.nd	.nd	0.778	0.825	0.812	0.758
76	1.013	0.964	0.714	0.812	.nd	.nd	.nd	.nd	1.040	0.892	0.896	0.914
77	1.171	0.936	1.102	.nd	.nd	.nd	.nd	.nd	1.040	1.154	1.006	1.067
78	1.235	1.308	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.228	1.111	1.172
79	1.486	1.413	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.331	1.315	1.309
80	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.413	1.446
81	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.622
82	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.517
83	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.676
84	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C9 cont'd: Central Air Conditioner Raw Time-Temperature Matrix
Standard Deviation of Load for all CEC Regions

THI \ hour →	13	14	15	16	17	18	19	20	21	22	23	24
45	0.359	0.246	0.344	0.253	0.321	0.286	0.279	0.341	0.278	0.241	0.202	0.206
46	0.319	0.265	0.296	0.331	0.187	0.188	0.253	0.232	0.289	0.211	0.188	0.185
47	0.304	0.279	0.183	0.222	0.240	0.334	0.311	0.214	0.176	0.181	0.167	0.198
48	0.225	0.279	0.353	0.225	0.336	0.240	0.327	0.240	0.208	0.189	0.198	0.192
49	0.284	0.222	0.279	0.305	0.229	0.268	0.271	0.224	0.209	0.191	0.218	0.187
50	0.203	0.271	0.256	0.203	0.210	0.208	0.244	0.215	0.249	0.187	0.199	0.175
51	0.266	0.260	0.191	0.237	0.260	0.255	0.318	0.206	0.188	0.200	0.182	0.174
52	0.241	0.266	0.220	0.187	0.207	0.237	0.236	0.210	0.200	0.194	0.174	0.150
53	0.216	0.207	0.252	0.244	0.270	0.236	0.192	0.190	0.202	0.175	0.172	0.163
54	0.221	0.204	0.157	0.193	0.188	0.235	0.198	0.179	0.200	0.156	0.143	0.140
55	0.204	0.210	0.209	0.168	0.197	0.191	0.176	0.195	0.183	0.136	0.122	0.117
56	0.180	0.193	0.182	0.216	0.207	0.202	0.209	0.151	0.155	0.123	0.122	0.113
57	0.131	0.147	0.149	0.173	0.182	0.177	0.145	0.168	0.134	0.111	0.110	0.098
58	0.328	0.134	0.177	0.123	0.181	0.139	0.155	0.119	0.111	0.116	0.124	0.095
59	0.128	0.248	0.155	0.181	0.159	0.263	0.144	0.142	0.245	0.123	0.174	0.275
60	0.115	0.129	0.312	0.323	0.310	0.140	0.286	0.284	0.144	0.276	0.261	0.106
61	0.239	0.139	0.129	0.121	0.145	0.157	0.142	0.141	0.175	0.309	0.326	0.337
62	0.119	0.181	0.118	0.106	0.129	0.149	0.155	0.291	0.290	0.378	0.364	0.308
63	0.127	0.198	0.246	0.133	0.145	0.264	0.283	0.306	0.397	0.285	0.247	0.271
64	0.142	0.132	0.128	0.136	0.291	0.205	0.307	0.361	0.314	0.338	0.376	0.313
65	0.189	0.150	0.125	0.293	0.224	0.266	0.281	0.351	0.349	0.407	0.383	0.407
66	0.123	0.157	0.198	0.200	0.279	0.308	0.416	0.372	0.352	0.464	0.461	0.427
67	0.206	0.181	0.208	0.229	0.342	0.347	0.417	0.435	0.516	0.562	0.572	0.449
68	0.259	0.274	0.288	0.352	0.416	0.463	0.534	0.564	0.628	0.611	0.679	0.577
69	0.306	0.255	0.307	0.352	0.435	0.505	0.607	0.703	0.725	0.709	0.637	0.593
70	0.464	0.379	0.350	0.374	0.495	0.654	0.973	0.787	0.847	0.817	0.724	0.697
71	0.500	0.433	0.443	0.512	0.616	0.753	0.923	0.866	0.808	0.818	0.790	0.717
72	0.513	0.538	0.622	0.630	0.821	0.927	0.933	0.962	1.004	0.901	0.866	0.741
73	0.630	0.694	0.670	0.783	0.875	0.976	1.052	1.147	0.995	1.047	0.892	0.875
74	0.736	0.694	0.807	0.910	1.000	1.117	1.204	1.044	1.052	1.089	1.006	0.900
75	0.828	0.841	0.857	0.994	1.092	1.187	1.238	1.172	1.217	1.138	1.113	0.978
76	0.851	0.973	0.983	1.005	1.193	1.259	1.257	1.250	1.219	1.302	1.231	1.120
77	1.023	1.078	1.222	1.246	1.254	1.332	1.450	1.404	1.365	1.417	1.311	1.182
78	1.145	1.206	1.231	1.344	1.449	1.505	1.557	1.478	1.528	1.506	1.404	1.334
79	1.353	1.290	1.394	1.453	1.535	1.637	1.633	1.593	1.586	1.606	1.469	1.444
80	1.429	1.467	1.500	1.608	1.707	1.708	1.739	1.713	1.657	1.671	1.601	1.557
81	1.565	1.618	1.595	1.703	1.782	1.862	1.877	1.811	1.769	1.767	1.770	.nd
82	1.747	1.744	1.772	1.806	1.868	1.914	1.956	1.900	1.842	1.854	1.622	.nd
83	1.845	1.846	1.907	1.923	1.965	2.016	2.025	1.962	1.932	1.889	.nd	.nd
84	1.883	1.965	1.956	2.030	2.068	2.090	2.114	2.055	1.980	.nd	.nd	.nd
85	1.899	2.043	2.104	2.107	2.143	2.156	2.155	2.064	2.062	.nd	.nd	.nd
86	.nd	1.934	2.153	2.263	2.193	2.205	2.192	2.194	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	2.215	2.290	2.257	2.214	2.152	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	2.160	2.240	2.134	1.950	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	1.972	2.427	2.222	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C10: Central Air Conditioner Raw Time-Temperature Matrix Standard Deviation of Load for CEC Region 2

THI \ hour →	1	2	3	4	5	6	7	8	9	10	11	12
45	0.109	0.153	0.136	0.136	0.178	0.161	0.209	0.242	0.236	0.199	0.264	0.227
46	0.165	0.132	0.184	0.080	0.161	0.177	0.283	0.298	0.215	0.270	0.257	0.325
47	0.113	0.099	0.162	0.191	0.219	0.204	0.261	0.233	0.203	0.252	0.184	0.285
48	0.103	0.120	0.126	0.162	0.107	0.101	0.181	0.215	0.205	0.142	0.244	0.170
49	0.138	0.151	0.135	0.133	0.134	0.167	0.150	0.188	0.201	0.223	0.171	0.182
50	0.112	0.126	0.112	0.078	0.106	0.113	0.134	0.172	0.161	0.296	0.177	0.263
51	0.089	0.097	0.085	0.079	0.106	0.136	0.131	0.177	0.166	0.215	0.185	0.135
52	0.099	0.106	0.090	0.102	0.129	0.109	0.183	0.178	0.165	0.156	0.210	0.189
53	0.140	0.170	0.140	0.201	0.219	0.153	0.204	0.226	0.166	0.151	0.143	0.215
54	0.054	0.066	0.074	0.062	0.071	0.062	0.117	0.130	0.126	0.133	0.138	0.212
55	0.054	0.080	0.066	0.071	0.094	0.095	0.100	0.139	0.150	0.119	0.458	0.189
56	0.061	0.043	0.036	0.057	0.064	0.050	0.081	0.092	0.123	0.122	0.106	0.687
57	0.048	0.071	0.069	0.056	0.191	0.372	0.380	0.108	0.134	0.096	0.124	0.151
58	0.037	0.094	0.084	0.093	0.384	0.070	0.215	0.607	0.495	0.639	0.096	0.144
59	0.356	0.259	0.395	0.419	0.214	0.191	0.075	0.083	0.072	0.097	0.492	0.086
60	0.512	0.604	0.300	0.148	0.219	0.324	0.360	0.097	0.097	0.058	0.062	0.578
61	0.361	0.294	0.284	0.288	0.231	0.123	0.127	0.335	0.526	0.086	0.072	0.089
62	0.319	0.146	0.144	0.165	0.156	0.123	0.147	0.143	0.157	0.087	0.090	0.079
63	0.258	0.199	0.181	0.155	0.129	0.188	0.213	0.200	0.337	0.473	0.076	0.079
64	0.341	0.272	0.233	0.238	0.296	0.232	0.200	0.205	0.228	0.192	0.113	0.066
65	0.386	0.322	0.335	0.293	0.273	0.375	0.391	0.245	0.213	0.251	0.227	0.091
66	0.470	0.412	0.403	0.369	0.533	0.283	0.231	0.249	0.372	0.285	0.352	0.098
67	0.584	0.533	0.405	0.513	0.360	0.251	0.689	0.608	0.368	0.358	0.216	0.115
68	0.678	0.562	0.539	0.747	0.381	1.257	0.252	0.256	0.307	0.379	0.235	0.181
69	0.826	1.073	1.266	1.207	1.240	0.158	1.519	0.723	0.670	0.501	0.399	0.259
70	0.691	1.187	0.543	0.246	.nd	.nd	.nd	.nd	0.633	0.507	0.522	0.249
71	1.442	0.831	0.310	.nd	.nd	1.244	.nd	.nd	0.441	0.557	0.717	0.430
72	1.054	.nd	.nd	.nd	1.782	.nd	.nd	.nd	0.694	0.669	0.557	0.469
73	0.706	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.108	0.637	0.661	0.817
74	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.738	0.700
75	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.952	0.954	0.884
76	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	0.796	1.025	1.138
77	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.314	1.023
78	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.295	1.176
79	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.400
80	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
81	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
82	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
83	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
84	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C10 cont'd: Central Air Conditioner Raw Time-Temperature Matrix Standard Deviation of Load for CEC Region 2

THI \ hour →	13	14	15	16	17	18	19	20	21	22	23	24
45	0.365	0.355	0.335	0.418	0.298	0.261	0.213	0.263	0.284	0.235	0.126	0.213
46	0.166	0.304	0.339	0.251	0.228	0.291	0.165	0.296	0.200	0.189	0.141	0.121
47	0.293	0.220	0.184	0.229	0.282	0.233	0.296	0.239	0.183	0.168	0.174	0.201
48	0.304	0.317	0.227	0.196	0.289	0.161	0.225	0.230	0.196	0.135	0.116	0.091
49	0.182	0.206	0.295	0.286	0.157	0.214	0.171	0.171	0.136	0.193	0.168	0.165
50	0.269	0.150	0.211	0.204	0.241	0.159	0.155	0.157	0.182	0.103	0.186	0.148
51	0.170	0.208	0.233	0.127	0.214	0.179	0.220	0.154	0.176	0.182	0.123	0.134
52	0.211	0.216	0.198	0.158	0.149	0.150	0.177	0.132	0.189	0.153	0.174	0.069
53	0.202	0.176	0.123	0.159	0.128	0.183	0.149	0.162	0.176	0.196	0.179	0.197
54	0.136	0.237	0.133	0.146	0.119	0.116	0.166	0.180	0.096	0.115	0.135	0.113
55	0.228	0.214	0.234	0.136	0.128	0.133	0.120	0.139	0.134	0.107	0.085	0.057
56	0.106	0.116	0.207	0.125	0.116	0.148	0.196	0.130	0.120	0.112	0.081	0.072
57	0.100	0.107	0.111	0.132	0.113	0.149	0.125	0.112	0.113	0.093	0.058	0.085
58	0.730	0.151	0.077	0.129	0.138	0.100	0.109	0.069	0.082	0.049	0.111	0.081
59	0.141	0.561	0.105	0.109	0.101	0.527	0.114	0.096	0.487	0.137	0.081	0.398
60	0.124	0.161	0.721	0.907	0.763	0.079	0.660	0.588	0.075	0.518	0.538	0.122
61	0.493	0.077	0.081	0.105	0.068	0.113	0.071	0.080	0.077	0.144	0.150	0.470
62	0.089	0.114	0.090	0.099	0.128	0.065	0.088	0.714	0.147	0.597	0.583	0.180
63	0.066	0.397	0.407	0.071	0.062	0.591	0.584	0.105	0.628	0.232	0.280	0.457
64	0.057	0.091	0.059	0.061	0.591	0.092	0.097	0.136	0.238	0.227	0.492	0.332
65	0.100	0.078	0.087	0.438	0.075	0.056	0.104	0.147	0.203	0.338	0.432	0.426
66	0.117	0.129	0.102	0.165	0.086	0.133	0.214	0.179	0.343	0.505	0.487	0.528
67	0.158	0.121	0.084	0.079	0.197	0.210	0.209	0.294	0.351	0.564	0.629	0.627
68	0.183	0.192	0.129	0.197	0.219	0.203	0.284	0.503	0.575	0.652	0.711	0.689
69	0.162	0.167	0.221	0.193	0.213	0.287	0.249	0.512	0.654	0.669	0.794	0.867
70	0.281	0.264	0.289	0.270	0.295	0.313	0.390	0.482	0.679	0.793	0.960	1.116
71	0.313	0.288	0.316	0.336	0.364	0.425	0.556	0.757	0.825	0.980	1.048	0.879
72	0.357	0.388	0.347	0.359	0.423	0.399	0.793	0.715	0.937	1.078	1.057	1.428
73	0.459	0.518	0.512	0.547	0.598	0.763	0.933	0.928	1.082	1.157	1.246	1.924
74	0.754	0.535	0.602	0.689	0.774	0.827	0.951	1.057	1.135	1.267	1.176	.nd
75	0.840	0.734	0.716	0.811	0.910	1.047	1.086	1.169	1.263	1.334	1.831	.nd
76	0.960	0.862	0.948	0.893	1.020	1.133	1.200	1.276	1.333	1.456	2.539	0.981
77	1.035	1.068	1.012	1.117	1.264	1.318	1.472	1.377	1.446	1.513	.nd	.nd
78	1.253	1.197	1.201	1.307	1.386	1.504	1.459	1.512	1.562	1.896	.nd	.nd
79	1.558	1.391	1.345	1.433	1.554	1.621	1.621	1.623	1.576	1.335	.nd	.nd
80	1.465	1.500	1.580	1.534	1.669	1.676	1.726	1.731	1.655	.nd	.nd	.nd
81	1.523	1.613	1.599	1.707	1.769	1.802	1.837	1.751	1.726	.nd	.nd	.nd
82	1.629	1.836	1.744	1.777	1.805	1.885	1.937	1.802	1.592	.nd	.nd	.nd
83	.nd	1.850	1.824	1.869	1.924	1.972	1.909	1.813	1.672	.nd	.nd	.nd
84	.nd	1.903	1.879	1.930	2.004	2.002	2.001	1.929	1.766	.nd	.nd	.nd
85	.nd	.nd	1.985	1.956	1.994	2.028	2.033	1.753	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	2.062	2.109	2.046	1.879	1.852	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	1.888	2.064	2.020	1.979	1.852	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	1.811	1.985	1.950	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	1.972	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C11: Central Air Conditioner Raw Time-Temperature Matrix Standard Deviation of Load for CEC Region 3

THI \ hour →	1	2	3	4	5	6	7	8	9	10	11	12
45	0.204	0.177	0.202	0.198	0.142	0.323	0.504	0.396	0.356	0.391	0.320	0.338
46	0.165	0.225	0.223	0.215	0.181	0.229	0.700	0.517	0.407	0.309	0.376	0.310
47	0.137	0.168	0.182	0.171	0.205	0.304	0.456	0.424	0.317	0.385	0.380	0.424
48	0.109	0.160	0.145	0.165	0.123	0.320	0.413	0.442	0.482	0.311	0.325	0.421
49	0.144	0.117	0.124	0.126	0.209	0.266	0.389	0.354	0.327	0.258	0.301	0.312
50	0.112	0.155	0.087	0.164	0.166	0.329	0.376	0.410	0.355	0.418	0.173	0.450
51	0.125	0.085	0.144	0.139	0.143	0.284	0.544	0.388	0.279	0.242	0.381	0.285
52	0.085	0.098	0.089	0.098	0.175	0.179	0.480	0.355	0.253	0.254	0.221	0.258
53	0.089	0.082	0.082	0.094	0.119	0.244	0.343	0.377	0.296	0.348	0.258	0.242
54	0.109	0.079	0.053	0.072	0.134	0.127	0.297	0.241	0.223	0.279	0.192	0.303
55	0.091	0.065	0.106	0.093	0.176	0.175	0.289	0.185	0.252	0.191	0.176	0.163
56	0.076	0.073	0.056	0.059	0.054	0.217	0.332	0.186	0.129	0.188	0.184	0.122
57	0.078	0.073	0.056	0.074	0.071	0.152	0.370	0.193	0.155	0.159	0.152	0.123
58	0.049	0.040	0.084	0.065	0.080	0.387	0.151	0.313	0.094	0.156	0.187	0.127
59	0.084	0.083	0.071	0.093	0.319	0.156	0.321	0.292	0.097	0.116	0.104	0.095
60	0.063	0.060	0.060	0.348	0.076	0.274	0.263	0.279	0.118	0.152	0.110	0.097
61	0.056	0.074	0.330	0.152	0.255	0.080	0.127	0.113	0.389	0.101	0.128	0.109
62	0.100	0.405	0.231	0.245	0.112	0.150	0.107	0.138	0.074	0.062	0.093	0.175
63	0.385	0.191	0.130	0.153	0.247	0.231	0.251	0.172	0.253	0.314	0.109	0.114
64	0.108	0.181	0.260	0.280	0.126	0.130	0.145	0.323	0.135	0.360	0.054	0.146
65	0.229	0.220	0.243	0.200	0.190	0.190	0.194	0.213	0.312	0.224	0.100	0.141
66	0.224	0.308	0.171	0.218	0.227	0.245	0.214	0.291	0.207	0.170	0.398	0.118
67	0.368	0.315	0.330	0.314	0.280	0.283	0.213	0.272	0.239	0.284	0.214	0.115
68	0.327	0.369	0.350	0.346	0.415	0.238	0.359	0.299	0.287	0.269	0.209	0.179
69	0.421	0.438	0.391	0.369	0.343	0.368	0.364	0.395	0.324	0.281	0.253	0.357
70	0.541	0.478	0.457	0.473	0.422	0.390	0.355	0.435	0.514	0.330	0.324	0.301
71	0.547	0.566	0.529	0.503	0.442	0.396	0.447	0.454	0.449	0.361	0.365	0.292
72	0.664	0.652	0.609	0.578	0.522	0.561	0.494	0.549	0.554	0.523	0.398	0.411
73	0.770	0.717	0.705	0.597	0.537	0.566	0.543	0.630	0.580	0.562	0.464	0.488
74	0.822	0.828	0.734	0.725	0.672	0.545	0.489	0.781	0.799	0.694	0.593	0.574
75	0.888	0.853	0.792	0.720	0.710	.nd	.nd	.nd	0.780	0.771	0.741	0.658
76	0.986	0.945	0.738	0.699	.nd	.nd	.nd	.nd	1.000	0.854	0.858	0.794
77	1.136	0.900	1.030	.nd	.nd	.nd	.nd	.nd	1.075	1.109	0.965	0.963
78	1.184	1.255	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.229	1.004	1.130
79	1.426	1.192	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.196	1.256	1.233
80	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.364	1.368
81	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.522
82	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.520
83	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.655
84	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C11 cont'd: Central Air Conditioner Raw Time-Temperature Matrix
Standard Deviation of Load for CEC Region 3

