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Program Evaluation: Weatherization Residential Assistance Partnership (WRAP) Program

Volume III
Appendices D, E, F, and G

MASTER

Prepared for
Northeast Utilities
WRAP Task Force

Prepared by
ICF Resources Incorporated

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this evaluation report is dedicated
to the memory of

Charles R. "Tom" Dunklee

The complete program evaluation comprises five documents:

Principal evaluation document:

Program Evaluation: Weatherization Residential Assistance Partnership (WRAP) Program, ICF Resources Incorporated, December 1991.

Volume I: Final Report

Volume II: Appendices A, B, and C

Volume III: Appendices D, E, F, and G

Companion documents:

WRAP Program Evaluation, Steven Ferrey & Associates, 1990.

Process Evaluation, Weatherization Residential Assistance Partnership (WRAP Program), Technical Development Corporation, October 1990.

Key conclusions and documentation from both companion documents have been incorporated into the principal report.

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Appendix D: Savings Based on Billing Data

Appendix D provides supporting documentation and analysis for savings estimates based on actual participant billing data. Key findings are summarized in chapter 4 of the main report.

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Appendix D: Savings Based on Billing Data

Section 1: PRISM Documentation

FOREWORD

The Princeton Scorekeeping Method, or "PRISM", is a statistical procedure which uses available billing and weather data to produce accurate estimates of saved energy. Derived from simple physical principles, the method provides physical descriptors as well as a weather-normalized index of consumption for each house analyzed. The long-range objective is a standardized approach which is equally applicable to all fuels, and which can be used over a wide range of climates and building types.

Until recently, the emphasis of PRISM development was on houses heated by natural gas: the individual-house approach was developed for the Modular Retrofit Experiment under funding by the Buildings Systems Division of the U.S. Department of Energy, while the aggregate approach, funded by the Ford Foundation and the New Jersey Department of Energy, was developed to monitor statewide conservation trends in New Jersey. We have explored the applicability of the method to oil-heated houses, and are currently working to extend it to houses heated and cooled by electricity (Electric Power Research Institute Project RP 2034-4; see EPRI Report No. EM-4358). Our most recent source of funding is the gas and electric utilities in New Jersey, through the establishment of the New Jersey Energy Conservation Laboratory. PRISM research to date and selected applications are summarized in the Scorekeeping Issue of Energy and Buildings (Vol. 9, #1-2, 1986); the sixteen papers are listed in the Bibliography.

None of this work would have been possible without the continued guidance and enthusiasm of Robert Socolow. The scorekeeping approach originated more than a decade ago when, under his direction, Thomas Schrader, Yoav Benjamini, Lawrence Mayer and Thomas Woteki gave the methodology its first inspiration. Special thanks go to Miriam Goldberg and Michael Lavine for bringing new ideas and statistical rigor to the approach, and to Clifford Hurvich and James Rachlin for contributing to recent advances of the methodology.

History of documentation : Version 1.0 (March 1984)
Version 2.1 (October 1984)
Version 2.2 (January 1985)
Version 3.0 (February 1986)
Version 4.0 (October 1986)

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PART I

PRISM Documentation

(Documentation for Scorekeeping Heating-only (HO) or Cooling-only (CO) Estimation Program)

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Center for Energy and Environmental Studies
Princeton University

October 1986 for Version 4.0

Introduction

This report provides documentation needed to set up and run the Heating Only (HO) or Cooling Only (CO) scorekeeping model estimation program, based on the PRInceton Scorekeeping Method (PRISM).* The estimation method used by this program is extensively discussed in PRISM: An Introduction (Fels, 1986) as well as other reports listed in the Bibliography. We recommend that the reader become familiar with the method before attempting to follow the procedure outlined here.

Briefly, from meter readings for each house analyzed and daily temperature data from a nearby weather station, the program produces the Normalized Annual Consumption (NAC) index for that house and time period, the corresponding physical descriptors (base level, heating [or cooling] slope, reference temperature, and heating [or cooling] estimate derived from them) and accurate standard errors for each estimate. Savings may then be computed as the difference in NAC between a pre- and post-retrofit period. Running the program for the two periods for each of the houses being monitored, one may obtain average savings and distributions of savings across houses for each group of interest (e.g., non-participant, audit-plus-loan, etc.). In addition, the program outputs may provide input to subsequent analyses, to determine key factors influencing consumption, for example, or the cost-effectiveness of the conservation measures being tried. Thus the PRISM analysis depicted in Figure 1 constitutes a standardized stage one of an evaluation, while subsequent analyses constituting stage two must be designed to meet the specific needs of the project being evaluated.

Version 4.0 of PRISM differs from earlier versions in the addition of an option to run the cooling-only (CO) model instead of the heating-only (HO) model (see Stram and Fels, 1986). The CO model is rigorously a mathematical analogue of the HO model, wherein heating variables (e.g., degree-days) have been replaced by their cooling analogues. Similar performance of the two models should not be expected, however. The HO model applied to the heating fuel has been shown to work extremely well on

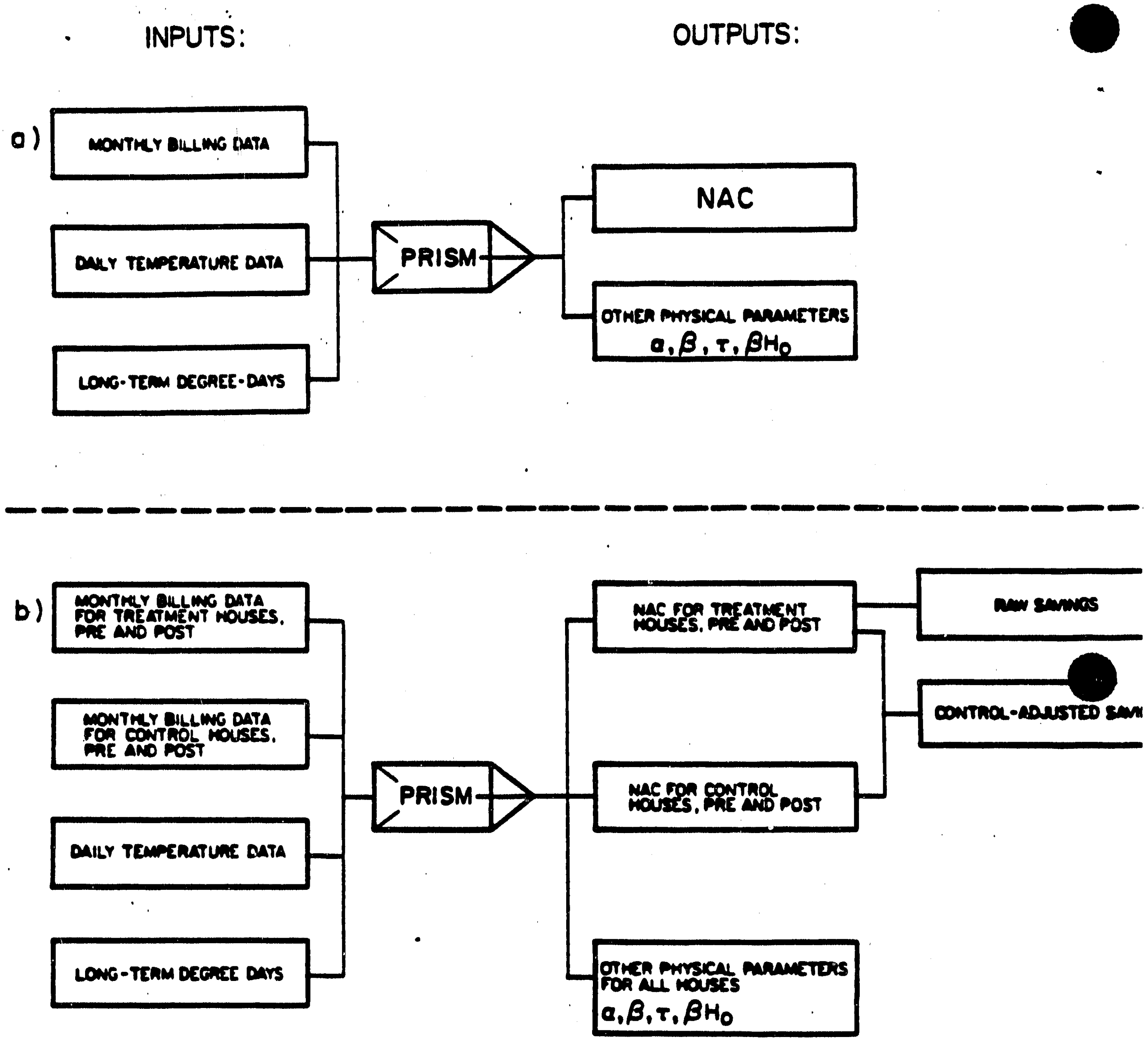

Figure 1. Schematic showing the inputs required for the Princeton Scorekeeping Method (PRISM) and the estimates that result from it: a) the basic procedure for one house; and b) the procedure for calculating control-adjusted savings for a group of treated houses.

average on houses in heating-dominated climates (to model total natural gas consumption in a gas-heated house, for example, or electricity consumption in a house heated but not extensively cooled by electricity). The success of the CO model, on the other hand, is much less well documented. In our experience, its performance on houses in a single climate varies enormously (for consumption of electricity used for cooling in a gas-heated house, for example, or for electricity consumption in an all-electric house in a cooling-dominated climate). We include the CO option here as an aid to exploratory analysis, and look to the experience of other PRISM users to teach us what level of success, under certain conditions, may be expected with the CO model. Because we expect that the primary application of this program will be to heating fuels, this documentation emphasizes the HO option and its output.

The software for Mainframe PRISM and PRISMonPC is identical, as are the auxiliary programs and data files. The only difference is the manner in which the software is provided: source code, on tape, for Mainframe PRISM, and compiled code, on floppy disk, for PRISMonPC. The same general documentation applies, and is provided in Part I of this documentation.

The purpose of Part I is to help other 'scorekeepers' use PRISM on their computer systems. The documentation discusses preparation of the required data (Section 1), the format of input and output files (Secs. 2 and 3, respectively), and the command syntax accepted by the program (Sec. 4). In addition, it provides instructions for a typical run (Sec. 5) to go with the sample data provided with the PRISM software. Documentation for auxiliary programs that are also provided is given in Appendix 2.

Note concerning PRISMonPC: special documentation for running PRISM on an IBM PC is provided at the end of this documentation, in Part II.

We welcome comments from all PRISM users. We are particularly eager to hear how the program (including this documentation) could serve the user better.

1. Data Preparation

Three data files are needed to run PRISM: 1) consumption data and corresponding time periods for each house, extracted from meter readings; 2) daily average temperatures from a nearby weather station for a long-run period plus the period encompassed by the meter reading periods, for computation of heating [or cooling] degree-days, and 3) long-term average heating [or cooling]* degree-days for each possible (integer) reference temperature, for computation of NAC, the Normalized Annual Consumption index. A brief description of each data file is given below (Secs. 1.1-1.4). Sample tables mentioned in the text appear after Sec. 6. In addition, several important data quality considerations are addressed (Sec. 1.5).

1.1. Meter reading file

The required format is described in this document under unit number 10 in Sec. 2, and illustrated in Table 1. See also note concerning data validation in Sec. 1.5.

The data file contains consumption computed from each successive pair of (non-estimated) meter readings. Each line of data contains the meter reading date and the consumption for the meter reading period ending with that date. The first line, which also includes the house ID and three descriptive labels, contains the date indicating the beginning of the first consumption period. Several specific points are important:

A. Do not use estimated readings. If an estimated reading is indicated, ignore the reading and combine the two readings on either side of it as one (~ two-month) period. Thus, the following meter reading data:

date	meter reading	consumption
Feb 16, 1983	9936	
Mar 15, 1983	0068	132
Apr 15, 1983	0197 (est'd)	129 (est'd)
May 15, 1983	0270	73
Jun 15, 1983	0322	52

should be entered as follows:

	2 16 83
132	3 15 83
202	5 15 83
52	6 15 83

so that the two-month period between March 15 and May 15 becomes a single consumption period, with consumption of 202 (=0270-0068) units. Note: an estimated meter reading for the first or last date, for any house, should be avoided.

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*This documentation is written primarily for the HO option. Substitution of "cooling" for "heating" yields documentation for the CO option.

B. It is preferable to have access to the raw meter readings as well as the consumption data derived from them, because of the internal consistency checks available (e.g., sum of consumption over the time periods comprising a year must equal the difference between meter readings for the end points of the year) and because transcription and subtraction errors can then be checked. With meter readings as the primary data source, "missing" data (which would be entered as negative consumption, i.e. -1, for the relevant time period) should occur very infrequently.

In the following example:

```
 :        :  :  :
2320      2 12 81
-1        3 13 81
1272      4 14 81
 :        :  :  :
```

PRISM will assign a period of 3/13/81 to 4/14/81 to the consumption 1272 and will treat the period from 2/12/81 to 3/13/81 as a missing point.

C. Enter the dates in this file in the standard convention: 3 15 83 for March 15, 1983, etc. [New with Version 3.0; date formats from meter files created for Version 2.2 (or lower) may be converted to new format using MDY program described in Appendix 2.]

D. Use -9 to indicate the end of data for one house, and -99 to indicate the end of the meter reading file.

E. Since the house ID for each house gets printed in the COMPARE file and other outputs, you may want to choose a convenient (non-proprietary) numbering scheme.

F. If you have more than one year of consecutive data for each house, and a treatment (retrofit) was done within the beginning and ending dates, there are two options for the organization of the data:

   1) Store all data under one house ID/label, and with the USE command (Sec. 4.7) specify the starting and ending dates for all houses. Thus you would run all houses for the pre-period, and repeat for the post-period.

   2) Store the data for each house in approximately 12-month segments, separating, for example, the pre- and post-periods. The data would be organized as follows:

T120 P PRE U KWH L HD

[consumption data for pre-period]

-9

T120 P POST U KWH L HD

[consumption data for post-period]

-9

etc.

Option 1 is particularly useful if you are exploring which starting or ending dates to use for the pre- and post-periods for each house. Once these dates (which may vary for some of the houses) are determined, Option 2 is in most cases preferable. Note that the only way to get the PRE and POST labels on the COMPARE output table is with Option 2.

1.2. Daily temperature data

The required format is described under unit number 12 in Sec. 2, and illustrated in Table 2.

We recommend the following procedure for obtaining the necessary temperature data (see also Appendix 3):

A. Select a NOAA (National Oceanic and Atmospheric Administration) primary weather station near the set of houses to be analyzed. Some variation of weather across the region can be tolerated; for example, PRISM has worked well for houses throughout most of New Jersey with temperature data from the Newark station.

B. For that station, obtain from the National Climatic Data Center (Federal Building, Asheville, NC 28801; phone 704-259-0682) the weather tape containing the historical temperature (among other useful) data. This tape is called Series TD-3210: Summary of the Day First Order (for daily rather than hourly observations), for the primary weather station in question. Data are also available on floppy disk.

C. For that station, obtain (also from the National Climatic Data Center) a copy of the Local Climatological Data (LCD) Monthly Summary for the months subsequent to the final month on the tape, and obtain a subscription for monthly updates - if continued analyses are to be performed. (Sample is shown in Figure 2.)

D. Starting from the earliest possible date needed (e.g., the beginning of the normalization period, as defined in Sec. 1.3, Step B), extract minimum and maximum temperatures from the tape for each date and compute daily average temperature as

$$T_i = \text{daily } t = (\text{minimum} + \text{maximum})/2,$$

rounding 0.5 (as NOAA does) to the next highest integer. For your convenience, the NOAA documentation for the weather data includes a typical FORTRAN program to read a tape formatted in Series 3210.

E. Continue the series with the monthly LCD's, using column 4 labeled "Temperature °F: average". Note discussion in Sec. 1.5 concerning data validation.

F. Update the file as needed.

See also the description of unit 12 in Sec. 2 and the note with the SET MIND command in Sec. 4.3.

1.3 Long-term average heating and cooling degree-days

The required format is described under unit numbers 15 and 21 in Sec. 2, and illustrated in Table 3. The FORTRAN program DDCALC produces the normalization files in the required format from a PRISM daily temperature file. (The program is included on the tape and documented in Appendix 2.) Note that use of DDCALC ensures the necessary consistency between the long-term degree-day data used in NAC and the daily temperature data used in the regression.

Long-term averages of heating and cooling degree-days for the desired weather station are computed once for each possible reference temperature (integers only), and retrieved for each computation of NAC.

Specific points follow:

A. Establish minimum (MINB) and maximum (MAXB) values well outside the range of likely temperatures. For Newark, we use MINB = -10°F and MAXB = +120°F; these are the default settings of DDCALC.

B. Choose a recent 10- to 12-year period for the normalization period. Our favorite is the 12-year period from Jan. 1, 1970 through Dec. 31, 1981; these are used as the default in DDCALC.

C. For each integer value T between (and including) MINB and MAXB, DDCALC computes the average per-day heating and cooling degree-days as follows:

$$H_o(T) = \sum_{i=1}^{N} [\max(0; T - T_i)] / N$$

$$C_o(T) = \sum_{i=1}^{N} [\max(0; T_i - T)] / N$$

where T_i is the average daily temperature for the i^{th} day (from the temperature file), and the summation extends over all N days comprising the normalization period.

See also description of units 15 and 21 in Sec. 2.

1.4 Auxiliary data

Additional household data, though not required by PRISM, may be useful for subsequent analysis, and, if available, might be profitably computerized as the meter reading data are entered. Examples include:

- house area
- whether water is heated by space heating fuel
- conservation program participation status
- primary/secondary heating fuels
- air conditioning ownership (central, room units, none)
- type of heating and/or air conditioning equipment
- type of unit (single-family detached, multi-family with 2,3,$\geq$ 4 units, etc.)
- date moved in.

Note that these data may be stored in the meter file as comments (see Sec. 2, unit 10), not read by PRISM but readable by other programs written by the user.

1.5. Examination of data quality

In order to obtain reliable scorekeeping results, considerable attention must be given to the quality of the input data. In our experience, the improvement in the reliability and credibility of the results well warrants the extra time invested in the beginning. In the words of PRISM users Rick Goeltz and Eric Hirst at Oak Ridge National Laboratory:

> We think that analysts too often manipulate data using high-speed computers and sophisticated statistical software packages without taking sufficient time to carefully examine the data beforehand. The old adage -- garbage in, garbage out -- applies here. ... This requires a commitment to data quality and to the investment of the resources necessary to achieve it.

The first step to assuring data quality is to identify anomalies in the consumption data at the individual-house level. Use of the plotting routine (see Sec. 4.3 and Fig. 3) can be very helpful here. For example, you may detect outliers (i.e., anomalously high or low bills) by plotting consumption against heating degree-days, computed at best tau or, for comparison, at a fixed reference temperature such as 60°F. If (and only if) the model is greatly improved by doing so, it may be reasonable to remove a single extreme outlier or, more commonly, to combine two outlier bills which are of opposite sign <u>and</u> consecutive. Such changes in the data should be well documented. (Note that, if you are starting with raw meter readings, an isolated consumption outlier should reflect high or low consumption that actually occurred, for example, due to a visit from Grandmother or a vacation.)

The temperature data deserve careful checking, particularly if they are entered manually from LCD's (see Sec. 1.2 and Fig. 2). A good check on the input data is to compute total heating and cooling degree-days to base 65°F for each month and compare with the printed total given on the month's LCD. You may use the FORTRAN program DDCALC for this (see Appendix 2).

Another way to detect input data problems is to vary the time period for estimation. If changes in heating consumption are of primary interest, the preferred estimation period is July-through-June. Similarly, January-through-December may be used for estimations of cooling consumption. Wherever possible, similar boundaries should be chosen for the pre- and post-periods. Obviously, data availability in the pre-period and the desire for early completion of data collection for the post-period may interfere with these ideals. The model results should not be overly sensitive to the exact choice of estimation period, and, if they are, the input data should be carefully examined (see stability study: Rachlin et al., 1986).

In general, it is important to identify anomalies in the PRISM outputs. The most meaningful indicators of problems are the model R^2 values and the standard errors of the estimates. The standard error of the reference temperature, which may be very large or infinite (indicated by -9.0) for a reference temperature near the boundaries of allowed temperatures, is a particularly good indicator. In subsequent analysis, you may want to eliminate houses for which a -9.0 has appeared; this is particularly important if you are reporting mean rather than median results. (See also description of LOOK file in Sec. 3.) In addition, examination of outliers in the individual parameters -- base level, heating slope and reference temperature -- and the relative magnitude of the physical estimates derived from them -- the heating consumption estimate, NAC (pre and post) and the resulting savings estimates -- can be very informative.

With the benefit of other users' experiences, we are currently trying to establish hard-and-fast rules for determining when adjustments in either the consumption data or the set of houses in the data set are warranted. Meanwhile, in the absence of such rules, we urge extreme caution in making any changes so as not to interfere with the credibility of the results.

The reliability of NAC is PRISM's most important feature. For most applications of the HO model, the standard error of NAC is usually within 3 or 4% of the NAC estimate, even when the individual parameters are much less well determined. These parameters deserve careful physical interpretation: generally the base level estimate (365*alpha) is rigorously the temperature-independent component of NAC, while the remainder of NAC, the temperature-dependent component, provides a slight overestimate of the energy consumed for heating in the heating-only model (roughly by approximately 10%, because of some seasonal dependence of energy usage for appliances, etc.; see seasonality study: Fels et al., 1986).

After an extensive examination of the results at the individual-house level, you may want to explore different cuts of the entire sample, reflecting, for example, reported wood use (e.g., those reporting <1 cord vs. $\geq$1 cord per year), or the ratio of heating consumption to NAC. Such examples of different cross-sections of the data can provide useful insights in the savings analysis.

PRISM research findings and selected applications are summarized in the Scorekeeping Issue of Energy and Buildings (Fels, ed., 1986). The stability and seasonality studies are particularly relevant to the interpretation of PRISM results. The analysis of the Modular Retrofit Experiment is presented as a prototype PRISM application. Additional studies of the use of specific fuels (natural gas, electricity, oil, and the effect of wood use on electricity consumption) as well as real-world applications of PRISM provide a wide range of experiences from which each PRISM user may benefit. A complete list of references is provided in the Bibliography (Appendix 4).

2. The Input Files

This section gives complete information about the contents of the four input files required by PRISM. These are defined in the program as FORTRAN unit numbers 10, 12, 15 and 21. In addition, unit 5 is defined to be connected to a terminal for the input of user commands.

To run this program in batch mode, unit 5 must be defined to the operating system so that it refers to a file containing user commands. There is a simple technique, discussed in Sec. 4, to change the unit which contains user commands so that in the course of a session with the program, commands may be read from a file and then control given back to the user at the terminal. This feature is helpful in reducing typing requirements; commonly used commands may be placed in a file, and the user may tell the program to execute those commands and then to return back to unit 5 for more input.

If your computer system requires OPEN/CLOSE statements, see special notes in Sec. 6.4.

The remainder of this section gives detailed information for each of the input files, referred to by FORTRAN unit number.

Unit-number	File-type	Description and/or format
5	terminal Logical Record Length (lrecl) 80 characters	Terminal input (free format) user's commands.
10	Meter file lrecl 80* See Table 1 for example.	Consumption data, house identifiers, labels and dates, typed as in following: House-id mm dd yy P prepost L label U units E(1) mm dd yy E(2) mm dd yy . . E(M) mm dd yy -9 House-id mm dd yy P prepost L label U units E(1) mm dd yy E(2) mm dd yy . . E(M) mm dd yy . -99

*Recommended record lengths are given for input files. User may wish to decrease them to save space.

Unit-Number	File-type	Description and/or format
		The consumption data for different houses are separated by a -9 while the end of data is flagged by a -99. The first line of each set of house data starts with 15 alphanumeric characters (without spaces). This is immediately followed by a space and the date of the beginning of the first consumption period.

There are three <u>optional</u> labels that may be entered in any order following the date:

P ___ indicates a pre- or post-retrofit period; up to 8 characters, the first 4 of which are printed in COMPARE file. Recommended values: PRE, POST.

U ___ indicates units of consumption data in meter file; up to 8 characters, the first of which is printed in the COMPARE file. Suggested values: CCF, THERMS, MBTU, KWH, GAL, etc.

L ___ provides an extra descriptor needed to distinguish between houses; up to 8 characters, the first 2 of which are printed in the COMPARE file. Suggested values: NP (non-participant), AO (audit only), AL (audit plus loan), HD (house doctor), etc.

Each subsequent line consists of a single consumption figure and the first date of the following meter reading period -- until a -9 or a -99 is reached. The program does not require that the dates or consumption figures be entered on any specific column numbers (i.e., the program accepts free format input).

See example in Table 1, which includes problem as well as well-behaved houses.

Important Notes:

Missing data on the meter file are signified by a negative consumption figure; we prefer -1. If an actual reading is zero, code the consumption as 0. (This is a change with Version 3.0 of PRISM.)

Unit-Number	File-type	Description and/or format
		Estimated readings should <u>not</u> be included. In the event of an estimated reading the consumption for the two periods on either side should be combined, to form one actual reading period. (See example in Sec. 1.1). Comment statements may now be included in the meter file (a new feature of Version 3.0; see example in Table 1). An asterisk must be placed in the first column to indicate that the line should be ignored as input. This is particularly useful for including auxiliary data (see Sec. 1.4).
12	Temperature file lrecl 80 See Table 2.	File of average daily temperatures. Each month consists of a separate logical record, though not necessarily on a single line in the file. The format is: YEAR MONTH DAYS T1 T2 ... TDAYS Here YEAR is typed as a full four-digit number, MONTH as two digits, and DAYS is the number of days in the month, i.e., 31 30 29 or 28. T1 T2 ... TDAYS are the average daily temperatures, typed as integers. At least one space separates each item. See example in Table 2. We strongly recommend that your temperature file predate any possible meter readings you might use. This will avoid the caveat connected with the SET MIND command (see Sec. 4). We think the safest procedure is to keep your entire temperature file that you used to create the long-term normalization files and periodically add updates to it. (Our temperature files go back to January 1, 1970.)
15	Normalized heating year lrecl 80 See Table 3a.	File of normal year heating degree-days for a range of base temperatures. A normal year heating degree-day value is an average (usually over approximately 10 years) of observed heating degree-days reported on a <u>per</u> <u>day</u> basis.

Unit-Number	File-type	Description and/or format
		The format is: MINB MAXB H_o(MINB) H_o(MINB+1) ... ... H_o(MAXB) and is specified in FORTRAN as: (2I4) for MINB and MAXB and (starting on a new line) (10(F6.3,1X)) for the H_o values. Here MINB and MAXB specify the minimum and maximum base temperatures for which normal-year heating degree-days are calculated. The program DDCALC produces the file in this format (unit 14) from the daily temperature file (unit 12). Note that you must copy this output file from DDCALC to an input file for PRISM, i.e., from unit 14 to unit 15. (Two different unit numbers are used so that a DDCALC run does not unintentionally write over an existing normalization file used by PRISM.) We strongly urge you to use DDCALC to prepare this file for PRISM, in order to ensure consistency between your daily temperature and long-term degree-day data. Comments may be inserted after MINB and MAXB on the same line. Notice in Table 3 that we use an extremely large range (-10 to 120 ^oF) of base temperatures in the normalization. This large range is incorporated as the default in DDCALC. Since PRISM requires the range of the normalization file to exceed the range of temperature data for the time period studied (for the purposes of interpolating degree-days), we strongly recommend that this default range be used.
21	Normalized cooling year lrecl 80 See Table 3b.	File of normal year cooling degree-days for a range of base temperatures. See description under unit 15 (above). This file is produced as an output file of DDCALC (unit 20).

Note regarding units 15 and 21 (normalized heating and cooling year files): Although a user may be interested in running only one of the two possible models (HO or CO), PRISM requires that a file definition for both normalization files be listed in any exec. To avoid confusion, we suggest always creating both heating and cooling degree-day files (using DDCALC) and defining both in your PRISM exec.

3. The Output Files

This section describes the contents of five files which are produced as output from the estimation program. Only one of these files, the 'LONG OUTPUT', is produced by default. This default setting is easily changed when running the program. Other output files are generated optionally according to user command specifications. The commands needed to create the optional output files are discussed below and in Sec. 4. Appropriate "heating" labels from the HO model appear as "cooling" labels when the CO option is used (new with Version 4.0). (Example outputs are given only for the HO model.)

Please note that there are some limitations on the size of some fields. For most systems, if an output value exceeds the space allotted, the field is filled by a '****'. This is not to be confused with the PRISM value of -9.0, which indicates a standard error that is approaching infinity. (Note to pre-version 3.0 users: this is an improved convention, new with Version 4.0, for consistently indicating infinite standard errors, previously indicated by -9.9 or -99.0.)

If your computer system requires OPEN/CLOSE statements or a change in the unit numbers, see special notes in Sec. 6.4.

This section discusses each output file in turn, again referred to by FORTRAN unit number.