THI \ hour →	13	14	15	16	17	18	19	20	21	22	23	24
45	0.379	0.186	0.378	0.138	0.363	0.328	0.327	0.398	0.290	0.241	0.216	0.184
46	0.363	0.262	0.295	0.384	0.160	0.146	0.291	0.208	0.328	0.193	0.158	0.170
47	0.324	0.321	0.185	0.231	0.241	0.379	0.346	0.217	0.152	0.164	0.128	0.120
48	0.192	0.279	0.424	0.245	0.387	0.283	0.381	0.239	0.192	0.191	0.180	0.149
49	0.327	0.195	0.280	0.328	0.256	0.297	0.306	0.233	0.205	0.160	0.215	0.131
50	0.146	0.335	0.282	0.204	0.191	0.213	0.287	0.203	0.290	0.158	0.176	0.146
51	0.324	0.299	0.177	0.270	0.303	0.297	0.394	0.220	0.158	0.182	0.161	0.135
52	0.242	0.320	0.247	0.177	0.194	0.266	0.278	0.242	0.192	0.184	0.135	0.121
53	0.218	0.206	0.311	0.288	0.336	0.262	0.200	0.191	0.214	0.155	0.137	0.084
54	0.275	0.168	0.136	0.211	0.184	0.274	0.213	0.165	0.222	0.119	0.092	0.069
55	0.215	0.226	0.214	0.144	0.221	0.215	0.167	0.254	0.234	0.119	0.091	0.104
56	0.204	0.208	0.193	0.253	0.255	0.235	0.248	0.176	0.180	0.092	0.098	0.101
57	0.130	0.109	0.126	0.194	0.225	0.198	0.147	0.200	0.133	0.086	0.126	0.065
58	0.172	0.111	0.206	0.090	0.200	0.130	0.187	0.113	0.099	0.139	0.155	0.071
59	0.112	0.133	0.179	0.212	0.183	0.144	0.157	0.188	0.187	0.113	0.119	0.073
60	0.106	0.107	0.075	0.091	0.082	0.136	0.145	0.172	0.138	0.169	0.056	0.053
61	0.115	0.160	0.140	0.104	0.179	0.198	0.159	0.110	0.112	0.084	0.148	0.057
62	0.111	0.103	0.111	0.098	0.120	0.149	0.143	0.134	0.152	0.113	0.074	0.054
63	0.079	0.096	0.159	0.137	0.142	0.189	0.089	0.094	0.067	0.071	0.091	0.125
64	0.132	0.090	0.053	0.085	0.150	0.104	0.088	0.105	0.152	0.094	0.084	0.148
65	0.095	0.099	0.096	0.099	0.138	0.084	0.074	0.096	0.108	0.125	0.166	0.351
66	0.055	0.121	0.087	0.078	0.073	0.160	0.175	0.172	0.083	0.099	0.199	0.218
67	0.103	0.109	0.067	0.093	0.095	0.117	0.103	0.099	0.142	0.210	0.259	0.288
68	0.087	0.093	0.140	0.156	0.147	0.155	0.164	0.141	0.226	0.289	0.602	0.436
69	0.135	0.133	0.111	0.122	0.151	0.155	0.123	0.218	0.314	0.388	0.369	0.395
70	0.406	0.150	0.156	0.173	0.171	0.236	0.241	0.290	0.444	0.696	0.559	0.513
71	0.351	0.195	0.180	0.210	0.233	0.246	0.343	0.409	0.499	0.604	0.597	0.624
72	0.396	0.344	0.280	0.268	0.266	0.351	0.340	0.425	0.748	0.703	0.775	0.651
73	0.372	0.524	0.437	0.332	0.385	0.440	0.498	0.752	0.767	0.906	0.801	0.781
74	0.515	0.458	0.600	0.618	0.434	0.578	0.699	0.759	0.919	1.014	0.935	0.891
75	0.652	0.618	0.563	0.644	0.805	0.838	0.839	0.945	1.042	1.056	1.048	0.950
76	0.773	0.747	0.746	0.806	0.849	0.909	1.045	1.110	1.131	1.251	1.178	1.073
77	0.924	0.884	0.988	0.948	0.996	1.095	1.258	1.266	1.323	1.374	1.282	1.166
78	1.034	1.103	1.080	1.211	1.266	1.336	1.409	1.411	1.469	1.480	1.384	1.241
79	1.256	1.208	1.293	1.320	1.430	1.533	1.554	1.559	1.567	1.591	1.431	1.408
80	1.401	1.400	1.429	1.518	1.577	1.636	1.721	1.683	1.650	1.636	1.568	1.483
81	1.504	1.578	1.526	1.647	1.741	1.835	1.859	1.790	1.746	1.721	1.710	.nd
82	1.687	1.671	1.736	1.786	1.833	1.891	1.935	1.896	1.828	1.846	1.637	.nd
83	1.773	1.795	1.879	1.897	1.952	1.998	2.033	1.966	1.899	1.852	.nd	.nd
84	1.846	1.877	1.938	2.021	2.047	2.095	2.111	2.045	1.923	.nd	.nd	.nd
85	1.775	1.976	2.028	2.077	2.138	2.138	2.137	2.031	2.061	.nd	.nd	.nd
86	.nd	1.931	2.082	2.228	2.152	2.190	2.217	2.171	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	2.184	2.253	2.219	2.178	2.082	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	2.119	2.218	2.204	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	2.356	2.182	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C12: Central Air Conditioner Raw Time-Temperature Matrix
Standard Deviation of Load for CEC Region 4

THI \ hour →	1	2	3	4	5	6	7	8	9	10	11	12
45	0.325	0.322	0.329	0.340	0.352	0.362	0.356	0.411	0.353	0.353	0.296	0.310
46	0.299	0.322	0.327	0.328	0.324	0.336	0.325	0.456	0.339	0.310	0.299	0.307
47	0.311	0.302	0.297	0.317	0.309	0.307	0.308	0.342	0.333	0.322	0.301	0.272
48	0.264	0.288	0.292	0.297	0.300	0.289	0.300	0.316	0.289	0.295	0.369	0.257
49	0.275	0.282	0.278	0.271	0.279	0.272	0.269	0.335	0.285	0.271	0.269	0.242
50	0.248	0.251	0.265	0.270	0.260	0.252	0.235	0.255	0.251	0.266	0.278	0.297
51	0.240	0.243	0.237	0.227	0.223	0.231	0.226	0.262	0.232	0.269	0.251	0.269
52	0.213	0.210	0.208	0.205	0.213	0.219	0.233	0.248	0.243	0.229	0.231	0.208
53	0.189	0.195	0.189	0.193	0.199	0.200	0.206	0.229	0.212	0.222	0.232	0.191
54	0.176	0.171	0.169	0.174	0.168	0.193	0.190	0.217	0.190	0.195	0.203	0.230
55	0.156	0.161	0.162	0.172	0.172	0.158	0.158	0.228	0.172	0.184	0.176	0.182
56	0.144	0.148	0.129	0.131	0.137	0.132	0.300	0.420	0.490	0.134	0.158	0.162
57	0.116	0.127	0.124	0.121	0.314	0.328	0.238	0.154	0.214	0.279	0.310	0.135
58	0.112	0.127	0.322	0.398	0.099	0.111	0.189	0.285	0.104	0.291	0.103	0.112
59	0.289	0.355	0.226	0.190	0.337	0.325	0.332	0.268	0.342	0.365	0.243	0.237
60	0.437	0.247	0.238	0.355	0.139	0.203	0.232	0.278	0.261	0.347	0.383	0.266
61	0.393	0.298	0.297	0.122	0.387	0.377	0.344	0.336	0.334	0.389	0.346	0.320
62	0.198	0.233	0.250	0.445	0.143	0.151	0.197	0.199	0.221	0.196	0.415	0.367
63	0.227	0.412	0.387	0.210	0.207	0.201	0.258	0.271	0.224	0.162	0.255	0.133
64	0.322	0.273	0.261	0.251	0.335	0.303	0.152	0.185	0.299	0.309	0.155	0.189
65	0.398	0.304	0.331	0.315	0.189	0.176	0.229	0.267	0.303	0.301	0.248	0.241
66	0.387	0.465	0.298	0.189	0.333	0.345	0.288	0.349	0.218	0.359	0.315	0.221
67	0.580	0.419	0.382	0.495	0.473	0.428	0.706	0.403	0.372	0.424	0.330	0.325
68	0.596	0.471	0.598	0.075	.nd	0.644	.nd	0.682	0.555	0.548	0.517	0.394
69	0.856	1.091	1.062	1.006	0.715	.nd	.nd	0.767	0.579	0.662	0.597	0.477
70	0.616	.nd	.nd	.nd	.nd	.nd	.nd	0.788	0.821	0.595	0.737	0.621
71	1.272	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.009	0.716	0.730	0.783
72	1.506	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.066	0.754	0.954
73	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.264	1.108	0.881
74	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.077	1.021	1.113	1.079
75	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.407	1.481	0.969
76	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.197
77	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.107	1.585
78	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	1.685	1.756
79	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
80	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
81	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
82	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
83	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C12 cont'd: Central Air Conditioner Raw Time-Temperature Matrix Standard Deviation of Load for CEC Region 4

THI \ hour →	13	14	15	16	17	18	19	20	21	22	23	24
45	.nd	0.207	.nd	.nd	.nd	.nd	.nd	.nd	0.303	0.320	0.292	0.350
46	.nd	0.293	.nd	.nd	.nd	.nd	0.298	0.277	0.224	0.343	0.348	0.327
47	0.231	0.151	0.214	0.209	0.176	0.275	0.251	0.243	0.278	0.342	0.294	0.300
48	0.258	.nd	.nd	0.199	0.213	0.225	0.214	0.282	0.301	0.255	0.288	0.300
49	0.241	0.264	0.239	0.205	0.240	0.272	0.257	0.284	0.307	0.252	0.268	0.266
50	0.235	0.223	0.260	0.186	0.219	0.235	0.274	0.300	0.232	0.259	0.263	0.248
51	0.218	0.229	0.169	0.220	0.219	0.256	0.221	0.234	0.235	0.240	0.240	0.238
52	0.253	0.182	0.201	0.190	0.266	0.235	0.206	0.208	0.224	0.227	0.225	0.210
53	0.227	0.240	0.181	0.196	0.173	0.241	0.200	0.206	0.215	0.199	0.211	0.210
54	0.181	0.166	0.152	0.173	0.209	0.213	0.191	0.203	0.215	0.199	0.179	0.185
55	0.185	0.171	0.167	0.180	0.191	0.177	0.186	0.169	0.172	0.164	0.154	0.154
56	0.167	0.185	0.158	0.158	0.155	0.173	0.155	0.143	0.150	0.150	0.151	0.140
57	0.131	0.149	0.155	0.143	0.149	0.154	0.135	0.138	0.135	0.137	0.121	0.129
58	0.128	0.130	0.133	0.120	0.158	0.134	0.123	0.114	0.112	0.112	0.104	0.115
59	0.103	0.082	0.115	0.145	0.132	0.131	0.124	0.102	0.100	0.112	0.229	0.317
60	0.096	0.091	0.087	0.093	0.103	0.120	0.122	0.104	0.124	0.155	0.110	0.116
61	0.158	0.092	0.095	0.089	0.087	0.110	0.116	0.105	0.172	0.410	0.420	0.370
62	0.118	0.218	0.093	0.079	0.074	0.109	0.132	0.124	0.369	0.374	0.381	0.414
63	0.156	0.097	0.214	0.112	0.111	0.121	0.142	0.373	0.437	0.349	0.284	0.245
64	0.147	0.093	0.124	0.099	0.153	0.153	0.361	0.462	0.385	0.418	0.423	0.352
65	0.231	0.153	0.109	0.307	0.252	0.307	0.272	0.433	0.431	0.483	0.458	0.442
66	0.101	0.141	0.253	0.210	0.330	0.305	0.526	0.472	0.412	0.615	0.568	0.534
67	0.241	0.178	0.211	0.237	0.416	0.414	0.526	0.542	0.670	0.752	0.768	0.574
68	0.336	0.341	0.367	0.433	0.525	0.538	0.652	0.701	0.793	0.809	0.782	0.774
69	0.393	0.315	0.370	0.406	0.529	0.657	0.792	0.883	0.953	1.083	0.942	0.831
70	0.553	0.476	0.426	0.490	0.643	0.814	0.833	0.998	1.120	1.005	1.281	1.016
71	0.652	0.570	0.596	0.673	0.812	1.012	1.179	1.135	1.269	1.278	1.173	1.144
72	0.717	0.704	0.798	0.802	1.046	1.210	1.250	1.384	1.363	1.531	1.038	.nd
73	0.942	0.906	0.893	1.034	1.180	1.242	1.373	1.538	1.487	1.426	.nd	1.615
74	1.150	0.954	1.013	1.142	1.326	1.483	1.577	1.610	1.487	.nd	1.799	.nd
75	1.196	1.208	1.180	1.325	1.438	1.592	1.721	1.666	1.729	.nd	.nd	.nd
76	0.994	1.416	1.333	1.447	1.683	1.764	1.825	1.720	1.583	1.880	.nd	.nd
77	1.436	1.491	1.648	1.599	1.648	1.757	1.861	1.855	.nd	.nd	.nd	.nd
78	1.450	1.496	1.583	1.665	1.793	1.855	1.993	1.942	1.980	.nd	.nd	.nd
79	1.799	1.577	1.761	1.843	1.820	1.965	2.050	1.777	.nd	.nd	.nd	.nd
80	.nd	1.778	1.688	1.915	2.073	2.068	1.916	.nd	.nd	.nd	.nd	.nd
81	1.992	.nd	1.891	2.075	1.986	2.026	1.916	2.117	.nd	.nd	.nd	.nd
82	.nd	.nd	.nd	1.820	1.955	2.040	.nd	.nd	.nd	.nd	.nd	.nd
83	.nd	2.182	.nd	1.934	.nd	.nd	2.185	.nd	.nd	.nd	.nd	.nd
85	.nd	.nd	2.287	.nd	.nd	2.226	.nd	.nd	.nd	.nd	.nd	.nd
86	.nd	.nd	.nd	2.365	2.370	.nd	.nd	.nd	.nd	.nd	.nd	.nd
87	.nd	.nd	.nd	2.365	2.370	.nd	.nd	.nd	.nd	.nd	.nd	.nd
88	.nd	.nd	.nd	2.365	2.370	.nd	.nd	.nd	.nd	.nd	.nd	.nd
89	.nd	.nd	.nd	2.365	2.370	.nd	.nd	.nd	.nd	.nd	.nd	.nd

.nd = no data available

Table C13: Central Air Conditioner Smoothed Time-Temperature Matrix
Mean Load in kWh for all CEC Regions

THI \ hour →	1	2	3	4	5	6	7	8	9	10	11	12
45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
46	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
47	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
48	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
49	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
53	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000
56	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001
57	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
58	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.001
59	0.003	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.002
60	0.005	0.003	0.003	0.002	0.003	0.003	0.004	0.005	0.005	0.005	0.004	0.003
61	0.007	0.005	0.004	0.004	0.004	0.005	0.006	0.007	0.007	0.007	0.006	0.005
62	0.011	0.008	0.006	0.006	0.006	0.007	0.008	0.010	0.011	0.010	0.009	0.008
63	0.015	0.011	0.009	0.008	0.009	0.010	0.012	0.014	0.015	0.015	0.013	0.011
64	0.022	0.016	0.013	0.012	0.013	0.014	0.017	0.020	0.021	0.020	0.018	0.015
65	0.031	0.024	0.019	0.018	0.018	0.020	0.024	0.027	0.029	0.028	0.025	0.021
66	0.043	0.033	0.028	0.025	0.026	0.029	0.033	0.037	0.039	0.038	0.034	0.029
67	0.059	0.046	0.039	0.036	0.036	0.039	0.044	0.049	0.052	0.050	0.046	0.040
68	0.080	0.064	0.054	0.050	0.050	0.054	0.060	0.066	0.068	0.067	0.061	0.054
69	0.107	0.086	0.074	0.068	0.068	0.072	0.080	0.086	0.090	0.087	0.080	0.071
70	0.141	0.116	0.100	0.092	0.091	0.096	0.105	0.113	0.116	0.113	0.104	0.094
71	0.185	0.154	0.133	0.123	0.122	0.127	0.137	0.146	0.149	0.145	0.134	0.122
72	0.240	0.202	0.176	0.163	0.160	0.166	0.176	0.186	0.190	0.185	0.172	0.157
73	0.308	0.263	0.231	0.214	0.209	0.215	0.226	0.236	0.239	0.233	0.218	0.201
74	0.391	0.338	0.300	0.278	0.270	0.275	0.286	0.297	0.300	0.291	0.274	0.254
75	0.493	0.431	0.385	0.357	0.346	0.349	0.359	0.370	0.372	0.361	0.342	0.320
76	0.614	0.544	0.489	0.455	0.439	0.439	0.448	0.457	0.457	0.445	0.422	0.398
77	0.758	0.679	0.616	0.573	0.551	0.547	0.553	0.559	0.558	0.543	0.518	0.491
78	0.926	0.840	0.767	0.715	0.685	0.675	0.677	0.680	0.675	0.658	0.630	0.602
79	1.119	1.027	0.945	0.883	0.844	0.825	0.821	0.819	0.810	0.790	0.760	0.731
80	1.338	1.241	1.151	1.078	1.028	0.999	0.986	0.978	0.964	0.940	0.909	0.879
81	1.581	1.482	1.385	1.301	1.238	1.198	1.174	1.157	1.137	1.110	1.077	1.049
82	1.845	1.748	1.645	1.551	1.474	1.420	1.383	1.356	1.330	1.299	1.266	1.239
83	2.125	2.034	1.929	1.825	1.735	1.664	1.613	1.575	1.541	1.506	1.473	1.450
84	2.416	2.333	2.229	2.118	2.014	1.928	1.861	1.810	1.768	1.730	1.699	1.680
85	2.708	2.637	2.538	2.423	2.308	2.206	2.123	2.059	2.008	1.968	1.939	1.927
86	2.993	2.936	2.845	2.730	2.607	2.491	2.394	2.317	2.259	2.216	2.190	2.185
87	3.259	3.218	3.139	3.028	2.902	2.777	2.666	2.578	2.513	2.469	2.448	2.451
88	3.499	3.472	3.407	3.306	3.182	3.052	2.933	2.837	2.766	2.722	2.705	2.716
89	3.704	3.690	3.639	3.552	3.436	3.308	3.187	3.085	3.012	2.969	2.957	2.975

Table C13 cont'd: Central Air Conditioner Smoothed Time-Temp. Matrix
Mean Load in kWh for all CEC Regions

THI \ hour →	13	14	15	16	17	18	19	20	21	22	23	24
45	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
46	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
47	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
48	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
49	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
53	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000
54	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.000
55	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.002	0.002	0.001	0.001
56	0.000	0.000	0.000	0.001	0.001	0.001	0.002	0.003	0.003	0.003	0.002	0.001
57	0.001	0.001	0.001	0.001	0.001	0.002	0.003	0.004	0.005	0.004	0.003	0.002
58	0.001	0.001	0.001	0.001	0.002	0.003	0.004	0.006	0.007	0.006	0.005	0.003
59	0.002	0.002	0.002	0.002	0.003	0.005	0.007	0.009	0.010	0.009	0.007	0.005
60	0.003	0.003	0.003	0.003	0.005	0.007	0.010	0.013	0.014	0.013	0.010	0.007
61	0.004	0.004	0.004	0.005	0.007	0.010	0.014	0.018	0.020	0.019	0.015	0.010
62	0.006	0.006	0.006	0.007	0.010	0.014	0.020	0.025	0.028	0.026	0.021	0.015
63	0.009	0.009	0.009	0.011	0.014	0.020	0.027	0.034	0.038	0.036	0.029	0.021
64	0.013	0.012	0.013	0.015	0.020	0.028	0.037	0.047	0.051	0.048	0.040	0.030
65	0.019	0.017	0.018	0.022	0.028	0.038	0.050	0.062	0.068	0.064	0.054	0.042
66	0.026	0.024	0.026	0.030	0.038	0.051	0.067	0.082	0.089	0.085	0.072	0.057
67	0.036	0.034	0.035	0.041	0.052	0.068	0.089	0.107	0.116	0.111	0.096	0.076
68	0.048	0.046	0.048	0.056	0.070	0.091	0.115	0.138	0.149	0.144	0.125	0.101
69	0.064	0.062	0.065	0.075	0.093	0.118	0.149	0.176	0.190	0.184	0.162	0.133
70	0.086	0.083	0.087	0.099	0.121	0.153	0.190	0.223	0.239	0.233	0.208	0.174
71	0.112	0.109	0.114	0.130	0.158	0.197	0.241	0.279	0.299	0.293	0.264	0.224
72	0.146	0.142	0.150	0.169	0.203	0.250	0.302	0.347	0.370	0.364	0.332	0.286
73	0.188	0.184	0.194	0.218	0.259	0.314	0.375	0.428	0.455	0.449	0.414	0.362
74	0.240	0.237	0.249	0.279	0.328	0.392	0.463	0.522	0.554	0.549	0.511	0.453
75	0.304	0.301	0.316	0.353	0.410	0.485	0.565	0.632	0.669	0.665	0.625	0.562
76	0.381	0.379	0.399	0.442	0.509	0.594	0.684	0.759	0.801	0.799	0.758	0.691
77	0.474	0.474	0.498	0.549	0.626	0.722	0.822	0.904	0.951	0.952	0.911	0.841
78	0.584	0.587	0.616	0.676	0.763	0.870	0.978	1.067	1.118	1.123	1.084	1.013
79	0.714	0.719	0.755	0.824	0.922	1.038	1.154	1.248	1.304	1.314	1.278	1.209
80	0.864	0.874	0.917	0.995	1.103	1.227	1.348	1.447	1.507	1.522	1.492	1.427
81	1.037	1.052	1.103	1.190	1.305	1.436	1.561	1.662	1.725	1.746	1.724	1.665
82	1.232	1.254	1.313	1.408	1.530	1.663	1.789	1.890	1.956	1.983	1.970	1.922
83	1.449	1.479	1.546	1.647	1.774	1.907	2.030	2.129	2.196	2.229	2.227	2.192
84	1.686	1.724	1.799	1.906	2.033	2.163	2.281	2.375	2.441	2.480	2.490	2.469
85	1.941	1.988	2.069	2.179	2.303	2.426	2.534	2.621	2.686	2.730	2.751	2.745
86	2.208	2.264	2.350	2.459	2.577	2.689	2.786	2.864	2.925	2.973	3.004	3.013
87	2.483	2.545	2.635	2.741	2.848	2.947	3.029	3.096	3.153	3.202	3.242	3.265
88	2.757	2.825	2.915	3.013	3.108	3.190	3.257	3.313	3.364	3.413	3.459	3.491
89	3.023	3.094	3.180	3.269	3.349	3.414	3.465	3.509	3.553	3.601	3.649	3.687