Unit-Number	File-type	Description and/or format
6	terminal lrecl 80	Output to user; prompts for commands, error messages, etc.
77	LONG OUTPUT lrecl 130 See Table 4.	The default output file produced for each house. Gives complete output for the estimation run. See example in Table 4. If this is not desired, use the command 'SET LONG OFF'. See Sec. 4.3. If the user has issued the additional commands 'SET PLTUSE ON' and/or 'SET PLTRSD ON', then line printer plots of energy usage and/or residuals are produced on this file. See sample plots in Figs. 3a and 3b, as well as the description of the SET command given below. Note that record length (lrecl) for this file <u>must</u> be set at 130 even if plots are not requested. An added feature (new with Version 3.0) is the SET PLT80 ON command. The same plots

Unit-number	File-type	Description and/or format
		described above are produced in an 80-column width for easier viewing on terminal screens. An additional feature (new with Version 4.0) is the option to display the Correlation Matrix. The default is off. To receive this information use the command 'SET CORR ON'. (See Table 4.) The coefficient of variation for each parameter (excluding tau) has been added beneath each standard error, indicated by '(CV%)' (new with Version 4.0). This value represents [se(estimate)/estimate]x100. Whether the HO or CO model was selected is indicated in the header to the LONG output. Error messages are printed for houses which did not run. Technical Codes, explained in Appendix 1, are included to give further details about the way the estimation procedure behaved for the specific run.
22	COMPARE (short summary of scorekeeping results) lrecl 130 See Tables 5&8.	This output file gives a short summary for a set of houses (one line per house), and is produced if the user has issued the command 'SET COMPAR ON'. (Note new notation; prior to Version 4.0, PRTCMP was used.) It consists of a standardized table patterned after those produced for Princeton's Modular Retrofit Experiment; see examples in Tables 5 and 8. Numbers in parentheses are accurate standard errors of the estimate.
	Note:	P-field is truncated to 4 characters and printed under 'PRE or POST'. L-field is truncated to 2 characters and printed under 'SAMP TYPE'. U-field is truncated to 1 character and printed under 'X' (new with version 4.0). Whether HO or CO model was selected is indicated in the header to the COMPARE file.

Unit-number	File-type	Description and/or format
		Error messages are printed instead of results if a house did not run. (See example in Table 5.)
16	LOOK SUMMARY lrecl 130 See Table 6.	This output file is produced if the user has issued the command 'SET LOOK ON'. It consists of a two-line per house summary of the estimation results. This file is most useful for passing the output to a statistical package (e.g., SAS) that wants to have a LOOK at the results of the estimation procedure (i.e., for calculating experiment-wide statistics). The fields produced for each house on this output file are:

House-id P-field Date1 Date2 tau alpha beta beta*H_o NAC R^2
U-field L-field se(tau) se(alpha) se(beta) se(beta*H_o) se(NAC)

where Date1 and Date2 are starting and ending dates of the estimation period, respectively.

No header or error message is produced for this file, which facilitates its being read as data by other software. All characters of the three labels (P, U, and L) are printed. See example in Table 6.

For computing median values of PRISM results (e.g., with SAS), we suggest changing all occurrences of -9.0 (for an undeterminable standard-error value) to 999999.0, so that these values are treated as positive outliers. For computing mean values or distributions, we suggest eliminating them and reporting the number eliminated.

We realize that the number of significant figures shown is many more than warranted by the accuracy of PRISM. This is done because of the disparate magnitudes of different energy units; as long as enough sig figs are available, user should be able to round to an appropriate level of accuracy in any final reporting of the results.

Unit-number	File-type	Description and/or format
92	VERY SHORT SUMMARY lrecl 80	This output file gives a minimal summary of the results for each house. We use this file to control the operation of sev ral other of our programs which need to know the estimation results. File is produced from the command 'SET CNTREC ON'. (Mainly for our research purposes; no example shown.)
41	RESIDUALS lrecl 80 See Table 7.	This file gives a summary of consumption and residuals by period. If the user issues the command 'SET RESIDS ON' (a new command notation; was PRTMAT prior to Version 4.0), then the following output is produced for every meter reading period:

PD# DATE NDAYS/PD CONS/DAY HDD(TAU)/DAY RESID/DAY

where PD# = period number = i
DATE = ending date of period i
NDAYS/PD = number of days in period i
CONS/DAY = raw consumption per day for i
HDD(TAU)/DAY = heating degree-days per day at best tau for i
RESID/DAY = residual per day for i

For the CO option, CDD (cooling degree-days) are given instead of HDD.

Note to non-statisticians: the residual computed for each consumption period is the difference between the value predicted by the model and the actual consumption per day for that period; the least-squares regression assures that the sum of the residuals over all periods is zero.

Note that, if a subset of the data in the meter file is used (i.e., issuing a USE DAT command), all periods in the meter file are produced in the residual file. Periods not used in the regression are indicated by a '-1' for consumption per day and '.' for residual per day.

The plots produced from the command 'SET PLTRSD ON' (Sec. 4.3) include data from the estimation period only. See Fig. 3b.

4. Command Syntax

The basic user commands which control the operation of the program are as follows:

1) The STATUS command
2) The MODEL HO/CO command
3) The SET command
4) The RUN command
5) The FIND command
6) The NEXT command
7) The USE command
8) The REWIND command
9) The RERUN command
10) The QUIT command.

User commands are read from unit 5, unless the user has given the command 'SET KEYBRD n' where n is the unit number of a file containing additional user commands. The last item in the file should be the command, 'SET KEYBRD 5', to return control of the program to the user.

A complete description of the syntax and the meaning of the user commands is given below.

4.1 The STATUS command

Typing the word 'STATUS' (without quotes and followed by a carriage return) prints out a page of information concerning the current settings of a number of internal variables which you may then manipulate with the SET command. Manipulating these status variables is the primary method of controlling the program. Below is the output produced at the terminal by the STATUS command. It is designed to fit on one screen.

```
STATUS
*********************PRISM-Heating Only (HO) *********************
DEBUG     OFF     RESIDS    OFF       COMPAR    OFF       RUN       OFF
PRTCVG    OFF     QUIT      OFF       LOOK      OFF       PLTUSE    OFF
RUNALL    OFF     PLTRSD    OFF       SAVER     OFF       CNTREC    OFF
RERUN     OFF     NEXT      OFF       REWIND    OFF       LONG      ON
TMPBIN    OFF     PLT80     OFF       FIND      OFF       CORR      OFF
MAXIT       9     TERM        6       KEYBRD      5       LOOKF      16
REPEAT      1     MIND   -99999       MAXD   999999
RMIN            -99.0
RMAX            999.0
TAUHO            62.0
TAUCO            70.0
TRANGE          -99.0     999.0
ALFAO            10.0
BHOTO             3.0
BCOOLO            3.0
INVALS           62.0      70.0      10.0       3.0       3.0
GENRSQ            1.0
```

4.2 The MODEL HO/CO command

A new feature of Version 4.0 is the option to run a cooling-only model of PRISM. In order to do this, type 'MODEL CO' before running PRISM. (The default is MODEL HO for heating-only.) All appropriate changes to output have been made to accommodate the cooling option (especially cosmetic changes from 'heating' to 'cooling').

Note 1: Once one or more houses have been run using either the MODEL CO or MODEL HO command, the user cannot switch models in the middle of a run. If attempted, the user will receive an error message at the terminal.

Note 2: The CO option requires a normalized cooling degree-day file (unit 21) just as the HO option requires a normalized heating degree-day file (unit 15).

4.3 The SET command

The SET command manipulates the internal variables shown by the STATUS command. The SET command itself does not produce any output until the RUN command is issued. Note that, with the exception of the 'LONG' command, the following variables are all set to 'OFF' by default. The possible forms and the meanings of the SET command are:

SET	PLTUSE	ON	- Causes the program to produce two plots for each house, 130 columns wide. The first plot is of energy usage by meter reading period; note that reading periods are "scaled" as if of equal length. The second plot is energy usage against heating [or cooling] degree-days calculated at the estimated value of the heating [or cooling] reference temperature (TAU). On the latter, symbols ($) are provided to indicate location of the best-fit line resulting from the regression. See Fig. 3a.
		OFF	- Turns off the consumption plots.
SET	PLTRSD	ON	- Causes the program to produce two graphs of the residuals of the regression for each house, 130 columns wide. The residuals are plotted by meter reading period and against heating [or cooling] degree-days calculated at the estimated value of best TAU. See Fig. 3b.
		OFF	- Turns off the residual plots.

SET	PLT80	ON	- Causes the above plots to be produced in 80-column widths, with periods listed on separate pages. Must be used in conjunction with SET PLTUSE ON or SET PLTRSD ON. (Note for PC users: unfortunately, the 80-column plots are printed onto a 130-column file, so that plots appear double-spaced on screen; will be improved.)
		OFF	- Turns off the 80-column feature for the requested plots.

NOTE: These graphs are produced as line printer plots. They are written to unit 77 along with the LONG OUTPUT for each house. If 'SET LONG OFF' is used (see below) the output will contain only the plots.

SET	COMPAR	ON	- Produces the COMPARE file, a standardized short summary of scorekeeping results (unit 22). (Note new notation; was PRTCMP prior to Version 4.0.) See Tables 5 and 8.
		OFF	- No such output is produced.
SET	LONG	ON	- Produces the LONG output file (unit 77); default is ON. See Table 4.
		OFF	- No such output is produced.
SET	RESIDS	ON	- Tells the program to print the RESIDUALS file (unit 41). (Note new notation; was PRTMAT prior to Version 4.0.) See Table 7.
		OFF	- No such output is produced.
SET	LOOK	ON	- Produces the LOOK summary file (unit 16). See Table 6.
		OFF	- No such output is produced.
SET	PRTCVG	ON	- Requests that the program print out, on the terminal, convergence information at each step of the iterative search for best TAU.
		OFF	- No such output is produced.
SET	RUNALL	ON	- Tells the program to run all houses on the meter file when the RUN command is issued.
		OFF	- When the RUN command is given the program will run one house, and then pause for more user commands.

Note: PRISM will produce output for all houses on the meter file, including houses that did not run due to data problems. Error messages for those houses are printed on the LONG and COMPARE files, along with estimates for all other houses. This assures that PRISM will not terminate after encountering an error-ridden house's data (new feature of Version 3.0).

SET CNTREC ON - Program produces the 'very short summary' file (unit 92) when RUN command is issued.

OFF - No such output produced.

SET RMIN t_{low} - Sets the lower bound on the search for best heating reference temperature to the value t_{low}. (Default setting is -99.0.)

SET RMAX t_{up} - Sets the upper bound on the search for best heating reference temperature to the value t_{up}. (Default setting is +999.0.)

SET TRANGE t_{low} t_{up} - Equivalent to the two SET commands: 'SET RMIN t_{low}' and 'SET RMAX t_{up}'.

Note concerning fixed tau: If you want the program to use a specific reference temperature (say 65°F) rather than trying to find the 'best' reference temperature, use the commands:

SET RMIN 65
SET RMAX 65

or alternatively, before the RUN command:

SET TRANGE 65 65

Fixed tau may be set at non-integer values (a new feature of Version 3.0).

SET TAUHO t_o - Sets the initial value for the search for best TAU to the value t_o. (Default setting is 62.0.)

SET MAXIT n - Sets the maximum number of iterations in the iterative portion of the search for best heating reference temperature, to the integer n. (Default setting is 9.)

SET MIND mm/dd/yy - Tells the program that the first day for which temperature data are available (on unit 12) is the date mm/dd/yy. This setting is used to check the validity of dates on the meter file. (Default setting is -99999.)

SET MAXD mm/dd/yy - Tells the program that the last day for which temperature data are available is mm/dd/yy. (Default setting is +999999.)

NOTE (including caveat): The SET MIND and MAXD commands deserve extra discussion, aided by the following definitions:

TMIN	=	beginning date in the temperature file
TMAX	=	ending date in the temperature file
DATE1	=	earliest date in meter file
DATE2	=	latest date in meter file

a) It is preferable to set MIND = TMIN and MAXD = TMAX. (even though leaving them at their default values is usually ok). You may want to include SET MIND and MAXD commands in a file of user commands (see explanation of SET KEYBRD n at beginning of section).

b) Always set up files so that TMIN < DATE1 (otherwise, program may go into a tailspin).

c) Never SET MIND > DATE1 (otherwise, program may go into a tailspin).

d) It is ok to set up files so that TMAX < DATE2 (for example, when the most recent temperature update hasn't yet arrived). PRISM correctly truncates the estimation period as long as you have set MAXD = TMAX. If MAXD is left at its default value, PRISM will not run the house, but will give an error message.

SET	TMPBIN	ON	- Tells the program to read temperatures in binary rather than character format (for Princeton use). OFF default should be maintained in distributed version of program.
SET	TERM	n	- Sets unit number for terminal output. If n is different from 6, terminal output goes to a file which must be defined to the operating system as unit n.
SET	KEYBRD	n	- Defines unit number n as a file containing additional user commands to be used immediately. The last command in this file should be 'SET KEYBRD 5' to bring control back to the user.

NOTE: The remaining STATUS variables not discussed in the context of the SET command are not used by this version of the program; they should be left at their default values.

4.4 The RUN command

Issuing the command 'RUN' tells the program to estimate the PRISM model using the current STATUS settings. If RUNALL has been set to ON then all houses on unit 10 are run. Otherwise a single house is run and the program pauses for more user commands. This command is equivalent to the command 'SET RUN ON'.

4.5 The FIND command (a new feature with Version 3.0)

When running PRISM, the user may input the command 'FIND house-id,' and the program will put the pointer before the house indicated (if it exists in the meter file).

Important notes about the FIND command:

a) The FIND command may be used as many times as desired in a meter file. However, it is important to remember that PRISM only moves <u>forward</u> in the meter file. If the desired house is positioned before the point where the FIND command is given, then PRISM will first search to the bottom of the meter file, REWIND the file, and position the pointer at the beginning of the file. At this point, the user may input the FIND command a second time to locate the desired house.

b) House-id must be entered exactly as it is typed on the meter file (no spaces separating characters are allowed).

c) The PRISM FIND command does not distinguish capital from lower case letters; it recognizes only caps. (This is because of the way the computer reads the terminal.) Therefore, if a house-id is typed in the meter file with lower case letters, the PRISM FIND command will not locate the house. Note that this upper case restriction applies only to the FIND command; PRISM run on any house-id will still run as before and will faithfully print out upper and lower case.

4.6 The NEXT command

Typing the command 'NEXT' causes the program to skip over one house on the meter file and to position the meter file at the start of the data for the next house. This differs from a RUN command in that no output is produced for the house which is skipped over. This command is especially useful for browsing; the FIND command is preferable if the exact house-id is known. After each NEXT command is issued, the program writes a message to the terminal (unit 6) giving the house-id of the next house on the file.

4.7 The USE command (improved for Version 3.0)

In many applications, the meter file may include more meter reading periods than the user wishes to use in the analysis. For example, the meter file might be set up so that pre- and post-periods are not separated on the file. The USE command enables the user to run the pre- and post-periods separately without recreating the meter file. Another important application is the sliding analysis, wherein a one-year estimation period is slid forward one month at a time [see PRISM: An Introduction (Fels, 1986)].

There are two ways in which the user can specify the meter readings to be used for each run. Both ways may be displayed in STATUS after the commands are issued.

a) The first form of the USE command is to give beginning and ending dates of the meter readings used for the estimation period. The format of the command is:

USE DAT 1

Then the program will respond with the prompt:

Input periods

The user then types:

KEEP m1/d1/y1 TO m2/d2/y2

where m1/d1/y1 and m2/d2/y2 specify the beginning and ending dates, respectively, which are to be used in the estimation period. After the RUN command is issued, the user may specify new dates and the RERUN command. For example, if the post-period is to consist of all meter reading periods with <u>beginning</u> dates between July 11, 1981 and July 10, 1982, the user will type:

USE DAT 1
KEEP 7/11/81 TO 7/10/82

If the user has typed:

USE DAT 2

then the computer will request that two periods be input as in:

KEEP m1/d1/y1 TO m2/d2/y2
KEEP m3/d3/y3 TO m4/d4/y4

Note: These two intervals <u>together</u> constitute <u>one</u> estimation period, and all meter readings which are in <u>either</u> of the two intervals are used in a <u>single</u> run.

b) The second form of the USE command allows the user to specify period numbers rather than dates to indicate which meter reading periods are to be used. The format of the command is:

USE NUM 1

followed by:

KEEP n1 TO n2

This form of the USE command is used when dates vary from house to house but the order of the readings for each house is the same. Thus if the user always wants to have the 13th to the 24th consumption readings be a single estimation period he or she would type:

```
USE NUM 1
KEEP 13 TO 24
```

If a USE command was issued and it is desired for the remaining houses to go back to the default of running all positive meter readings, then the command 'USE ALL' should be typed.

If the USE command is not specified, then all positive meter readings are included in the estimation.

4.8 The REWIND command

Issuing the command 'REWIND' causes the meter file (unit 10) to be reset at its beginning. The first house on the meter file is then ready to be processed. This command may be used together with the USE command to define pre- and post-periods for a number of houses. For example, the USE command may be invoked to define the 'pre-period' for all houses on the meter file. Then after running all houses for the pre-period the user may REWIND the meter file, issue a new USE command for the post-period and run the houses again.

4.9 The RERUN command

This command tells the program to rerun the last house with any new settings changed since the last RUN command was issued. It is equivalent to the command 'SET RERUN ON'.

4.10 The QUIT command

Terminates the program. Equivalent to 'SET QUIT ON'.

5. A Typical Run

A typical run of the estimation program consists of setting up the input files (units 10, 12, 15, and 21), compiling, and executing the program. You might then enter the commands:

command	explanation	
MODEL HO	--tells the program to run the heating-only model	*
SET MIND 1/1/69	--indicates the beginning date for which temperature data are available (note caveat in Sec. 4.3).	*
SET MAXD 12/31/85	--indicates the last date for which temp data are present.	*
SET PLTUSE ON	--tells the program to generate plots of energy usage (unit 77).	
SET PLTRSD ON	--tells the program to generate residual plots (unit 77).	
SET COMPAR ON	--tells the program to produce the COMPARE file (unit 22).	
SET LOOK ON	--tells the program to produce the LOOK file (unit 16).	
SET RUNALL ON	--says to run all the houses on the METER file (unit 10).	*
USE DAT 1 KEEP 7/1/80 TO 6/30/81	--specifies the estimation period (example)	
RUN	--begins execution of the program.	*
QUIT	--stops execution of the program.	*

NOTE: if you are running in batch mode, the QUIT command is essential to avoid getting into an infinite loop.

The output of the estimation will be printed on units 16, 22 and 77.

---

* With input data from the meter file, temperature file, and normalization file found on the tape (or disk), use of only the starred commands will produce the LONG output on the tape. Note also that the data on the tables and figures in this documentation are consistent with the data on the tape.

6. Programming Notes (for Mainframe PRISM)

6.1. There is a maximum number of meter reading periods which can be used for a single house. This maximum is currently set at 400. The maximum is defined by the use of a FORTRAN 77 PARAMETER statement. To change the maximum from 400 to some other (fixed) number, it is necessary to change all occurrences of the

PARAMETER(MAXPD = 400)

statement in the program to set MAXPD to some other maximum. The program must then be recompiled.

6.2. Similarly, there is a maximum number of daily average temperatures (hence days in the estimation period) which can be read into memory at one time. The current maximum is set to 3660, or ten years of daily data, which is generally ample since a usual run requires approximately one year of data. If for some reason you want to run more than this amount of meter reading data at one time for a single house, you will have to change all occurrences of the FORTRAN 77 PARAMETER statement:

PARAMETER (MAXTEM=366*10)

to set MAXTEM to some other maximum, and recompile the program. Note that the daily temperature file itself may contain as much data as required.

6.3. Some systems have limitations on the size of the file unit numbers for input/output. These numbers can be altered in the PARAMETER statements at the beginning of the program.

6.4. If your computer system requires OPEN/CLOSE statements, these may be inserted in the dummy subroutines OPENF and CLOSEF provided in the PRISM program. These subroutines are called at the appropriate places in the program.

GOOD LUCK & HAPPY SCOREKEEPING!

Tables and Figures

Table 1. Example of meter file

```
                          17  [illegible] [illegible] 26
J3                         12    4  78  P  PRE          U  KWH    L  HO
2320                                         1   4  79
2930                                         2   2  79
2920                                         3   6  79
1530                                         4   4  79
1150                                         5   4  79
630                                          6   5  79
510                                          7   5  79
600                                          8   3  79
520                                          9   4  79
620                                         10   3  79
950                                         11   2  79
1210                                        12   4  79
-9
J4                         12   20  78  P  POST         U  KWH    L  HO
5040                                         1  22  79
5550                                         2  22  79
2150                                         3  22  79
1350                                         4  23  79
920                                          5  22  79
930                                          6  21  79
960                                          7  23  79
700                                          8  21  79
880                                          9  20  79
1060                                        10  22  79
1380                                        11  20  79
2360                                        12  20  79
-9
* To illustrate missing data point *
anyhouse         12  26  78  P  POST  U  GUESS  L  UNKNOWN
         6040.0000   1  25  79
         7100.0000   2  27  79
         4010.0000   3  27  79
         3470.0000   4  26  79
         2110.0000   5  25  79
-1                   6  26  79
         1540.0000   7  26  79
         1720.0000   8  24  79
         1940.0000   9  25  79
         2830.0000  10  25  79
         4180.0000  11  26  79
         4850.0000  12  26  79
-9
```

Table 1. Example of meter file (cont'd.)

```
* Similar to house J3 but with a zero consumption point
J23456789012345 12  4 78 P PRE L HO U KWH
      2320.0000  1  4 79
      2930.0000  2  2 79
      2920.0000  3  6 79
      1530.0000  4  4 79
      1150.0000  5  4 79
         0.0000  6  5 79
       510.0000  7  5 79
       600.0000  8  3 79
       520.0000  9  4 79
       620.0000 10  3 79
       950.0000 11  2 79
      1210.0000 12  4 79
-9
*  This is a bad house--Too few meter reading periods
BADHOUSE        12 19 78 P BEFORE  U MBTU  L BADDATA
      3850.0000  1 19 79
      4640.0000  2 21 79
      2950.0000  3 21 79
-9
*  This is a bad house--mixed dates in July
J6PICKUPSTICKS  12  4 78 P MIXED L WRONG U BAD
      2320.0000  1  4 79
      2930.0000  2  2 79
      2920.0000  3  6 79
      1530.0000  4  4 79
      1150.0000  5  4 79
         0.0000  6  5 79
       510.0000  7  5 79
       600.0000  7  3 79
       520.0000  9  4 79
       620.0000 10  3 79
       950.0000 11  2 79
      1210.0000 12  4 79
 -9
 E105                 1  2 79 P  PRE      U CCF   L CONTROL
 296.                           2  2 79
 374.                           3  2 79
 182.                           4  2 79
 143.                           5  2 79
  53.                           6  2 79
  45.                           7  2 79
  39.                           8  2 79
  37.                           9  2 79
  48.                          10  2 79
 107.                          11  2 79
 195.                          12  2 79
 255.                           1  2 80
 -99
```

35

Table 2. Example of file of daily average temperatures

1984	1	31	27	31	34	35	40	39	30	23	31	38	
			22	15	21	31	23	17	23	26	22	12	
			11	10	21	36	40	41	45	32	32	34	29
1984	2	29	22	27	44	46	37	37	27	26	35	39	
			46	47	41	47	56	49	45	50	43	50	
			43	43	44	56	46	36	33	41	33		
1984	3	31	27	30	31	32	37	41	32	23	23	19	
			30	22	29	37	41	44	43	41	44	46	
			46	46	41	43	42	46	44	39	36	39	45
1984	4	30	46	51	55	50	54	53	47	49	47	48	
			53	56	52	46	48	52	57	57	51	55	
			53	46	43	51	53	62	58	59	65	67	
1984	5	31	63	59	54	65	62	59	60	64	57	57	
			65	64	62	56	53	50	55	56	66	67	
			68	69	75	68	71	78	69	60	66	59	57
1984	6	30	60	66	61	71	75	78	63	86	85	87	
			87	76	84	79	69	66	69	71	81	77	
			74	72	75	73	77	71	77	78	78	71	
1984	7	31	72	78	80	80	82	79	73	71	72	73	
			84	81	81	63	84	81	79	74	74	76	
			72	77	80	83	75	74	69	70	73	74	76
1984	8	31	80	84	82	83	77	80	81	83	79	76	
			77	77	81	83	84	83	78	73	72	71	
			70	73	75	71	74	74	73	74	77	79	77
1984	9	30	71	70	77	65	65	61	60	63	66	71	
			75	73	68	73	59	55	60	59	63	71	
			68	65	72	78	79	62	52	49	60	59	
1984	10	31	56	52	56	58	58	50	53	61	66	63	
			66	65	63	62	62	61	62	68	66	72	
			67	71	63	56	61	67	65	73	68	60	64
1984	11	30	58	52	43	51	65	51	44	42	48	61	
			60	44	39	44	46	48	40	40	35	29	
			34	33	36	41	43	45	48	54	49	43	
1984	12	31	46	39	44	35	35	36	28	31	36	45	
			47	43	51	45	38	42	52	51	39	43	
			39	50	37	39	35	32	30	36	58	50	36
1985	01	31	46	45	31	29	28	29	38	25	16	19	
			19	22	27	31	24	16	23	26	26	8	
			-2	15	24	28	32	23	23	29	28	26	26
1985	02	28	32	24	20	18	22	24	22	13	20	28	
			32	40	33	31	29	26	34	38	41	35	
			36	50	60	60	56	43	41	30			
1985	03	31	41	48	39	33	48	29	31	47	45	44	
			47	49	51	46	39	38	44	32	32	49	
			37	36	44	47	43	46	57	68	73	56	46
1985	04	30	49	43	42	53	67	63	55	46	41	40	
			48	55	56	51	55	66	53	60	77	60	
			69	70	58	52	58	71	65	61	63	71	
1985	05	31	72	55	52	56	68	71	65	60	56	71	
			79	76	79	71	59	65	70	63	60	73	
			73	69	65	69	71	74	79	71	65	62	68
1985	06	30	73	72	76	70	61	66	64	65	69	78	
			70	73	62	62	66	70	71	76	72	71	
			•	•	•	•	•	•	•	•	•	•	
			•	•	•	•	•	•	•	•	•	•	

Table 3a. **Example of normalized-year heating degree-day file**

```
-10 120   'HDD:  JAN 1 1970 - DEC 31 1981'
0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
0.000  0.000  0.000  0.000  0.000  0.000  0.001  0.002  0.003  0.006
0.009  0.013  0.017  0.023  0.029  0.037  0.047  0.059  0.073  0.089
0.109  0.133  0.162  0.199  0.244  0.297  0.360  0.430  0.512  0.601
0.698  0.804  0.922  1.048  1.188  1.340  1.505  1.686  1.880  2.090
2.318  2.564  2.829  3.111  3.412  3.730  4.065  4.418  4.783  5.162
5.560  5.974  6.404  6.852  7.313  7.796  8.292  8.803  9.329  9.871
10.430 11.006 11.597 12.206 12.830 13.471 14.130 14.807 15.499 16.210
16.934 17.675 18.437 19.219 20.024 20.851 21.700 22.569 23.459 24.370
25.301 26.247 27.205 28.178 29.161 30.150 31.141 32.136 33.133 34.131
35.130 36.130 37.130 38.130 39.130 40.130 41.130 42.130 43.130 44.130
45.130 46.130 47.130 48.130 49.130 50.130 51.130 52.130 53.130 54.130
55.130 56.130 57.130 58.130 59.130 60.130 61.130 62.130 63.130 64.130
65.130
```

Table 3b. **Example of normalized-year cooling degree-day file**

```
-10 120   'CDD:  JAN 1 1970 - DEC 31 1981'
64.870 63.870 62.870 61.870 60.870 59.870 58.870 57.870 56.870 55.870
54.870 53.870 52.870 51.870 50.870 49.871 48.871 47.872 46.873 45.876
44.879 43.883 42.888 41.893 40.899 39.907 38.917 37.929 36.943 35.959
34.979 34.003 33.032 32.070 31.115 30.167 29.230 28.300 27.382 26.471
25.568 24.675 23.792 22.919 22.058 21.210 20.375 19.556 18.750 17.960
17.188 16.435 15.700 14.981 14.282 13.600 12.935 12.288 11.653 11.033
10.430  9.844  9.274  8.722  8.183  7.666  7.162  6.673  6.200  5.741
 5.300  4.877  4.467  4.076  3.700  3.342  3.000  2.677  2.369  2.080
 1.804  1.545  1.308  1.090  0.895  0.721  0.570  0.440  0.329  0.240
 0.172  0.117  0.076  0.049  0.031  0.020  0.012  0.006  0.003  0.001
 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 0.000
```

Table 4. Example of LONG output file (from first house in Table 1*)

```
********************** PRISM-Heating Only (HO) ****************************

ESTIMATION FOR HOUSE J3 , PERIOD: DEC 4, 1978 TO DEC 4, 1979
                       PREPOST=PRE LABEL=HO UNITS=KWH

            REFERENCE      HEATING     BASE      NORM ANNUAL    R-SQUARE   NUM
            TEMPERATURE    SLOPE       LEVEL     CONSUMPTION               OF OBS

 ESTIMATES:     59.72       2.5277    18.6065    16279.9180     0.9715     12
(STD ERRS)     (2.77)      (0.2719)  (2.5808)    (591.6843)
  (CV%)        (----)      ( 10.8%)  ( 13.9%)    (     3.6%)

HEATING PART OF NAC:     9483.8945 (782.2114)       % OF NAC:  58.3
  (CV%)                            (     8.2%)

                                 INTERCEPT      SLOPE    REFERENCE TEMP
    CORRELATION       INTERCEPT   1.0
    MATRIX FOR        SLOPE       0.1746         1.0
    ESTIMATES         REF TEMP   -0.5515        -0.8476       1.0

    ERROR VARIANCE:      31.27

TECHNICAL CODES:  J              NUMBER OF ITERATIONS:   3
```

use 'SET CORR to get th additiona output

*Plots in Figs. 3a and 3b correspond with this output.

Table 5. Example of COMPARE file (from data in Tables 1-3)

******************** PRISM-Heating Only (HO) ********************

UNIT ID	PRE OR POST	SAMP TYPE	TIME PERIOD	# PDS	# DAYS	RAW CONS X	RXR	TREF	BASE LEVEL X PER DAY	HEAT SLOPE X PER HDD	HEATING PART X PER YEAR	NAC X PER YEAR
J3	PRE	HO	12/04/78-12/04/79	12	365	15890K	0.972	59.7(2.8)	18.61(2.58)	2.528(0.272)	9484.(782.)	16280.(592.)
J4	POST	HO	12/20/78-12/20/79	12	365	23280K	0.993	50.9(1.2)	29.06(1.98)	5.975(0.339)	12965.(565.)	23579.(504.)
anyhouse	POST	UN	12/26/78-12/26/79	11	333	39790G	0.991	70.0(2.4)	52.27(5.56)	3.761(0.190)	23263.(1774.)	42354.(688.)
J23456789012345	PRE	HO	12/04/78-12/04/79	12	365	15260K	0.949	60.9(3.7)	14.97(3.76)	2.555(0.356)	10242.(1126.)	15711.(839.)
ERROR FOUND ON	HOUSE: BADHOUSE		Too few meter reading periods									
ERROR FOUND ON	HOUSE: J6PICKUPSTICKS		Dates out of order on Meter file									
E105	PRE	CO	01/02/79-01/02/80	12	365	1774C	0.975	65.6(3.2)	1.20(0.42)	0.277(0.025)	1404.(133.)	1841.(72.)

39

Table 6. Example of LOOK summary file (from data in Tables 1-3)

J3		PRE	120478	120479	59.72	18.6065	2.5277	9483.89	16279.92	0.9715
	KWH	HO			2.77	2.5808	0.2719	782.21	591.68	
J4		POST	122078	122079	50.92	29.0610	5.9753	12964.81	23579.34	0.9930
	KWH	HO			1.19	1.9801	0.3389	565.01	503.88	
anyhouse		POST	122678	122679	70.00	52.2681	3.7611	23262.65	42353.58	0.9909
	GUESS	UNKNOWN			2.42	5.5578	0.1899	1774.07	688.08	
J23456789012345		PRE	120478	120479	60.94	14.9732	2.5552	10241.77	15710.71	0.9491
	KWH	HO			3.70	3.7582	0.3562	1125.67	839.14	
E105		PRE	010279	010280	65.64	1.1960	0.2766	1404.05	1840.90	0.9751
	CCF	CONTROL			3.15	0.4201	0.0246	133.01	72.40	

Table 7. **Example of RESIDUALS file (from data in Tables 1-3)**

	PD#	DATE	NDAYS/PD	CONS/DAY	HDD(TAU)/DAY	RESID/DAY
J3		PRE				
		12/04/78				
	1	1/04/79	31	74.84	21.2665	2.4774
	2	2/02/79	29	101.03	28.3387	10.7966
	3	3/06/79	32	91.25	32.6555	-9.8993
	4	4/04/79	29	52.76	12.8755	1.6070
	5	5/04/79	30	38.33	7.0933	1.7972
	6	6/05/79	32	19.69	0.0761	0.8885
	7	7/05/79	30	17.00	0.0000	-1.6065
	8	8/03/79	29	20.69	0.0000	2.0831
	9	9/04/79	32	16.25	0.0000	-2.3565
	10	10/03/79	29	21.38	0.2219	2.2118
	11	11/02/79	30	31.67	6.1361	-2.4498
	12	12/04/79	32	37.81	9.7934	-5.5487
J4		POST				
		12/20/78				
	1	1/22/79	33	152.73	19.1940	8.9765
	2	2/22/79	31	179.03	26.0155	-5.4796
	3	3/22/79	28	76.79	8.3233	-2.0095
	4	4/23/79	32	42.19	3.2381	-6.2223
	5	5/22/79	29	31.72	0.0000	2.6631
	6	6/21/79	30	31.00	0.0000	1.9390
	7	7/23/79	32	30.00	0.0000	0.9390
	8	8/21/79	29	24.14	0.0000	-4.9231
	9	9/20/79	30	29.33	0.0000	0.2723
	10	10/22/79	32	33.13	0.6149	0.3900
	11	11/20/79	29	47.59	2.4753	3.7347
	12	12/20/79	30	78.67	8.3486	-0.2798
anyhouse		POST				
		12/26/78				
	1	1/25/79	30	201.33	38.7333	3.3872
	2	2/27/79	33	215.15	44.1212	-3.0587
	3	3/27/79	28	143.21	24.8571	-2.5428
	4	4/26/79	30	115.67	19.1667	-8.6882
	5	5/25/79	29	72.76	7.0000	-5.8369
	6	6/26/79	32	-1.	2.7813	.
	7	7/26/79	30	51.33	0.8333	-4.0690
	8	8/24/79	29	59.31	0.7586	4.1890
	9	9/25/79	32	60.63	2.4063	-0.6932
	10	10/25/79	30	94.33	9.4000	6.7113
	11	11/26/79	32	130.62	18.4688	8.8950
	12	12/26/79	30	161.67	28.6333	1.7071
J23456789012345		PRE				
		12/04/78				
	1	1/04/79	31	74.84	22.4925	2.3926
	2	2/02/79	29	101.03	29.5648	10.5172
	3	3/06/79	32	91.25	33.8816	-10.2976
	4	4/04/79	29	52.76	14.0495	1.8861
	5	5/04/79	30	38.33	8.1183	2.6163
	6	6/05/79	32	0.00	0.2118	-15.5143
	7	7/05/79	30	17.00	0.0315	1.9464
	.	.	.	.	.	.
	.	.	.	.	.	.
	.	.	.	.	.	.

******************** PRISM-Heating Only (HO) ********************

UNIT ID	PRE OR POST	SAMP TYPE	TIME PERIOD	# PDS	# DAYS	RAW CONS X	RXR	TREF	BASE LEVEL X PER DAY	HEAT SLOPE X PER HDD	HEATING PART X PER YEAR	NAC X PER YEAR
J3		HO	12/04/78-12/04/79	12	365	15890K	0.972	59.7(2.8)	18.61(2.58)	2.528(0.272)	9484.(782.)	16280.(592.)
J4		HO	12/20/78-12/20/79	12	365	23280K	0.993	50.9(1.2)	29.06(1.98)	5.975(0.339)	12965.(565.)	23579.(504.)
J5		HO	12/26/78-12/26/79	12	365	41640K	0.991	70.0(2.3)	51.42(5.37)	3.788(0.179)	23428.(1727.)	42209.(646.)
J6		HO	12/11/78-12/11/79	12	365	27980K	0.993	64.5(1.6)	26.33(2.77)	3.932(0.195)	18909.(878.)	28526.(513.)
J7		HO	12/19/78-12/19/79	12	365	28520K	0.966	61.9(3.2)	51.19(3.20)	2.434(0.269)	10238.(981.)	28936.(668.)
J10		HO	12/22/78-12/24/79	12	367	30340K	0.976	61.9(2.7)	44.26(3.73)	3.426(0.321)	14417.(1137.)	30582.(780.)
J11		HO	12/27/78-12/28/79	12	366	17990K	0.936	61.6(4.5)	28.33(3.55)	1.929(0.303)	8011.(1089.)	18359.(740.)
J16		HO	12/14/78-12/14/79	12	365	17950K	0.989	60.4(1.7)	23.12(1.73)	2.553(0.164)	9935.(529.)	18379.(374.)
J17		HO	12/27/78-12/28/79	12	366	22052K	0.983	66.0(2.7)	27.90(3.24)	2.380(0.171)	12285.(1043.)	22475.(512.)
J18		HO	12/22/78-12/24/79	12	367	13280K	0.904	61.0(5.3)	17.78(3.82)	1.731(0.329)	6959.(1165.)	13455.(798.)
J20		HO	12/05/78-12/05/79	12	365	8576K	0.921	57.5(4.7)	7.22(2.88)	1.840(0.362)	6103.(864.)	8740.(687.)
J21		HO	12/01/78-12/03/79	12	367	38300K	0.973	58.0(2.4)	55.56(4.95)	5.377(0.529)	18320.(1479.)	38613.(1157.)
J22		HO	12/13/78-12/13/79	12	365	43170K	0.971	66.1(3.5)	28.66(11.35)	6.530(0.615)	33895.(3636.)	44363.(1820.)
J23		HO	12/12/78-12/12/79	12	365	31220K	0.933	59.6(4.6)	38.92(7.57)	4.725(0.840)	17622.(2325.)	31839.(1706.)
J24		HO	11/30/78-11/30/79	12	365	22000K	0.966	64.4(3.4)	24.19(4.52)	2.866(0.297)	13686.(1423.)	22520.(853.)
J25		HO	12/05/78-12/05/79	12	365	30740K	0.958	64.7(4.0)	36.60(6.41)	3.693(0.457)	17900.(2024.)	31267.(1222.)
J26		HO	12/07/78-12/07/79	12	365	26060K	0.976	60.2(2.5)	26.62(4.27)	4.367(0.411)	16834.(1285.)	26556.(944.)
J27		HO	12/11/78-12/11/79	12	365	20220K	0.983	58.9(2.3)	24.80(2.43)	3.208(0.290)	11514.(735.)	20574.(556.)
J29		HO	12/20/78-12/20/79	12	365	19060K	0.985	60.9(2.0)	25.57(2.02)	2.529(0.184)	10118.(611.)	19458.(447.)
J30		HO	12/01/78-12/03/79	12	367	33800K	0.988	65.2(2.1)	35.76(4.32)	4.259(0.264)	21197.(1371.)	34259.(759.)
J32		HO	12/07/78-12/07/79	12	365	28700K	0.988	64.0(2.0)	30.41(3.31)	3.861(0.250)	18094.(1026.)	29202.(649.)
J33		HO	12/26/78-12/26/79	12	365	25230K	0.971	67.4(3.9)	24.25(6.30)	3.080(0.293)	16992.(2015.)	25849.(901.)
J34		HO	12/28/78-12/28/79	12	365	22010K	0.918	63.3(5.3)	27.33(6.57)	2.772(0.467)	12566.(2045.)	22549.(1279.)
J38		HO	12/06/78-12/06/79	12	365	25480K	0.972	51.2(2.8)	31.33(3.98)	3.564(0.363)	14484.(1213.)	25927.(860.)
J39		HO	12/13/78-12/13/79	12	365	27270K	0.994	55.8(1.5)	14.94(3.14)	4.420(0.192)	22610.(998.)	28067.(543.)
J40		HO	12/12/78-12/12/79	12	365	26600K	0.991	63.1(1.7)	33.99(2.47)	3.284(0.187)	14724.(771.)	27138.(475.)
J41		HO	12/11/78-12/11/79	12	365	24780K	0.868	55.4(6.5)	41.94(6.42)	3.353(0.964)	3771.(1912.)	25088.(1514.)
J43		HO	12/15/78-12/17/79	12	367	22910K	0.915	45.2(4.6)	35.94(5.78)	7.081(2.070)	9780.(1614.)	22907.(1569.)
J44		HO	12/19/78-12/19/79	12	365	20340K	0.990	59.4(1.6)	29.04(1.65)	2.735(0.166)	10097.(502.)	20705.(375.)
J45		HO	12/04/78-12/04/79	12	365	26870K	0.969	64.7(3.4)	28.29(5.27)	3.532(0.369)	17147.(1664.)	27480.(994.)
J46		HO	12/27/78-12/28/79	12	366	20110K	0.976	68.1(3.4)	20.65(4.40)	2.282(0.187)	12966.(1410.)	20508.(626.)
J47		HO	12/19/78-12/19/79	12	365	24100K	0.873	70.6(9.5)	24.98(13.95)	2.435(0.467)	15429.(4488.)	24555.(1693.)
J48		HO	12/05/78-12/05/79	12	365	35840K	0.975	61.4(2.6)	47.79(4.95)	4.638(0.448)	19034.(1506.)	36489.(1071.)
J49		HO	12/15/78-12/17/79	12	367	22600K	0.948	59.0(3.8)	43.19(2.70)	1.942(0.285)	7001.(828.)	22778.(605.)
J50		HO	11/30/78-11/30/79	12	365	22260K	0.996	69.1(1.3)	16.66(2.21)	2.793(0.083)	16636.(701.)	22721.(305.)
J51		HO	12/13/78-12/13/79	12	365	22400K	0.956	51.6(3.7)	45.07(2.32)	2.695(0.487)	6125.(706.)	22589.(577.)
J54		HO	12/04/78-12/04/79	12	365	18981K	0.965	62.8(3.3)	27.25(2.97)	2.134(0.242)	9397.(918.)	19350.(606.)
J55		HO	12/18/78-12/18/79	12	365	36380K	0.986	63.5(2.1)	41.21(4.62)	4.852(0.323)	22145.(1439.)	37198.(884.)
J57		HO	12/26/78-12/26/79	12	365	28620K	0.982	66.4(3.0)	34.22(4.67)	3.184(0.245)	16758.(1503.)	29258.(720.)
J58		HO	12/28/78-12/28/79	12	365	18510K	0.997	55.9(0.9)	21.18(1.09)	3.741(0.136)	11257.(320.)	18994.(264.)

ISSN 0198-344X

LOCAL CLIMATOLOGICAL DATA

Monthly Summary

INTERNATIONAL AIRPORT

LATITUDE 40°42' LONGITUDE 74°10' ELEVATION (GROUND) 7 FEET TIME ZONE EASTERN 14734

Date 1	Temperature °F: Maximum 2	Minimum 3	Average 4	Departure from normal 5	Average dew point 6	Degree days base 65°F: Heating (season begins with Jul) 7A	Cooling (season begins with Jan) 7B	Weather types (1 Fog, 2 Heavy fog, 3 Thunderstorm, 4 Ice pellets, 5 Hail, 6 Glaze, 7 Duststorm, 8 Smoke, haze, 9 Blowing snow) 8	Snow, ice pellets or ice on ground at 0700 (inches) 9	Precipitation: Water equivalent (inches) 10	Snow, ice pellets (inches) 11	Average station pressure in inches, elev. 30 feet above M.S.L. 12	Wind (M.P.H.): Resultant dir. 13	Resultant speed 14	Average speed 15	Fastest mile: Speed 16	Direction 17	Sunshine: Minutes 18	Percent of total possible 19	Sky cover (tenths): Sunrise to sunset 20	Midnight to midnight 21	Date 22
01	59	36	48	1	25	17	0		T	0.00	0.0	29.980	29	6.1	7.3	15	29			4	3	01
02	62	39	51	4	27	14	0		0	0.00	0.0	30.065	29	9.7	10.4	18	30			5	5	02
03	64	45	55	7	26	10	0		0	0.00	0.0	30.195	01	3.7	8.3	16	03			2	5	03
04	54	45	50	2	42	15	0	1	0	1.82	0.0	30.070	07	8.0	10.1	21	12			10	10	04
05	57	51	54	6	52	11	0	2	0	2.07	0.0	29.480	13	14.5	15.5	24	11			10	9	05
06	58	48	53	4	42	12	0	1 8	0	0.00	0.0	29.460	24	11.0	12.1	18	23			8	8	06
07	53	40	47	-2	33	18	0		0	0.00	0.0	29.720	30	14.5	16.2	22	32			10	9	07
08	59	39	49	-1	30	16	0		0	0.00	0.0	30.100	35	13.8	15.5	22	33			3	2	08
09	59	35	47	-3	24	18	0		0	0.00	0.0	30.260	03	9.0	11.8	22	02			4	2	09
10	61	35*	48	-2	24	17	0		0	0.00	0.0	30.050	01	12.2	13.7	20	02			2	4	10
11	65	40	53	2	34	12	0		0	0.00	0.0	29.930	03	7.6	10.7	20	02			6	7	11
12	67	45	56	5	38	9	0		0	0.00	0.0	29.950	20	2.9	6.9	9	22			3	4	12
13	56	47	52	1	42	13	0		0	0.05	0.0	30.030	10	10.3	10.6	15	11			9	10	13
14	47	44	46	-6	43	19	0	1	0	0.44	0.0	30.020	05	12.4	12.7	20	04			10	10	14
15	51	44	48	-4	46	17	0	1	0	0.86	0.0	29.810	05	12.2	12.3	16	05			10	10	15
16	59	45	52	0	48	13	0	1 8	0	0.57	0.0	29.460	34	2.3	11.2	17	23			10	10	16
17	66	48	57	4	48	8	0	1 3 8	0	0.07	0.0	29.520	17	5.0	8.1	16	26			4	5	17
18	67	47	57	4	46	8	0	1 8	0	T	0.0	29.695	36	2.2	7.1	16	25			7	7	18
19	55	47	51	-2	47	14	0	1 8	0	0.01	0.0	29.940	12	6.8	8.5	12	17			10	10	19
20	63	47	55	1	43	10	0	1 8	0	T	0.0	29.970	28	7.9	10.8	18	33			8	6	20
21	62	44	53	-1	27	12	0		0	0.00	0.0	30.010	32	16.8	19.1	29	32			1	1	21
22	55	36	46	-8	21	19	0		0	0.00	0.0	30.180	02	1.2	10.9	18	03			9	8	22
23	47	39	43*	-12	42	22	0	1 4	0	0.45	T	29.750	06	6.1	10.2	14	04			10	10	23
24	55	47	51	-4	45	14	0	2	0	0.02	0.0	29.380	25	9.8	12.2	18	24			10	10	24
25	59	47	53	-2	42	12	0		0	T	0.0	29.590	30	14.9	16.8	28	34			10	9	25
26	77*	47	62	6	43	3	0		0	0.00	0.0	29.940	36	4.3	8.7	16	01			2	2	26
27	66	50	58	2	43	7	0	8	0	0.00	0.0	30.120	11	5.7	8.0	12	14			2	1	27
28	70	48	59	3	40	6	0		0	T	0.0	30.215	19	2.8	6.3	10	24			7	6	28
29	76	53	65	8	50	0	0		0	0.00	0.0	30.180	20	5.2	8.2	12	24			2	4	29
30	76	58	67*	10	57	0	2		0	T	0.0	29.890	21	8.9	11.0	17	20			10	8	30

Sum	Sum				Total	Total	Number of days	Total	Total	For the month:						Total	% of possible	Sum	Sum
1825	1336				366	2		6.36	T	29.900	35	2.0	11.0	29	32			198	195
Avg	Avg	Avg	Dep	Avg	Dep	Dep	Precipitation ≥ .01 inch 10	Dep						Date: 21				Avg	Avg
60.8	44.5	52.7	0.6	35.0	-21	2	Snow, ice pellets ≥ 1.0 inch 0	2.75										6.6	6.5

Number of days: Maximum temp ≥ 90°	Maximum temp ≤ 32°	Minimum temp ≤ 32°	Minimum temp ≤ 0°	Season to date: Total	Total		Greatest in 24 hours and dates: Precipitation		Snow, ice pellets		Greatest depth on ground of snow, ice pellets or ice and date	
				4840	2	Thunderstorms 1						
				Dep	Dep	Heavy fog 2	3.73	04-05	Trace	23	T	01
0	0	0	0	8	2	Clear 8 Partly cloudy 7 Cloudy 15						

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.
T TRACE AMOUNT.
+ ALSO ON EARLIER DATE(S).
HEAVY FOG: VISIBILITY 1/4 MILE OR LESS.
BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA.

DATA IN COLS 6 AND 12-15 ARE BASED ON 21 OR MORE OBSERVATIONS AT HOURLY INTERVALS. RESULTANT WIND IS THE VECTOR SUM OF WIND SPEEDS AND DIRECTIONS DIVIDED BY THE NUMBER OF OBSERVATIONS. ONE OF THREE WIND SPEEDS IS GIVEN UNDER FASTEST MILE: FASTEST MILE - HIGHEST RECORDED SPEED FOR WHICH A MILE OF WIND PASSES STATION (DIRECTION IN COMPASS POINTS). FASTEST OBSERVED ONE MINUTE WIND - HIGHEST ONE MINUTE SPEED (DIRECTION IN TENS OF DEGREES). PEAK GUST - HIGHEST INSTANTANEOUS WIND SPEED (A / APPEARS IN THE DIRECTION COLUMN). ERRORS WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL PUBLICATION.

I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC DATA CENTER, ASHEVILLE, NORTH CAROLINA, 28801

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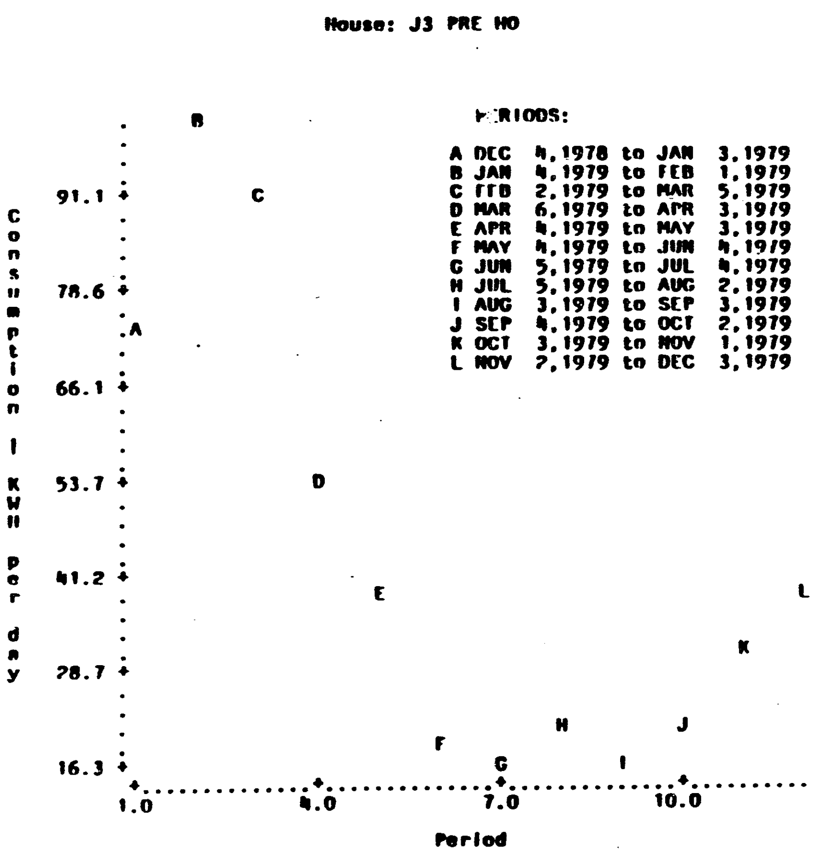
DIRECTOR
NATIONAL CLIMATIC DATA CENTER

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / NATIONAL ENVIRONMENTAL SATELLITE, DATA AND INFORMATION SERVICE / NATIONAL CLIMATIC DATA CENTER ASHEVILLE NORTH CAROLINA

Figure 2. Sample data from NOAA Local Climatological Data, the data source for monthly temperature updates



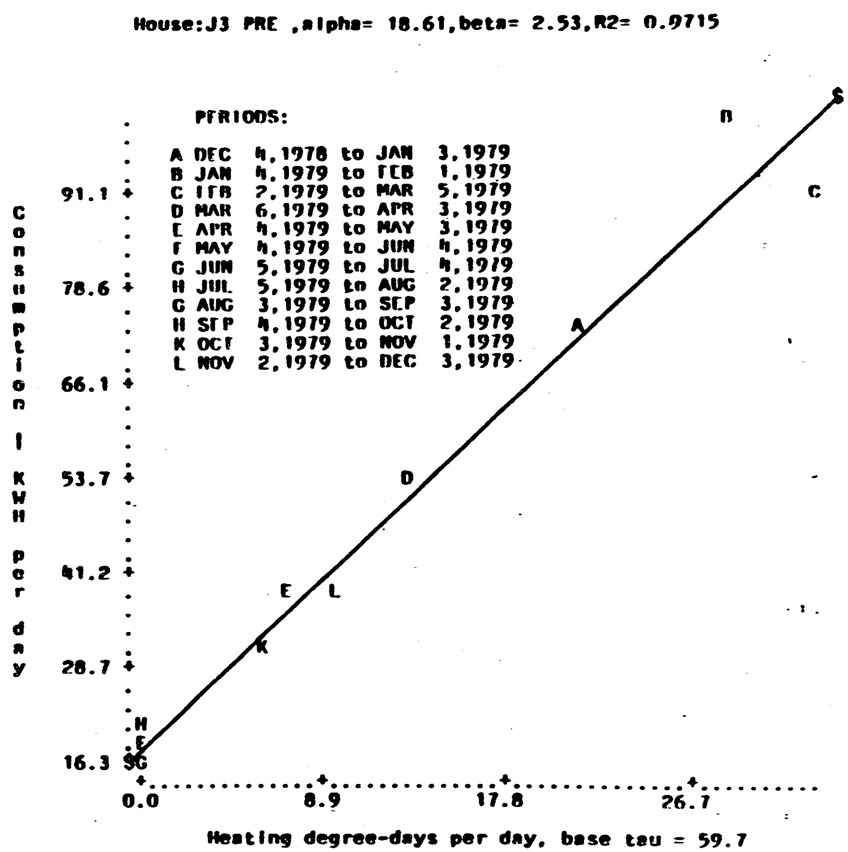
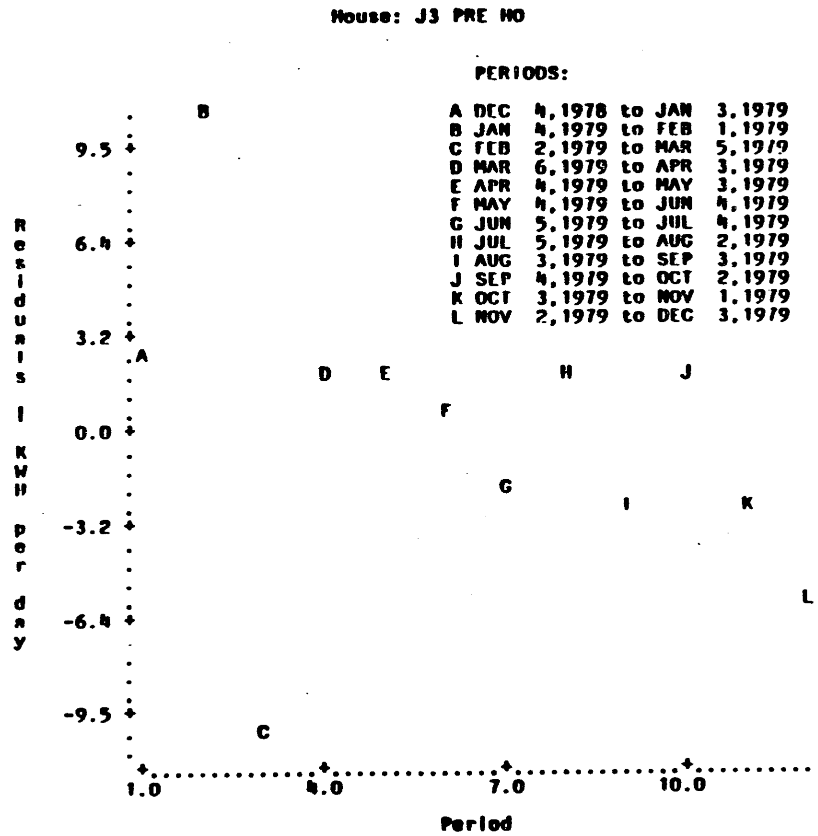


Figure 3a. Plots produced by PRISM program (MODEL HO) when the command 'SET PLTUSE ON' is used.
Line in consumption vs. HDD plot is hand-drawn, between "$" symbols, to indicate best PRISM fit.



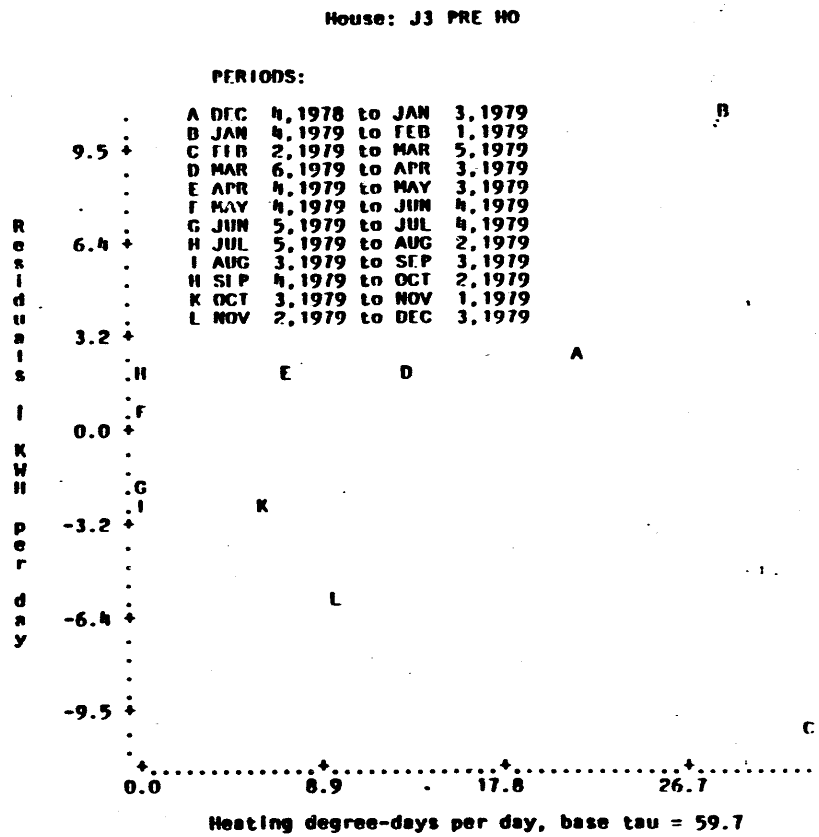


Figure 3b: Plots produced by PRISM program (MODEL HO) when the command 'SET PLTRSD ON' is used.