Appendix D
Data Tables for Chapter 6

Normalized Load Shape for PGE Zone R Weekday

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=0-66.2 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	3.22	0.013011	0.02736	1987
2	3.20	0.012925	0.02684	1987
3	3.44	0.013879	0.03233	1987
4	3.46	0.013960	0.03283	1987
5	3.44	0.013889	0.03224	1987
6	3.96	0.016001	0.04662	1987
7	4.98	0.020121	0.07822	1987
8	5.62	0.022700	0.09342	1987
9	4.75	0.019175	0.06234	1987
10	4.61	0.018642	0.11290	1987
11	4.09	0.016537	0.06420	1987
12	3.80	0.015370	0.03993	1987
13	3.64	0.014687	0.03352	1987
14	3.75	0.015134	0.03678	1987
15	4.17	0.016866	0.08368	1987
16	5.01	0.020229	0.10786	1987
17	5.12	0.020699	0.11100	1987
18	5.05	0.020419	0.10229	1987
19	5.14	0.020756	0.08654	1987
20	4.31	0.017421	0.06503	1987
21	4.00	0.016175	0.05422	1987
22	4.33	0.017477	0.06096	1987
23	3.70	0.014930	0.03743	1987
24	3.22	0.013029	0.02546	1987

Normalized Load Shape for PGE Zone R Weekday

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=66.2-75 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	2.20	0.05953	0.46708	10993
2	1.63	0.04414	0.43365	10993
3	1.30	0.03514	0.41157	10993
4	1.03	0.02796	0.38712	10993
5	0.89	0.02408	0.38553	10993
6	0.86	0.02322	0.39192	10993
7	0.83	0.02236	0.39608	10993
8	0.90	0.02447	0.40018	10993
9	0.99	0.02677	0.40286	10993
10	1.16	0.03127	0.46673	10993
11	1.26	0.03412	0.37619	10993
12	1.66	0.04484	0.40458	10993
13	2.45	0.06619	0.45929	10993
14	3.34	0.09023	0.51202	10993
15	4.78	0.12922	0.59526	10993
16	6.98	0.18894	0.71399	10993
17	9.66	0.26147	0.85235	10993
18	12.05	0.32596	0.93309	10993
19	12.71	0.34384	0.97634	10993
20	10.69	0.28924	0.88286	10993
21	8.60	0.23253	0.79080	10993
22	6.64	0.17956	0.68742	10993
23	4.51	0.12195	0.56847	10993
24	2.90	0.07841	0.48647	10993

Normalized Load Shape for PGE Zone R Weekday

-------- APPLIANCE CODE FROM QA=Cooling Mean daily temperature=75-80 ---------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.88	0.15067	0.54777	11271
2	1.28	0.10239	0.44122	11271
3	0.90	0.07212	0.33750	11271
4	0.69	0.05570	0.29292	11271
5	0.53	0.04210	0.30473	11271
6	0.41	0.03326	0.25421	11271
7	0.38	0.03056	0.23325	11271
8	0.46	0.03716	0.24694	11271
9	0.57	0.04577	0.24543	11271
10	0.76	0.06082	0.30251	11271
11	1.05	0.08447	0.37955	11271
12	1.75	0.13991	0.53027	11271
13	2.73	0.21890	0.67463	11271
14	4.18	0.33548	0.90166	11271
15	6.16	0.49385	1.11260	11271
16	8.27	0.66305	1.30019	11271
17	10.34	0.82870	1.45754	11271
18	12.30	0.98601	1.58609	11271
19	12.86	1.03142	1.59942	11271
20	10.98	0.88036	1.44777	11271
21	8.46	0.67846	1.22463	11271
22	6.27	0.50295	1.04007	11271
23	4.14	0.33217	0.81624	11271
24	2.63	0.21121	0.65542	11271

Normalized Load Shape for PGE Zone R Weekday

-------- APPLIANCE CODE FROM QA=Cooling Mean daily temperature=80-85 ---------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.77	0.27059	0.74432	12566
2	1.24	0.18890	0.58914	12566
3	0.88	0.13499	0.47656	12566
4	0.65	0.09871	0.38478	12566
5	0.45	0.06801	0.29095	12566
6	0.37	0.05629	0.25905	12566
7	0.32	0.04891	0.23867	12566
8	0.40	0.06152	0.27398	12566
9	0.57	0.08706	0.36760	12566
10	1.01	0.15435	2.16676	12566
11	1.38	0.21143	0.67631	12566
12	2.27	0.34700	0.89236	12566
13	3.62	0.55308	1.16709	12566
14	5.13	0.78364	1.41237	12566
15	6.70	1.02336	1.61510	12566
16	8.29	1.26552	1.77915	12566
17	9.82	1.49940	1.90300	12566
18	11.22	1.71333	1.98490	12566
19	11.77	1.79760	2.14866	12566
20	10.35	1.58001	1.84052	12566
21	8.30	1.26774	1.60270	12566
22	6.45	0.98435	1.41800	12566
23	4.34	0.66246	1.18414	12566
24	2.67	0.40838	0.92924	12566

Normalized Load Shape for PGE Zone R Weekday

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=85-87.5 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.80	0.39046	0.85906	4838
2	1.27	0.27474	0.69439	4838
3	0.89	0.19307	0.54385	4838
4	0.68	0.14801	0.44705	4838
5	0.49	0.10628	0.35637	4838
6	0.38	0.08301	0.30470	4838
7	0.35	0.07519	0.29883	4838
8	0.46	0.10039	0.38008	4838
9	0.66	0.14408	0.49344	4838
10	1.02	0.22058	0.64577	4838
11	1.73	0.37420	0.90147	4838
12	2.94	0.63706	1.22976	4838
13	4.24	0.91993	1.47281	4838
14	5.67	1.22995	1.72754	4838
15	7.08	1.53526	1.92718	4838
16	8.20	1.77686	2.02132	4838
17	9.01	1.95294	2.08031	4838
18	10.26	2.22448	2.14686	4838
19	10.88	2.35779	2.16823	4838
20	9.77	2.11704	2.04752	4838
21	8.24	1.78550	1.84295	4838
22	6.65	1.44100	1.65172	4838
23	4.48	0.97178	1.37649	4838
24	2.85	0.61704	1.11326	4838

Normalized Load Shape for PGE Zone R Weekday

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=87.5-100 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	2.16	0.65637	1.17553	4408
2	1.63	0.49499	0.95939	4408
3	1.26	0.38397	0.79493	4408
4	0.96	0.29193	0.63805	4408
5	0.74	0.22566	0.55822	4408
6	0.61	0.18617	0.52281	4408
7	0.55	0.16650	0.48089	4408
8	0.66	0.20157	0.59414	4408
9	1.02	0.31155	0.78600	4408
10	1.66	0.50549	1.06601	4408
11	2.48	0.75395	1.30873	4408
12	3.50	1.06373	1.58802	4408
13	4.65	1.41554	1.81749	4408
14	5.83	1.77253	2.00939	4408
15	6.79	2.06486	2.15782	4408
16	7.71	2.34504	2.26480	4408
17	8.50	2.58622	2.32850	4408
18	9.18	2.79061	2.33573	4408
19	9.53	2.89724	2.30476	4408
20	8.76	2.66458	2.20756	4408
21	7.58	2.30503	2.05808	4408
22	6.47	1.96674	1.90182	4408
23	4.65	1.41338	1.69796	4408
24	3.13	0.95119	1.45911	4408

Normalized Load Shape for PGE Zone R Weekday

------ APPLIANCE CODE FROM QA=Central AC Mean daily temperature=0-66.2 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	3.23	0.013389	0.02778	1872
2	3.21	0.013306	0.02725	1872
3	3.45	0.014325	0.03297	1872
4	3.47	0.014412	0.03349	1872
5	3.46	0.014344	0.03289	1872
6	4.00	0.016578	0.04777	1872
7	5.05	0.020950	0.08040	1872
8	5.72	0.023706	0.09607	1872
9	4.81	0.019956	0.06400	1872
10	4.67	0.019380	0.11620	1872
11	4.14	0.017152	0.06596	1872
12	3.84	0.015923	0.04086	1872
13	3.66	0.015160	0.03417	1872
14	3.77	0.015628	0.03756	1872
15	4.20	0.017436	0.08603	1872
16	5.05	0.020933	0.11089	1872
17	5.20	0.021579	0.11423	1872
18	5.13	0.021259	0.10524	1872
19	4.94	0.020492	0.08590	1872
20	4.01	0.016648	0.04667	1872
21	3.82	0.015853	0.03965	1872
22	4.21	0.017470	0.05558	1872
23	3.72	0.015411	0.03822	1872
24	3.25	0.013460	0.02587	1872

Normalized Load Shape for PGE Zone R Weekday

------ APPLIANCE CODE FROM QA=Central AC Mean daily temperature=66.2-75 ------

HOUR	% Daily Load	LOAD	STDDEV	N
1	2.21	0.06203	0.47838	10449
2	1.64	0.04597	0.44431	10449
3	1.31	0.03668	0.42195	10449
4	1.04	0.02925	0.39705	10449
5	0.90	0.02519	0.39543	10449
6	0.86	0.02429	0.40199	10449
7	0.83	0.02338	0.40626	10449
8	0.91	0.02552	0.41038	10449
9	0.99	0.02785	0.41291	10449
10	1.16	0.03251	0.47821	10449
11	1.26	0.03547	0.38499	10449
12	1.66	0.04655	0.41438	10449
13	2.43	0.06831	0.47012	10449
14	3.33	0.09342	0.52360	10449
15	4.76	0.13378	0.60851	10449
16	6.98	0.19606	0.72927	10449
17	9.67	0.27153	0.87027	10449
18	12.05	0.33832	0.95235	10449
19	12.71	0.35689	0.99608	10449
20	10.68	0.29988	0.90027	10449
21	8.59	0.24118	0.80692	10449
22	6.63	0.18603	0.70174	10449
23	4.50	0.12649	0.58083	10449
24	2.90	0.08138	0.49709	10449

Normalized Load Shape for PGE Zone R Weekday

APPLIANCE CODE FROM QA=Central AC Mean daily temperature=75-80 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.88	0.15648	0.55776	10719
2	1.28	0.10642	0.45013	10719
3	0.90	0.07506	0.34446	10719
4	0.69	0.05792	0.29913	10719
5	0.52	0.04347	0.31081	10719
6	0.41	0.03454	0.26010	10719
7	0.38	0.03181	0.23870	10719
8	0.46	0.03877	0.25278	10719
9	0.57	0.04785	0.25137	10719
10	0.76	0.06336	0.30943	10719
11	1.05	0.08757	0.38787	10719
12	1.74	0.14513	0.54182	10719
13	2.72	0.22704	0.68869	10719
14	4.19	0.34928	0.92037	10719
15	6.17	0.51458	1.13455	10719
16	8.27	0.68991	1.32299	10719
17	10.35	0.86309	1.48180	10719
18	12.30	1.02617	1.61092	10719
19	12.87	1.07310	1.62341	10719
20	10.98	0.91612	1.46981	10719
21	8.46	0.70520	1.24387	10719
22	6.27	0.52276	1.05793	10719
23	4.14	0.34498	0.83057	10719
24	2.64	0.21981	0.66791	10719

Normalized Load Shape for PGE Zone R Weekday

APPLIANCE CODE FROM QA=Central AC Mean daily temperature=80-85 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.78	0.28289	0.75967	11917
2	1.24	0.19760	0.60155	11917
3	0.89	0.14095	0.48649	11917
4	0.65	0.10284	0.39258	11917
5	0.45	0.07087	0.29723	11917
6	0.37	0.05889	0.26530	11917
7	0.32	0.05113	0.24444	11917
8	0.40	0.06440	0.28071	11917
9	0.57	0.09102	0.37655	11917
10	1.01	0.16161	2.22467	11917
11	1.39	0.22068	0.69141	11917
12	2.27	0.36165	0.91154	11917
13	3.63	0.57755	1.19036	11917
14	5.14	0.81896	1.43846	11917
15	6.71	1.06872	1.64123	11917
16	8.28	1.31915	1.80301	11917
17	9.81	1.56184	1.92445	11917
18	11.20	1.78302	2.00351	11917
19	11.77	1.87347	2.17149	11917
20	10.35	1.64769	1.85705	11917
21	8.31	1.32289	1.62046	11917
22	6.46	1.02814	1.43770	11917
23	4.34	0.69152	1.20453	11917
24	2.68	0.42624	0.94644	11917

Normalized Load Shape for PGE Zone R Weekday

------ APPLIANCE CODE FROM QA=Central AC Mean daily temperature=85-87.5 ------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.81	0.40986	0.87661	4572
2	1.27	0.28810	0.70917	4572
3	0.89	0.20248	0.55609	4572
4	0.68	0.15498	0.45692	4572
5	0.49	0.11073	0.36269	4572
6	0.38	0.08653	0.31020	4572
7	0.35	0.07885	0.30642	4572
8	0.47	0.10576	0.39017	4572
9	0.67	0.15131	0.50619	4572
10	1.02	0.23181	0.66181	4572
11	1.73	0.39202	0.92242	4572
12	2.95	0.66708	1.25531	4572
13	4.26	0.96397	1.49938	4572
14	5.69	1.28930	1.75423	4572
15	7.09	1.60537	1.95163	4572
16	8.17	1.84906	2.04091	4572
17	8.96	2.02927	2.09515	4572
18	10.22	2.31338	2.15660	4572
19	10.85	2.45773	2.17158	4572
20	9.75	2.20872	2.05308	4572
21	8.24	1.86499	1.85158	4572
22	6.68	1.51262	1.66441	4572
23	4.51	1.02011	1.39621	4572
24	2.86	0.64804	1.13396	4572

Normalized Load Shape for PGE Zone R Weekday

----- APPLIANCE CODE FROM QA=Central AC Mean daily temperature=87.5-100 ------

HOUR	% Daily Load	LOAD	STDDEV	N
1	2.17	0.68538	1.19416	4186
2	1.64	0.51708	0.97529	4186
3	1.27	0.40224	0.80989	4186
4	0.97	0.30580	0.65025	4186
5	0.75	0.23620	0.56954	4186
6	0.62	0.19496	0.53411	4186
7	0.55	0.17327	0.48939	4186
8	0.67	0.20999	0.60693	4186
9	1.03	0.32502	0.80199	4186
10	1.67	0.52686	1.08680	4186
11	2.49	0.78671	1.33149	4186
12	3.51	1.10801	1.61204	4186
13	4.67	1.47429	1.84061	4186
14	5.84	1.84284	2.02800	4186
15	6.79	2.14188	2.17431	4186
16	7.68	2.42475	2.27872	4186
17	8.46	2.66882	2.34194	4186
18	9.13	2.87998	2.34363	4186
19	9.49	2.99603	2.30474	4186
20	8.74	2.75802	2.20833	4186
21	7.58	2.39041	2.06171	4186
22	6.48	2.04557	1.90685	4186
23	4.66	1.47032	1.71445	4186
24	3.14	0.99173	1.48001	4186

Normalized Load Shape for PGE Zone R Weekend

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=0-66.2 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	4.86	0.023717	0.15425	1194
2	3.52	0.017181	0.07498	1194
3	3.43	0.016755	0.09001	1194
4	2.92	0.014251	0.04125	1194
5	3.03	0.014797	0.06050	1194
6	3.02	0.014744	0.04858	1194
7	3.07	0.015008	0.04088	1194
8	3.70	0.018057	0.05362	1194
9	3.54	0.017295	0.04444	1194
10	3.25	0.015885	0.03951	1194
11	3.33	0.016287	0.05412	1194
12	3.75	0.018296	0.08257	1194
13	3.15	0.015384	0.05175	1194
14	4.49	0.021923	0.14457	1194
15	5.00	0.024407	0.13775	1194
16	5.88	0.028734	0.16406	1194
17	5.88	0.028727	0.16272	1194
18	6.92	0.033779	0.20620	1194
19	5.48	0.026755	0.14349	1194
20	5.21	0.025430	0.13690	1194
21	5.64	0.027532	0.14523	1194
22	4.83	0.023582	0.12960	1194
23	3.23	0.015782	0.05749	1194
24	2.88	0.014061	0.05055	1194

Normalized Load Shape for PGE Zone R Weekend

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=66.2-75 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	2.32	0.07386	0.41804	5154
2	1.68	0.05343	0.36382	5154
3	1.30	0.04134	0.35589	5154
4	1.12	0.03543	0.38125	5154
5	0.99	0.03142	0.40803	5154
6	0.87	0.02763	0.39123	5154
7	0.90	0.02850	0.43943	5154
8	1.00	0.03187	0.48311	5154
9	1.05	0.03324	0.46264	5154
10	1.13	0.03603	0.43061	5154
11	1.63	0.05168	0.39063	5154
12	1.83	0.05809	0.42280	5154
13	2.86	0.09098	0.53153	5154
14	4.26	0.13530	0.64595	5154
15	5.93	0.18845	0.77492	5154
16	8.33	0.26479	0.93504	5154
17	10.13	0.32184	0.98697	5154
18	11.73	0.37257	1.05829	5154
19	11.37	0.36122	1.01155	5154
20	9.52	0.30230	0.90557	5154
21	7.56	0.24022	0.77818	5154
22	5.70	0.18107	0.64590	5154
23	4.26	0.13524	0.58241	5154
24	2.53	0.08046	0.47543	5154

Normalized Load Shape for PGE Zone R Weekend

-------- APPLIANCE CODE FROM QA=Cooling Mean daily temperature=75-80 ---------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.90	0.15894	0.57388	5331
2	1.29	0.10794	0.46860	5331
3	0.85	0.07157	0.35442	5331
4	0.62	0.05233	0.28068	5331
5	0.47	0.03909	0.22344	5331
6	0.38	0.03219	0.18409	5331
7	0.35	0.02937	0.16351	5331
8	0.41	0.03468	0.19477	5331
9	0.49	0.04139	0.21337	5331
10	0.66	0.05540	0.25716	5331
11	1.07	0.08956	0.39797	5331
12	1.69	0.14192	0.51652	5331
13	2.70	0.22610	0.67240	5331
14	4.64	0.38909	0.95719	5331
15	6.94	0.58169	1.19982	5331
16	9.07	0.75993	1.39805	5331
17	10.85	0.90977	1.50878	5331
18	12.17	1.02039	1.58874	5331
19	12.21	1.02336	1.58166	5331
20	10.34	0.86646	1.41669	5331
21	7.88	0.66069	1.17524	5331
22	6.10	0.51105	1.01023	5331
23	4.17	0.34973	0.84622	5331
24	2.75	0.23035	0.68224	5331

Normalized Load Shape for PGE Zone R Weekend

-------- APPLIANCE CODE FROM QA=Cooling Mean daily temperature=80-85 ---------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.71	0.26777	0.72131	4685
2	1.16	0.18124	0.55791	4685
3	0.84	0.13059	0.46619	4685
4	0.61	0.09517	0.37977	4685
5	0.45	0.06980	0.29680	4685
6	0.34	0.05244	0.23273	4685
7	0.30	0.04698	0.22742	4685
8	0.36	0.05567	0.27448	4685
9	0.50	0.07769	0.32694	4685
10	0.77	0.12064	0.45980	4685
11	1.30	0.20293	0.63684	4685
12	2.20	0.34342	0.88496	4685
13	3.66	0.57116	1.15911	4685
14	5.60	0.87376	1.46292	4685
15	7.39	1.15328	1.69992	4685
16	9.19	1.43445	1.87529	4685
17	10.53	1.64485	1.97191	4685
18	11.20	1.74828	2.00674	4685
19	11.16	1.74196	1.95806	4685
20	9.73	1.51897	1.78955	4685
21	7.83	1.22267	1.57314	4685
22	6.23	0.97346	1.39871	4685
23	4.33	0.67550	1.18817	4685
24	2.63	0.41098	0.92444	4685