Appendix 1. Technical Codes for PRISM Program

Code	Explanation
Blank	- Normal convergence. Iterative procedure found best estimates in less than MAXIT iterations.
B	- Iterative procedure tried to go above MAXTAU in search for best TAU.
C	- Iterative procedure tried to go below MINTAU.
D	- Oscillation around values for more than one integer ("double star orbit").
E	- Oscillation around one integer value ("single star orbit").
F	- No convergence in MAXIT iterations.
G	- R^2 maximized in gridsearch rather than in iterative procedure.
H	- Value for TAU set to MAXTAU.
I	- Best TAU found within one integer above best value found in integer gridsearch.
J	- Best TAU found within one integer below best value found in integer gridsearch.
O	- Heating slope too close to zero to calculate standard error for TAU. In this case, the standard error for NAC is set to -9.0.
X	- Iterative procedure terminated because R^2 decreased (rather than increased) twice in a row during iterative portion of estimation procedure. Gridsearch was used to complete estimations.
A,K,L,M,N	- All used to flag zero divide errors in various sections of the program.

Note to user: Gridsearch refers to the fallback routine used when the iterative procedure fails to find best TAU.

Appendix 2. Supplementary Programs

Three additional programs are provided on the tape for users of the PRISM software. These are:

A. A FORTRAN 77 program, called DDCALC, which can be used to generate the normalized year heating and cooling degree-day files for PRISM from the input daily temperature data (in PRISM format). The program reads the temperature file (unit 12) described in Sec. 2 and creates the normalized heating year file (unit 14) and cooling year file (unit 20). Degree-days are computed on a per-day basis. The user specifies the normalization period dates and the desired range of integer reference temperatures. This program is also useful for computing degree-days for other periods (e.g., for each month at base 65°F, to validate the temperature data entered; see Sec. 1.5).

B. A FORTRAN 77 program, called MDY, which reads meter files used for PRISM Version 2.2 and rewrites them into a new file in the format required by PRISM Versions 3.0 and higher. The program assumes that the original meter file has no errors and is already PRISM-usable.

A. DDCALC

The program DDCALC requires five files. These are (by FORTRAN unit number):

Unit 5	-	Terminal input of commands (see below)
6	-	Terminal output of messages
12	-	Input temperature file (Sec. 2)
14	-	Output file of normalized heating degree-days (was 15 prior to Version 3.0)
20	-	Output file of normalized cooling degree-days

To run DDCALC:

1. Prepare the temperature file and define this file as unit 12 to your computer's operating system.

2. Compile and execute program.

3. Type the following commands from the terminal

SET STARTD	mm/dd/yy	-- to define the beginning of the normalization period. Default is 1/1/70.
SET ENDD	mm/dd/yy	-- to define the end of the normalization period. Default is 12/31/81.
SET TRANGE	minb maxb	-- to define the minimum and maximum reference temperatures for the calculation of heating (and cooling) degree-days. The default values are minb = -10 and maxb = 120°F.
STATUS		-- to view current settings of internal variables that are manipulated with the SET commands.
RUN		-- to begin the calculations and create the normalization files.

If you desire only heating degree-days (unit 14) then type

SET CDD OFF

before the RUN command. (Prior to version 4.0, SET CDD ON was not a default.)

B. MDY (for pre-Version 3.0 users only)

The MDY program uses two files. These are (by FORTRAN unit number):

Unit 9 - Meter file used in PRISM Version 2.2 (or earlier).

Unit 10 - Converted meter file to be used in PRISM Version 3.0 or higher.

Error messages are printed on the terminal, unit 6.

The following example illustrates the differences between the old format read by MDY and the new format generated by the program:

METER FILE (Version 2.2)	METER FILE (Versions 3.0 or higher)
J 3 'PRE' 'KWH' 4 12 78	J3 12 4 78 P PRE U KWH
2320 4 1 79	2320 1 4 79
2930 2 2 79	2930 2 2 79
2920 6 3 79	2920 3 6 79
. . . .	. . . .
. . . .	. . . .
. . . .	. . . .
1210 4 12 79	1210 12 4 79
-9	-9
J 1234 'HO' 'KWH' 20 12 78	J1234 12 20 78 P HO U KWH
5040 22 1 79	5040 1 22 79
5550 22 2 79	5550 2 22 79
0 23 3 79	-1 3 23 79
. . . .	. . . .
. . . .	. . . .
. . . .	. . . .
2360 20 12 79	2360 12 20 79
-99	-99

Please note the following differences:

1. The header card of the meter file consists now of a house identifier which may be up to 15 alphanumeric characters (no spaces are allowed), the date with the new format MM DD YY, and three label fields described in Sec. 2 (unit 10).

2. PRISM Version 2.2 allowed only 2 descriptive fields in the header card. With the MDY program these two fields are copied to the new format as the PREPOST (P) field and the UNITS (U) field. You may wish to change the MDY format statement which specifies the field (e.g., if you used 'HD' in the PREPOST field of an old meter file to describe a house doctor treatment, you may wish to change the field from P to L for this set of houses).

3. In order to accommodate those cases when consumption is actually zero, PRISM Version 3.0 or higher will accept 0 as a consumption point. Therefore, the MDY program converts all 0 readings, previously indicating a missing data point, to a -1 reading. This is the new convention for missing readings.

Appendix 3. Description of NOAA Data Series

Following is a general description of the weather data obtained from the National Climatic Data Center in Asheville, NC (see also Sec. 1.2):

a) data for over 400 primary weather stations are available (including navy bases and islands)
b) years included range from 1940 to 1983 (any number of yearly data may be requested) with updates on a separate reel or on hard copy
c) format is Series 3210: variable length ASCII; can be converted to ASCII fixed length or EBCDIC fixed or variable length for an additional fee*
d) Local Climatological Data (LCD) updates are available on a per-month basis and also as an annual subscription of monthly updates. There is usually a 2-month lag in receiving the most recent update.

The following list describes the individual components that determine the total cost of any data request:

a) minimum charge
b) cost per station selected
c) conversion to a different tape format*
d) # of input tape mounts**
e) # of output tape mounts
f) fixed tape cost
g) merge of pre-1984 data with more recent data
h) LCD updates
i) shipping and handling.

The meteorologists are very helpful and encourage people to call for a cost estimate. Payment may be made in several ways: by VISA or MASTERCARD (if one wishes to speed things up), as well as with normal purchasing procedures. Delivery dates may be as long as 3 to 4 weeks from time of order. The NCDC will take rush orders and Federal Express orders (at extra cost).

---

*The conversion cost is the same whether one wishes to have the data formatted in the 3210 series ASCII fixed length or converted to the 9750 series variable or fixed length (the old NOAA tape format for weather data). This cost results from having to put the data through a software program first before being output to tape.

**The number of input tape mounts is determined by the number of selected weather stations. Frequently, data from many weather stations in the same geographical location are on the same reel, in which case only one tape mount is charged.

Appendix 4. Bibliography of Scorekeeping Publications

About the Scorekeeping Methodology:

M. F. Fels (1986) "PRISM: An Introduction", Energy and Buildings, 9, #1, pp. 5-18; previously available as PU/CEES No. 163.

(the description of the method)

M. F. Fels, ed. (1986) Measuring Energy Savings: the Scorekeeping Approach, A special issue of Energy and Buildings, 9, #1-2, Elsevier, Lausanne, Switzerland.

(sixteen papers providing a comprehensive summary of PRISM research and applications; see specific references in list below)

M. L. Goldberg (1982) "A geometrical approach to nondifferentiable regression models as related to methods for assessing residential energy conservation", Ph.D. Thesis for Dept. of Statistics, Princeton University, PU/CEES Report No. 142, Princeton, NJ.

(derivation of rigorous statistics underlying PRISM, including method for computing standard errors of the estimates)

Prototype application

G. S. Dutt, M. L. Lavine and B. G. Levi (1986) "The Modular Retrofit Experiment: Design, scorekeeping and evaluation", Energy and Buildings, 9, #1, pp. 21-33.

(the retrofit experiment of 140 gas-heated houses for which the scorekeeping method was developed)

Interpretation of PRISM results

M. F. Fels, J. Rachlin and R. H. Socolow (1986) "Seasonality of non-heating consumption and its effect on PRISM results", Energy and Buildings, 9, #2, pp. 139-148.

(an analysis of heating vs. non-heating consumption, with an improved understanding of the physical meaning of the model estimates)

J. Rachlin, M. F. Fels and R. H. Socolow (1986) "The stability of PRISM estimates", Energy and Buildings, 9, #2, pp. 149-157.

(an analysis of the data requirements of the scorekeeping model and the stability of model results)

Other studies

E. Hirst, R. Goeltz and D. White (August 1984) "Use of electricity billing data to determine household energy use 'fingerprints'", Oak Ridge National Laboratory Report No. ORNL/CON-164, Oak Ridge, TN.

(an exploration of different ways to use PRISM estimates to categorize houses)

Application to different fuels

M. F. Fels, R. H. Socolow, J. Rachlin and D. O. Stram (1985) "PRISM: A conservation scorekeeping method applied to electrically heated houses", Electric Power Research Institute Report No. EM-4358, Palo Alto, CA.

(summary of research to extend PRISM from gas-heated to electrically heated houses)

D. O. Stram and M. F. Fels (1986) "The applicability of PRISM to electric heating and cooling", Energy and Buildings, 9, #2, pp. 101-110.

(application of the scorekeeping approach to electrically heated houses, including an exploration of how cooling might be included in the model)

M. F. Fels and D. O. Stram (1986) "The effect of burning wood on saving electricity", Energy and Buildings, 9, #2, pp. 119-126.

(an assessment of the reliability of scorekeeping results when wood is supplementing electricity used for heating; the benefits of separating woodusers from non-woodusers for the analysis)

M. F. Fels and D. O. Stram (1986) "Does PRISM distort the energy signature of heat-pump houses?", Energy and Buildings, 9, #2, pp. 111-118.

(exploration of the application of PRISM to houses heated by heat-pump systems)

M. F. Fels, M. L. Goldberg and M. L. Lavine (1986) "Exploratory scorekeeping for oil-heated houses", Energy and Buildings, 9, #2, pp. 127-136.

(an assessment of how well the model works on oil delivery data in single-family houses)

Application to multifamily buildings

J. M. DeCicco, G. S. Dutt, D. T. Harrje and R. H. Socolow (1986) "PRISM applied to a multifamily building: the Lumley Homes case study", Energy and Buildings, 9, #1, pp. 77-88.

(a pilot application of PRISM to a multifamily building; more detailed analysis using instrumented data)

C. A. Goldman and R. L. Ritschard (1986) "Energy conservation in public housing: a case study of the San Francisco Housing Authority", Energy and Buildings, 9, #1, pp. 89-98.

(application of PRISM to several multifamily buildings)

Evaluation of energy conservation programs

M. L. Goldberg (1986) "A Midwest low-income weatherization program seen through PRISM", Energy and Buildings, 9, #1, pp. 37-44.

(scorekeeping for a low-income weatherization project; good accounting of data problems encountered)

M. J. Hewett, T. S. Dunsworth, T. A. Miller and M. J. Koehler (1986) "Measured vs. predicted savings from single retrofits: a sample study", Energy and Buildings, 9, #1, pp. 65-73.

(use of PRISM to assess the accuracy of savings predictions)

E. Hirst (1986) "Electricity savings one, two, and three years after participation in the BPA Residential Weatherization Pilot Program", Energy and Buildings, 9, #1, pp. 45-53.

(a complete evaluation, based on NAC's from PRISM; illustrates two-stage approach)

L. S. Rodberg (1986) "Energy conservation in low-income homes in New York City: the effectiveness of house doctoring", Energy and Buildings, 9, #1, pp. 55-64.

(successful application of PRISM to data set with considerable data problems)

Monitoring aggregate consumption

M. F. Fels and M. L. Goldberg (1986) "Using the scorekeeping approach to monitor aggregate energy conservation", Energy and Buildings, 9, #2, pp. 161-168.

(the methodology applied to aggregate gas billing data in New Jersey, to understand post-embargo conservation)

M. L. Goldberg and M. F. Fels (1986) "Refraction of PRISM results into components of saved energy", Energy and Buildings, 9, #2, pp. 169-180.

(a new extension of PRISM to decompose the energy savings into physically meaningful components; includes estimates of interior temperature changes and the takeback effect)

M. F. Fels and M. L. Goldberg (1982) "Measuring household fuel consumption on the standard living cycle", Energy, 7, #6.

(earlier version of Fels and Goldberg (1986))

M. F. Fels and M. L. Goldberg (1984) "Using billing and weather data to separate thermostat from insulation effects", Energy, 9, #5.

(precursor of refraction approach)

Foundations for PRISM

T. F. Schrader (1978) "A two-parameter model for assessing the determinants of residential space heating", MS Thesis for Dept. of Mech. and Aer. Engineering, Princeton University, PU/CEES Report No. 69, Princeton, NJ.

(the physical underpinning of the model)

R. H. Socolow, ed. (1978) Saving Energy in the Home, Ballinger Publishing Co., Cambridge, MA.

(original PU/CEES studies of energy consumption in housing; early formulation of scorekeeping approach)

PART II

Documentation for PC Application

October 1986

These instructions are for PRISMonPC, the PC version of PRISM (the PRInceton Scorekeeping Method). They are to be used along with the regular PRISM documentation found in Part I of this report. In what follows, the user types what is indicated after A> (the A prompt) and presses RETURN at the end of each line.

1. Getting Set Up

1.1. What you will need

a) an IBM PC with 256K memory and two disk drives*
b) a math coprocessor (an 8087 chip)
c) the PRISM disk and the sample data disk, from CEES
d) a DOS 2.1 (or higher) disk
e) a blank disk formatted in DOS 2.1 (or higher) using /S option
f) your input data files on a floppy disk (see 1.4 below).

1.2. Making a back-up copy

We recommend that you back up both disks that were sent. Current output files are immediately replaced when the programs are run if a new filename is not specified beforehand (see Section 2.2 below).

1.3. Installation (one time only)

To install PRISM, follow these steps:

a) Place your DOS disk in the A drive and your blank formatted disk in the B drive

b) Turn on PC

c) Type
```
A>COPY PRINT.COM B:
```

d) Replace DOS disk (in A drive) with the PRISM disk

e) Type
```
A>COPY *.* B:
```

All the programs you need are now on the disk in the B drive. Remove the disk, affix the extra PRISM label to the disk, and place a write-prevent tape over the notch.

not sent 10/17/89 Ca

*These instructions can be easily adapted to a PC with a hard disk, as described in Section 5.

1.4. Input data

For preparation of the four required input data files, see Part I, Section 2 of documentation. For the PC version, we recommend the following naming convention:

TEMPS.xyz	the daily temperature file
HNORM.xyz	the normalized heating degree-day file
CNORM.xyz	the normalized cooling degree-day file
METER.abc	the consumption data

where xyz represents the weather station (e.g. NWK for Newark), and abc represents the set of houses/years to be analyzed.

2. To run PRISM

2.1. Start

Put new PRISM disk in A drive and disk with input data in B drive (see 2.2 below).

Reboot (control-alt-delete) or turn PC on.

Set CAPS LOCK on.

An AUTOEXEC program invokes a program in BASIC, and provides a complete set of SET commands for PRISM input and output (I/O) files, using default names given in Exhibit 1a. To see these filenames on the screen, type

```
A>TYPE A:AUTOEXEC.BAT
```

2.2. Specify I/O files

At the beginning of each session (i.e., after turning PC on or after rebooting), it is necessary to set I/O files, to correspond with the PRISM documentation in Part I: Section 2 for input and Section 3 for output files.

If you wish to change the default values, type new set commands. For example,

```
A>SET FORT10=B:METER.MRE
A>SET FORT12=B:TEMPS.NWK
A>SET FORT15=B:HNORM.NWK
```

would specify the Newark temperature and normalization files, and the consumption data for Modular Retrofit Experiment (MRE) houses.

Note 1: This needs to be done only once at the beginning of the session unless you change an input file to be used or respecify an output file. Please remember that output files will be replaced each time the program is run. If you wish to save a previous run, rename the old file.

Note 2: Depending on your system, you may encounter an error message while running the AUTOEXEC which reads "Out of environment space". This feature of DOS may limit the number of characters used in the SET commands for the PRISM FORTRAN file definitions. If this occurs, a quick fix is to use shorter length file names.

2.3. Run

With system configured as in 2.1, type

A>PRISM

Screen will respond:

Next house.......

Enter PRISM commands (e.g., SET PLTUSE ON, RUNALL, etc.; see Part I, Section 4.3 of documentation).

Type

RUN

Wait for PRISM to run (be patient!).

2.4. End

After you have finished the run:

Type

QUIT

System will return to A>, after giving message "Execution terminated: 0". See example run in Exhibit 2.

3. The output

3.1. On the screen

To look at output on the screen, type

A>TYPE B:filename

For example,

A>TYPE B:LONG

will give the LONG output.

For an output wider than 80 characters (e.g., the plots in the LONG output, or the COMPARE file), the TYPE command will show two 80-character lines for each line of output. A wordprocessor can read it correctly (e.g., use non-document mode of WordStar).

3.2. <u>On the printer</u>

If you have a narrow (80-character) printer such as a small Epson, and want to print more than 80 characters per line, first type

A>CONDENSE

to get condensed output. (To return to regular type, turn printer off and on.) Printer will ask for printer name ("name of list device"); respond LPT1 (unless you know otherwise). See Exhibit 3 for example of condensed output.

Set paper in correct position for form feeds.

Type

A>PRINT B:filename

to get a printout of the file you desire.

3.3. <u>Space limitations</u>

The LONG output takes up approximately 900 bytes of disk space for each house, and an additional 15,000 bytes per house if <u>either</u> SET PLTUSE ON or SET PLTRSD ON is used, i.e., a total of about 30,000 bytes per house. In contrast, the COMPARE file takes up only 550 bytes for the first house and 130 bytes for each subsequent house. If many houses are being run, you may want first to produce the COMPARE file <u>only</u> for all the houses (use SET LONG OFF and SET COMPAR ON), and then request the LONG output (for example, use SET LONG ON and SET PLTUSE ON) for individual houses that need a closer look.

4. <u>Auxiliary programs</u>

Before running the autoexec for either DDCALC or MDY, you will need to run the ZAPAUTO program as described below. This clears previous FORTRAN file definitions to make room for the new ones that are defined in DDAUTO or MDYAUTO. (See Note 2 under Sec. 2.2).

Whenever you switch from one program to another (e.g., from DDCALC back to PRISM), it is important first to run ZAPAUTO followed by the appropriate autoexec: AUTOEXEC for PRISM, DDAUTO for DDCALC, and MDYAUTO for MDY. For example, to run PRISM after running DDCALC or MDY, either reboot, or type

A>ZAPAUTO
A>AUTOEXEC

Note: To check the status of your file definitions at any time, simply type

A>SET

4.1. To run DDCALC

With PRISM disk in A drive, type

```
A>ZAPAUTO
A>DDAUTO
```

This will define the necessary FORTRAN files (see Exhibit 1b).

Type

```
A>DDCALC
```

Enter any necessary SET commands (e.g., SET STARTD MM/DD/YY; see Appendix 2, Section A in Part I).

Type

```
RUN
```

The heating degree-days will be written to the file specified as unit number 14 called HDD on the B disk. The output file for cooling degree-days is specified as unit number 20 called CDD on the B disk.

4.2. To run MDY (pre-Version 3.0 users only)

As described in Appendix 2, Section B in Part I, in order to run any pre-Version 3.0 meter files through PRISM they must first be converted to the new format using the program MDY.

The input meter file should be assigned to unit 9. To do this, type

```
A>ZAPAUTO
A>MDYAUTO
```

Next, copy the old meter file to a file called METER.OLD on the B drive. The converted output file is assigned to unit 10 on the B drive, with filename METER (see Exhibit 1c). If you want to change the output filename then type

```
A>SET FORT10=__________.__
```

With the PRISM disk in the A drive, type

```
A>B:MDY
```

(Because of insufficient space on the PRISM disk, the MDY program is on the DATA disk.) After execution, you should be able to run the converted meter file through PRISM immediately.

5. Additional details concerning a hard-disk configuration

5.1. Before installing PRISM

a) Because the PRISM program may open and close more files than the default settings for DOS allow, you must add a FILES=20 statement to the CONFIG.SYS file that resides in the root directory of the hard disk. If you do not have a CONFIG.SYS already, copy the file on the PRISM disk into the root directory.

b) The PATH command must be appended to search for the subdirectory where the PRINT.COM file can be located. For example, if PRINT.COM is in a subdirectory called PRGMS and the current PATH command reads

```
C>PATH C:\FIRST
```

then the PATH command should be modified to read

```
C>PATH C:\FIRST;C:\PRGMS
```

5.2. Installation on the hard disk (one time only)

To install PRISM on the hard disk, follow these steps:

a) Create a new subdirectory (call it PRISM):

```
C>MD \PRISM
```

b) Create a batch file in the root directory called PRISM.BAT (use a word processing software or EDLIN). In this file, input the following:

```
CD \PRISM
SET FORT10=METER
SET FORT12=TEMPS
SET FORT15=HNORM
SET FORT21=CNORM
SET FORT16=LOOK
SET FORT77=LONG
SET FORT22=COMPARE
SET FORT41=RESIDS
PRITITLE
```

This is essentially equivalent to the AUTOEXEC.BAT file found on the PRISM disk with "B:" removed before each filename, and with the first line added to direct the computer to the PRISM subdirectory.

c) Type

C>CD \PRISM

to go into the PRISM subdirectory.

d) Insert PRISM disk in A drive.

e) Type

C>COPY/V A:*.* C:

f) Insert sample file disk in A drive.

g) Type

C>COPY/V A:*.* C:

h) Edit the autoexec files DDAUTO.BAT and MDYAUTO.BAT (using word processing software) to eliminate "B:" before each filename. For example, in DDAUTO.BAT, the statement

SET FORT12=B:TEMPS

should be changed to

SET FORT12=TEMPS

5.3. To run PRISM on the hard disk

Reboot on the hard disk.

Set CAPS LOCK on and type

C>PRISM

This will put you in the PRISM subdirectory and run the AUTOEXEC file.

Make any changes in file definitions by typing

C>SET FORT__=________.___

(See Sec. 2.2.)

Type

C>PRISM

Follow directions beginning with Sec. 2.3.

GOOD LUCK!!

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Exhibit 1. Sample FORTRAN file definitions for a) AUTOEXEC.BAT for PRISM execution, b) DDAUTO.BAT for DDCALC execution, and c) MDYAUTO.BAT for MDY execution.

a)

```
SET FORT10=B:METER
SET FORT12=B:TEMPS
SET FORT15=B:HNORM
SET FORT21=B:CNORM
SET FORT16=B:LOOK
SET FORT77=B:LONG
SET FORT22=B:COMPARE
SET FORT41=B:RESIDS
```

b)

```
SET FORT12=B:TEMPS
SET FORT14=B:HDD
SET FORT20=B:CDD
```

c)

```
SET FORT9=B:METER.OLD
SET FORT10=B:METER
```

Exhibit 2. Sample PRISM run.

```
A:\>PRISM

Next house on meter file is J3 PRE HO
SET PLTUSE ON
SET COMPAR ON
SET RUNALL ON
RUN

Finished house J3 PRE HO ---

Next house on meter file is J4 POST HO

Finished house J4 POST HO --- J

 End of file detected on METER file
 REWINDing meter file.
Next house on meter file is J3 PRE HO
QUIT

End of Run:
Execution terminated :  0

A:\>
```

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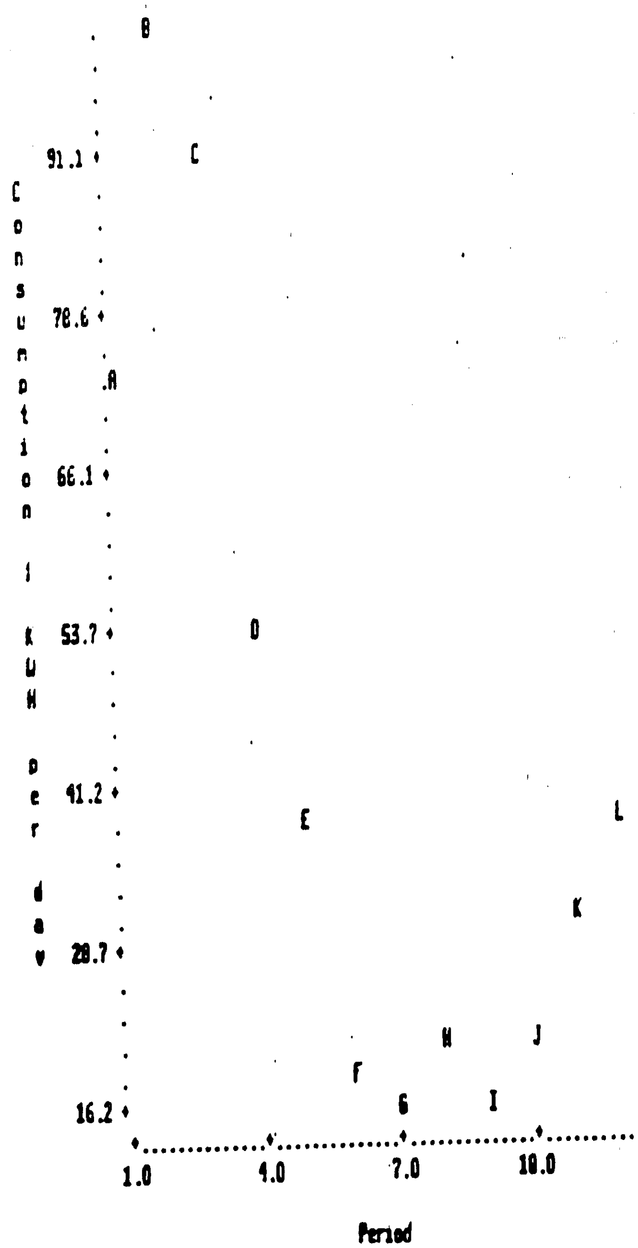
Exhibit 3. Sample output printed in CONDENSED mode. (Plot results from using SET PLTUSE ON when running PRISM; see Figure 3 in Part I for other plots produced in the LONG output.)

House: J3 PRE MO



PERIODS:

A DEC 4.1978 to JAN 3.1979
B JAN 4.1979 to FEB 1.1979
C FEB 2.1979 to MAR 5.1979
D MAR 6.1979 to APR 3.1979
E APR 4.1979 to MAY 3.1979
F MAY 4.1979 to JUN 4.1979
G JUN 5.1979 to JUL 4.1979
H JUL 5.1979 to AUG 2.1979
I AUG 3.1979 to SEP 3.1979
J SEP 4.1979 to OCT 2.1979
K OCT 3.1979 to NOV 1.1979
L NOV 2.1979 to DEC 3.1979

Appendix D: Savings Based on Billing Data

Section 2: Statistical Analysis

The Princeton Scorekeeping Method, or PRISM, is a computer program that takes weather sensitive billing data and normalizes the data for weather conditions. The program computes a normal annualized consumption (NAC) estimate for each household. PRISM provides this estimate by calculating degree-days for the consumption period, then estimating a straight line regression equation to best fit the data. PRISM also provides statistical estimates for goodness of fit (R-squared tests) and reliability estimates (coefficient of variance tests) for each household. Additional information on this model is presented in section 1 of this appendix.

The goodness of fit test, R-squared, indicates how accurately the regression line fits the data. Specifically, the R-squared measures the proportion of total variation about the mean explained by the regression; or, in other words, the percent of the data that is explained by the regression equation. When a regression equation fits a data set well, the estimators in that equation are accurate predictors of the data. An R-squared close to 100 percent indicates that the regression equation predicts the data with perfect accuracy.

The coefficient of variance test, or CV, measures the reliability of estimates made by the regression equation. It is calculated by dividing the standard error of an estimate by the estimate itself. A lower CV percent indicates a more reliable estimate; a perfectly reliable estimate will have a CV of zero percent.

ICF used PRISM to estimate actual consumption, both for the year prior to installation and for the year after installation. The difference between the two consumption estimates yielded estimates of actual savings. This analysis was calculated for various sub-groups, including urban and rural participants, electric heat customers, and consumption quartiles. ICF compared the savings of the various groups to analyze the effects of weatherization on usage patterns.

Data Reliability and Goodness of Fit

Northeast Utilities provided ICF with data for 373 homes, weatherized in 1988 through the WRAP program, to be evaluated by PRISM. Of the 373, not all of whom are primary electric users, 47 were not analyzed through PRISM because of various anomalies found within the data. Of the remaining 326 accounts, 57 (17 percent) had R-squareds greater than 50 percent. This indicates that the regression equations calculated by PRISM are not highly accurate in predicting the data for these low fit participants.

Each account was also analyzed for its coefficient of variance, in order to determine the reliability of PRISM's estimates of energy consumption. The analysis showed that the "reliable" accounts (those possessing low CV percents) are concentrated among the "good fitting" (those possessing high R-squareds). In table D-1, the accounts are grouped based on their R-squareds. Those accounts with high CV percents (low reliability) were also broken out from each group. ICF divided the number of high CV percent accounts by the total number of accounts in each group to determine if a correlation existed between accounts that fit the PRISM model well and those with reliable estimates. These calculations showed that a correlation does exist. Over 52 percent of the 326 total accounts have a CV percent greater than 6 percent, while only 21 percent of the accounts with R-squareds greater than 70 percent have a CV percent greater than 6 percent. Thus, this indicates that those participants with good fit are also reliable for analysis of energy savings.

TABLE D-1 Data Reliability and Goodness of Fit					
R-Squared	Number of Accounts		Total Number	Percent of Total Accounts	
	CV>6%	CV>7%		CV>6%	CV>7%
ALL	171	154	326	52%	47%
>50%	19	17	57	33%	30%
>60%	9	7	39	23%	18%
>70%	5	3	24	21%	13%
>75%	4	2	19	21%	11%
>80%	4	2	12	33%	17%
>85%	3	1	9	33%	11%
>90%	0	0	5	0%	0%

ICF used the R-squared calculations to determine whether PRISM over or underestimated energy consumption. Since the most accurate and reliable accounts were used, the estimated amount of consumption is considered close to reality. However, for the less accurate accounts, PRISM underestimated heating and cooling consumption, especially in the year after installation. Thus, overall saving estimates for heating and cooling with these data included may be overstated.

Due to this possible source of inaccuracy, the remainder of the analyses presented in this appendix focus primarily on the accurate and reliable estimates (those accounts with high R-squareds).

Savings By End Use Category

Based on the normal annualized consumption (NAC) estimates from PRISM, the electric accounts experienced a savings of 0.5 percent (table D-2). However, estimates of savings increased with the accuracy of the data. For the reasonably accurate accounts (R-squareds greater than 75 percent), PRISM estimated a 6 percent savings. For an even more accurate level (greater than 85 percent), PRISM estimated savings of 7.7 percent. Based on these figures, the WRAP effort should be credited with approximately 6.5 percent savings in general electricity consumption. Again it should be noted that these estimates are for all customers with electricity, not only those having electricity as the primary heating or water heating fuel.

TABLE D-2
Estimated Actual Consumption and Savings

R-Squared	Total Normalized, Annualized Consumption			Percent Savings	Number of Accounts	Savings Per Participant (kWh)
	Pre-Installation (kWh)	Post-Installation (kWh)	Savings (kWh)			
ALL	2,794,304	2,781,490	12,814	0.5%	326	39
>50%	390,196	384,390	5,806	1.5%	57	102
>60%	273,945	270,101	3,844	1.4%	39	99
>70%	207,344	199,076	8,268	4.0%	24	345
>75%	159,008	149,443	9,565	6.0%	19	503
>80%	120,077	112,609	7,468	6.2%	12	622
>85%	98,965	91,390	7,575	7.7%	9	842
>90%	40,002	37,261	2,741	6.9%	5	548

Estimating the savings for heating/cooling consumption was more difficult. No clear level of savings was established among the more accurate accounts (those with higher R-squareds). Among those accounts with R-squareds greater than 75 percent, PRISM estimated actual savings of 5.5 percent; among all accounts with R-squareds greater than 85 percent, PRISM estimated an <u>increase</u> in consumption of 2.8 percent (table D-3).

TABLE D-3
Estimated Actual Consumption and Savings for Heating and Cooling

R-Squared	Normalized, Annualized Consumption For Heating and Cooling			Percent Savings	Number of Accounts	Savings Per Participant (kWh)
	Pre-Installation (kWh)	Post-Installation (kWh)	Savings (kWh)			
ALL	376,589	231,826	144,763	38.4%	326	444
>50%	100,973	103,255	(2,282)	(2.3%)	57	(40)
>60%	92,430	90,558	1,872	2.0%	39	48
>70%	72,326	70,947	1,379	1.9%	24	57
>75%	59,615	56,341	3,274	5.5%	19	172
>80%	52,504	51,241	1,263	2.4%	12	105
>85%	43,120	44,317	(1,197)	(2.8%)	9	(133)
>90%	18,565	18,647	(82)	(0.4%)	5	(16)

Table D-4 shows the breakdown of energy savings between heating and cooling and other end uses. Among the more accurate accounts with higher R-squareds, most of the energy savings came from the non-space-conditioning measures. Low R-squared accounts exhibited the opposite pattern. As discussed later in this chapter, the high R-squared accounts tended to be primary electric users and the low R-squared accounts tended to heat primarily with other fuels. This implies that space conditioning measures were more effective in residences with non-electric primary heat.

TABLE D-4
Energy Savings by Category of End Use

R-Squared	Number of Accounts	Total Savings		Heating/Cooling Savings		Savings From Other End Uses		Percent of Total Savings From Other End Uses
		kWh	%	kWh	%	kWh	%	
All	326	12,814	0.5	144,763	38.4	(131,949)	(5.5)	N/A
> 50%	57	5,806	1.5	(2,282)	(2.3)	8,088	2.8	139.3%
> 60%	39	3,844	1.4	1,872	2.0	1,972	1.1	51.3%
> 70%	24	8,268	4.0	1,379	1.9	6,889	5.1	83.3%
> 75%	19	9,565	6.0	3,274	5.5	6,291	6.3	65.7%
> 80%	12	7,468	6.2	1,263	2.4	6,205	9.2	83.1%
> 85%	9	7,575	7.7	(1,197)	(2.8)	8,772	15.7	115.8%
> 90%	5	2,741	6.9	(82)	(0.4)	2,823	13.2	103.0%

In summation, the data suggests that participants consumed about 6.5 percent less total energy due to participation in the WRAP program. For electric general service use accounts, the heating/cooling energy usage declined approximately 3 percent. For participants with electric heat, end uses other than space-conditioning accounted for the majority of the savings. The data is more reliable for higher R-squareds than for lower R-squareds and the total annual consumption figures are more consistent in their claimed savings than are the heating/cooling figures.

Quartile Analysis

ICF also analyzed the PRISM data based on base consumption quartiles. The purpose of this analysis was twofold: (1) to determine if high energy consumption was correlated with high energy savings, and (2) to determine if high energy consumption was correlated with high R-squared values.

The pre-installation quartile analysis showed that high consumption was associated with high savings (table D-5). The highest consumption quartile accounted for over 70,000 kWh in savings, while savings for all four quartiles were less than 13,000 kWh.

TABLE D-5
Savings by Pre-Installation Consumption Quartiles

Quartile	Savings (kWh)	Pre-Installation Consumption (kWh)	Savings As A Percentage Of Pre-Installation Consumption
Lowest 25% Accounts	(51,048)	174,393	(29.3%
Lower Middle 25% Accounts	5,797	279,790	2.1%
Higher Middle 25% Accounts	(11,989)	415,098	(2.9%)
Highest 25% Accounts	70,055	1,925,024	3.6%
Total Savings	12,814	2,794,304	0.5%

Note: numbers may not add exactly due to rounding

As discussed previously, much of the billing data could not be included for analysis with the PRISM model. Only 17 percent of the accounts had R-squareds higher than 50 percent. ICF's analysis shows that the most accurate accounts are concentrated among the highest 25 percent quartile of pre-installation base energy consumption (table D-6). Over half of the most accurate accounts (with R-squareds of 70 percent or higher) fell in the top pre-installation consumption quartile.

Since previous analysis showed that the highest quartile was also associated with higher savings, this analysis implies that the higher savings are associated with more accurate accounts. This supports the conclusion that the lower overall estimates of actual savings may have been underestimated by PRISM.

TABLE D-6
Accuracy of Accounts by Pre-Installation Consumption Quartile

R-Squared	Number of Accounts	Highest Quartile		Higher Middle Quartile		Top Two Quartiles (Upper 50%)	
		Number Of Accounts	Quartile As A % Of Total	Number Of Accounts	Quartile As A % Of Total	Number Of Accounts	Quartile As A % Of Total
>50%	57	19	33%	15	26%	34	60%
>60%	39	14	36%	9	23%	23	59%
>70%	24	12	50%	4	17%	16	67%
>75%	19	10	53%	2	11%	12	63%
>80%	12	8	67%	1	8%	9	75%
>85%	9	6	67%	1	11%	7	78%
>90%	5	3	60%	0	0%	3	60%

Urban/Rural Analysis

ICF analyzed PRISM's electricity consumption estimates for urban and rural participants. Total consumption and savings for each R-squared level are shown in table D-7 for urban accounts, and in table D-8 for rural accounts. Both tables reflect that the estimates of percent savings vary positively with the accuracy level of the data. The exception to this is in the greater than 90 percent R-squared level; this inconsistency may be due to the very small sample size at this level. The correlation between accuracy and savings implies that overall savings may be underestimated for both groups. The relatively accurate estimates, those with R-squareds higher than 70 percent, show savings of between 6 percent and 8 percent for urban participants, and between 4.5 percent and 10 percent for rural participants.

A more detailed examination of R-squared level distribution shows that consumption estimates for urban accounts are more accurate than for rural accounts (table D-9). Urban accounts are more likely to have higher R-squared values than rural accounts.

The distribution of reliable accounts (those with CVs lower than 7 percent) indicates that PRISM's consumption estimates for urban accounts may be more reliable than those for rural accounts (table D-10, "Reliable Accounts"). An examination of the percentage of accounts that are reliable at each R-squared level (table D-10, "All Accounts") show that the more accurate accounts tend to be more reliable as well.

TABLE D-7
Estimated Actual Consumption and Savings for Urban Participants

R-Squared	Normalized, Annualized Consumption			Percent Savings
	Pre-Installation (kWh)	Post-Installation (kWh)	Savings (kWh)	
ALL	751,736	740,750	10,986	1.5%
>50%	176,473	172,871	3,601	2.0%
>60%	142,025	135,938	6,087	4.3%
>70%	124,423	116,929	7,494	6.0%
>75%	85,269	79,534	5,735	6.7%
>80%	82,822	76,944	5,878	7.1%
>85%	68,989	63,511	5,479	7.9%
>90%	38,389	35,607	2,782	7.3%

TABLE D-8
Estimated Actual Consumption and Savings for Rural Participants

R-Squared	Normalized, Annualized Consumption			Percent Savings
	Pre-Installation (kWh)	Post-Installation (kWh)	Savings (kWh)	
ALL	2,042,568	2,040,740	1,828	0.1%
>50%	86,377	85,169	1,208	1.4%
>60%	75,309	73,680	1,630	2.2%
>70%	51,569	49,253	2,316	4.5%
>75%	45,901	42,750	3,151	6.9%
>80%	9,417	8,506	912	9.7%
>85%	9,417	8,506	912	9.7%
>90%	3,975	3,809	166	4.2%

TABLE D-9
Goodness of Fit (Accuracy) of Data for Urban and Rural Participants

R-Squared	Total Accounts		Urban Accounts		Rural Accounts	
	Number	Percent Distribution	Number	Percent Distribution	Number	Percent Distribution
ALL	326	100%	114	100%	212	100%
>50%	57	17%	28	25%	29	14%
>60%	39	12%	19	17%	20	9%
>70%	24	7%	13	11%	11	5%
>75%	19	6%	10	9%	9	4%
>80%	12	4%	9	8%	3	1%
>85%	9	3%	6	5%	3	1%
>90%	5	2%	4	4%	1	0%

TABLE D-10
Reliability of Data
for Urban and Rural Participants

R-Squared	Reliable Accounts				All Accounts			
	Urban		Rural		Urban		Rural	
	Number	Percent of Urban Accounts	Number	Percent of Urban Accounts	Number	Percent Reliable	Number	Percent Reliable
ALL	72	63%	100	47%	114	63%	212	47%
>50%	21	18%	19	9%	28	75%	29	66%
>60%	16	14%	16	8%	19	84%	20	80%
>70%	12	11%	9	4%	13	92%	11	82%
>75%	8	7%	8	4%	10	80%	9	89%
>80%	7	6%	2	1%	9	78%	3	67%
>85%	5	4%	2	1%	6	83%	3	67%
>90%	3	3%	1	0%	4	75%	1	100%

More detailed information on the energy consumption characteristics of urban and rural participants was obtained by computing average consumption and savings per participant (tables D-11 and D-12). The results of this analysis indicate that higher levels of accuracy are related to higher levels of consumption, as well as to larger percent savings. In addition, the more accurate estimates show that urban participants used electricity far more intensively than rural participants; for the very accurate accounts, up to three times more per year. This implies that urban participants may use electricity for a wider range of end-uses, and may also have a higher incidence of primary electric space heating. If PRISM is more accurate for accounts with higher consumption, as the data may indicate, this may explain why PRISM's estimates were generally more accurate for urban accounts than for rural.

TABLE D-11
Average Estimated Actual Consumption and Savings per Urban Participant

R-Squared	Number of Urban Accounts	Normalized, Annualized Consumption		
		Pre-Installation (kWh)	Post-Installation (kWh)	Savings (kWh)
ALL	114	6,594	6,498	96
>50%	28	6,303	6,174	129
>60%	19	7,475	7,155	320
>70%	13	9,571	8,995	576
>75%	10	8,527	7,953	574
>80%	9	9,202	8,549	653
>85%	6	11,498	10,585	913
>90%	4	9,597	8,902	695

To determine the relationship between accuracy and the use of electricity as the primary heating fuel, ICF separated primary electric heat users from the urban and rural categories. Fifteen participants in the sample set used electricity as their primary heating fuel, thirteen urban and two rural. (This supports the earlier inference that urban customers have a higher incidence of primary electric heat.) No further examination of the rural group was performed because of the statistical insignificance of the sample size.

TABLE D-12
Average Estimated Actual Consumption and Savings per Rural Participant

R-Squared	Number of Rural Accounts	Normalized, Annualized Consumption		
		Pre-Installation (kWh)	Post-Installation (kWh)	Savings (kWh)
ALL	212	9,635	9,626	9
>50%	29	2,979	2,937	42
>60%	20	3,765	3,684	81
>70%	11	4,688	4,478	210
>75%	9	5,100	4,750	350
>80%	3	3,139	2,835	304
>85%	3	3,139	2,835	304
>90%	1	3,975	3,809	166

For urban participants, this analysis showed a marked difference in goodness of fit (accuracy) between primary electric heat users and all urban participants (table D-13). Urban accounts with primary electric heat also showed significantly better results for their reliability of the estimates (table D-14). These results are as anticipated because PRISM was designed to adjust weather-sensitive energy consumption for weather variations. Thus, consumption that is not weather sensitive would not fit the model as well.

TABLE D-13
Goodness of Fit (Accuracy) of Data for Urban Participants With and Without Primary Electric Heat

R-Squared	Urban Participants with Primary Electric Heat		Urban Participants	
	Number	Percent Distribution	Number	Percent Distribution
ALL	13	100%	114	100%
>50%	8	62%	28	25%
>60%	7	54%	19	17%
>70%	5	38%	13	11%
>75%	4	31%	10	9%
>80%	4	31%	9	8%
>85%	4	31%	6	5%
>90%	3	23%	4	4%

TABLE D-14
Reliability of Data
For Urban Participants With and Without Primary Electric Heat

R-Squared	Reliable Accounts				All Accounts			
	Electric Heat		Total Urban		Electric Heat		Total Urban	
	Number	Percent of all Urban Electric Heat Accounts	Number	Percent of All Urban Accounts	Number	Percent Reliable	Number	Percent Reliable
ALL	9	69%	72	63%	13	69%	114	63%
>50%	5	38%	21	18%	8	63%	28	75%
>60%	5	38%	16	14%	7	71%	19	84%
>70%	5	38%	12	11%	5	100%	13	92%
>75%	4	31%	8	7%	4	100%	10	80%
>80%	4	31%	7	6%	4	100%	9	78%
>85%	4	31%	5	4%	4	100%	6	83%
>90%	3	23%	3	3%	3	100%	4	75%

Tables D-15 and D-16 display heating and cooling consumption and savings data for urban and rural participants. For urban accounts, the data showed no significant savings or losses within the space conditioning end-uses. Rural accounts, however, showed substantial heating and cooling electricity savings, between 31 percent and 36 percent among the higher R-squared levels. Comparing these figures to the overall urban and rural savings shown in tables D-7 and D-8 indicates that urban savings were driven primarily by non-space conditioning end-uses, while rural savings were driven by heating and cooling end-use savings.

TABLE D-15
Estimated Actual Heating and Cooling Consumption and Savings for Urban Participants

R-Squared	Normalized, Annualized Consumption			Percent Savings
	Pre-Installation (kWh)	Post-Installation (kWh)	Savings (kWh)	
ALL	124,542	123,850	692	0.6%
>50%	51,843	53,202	(1,359)	(2.6)
>60%	47,610	47,496	114	0.2%
>70%	43,437	44,594	(1,157)	(2.7%)
>75%	34,260	34,337	(77)	(0.2%)
>80%	33,729	33,688	41	0.1%
>85%	30,317	31,175	(858)	(2.8%)
>90%	15,131	14,537	594	3.9%

One possible explanation for this relies on the premise that many participants have more than one type of heat available to them. If they are more likely to reduce consumption of secondary heating fuels when temperature conditions improve as a result of weatherization, then weatherization will show little effect on the consumption of the primary heating fuel. Because urban participants may be more likely to have primary electric heat, they may show lower electricity savings from heating and cooling, which appears to be the case.

TABLE D-16
Estimated Actual Heating and Cooling Consumption and Savings for Rural Participants

R-Squared	Normalized, Annualized Consumption			Percent Savings
	Pre-Installation (kWh)	Post-Installation (kWh)	Savings (kWh)	
ALL	252,047	107,976	144,071	57.2%
>50%	12,701	12,400	302	2.4%
>60%	11,619	11,567	52	0.5%
>70%	11,507	7,944	3,563	31.0%
>75%	10,769	7,193	3,576	33.2%
>80%	4,189	2,742	1,447	34.5%
>85%	4,189	2,742	1,447	34.5%
>90%	854	546	308	36.0%

This concept is further supported by examining data on heating and cooling electricity consumption as a percent of total consumption (table D-17). Heating and cooling account for a larger share of urban consumption than rural consumption, implying that urban participants may use more electricity as a primary space heating fuel.

TABLE D-17 Heating and Cooling Electricity Consumption as a Percent of Total Electricity Consumption				
R-Squared	Urban		Rural	
	Pre-Installation	Post-Installation	Pre-Installation	Post-Installation
ALL	16.57%	16.72%	12.34%	5.29%
>50%	29.38%	30.78%	14.70%	14.56%
>60%	33.52%	34.94%	15.43%	15.70%
>70%	34.91%	38.14%	22.31%	16.13%
>75%	40.18%	43.17%	23.46%	16.83%
>80%	40.72%	43.78%	44.49%	32.24%
>85%	43.94%	49.09%	44.49%	32.24%
>90%	39.42%	40.83%	21.49%	14.34%

Conclusions

Preliminary PRISM results showed overall electricity savings of only 0.5 percent; this included savings of 38.4 percent in heating and cooling consumption and an increase of 5.5 percent in the electricity consumption of other end-uses. However, additional statistical analysis showed that the PRISM estimates did not have a high level of accuracy or reliability. Examination of only the more accurate accounts provided different, but more accurate results.

Analysis of the most accurate and reliable accounts showed that 1988 WRAP participants reduced their electricity consumption by about 6.5 percent overall. Savings from non-space conditioning end-uses were probably between 6 percent and 15 percent. Heating and cooling consumption reductions for urban participants were close to zero; however, rural participants showed savings between 31 percent and 36 percent. This may be due to the higher incidence of primary electric space heating in urban residences. Primary heating fuels may be less affected by weatherization than secondary fuels. For all end-uses, urban participants saved approximately 6 percent to 8 percent, and rural participants approximately 4.5 percent to 10 percent.

Appendix D: Savings Based on Billing Data

Section 3: Savings from 1989 Installations

Table of Contents:

TTEST PROCEDURE

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	2936	7111.43187670	32793.71252123	605.21900829
PRE	2980	6611.48971477	28746.73536218	526.59944725

Variances	T	DF	Prob>|T|
Unequal	0.6232	5791.1	0.5332
Equal	0.6238	5914.0	0.5328

For H0: Variances are equal, F' = 1.30   DF = (2935,2979)   Prob>F' = 0.0000

Normalized Annual Consumption of 1989 Participants
(by plan)

EPLAN=1 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	893	7920.08684211	34758.56772018	1163.15111927
PRE	910	7907.81868132	33203.61621195	1100.68915952

Variances	T	DF	Prob>|T|
Unequal	0.0077	1793.5	0.9939
Equal	0.0077	1801.0	0.9939

For H0: Variances are equal, F' = 1.10 DF = (892,909) Prob>F' = 0.1697

EPLAN=2 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	172	6612.20802326	4132.46940282	315.09783794
PRE	175	6850.05205714	4877.98811813	368.74124168

Variances	T	DF	Prob>|T|
Unequal	-0.4904	337.7	0.6242
Equal	-0.4897	345.0	0.6247

For H0: Variances are equal, F' = 1.39 DF = (174,171) Prob>F' = 0.0301

EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1468	6678.96787466	37345.00632321	974.69673104
PRE	1488	5420.25680780	30700.77230648	795.88044682

Variances	T	DF	Prob>|T|
Unequal	1.0003	2832.9	0.3173
Equal	1.0016	2954.0	0.3166

For H0: Variances are equal, F' = 1.48 DF = (1467,1487) Prob>F' = 0.0000

EPLAN=4 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	223	6596.73062780	4637.84833710	310.57329600
PRE	227	8032.02757709	12633.22078261	838.49631340

Variances	T	DF	Prob>|T|
Unequal	-1.6052	286.8	0.1096
Equal	-1.5943	448.0	0.1116

For H0: Variances are equal, F' = 7.42 DF = (226,222) Prob>F' = 0.0000

Normalized Annual Consumption of 1989 Participants (by plan)

EPLAN=5 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	180	7741.28272222	11585.23408067	863.51236465
PRE	180	7881.96027778	8669.63920638	646.19675353

Variances	T	DF	Prob>|T|
Unequal	-0.1304	331.6	0.8963
Equal	-0.1304	358.0	0.8963

For H0: Variances are equal, F' = 1.79   DF = (179,179)   Prob>F' = 0.0001

Normalized Annual Consumption of 1989 Participants (by urban/rural status)

URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1285	8176.10933074	49222.25422640	1373.12456072
PRE	1302	6321.48996928	39443.91690053	1093.13687088

Variances	T	DF	Prob>|T|
Unequal	1.0567	2454.3	0.2908
Equal	1.0582	2585.0	0.2901

For H0: Variances are equal, F' = 1.56 DF = (1284,1301) Prob>F' = 0.0000

URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1651	6282.77619624	5097.56576077	125.45538295
PRE	1678	6836.50739571	16150.95149963	394.27762762

Variances	T	DF	Prob>|T|
Unequal	-1.3383	2012.8	0.1809
Equal	-1.3294	3327.0	0.1838

For H0: Variances are equal, F' = 10.04 DF = (1677,1650)
Prob>F' = 0.0000

Normalized Annual Consumption of 1989 Participants
(by urban/rural status and plan)

EPLAN=1 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	441	8925.07614512	49241.73032598	2344.84430124
PRE	449	8931.64835189	47051.40653670	2220.49316192

Variances	T	DF	Prob>|T|
Unequal	-0.0020	884.4	0.9984
Equal	-0.0020	888.0	0.9984

For H0: Variances are equal, F' = 1.10   DF = (440,448)   Prob>F' = 0.3378

EPLAN=1 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	452	6939.55524336	4687.07163709	220.46130503
PRE	461	6910.63967462	4527.05996003	210.84620276

Variances	T	DF	Prob>|T|
Unequal	0.0948	908.3	0.9245
Equal	0.0948	911.0	0.9245

For H0: Variances are equal, F' = 1.07   DF = (451,460)   Prob>F' = 0.4586

EPLAN=2 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	76	5878.57486842	3597.42209337	412.65261480
PRE	78	6181.93435897	5117.48154027	579.44068207

Variances	T	DF	Prob>|T|
Unequal	-0.4264	138.4	0.6704
Equal	-0.4246	152.0	0.6718

For H0: Variances are equal, F' = 2.02   DF = (77,75)   Prob>F' = 0.0025

EPLAN=2 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	96	7193.00093750	4444.18383872	453.58261367
PRE	97	7387.30134021	4633.38272504	470.44873815

Variances	T	DF	Prob>|T|
Unequal	-0.2973	190.8	0.7665
Equal	-0.2973	191.0	0.7666

For H0: Variances are equal, F' = 1.09   DF = (96,95)   Prob>F' = 0.6848

Normalized Annual Consumption of 1989 Participants (by urban/rural status and plan)

EPLAN=3 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	546	8333.39007326	60841.22343496	2603.76399462
PRE	553	3604.12231465	42407.84667840	1803.36507829

Variances	T	DF	Prob>|T|
Unequal	1.4932	972.4	0.1357
Equal	1.4965	1097.0	0.1348

For H0: Variances are equal, F' = 2.06 DF = (545,552) Prob>F' = 0.0000

EPLAN=3 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	922	5699.23412148	5330.51522494	175.55116973
PRE	935	6494.39838503	20847.14228892	681.77445548

Variances	T	DF	Prob>|T|
Unequal	-1.1295	1057.2	0.2590
Equal	-1.1226	1855.0	0.2618

For H0: Variances are equal, F' = 15.30 DF = (934,921) Prob>F' = 0.0000

EPLAN=4 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	111	6178.82495495	4435.76219046	421.02391503
PRE	112	7660.35250000	12976.22339832	1226.13785960

Variances	T	DF	Prob>|T|
Unequal	-1.1428	136.8	0.2551
Equal	-1.1387	221.0	0.2560

For H0: Variances are equal, F' = 8.56 DF = (111,110) Prob>F' = 0.0000

EPLAN=4 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	112	7010.90500000	4813.81536327	454.86279674
PRE	115	8394.00678261	12336.02080741	1150.33987175

Variances	T	DF	Prob>|T|
Unequal	-1.1181	148.7	0.2653
Equal	-1.1072	225.0	0.2694

For H0: Variances are equal, F' = 6.57 DF = (114,111) Prob>F' = 0.0000

Normalized Annual Consumption of 1989 Participants
(by urban/rural status and plan)

EPLAN=5 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	111	7997.20423423	14263.72771000	1353.85312052
PRE	110	8063.99845455	10141.50077218	966.95415851

Variances	T	DF	Prob>|T|
Unequal	-0.0401	198.7	0.9680
Equal	-0.0401	219.0	0.9681

For H0: Variances are equal, F' = 1.98 DF = (110,109) Prob>F' = 0.0004

EPLAN=5 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	69	7329.58289855	4890.05850168	588.69386436
PRE	70	7595.90028571	5690.17185612	680.10561945

Variances	T	DF	Prob>|T|
Unequal	-0.2961	134.5	0.7676
Equal	-0.2957	137.0	0.7679

For H0: Variances are equal, F' = 1.35 DF = (69,68) Prob>F' = 0.2127

Normalized Annual Consumption of 1989 Participants
(by owner/renter status)

OWNRENT=H **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1228	7084.19728013	6143.58041644	175.31632726
PRE	1242	7762.53285829	18397.93256159	522.04534152

Variances	T	DF	Prob>|T|
Unequal	-1.2318	1517.2	0.2182
Equal	-1.2262	2468.0	0.2202

For H0: Variances are equal, F' = 8.97 DF = (1241,1227) Prob>F' = 0.0000

OWNRENT=T **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1700	7120.34628824	42781.87621161	1037.61290872
PRE	1730	5780.50654335	34337.94254742	825.56489625

Variances	T	DF	Prob>|T|
Unequal	1.0105	3250.8	0.3124
Equal	1.0124	3428.0	0.3114

For H0: Variances are equal, F' = 1.55 DF = (1699,1729) Prob>F' = 0.0000

Normalized Annual Consumption of 1989 Participants (by owner/renter status and plan)

EPLAN=1 OWNRENT=H **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	442	6827.60373303	4792.73413063	227.96711503
PRE	451	6889.30820399	4699.49329152	221.29049642

Variances	T	DF	Prob>|T|
Unequal	-0.1942	889.6	0.8460
Equal	-0.1943	891.0	0.8460

For H0: Variances are equal, F' = 1.04 DF = (441,450) Prob>F' = 0.6783

EPLAN=1 OWNRENT=T **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	450	8985.88066667	48736.77462803	2297.47358884
PRE	458	8902.62373362	46573.65362590	2176.24391577

Variances	T	DF	Prob>|T|
Unequal	0.0263	902.4	0.9790
Equal	0.0263	906.0	0.9790

For H0: Variances are equal, F' = 1.10 DF = (449,457) Prob>F' = 0.3341

EPLAN=2 OWNRENT=H **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	134	6944.86582090	4200.08433884	362.83202451
PRE	135	7257.77481481	5145.91651363	442.88997685