Normalized Load Shape for PGE Zone R Weekend

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=85-87.5 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.89	0.46292	0.93362	1583
2	1.39	0.34064	0.77202	1583
3	0.96	0.23563	0.60549	1583
4	0.72	0.17696	0.49365	1583
5	0.51	0.12453	0.36863	1583
6	0.42	0.10215	0.35048	1583
7	0.36	0.08792	0.32641	1583
8	0.43	0.10587	0.38540	1583
9	0.69	0.17031	0.52811	1583
10	1.15	0.28177	0.79061	1583
11	2.02	0.49540	1.04780	1583
12	3.31	0.81318	1.40465	1583
13	4.78	1.17377	1.67457	1583
14	6.33	1.55534	1.91160	1583
15	7.34	1.80235	2.01203	1583
16	8.48	2.08310	2.18693	1583
17	9.34	2.29439	2.26037	1583
18	9.77	2.39946	2.26553	1583
19	9.80	2.40705	2.24494	1583
20	9.00	2.20939	2.09051	1583
21	7.76	1.90604	1.92501	1583
22	6.19	1.52096	1.71110	1583
23	4.42	1.08538	1.43337	1583
24	2.93	0.71824	1.21191	1583

Normalized Load Shape for PGE Zone R Weekend

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=87.5-100 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	2.16	0.68067	1.20142	1875
2	1.69	0.53223	1.06146	1875
3	1.27	0.40140	0.87165	1875
4	1.04	0.32827	0.74668	1875
5	0.81	0.25474	0.64886	1875
6	0.63	0.19883	0.54301	1875
7	0.60	0.18939	0.55973	1875
8	0.74	0.23164	0.69545	1875
9	1.02	0.32226	0.75181	1875
10	1.84	0.58023	1.14006	1875
11	2.79	0.87822	1.44584	1875
12	3.89	1.22406	1.68801	1875
13	5.14	1.61834	1.92802	1875
14	6.44	2.02871	2.07480	1875
15	7.41	2.33416	2.21330	1875
16	8.24	2.59499	2.25773	1875
17	8.86	2.79043	2.29686	1875
18	9.07	2.85624	2.32920	1875
19	8.76	2.75931	2.25948	1875
20	8.02	2.52555	2.15446	1875
21	6.84	2.15419	1.95084	1875
22	5.67	1.78664	1.78740	1875
23	4.14	1.30413	1.54820	1875
24	2.89	0.90851	1.38411	1875

Normalized Load Shape for PGE Zone R Weekend

------ APPLIANCE CODE FROM QA=Central AC Mean daily temperature=0-66.2 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	4.89	0.024678	0.15831	1132
2	3.52	0.017784	0.07686	1132
3	3.44	0.017348	0.09232	1132
4	2.91	0.014707	0.04214	1132
5	3.02	0.015269	0.06197	1132
6	3.01	0.015215	0.04969	1132
7	3.08	0.015530	0.04177	1132
8	3.71	0.018708	0.05485	1132
9	3.55	0.017918	0.04539	1132
10	3.25	0.016418	0.04032	1132
11	3.34	0.016866	0.05540	1132
12	3.76	0.018961	0.08466	1132
13	3.15	0.015877	0.05294	1132
14	4.43	0.022366	0.14787	1132
15	4.91	0.024779	0.14089	1132
16	5.83	0.029446	0.16815	1132
17	5.89	0.029739	0.16685	1132
18	7.00	0.035317	0.21164	1132
19	5.52	0.027869	0.14723	1132
20	5.25	0.026484	0.14047	1132
21	5.69	0.028703	0.14902	1132
22	4.77	0.024087	0.13219	1132
23	3.22	0.016242	0.05882	1132
24	2.87	0.014492	0.05173	1132

Normalized Load Shape for PGE Zone R Weekend

------ APPLIANCE CODE FROM QA=Central AC Mean daily temperature=66.2-75 ------

HOUR	% Daily Load	LOAD	STDDEV	N
1	2.32	0.07646	0.42630	4898
2	1.67	0.05518	0.37133	4898
3	1.30	0.04279	0.36414	4898
4	1.11	0.03675	0.39051	4898
5	0.99	0.03272	0.41824	4898
6	0.86	0.02850	0.40071	4898
7	0.90	0.02968	0.45055	4898
8	1.01	0.03323	0.49540	4898
9	1.05	0.03469	0.47441	4898
10	1.14	0.03764	0.44162	4898
11	1.61	0.05317	0.39940	4898
12	1.82	0.05996	0.43204	4898
13	2.85	0.09383	0.54326	4898
14	4.23	0.13938	0.65945	4898
15	5.91	0.19498	0.79149	4898
16	8.33	0.27465	0.95498	4898
17	10.14	0.33444	1.00757	4898
18	11.76	0.38778	1.08011	4898
19	11.41	0.37613	1.03254	4898
20	9.54	0.31449	0.92444	4898
21	7.55	0.24903	0.79342	4898
22	5.67	0.18703	0.65778	4898
23	4.27	0.14095	0.59555	4898
24	2.55	0.08423	0.48726	4898

Normalized Load Shape for PGE Zone R Weekend

APPLIANCE CODE FROM QA=Central AC Mean daily temperature=75-80 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.90	0.16593	0.58609	5066
2	1.29	0.11234	0.47862	5066
3	0.85	0.07437	0.36209	5066
4	0.62	0.05432	0.28669	5066
5	0.46	0.04046	0.22801	5066
6	0.38	0.03344	0.18828	5066
7	0.35	0.03054	0.16720	5066
8	0.41	0.03612	0.19932	5066
9	0.49	0.04310	0.21829	5066
10	0.66	0.05783	0.26335	5066
11	1.07	0.09380	0.40769	5066
12	1.69	0.14734	0.52751	5066
13	2.68	0.23371	0.68544	5066
14	4.63	0.40425	0.97616	5066
15	6.91	0.60379	1.22162	5066
16	9.05	0.79045	1.42323	5066
17	10.85	0.94809	1.53382	5066
18	12.18	1.06415	1.61374	5066
19	12.23	1.06832	1.60632	5066
20	10.37	0.90584	1.43979	5066
21	7.91	0.69060	1.19575	5066
22	6.10	0.53273	1.02918	5066
23	4.17	0.36419	0.86277	5066
24	2.75	0.24020	0.69631	5066

Normalized Load Shape for PGE Zone R Weekend

APPLIANCE CODE FROM QA=Central AC Mean daily temperature=80-85 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.73	0.28174	0.73829	4430
2	1.17	0.19078	0.57161	4430
3	0.84	0.13731	0.47795	4430
4	0.61	0.09994	0.38947	4430
5	0.45	0.07317	0.30436	4430
6	0.34	0.05471	0.23844	4430
7	0.30	0.04868	0.23225	4430
8	0.36	0.05799	0.28069	4430
9	0.50	0.08133	0.33535	4430
10	0.78	0.12647	0.47127	4430
11	1.30	0.21279	0.65255	4430
12	2.21	0.35985	0.90571	4430
13	3.67	0.59797	1.18325	4430
14	5.59	0.91099	1.48749	4430
15	7.36	1.20092	1.72530	4430
16	9.14	1.49079	1.89666	4430
17	10.49	1.71119	1.98993	4430
18	11.18	1.82247	2.02498	4430
19	11.14	1.81678	1.97500	4430
20	9.73	1.58662	1.80808	4430
21	7.84	1.27922	1.59348	4430
22	6.26	1.02153	1.41976	4430
23	4.36	0.71137	1.21055	4430
24	2.65	0.43276	0.94474	4430

Normalized Load Shape for PGE Zone R Weekend

------ APPLIANCE CODE FROM QA=Central AC Mean daily temperature=85-87.5 ------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.89	0.48337	0.95071	1496
2	1.40	0.35657	0.78718	1496
3	0.97	0.24696	0.61831	1496
4	0.73	0.18528	0.50447	1496
5	0.51	0.12939	0.37415	1496
6	0.42	0.10612	0.35702	1496
7	0.36	0.09195	0.33393	1496
8	0.43	0.11025	0.39420	1496
9	0.70	0.17746	0.53958	1496
10	1.15	0.29441	0.80997	1496
11	2.02	0.51584	1.06958	1496
12	3.31	0.84369	1.42983	1496
13	4.78	1.21836	1.70046	1496
14	6.33	1.61358	1.93569	1496
15	7.31	1.86565	2.02828	1496
16	8.45	2.15665	2.20571	1496
17	9.29	2.36874	2.27993	1496
18	9.72	2.48064	2.28240	1496
19	9.82	2.50432	2.25169	1496
20	9.02	2.30088	2.09606	1496
21	7.77	1.98167	1.93847	1496
22	6.23	1.58864	1.72602	1496
23	4.47	1.13919	1.44987	1496
24	2.94	0.75081	1.23185	1496

Normalized Load Shape for PGE Zone R Weekend

----- APPLIANCE CODE FROM QA=Central AC Mean daily temperature=87.5-100 ------

HOUR	% Daily Load	LOAD	STDDEV	N
1	2.18	0.70843	1.21934	1782
2	1.70	0.55407	1.07830	1782
3	1.29	0.41843	0.88705	1782
4	1.05	0.34198	0.76031	1782
5	0.82	0.26519	0.65989	1782
6	0.64	0.20765	0.55439	1782
7	0.61	0.19788	0.57186	1782
8	0.74	0.24075	0.70990	1782
9	1.03	0.33478	0.76564	1782
10	1.86	0.60418	1.16098	1782
11	2.80	0.91139	1.46879	1782
12	3.89	1.26422	1.70944	1782
13	5.14	1.67161	1.94901	1782
14	6.45	2.09791	2.09058	1782
15	7.42	2.41116	2.22569	1782
16	8.22	2.67096	2.26931	1782
17	8.82	2.86681	2.30798	1782
18	9.05	2.94051	2.33680	1782
19	8.73	2.83887	2.26759	1782
20	8.00	2.60036	2.16399	1782
21	6.83	2.22077	1.96238	1782
22	5.68	1.84704	1.79963	1782
23	4.15	1.34841	1.56284	1782
24	2.90	0.94254	1.40318	1782

Normalized Load Shape for PGE Zone S Weekday

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=0-62.1 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	3.48	0.015859	0.07649	1291
2	3.72	0.016936	0.12472	1291
3	3.73	0.016991	0.12691	1291
4	3.28	0.014947	0.08524	1291
5	3.33	0.015145	0.08748	1291
6	3.56	0.016219	0.08517	1291
7	4.17	0.018972	0.09660	1291
8	5.10	0.023208	0.10510	1291
9	5.30	0.024155	0.13116	1291
10	3.96	0.018011	0.07702	1291
11	3.62	0.016490	0.06434	1291
12	3.10	0.014105	0.04064	1291
13	3.46	0.015755	0.07480	1291
14	4.59	0.020903	0.16521	1291
15	4.87	0.022175	0.16100	1291
16	4.54	0.020693	0.12828	1291
17	5.25	0.023906	0.15274	1291
18	6.01	0.027380	0.17757	1291
19	6.33	0.028801	0.17094	1291
20	4.55	0.020721	0.10787	1291
21	4.33	0.019728	0.10800	1291
22	3.38	0.015383	0.05777	1291
23	3.23	0.014724	0.05876	1291
24	3.10	0.014128	0.06926	1291

Normalized Load Shape for PGE Zone S Weekday

------- APPLIANCE CODE FROM QA=Cooling Mean daily temperature=62.1-70 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.88	0.03663	0.22371	18745
2	1.36	0.02655	0.19333	18745
3	1.06	0.02071	0.16559	18745
4	0.89	0.01735	0.14948	18745
5	0.79	0.01539	0.13838	18745
6	0.77	0.01511	0.14058	18745
7	0.78	0.01522	0.13945	18745
8	0.81	0.01588	0.14747	18745
9	0.88	0.01718	0.14692	18745
10	0.99	0.01923	0.12878	18745
11	1.19	0.02319	0.15797	18745
12	1.46	0.02853	0.18276	18745
13	2.18	0.04257	0.25247	18745
14	3.32	0.06480	0.33961	18745
15	5.67	0.11063	0.48150	18745
16	8.56	0.16701	0.61270	18745
17	11.72	0.22864	0.72326	18745
18	13.94	0.27181	0.79035	18745
19	13.80	0.26910	0.78554	18745
20	10.37	0.20219	0.61429	18745
21	7.02	0.13686	0.47266	18745
22	4.91	0.09568	0.38431	18745
23	3.45	0.06726	0.31642	18745
24	2.18	0.04256	0.26313	18745

Normalized Load Shape for PGE Zone S Weekday

APPLIANCE CODE FROM QA-Cooling Mean daily temperature=70-75 ---------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.43	0.09043	0.42725	14094
2	0.93	0.05884	0.35472	14094
3	0.67	0.04235	0.32776	14094
4	0.54	0.03405	0.31759	14094
5	0.43	0.02757	0.29854	14094
6	0.38	0.02377	0.29537	14094
7	0.36	0.02262	0.29946	14094
8	0.39	0.02444	0.32221	14094
9	0.50	0.03179	0.36404	14094
10	0.70	0.04434	0.38767	14094
11	1.05	0.06635	0.40132	14094
12	1.57	0.09980	0.46073	14094
13	2.56	0.16250	0.58906	14094
14	4.14	0.26255	0.76328	14094
15	6.45	0.40856	0.97042	14094
16	9.32	0.59069	1.18213	14094
17	12.25	0.77666	1.35324	14094
18	14.08	0.89243	1.42220	14094
19	13.75	0.87163	1.38775	14094
20	10.67	0.67620	1.18537	14094
21	7.37	0.46737	0.94555	14094
22	5.09	0.32280	0.76858	14094
23	3.39	0.21503	0.62503	14094
24	1.97	0.12489	0.45866	14094

Normalized Load Shape for PGE Zone S Weekday

-------- APPLIANCE CODE FROM QA-Cooling Mean daily temperature=75-80 ---------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.34	0.16468	0.54497	10740
2	0.91	0.11173	0.42543	10740
3	0.66	0.08102	0.36080	10740
4	0.50	0.06161	0.31611	10740
5	0.39	0.04768	0.29085	10740
6	0.31	0.03829	0.24547	10740
7	0.29	0.03632	0.23874	10740
8	0.37	0.04597	0.29107	10740
9	0.52	0.06455	0.34721	10740
10	0.80	0.09860	0.45345	10740
11	1.25	0.15439	0.56848	10740
12	2.07	0.25505	0.74064	10740
13	3.30	0.40669	0.94702	10740
14	5.03	0.62022	1.18748	10740
15	7.12	0.87803	1.41618	10740
16	9.46	1.16713	1.61346	10740
17	11.36	1.40107	1.74351	10740
18	12.71	1.56722	1.79229	10740
19	12.58	1.55141	1.75320	10740
20	10.36	1.27815	1.56638	10740
21	7.63	0.94114	1.32486	10740
22	5.33	0.65771	1.09849	10740
23	3.59	0.44213	0.90535	10740
24	2.12	0.26198	0.69810	10740

Normalized Load Shape for PGE Zone S Weekday

APPLIANCE CODE FROM QA-Cooling Mean daily temperature-80-85 ---------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.29	0.24005	0.62543	6267
2	0.90	0.16782	0.49798	6267
3	0.62	0.11514	0.38838	6267
4	0.45	0.08423	0.31726	6267
5	0.35	0.06570	0.28203	6267
6	0.28	0.05199	0.25378	6267
7	0.28	0.05216	0.25862	6267
8	0.39	0.07230	0.31472	6267
9	0.60	0.11164	0.42240	6267
10	1.06	0.19713	0.62845	6267
11	1.73	0.32221	0.83192	6267
12	2.68	0.49966	1.08874	6267
13	4.16	0.77646	1.33125	6267
14	5.79	1.08053	1.52867	6267
15	7.46	1.39153	1.71023	6267
16	9.09	1.69556	1.85175	6267
17	10.51	1.96135	1.94329	6267
18	11.49	2.14383	1.95063	6267
19	11.42	2.13010	1.91593	6267
20	9.92	1.85007	1.77113	6267
21	7.68	1.43256	1.55015	6267
22	5.60	1.04410	1.33321	6267
23	3.83	0.71445	1.12016	6267
24	2.44	0.45575	0.92620	6267

Normalized Load Shape for PGE Zone S Weekday

-------- APPLIANCE CODE FROM QA-Cooling Mean daily temperature-85-100 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.62	0.37558	0.84551	1133
2	1.25	0.29062	0.74787	1133
3	0.98	0.22695	0.63720	1133
4	0.74	0.17129	0.53199	1133
5	0.62	0.14278	0.50358	1133
6	0.49	0.11260	0.41112	1133
7	0.41	0.09596	0.39937	1133
8	0.62	0.14440	0.51646	1133
9	0.98	0.22680	0.68101	1133
10	1.42	0.32939	0.85725	1133
11	2.09	0.48390	1.04326	1133
12	3.26	0.75419	1.30752	1133
13	4.70	1.08854	1.54425	1133
14	6.13	1.41845	1.76788	1133
15	7.44	1.72382	1.89392	1133
16	8.63	1.99931	1.98991	1133
17	9.43	2.18408	2.03065	1133
18	10.35	2.39607	2.03689	1133
19	10.40	2.40722	1.98733	1133
20	8.96	2.07425	1.85987	1133
21	7.45	1.72593	1.70196	1133
22	5.62	1.30205	1.49791	1133
23	3.88	0.89891	1.26454	1133
24	2.52	0.58419	1.04509	1133

Normalized Load Shape for PGE Zone S Weekday

APPLIANCE CODE FROM QA=Central AC Mean daily temperature=0-62.1 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	3.54	0.017951	0.08128	1137
2	3.78	0.019176	0.13275	1137
3	3.80	0.019237	0.13509	1137
4	3.34	0.016921	0.09066	1137
5	3.38	0.017142	0.09305	1137
6	3.62	0.018360	0.09055	1137
7	4.24	0.021488	0.10268	1137
8	5.19	0.026294	0.11165	1137
9	5.40	0.027374	0.13946	1137
10	4.03	0.020400	0.08178	1137
11	3.68	0.018669	0.06827	1137
12	3.15	0.015964	0.04296	1137
13	3.52	0.017839	0.07949	1137
14	4.61	0.023367	0.17554	1137
15	4.54	0.023003	0.15550	1137
16	4.63	0.023465	0.13647	1137
17	5.35	0.027123	0.16252	1137
18	5.92	0.029983	0.18553	1137
19	5.98	0.030322	0.16394	1137
20	4.16	0.021072	0.08539	1137
21	4.25	0.021549	0.11328	1137
22	3.44	0.017437	0.06128	1137
23	3.27	0.016565	0.06229	1137
24	3.15	0.015981	0.07360	1137

Normalized Load Shape for PGE Zone S Weekday

------ APPLIANCE CODE FROM QA=Central AC Mean daily temperature=62.1-70 ------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.95	0.04055	0.23489	16681
2	1.42	0.02944	0.20311	16681
3	1.10	0.02294	0.17363	16681
4	0.93	0.01931	0.15800	16681
5	0.83	0.01720	0.14655	16681
6	0.81	0.01691	0.14890	16681
7	0.82	0.01704	0.14771	16681
8	0.85	0.01772	0.15612	16681
9	0.92	0.01912	0.15535	16681
10	1.01	0.02100	0.13383	16681
11	1.21	0.02518	0.16413	16681
12	1.47	0.03054	0.18820	16681
13	2.18	0.04535	0.26060	16681
14	3.32	0.06906	0.35183	16681
15	5.64	0.11728	0.49804	16681
16	8.50	0.17654	0.63126	16681
17	11.55	0.23996	0.74363	16681
18	13.81	0.28698	0.81460	16681
19	13.74	0.28550	0.81222	16681
20	10.33	0.21459	0.63336	16681
21	6.97	0.14492	0.48579	16681
22	4.86	0.10098	0.39448	16681
23	3.50	0.07269	0.32860	16681
24	2.27	0.04722	0.27776	16681

Normalized Load Shape for PGE Zone S Weekday

APPLIANCE CODE FROM QA=Central AC Mean daily temperature=70-75 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.51	0.09947	0.44717	12522
2	0.98	0.06447	0.37070	12522
3	0.70	0.04614	0.34290	12522
4	0.56	0.03714	0.33371	12522
5	0.46	0.03026	0.31444	12522
6	0.40	0.02630	0.31259	12522
7	0.38	0.02518	0.31747	12522
8	0.41	0.02712	0.34128	12522
9	0.53	0.03526	0.38574	12522
10	0.73	0.04792	0.40764	12522
11	1.06	0.06969	0.41519	12522
12	1.57	0.10333	0.47232	12522
13	2.58	0.17037	0.60607	12522
14	4.18	0.27558	0.78359	12522
15	6.42	0.42343	0.99054	12522
16	9.22	0.60841	1.20578	12522
17	12.05	0.79516	1.37932	12522
18	13.88	0.91628	1.45005	12522
19	13.59	0.89705	1.41758	12522
20	10.65	0.70306	1.21409	12522
21	7.43	0.49063	0.96824	12522
22	5.14	0.33913	0.78621	12522
23	3.50	0.23100	0.64691	12522
24	2.07	0.13679	0.47807	12522

Normalized Load Shape for PGE Zone S Weekday

------- APPLIANCE CODE FROM QA=Central AC Mean daily temperature=75-80 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.40	0.17931	0.56438	9558
2	0.95	0.12163	0.43961	9558
3	0.69	0.08823	0.37394	9558
4	0.52	0.06703	0.32746	9558
5	0.41	0.05219	0.30355	9558
6	0.33	0.04208	0.25689	9558
7	0.32	0.04044	0.25237	9558
8	0.40	0.05103	0.30753	9558
9	0.55	0.07035	0.36392	9558
10	0.82	0.10583	0.47144	9558
11	1.27	0.16325	0.58482	9558
12	2.10	0.26993	0.76129	9558
13	3.34	0.42877	0.97362	9558
14	5.06	0.64935	1.21616	9558
15	7.09	0.90960	1.44586	9558
16	9.35	1.20003	1.64376	9558
17	11.20	1.43674	1.77707	9558
18	12.53	1.60816	1.82820	9558
19	12.46	1.59911	1.79008	9558
20	10.33	1.32507	1.59643	9558
21	7.64	0.98065	1.35092	9558
22	5.37	0.68850	1.11972	9558
23	3.66	0.46992	0.93026	9558
24	2.21	0.28328	0.72192	9558

Normalized Load Shape for PGE Zone S Weekday

APPLIANCE CODE FROM QA=Central AC Mean daily temperature=80-85 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.35	0.26283	0.64971	5576
2	0.95	0.18457	0.51852	5576
3	0.66	0.12749	0.40793	5576
4	0.48	0.09354	0.33384	5576
5	0.38	0.07280	0.29691	5576
6	0.30	0.05778	0.26792	5576
7	0.30	0.05847	0.27345	5576
8	0.41	0.08011	0.33132	5576
9	0.62	0.12070	0.43857	5576
10	1.08	0.20907	0.64656	5576
11	1.76	0.34117	0.85479	5576
12	2.73	0.52989	1.12257	5576
13	4.18	0.81054	1.36438	5576
14	5.78	1.12215	1.56220	5576
15	7.40	1.43687	1.74519	5576
16	8.99	1.74581	1.89206	5576
17	10.37	2.01292	1.98484	5576
18	11.38	2.20911	1.98922	5576
19	11.31	2.19627	1.95324	5576
20	9.83	1.90871	1.80178	5576
21	7.64	1.48389	1.57517	5576
22	5.64	1.09389	1.35576	5576
23	3.92	0.76161	1.14312	5576
24	2.54	0.49210	0.95367	5576

Normalized Load Shape for PGE Zone S Weekday

------ APPLIANCE CODE FROM QA=Central AC Mean daily temperature=85-100 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.68	0.40917	0.87263	999
2	1.31	0.31994	0.77756	999
3	1.01	0.24697	0.65899	999
4	0.77	0.18685	0.55220	999
5	0.64	0.15649	0.52439	999
6	0.51	0.12310	0.42503	999
7	0.44	0.10801	0.42379	999
8	0.66	0.16109	0.54644	999
9	1.02	0.24922	0.71214	999
10	1.46	0.35612	0.89139	999
11	2.15	0.52428	1.08281	999
12	3.34	0.81218	1.35129	999
13	4.71	1.14660	1.58970	999
14	6.07	1.47718	1.81012	999
15	7.34	1.78639	1.93913	999
16	8.55	2.08299	2.03193	999
17	9.31	2.26605	2.07688	999
18	10.29	2.50645	2.07137	999
19	10.34	2.51682	2.02098	999
20	8.85	2.15610	1.89812	999
21	7.41	1.80471	1.73596	999
22	5.61	1.36654	1.52834	999
23	3.94	0.95822	1.28979	999
24	2.58	0.62842	1.06977	999

Normalized Load Shape for PGE Zone S Weekend

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=0-62.1 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	5.30	0.020327	0.15091	1161
2	4.32	0.016560	0.10597	1161
3	4.61	0.017683	0.10441	1161
4	3.70	0.014180	0.07698	1161
5	3.79	0.014544	0.08046	1161
6	3.83	0.014695	0.07897	1161
7	3.77	0.014433	0.06834	1161
8	3.94	0.015118	0.06343	1161
9	4.55	0.017456	0.07438	1161
10	3.86	0.014801	0.05179	1161
11	3.40	0.013021	0.03934	1161
12	3.13	0.011981	0.03363	1161
13	3.05	0.011691	0.03435	1161
14	3.97	0.015198	0.13861	1161
15	4.22	0.016171	0.11141	1161
16	5.11	0.019577	0.16586	1161
17	5.03	0.019291	0.12979	1161
18	4.88	0.018686	0.09707	1161
19	4.67	0.017905	0.09197	1161
20	4.83	0.018516	0.12313	1161
21	5.35	0.020520	0.14358	1161
22	4.15	0.015894	0.10337	1161
23	3.52	0.013500	0.07936	1161
24	3.01	0.011541	0.06030	1161

Normalized Load Shape for PGE Zone S Weekend

------- APPLIANCE CODE FROM QA=Cooling Mean daily temperature=62.1-70 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.99	0.05205	0.27164	8510
2	1.43	0.03737	0.23081	8510
3	1.13	0.02959	0.21301	8510
4	0.99	0.02593	0.23795	8510
5	0.85	0.02223	0.22017	8510
6	0.77	0.02006	0.21849	8510
7	0.69	0.01808	0.22301	8510
8	0.70	0.01828	0.25678	8510
9	0.86	0.02237	0.31754	8510
10	1.11	0.02898	0.29513	8510
11	1.45	0.03781	0.24889	8510
12	2.02	0.05279	0.31236	8510
13	2.79	0.07295	0.39547	8510
14	4.12	0.10784	0.49584	8510
15	5.95	0.15576	0.59922	8510
16	8.32	0.21774	0.72794	8510
17	10.93	0.28596	0.84980	8510
18	13.06	0.34166	0.93740	8510
19	12.92	0.33793	0.91206	8510
20	10.32	0.26995	0.77662	8510
21	7.05	0.18433	0.60519	8510
22	5.11	0.13377	0.49119	8510
23	3.35	0.08754	0.36479	8510
24	2.09	0.05475	0.26499	8510

Normalized Load Shape for PGE Zone S Weekend

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=70-75 ---------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.50	0.10350	0.42120	6808
2	1.09	0.07504	0.35397	6808
3	0.72	0.04988	0.27542	6808
4	0.56	0.03838	0.23650	6808
5	0.46	0.03164	0.23816	6808
6	0.37	0.02518	0.19644	6808
7	0.35	0.02416	0.18434	6808
8	0.42	0.02920	0.21431	6808
9	0.55	0.03794	0.28785	6808
10	0.77	0.05287	0.34796	6808
11	1.22	0.08419	0.46181	6808
12	1.99	0.13692	0.58008	6808
13	3.25	0.22432	0.75124	6808
14	4.85	0.33434	0.90505	6808
15	6.88	0.47442	1.08562	6808
16	9.19	0.63332	1.24923	6808
17	11.62	0.80107	1.39463	6808
18	13.34	0.91943	1.48039	6808
19	12.89	0.88878	1.41664	6808
20	10.47	0.72187	1.24823	6808
21	7.31	0.50372	1.01397	6808
22	4.84	0.33366	0.80032	6808
23	3.35	0.23076	0.66360	6808
24	2.02	0.13915	0.49986	6808

Normalized Load Shape for PGE Zone S Weekend

-------- APPLIANCE CODE FROM QA=Cooling Mean daily temperature=75-100 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.50	0.24654	0.69695	6193
2	1.02	0.16744	0.56209	6193
3	0.77	0.12603	0.48921	6193
4	0.56	0.09172	0.41075	6193
5	0.42	0.06878	0.35085	6193
6	0.33	0.05413	0.29245	6193
7	0.29	0.04811	0.26291	6193
8	0.37	0.06140	0.28301	6193
9	0.61	0.09953	0.41501	6193
10	1.07	0.17532	0.60442	6193
11	1.78	0.29133	0.80546	6193
12	2.77	0.45397	1.00964	6193
13	4.20	0.68838	1.23417	6193
14	6.02	0.98707	1.49318	6193
15	7.78	1.27547	1.66716	6193
16	9.52	1.56065	1.81758	6193
17	10.69	1.75273	1.89161	6193
18	11.28	1.84921	1.90378	6193
19	10.92	1.78998	1.85734	6193
20	9.45	1.54904	1.70158	6193
21	7.20	1.18085	1.47340	6193
22	5.32	0.87264	1.28007	6193
23	3.71	0.60835	1.08658	6193
24	2.43	0.39866	0.91824	6193

Normalized Load Shape for PGE Zone S Weekend

APPLIANCE CODE FROM QA-Central AC Mean daily temperature=0-62.1 ------

HOUR	% Daily Load	LOAD	STDDEV	N
1	5.37	0.022815	0.16007	1030
2	4.38	0.018578	0.11235	1030
3	4.67	0.019835	0.11067	1030
4	3.74	0.015889	0.08157	1030
5	3.84	0.016295	0.08526	1030
6	3.87	0.016431	0.08367	1030
7	3.81	0.016177	0.07236	1030
8	3.99	0.016952	0.06712	1030
9	4.57	0.019399	0.07841	1030
10	3.91	0.016610	0.05472	1030
11	3.45	0.014628	0.04150	1030
12	3.17	0.013464	0.03544	1030
13	3.09	0.013121	0.03622	1030
14	4.03	0.017106	0.14708	1030
15	4.29	0.018200	0.11815	1030
16	5.16	0.021928	0.17595	1030
17	4.92	0.020910	0.13595	1030
18	4.87	0.020682	0.10240	1030
19	4.52	0.019178	0.09538	1030
20	4.74	0.020117	0.12982	1030
21	5.03	0.021355	0.14826	1030
22	4.18	0.017764	0.10960	1030
23	3.35	0.014219	0.07967	1030
24	3.04	0.012909	0.06388	1030

Normalized Load Shape for PGE Zone S Weekend

------ APPLIANCE CODE FROM QA-Central AC Mean daily temperature=62.1-70 ------

HOUR	% Daily Load	LOAD	STDDEV	N
1	2.07	0.05717	0.28326	7579
2	1.50	0.04138	0.24157	7579
3	1.19	0.03271	0.22273	7579
4	1.04	0.02860	0.24959	7579
5	0.90	0.02472	0.23305	7579
6	0.81	0.02239	0.23142	7579
7	0.73	0.02018	0.23624	7579
8	0.74	0.02036	0.27198	7579
9	0.90	0.02473	0.33593	7579
10	1.14	0.03153	0.30925	7579
11	1.45	0.04013	0.25477	7579
12	1.98	0.05454	0.31795	7579
13	2.72	0.07512	0.40352	7579
14	4.03	0.11125	0.50591	7579
15	5.88	0.16217	0.61335	7579
16	8.20	0.22628	0.74465	7579
17	10.85	0.29929	0.87327	7579
18	13.01	0.35894	0.96508	7579
19	12.87	0.35508	0.93962	7579
20	10.31	0.28429	0.79925	7579
21	7.03	0.19385	0.62037	7579
22	5.14	0.14174	0.50489	7579
23	3.37	0.09297	0.37386	7579
24	2.14	0.05903	0.27312	7579

Normalized Load Shape for PGE Zone S Weekend

APPLIANCE CODE FROM QA-Central AC Mean daily temperature=70-75 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.55	0.11169	0.43452	6056
2	1.12	0.08069	0.36304	6056
3	0.74	0.05311	0.27951	6056
4	0.57	0.04132	0.24157	6056
5	0.47	0.03389	0.24412	6056
6	0.38	0.02744	0.20477	6056
7	0.37	0.02668	0.19449	6056
8	0.45	0.03234	0.22666	6056
9	0.58	0.04159	0.30244	6056
10	0.78	0.05608	0.36217	6056
11	1.20	0.08674	0.47189	6056
12	1.99	0.14337	0.59587	6056
13	3.25	0.23433	0.77325	6056
14	4.82	0.34747	0.92567	6056
15	6.83	0.49223	1.10844	6056
16	9.16	0.66008	1.27896	6056
17	11.50	0.82881	1.42547	6056
18	13.22	0.95242	1.51395	6056
19	12.78	0.92124	1.44955	6056
20	10.47	0.75423	1.27752	6056
21	7.34	0.52921	1.03988	6056
22	4.87	0.35123	0.81977	6056
23	3.43	0.24693	0.68523	6056
24	2.12	0.15266	0.52370	6056

Normalized Load Shape for PGE Zone S Weekend

------ APPLIANCE CODE FROM QA-Central AC Mean daily temperature=75-100 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.57	0.26712	0.72086	5520
2	1.07	0.18263	0.58323	5520
3	0.80	0.13714	0.50654	5520
4	0.58	0.09860	0.42426	5520
5	0.44	0.07479	0.36498	5520
6	0.35	0.05911	0.30544	5520
7	0.31	0.05245	0.27487	5520
8	0.39	0.06705	0.29628	5520
9	0.63	0.10678	0.43021	5520
10	1.09	0.18552	0.62306	5520
11	1.80	0.30737	0.92824	5520
12	2.79	0.47561	1.03570	5520
13	4.20	0.71591	1.25958	5520
14	5.98	1.02064	1.52266	5520
15	7.69	1.31141	1.70102	5520
16	9.42	1.60733	1.85669	5520
17	10.58	1.80376	1.93220	5520
18	11.20	1.90954	1.94280	5520
19	10.85	1.85109	1.89479	5520
20	9.40	1.60317	1.73385	5520
21	7.20	1.22708	1.49988	5520
22	5.38	0.91766	1.30662	5520
23	3.78	0.64414	1.11393	5520
24	2.51	0.42820	0.94794	5520

Normalized Load Shape for PGE Zone X Weekday

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=0-5[illegible].6 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	3.39	0.015021	0.05900	3368
2	2.98	0.013210	0.04393	3368
3	2.80	0.012393	0.03584	3368
4	2.72	0.012027	0.03426	3368
5	2.67	0.011828	0.03380	3368
6	2.79	0.012352	0.03881	3368
7	2.93	0.012955	0.04597	3368
8	3.32	0.014713	0.06537	3368
9	3.58	0.015861	0.08836	3368
10	3.25	0.014395	0.08219	3368
11	3.12	0.013803	0.05192	3368
12	3.78	0.016737	0.09444	3368
13	4.01	0.017761	0.11386	3368
14	4.73	0.020936	0.15884	3368
15	4.70	0.020804	0.12787	3368
16	5.57	0.024663	0.15615	3368
17	6.78	0.030045	0.18043	3368
18	7.04	0.031164	0.18939	3368
19	6.07	0.026870	0.14739	3368
20	5.95	0.026371	0.14794	3368
21	4.84	0.021426	0.10630	3368
22	4.67	0.020667	0.09909	3368
23	4.46	0.019738	0.08990	3368
24	3.87	0.017134	0.08756	3368

Normalized Load Shape for PGE Zone X Weekday

------ APPLIANCE CODE FROM QA=Cooling Mean daily temperature=58.6-67.5 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.58	0.02274	0.12769	24092
2	1.21	0.01745	0.09081	24092
3	1.06	0.01533	0.07563	24092
4	0.99	0.01433	0.07296	24092
5	0.94	0.01348	0.06228	24092
6	0.94	0.01358	0.06714	24092
7	1.03	0.01490	0.07739	24092
8	1.17	0.01683	0.07780	24092
9	1.22	0.01754	0.08881	24092
10	1.54	0.02218	0.13090	24092
11	1.95	0.02806	0.17260	24092
12	2.37	0.03422	0.20780	24092
13	3.19	0.04604	0.26124	24092
14	4.48	0.06455	0.32879	24092
15	6.68	0.09624	0.42552	24092
16	9.24	0.13318	0.52036	24092
17	12.21	0.17595	0.61543	24092
18	13.69	0.19732	0.65212	24092
19	12.16	0.17529	0.60245	24092
20	8.31	0.11975	0.45751	24092
21	5.26	0.07579	0.32757	24092
22	3.94	0.05675	0.26255	24092
23	2.86	0.04124	0.20538	24092
24	1.99	0.02865	0.15640	24092

Normalized Load Shape for PGE Zone X Weekday

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=67.5-72.5 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.05	0.04889	0.26965	8942
2	0.76	0.03521	0.22970	8942
3	0.58	0.02678	0.18546	8942
4	0.50	0.02315	0.17652	8942
5	0.43	0.01989	0.15259	8942
6	0.39	0.01819	0.13501	8942
7	0.42	0.01946	0.12789	8942
8	0.51	0.02350	0.15788	8942
9	0.60	0.02779	0.17375	8942
10	0.82	0.03834	0.21993	8942
11	1.19	0.05517	0.30104	8942
12	1.72	0.08014	0.37878	8942
13	2.68	0.12456	0.50601	8942
14	4.27	0.19847	0.65689	8942
15	7.03	0.32690	0.88198	8942
16	9.92	0.46158	1.05204	8942
17	13.41	0.62411	1.20855	8942
18	15.19	0.70702	1.27849	8942
19	14.03	0.65294	1.20180	8942
20	10.27	0.47791	1.00069	8942
21	6.22	0.28943	0.74351	8942
22	3.97	0.18478	0.57381	8942
23	2.55	0.11870	0.43762	8942
24	1.51	0.07036	0.31470	8942

Normalized Load Shape for PGE Zone X Weekday

------ APPLIANCE CODE FROM QA=Cooling Mean daily temperature=72.5-77.5 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	0.84	0.07027	0.33423	5340
2	0.60	0.04993	0.26617	5340
3	0.42	0.03513	0.20645	5340
4	0.33	0.02767	0.17836	5340
5	0.28	0.02369	0.15987	5340
6	0.25	0.02095	0.13602	5340
7	0.24	0.01972	0.11777	5340
8	0.33	0.02775	0.16739	5340
9	0.45	0.03783	0.22138	5340
10	0.75	0.06250	0.31384	5340
11	1.20	0.10046	0.44678	5340
12	1.95	0.16245	0.60017	5340
13	3.11	0.25931	0.78360	5340
14	4.84	0.40385	0.98430	5340
15	7.34	0.61186	1.21581	5340
16	10.02	0.83537	1.40443	5340
17	12.84	1.07047	1.55772	5340
18	14.33	1.19534	1.59169	5340
19	13.89	1.15807	1.55479	5340
20	10.78	0.89869	1.34933	5340
21	6.95	0.57972	1.07134	5340
22	4.22	0.35220	0.82548	5340
23	2.55	0.21286	0.62875	5340
24	1.48	0.12368	0.46540	5340

Normalized Load Shape for PGE Zone X Weekday

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=77.5-100 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.16	0.18248	0.64256	1593
2	0.88	0.13861	0.55043	1593
3	0.70	0.10975	0.49176	1593
4	0.52	0.08224	0.40898	1593
5	0.39	0.06210	0.34938	1593
6	0.34	0.05402	0.31972	1593
7	0.28	0.04426	0.27110	1593
8	0.40	0.06255	0.32064	1593
9	0.62	0.09709	0.42289	1593
10	1.08	0.16981	0.61667	1593
11	1.74	0.27444	0.79789	1593
12	2.49	0.39267	0.95393	1593
13	3.64	0.57305	1.16069	1593
14	5.46	0.85963	1.43339	1593
15	7.52	1.18415	1.65552	1593
16	9.22	1.45178	1.77177	1593
17	11.01	1.73462	1.86273	1593
18	12.34	1.94378	1.89159	1593
19	12.08	1.90312	1.86671	1593
20	10.47	1.64981	1.72571	1593
21	7.69	1.21192	1.50007	1593
22	5.13	0.80785	1.23627	1593
23	3.07	0.48382	0.97803	1593
24	1.77	0.27939	0.75539	1593