Variances	T	DF	Prob>|T|
Unequal	-0.5465	257.4	0.5852
Equal	-0.5461	267.0	0.5854

For H0: Variances are equal, F' = 1.50 DF = (134,133) Prob>F' = 0.0196

EPLAN=2 OWNRENT=T **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	38	5439.15157895	3701.29895004	600.42997571
PRE	40	5473.98775000	3558.03248366	562.57433186

Variances	T	DF	Prob>|T|
Unequal	-0.0423	75.4	0.9663
Equal	-0.0424	76.0	0.9663

For H0: Variances are equal, F' = 1.08 DF = (37,39) Prob>F' = 0.8068

Normalized Annual Consumption of 1989 Participants (by owner/renter status and plan)

EPLAN=3 OWNRENT=H **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	457	6687.52614880	4477.78425662	209.46191273
PRE	459	8177.78492375	28806.45735376	1344.57028413

Variances	T	DF	Prob>|T|
Unequal	-1.0951	480.2	0.2740
Equal	-1.0929	914.0	0.2747

For H0: Variances are equal, F' = 41.39 DF = (458,456) Prob>F' = 0.0000

EPLAN=3 OWNRENT=T **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1004	6657.90313745	45058.99184480	1422.04917308
PRE	1022	4170.72109589	31548.41399812	986.85213125

Variances	T	DF	Prob>|T|
Unequal	1.4369	1793.1	0.1509
Equal	1.4413	2024.0	0.1497

For H0: Variances are equal, F' = 2.04 DF = (1003,1021) Prob>F' = 0.0000

EPLAN=4 OWNRENT=H **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	92	7352.98576087	4553.38797530	474.72351282
PRE	94	9296.35691489	13311.20848045	1372.94632401

Variances	T	DF	Prob>|T|
Unequal	-1.3378	114.9	0.1836
Equal	-1.3264	184.0	0.1864

For H0: Variances are equal, F' = 8.55 DF = (93,91) Prob>F' = 0.0000

EPLAN=4 OWNRENT=T **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	131	6065.62015267	4639.99026933	405.39783212
PRE	133	7138.44142857	12102.54090093	1049.42338718

Variances	T	DF	Prob>|T|
Unequal	-0.9536	170.5	0.3416
Equal	-0.9482	262.0	0.3439

For H0: Variances are equal, F' = 6.80 DF = (132,130) Prob>F' = 0.0000

Normalized Annual Consumption of 1989 Participants
(by owner/renter status and plan)

EPLAN=5 OWNRENT=H **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	103	9886.47815534	14648.28735568	1443.33864065
PRE	103	8997.35320388	9499.10894716	935.97501621

Variances	T	DF	Prob>|T|
Unequal	0.5169	174.9	0.6059
Equal	0.5169	204.0	0.6058

For H0: Variances are equal, F' = 2.38 DF = (102,102) Prob>F' = 0.0000

EPLAN=5 OWNRENT=T **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	77	4871.73558442	3682.37111270	419.64513474
PRE	77	6389.94116883	7209.99515391	821.65520401

Variances	T	DF	Prob>|T|
Unequal	-1.6455	113.1	0.1026
Equal	-1.6455	152.0	0.1019

For H0: Variances are equal, F' = 3.83 DF = (76,76) Prob>F' = 0.0000

Normalized Annual Consumption of 1989 Participants (by primary space heating fuel)

FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	335	11666.41844776	6751.44578125	368.87088765
PRE	334	13229.83742515	33705.54560680	1844.28540001

Variances	T	DF	Prob>|T|
Unequal	-0.8312	359.6	0.4064
Equal	-0.8324	667.0	0.4055

For H0: Variances are equal, F' = 24.92 DF = (333,334) Prob>F' = 0.0000

FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1283	5940.34360873	39903.56211800	1114.03372378
PRE	1295	4411.00535907	28574.69849819	794.04802976

Variances	T	DF	Prob>|T|
Unequal	1.1179	2321.8	0.2637
Equal	1.1196	2576.0	0.2630

For H0: Variances are equal, F' = 1.95 DF = (1282,1294) Prob>F' = 0.0000

FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1206	7202.35137645	30056.57614773	865.49757050
PRE	1237	7143.52100243	28410.30984056	807.77632494

Variances	T	DF	Prob>|T|
Unequal	0.0497	2424.8	0.9604
Equal	0.0497	2441.0	0.9603

For H0: Variances are equal, F' = 1.12 DF = (1205,1236) Prob>F' = 0.0491

FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	10	5350.57200000	7033.64819919	2224.23485698
PRE	10	4150.26600000	2013.76717744	636.80909580

Variances	T	DF	Prob>|T|
Unequal	0.5188	10.5	0.6147
Equal	0.5188	18.0	0.6102

For H0: Variances are equal, F' = 12.20 DF = (9,9) Prob>F' = 0.0010

Normalized Annual Consumption of 1989 Participants
(by primary space heating fuel and plan)

EPLAN=1 FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	134	11288.76470149	5381.06276143	464.85302157
PRE	134	11119.41805970	5417.32075441	467.98592619

Variances	T	DF	Prob>|T|
Unequal	0.2567	266.0	0.7976
Equal	0.2567	266.0	0.7976

For H0: Variances are equal, F' = 1.01   DF = (133,133)   Prob>F' = 0.9384

EPLAN=1 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	298	5764.81114094	8301.46220870	480.89079396
PRE	308	5569.39074675	7262.70532483	413.83104274

Variances	T	DF	Prob>|T|
Unequal	0.3080	587.9	0.7582
Equal	0.3087	604.0	0.7577

For H0: Variances are equal, F' = 1.31   DF = (297,307)   Prob>F' = 0.0204

EPLAN=1 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	421	8498.50434679	49988.78683289	2436.30439782
PRE	426	8737.30880282	47964.37792290	2323.88170366

Variances	T	DF	Prob>|T|
Unequal	-0.0709	842.6	0.9435
Equal	-0.0709	845.0	0.9435

For H0: Variances are equal, F' = 1.09   DF = (420,425)   Prob>F' = 0.3957

EPLAN=1 FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	1031.60000000	.	.
PRE	1	1104.60000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

Normalized Annual Consumption of 1989 Participants (by primary space heating fuel and plan)

EPLAN=2 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	14	3858.66142857	1776.96738720	474.91451074
PRE	15	4247.80133333	2033.87515044	525.14430573

Variances	T	DF	Prob>|T|
Unequal	-0.5496	26.9	0.5871
Equal	-0.5470	27.0	0.5889

For H0: Variances are equal, F' = 1.31   DF = (14,13)   Prob>F' = 0.6324

EPLAN=2 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	139	7116.98647482	4182.82542384	354.78262193
PRE	141	7344.42312057	5149.62829572	433.67693620

Variances	T	DF	Prob>|T|
Unequal	-0.4059	268.2	0.6851
Equal	-0.4053	278.0	0.6856

For H0: Variances are equal, F' = 1.52   DF = (140,138)   Prob>F' = 0.0148

Normalized Annual Consumption of 1989 Participants (by primary space heating fuel and plan)

EPLAN=3 FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	175	11700.08062857	7208.93323028	544.94412987
PRE	174	14409.42011494	46296.01740792	3509.69202224

Variances	T	DF	Prob>|T|
Unequal	-0.7628	181.3	0.4466
Equal	-0.7649	347.0	0.4448

For H0: Variances are equal, F' = 41.24 DF = (173,174) Prob>F' = 0.0000

EPLAN=3 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	763	6244.29158585	51467.59616992	1863.25208430
PRE	764	3271.71990838	36226.97376775	1310.64591225

Variances	T	DF	Prob>|T|
Unequal	1.3049	1368.1	0.1922
Equal	1.3052	1525.0	0.1920

For H0: Variances are equal, F' = 2.02 DF = (762,763) Prob>F' = 0.0000

EPLAN=3 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	492	5616.48993902	4983.06544552	224.65393999
PRE	512	5427.69033203	3131.59326489	138.39817710

Variances	T	DF	Prob>|T|
Unequal	0.7155	820.8	0.4745
Equal	0.7217	1002.0	0.4706

For H0: Variances are equal, F' = 2.53 DF = (491,511) Prob>F' = 0.0000

Normalized Annual Consumption of 1989 Participants
(by primary space heating fuel and plan)

EPLAN=4 FUEL=ELEC ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	13	13055.88769231	10628.29578499	2947.75887874
PRE	13	15258.18846154	10768.07755063	2986.52736515

Variances	T	DF	Prob>|T|
Unequal	-0.5248	24.0	0.6045
Equal	-0.5248	24.0	0.6045

For H0: Variances are equal, F' = 1.03 DF = (12,12) Prob>F' = 0.9646

EPLAN=4 FUEL=GAS ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	133	5612.36338346	3090.64224341	267.99267015
PRE	134	7632.80805970	15652.22727503	1352.14649329

Variances	T	DF	Prob>|T|
Unequal	-1.4657	143.4	0.1449
Equal	-1.4607	265.0	0.1453

For H0: Variances are equal, F' = 25.65 DF = (133,132) Prob>F' = 0.0000

EPLAN=4 FUEL=OIL ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	75	7266.61733333	4403.35763603	508.45594330
PRE	78	7579.43192308	4175.18442558	472.74654384

Variances	T	DF	Prob>|T|
Unequal	-0.4506	149.7	0.6530
Equal	-0.4510	151.0	0.6526

For H0: Variances are equal, F' = 1.11 DF = (74,77) Prob>F' = 0.6439

EPLAN=4 FUEL=PROP ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	2344.17000000	.	.
PRE	1	2131.72000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

Normalized Annual Consumption of 1989 Participants
(by primary space heating fuel and plan)

EPLAN=5 FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	13	13716.54307692	8544.66927296	2369.86486120
PRE	13	17166.77923077	9687.37351680	2686.79399534

Variances	T	DF	Prob>|T|
Unequal	-0.9630	23.6	0.3453
Equal	-0.9630	24.0	0.3451

For H0: Variances are equal, F' = 1.29 DF = (12,12) Prob>F' = 0.6706

EPLAN=5 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	75	4515.82746667	3231.80924476	373.17718749
PRE	74	5550.97675676	6908.79129547	803.13067467

Variances	T	DF	Prob>|T|
Unequal	-1.1689	103.2	0.2451
Equal	-1.1739	147.0	0.2423

For H0: Variances are equal, F' = 4.57 DF = (73,74) Prob>F' = 0.0000

EPLAN=5 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	79	10260.69569620	16147.97385313	1816.78900066
PRE	80	8858.81412500	9395.23404033	1050.41909894

Variances	T	DF	Prob>|T|
Unequal	0.6680	125.1	0.5054
Equal	0.6701	157.0	0.5038

For H0: Variances are equal, F' = 2.95 DF = (78,79) Prob>F' = 0.0000

EPLAN=5 FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	3	3240.29000000	2051.77442191	1184.59251481
PRE	3	4542.10666667	1865.72533673	1077.17702540

Variances	T	DF	Prob>|T|
Unequal	-0.8131	4.0	0.4623
Equal	-0.8131	4.0	0.4618

For H0: Variances are equal, F' = 1.21 DF = (2,2) Prob>F' = 0.9052

Appendix D: Savings Based on Billing Data

Section 4: Savings from 1990 Installations

Table of Contents:

Normalized Annual Consumption of 1990 Participants

PREPOST	N	Mean	Std Dev	Std Error
POS	1986	6643.03062437	17754.65067235	398.40291721
PRE	1988	6988.92055332	19949.96258978	447.43906172

Variances	T	DF	Prob>|T|
Unequal	-0.5773	3920.1	0.5637
Equal	-0.5773	3972.0	0.5638

For H0: Variances are equal, F' = 1.26 DF = (1987,1985) Prob>F' = 0.0000

Normalized Annual Consumption of 1990 Participants (by plan)

EPLAN=1 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	334	6152.81862275	5062.40421215	277.00243415
PRE	338	6319.62647929	5156.18178769	280.45931593

Variances	T	DF	Prob>|T|
Unequal	-0.4232	670.0	0.6723
Equal	-0.4231	670.0	0.6723

For H0: Variances are equal, F' = 1.04 DF = (337,333) Prob>F' = 0.7373

EPLAN=2 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	167	6043.02257485	4010.19789958	310.31843018
PRE	167	6102.45347305	4372.49406374	338.35374906

Variances	T	DF	Prob>|T|
Unequal	-0.1294	329.5	0.8971
Equal	-0.1294	332.0	0.8971

For H0: Variances are equal, F' = 1.19 DF = (166,166) Prob>F' = 0.2661

EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	841	7384.43115339	26772.82761538	923.20095225
PRE	836	8029.03593301	30239.41800707	1045.85214072

Variances	T	DF	Prob>|T|
Unequal	-0.4621	1648.4	0.6441
Equal	-0.4622	1675.0	0.6440

For H0: Variances are equal, F' = 1.28 DF = (835,840) Prob>F' = 0.0004

EPLAN=4 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	321	7088.71778816	4805.63585151	268.22443721
PRE	322	7314.65475155	5120.14768410	285.33467495

Variances	T	DF	Prob>|T|
Unequal	-0.5769	638.7	0.5642
Equal	-0.5769	641.0	0.5642

For H0: Variances are equal, F' = 1.14 DF = (321,320) Prob>F' = 0.2570

Normalized Annual Consumption of 1990 Participants (by plan)

EPLAN=5 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	323	5086.83473684	3336.96700690	185.67381103
PRE	325	5142.26987692	3688.15985874	204.58229974

Variances	T	DF	Prob>|T|
Unequal	-0.2007	640.4	0.8410
Equal	-0.2006	646.0	0.8411

For H0: Variances are equal, F' = 1.22 DF = (324,322) Prob>F' = 0.0726

Normalized Annual Consumption of 1990 Participants
(by urban/rural status)

URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	701	7523.60400856	29318.45064362	1107.34259798
PRE	700	7630.32795714	28373.11813852	1072.40306449

Variances	T	DF	Prob>|T|
Unequal	-0.0692	1397.6	0.9448
Equal	-0.0692	1399.0	0.9448

For H0: Variances are equal, F' = 1.07   DF = (700,699)   Prob>F' = 0.3863

URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1285	6162.65557198	4249.48724163	118.54547082
PRE	1288	6640.32957298	13300.21696746	370.59605692

Variances	T	DF	Prob>|T|
Unequal	-1.2277	1547.6	0.2198
Equal	-1.2265	2571.0	0.2201

For H0: Variances are equal, F' = 9.80   DF = (1287,1284)   Prob>F' = 0.0000

Normalized Annual Consumption of 1990 Participants
(by urban/rural status and plan)

EPLAN=1 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	140	5699.9400714	5087.0908471	429.93764736	33.47000000	31000.130000	Unequal	-0.5123	280.9	0.6088
PRE	143	6015.6202098	5278.3328605	441.39636808	16.88000000	30745.080000	Equal	-0.5121	281.0	0.6090

For H0: Variances are equal, F' = 1.08 DF = (142,139) Prob>F' = 0.6629

EPLAN=1 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	194	6479.6381959	5032.3085992	361.29870155	229.51000000	40884.720000	Unequal	-0.1229	387.0	0.9023
PRE	195	6542.5644103	5066.7767185	362.83941716	554.55000000	37960.540000	Equal	-0.1229	387.0	0.9023

For H0: Variances are equal, F' = 1.01 DF = (194,193) Prob>F' = 0.9245

EPLAN=2 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	52	6317.4092308	3990.5478997	553.38942576	1598.8100000	21196.910000	Unequal	0.2084	101.4	0.8354
PRE	52	6160.3165385	3692.2511403	512.02310801	1782.1400000	19342.080000	Equal	0.2084	102.0	0.8354

For H0: Variances are equal, F' = 1.17 DF = (51,51) Prob>F' = 0.5811

EPLAN=2 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	115	5918.9520870	4030.2874672	375.82624418	1538.1900000	20965.320000	Unequal	-0.2738	223.3	0.7845
PRE	115	6076.2893043	4662.4512128	434.77581742	855.1100000	35429.080000	Equal	-0.2738	228.0	0.7845

For H0: Variances are equal, F' = 1.34 DF = (114,114) Prob>F' = 0.1212

EPLAN=3 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	245	10030.809469	49167.659538	3141.2065435	706.03000000	771375.19000	Unequal	0.0439	482.0	0.9650
PRE	239	9836.969163	48049.937043	3108.0920501	344.58000000	743902.44000	Equal	0.0439	482.0	0.9650

For H0: Variances are equal, F' = 1.05 DF = (244,238) Prob>F' = 0.7218

EPLAN=3 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	596	6296.5742953	4062.068513	166.38880945	526.73000000	36368.73000	Unequal	-1.2747	651.0	0.2029
PRE	597	7305.2569682	18902.576406	773.63095136	724.22000000	442734.41000	Equal	-1.2737	1191.0	0.2030

For H0: Variances are equal, F' = 21.65 DF = (596,595) Prob>F' = 0.0000

Normalized Annual Consumption of 1990 Participants
(by urban/rural status and plan)

EPLAN=4 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	145	7162.3542759	4595.8674054	381.66601403	348.82000000	28129.400000	Unequal	-0.8148	286.6	0.4159
PRE	146	7624.7580822	5074.8797855	420.00003945	586.15000000	33594.530000	Equal	-0.8145	289.0	0.4160

For H0: Variances are equal, F' = 1.22 DF = (145,144) Prob>F' = 0.2347

EPLAN=4 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	176	7028.0513636	4984.0442045	375.68646739	567.9700000	32378.030000	Unequal	-0.0543	349.6	0.9567
PRE	176	7057.4099432	5157.6475330	388.77231064	1437.2100000	35479.410000	Equal	-0.0543	350.0	0.9567

For H0: Variances are equal, F' = 1.07 DF = (175,175) Prob>F' = 0.6511

EPLAN=5 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	119	5474.4523529	3894.1153733	356.97297100	187.7800000	24240.730000	Unequal	-0.5790	227.3	0.5632
PRE	120	5803.4092500	4841.7988931	441.99374544	1085.0500000	40544.000000	Equal	-0.5785	237.0	0.5635

For H0: Variances are equal, F' = 1.55 DF = (119,118) Prob>F' = 0.0185

EPLAN=5 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	204	4860.7244608	2951.0833964	206.61716531	805.5200000	20294.520000	Unequal	0.3743	404.5	0.7084
PRE	205	4755.2614634	2742.4959292	191.54422430	1400.5800000	15251.510000	Equal	0.3744	407.0	0.7083

For H0: Variances are equal, F' = 1.16 DF = (203,204) Prob>F' = 0.2964

Normalized Annual Consumption of 1990 Participants (by owner/renter status)

OWNRENT=H ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	776	7169.66139175	5113.96873407	183.58077878
PRE	774	7338.81844961	5453.41051939	196.01879324

Variances	T	DF	Prob>|T|
Unequal	-0.6299	1541.1	0.5289
Equal	-0.6299	1548.0	0.5288

For H0: Variances are equal, F' = 1.14   DF = (773,775)   Prob>F' = 0.0740

OWNRENT=T ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1210	6305.29056198	22371.87144641	643.14608446
PRE	1214	6765.83902801	25157.11633406	722.02380215

Variances	T	DF	Prob>|T|
Unequal	-0.4763	2391.2	0.6339
Equal	-0.4762	2422.0	0.6340

For H0: Variances are equal, F' = 1.26   DF = (1213,1209)   Prob>F' = 0.0000

Normalized Annual Consumption of 1990 Participants
(by owner/renter status and plan)

EPLAN=1 OWNRENT=H **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	155	7358.5978710	5525.0854026	443.78553892	33.47000000	31000.130000	Unequal	-0.3792	308.0	0.7048
PRE	155	7597.9694839	5587.9546354	448.83531722	16.88000000	30745.080000	Equal	-0.3792	308.0	0.7048

For H0: Variances are equal, F' = 1.02   DF = (154,154)   Prob>F' = 0.8885

EPLAN=1 OWNRENT=T **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	179	5108.7081006	4378.5203054	327.26597306	496.53000000	40884.720000	Unequal	-0.2747	360.0	0.7837
PRE	183	5236.8769399	4498.4931122	332.53817958	655.07000000	37960.540000	Equal	-0.2746	360.0	0.7838

For H0: Variances are equal, F' = 1.06   DF = (182,178)   Prob>F' = 0.7177

EPLAN=2 OWNRENT=H **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	92	6343.6871739	4131.6078848	430.74989861	1598.8100000	21196.910000	Unequal	-0.6050	176.8	0.5459
PRE	92	6748.6911957	4914.4634452	512.36823284	855.1100000	35429.080000	Equal	-0.6050	182.0	0.5459

For H0: Variances are equal, F' = 1.41   DF = (91,91)   Prob>F' = 0.0996

EPLAN=2 OWNRENT=T **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	75	5674.2073333	3851.3858133	444.71972721	1538.1900000	20908.720000	Unequal	0.6090	146.4	0.5435
PRE	75	5309.7352000	3468.6352947	400.52350423	1577.8600000	18344.710000	Equal	0.6090	148.0	0.5435

For H0: Variances are equal, F' = 1.23   DF = (74,74)   Prob>F' = 0.3699

EPLAN=3 OWNRENT=H **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	264	7436.5348864	5646.7702586	347.53468517	706.03000000	36368.730000	Unequal	0.1291	523.4	0.8973
PRE	262	7372.1514122	5790.6848320	357.74970366	344.58000000	46795.740000	Equal	0.1291	524.0	0.8973

For H0: Variances are equal, F' = 1.05   DF = (261,263)   Prob>F' = 0.6839

EPLAN=3 OWNRENT=T **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	577	7360.5916638	32105.288601	1336.5606526	526.73000000	771375.19000	Unequal	-0.4793	1130.7	0.6318
PRE	574	8328.8682404	36290.138531	1514.7211163	724.22000000	743902.44000	Equal	-0.4795	1149.0	0.6317

For H0: Variances are equal, F' = 1.28   DF = (573,576)   Prob>F' = 0.0034

Normalized Annual Consumption of 1990 Participants
(by owner/renter status and plan)

EPLAN=4 OWNRENT=H **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	109	8608.1683486	5256.4844194	503.47989447	348.82000000	30482.450000	Unequal	-0.6180	213.5	0.5372
PRE	109	9074.0833028	5857.8543780	561.08068982	586.15000000	35479.410000	Equal	-0.6180	216.0	0.5372

For H0: Variances are equal, F' = 1.24 DF = (108,108) Prob>F' = 0.2619

EPLAN=4 OWNRENT=T **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	212	6307.4908491	4367.5761192	299.96635941	567.9700000	32378.030000	Unequal	-0.2497	422.9	0.8030
PRE	213	6414.2899061	4450.5974284	304.94991100	1437.2100000	35594.530000	Equal	-0.2497	423.0	0.8030

For H0: Variances are equal, F' = 1.04 DF = (212,211) Prob>F' = 0.7845

EPLAN=5 OWNRENT=H **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	156	6012.3063462	3700.1340594	296.24781789	1368.8100000	24240.730000	Unequal	-0.3249	302.2	0.7455
PRE	156	6160.9094231	4353.0057733	348.51938899	1085.0500000	40544.000000	Equal	-0.3249	310.0	0.7455

For H0: Variances are equal, F' = 1.38 DF = (155,155) Prob>F' = 0.0439

EPLAN=5 OWNRENT=T **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	167	4222.3223353	2694.3181654	208.49259922	187.7800000	21774.460000	Unequal	0.0700	333.5	0.9442
PRE	169	4201.9872189	2626.4308519	202.03314246	1400.5800000	21759.750000	Equal	0.0701	334.0	0.9442

For H0: Variances are equal, F' = 1.05 DF = (166,168) Prob>F' = 0.7417

Normalized Annual Consumption of 1990 Participants
(by primary space heating fuel)

FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	192	12085.86088542	6918.70516554	499.31453622
PRE	193	12415.22103627	7253.27599579	522.10223063

Variances	T	DF	Prob>|T|
Unequal	-0.4559	382.3	0.6487
Equal	-0.4558	383.0	0.6488

For H0: Variances are equal, F' = 1.10 DF = (192,191) Prob>F' = 0.5142

FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	506	5201.71173913	3515.64159630	156.28933234
PRE	504	5957.11769841	19812.93629801	882.53832682

Variances	T	DF	Prob>|T|
Unequal	-0.8428	534.5	0.3997
Equal	-0.8444	1008.0	0.3986

For H0: Variances are equal, F' = 31.76 DF = (503,505) Prob>F' = 0.0000

FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	975	6662.11868718	24807.98601922	794.49140018
PRE	977	6770.94264074	23931.65976906	765.64162809

Variances	T	DF	Prob>|T|
Unequal	-0.0986	1947.2	0.9214
Equal	-0.0986	1950.0	0.9214

For H0: Variances are equal, F' = 1.07 DF = (974,976) Prob>F' = 0.2616

FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	14	6700.02142857	4456.41808325	1191.02783141
PRE	14	6489.70642857	4264.08197100	1139.62384319

Variances	T	DF	Prob>|T|
Unequal	0.1276	25.9	0.8995
Equal	0.1276	26.0	0.8995

For H0: Variances are equal, F' = 1.09 DF = (13,13) Prob>F' = 0.8760

Normalized Annual Consumption of 1990 Participants
(by primary space heating fuel and plan)

EPLAN=1 FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	17	16041.321176	6390.0911757	1549.8247573	5861.6200000	27841.120000	Unequal	-0.4068	33.0	0.6868
PRE	18	16960.419444	6975.0532774	1644.0358239	6104.4100000	30745.080000	Equal	-0.4057	33.0	0.6875

For H0: Variances are equal, F' = 1.19   DF = (17,16)   Prob>F' = 0.7303

EPLAN=1 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	102	4667.1481373	3864.6330244	382.65568[illegible]36	496.53000000	25280.560000	Unequal	0.6394	195.9	0.5233
PRE	103	4349.3233981	3219.8344677	317.25971719	655.07000000	23073.700000	Equal	0.6400	203.0	0.5229

For H0: Variances are equal, F' = 1.44   DF = (101,102)   Prob>F' = 0.0672

EPLAN=1 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	189	5807.0590476	4180.5954422	304.09357244	33.47000000	40884.720000	Unequal	-0.6519	377.9	0.5148
PRE	191	6090.2071204	4285.7358408	310.10496194	16.88000000	37960.540000	Equal	-0.6518	378.0	0.5149

For H0: Variances are equal, F' = 1.05   DF = (190,188)   Prob>F' = 0.7333

EPLAN=1 FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	2	11447.920000	3419.9360893	2418.2600000	9029.6600000	13866.180000	Unequal	0.1830	1.9	0.8727
PRE	2	10747.380000	4195.7029390	2966.8100000	7780.5700000	13714.190000	Equal	0.1830	2.0	0.8717

For H0: Variances are equal, F' = 1.51   DF = (1,1)   Prob>F' = 0.8707

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EPLAN=2 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	21	8357.6000000	4636.7052729	1011.8120423	2644.1100000	20908.720000	Unequal	0.2883	39.7	0.7746
PRE	21	7926.8390476	5038.1830366	1099.4216729	3125.6900000	23339.620000	Equal	0.2883	40.0	0.7746

For H0: Variances are equal, F' = 1.18   DF = (20,20)   Prob>F' = 0.7140

Normalized Annual Consumption of 1990 Participants
(by primary space heating fuel and plan)

EPLAN=2 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	143	5617.8893706	3632.9279142	303.80069412	1538.1900000	21196.910000	Unequal	-0.0737	283.3	0.9413
PRE	143	5648.8102797	3461.6664110	289.47908775	855.1100000	19342.080000	Equal	-0.0737	284.0	0.9413

For H0: Variances are equal, F' = 1.10 DF = (142,142) Prob>F' = 0.5658

EPLAN=2 FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	1	4093.4600000	.	.	4093.4600000	4093.4600000	Unequal	.	.	.
PRE	1	3934.8300000	.	.	3934.8300000	3934.8300000	Equal	.	.	.

NOTE: All values are the same for one CLASS level.