Normalized Load Shape for PGE Zone X Weekday

------ APPLIANCE CODE FROM QA=Central AC Mean daily temperature=0-58.6 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	3.66	0.017702	0.05932	2606
2	3.21	0.015548	0.04059	2606
3	3.12	0.015125	0.03861	2606
4	3.03	0.014691	0.03665	2606
5	2.96	0.014343	0.03567	2606
6	2.99	0.014467	0.03554	2606
7	3.08	0.014890	0.03790	2606
8	3.42	0.016581	0.06555	2606
9	3.16	0.015321	0.04335	2606
10	3.03	0.014684	0.03405	2606
11	3.26	0.015801	0.05048	2606
12	3.58	0.017351	0.07082	2606
13	4.07	0.019714	0.11751	2606
14	4.31	0.020887	0.12956	2606
15	4.34	0.021012	0.12425	2606
16	5.28	0.025574	0.14313	2606
17	6.52	0.031578	0.17895	2606
18	6.95	0.033640	0.19718	2606
19	6.18	0.029936	0.15892	2606
20	5.93	0.028718	0.15202	2606
21	4.75	0.022982	0.10615	2606
22	4.68	0.022642	0.10249	2606
23	4.51	0.021846	0.08994	2606
24	3.96	0.019171	0.07956	2606

Normalized Load Shape for PGE Zone X Weekday

APPLIANCE CODE FROM QA=Central AC Mean daily temperature=58.6-67.5 -----

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.69	0.02751	0.13847	18600
2	1.33	0.02171	0.10204	18600
3	1.17	0.01914	0.08534	18600
4	1.10	0.01787	0.08235	18600
5	1.03	0.01677	0.07005	18600
6	1.00	0.01638	0.07067	18600
7	1.02	0.01667	0.07320	18600
8	1.14	0.01861	0.07323	18600
9	1.20	0.01958	0.08161	18600
10	1.51	0.02454	0.13139	18600
11	1.91	0.03122	0.17725	18600
12	2.41	0.03928	0.22452	18600
13	3.19	0.05203	0.28033	18600
14	4.44	0.07236	0.35001	18600
15	6.66	0.10858	0.45936	18600
16	9.10	0.14837	0.55958	18600
17	11.95	0.19481	0.66025	18600
18	13.34	0.21743	0.69871	18600
19	12.26	0.19982	0.65444	18600
20	8.41	0.13708	0.49632	18600
21	5.26	0.08576	0.35069	18600
22	3.96	0.06449	0.28018	18600
23	2.89	0.04716	0.21710	18600
24	2.04	0.03323	0.16317	18600

Normalized Load Shape for PGE Zone X Weekday

----- APPLIANCE CODE FROM QA=Central AC Mean daily temperature=67.5-72.5 -----

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.14	0.05919	0.27866	6854
2	0.81	0.04204	0.22307	6854
3	0.62	0.03240	0.18006	6854
4	0.53	0.02737	0.15965	6854
5	0.46	0.02362	0.13381	6854
6	0.41	0.02141	0.11469	6854
7	0.42	0.02162	0.10751	6854
8	0.48	0.02511	0.12760	6854
9	0.57	0.02931	0.14056	6854
10	0.84	0.04366	0.22506	6854
11	1.28	0.06611	0.33111	6854
12	1.82	0.09460	0.41824	6854
13	2.76	0.14308	0.55458	6854
14	4.34	0.22507	0.71287	6854
15	7.10	0.36810	0.95519	6854
16	9.85	0.51080	1.13170	6854
17	13.17	0.68297	1.29145	6854
18	14.85	0.76997	1.36595	6854
19	13.69	0.70997	1.28074	6854
20	10.16	0.52677	1.07194	6854
21	6.28	0.32532	0.80272	6854
22	4.09	0.21192	0.62401	6854
23	2.67	0.13838	0.47783	6854
24	1.65	0.08549	0.34768	6854

Normalized Load Shape for PGE Zone X Weekday

APPLIANCE CODE FROM QA=Central AC Mean daily temperature=72.5-77.5 -----

HOUR	% Daily Load	LOAD	STDDEV	N
1	0.92	0.08540	0.37039	4094
2	0.66	0.06143	0.29351	4094
3	0.46	0.04299	0.22180	4094
4	0.36	0.03328	0.18614	4094
5	0.30	0.02796	0.15830	4094
6	0.26	0.02373	0.11899	4094
7	0.23	0.02091	0.09482	4094
8	0.31	0.02901	0.15328	4094
9	0.45	0.04200	0.23182	4094
10	0.77	0.07127	0.34228	4094
11	1.25	0.11603	0.49077	4094
12	1.99	0.18487	0.65554	4094
13	3.16	0.29332	0.85183	4094
14	4.92	0.45655	1.06410	4094
15	7.50	0.69669	1.31170	4094
16	10.09	0.93736	1.50747	4094
17	12.70	1.17929	1.65809	4094
18	14.03	1.30274	1.68984	4094
19	13.62	1.26485	1.65310	4094
20	10.53	0.97803	1.42998	4094
21	6.91	0.64187	1.14259	4094
22	4.31	0.40033	0.88621	4094
23	2.68	0.24926	0.67674	4094
24	1.60	0.14899	0.49932	4094

Normalized Load Shape for PGE Zone X Weekday

----- APPLIANCE CODE FROM QA=Central AC Mean daily temperature=77.5-100 ------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.28	0.22851	0.71776	1232
2	0.98	0.17471	0.61740	1232
3	0.77	0.13783	0.55240	1232
4	0.58	0.10334	0.46072	1232
5	0.44	0.07844	0.39515	1232
6	0.38	0.06707	0.35996	1232
7	0.30	0.05380	0.30510	1232
8	0.41	0.07333	0.35332	1232
9	0.62	0.11113	0.46191	1232
10	1.08	0.19290	0.66913	1232
11	1.78	0.31789	0.86664	1232
12	2.49	0.44493	1.02773	1232
13	3.65	0.65264	1.24513	1232
14	5.52	0.98615	1.54082	1232
15	7.58	1.35295	1.76371	1232
16	9.16	1.63497	1.87296	1232
17	10.82	1.93226	1.95391	1232
18	12.10	2.16169	1.96958	1232
19	11.89	2.12276	1.95154	1232
20	10.32	1.84294	1.80729	1232
21	7.63	1.36339	1.58649	1232
22	5.15	0.91907	1.32006	1232
23	3.16	0.56380	1.05862	1232
24	1.91	0.34155	0.83524	1232

Normalized Load Shape for PGE Zone X Weekend

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=0-58.6 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	3.14	0.013013	0.07331	1782
2	2.98	0.012343	0.07095	1782
3	2.87	0.011858	0.06883	1782
4	2.91	0.012026	0.06143	1782
5	2.43	0.010059	0.02943	1782
6	2.43	0.010074	0.02799	1782
7	2.44	0.010092	0.02775	1782
8	3.08	0.012729	0.04813	1782
9	3.52	0.014586	0.08090	1782
10	3.36	0.013901	0.09441	1782
11	3.76	0.015561	0.09406	1782
12	4.57	0.018893	0.11129	1782
13	5.80	0.024001	0.16999	1782
14	4.70	0.019436	0.12081	1782
15	4.31	0.017841	0.11667	1782
16	6.35	0.026287	0.19728	1782
17	6.83	0.028283	0.18650	1782
18	7.11	0.029440	0.19597	1782
19	6.18	0.025577	0.18400	1782
20	5.16	0.021365	0.14024	1782
21	4.48	0.018526	0.11117	1782
22	3.84	0.015902	0.06422	1782
23	4.03	0.016668	0.09891	1782
24	3.72	0.015406	0.08361	1782

Normalized Load Shape for PGE Zone X Weekend

------- APPLIANCE CODE FROM QA=Cooling Mean daily temperature=58.6-70 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.58	0.02702	0.15620	12043
2	1.16	0.01971	0.10606	12043
3	1.02	0.01736	0.08692	12043
4	0.94	0.01608	0.08121	12043
5	0.88	0.01494	0.07178	12043
6	0.84	0.01431	0.06423	12043
7	0.84	0.01429	0.05552	12043
8	0.95	0.01627	0.07358	12043
9	1.13	0.01931	0.10997	12043
10	1.34	0.02282	0.13186	12043
11	1.71	0.02911	0.16503	12043
12	2.37	0.04035	0.23037	12043
13	3.43	0.05856	0.30628	12043
14	4.82	0.08223	0.39489	12043
15	7.16	0.12210	0.49625	12043
16	9.69	0.16532	0.59323	12043
17	12.35	0.21067	0.67799	12043
18	13.20	0.22510	0.71208	12043
19	12.06	0.20561	0.66236	12043
20	8.86	0.15108	0.52813	12043
21	5.18	0.08828	0.36106	12043
22	3.85	0.06566	0.29752	12043
23	2.79	0.04753	0.22990	12043
24	1.86	0.03166	0.16814	12043

Normalized Load Shape for PGE Zone X Weekend

APPLIANCE CODE FROM QA=Cooling Mean daily temperature=70-100 --------

HOUR	% Daily Load	LOAD	STDDEV	N
1	0.97	0.09127	0.41123	4466
2	0.67	0.06347	0.33390	4466
3	0.46	0.04308	0.25979	4466
4	0.34	0.03253	0.20309	4466
5	0.27	0.02517	0.17265	4466
6	0.23	0.02181	0.15512	4466
7	0.22	0.02035	0.14386	4466
8	0.30	0.02835	0.18180	4466
9	0.49	0.04664	0.26347	4466
10	0.91	0.08632	0.41021	4466
11	1.48	0.14010	0.55731	4466
12	2.47	0.23272	0.73452	4466
13	3.76	0.35448	0.92449	4466
14	5.95	0.56163	1.17932	4466
15	8.26	0.77945	1.38370	4466
16	10.10	0.95265	1.50488	4466
17	11.90	1.12303	1.60667	4466
18	12.76	1.20411	1.62582	4466
19	12.01	1.13305	1.57506	4466
20	9.87	0.93110	1.41608	4466
21	6.92	0.65299	1.17393	4466
22	4.63	0.43716	0.94940	4466
23	3.15	0.29732	0.79120	4466
24	1.89	0.17790	0.58640	4466

Normalized Load Shape for PGE Zone X Weekend

------ APPLIANCE CODE FROM QA=Central AC Mean daily temperature=0-58.6 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	3.70	0.015989	0.08248	1394
2	3.52	0.015213	0.07986	1394
3	3.39	0.014639	0.07752	1394
4	3.45	0.014925	0.06911	1394
5	2.87	0.012402	0.03271	1394
6	2.85	0.012340	0.03092	1394
7	2.85	0.012310	0.03065	1394
8	3.49	0.015099	0.05184	1394
9	3.77	0.016297	0.08172	1394
10	2.87	0.012408	0.03152	1394
11	3.03	0.013092	0.03679	1394
12	3.84	0.016598	0.08688	1394
13	4.60	0.019873	0.11260	1394
14	3.86	0.016670	0.08485	1394
15	3.52	0.015226	0.06648	1394
16	5.62	0.024315	0.15663	1394
17	6.34	0.027427	0.17355	1394
18	7.81	0.033749	0.21475	1394
19	6.85	0.029621	0.19840	1394
20	5.28	0.022837	0.12192	1394
21	4.22	0.018247	0.07072	1394
22	3.84	0.016597	0.05450	1394
23	4.18	0.018057	0.08741	1394
24	4.25	0.018387	0.09136	1394

Normalized Load Shape for PGE Zone X Weekend

APPLIANCE CODE FROM QA=Central AC Mean daily temperature=58.6-70 ------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.75	0.03319	0.17290	9293
2	1.27	0.02398	0.11434	9293
3	1.13	0.02146	0.09757	9293
4	1.05	0.01988	0.09069	9293
5	0.97	0.01841	0.07924	9293
6	0.91	0.01723	0.06223	9293
7	0.91	0.01725	0.06110	9293
8	1.01	0.01906	0.07558	9293
9	1.12	0.02112	0.10680	9293
10	1.25	0.02367	0.11856	9293
11	1.59	0.03012	0.15816	9293
12	2.23	0.04224	0.23317	9293
13	3.27	0.06189	0.31747	9293
14	4.68	0.08857	0.42040	9293
15	6.87	0.13009	0.52538	9293
16	9.43	0.17845	0.63086	9293
17	12.13	0.22953	0.72157	9293
18	13.17	0.24918	0.76315	9293
19	12.17	0.23027	0.71515	9293
20	9.02	0.17070	0.56926	9293
21	5.25	0.09933	0.38953	9293
22	3.97	0.07513	0.32192	9293
23	2.88	0.05443	0.24670	9293
24	1.97	0.03735	0.18069	9293

Normalized Load Shape for PGE Zone X Weekend

------ APPLIANCE CODE FROM QA=Central AC Mean daily temperature=70-100 -------

HOUR	% Daily Load	LOAD	STDDEV	N
1	1.06	0.11162	0.46018	3430
2	0.75	0.07877	0.37492	3430
3	0.51	0.05336	0.29312	3430
4	0.38	0.04006	0.22822	3430
5	0.30	0.03101	0.19485	3430
6	0.26	0.02696	0.17551	3430
7	0.24	0.02479	0.16256	3430
8	0.31	0.03266	0.20001	3430
9	0.51	0.05300	0.28729	3430
10	0.92	0.09659	0.44491	3430
11	1.50	0.15710	0.60876	3430
12	2.46	0.25834	0.79561	3430
13	3.73	0.39132	0.99597	3430
14	5.93	0.62150	1.26854	3430
15	8.22	0.86230	1.48123	3430
16	10.00	1.04886	1.60398	3430
17	11.80	1.23771	1.70737	3430
18	12.61	1.32243	1.72631	3430
19	11.85	1.24259	1.67221	3430
20	9.73	1.02057	1.50146	3430
21	6.91	0.72457	1.25734	3430
22	4.74	0.49673	1.02562	3430
23	3.27	0.34311	0.85920	3430
24	2.01	0.21124	0.64670	3430

Appendix E
Data Tables for Chapter 7

Table E-1
Monthly Allocation Factors Non-Conditioning End Uses

SEASON	*WEEKDAY*	*WEEKEND*	*ALL DAYS*	*WEEKDAY/WEEKEND*
Clothes Dryer				
Jan	1.101	1.410	1.191	0.781
Feb	1.022	1.369	1.134	0.746
Mar	0.996	1.302	1.088	0.765
Apr	0.900	1.164	0.977	0.774
May	0.876	1.082	0.937	0.809
Jun	0.873	0.978	0.882	0.848
Jul	0.815	0.901	0.842	0.905
Aug	0.810	0.937	0.847	0.864
Sep	0.836	1.105	0.923	0.757
Oct	0.882	1.167	0.958	0.756
Nov	0.972	1.207	1.028	0.805
Dec	1.088	1.323	1.163	0.823
Cooking				
Jan	1.052	1.230	1.103	0.855
Feb	0.994	1.171	1.051	0.849
Mar	1.010	1.205	1.068	0.838
Apr	0.930	1.063	0.968	0.875
May	0.880	0.984	0.911	0.894
Jun	0.829	0.922	0.857	0.898
Jul	0.865	0.923	0.883	0.938
Aug	0.907	0.950	0.919	0.955
Sep	0.918	1.061	0.964	0.865
Oct	0.947	1.104	0.989	0.857
Nov	1.015	1.310	1.124	0.775
Dec	1.058	1.356	1.153	0.780

Table E-1 continued

SEASON	WEEKDAY	WEEKEND	ALL DAYS	WEEKDAY/WEEKEND
Kitchen Circuit				
Jan	0.975	1.001	0.982	0.974
Feb	0.966	0.983	0.972	0.982
Mar	0.953	0.981	0.962	0.972
Apr	0.985	1.008	0.991	0.977
May	0.971	0.998	0.979	0.973
Jun	1.050	1.056	1.052	0.995
Jul	1.092	1.087	1.091	1.005
Aug	1.052	1.066	1.056	0.987
Sep	1.031	1.051	1.038	0.981
Oct	0.985	1.017	0.994	0.969
Nov	0.943	0.976	0.956	0.966
Dec	0.931	0.950	0.937	0.980
Refrigerator				
Jan	0.846	0.868	0.852	0.975
Feb	0.862	0.883	0.869	0.977
Mar	0.900	0.944	0.913	0.954
Apr	0.971	1.002	0.980	0.969
May	0.985	1.013	0.994	0.972
Jun	1.133	1.117	1.128	1.015
Jul	1.117	1.122	1.119	0.996
Aug	1.130	1.160	1.139	0.974
Sep	1.066	1.118	1.082	0.954
Oct	1.014	1.029	1.018	0.985
Nov	0.932	0.976	0.948	0.955
Dec	0.926	0.939	0.930	0.987
Water Heater				
Jan	1.258	1.287	1.267	0.977
Feb	1.208	1.243	1.220	0.972
Mar	1.139	1.181	1.151	0.964
Apr	1.015	1.037	1.021	0.979
May	0.944	0.941	0.943	1.003
Jun	0.819	0.817	0.819	1.002
Jul	0.745	0.772	0.754	0.966
Aug	0.749	0.753	0.750	0.995
Sep	0.857	0.854	0.856	1.004
Oct	0.943	0.956	0.947	0.986
Nov	1.077	1.114	1.090	0.967
Dec	1.174	1.199	1.182	0.979

Average Daily Load Shapes by Season and Day Type

Percent of Total Daily Energy

-------------------- APPLIANCE CODE FROM QA=Clothes Dryer --------------------

Hour	Winter Weekend	Winter Weekday	Summer Weekend	Summer Weekday
1	0.71	0.93	0.87	0.99
2	0.38	0.41	0.42	0.42
3	0.21	0.25	0.24	0.25
4	0.13	0.16	0.17	0.20
5	0.12	0.20	0.15	0.24
6	0.21	0.59	0.27	0.57
7	0.51	2.08	0.57	1.94
8	1.52	3.89	1.73	3.87
9	3.49	5.48	3.84	5.69
10	5.92	7.08	6.11	7.19
11	7.83	7.88	7.99	8.22
12	8.92	7.91	8.90	8.27
13	8.93	7.10	8.84	7.09
14	8.21	6.03	8.10	5.96
15	7.59	5.57	6.99	5.29
16	7.05	5.61	6.26	5.19
17	6.76	5.67	6.07	5.32
18	6.50	5.73	5.95	5.40
19	5.78	5.68	5.66	5.49
20	5.37	5.47	5.33	5.28
21	4.90	5.45	5.28	5.44
22	4.19	5.14	4.85	5.29
23	3.00	3.66	3.47	4.08
24	1.76	2.02	1.95	2.31

Summer is June through October.
Winter is November through May.

Average Daily Load Shapes by Season and Day Type

Percent of Total Daily Energy

-------------------- APPLIANCE CODE FROM QA=Refrigerator --------------------

Hour	Winter Weekend	Winter Weekday	Summer Weekend	Summer Weekday
1	3.81	3.80	4.04	4.01
2	3.65	3.65	3.84	3.80
3	3.56	3.60	3.67	3.66
4	3.56	3.58	3.59	3.60
5	3.43	3.47	3.60	3.65
6	3.41	3.54	3.52	3.58
7	3.45	3.88	3.53	3.80
8	3.64	4.12	3.71	3.96
9	4.04	4.14	3.87	3.98
10	4.23	4.01	4.06	3.88
11	4.23	3.94	4.16	3.98
12	4.32	4.02	4.18	3.98
13	4.41	4.19	4.35	4.23
14	4.40	4.09	4.30	4.17
15	4.41	4.16	4.38	4.23
16	4.47	4.38	4.44	4.36
17	4.52	4.52	4.54	4.51
18	4.81	4.78	4.71	4.68
19	4.96	5.09	4.81	4.89
20	4.90	5.03	4.80	4.84
21	4.73	4.85	4.70	4.80
22	4.61	4.68	4.57	4.66
23	4.36	4.38	4.44	4.53
24	4.10	4.10	4.22	4.23

Summer is June through October.
Winter is November through May.

Average Daily Load Shapes by Season and Day Type

Percent of Total Daily Energy

-------------------- APPLIANCE CODE FROM QA=Water Heater --------------------

Hour	Winter Weekend	Winter Weekday	Summer Weekend	Summer Weekday
1	1.57	1.43	1.64	1.46
2	1.14	1.06	1.15	1.06
3	0.98	0.95	0.97	1.02
4	1.04	1.11	1.06	1.18
5	1.74	1.99	1.64	1.91
6	2.96	4.21	3.04	4.10
7	3.49	7.72	3.85	7.78
8	5.28	9.26	5.22	8.46
9	7.19	8.07	7.22	8.00
10	7.34	6.03	7.53	6.55
11	6.37	4.71	6.44	5.09
12	5.42	3.68	5.39	4.00
13	4.75	3.32	4.72	3.50
14	4.26	3.17	4.47	3.47
15	3.98	3.01	3.99	2.99
16	4.05	2.96	3.63	2.80
17	4.95	4.12	4.81	4.11
18	5.84	5.32	5.77	5.37
19	6.68	6.57	6.00	5.99
20	6.31	6.52	5.64	5.64
21	5.14	5.22	5.41	5.19
22	3.95	4.04	4.63	4.62
23	3.09	3.13	3.30	3.35
24	2.48	2.43	2.51	2.35

Summer is June through October.
Winter is November through May.

Average Daily Load Shapes by Season and Day Type

Percent of Total Daily Energy

------------------- APPLIANCE CODE FROM QA=Kitchen Circuit -------------------

Hour	Winter Weekend	Winter Weekday	Summer Weekend	Summer Weekday
1	3.72	3.71	3.85	3.84
2	3.52	3.50	3.67	3.63
3	3.36	3.36	3.52	3.52
4	3.22	3.25	3.38	3.40
5	3.20	3.26	3.33	3.36
6	3.20	3.41	3.32	3.48
7	3.40	3.90	3.46	3.82
8	3.89	4.31	3.75	4.04
9	4.24	4.08	4.09	3.93
10	4.31	3.91	4.22	3.88
11	4.21	3.81	4.13	3.87
12	4.22	3.85	4.12	3.90
13	4.28	4.01	4.23	4.06
14	4.27	3.92	4.29	4.03
15	4.26	3.99	4.31	4.11
16	4.34	4.21	4.39	4.31
17	4.55	4.49	4.60	4.58
18	5.10	5.21	4.91	5.02
19	5.28	5.52	5.08	5.24
20	5.17	5.40	5.03	5.19
21	5.05	5.27	4.91	5.08
22	4.77	4.96	4.80	4.92
23	4.42	4.57	4.52	4.61
24	4.03	4.11	4.11	4.16

Summer is June through October.
Winter is November through May.

Average Daily Load Shapes by Season and Day Type

Percent of Total Daily Energy

----------------------- APPLIANCE CODE FROM QA=Cooking -----------------------

Hour	Winter Weekend	Winter Weekday	Summer Weekend	Summer Weekday
1	0.33	0.28	0.38	0.33
2	0.22	0.20	0.27	0.24
3	0.19	0.18	0.23	0.22
4	0.20	0.22	0.24	0.27
5	0.31	0.54	0.37	0.56
6	0.66	1.58	0.70	1.57
7	1.80	3.82	1.67	3.45
8	4.00	4.89	3.69	4.38
9	5.66	3.72	5.67	3.78
10	6.03	3.19	6.21	3.49
11	5.53	3.23	5.86	3.40
12	5.91	4.34	6.03	4.38
13	6.30	4.51	6.13	4.67
14	5.42	3.48	5.10	3.75
15	5.15	3.32	4.71	3.38
16	6.00	4.94	5.33	4.69
17	9.04	9.21	7.84	8.29
18	13.47	17.37	12.29	15.85
19	11.73	15.80	12.32	16.07
20	5.94	7.51	7.12	8.43
21	3.04	3.92	3.95	4.49
22	1.67	2.16	2.20	2.47
23	0.91	1.09	1.08	1.28
24	0.48	0.50	0.59	0.60

Summer is June through October.
Winter is November through May.

Appendix F
Exploratory Analysis for CEC Space Conditioning THI-Matrix

Introduction

In the exploratory analyses presented in this appendix we begin to address two issues of interest in forecasting residential cooling loads: (1) estimating the incremental value of additional metered data, and (2) deciding on appropriate aggregation schemes for metered load data collected across possibly disparate (in terms of characterizing load response)geographic regions and over seasons and years. Answers depend on what particular features of energy use are important (for example, the peak hour of the year or the load pattern on a typical summer weekday, etc.) and on the degree of accuracy or precision required, or, more practically, on the cost of increased accuracy and precision relative to benefits achieved. We address these issues within the framework of the time-temperature matrix representation of central air conditioner loads used in the CEC model. As in Chapter 5, we compare backcast load shapes to sample data to evaluate the time-temperature matrices developed in these exploratory analyses. A limitation to our analyses is that, while the ultimate evaluation of the usefulness of model inputs is their performance as a component in estimation of residential class demand, we do not have system level residential data to which to compare our sample data.

We first discuss motivations for disaggregation of the AMP central air conditioner data by region, season, and day type. We show the data suggest that disaggregation by these factors may be appropriate, and develop smoothed time-temperature matrices from regional subsets of the AMP data. We then compare these representations to those based on the full set of 1985-1989 AMP central air conditioning data. We also address the issue of the value of additional years of sample data by comparing a time-temperature matrix based on a single year of data to one based on four years of data. Finally, we comment on the strategy used to evaluate the backcasts. The analyses described in this appendix were conducted without using analysis weights (see Chapter 3 and Appendix A).

Aggregation Issues

The time-temperature matrix used for backcast comparisons in Chapter 5 was developed using all central air conditioner data reported in the 1985-1989 AMP data sets. Backcast results presented in that chapter indicate the all-regions 1985-1989 time-temperature matrix performs reasonably well, at least for Region 3, in "predicting" the sample loads from which the matrix was derived. It is likely, however, that average air conditioning demand response to a given set of weather conditions (here as measured by THI on a given hour) varies by geographic region, season, day type, and even from year to year. Thus, developing separate time-temperature matrices for relevant subsets of the sample data set - which may form the basis for future enhancements to the CEC model - could lead to better estimates of demand although at the expense of reduced sample size. Another advantage of computing matrices based on subsets of the data is that subset-specific matrices may be used for model cross-validation, so that the data used to evaluate model fit are different than those used to construct the time-temperature matrix. For example, one could test how well a time-temperature matrix based on Region 3 data works for predicting load shape characteristics of Region 2 sample data. We do not present results from such cross-validations.

The aggregation issue for the time-temperature matrix may be viewed as one of balancing accuracy with precision: while in general more data is better than less, combining too much data may decrease accuracy, if the data combined are too disparate. The more disaggregated sample data become, however, the less data there are within a classification; consequently precision may be lowered. For example, a matrix based on only Region 2 central air conditioner data uses metered data from only 65 residences, while over 400 central air conditioners were metered between 1985-1989 in the AMP sample as a whole.

We examined the extent to which response does vary according to region, day type, and "season" (as defined below), first by comparing load distributions for several fixed set of weather conditions according to various factor aggregations. As an illustration of the typical levels of load variation observed, in CEC Region 2 there were 44 days over the five-year sample period with THI 81 at 6 p.m., and in CEC Region 3 there were 79 such days. We computed the average central air conditioner load across the regional sample for each of the 44 (Region 2) and 79 (Region 3) hours, respectively. The mean of the Region 3 distribution is approximately 0.3 kWh lower than the 1.7 kWh mean load for Region 2. A statistical test confirms that the means are different ($p < 0.05$), although an issue of at least equal importance is "how much different?" We also note that the sets of hours compared are not the same hours of the year, so there may be other confounding factors.[4] At these higher levels of disaggregation there are typically insufficient data to detect statistically significant differences for any but the grossest disparities.

We used the statistical technique analysis of variance (ANOVA) to make these comparisons for a broader portion of the sample, and to judge the importance of the differences. Considering only hours with THI 68 or greater (by an assumption of the CEC model, hours that contribute to air conditioning loads) and in the months April through October, we modeled regional mean central air conditioner load for a selected hour of the day (once for 4 p.m., once for 6 p.m.) as a function of THI and the first-order factors region, season, day type, and two second-order factor terms:region crossed with season, and region crossed with day type. We used only CEC Regions 2, 3, and 4, in these comparisons since only these three regions have sufficient data for reasonably reliable estimation of regional mean loads. The season factor had two values, Spring (April and May) and Summer (June through October). The day type factor had two values, Weekend and Weekday.

[4] One might also compare distributions by day type and season in addition to region.

Table F-1 lists coefficients and statistical significance (from an F-test) for these two ANOVAs. In the ANOVA for 6 p.m. load, the region and season were significant ($p=0.0001$), but day type was not ($p=0.8002$), nor were season crossed with region ($p=0.2379$) or day type crossed with region ($p=0.4834$). The coefficient estimates indicate that, for a given level of THI, central air conditioner demand is about 0.35 kWh higher in the relatively mild Region 4 than in Region 2 and about 0.46 kWh higher in Region 4 than in the warmest region, Region 3.[5] The coefficient estimates for seasonal effect suggest that for a given level of THI, central air conditioner demand is 0.185 higher in midsummer than in April and May. The ANOVA for 4 p.m. also indicated that region and season were important factors ($p=0.0001$), and that day type was important as well ($p=0.004$). That day type is important at 4 p.m. seems reasonable, since residents are more likely to at home at 4 p.m. on weekends than at 4 p.m. on weekdays.

This evidence suggests that greater disaggregation of the sample data in the construction of time-temperature matrices may result in increased model accuracy. For example, if midsummer forecasts are of interest, on the basis of the ANOVAs discussed above it seems reasonable to construct separate matrices for each region and to exclude early season data from the construction of the matrices. That is, the ANOVAs indicate that the level of demand to a given value of THI varies according to region, day type, and season, yet the time-temperature matrix used to generate normalized load curves is developed on an energy scale and is therefore influenced by the levels of absolute demand for loads contributing to its development.

To provide an indication of how much different the region-specific matrices are from an all-regions matrix, we computed separate time-temperature matrices (including the smoothing procedure described in Chapter 5) for the three CEC Regions with the most metered data for central air conditioners: Region 2 (Sacramento weather station, 65 residences reporting metered central air conditioner data), Region 3 (Fresno weather station, 186 residences), and the relatively mild Region 4 (San Jose weather station, 133 residences). We compared the actual region-specific matrices to the all-region matrix, and then compared backcasts based on each region-specific matrix to backcasts based on the all-regions matrix.

Figure F-1 shows the difference between the all-regions matrix and the matrix developed for Region 2 only. Only cells for which some data were observed over the five-year period are depicted. The surface is not flat; that is, the regional matrix does not represent a constant shift of loads. This lack of flatness suggests that the normalized load shapes generated from the two matrices will differ. The matrices are in good agreement for mild weather, with differences near zero for THI less than 70, but differ considerably for cells involving little data or with extrapolated loads.

We compared the performance of the region-specific time-temperature matrix relative to the all-regions time-temperature matrix. As in Chapter 5, we developed backcast load shapes for each day and compared the backcasts to the observed average load shapes from the sample data

[5] That residents respond to relative changes in THI is not surprising, although these effects might be at least in part due to how representative weather at the weather station is of weather at the metered residences.

in the region. For example, we compared backcasts based on the Region 2 time-temperature matrix to Region 2 sample data, using the measures described in Chapter 4. Tables F-2, F-3, and F-4 summarize the performance of the backcasts from the region-specific matrices, as compared to backcasts based on the all-region matrix, for Regions 2, 3, and 4 respectively. These summaries are based on days in the hottest five percentile of THI-DD between 1985 and 1989 at the NOAA station assigned to the region. Of course, the difficulty we noted in Chapter 5 of using the same data to develop the matrix as to evaluate the matrix is even more pronounced when using a region-specific matrix to backcast load shapes for the same region, as we do here.

Table F-2 shows that the Region 2 (Sacramento) matrix results are noticeably different than the all-regions matrix results: Region 2 matrix backcasts are worse than all-regions matrix backcasts in predicting the timing of the peak hour (17 percent correct as opposed to 23 percent correct for the all-regions backcast), but do somewhat better in predicting the level of the peak and that of the 4 p.m. load, and achieve a slightly lower mean RMSE. Similarly, Table F-4 shows the Region 4 matrix does worse in timing but better in the other three measures than the all-regions matrix. Table F-3 shows little difference between the performance of Region 3 and all-regions matrices. Note that Region 3 data makes a relatively large contribution to the all regions matrix, since it has the hottest weather and the most central air conditioners metered.

In summary, the ANOVAs described above indicate that central air conditioner load at a given hour depend not only on THI but also on region, season, and sometimes day type, and our backcast comparisons suggest that these differences may be large enough to warrant using region-specific time-temperature matrices within CEC modeling framework. However we cannot quantify the forecasting improvement that may be achieved.

Value of Additional Years of Data

Another issue in collecting metered end-use load data is estimating the value of additional data, both in terms of increased sample size and in the length of the period over which metered data is collected. In our exploratory analyses we begin to address the latter issue, again within the framework of the CEC model for residential air conditioning. In particular, we compared a time-temperature matrix developed from a single year (1988) of data alone to a matrix developed from four years of data (1985-1988) and compared backcasts from each of these two matrices to the sample data for 1989. Thus, sample data for the testing the matrices were not used in the development of the matrices, although most of the central air conditioners metered in 1989 were also metered in earlier years (that is, the 1989 sample is not "independent" of the 1985-1988 sample). We selected 1989 as the test year since it is the most recent year of sample data we have available, and selected 1988 for development of the one-year data set since it is the year closest to 1989. More importantly, 1988 was a relatively hot year in the service territory, while 1989 was a relatively mild year; this difference in weather may affect results.

Figure F-2 shows the difference between the time-temperature matrix developed from 1988 data only and that developed from 1985-1988 data. Again, only time-temperature cells for which some data were observed are depicted. The matrices are in close agreement for low and moderate THI portions of the matrix, but in poorer agreement in the high THI portion of the matrix, where less data are observed.

We developed backcasts for 1989 from the 1988 and from the 1985-1988 time-temperature matrices. Tables F-5 and F-6 summarize the results of the backcast-to-sample comparisons for Region 2, for all summer days and for days in the hottest ten percentile of THI-DD, respectively. (Both matrices are based on data from all regions, but separate backcasts are developed for Regions 2, 3, and 4 based on weather reported at the regional NOAA weather stations.) Definitions used for these summaries are discussed in Chapter 4. Over all summer days (Table F-5), the 1985-1988 matrix performs somewhat better than the 1988 matrix in predicting the level of load shape peaks in the 1989 Region 2 data, with the 1988 matrix generally underestimating the level of the peak. A similar but more moderate pattern holds for the hottest days (Table F-6). There is little difference between the performance of 1985-1988 and 1988 matrices for the other measures summarized in Tables F-5 and F-6.

Tables F-7 and F-8 summarize backcast results from using the 1988 and 1985-1988 matrices to predict 1989 load shapes for Region 3 for all summer days (Table F-7) and the hottest days (Table F-8). The 1985-1988 matrix predicts peak leads better than does the 1988 matrix for both all summer days and the hottest days. Both matrices predict 4 p.m. load on the hottest days well.

Tables F-9 and F-10 summarize backcasts from the 1985-1988 matrices for 1989 Region 4. While the 1985-1988 matrix does considerable better than the 1988 matrix in predicting peak loads over all summer days (Table F-9), the 1988 matrix in general predicts peak load better than does the 1985-1988 matrix for the hottest days (Table F-10).

Our analyses do not provide a general test of the question "how well does a matrix developed from any one year of data perform as compared to a matrix developed from multiple years of data?", due to the possible influence of confounding factors (which could be present in any pair of matrices compared). Among these confounding factors are the possibility of temporal trends and possible differences in response to a given set of weather variables between mild years (1989) and hot years (1988). Even with such factors, studies similar to these analyses may be useful in determining when to stop metering.

In summary, the four-year matrix predicted the level of the Region 2 sample data load shape peak better than did the one-year matrix, and both matrices performed about equally well for the other measures. That more data works better than less, assuming uniform data quality, is not a surprising result. That the performance difference between the four-year and one-year matrix lies almost entirely in predicting peak level suggests specifying more precisely the items to be forecast, and the implications of that choice for accuracy in forecasting other items. Finally, on the basis of these exploratory analyses, we do not have enough information to estimate the extent to which accuracy in forecasting systemwide residential cooling loads can be improved by additional years of data. For example, the degree to which additional data yields improved forecasts also depends on the method used to develop the smoothed load surface: a good smoothing algorithm might make up for a sparsely filled raw data matrix.

Comments on the Representation of Air Conditioning Loads

In Chapter 5, we commented on some shortcomings of the backcast-to-sample format used for matrix evaluation. We noted that, for a given set of weather conditions, the sample data shows considerable variation. Below we briefly address this inherent sample variability and the implications this variability has for our evaluation scheme.

As an illustration of the variation over which the averaging to compute a time-temperature matrix has taken place, consider all days over the five year period in CEC Region 2 weather data THI 81 at 6 p.m. There were 44 such days. For these 44 days, average daily central air conditioner energy use in the region ranged from 0.65 kWh to 1.93 kWh, which represents nearly a three-fold variation in load for the identical (in terms of model inputs) conditions.

To examine this variation from another perspective, we selected several days with similar THI profiles and compared the sample load shapes for these days. For example, we selected the 1986 system peak day (7/31/86, a Thursday), determined the hourly CEC Region 2 (Sacramento) THI profile for that day, and then examined historical weather data to find a second day with a similar load profile (9/5/88, a Monday) with THI profile from 3 p.m. to 9 p.m. identical to that recorded for 7/31/86. Figure F-3 shows the sample load profiles for this comparison on an energy-normalized basis. On an energy scale, the sample load shapes have nearly identical peak load levels (2.87 kWh at 7 p.m. on 7/31/86, 2.84 kWh at 5 p.m. on 9/5/88.) The two Region 2 energy-normalized load shapes shown in the figure are dramatically different, with peak load hour accounting for over 14 percent of total daily load on 7/31/86 but only 10.5 percent of total daily load, and two hours earlier, for 9/5/88. Since the THI profiles for the two days are nearly the same, so would be the backcast load shapes from a time-temperature matrix; the model can not capture this sample variability. Thus, in our backcast summaries, we consider average performance rather than performance for any single day. We examined such matched pairs for each of the five system peak days, all of which showed notable differences, although somewhat less dramatically than the energy-normalized comparison described above.

In the CEC model, load data for all days contribute to the raw time-temperature matrix and hence influence the smoothed load surface. Furthermore, the contribution of a day's load shape to the matrix backcast load shape for a day with the same THI profile is not straightforward, although data for all days are used in constructing the matrix, forecasting loads for particular days (such as hottest or peak load days) or forecasting particular aspects of the load shape (such as the peak hour of the day) have historically been of most interest. This distinction is important, since peak demand is different in nature than average demand. Statistical theory reflects this: peak loads are extreme values, which as statistical entities, do not have the nice properties of other distributional parameters such as the mean and other moments. For these reasons, it may be appropriate to examine additional or alternative load representations to the time-temperature matrix.

Conclusion

These exploratory analyses indicate that time-temperature matrices developed from data disaggregated data according to region, day type, and season, may provide better load forecasts than a single time-temperature matrix derived from all data combined. However, our results on the value of additional years of sample data, while consistent with the expectation that more data works better than less, do not provide a complete basis upon which to estimate the value of such additional data.