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EPLAN=3 FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	164	11679.331280	6835.7824058	533.78492688	1425.0400000	36368.730000	Unequal	-0.2086	325.2	0.8349
PRE	164	11840.849756	7184.0658716	560.98129641	1299.9500000	46795.740000	Equal	-0.2086	326.0	0.8349

For H0: Variances are equal, F' = 1.10 DF = (163,163) Prob>F' = 0.5265

EPLAN=3 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	141	4592.4647518	2429.912843	204.6355769	706.03000000	14659.22000	Unequal	-0.9007	137.1	0.3693
PRE	137	7485.6088321	37520.154661	3205.5631454	764.61000000	442734.41000	Equal	-0.9137	276.0	0.3617

For H0: Variances are equal, F' = 238.42 DF = (136,140) Prob>F' = 0.0000

EPLAN=3 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	345	7599.2317101	41318.043848	2224.4887036	526.73000000	771375.19000	Unequal	0.0073	685.5	0.9942
PRE	343	7576.6031487	39957.014210	2157.4759741	344.58000000	743902.44000	Equal	0.0073	686.0	0.9942

For H0: Variances are equal, F' = 1.07 DF = (344,342) Prob>F' = 0.5355

EPLAN=3 FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	5	6562.1860000	5602.0913581	2505.3314186	3148.6600000	16468.160000	Unequal	0.1115	8.0	0.9140
PRE	5	6165.2380000	5655.7607294	2529.3330911	827.0300000	15698.260000	Equal	0.1115	8.0	0.9140

For H0: Variances are equal, F' = 1.02 DF = (4,4) Prob>F' = 0.9857

Normalized Annual Consumption of 1990 Participants
(by primary space heating fuel and plan)

EPLAN=4 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	161	5943.3981988	3966.8643356	312.63270630	1159.6000000	28129.400000	Unequal	-0.3255	316.6	0.7450
PRE	161	6095.4149689	4403.2638249	347.02580418	1437.2100000	33594.530000	Equal	-0.3255	320.0	0.7450

For H0: Variances are equal, F' = 1.23 DF = (160,160) Prob>F' = 0.1879

EPLAN=4 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	123	8279.3147154	5124.4761018	462.05844046	567.9700000	30482.450000	Unequal	-0.3147	244.9	0.7532
PRE	124	8486.9545968	5243.4193460	470.87295765	1147.5500000	35479.410000	Equal	-0.3147	245.0	0.7532

For H0: Variances are equal, F' = 1.05 DF = (123,122) Prob>F' = 0.8001

EPLAN=4 FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	5	6297.8600000	3557.1477595	1590.8048392	2569.0800000	10884.000000	Unequal	-0.0119	7.7	0.9908
PRE	5	6322.5720000	2962.2822023	1324.7728746	2914.5900000	9827.190000	Equal	-0.0119	8.0	0.9908

For H0: Variances are equal, F' = 1.44 DF = (4,4) Prob>F' = 0.7315

Normalized Annual Consumption of 1990 Participants
(by primary space heating fuel and plan)

EPLAN=5 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	81	4642.9974074	2632.3366233	292.48184703	1374.2600000	14049.160000	Unequal	-0.0099	160.6	0.9921
PRE	82	4646.9898780	2531.9849614	279.61096328	1205.3500000	12522.030000	Equal	-0.0099	161.0	0.9921

For H0: Variances are equal, F' = 1.08 DF = (80,81) Prob>F' = 0.7278

EPLAN=5 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	175	5454.7584571	3885.6831515	293.73003693	187.7800000	24240.730000	Unequal	-0.4264	345.2	0.6701
PRE	176	5642.2970455	4342.9654650	327.36333920	1085.0500000	40544.000000	Equal	-0.4263	349.0	0.6702

For H0: Variances are equal, F' = 1.25 DF = (175,174) Prob>F' = 0.1427

EPLAN=5 FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error	Minimum	Maximum	Variances	T	DF	Prob>|T|
POS	1	2510.7700000	.	.	2510.7700000	2510.7700000	Unequal	.	.	.
PRE	1	2987.2500000	.	.	2987.2500000	2987.2500000	Equal	.	.	.

NOTE: All values are the same for one CLASS level.

Normalized Annual Consumption of 1990 Participants
(by consumption level)

SIZE=BIG EPLAN=1 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	66	14064.65575758	5987.55069015	737.01654177
PRE	62	14889.35967742	6019.00106382	764.41389952

Variances	T	DF	Prob>|T|
Unequal	-0.7767	125.4	0.4388
Equal	-0.7768	126.0	0.4387

For H0: Variances are equal, F' = 1.01 DF = (61,65) Prob>F' = 0.9648

SIZE=BIG EPLAN=2 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	32	12611.06562500	3875.26144085	685.05591092
PRE	30	13112.63533333	5422.42771027	989.99532445

Variances	T	DF	Prob>|T|
Unequal	-0.4166	52.2	0.6787
Equal	-0.4211	60.0	0.6752

For H0: Variances are equal, F' = 1.96 DF = (29,31) Prob>F' = 0.0691

SIZE=BIG EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	129	21024.04232558	66812.98814572	5882.55559672
PRE	131	24871.59000000	74266.16585037	6488.66503761

Variances	T	DF	Prob>|T|
Unequal	-0.4393	255.9	0.6608
Equal	-0.4389	258.0	0.6611

For H0: Variances are equal, F' = 1.24 DF = (130,128) Prob>F' = 0.2313

SIZE=BIG EPLAN=4 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	70	14326.83114286	5031.07541546	601.32852723
PRE	81	14015.17283951	5790.93967835	643.43774204

Variances	T	DF	Prob>|T|
Unequal	0.3539	149.0	0.7239
Equal	0.3503	149.0	0.7266

For H0: Variances are equal, F' = 1.32 DF = (80,69) Prob>F' = 0.2321

Normalized Annual Consumption of 1990 Participants (by consumption level)

SIZE=BIG EPLAN=5 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	32	12913.11031250	3696.34638165	653.42789802
PRE	37	12714.51513514	5511.55356490	906.09382455

Variances	T	DF	Prob>|T|
Unequal	0.1778	63.3	0.8595
Equal	0.1729	67.0	0.8633

For H0: Variances are equal, F' = 2.22 DF = (36,31) Prob>F' = 0.0258

SIZE=SMALL EPLAN=1 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	268	4204.38111940	1987.74585455	121.42090329
PRE	276	4394.54148551	2065.71940676	124.34169651

Variances	T	DF	Prob>|T|
Unequal	-1.0942	542.0	0.2744
Equal	-1.0936	542.0	0.2746

For H0: Variances are equal, F' = 1.08 DF = (275,267) Prob>F' = 0.5274

SIZE=SMALL EPLAN=2 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	135	4486.15311111	1924.58578689	165.64197113
PRE	137	4567.37715328	1962.72536650	167.68694469

Variances	T	DF	Prob>|T|
Unequal	-0.3446	270.0	0.7307
Equal	-0.3446	270.0	0.7307

For H0: Variances are equal, F' = 1.04 DF = (136,134) Prob>F' = 0.8203

SIZE=SMALL EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	712	4913.20946629	1822.96358387	68.31844870
PRE	705	4899.42659574	1871.73608381	70.49365916

Variances	T	DF	Prob>|T|
Unequal	0.1404	1413.1	0.8884
Equal	0.1404	1415.0	0.8883

For H0: Variances are equal, F' = 1.05 DF = (704,711) Prob>F' = 0.4826

Normalized Annual Consumption of 1990 Participants (by consumption level)

SIZE=SMALL EPLAN=4 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	251	5070.12043825	1952.98370219	123.27123822
PRE	241	5062.61340249	1907.85608313	122.89581382

Variances	T	DF	Prob>|T|
Unequal	0.0431	489.9	0.9656
Equal	0.0431	490.0	0.9656

For H0: Variances are equal, F' = 1.05 DF = (250,240) Prob>F' = 0.7155

SIZE=SMALL EPLAN=5 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	291	4226.21336770	1844.35435024	108.11796678
PRE	288	4169.44670139	1789.96368291	105.47462152

Variances	T	DF	Prob>|T|
Unequal	0.3758	576.8	0.7072
Equal	0.3758	577.0	0.7072

For H0: Variances are equal, F' = 1.06 DF = (290,287) Prob>F' = 0.6116

Normalized Annual Consumption of 1990 Participants (by consumption level)

SIZE=BIG URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	127	20932.85322835	67358.45442894	5977.09630017
PRE	133	20828.94789474	63489.03579992	5505.19758976

Variances	T	DF	Prob>|T|
Unequal	0.0128	255.2	0.9898
Equal	0.0128	258.0	0.9898

For H0: Variances are equal, F' = 1.13 DF = (126,132) Prob>F' = 0.5016

SIZE=BIG URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	202	13869.05044554	5005.74617153	352.20307158
PRE	208	16394.77711538	31083.31162024	2155.23988188

Variances	T	DF	Prob>|T|
Unequal	-1.1566	218.0	0.2487
Equal	-1.1406	408.0	0.2547

For H0: Variances are equal, F' = 38.56 DF = (207,201) Prob>F' = 0.0000

SIZE=SMALL URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	574	4556.74921603	1927.87009636	80.46774310
PRE	567	4534.35537919	1899.24729606	79.76088926

Variances	T	DF	Prob>|T|
Unequal	0.1977	1139.0	0.8434
Equal	0.1976	1139.0	0.8434

For H0: Variances are equal, F' = 1.03 DF = (573,566) Prob>F' = 0.7214

SIZE=SMALL URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1083	4725.26705448	1902.43674622	57.80907198
PRE	1080	4761.69523148	1940.86534409	59.05865167

Variances	T	DF	Prob>|T|
Unequal	-0.4408	2159.9	0.6594
Equal	-0.4408	2161.0	0.6594

For H0: Variances are equal, F' = 1.04 DF = (1079,1082) Prob>F' = 0.5110

Normalized Annual Consumption of 1990 Participants
(by consumption level)

SIZE=BIG FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	105	16922.08914286	5800.77029215	566.09721513
PRE	108	17148.65222222	6368.63300939	612.82199706

Variances	T	DF	Prob>|T|
Unequal	-0.2716	210.1	0.7862
Equal	-0.2712	211.0	0.7865

For H0: Variances are equal, F' = 1.21 DF = (107,104) Prob>F' = 0.3396

SIZE=BIG FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	53	13274.28943396	4162.73293956	571.79534415
PRE	51	21466.70745098	60388.58075384	8456.09269323

Variances	T	DF	Prob>|T|
Unequal	-0.9666	50.5	0.3383
Equal	-0.9854	102.0	0.3268

For H0: Variances are equal, F' = 210.45 DF = (50,52) Prob>F' = 0.0000

SIZE=BIG FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	138	18422.91398551	64725.20115680	5509.77501894
PRE	150	17729.29386667	59896.66521723	4890.54223588

Variances	T	DF	Prob>|T|
Unequal	0.0942	278.8	0.9251
Equal	0.0945	286.0	0.9248

For H0: Variances are equal, F' = 1.17 DF = (137,149) Prob>F' = 0.3536

SIZE=BIG FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	4	12562.00000000	3278.82505854	1639.41252927
PRE	3	13079.88000000	2986.49085354	1724.25129823

Variances	T	DF	Prob>|T|
Unequal	-0.2177	4.7	0.8369
Equal	-0.2142	5.0	0.8388

For H0: Variances are equal, F' = 1.21 DF = (3,2) Prob>F' = 0.9667

Normalized Annual Consumption of 1990 Participants (by consumption level)

SIZE=SMALL FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	87	6249.03367816	1612.34574005	172.86160784
PRE	85	6400.97905882	1782.63209536	193.35359828

Variances	T	DF	Prob>|T|
Unequal	-0.5859	167.5	0.5588
Equal	-0.5865	170.0	0.5583

For H0: Variances are equal, F' = 1.22 DF = (84,86) Prob>F' = 0.3558

SIZE=SMALL FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	453	4257.23796909	1811.14889015	85.09519799
PRE	453	4211.00494481	1800.79458293	84.60871019

Variances	T	DF	Prob>|T|
Unequal	0.3853	904.0	0.7001
Equal	0.3853	904.0	0.7001

For H0: Variances are equal, F' = 1.01 DF = (452,452) Prob>F' = 0.9030

SIZE=SMALL FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	837	4723.06283154	1974.39767618	68.24516721
PRE	827	4783.33359129	1951.29344724	67.85312145

Variances	T	DF	Prob>|T|
Unequal	-0.6263	1662.0	0.5312
Equal	-0.6262	1662.0	0.5312

For H0: Variances are equal, F' = 1.02 DF = (836,826) Prob>F' = 0.7346

SIZE=SMALL FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	10	4355.23000000	1929.07251487	610.02629186
PRE	11	4692.38636364	2295.81714876	692.21491543

Variances	T	DF	Prob>|T|
Unequal	-0.3654	18.9	0.7189
Equal	-0.3623	19.0	0.7211

For H0: Variances are equal, F' = 1.42 DF = (10,9) Prob>F' = 0.6119

Normalized Annual Consumption of 1990 Participants
(by consumption level)

SIZE=BIG OWNRENT=H **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	187	14461.12844920	5212.10353011	381.14675833
PRE	186	14861.33376344	6114.99033528	448.37284553

Variances	T	DF	Prob>|T|
Unequal	-0.6801	361.3	0.4969
Equal	-0.6804	371.0	0.4967

For H0: Variances are equal, F' = 1.38   DF = (185,186)   Prob>F' = 0.0301

SIZE=BIG OWNRENT=T **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	142	19406.96852113	63780.56811226	5352.34637814
PRE	155	22039.71374194	68489.81731705	5501.23451021

Variances	T	DF	Prob>|T|
Unequal	-0.3430	294.9	0.7318
Equal	-0.3419	295.0	0.7326

For H0: Variances are equal, F' = 1.15   DF = (154,141)   Prob>F' = 0.3902

SIZE=SMALL OWNRENT=H **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	589	4854.71344652	1897.48096652	78.18434116
PRE	588	4959.24727891	1943.04493458	80.12982257

Variances	T	DF	Prob>|T|
Unequal	-0.9337	1174.2	0.3506
Equal	-0.9337	1175.0	0.3506

For H0: Variances are equal, F' = 1.05   DF = (587,588)   Prob>F' = 0.5654

SIZE=SMALL OWNRENT=T **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1068	4563.30716292	1913.56474736	58.55413036
PRE	1059	4530.28607177	1905.03828962	58.54040585

Variances	T	DF	Prob>|T|
Unequal	0.3988	2125.0	0.6901
Equal	0.3988	2125.0	0.6901

For H0: Variances are equal, F' = 1.01   DF = (1067,1058)   Prob>F' = 0.8844

Normalized Annual Consumption of 1990 Participants (by consumption level)

SIZE=BIG EPLAN=1 FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	15	17388.18333333	5490.44754510	1417.62746036
PRE	14	19672.63500000	5238.13811953	1399.95129913

Variances	T	DF	Prob>|T|
Unequal	-1.1466	27.0	0.2616
Equal	-1.1447	27.0	0.2624

For H0: Variances are equal, F' = 1.10 DF = (14,13) Prob>F' = 0.8708

SIZE=BIG EPLAN=1 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	10	14444.50200000	4562.57245212	1442.81209382
PRE	6	14341.53666667	4696.18009917	1917.20749720

Variances	T	DF	Prob>|T|
Unequal	0.0429	10.4	0.9666
Equal	0.0432	14.0	0.9661

For H0: Variances are equal, F' = 1.06 DF = (5,9) Prob>F' = 0.8830

SIZE=BIG EPLAN=1 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	32	12276.43312500	5698.03770394	1007.28027498
PRE	32	13019.34562500	5628.06375104	994.91051083

Variances	T	DF	Prob>|T|
Unequal	-0.5247	62.0	0.6016
Equal	-0.5247	62.0	0.6016

For H0: Variances are equal, F' = 1.03 DF = (31,31) Prob>F' = 0.9456

SIZE=BIG EPLAN=1 FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	2	11447.92000000	3419.93608934	2418.26000000
PRE	1	13714.19000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	-0.5411	1.0	0.6843

NOTE: All values are the same for one CLASS level.

Normalized Annual Consumption of 1990 Participants
(by consumption level)

SIZE=BIG EPLAN=2 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	7	13043.51285714	4903.88639895	1853.49483848
PRE	6	14043.89500000	5542.23875521	2262.60949716

Variances	T	DF	Prob>|T|
Unequal	-0.3420	10.2	0.7393
Equal	-0.3455	11.0	0.7362

For H0: Variances are equal, F' = 1.28 DF = (5,6) Prob>F' = 0.7640

SIZE=BIG EPLAN=2 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	24	12136.84125000	3262.15857311	665.88533035
PRE	23	11899.41782609	2713.73693460	565.85326682

Variances	T	DF	Prob>|T|
Unequal	0.2717	44.1	0.7871
Equal	0.2706	45.0	0.7879

For H0: Variances are equal, F' = 1.45 DF = (23,22) Prob>F' = 0.3917

SIZE=BIG EPLAN=3 FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	84	16897.72297619	5716.39058350	623.70934645
PRE	85	16965.05564706	6481.94227109	703.06535221

Variances	T	DF	Prob>|T|
Unequal	-0.0716	164.9	0.9430
Equal	-0.0716	167.0	0.9430

For H0: Variances are equal, F' = 1.29 DF = (84,83) Prob>F' = 0.2531

SIZE=BIG EPLAN=3 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	8	11202.98000000	1920.08024558	678.85088104
PRE	7	71975.28428571	163492.19441910	61794.24110474

Variances	T	DF	Prob>|T|
Unequal	-0.9834	6.0	0.3634
Equal	-1.0571	13.0	0.3097

For H0: Variances are equal, F' = 7250.29 DF = (6,7) Prob>F' = 0.0000

SIZE=BIG EPLAN=3 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	23	44714.41869565	158442.29565950	33037.50244130
PRE	26	39778.44730769	143644.08329387	28170.92245106

Variances	T	DF	Prob>|T|
Unequal	0.1137	44.8	0.9100
Equal	0.1144	47.0	0.9094

For H0: Variances are equal, F' = 1.22 DF = (22,25) Prob>F' = 0.6321

SIZE=BIG EPLAN=3 FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	16468.16000000	.	.
PRE	1	15698.26000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

Normalized Annual Consumption of 1990 Participants (by consumption level)

SIZE=BIG EPLAN=4 FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	6	16097.98000000	8460.19634199	3453.86069361
PRE	9	14956.42444444	6310.27680742	2103.42560247

Variances	T	DF	Prob>|T|
Unequal	0.2823	8.7	0.7844
Equal	0.3003	13.0	0.7687

For H0: Variances are equal, F' = 1.80 DF = (5,8) Prob>F' = 0.4392

SIZE=BIG EPLAN=4 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	22	14007.93181818	4624.99874681	986.05304596
PRE	25	13764.94280000	6254.83696013	1250.96739203

Variances	T	DF	Prob>|T|
Unequal	0.1525	43.8	0.8795
Equal	0.1497	45.0	0.8817

For H0: Variances are equal, F' = 1.83 DF = (24,21) Prob>F' = 0.1664

SIZE=BIG EPLAN=4 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	36	14553.36472222	4863.61603518	810.60267253
PRE	42	13884.97500000	5465.65613401	843.36905122

Variances	T	DF	Prob>|T|
Unequal	0.5714	75.9	0.5694
Equal	0.5662	76.0	0.5729

For H0: Variances are equal, F' = 1.26 DF = (41,35) Prob>F' = 0.4834

SIZE=BIG EPLAN=4 FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	10884.00000000	.	.
PRE	1	9827.19000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

Normalized Annual Consumption of 1990 Participants
(by consumption level)

SIZE=BIG EPLAN=5 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	6	11664.89833333	1931.35322627	788.47165291
PRE	7	10934.13285714	962.40143407	363.75355085

Variances	T	DF	Prob>|T|
Unequal	0.8416	7.1	0.4275
Equal	0.8854	11.0	0.3949

For H0: Variances are equal, F' = 4.03 DF = (5,6) Prob>F' = 0.1197

SIZE=BIG EPLAN=5 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	23	13299.10086957	4134.71018315	862.14667114
PRE	27	13025.17888889	6184.90605307	1190.28572488

Variances	T	DF	Prob>|T|
Unequal	0.1864	45.6	0.8530
Equal	0.1807	48.0	0.8574

For H0: Variances are equal, F' = 2.24 DF = (26,22) Prob>F' = 0.0589

Normalized Annual Consumption of 1990 Participants
(by consumption level)

SIZE=SMALL EPLAN=1 FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	2	5939.85500000	110.64099805	78.23500000
PRE	4	7467.66500000	1521.28722562	760.64361281

Variances	T	DF	Prob>|T|
Unequal	-1.9980	3.1	0.1381
Equal	-1.3379	4.0	0.2519

For H0: Variances are equal, F' = 189.06 DF = (3,1) Prob>F' = 0.1068

SIZE=SMALL EPLAN=1 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	92	3604.39228261	1694.34981241	176.64817917
PRE	97	3731.24835052	1800.10401360	182.77287070

Variances	T	DF	Prob>|T|
Unequal	-0.4991	187.0	0.6183
Equal	-0.4983	187.0	0.6189

For H0: Variances are equal, F' = 1.13 DF = (96,91) Prob>F' = 0.5610

SIZE=SMALL EPLAN=1 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	157	4488.46050955	2067.73846232	165.02349473
PRE	159	4695.66352201	2047.33942236	162.36457754

Variances	T	DF	Prob>|T|
Unequal	-0.8950	313.8	0.3715
Equal	-0.8951	314.0	0.3714

For H0: Variances are equal, F' = 1.02 DF = (156,158) Prob>F' = 0.9010

Normalized Annual Consumption of 1990 Participants
(by consumption level)

SIZE=SMALL EPLAN=2 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	14	6014.64357143	2059.41407228	550.40156257
PRE	15	5480.01666667	1685.42865462	435.17580737

Variances	T	DF	Prob>|T|
Unequal	0.7620	25.2	0.4532
Equal	0.7674	27.0	0.4495

For H0: Variances are equal, F' = 1.49 DF = (13,14) Prob>F' = 0.4663

SIZE=SMALL EPLAN=2 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	119	4303.14277311	1849.78416986	169.56943683
PRE	120	4450.77716667	1984.69521880	181.17705685

Variances	T	DF	Prob>|T|
Unequal	-0.5949	236.1	0.5525
Equal	-0.5948	237.0	0.5526

For H0: Variances are equal, F' = 1.15 DF = (119,118) Prob>F' = 0.4448

SIZE=SMALL EPLAN=2 FUEL=PROP ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	4093.46000000	.	.
PRE	1	3934.83000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

Normalized Annual Consumption of 1990 Participants
(by consumption level)

SIZE=SMALL EPLAN=3 FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	80	6200.02000000	1650.34136713	184.51377415
PRE	79	6327.46367089	1790.17787813	201.41074712

Variances	T	DF	Prob>|T|
Unequal	-0.4666	155.6	0.6415
Equal	-0.4668	157.0	0.6413

For H0: Variances are equal, F' = 1.18 DF = (78,79) Prob>F' = 0.4724

SIZE=SMALL EPLAN=3 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	133	4194.83977444	1805.29608014	156.53902290
PRE	130	4013.08784615	1755.22924852	153.94378881

Variances	T	DF	Prob>|T|
Unequal	0.8278	261.0	0.4085
Equal	0.8276	261.0	0.4087

For H0: Variances are equal, F' = 1.06 DF = (132,129) Prob>F' = 0.7490

SIZE=SMALL EPLAN=3 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	322	4948.14692547	1797.00673141	100.14326993
PRE	317	4935.44242902	1789.33172801	100.49888228

Variances	T	DF	Prob>|T|
Unequal	0.0895	636.9	0.9287
Equal	0.0895	637.0	0.9287

For H0: Variances are equal, F' = 1.01 DF = (321,316) Prob>F' = 0.9394

SIZE=SMALL EPLAN=3 FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	4	4085.69250000	978.65711154	489.32855577
PRE	4	3781.98250000	2187.26481757	1093.63240878

Variances	T	DF	Prob>|T|
Unequal	0.2535	4.2	0.8120
Equal	0.2535	6.0	0.8084

For H0: Variances are equal, F' = 5.00 DF = (3,3) Prob>F' = 0.2194

Normalized Annual Consumption of 1990 Participants
(by consumption level)

SIZE=SMALL EPLAN=4 FUEL=ELEC **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	5	7156.92400000	985.80121697	440.86370669
PRE	2	7171.46500000	1963.50118107	1388.40500000

Variances	T	DF	Prob>|T|
Unequal	-0.0100	1.2	0.9935
Equal	-0.0140	5.0	0.9894

For H0: Variances are equal, F' = 3.97 DF = (1,4) Prob>F' = 0.2344

SIZE=SMALL EPLAN=4 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	139	4666.99719424	1726.37879092	146.42953789
PRE	136	4685.57529412	1768.83300291	151.67617868

Variances	T	DF	Prob>|T|
Unequal	-0.0881	272.4	0.9298
Equal	-0.0881	273.0	0.9298

For H0: Variances are equal, F' = 1.05 DF = (135,138) Prob>F' = 0.7765

SIZE=SMALL EPLAN=4 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	87	5683.15609195	2080.80302412	223.08550047
PRE	82	5722.11487805	1944.37030173	214.71977968

Variances	T	DF	Prob>|T|
Unequal	-0.1258	167.0	0.9000
Equal	-0.1256	167.0	0.9002

For H0: Variances are equal, F' = 1.15 DF = (86,81) Prob>F' = 0.5387

SIZE=SMALL EPLAN=4 FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	4	5151.32500000	2847.35846044	1423.67923022
PRE	4	5446.41750000	2565.64022069	1282.82011035

Variances	T	DF	Prob>|T|
Unequal	-0.1540	5.9	0.8827
Equal	-0.1540	6.0	0.8827

For H0: Variances are equal, F' = 1.23 DF = (3,3) Prob>F' = 0.8681

Normalized Annual Consumption of 1990 Participants (by consumption level)

SIZE=SMALL EPLAN=5 FUEL=GAS **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	75	4081.24533333	1709.17674704	197.35873100
PRE	75	4060.18986667	1689.42353596	195.07782665

Variances	T	DF	Prob>|T|
Unequal	0.0759	148.0	0.9396
Equal	0.0759	148.0	0.9396

For H0: Variances are equal, F' = 1.02   DF = (74,74)   Prob>F' = 0.9206

SIZE=SMALL EPLAN=5 FUEL=OIL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	152	4267.78559211	2028.94263075	164.56897848
PRE	149	4304.45939597	1958.67323049	160.46076323

Variances	T	DF	Prob>|T|
Unequal	-0.1596	298.9	0.8733
Equal	-0.1595	299.0	0.8734

For H0: Variances are equal, F' = 1.07   DF = (151,148)   Prob>F' = 0.6675

SIZE=SMALL EPLAN=5 FUEL=PROP **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	2510.77000000	.	.
PRE	1	2987.25000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

Normalized Annual Consumption of 1990 Participants
(by consumption level)

Normalized Annual Consumption of 1990 Participants (by consumption level)

Normalized Annual Consumption of 1990 Participants
(by consumption level)

Normalized Annual Consumption of 1990 Participants
(by consumption level)

Normalized Annual Consumption of 1990 Participants (by R-squared level)

RSQCL=0 ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1334	5412.78113943	3297.19424521	90.27481734
PRE	1366	5913.98565154	12737.77722637	344.64207744

Variances	T	DF	Prob>|T|
Unequal	-1.4068	1551.3	0.1597
Equal	-1.3923	2698.0	0.1639

For H0: Variances are equal, F' = 14.92 DF = (1365,1333)
Prob>F' = 0.0000

RSQCL=0.5 ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	363	6305.30407713	4793.03553535	251.56912332
PRE	353	8768.48951841	39534.96956660	2104.23410911

Variances	T	DF	Prob>|T|
Unequal	-1.1623	362.1	0.2459
Equal	-1.1782	714.0	0.2391

For H0: Variances are equal, F' = 68.04 DF = (352,362) Prob>F' = 0.0000

RSQCL=0.8 ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	289	12745.96332180	45265.20510810	2662.65912401
PRE	269	10112.24111524	7189.89202655	438.37545379

Variances	T	DF	Prob>|T|
Unequal	0.9760	303.6	0.3298
Equal	0.9432	556.0	0.3460

For H0: Variances are equal, F' = 39.64 DF = (288,268) Prob>F' = 0.0000

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

FUEL=ELEC RSQCL=0 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	24	6929.42583333	4166.22032860	850.42616342
PRE	26	7730.19115385	5310.93564327	1041.56017233

Variances	T	DF	Prob>|T|
Unequal	-0.5955	46.8	0.5544
Equal	-0.5898	48.0	0.5581

For H0: Variances are equal, F' = 1.63   DF = (25,23)   Prob>F' = 0.2458

FUEL=ELEC RSQCL=0.5 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	17	12542.30176471	8528.50702764	2068.46678257
PRE	27	13450.18666667	7923.71629212	1524.91991141

Variances	T	DF	Prob>|T|
Unequal	-0.3533	32.3	0.7262
Equal	-0.3594	42.0	0.7211

For H0: Variances are equal, F' = 1.16   DF = (16,26)   Prob>F' = 0.7181

FUEL=ELEC RSQCL=0.8 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	151	12854.03933775	6757.27492873	549.89923497
PRE	140	13085.69750000	7147.47554186	604.07193648

Variances	T	DF	Prob>|T|
Unequal	-0.2836	284.1	0.7769
Equal	-0.2842	289.0	0.7765

For H0: Variances are equal, F' = 1.12   DF = (139,150)   Prob>F' = 0.4993

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

FUEL=GAS RSQCL=0 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	370	4771.87351351	3047.34074380	158.42370155
PRE	395	5910.08734177	22257.73522001	1119.90819823

Variances	T	DF	Prob>|T|
Unequal	-1.0063	409.8	0.3149
Equal	-0.9751	763.0	0.3298

For H0: Variances are equal, F' = 53.35 DF = (394,369) Prob>F' = 0.0000

FUEL=GAS RSQCL=0.5 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	93	5694.08365591	3645.19504308	377.98911775
PRE	79	5570.15645570	4216.41699489	474.38397462

Variances	T	DF	Prob>|T|
Unequal	0.2043	155.4	0.8384
Equal	0.2067	170.0	0.8365

For H0: Variances are equal, F' = 1.34 DF = (78,92) Prob>F' = 0.1794

FUEL=GAS RSQCL=0.8 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	43	7835.42232558	5352.80968960	816.29582493
PRE	30	7595.34866667	5198.45799263	949.10423560

Variances	T	DF	Prob>|T|
Unequal	0.1918	63.7	0.8485
Equal	0.1908	71.0	0.8493

For H0: Variances are equal, F' = 1.06 DF = (42,29) Prob>F' = 0.8816

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

FUEL=OIL RSQCL=0 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	704	5772.78180398	3532.27193061	133.12750740
PRE	708	5917.87326271	3868.81711432	145.39905085

Variances	T	DF	Prob>|T|
Unequal	-0.7360	1399.9	0.4619
Equal	-0.7358	1410.0	0.4620

For H0: Variances are equal, F' = 1.20   DF = (707,703)   Prob>F' = 0.0158

FUEL=OIL RSQCL=0.5 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	199	6234.95221106	4716.74764691	334.36137557
PRE	191	10286.77272251	53507.70120735	3871.68137812

Variances	T	DF	Prob>|T|
Unequal	-1.0426	192.8	0.2984
Equal	-1.0640	388.0	0.2880

For H0: Variances are equal, F' = 128.69   DF = (190,198)   Prob>F' = 0.0000

FUEL=OIL RSQCL=0.8 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	72	16538.49777778	90276.74864804	10639.21685875
PRE	78	5904.91153846	4381.16925782	496.06973333

Variances	T	DF	Prob>|T|
Unequal	0.9984	71.3	0.3215
Equal	1.0392	148.0	0.3004

For H0: Variances are equal, F' = 424.59   DF = (71,77)   Prob>F' = 0.0000

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

FUEL=PROP RSQCL=0 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	6	6300.99666667	3143.54323154	1283.34615027
PRE	9	5240.32666667	3730.57159515	1243.52386505

Variances	T	DF	Prob>|T|
Unequal	0.5936	12.1	0.5637
Equal	0.5723	13.0	0.5769

For H0: Variances are equal, F' = 1.41 DF = (8,5) Prob>F' = 0.7345

FUEL=PROP RSQCL=0.5 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	7	5646.59428571	4175.85261854	1578.32393433
PRE	4	6998.67250000	2895.49232877	1447.74616438

Variances	T	DF	Prob>|T|
Unequal	-0.6313	8.4	0.5447
Equal	-0.5681	9.0	0.5839

For H0: Variances are equal, F' = 2.08 DF = (6,3) Prob>F' = 0.5849

FUEL=PROP RSQCL=0.8 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	16468.16000000	.	.
PRE	1	15698.26000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0 FUEL=ELEC EPLAN=1 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	6018.09000000	.	.
PRE	2	7408.86500000	1698.62099094	1200.96500000

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	-0.6686	1.0	0.6248

NOTE: All values are the same for one CLASS level.