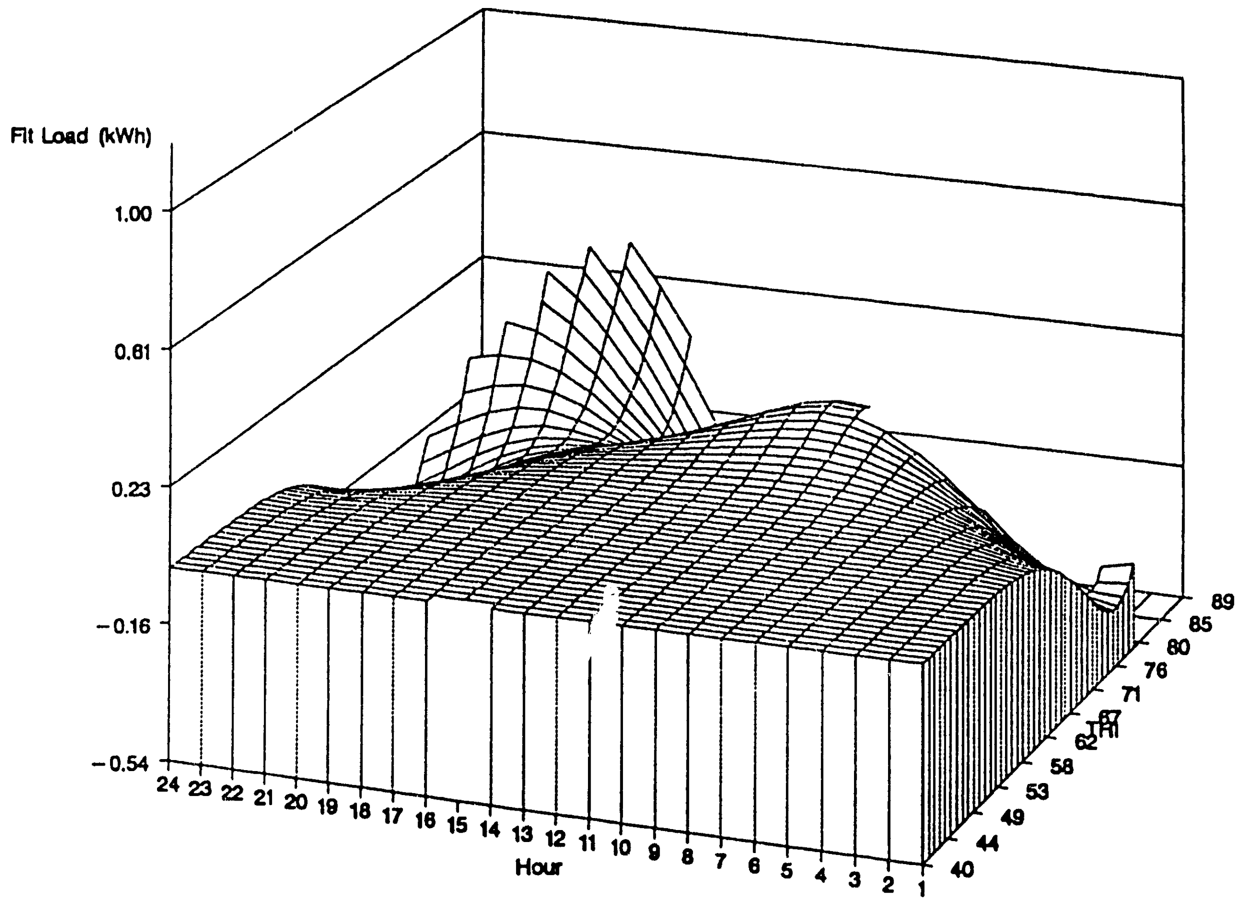

Figure F-1
Difference Between All Regions Time-Temperature Matrix and Region 2 Time-Temperature Matrix

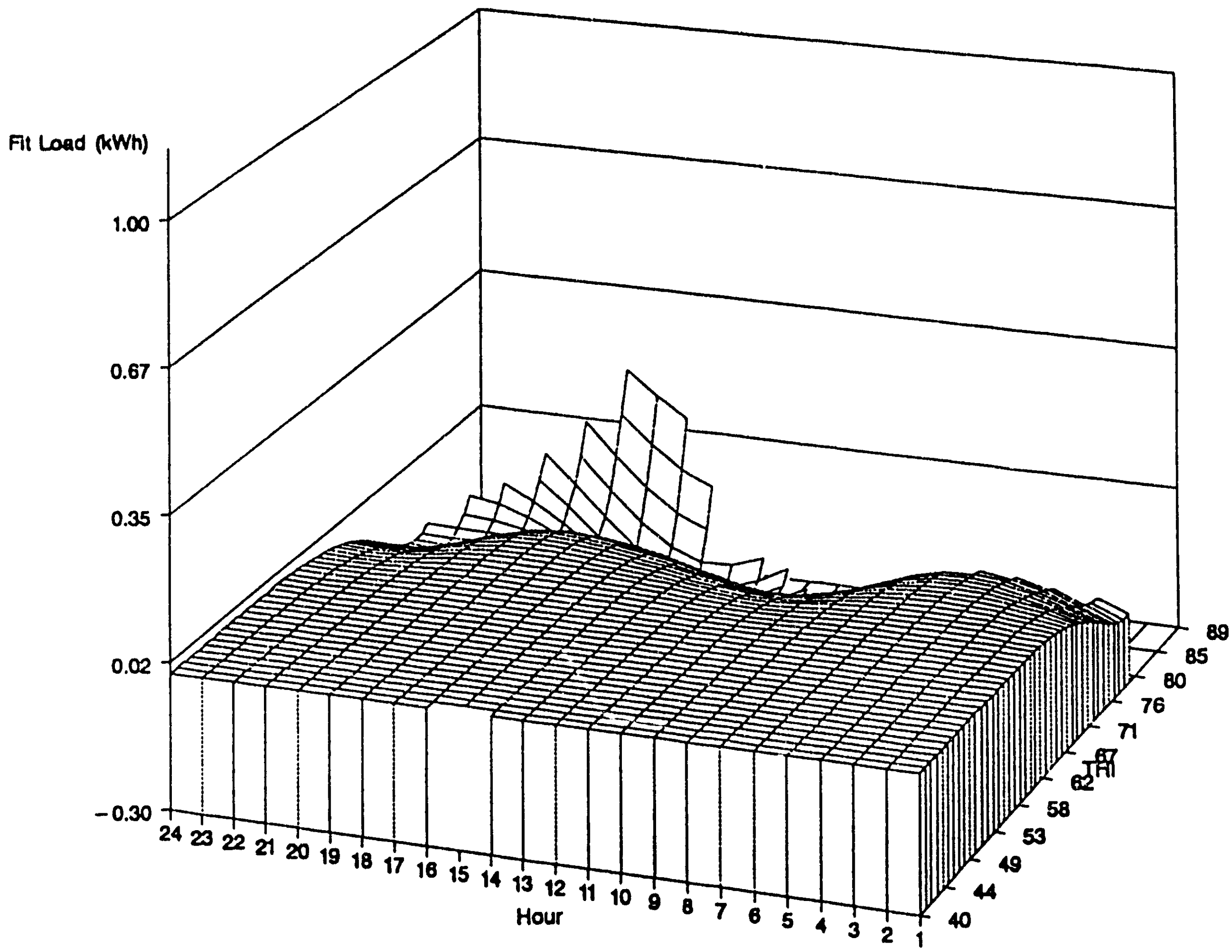

Figure F-2
Difference Between 1985-1988 Time-Temperature Matrix and 1988 Time-Temperature Matrix

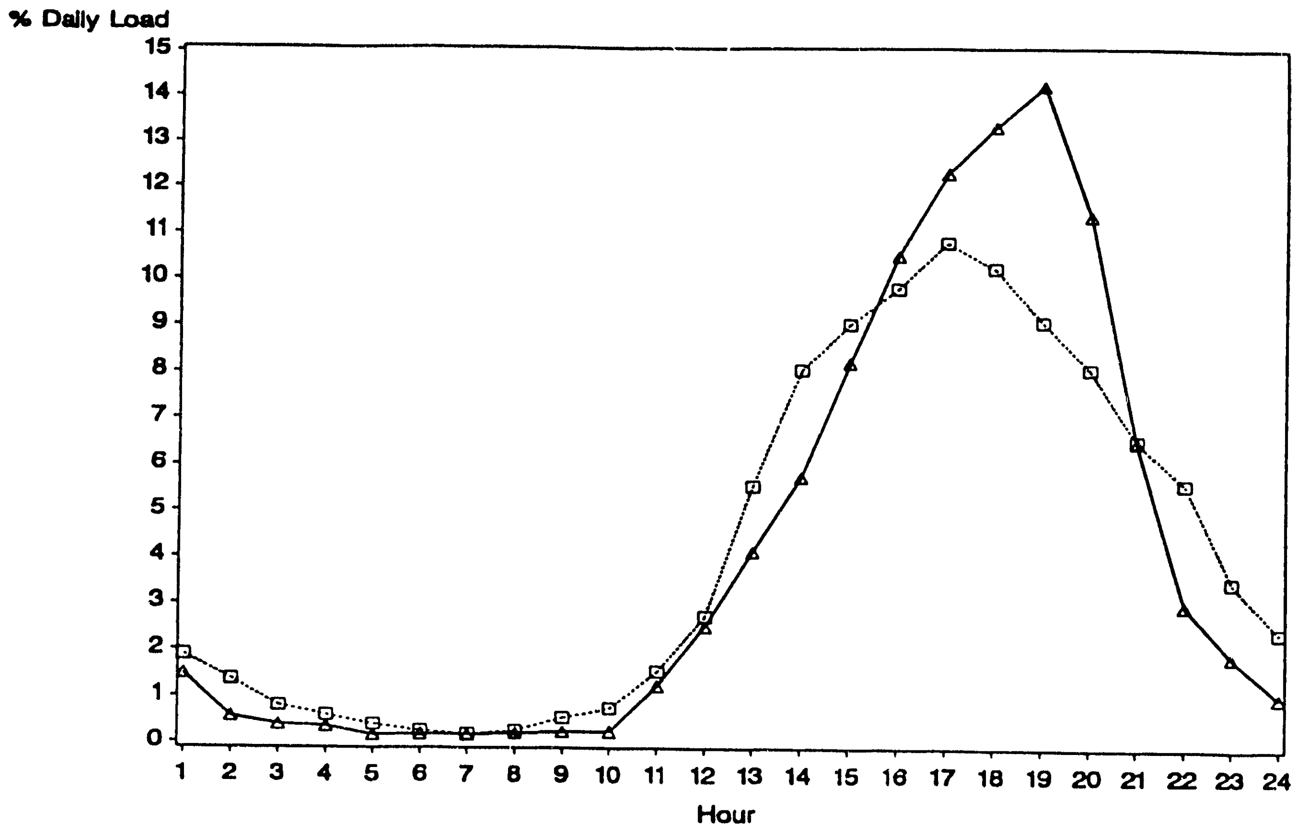

Figure F-3
CEC Region 2 Average Load Profiles for 7/31/86 (solid line) and 9/5/88 (dotted line)

Table F-1
ANOVA Results for 4 p.m. and 6 p.m. Regional Mean Loads

	ANOVA for 4 p.m. Load			ANOVA for 6 p.m. Load		
Parameter **	***Estimate***	***Standard Error***	***p-value****	***Estimate***	***Standard Error***	***p-value****
Intercept	-8.51	0.12	0	-10.33	0.13	0
THI	0.12	0	0	0.15	0	0
CEC Region			0.0001			0.0001
2	-0.21	0.03	0.0001	-0.33	0.04	0.0001
3	-0.27	0.03	0.0001	-0.46	0.04	0.0001
4	0	n/a	n/a	0	n/a	n/a
Season			0.0001			0.0001
Spring	-0.09	0.03	0.0066	-0.18	0.04	0.0001
Summer	0	n/a	n/a	0	n/a	n/a
Day Type			0.0041			0.8002
Weekday	-0.02	0.03	0.0289	0.02	0.03	0.4848
Weekend	0	n/a	n/a	0	n/a	n/a
Season x Region			0.2150			0.2379
Spring x Region 2	0.05	0.04	0.2115	0.09	0.05	0.0921
Spring x Region 3	-0.01	0.04	0.8554	0.05	0.05	0.3494
Spring x Region 4	0	n/a	n/a	0	n/a	n/a
Summer x Region 2	0	n/a	n/a	0	n/a	n/a
Summer x Region 3	0	n/a	n/a	0	n/a	n/a
Summer x Region 4	0	n/a	n/a	0	n/a	n/a
Daytype x Region			0.2909			0.4834
Weekend x Region 2	0	0.04	0.9473	0	0.04	0.9125
Weekend x Region 3	-0.05	0.04	0.1876	-0.04	0.04	0.3022
Weekend x Region 4	0	n/a	n/a	0	n/a	n/a
Weekday x Region 2	0	n/a	n/a	0	n/a	n/a
Weekday x Region 3	0	n/a	n/a	0	n/a	n/a
Weekday x Region 4	0	n/a	n/a	0	n/a	n/a

* p-values are from F-test for factors (THI, CEC Region, Season, Day Type, Season x Region, and Daytype x Region) and from t-test for coefficient estimates.

** the dimensionality of the factor subspaces requires model constraints: coefficients for some levels of each factor are set to 0, with corresponding standard error estimates and p-values irrelevant. Coefficients for the other levels of the factor show relative effects. This practice is called aliasing, and does not affect the model itself, but only model expression.

Table F-2
Summary of Backcast Performance of All-Regions and Region-Specific Matrix for CEC Region 2

Days in Top 5 Percent of THI-DD

*Timing of Peak Hour**	*All Region Matrix*	*Region 2 Matrix*
% same	23	17
% 1 hour late	28	15
% 1 hour early	32	34
% > 2 hours off	4	8
Magnitude of Peak (sample-backcast)		
Normalized:		
mean	-0.022	-0.008
mean absolute	0.022	0.011
median	-0.020	-0.006
standard deviation	0.013	0.013
Magnitude of 4 p.m. Load (sample-backcast)		
Normalized:		
mean	-0.014	-0.016
mean absolute	0.017	0.018
median	-0.014	-0.016
standard deviation	0.015	0.014
RMSE		
Normalized:		
mean	0.013	0.010
median	0.013	0.010
standard deviation	0.003	0.003
Number of day pairs	47	47

* backcast relative to sample

** in terms of THI-DD (see text)

Table F-3
Summary of Backcast Performance of All-Regions and Region-Specific Matrix for CEC Region 3

Summer Days in Top 5 Percent of THI-DD

	All Region Matrix	Region 3 Matrix
Timing of Peak Hour *		
% same	27	27
% 1 hour late	25	25
% 1 hour early	23	25
% > 2 hours off	10	8
Magnitude of Peak (sample-backcast)		
Normalized:		
mean	-0.001	-0.004
mean absolute	0.006	0.007
median	0.002	-0.004
standard deviation	0.008	0.007
Magnitude of 4 p.m. Load (sample-backcast)		
Normalized:		
mean	0.001	-0.001
mean absolute	0.006	0.007
median	0.001	-0.001
standard deviation	0.008	0.008
RMSE		
Normalized:		
mean	0.007	0.007
median	0.006	0.007
standard deviation	0.002	0.002
Number of day pairs	48	48

* backcast relative to sample
** in terms of THI-DD (see text)

Table F-4
Summary of Backcast Performance of All-Regions and Region-Specific Matrix for CEC Region 4

Days in Top 5 Percent of THI-DD

	All Region Matrix	*Region 4 Matrix*
Timing of Peak Hour*		
% same	30	18
% 1 hour late	10	25
% 1 hour early	40	38
% > 2 hours off	3	0
Magnitude of Peak (sample-backcast)		
Normalized:		
mean	-0.016	0.000
mean absolute	0.021	0.013
median	-0.018	0.002
standard deviation	0.021	0.018
Magnitude of 4 p.m. Load (sample-backcast)		
Normalized:		
mean	-0.020	-0.006
mean absolute	0.022	0.012
median	-0.018	-0.006
standard deviation	0.018	0.015
RMSE		
Normalized:		
mean	0.014	0.011
median	0.014	0.010
standard deviation	0.004	0.003
Number of day pairs	40	40

* backcast relative to sample

** in terms of THI-DD (see text)

Table F-5
Summary of Backcast Performance of 1988 and 1985-1988 Matrices for CEC Region 2

1989 Summer Days

	1985-1988 Matrix	1988 Matrix
Timing of Peak Hour*		
% same	27	28
% 1 hour late	17	16
% 1 hour early	23	24
% > 2 hours off	18	19
Magnitude of Peak (sample-backcast)		
Normalized:		
mean	-0.001	0.014
mean absolute	0.037	0.038
median	0.002	0.014
standard deviation	0.052	0.049
Magnitude of 4 p.m. Load (sample-backcast)		
Normalized:		
mean	-0.019	-0.015
mean absolute	0.039	0.037
median	-0.017	-0.015
standard deviation	0.050	0.048
RMSE		
Normalized:		
mean	0.030	0.029
median	0.023	0.025
standard deviation	0.017	0.015
Number of day pairs	184	184

* backcast relative to sample

Table F-6
Summary of Backcast Performance of 1988 and 1985-1988 Matrices for CEC Region 2

1989 Summer Days in Top 10% of 1989 THI-DD

	1985-1988 Matrix	1988 Matrix
Timing of Peak Hour*		
% same	21	21
% 1 hour late	32	21
% 1 hour early	26	37
% > 2 hours off	0	0
Magnitude of Peak (sample-backcast)		
Normalized:		
mean	-0.003	0.006
mean absolute	0.018	0.018
median	-0.006	0.002
standard deviation	0.023	0.023
Magnitude of 4 p.m. Load (sample-backcast)		
Normalized:		
mean	-0.002	-0.002
mean absolute	0.018	0.017
median	-0.006	-0.005
standard deviation	0.022	0.021
RMSE		
Normalized:		
mean	0.013	0.014
median	0.012	0.012
standard deviation	0.004	0.005
Number of day pairs	19	19

* backcast relative to sample

Table F-7
Summary of Backcast Performance of 1988 and 1985-1988 Matrices for CEC Region 3

1989 Summer Days

	1985-1988 Matrix	1988 Matrix
Timing of Peak Hour*		
% same	35	41
% 1 hour late	21	19
% 1 hour early	21	21
% > 2 hours off	14	14
Magnitude of Peak (sample-backcast)		
Normalized:		
mean	0.010	0.009
mean absolute	0.024	0.046
median	0.012	0.033
standard deviation	0.030	0.070
Magnitude of 4 p.m. Load (sample-backcast)		
Normalized:		
mean	-0.012	-0.003
mean absolute	0.023	0.018
median	-0.008	0.002
standard deviation	0.030	0.025
RMSE		
Normalized:		
mean	0.021	0.028
median	0.015	0.018
standard deviation	0.017	0.023
Number of day pairs	184	184

* backcast relative to sample

** in terms of THI-DD (see text)

Table F-8
Summary of Backcast Performance of 1988 and 1985-1988 Matrices for CEC Region 3

1989 Summer Days in Top 10% of 1989 THI-DD

	1985-1988 Matrix	1988 Matrix
Timing of Peak Hour*		
% same	41	41
% 1 hour late	18	18
% 1 hour early	27	32
% > 2 hours off	0	0
Magnitude of Peak (sample-backcast)		
Normalized:		
mean	0.004	0.011
mean absolute	0.008	0.012
median	0.003	0.013
standard deviation	0.009	0.008
Magnitude of 4 p.m. Load (sample-backcast)		
Normalized:		
mean	0.000	0.000
mean absolute	0.007	0.007
median	0.001	0.000
standard deviation	0.009	0.009
RMSE		
Normalized:		
mean	0.007	0.008
median	0.007	0.008
standard deviation	0.001	0.002
Number of day pairs	22	22

* backcast relative to sample

** in terms of THI-DD (see text)

Table F-9
Summary of Backcast Performance of 1988 and 1985-1988 Matrices for CEC Region 4

1989 Summer Days

*Timing of Peak Hour**	*1985-1988 Matrix*	*1988 Matrix*
% same	25	29
% 1 hour late	17	21
% 1 hour early	29	23
% > 2 hours off	16	16
Magnitude of Peak (sample-backcast)		
Normalized:		
mean	0.001	-0.030
mean absolute	0.029	0.049
median	0.003	-0.003
standard deviation	0.040	0.073
Magnitude of 4 p.m. Load (sample-backcast)		
Normalized:		
mean	-0.019	-0.003
mean absolute	0.023	0.024
median	-0.018	-0.001
standard deviation	0.032	0.033
RMSE		
Normalized:		
mean	0.026	0.032
median	0.022	
standard deviation	0.015	0.024
Number of day pairs	182	182

* backcast relative to sample
** in terms of THI-DD (see text)

Table F-10
Summary of Backcast Performance of 1988 and 1985-1988 Matrices for CEC Region 4

1989 Summer Days in Top 10% of 1989 THI-DD

	1985-1988 Matrix	1988 Matrix
Timing of Peak Hour *		
% same	30	25
% 1 hour late	15	15
% 1 hour early	40	40
% > 2 hours off	0	0
Magnitude of Peak (sample-backcast)		
Normalized:		
mean	-0.009	0.001
mean absolute	0.018	0.016
median	-0.009	0.003
standard deviation	0.023	0.023
Magnitude of 4 p.m. Load (sample-backcast)		
Normalized:		
mean	-0.010	-0.007
mean absolute	0.018	0.017
median	-0.013	-0.011
standard deviation	0.018	0.018
RMSE		
Normalized:		
mean	0.015	0.017
median	0.015	0.018
standard deviation	0.004	0.005
Number of day pairs		20

* backcast relative to sample

** in terms of THI-DD (see text)

END

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