RSQCL=0 FUEL=ELEC EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	21	6297.25000000	3630.55573592	792.25221308
PRE	20	7075.66100000	5470.71308813	1223.28863505

Variances	T	DF	Prob>|T|
Unequal	-0.5341	32.8	0.5969
Equal	-0.5393	39.0	0.5927

For H0: Variances are equal, F' = 2.27   DF = (19,20)   Prob>F' = 0.0762

RSQCL=0 FUEL=ELEC EPLAN=4 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	2	14022.94000000	5073.68914491	3587.64000000
PRE	4	11163.50500000	5089.06336656	2544.53168328

Variances	T	DF	Prob>|T|
Unequal	0.6501	2.1	0.5806
Equal	0.6493	4.0	0.5515

For H0: Variances are equal, F' = 1.01   DF = (3,1)   Prob>F' = 1.0000

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0 FUEL=GAS EPLAN=1 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	76	3947.34105263	2696.05388450	309.25859023
PRE	77	3823.12805195	2111.66316769	240.64635188

Variances	T	DF	Prob>|T|
Unequal	0.3170	142.0	0.7517
Equal	0.3175	151.0	0.7513

For H0: Variances are equal, F' = 1.63 DF = (75,76) Prob>F' = 0.0351

RSQCL=0 FUEL=GAS EPLAN=2 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	12	8177.66583333	4225.80345046	1219.88437983
PRE	14	6277.41142857	2820.72428542	753.87027562

Variances	T	DF	Prob>|T|
Unequal	1.3251	18.7	0.2011
Equal	1.3665	24.0	0.1844

For H0: Variances are equal, F' = 2.24 DF = (11,13) Prob>F' = 0.1676

RSQCL=0 FUEL=GAS EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	105	4307.55704762	2280.24043614	222.52868080
PRE	116	8127.80931034	40761.02236582	3784.56591633

Variances	T	DF	Prob>|T|
Unequal	-1.0077	115.8	0.3157
Equal	-0.9588	219.0	0.3387

For H0: Variances are equal, F' = 319.54 DF = (115,104) Prob>F' = 0.0000

RSQCL=0 FUEL=GAS EPLAN=4 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	119	5482.01621849	3663.43367095	335.82641401
PRE	124	5708.58040323	4268.04299172	383.28157530

Variances	T	DF	Prob>|T|
Unequal	-0.4446	238.1	0.6570
Equal	-0.4432	241.0	0.6580

For H0: Variances are equal, F' = 1.36 DF = (123,118) Prob>F' = 0.0956

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0 FUEL=GAS EPLAN=5 ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	58	4531.20465517	2231.31152009	292.98555630
PRE	64	4711.40671875	2626.40334703	328.30041838

Variances	T	DF	Prob>|T|
Unequal	-0.4095	119.5	0.6829
Equal	-0.4063	120.0	0.6853

For H0: Variances are equal, F' = 1.39   DF = (63,57)   Prob>F' = 0.2129

Normalized Annual Consumption of 1990 Participants (by R-squared level)

RSQCL=0 FUEL=OIL EPLAN=1 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	143	5696.62223776	3350.86346663	280.21328006
PRE	137	5898.73255474	3825.04314993	326.79549062

Variances	T	DF	Prob>|T|
Unequal	-0.4695	269.8	0.6391
Equal	-0.4708	278.0	0.6381

For H0: Variances are equal, F' = 1.30 DF = (136,142) Prob>F' = 0.1193

RSQCL=0 FUEL=OIL EPLAN=2 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	99	5655.66222222	3422.39344434	343.96348303
PRE	101	5604.89851485	3390.81588458	337.39879103

Variances	T	DF	Prob>|T|
Unequal	0.1054	197.8	0.9162
Equal	0.1054	198.0	0.9162

For H0: Variances are equal, F' = 1.02 DF = (98,100) Prob>F' = 0.9262

RSQCL=0 FUEL=OIL EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	252	5263.97289683	2275.10889780	143.31838927
PRE	256	5408.07894531	2545.85891840	159.11618240

Variances	T	DF	Prob>|T|
Unequal	-0.6729	501.4	0.5013
Equal	-0.6723	506.0	0.5017

For H0: Variances are equal, F' = 1.25 DF = (255,251) Prob>F' = 0.0744

RSQCL=0 FUEL=OIL EPLAN=4 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	87	8084.49413793	4926.15389124	528.13913353
PRE	86	8305.65709302	5133.06797989	553.51295531

Variances	T	DF	Prob>|T|
Unequal	-0.2891	170.5	0.7729
Equal	-0.2892	171.0	0.7728

For H0: Variances are equal, F' = 1.09 DF = (85,86) Prob>F' = 0.7041

RSQCL=0 FUEL=OIL EPLAN=5 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	123	5362.91617886	4138.81787424	373.18464006
PRE	128	5600.61281250	4836.34925335	427.47691915

Variances	T	DF	Prob>|T|
Unequal	-0.4189	245.8	0.6757
Equal	-0.4176	249.0	0.6766

For H0: Variances are equal, F' = 1.37 DF = (127,122) Prob>F' = 0.0841

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0 FUEL=PROP EPLAN=1 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	9029.66000000	.	.
PRE	2	10747.38000000	4195.70293898	2966.81000000

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	-0.3343	1.0	0.7946

NOTE: All values are the same for one CLASS level.

RSQCL=0 FUEL=PROP EPLAN=2 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	4093.46000000	.	.
PRE	1	3934.83000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

RSQCL=0 FUEL=PROP EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	4834.54000000	.	.
PRE	3	3880.04333333	2668.05088239	1540.39989516

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	0.3098	2.0	0.7860

NOTE: All values are the same for one CLASS level.

RSQCL=0 FUEL=PROP EPLAN=4 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	3	6616.10666667	4161.85778408	2402.84971197
PRE	2	3552.98500000	902.82686715	638.39500000

Variances	T	DF	Prob>|T|
Unequal	1.2320	2.3	0.3330
Equal	0.9760	3.0	0.4010

For H0: Variances are equal, F' = 21.25 DF = (2,1) Prob>F' = 0.3032

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.5 FUEL=ELEC EPLAN=1 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	24521.58000000	.	.
PRE	4	13169.22000000	7505.85945684	3752.92972842

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	1.3528	3.0	0.2690

NOTE: All values are the same for one CLASS level.

RSQCL=0.5 FUEL=ELEC EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	12	12816.28833333	9128.82118489	2635.26368424
PRE	20	12582.73500000	7768.93796822	1737.18734099

Variances	T	DF	Prob>|T|
Unequal	0.0740	20.4	0.9417
Equal	0.0771	30.0	0.9390

For H0: Variances are equal, F' = 1.38   DF = (11,19)   Prob>F' = 0.5175

RSQCL=0.5 FUEL=ELEC EPLAN=4 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	4	8725.52250000	3847.19070262	1923.59535131
PRE	3	19607.82000000	9682.90737821	5590.42918134

Variances	T	DF	Prob>|T|
Unequal	-1.8407	2.5	0.1859
Equal	-2.0921	5.0	0.0907

For H0: Variances are equal, F' = 6.33   DF = (2,3)   Prob>F' = 0.1675

Normalized Annual Consumption of 1990 Participants (by R-squared level)

RSQCL=0.5 FUEL=GAS EPLAN=1 ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	16	4787.31312500	3653.96950744	913.49237686
PRE	22	4752.10954545	3471.49594063	740.12542137

Variances	T	DF	Prob>|T|
Unequal	0.0299	31.5	0.9763
Equal	0.0302	36.0	0.9761

For H0: Variances are equal, F' = 1.11   DF = (15,21)   Prob>F' = 0.8114

RSQCL=0.5 FUEL=GAS EPLAN=2 ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	7	9294.25714286	5927.57132256	2240.41137116
PRE	4	13977.24000000	7961.94521395	3980.97260697

Variances	T	DF	Prob>|T|
Unequal	-1.0251	5.0	0.3528
Equal	-1.1193	9.0	0.2920

For H0: Variances are equal, F' = 1.80   DF = (3,6)   Prob>F' = 0.4931

RSQCL=0.5 FUEL=GAS EPLAN=3 ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	25	4993.09320000	2230.16510833	446.03302167
PRE	17	3637.41058824	1718.13233595	416.70829999

Variances	T	DF	Prob>|T|
Unequal	2.2210	39.3	0.0322
Equal	2.1131	40.0	0.0409

For H0: Variances are equal, F' = 1.68   DF = (24,16)   Prob>F' = 0.2832

RSQCL=0.5 FUEL=GAS EPLAN=4 ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	27	6380.46000000	3396.34037126	653.62600920
PRE	27	6803.10111111	4173.42223055	803.17548275

Variances	T	DF	Prob>|T|
Unequal	-0.4081	49.9	0.6849
Equal	-0.4081	52.0	0.6848

For H0: Variances are equal, F' = 1.51   DF = (26,26)   Prob>F' = 0.2998

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.5 FUEL=GAS EPLAN=5 ***

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	18	5044.06777778	3877.39253904	913.91018589
PRE	9	3785.25333333	1259.86322985	419.95440995

Variances	T	DF	Prob>|T|
Unequal	1.2516	22.8	0.2234
Equal	0.9413	25.0	0.3556

For H0: Variances are equal, F' = 9.47   DF = (17,8)   Prob>F' = 0.0031

Normalized Annual Consumption of 1990 Participants (by R-squared level)

RSQCL=0.5 FUEL=OIL EPLAN=1 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	34	6207.04470588	6880.74895924	1180.03871123
PRE	38	7003.56631579	5934.91153810	962.76978400

Variances	T	DF	Prob>|T|
Unequal	-0.5230	65.6	0.6027
Equal	-0.5274	70.0	0.5996

For H0: Variances are equal, F' = 1.34 DF = (33,37) Prob>F' = 0.3818

RSQCL=0.5 FUEL=OIL EPLAN=2 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	31	5566.24516129	3391.06490507	609.05323647
PRE	31	5597.31419355	2838.31337341	509.77613068

Variances	T	DF	Prob>|T|
Unequal	-0.0391	58.2	0.9689
Equal	-0.0391	60.0	0.9689

For H0: Variances are equal, F' = 1.43 DF = (30,30) Prob>F' = 0.3351

RSQCL=0.5 FUEL=OIL EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	69	5844.54463768	3361.81848052	404.71538570
PRE	62	17769.37580645	93771.56724615	11909.00094927

Variances	T	DF	Prob>|T|
Unequal	-1.0008	61.1	0.3209
Equal	-1.0561	129.0	0.2929

For H0: Variances are equal, F' = 778.03 DF = (61,68) Prob>F' = 0.0000

RSQCL=0.5 FUEL=OIL EPLAN=4 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	27	9313.56407407	6213.97732895	1195.88049454
PRE	27	8417.05259259	4469.34895364	860.12660716

Variances	T	DF	Prob>|T|
Unequal	0.6086	47.2	0.5457
Equal	0.6086	52.0	0.5454

For H0: Variances are equal, F' = 1.93 DF = (26,26) Prob>F' = 0.0990

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.5 FUEL=OIL EPLAN=5 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	38	5326.90947368	3343.31045760	542.35657371
PRE	33	5944.23060606	2855.36188703	497.05470420

Variances	T	DF	Prob>|T|
Unequal	-0.8391	69.0	0.4043
Equal	-0.8298	69.0	0.4095

For H0: Variances are equal, F' = 1.37 DF = (37,32) Prob>F' = 0.3660

Normalized Annual Consumption of 1990 Participants (by R-squared level)

RSQCL=0.5 FUEL=PROP EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	3	3836.07666667	1030.92493783	595.20479037
PRE	1	3487.80000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	0.2926	2.0	0.7974

NOTE: All values are the same for one CLASS level.

RSQCL=0.5 FUEL=PROP EPLAN=4 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	2	5820.49000000	3900.18887299	2757.85000000
PRE	3	8168.96333333	2087.66135459	1205.31184505

Variances	T	DF	Prob>|T|
Unequal	-0.7803	1.4	0.5541
Equal	-0.9109	3.0	0.4295

For H0: Variances are equal, F' = 3.49 DF = (1,2) Prob>F' = 0.4054

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.8 FUEL=ELEC EPLAN=1 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	15	16144.18600000	5860.23873983	1513.10713628
PRE	12	19816.07833333	5371.30623667	1550.56255082

Variances	T	DF	Prob>|T|
Unequal	-1.6948	24.5	0.1028
Equal	-1.6779	25.0	0.1058

For H0: Variances are equal, F' = 1.19 DF = (14,11) Prob>F' = 0.7830

RSQCL=0.8 FUEL=ELEC EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	131	12437.95893130	6643.17804157	580.41716040
PRE	124	12489.76967742	7088.16690156	636.53617859

Variances	T	DF	Prob>|T|
Unequal	-0.0601	249.4	0.9521
Equal	-0.0603	253.0	0.9520

For H0: Variances are equal, F' = 1.14 DF = (123,130) Prob>F' = 0.4658

RSQCL=0.8 FUEL=ELEC EPLAN=4 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	5	13884.90600000	10497.81769470	4694.76679615
PRE	4	11368.31750000	1219.39101952	609.69550976

Variances	T	DF	Prob>|T|
Unequal	0.5316	4.1	0.6224
Equal	0.4704	7.0	0.6524

For H0: Variances are equal, F' = 74.12 DF = (4,3) Prob>F' = 0.0050

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.8 FUEL=GAS EPLAN=1 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	10	9945.41800000	7030.40373096	2223.20886604
PRE	4	12263.26000000	7960.05078088	3980.02539044

Variances	T	DF	Prob>|T|
Unequal	-0.5084	5.0	0.6328
Equal	-0.5386	12.0	0.6000

For H0: Variances are equal, F' = 1.28 DF = (3,9) Prob>F' = 0.6768

RSQCL=0.8 FUEL=GAS EPLAN=2 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	2	6158.90500000	2556.21222719	1807.51500000
PRE	3	7556.96666667	3816.10769935	2203.23080748

Variances	T	DF	Prob>|T|
Unequal	-0.4906	2.9	0.6583
Equal	-0.4442	3.0	0.6870

For H0: Variances are equal, F' = 2.23 DF = (2,1) Prob>F' = 0.8561

RSQCL=0.8 FUEL=GAS EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	11	6401.51909091	3434.77307203	1035.62304727
PRE	4	5216.63750000	2595.63846149	1297.81923074

Variances	T	DF	Prob>|T|
Unequal	0.7136	7.2	0.4981
Equal	0.6224	13.0	0.5444

For H0: Variances are equal, F' = 1.75 DF = (10,3) Prob>F' = 0.7066

RSQCL=0.8 FUEL=GAS EPLAN=4 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	15	8816.98400000	5854.47729825	1511.61953846
PRE	10	8981.41100000	5709.49068179	1805.49948340

Variances	T	DF	Prob>|T|
Unequal	-0.0698	19.8	0.9450
Equal	-0.0695	23.0	0.9452

For H0: Variances are equal, F' = 1.05 DF = (14,9) Prob>F' = 0.9707

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.8 FUEL=GAS EPLAN=5 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	5	4495.94000000	1676.11981609	749.58356944
PRE	9	5050.65111111	2819.56814490	939.85604830

Variances	T	DF	Prob>|T|
Unequal	-0.4614	11.8	0.6529
Equal	-0.3982	12.0	0.6975

For H0: Variances are equal, F' = 2.83 DF = (8,4) Prob>F' = 0.3302

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.8 FUEL=OIL EPLAN=1 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	12	5989.80500000	3321.70226148	958.89284742
PRE	16	5560.48000000	3220.25431378	805.06357845

Variances	T	DF	Prob>|T|
Unequal	0.3429	23.4	0.7347
Equal	0.3445	26.0	0.7333

For H0: Variances are equal, F' = 1.06   DF = (11,15)   Prob>F' = 0.8905

RSQCL=0.8 FUEL=OIL EPLAN=2 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	13	5453.38615385	5632.73144234	1562.23861818
PRE	11	6197.12545455	5536.94005126	1669.45023970

Variances	T	DF	Prob>|T|
Unequal	-0.3253	21.5	0.7481
Equal	-0.3248	22.0	0.7484

For H0: Variances are equal, F' = 1.03   DF = (12,10)   Prob>F' = 0.9707

RSQCL=0.8 FUEL=OIL EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	24	37164.17458333	156404.94756311	31926.02623136
PRE	25	4504.21480000	2151.52491097	430.30498219

Variances	T	DF	Prob>|T|
Unequal	1.0229	23.0	0.3170
Equal	1.0444	47.0	0.3016

For H0: Variances are equal, F' = 5284.55   DF = (23,24)   Prob>F' = 0.0000

RSQCL=0.8 FUEL=OIL EPLAN=4 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	9	7059.83222222	2899.80576576	966.60192192
PRE	11	10075.94909091	7694.12997643	2319.86747455

Variances	T	DF	Prob>|T|
Unequal	-1.2001	13.3	0.2511
Equal	-1.1088	18.0	0.2821

For H0: Variances are equal, F' = 7.04   DF = (10,8)   Prob>F' = 0.0108

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.8 FUEL=OIL EPLAN=5 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	14	6608.67714286	2820.68949522	753.86097754
PRE	15	5333.74866667	2148.31316416	554.69207381

Variances	T	DF	Prob>|T|
Unequal	1.3622	24.3	0.1856
Equal	1.3752	27.0	0.1804

For H0: Variances are equal, F' = 1.72   DF = (13,14)   Prob>F' = 0.3243

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.8 FUEL=PROP EPLAN=3 **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	16468.16000000	.	.
PRE	1	15698.26000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0 FUEL=BLANK EPLAN=1 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	6	5708.00333333	1411.92556734	576.41619913
PRE	4	5809.53750000	1507.27091173	753.63545587

Variances	T	DF	Prob>|T|
Unequal	-0.1070	6.3	0.9181
Equal	-0.1086	8.0	0.9162

For H0: Variances are equal, F' = 1.14 DF = (3,5) Prob>F' = 0.8356

RSQCL=0 FUEL=BLANK EPLAN=1 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	4	4879.07500000	4071.42764879	2035.71382440
PRE	4	4067.67750000	4318.61732903	2159.30866451

Variances	T	DF	Prob>|T|
Unequal	0.2734	6.0	0.7937
Equal	0.2734	6.0	0.7937

For H0: Variances are equal, F' = 1.13 DF = (3,3) Prob>F' = 0.9251

RSQCL=0 FUEL=BLANK EPLAN=2 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	5258.21000000	.	.
PRE	1	5502.33000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

RSQCL=0 FUEL=BLANK EPLAN=3 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	5	6153.41600000	4597.75973602	2056.18066279
PRE	8	8283.64000000	5872.90907365	2076.38691563

Variances	T	DF	Prob>|T|
Unequal	-0.7290	10.2	0.4824
Equal	-0.6864	11.0	0.5067

For H0: Variances are equal, F' = 1.63 DF = (7,4) Prob>F' = 0.6660

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0 FUEL=BLANK EPLAN=3 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	129	5057.44271318	1958.24820569	172.41414075
PRE	124	6151.00717742	10485.56242566	941.63130319

Variances	T	DF	Prob>|T|
Unequal	-1.1424	131.2	0.2554
Equal	-1.1637	251.0	0.2457

For H0: Variances are equal, F' = 28.67 DF = (123,128) Prob>F' = 0.0000

RSQCL=0 FUEL=BLANK EPLAN=4 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	11	5275.19272727	2804.90811015	845.71161571
PRE	11	5097.55000000	2293.55139006	691.53176347

Variances	T	DF	Prob>|T|
Unequal	0.1626	19.2	0.8725
Equal	0.1626	20.0	0.8725

For H0: Variances are equal, F' = 1.50 DF = (10,10) Prob>F' = 0.5361

RSQCL=0 FUEL=BLANK EPLAN=5 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	4	5424.02750000	4821.01541739	2410.50770870
PRE	3	8980.99333333	10044.18958176	5799.01555882

Variances	T	DF	Prob>|T|
Unequal	-0.5664	2.7	0.6160
Equal	-0.6320	5.0	0.5551

For H0: Variances are equal, F' = 4.34 DF = (2,3) Prob>F' = 0.2603

RSQCL=0 FUEL=BLANK EPLAN=5 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	48	4488.01604167	1626.05343739	234.70059745
PRE	54	4089.24611111	1511.10743201	205.63567527

Variances	T	DF	Prob>|T|
Unequal	1.2779	96.5	0.2043
Equal	1.2835	100.0	0.2023

For H0: Variances are equal, F' = 1.16 DF = (47,53) Prob>F' = 0.6023

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0 FUEL=ELEC EPLAN=1 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	6018.09000000	.	.
PRE	1	8609.83000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

RSQCL=0 FUEL=ELEC EPLAN=3 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	10	5552.62200000	3090.74997582	977.38096017
PRE	9	5238.79222222	4680.07945379	1560.02648460

Variances	T	DF	Prob>|T|
Unequal	0.1705	13.6	0.8671
Equal	0.1743	17.0	0.8637

For H0: Variances are equal, F' = 2.29 DF = (8,9) Prob>F' = 0.2382

RSQCL=0 FUEL=ELEC EPLAN=3 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	11	6974.18454545	4087.28182982	1232.36184018
PRE	11	8578.55363636	5815.56404322	1753.45853415

Variances	T	DF	Prob>|T|
Unequal	-0.7486	17.9	0.4638
Equal	-0.7486	20.0	0.4628

For H0: Variances are equal, F' = 2.02 DF = (10,10) Prob>F' = 0.2815

RSQCL=0 FUEL=ELEC EPLAN=4 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	2	14022.94000000	5073.68914491	3587.64000000
PRE	4	11163.50500000	5089.06336656	2544.53168328

Variances	T	DF	Prob>|T|
Unequal	0.6501	2.1	0.5806
Equal	0.6493	4.0	0.5515

For H0: Variances are equal, F' = 1.01 DF = (3,1) Prob>F' = 1.0000

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0 FUEL=GAS EPLAN=1 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	46	3809.94956522	2726.94643828	402.06631719
PRE	46	3693.34043478	1819.22667466	268.23033960

Variances	T	DF	Prob>|T|
Unequal	0.2413	78.4	0.8100
Equal	0.2413	90.0	0.8099

For H0: Variances are equal, F' = 2.25 DF = (45,45) Prob>F' = 0.0077

RSQCL=0 FUEL=GAS EPLAN=1 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	30	4158.00800000	2680.21228826	489.33757639
PRE	31	4015.71612903	2503.57882493	449.65603100

Variances	T	DF	Prob>|T|
Unequal	0.2141	58.4	0.8312
Equal	0.2144	59.0	0.8310

For H0: Variances are equal, F' = 1.15 DF = (29,30) Prob>F' = 0.7120

RSQCL=0 FUEL=GAS EPLAN=2 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	4938.70000000	.	.
PRE	2	4630.49500000	1114.06794696	787.76500000

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	0.2259	1.0	0.8586

NOTE: All values are the same for one CLASS level.

RSQCL=0 FUEL=GAS EPLAN=2 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	11	8472.11727273	4301.01086955	1296.80357032
PRE	12	6551.89750000	2952.10841988	852.20029545

Variances	T	DF	Prob>|T|
Unequal	1.2375	17.5	0.2323
Equal	1.2579	21.0	0.2222

For H0: Variances are equal, F' = 2.12 DF = (10,11) Prob>F' = 0.2329

Normalized Annual Consumption of 1990 Participants (by R-squared level)

RSQCL=0 FUEL=GAS EPLAN=3 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	56	4332.21750000	2541.9..988179	339.68367745
PRE	58	4195.46155172	2265.52890507	297.47851906

Variances	T	DF	Prob>|T|
Unequal	0.3029	109.5	0.7626
Equal	0.3035	112.0	0.7621

For H0: Variances are equal, F' = 1.26 DF = (55,57) Prob>F' = 0.3905

RSQCL=0 FUEL=GAS EPLAN=3 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	49	4279.37367347	1964.73520091	280.67645727
PRE	58	12060.15706897	57580.10431762	7560.63810164

Variances	T	DF	Prob>|T|
Unequal	-1.0284	57.2	0.3081
Equal	-0.9447	105.0	0.3470

For H0: Variances are equal, F' = 858.89 DF = (57,48) Prob>F' = 0.0000

RSQCL=0 FUEL=GAS EPLAN=4 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	49	5737.39877551	3901.26923613	557.32417659
PRE	54	6470.98129630	5168.65169668	703.36440639

Variances	T	DF	Prob>|T|
Unequal	-0.8175	97.9	0.4157
Equal	-0.8065	101.0	0.4218

For H0: Variances are equal, F' = 1.76 DF = (53,48) Prob>F' = 0.0500

RSQCL=0 FUEL=GAS EPLAN=4 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	70	5303.24842857	3504.98595721	418.92594914
PRE	70	5120.44257143	3338.61332635	399.04061632

Variances	T	DF	Prob>|T|
Unequal	0.3160	137.7	0.7525
Equal	0.3160	138.0	0.7525

For H0: Variances are equal, F' = 1.10 DF = (69,69) Prob>F' = 0.6874

Normalized Annual Consumption of 1990 Participants (by R-squared level)

RSQCL=0 FUEL=GAS EPLAN=5 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	39	4157.21051282	1915.23272572	306.68268048
PRE	44	4445.39818182	2704.83451084	407.76914511

Variances	T	DF	Prob>|T|
Unequal	-0.5648	77.4	0.5738
Equal	-0.5535	81.0	0.5814

For H0: Variances are equal, F' = 1.99 DF = (43,38) Prob>F' = 0.0326

RSQCL=0 FUEL=GAS EPLAN=5 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	19	5298.87684211	2664.04355835	611.17350800
PRE	20	5296.62550000	2406.31836490	538.06914394

Variances	T	DF	Prob>|T|
Unequal	0.0028	36.1	0.9978
Equal	0.0028	37.0	0.9978

For H0: Variances are equal, F' = 1.23 DF = (18,19) Prob>F' = 0.6629

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0 FUEL=OIL EPLAN=1 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	45	5457.03244444	3252.51504028	484.85631519
PRE	40	5726.80025000	4036.03925714	638.15383892

Variances	T	DF	Prob>|T|
Unequal	-0.3366	74.9	0.7374
Equal	-0.3409	83.0	0.7341

For H0: Variances are equal, F' = 1.54 DF = (39,44) Prob>F' = 0.1656

RSQCL=0 FUEL=OIL EPLAN=1 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	98	5806.63795918	3405.84358671	344.04215655
PRE	97	5969.63247423	3753.94925761	381.15579828

Variances	T	DF	Prob>|T|
Unequal	-0.3174	190.8	0.7513
Equal	-0.3176	193.0	0.7511

For H0: Variances are equal, F' = 1.21 DF = (96,97) Prob>F' = 0.3405

RSQCL=0 FUEL=OIL EPLAN=2 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	32	5866.32062500	2501.47489029	442.20246447
PRE	37	5824.82189189	2883.75807986	474.08690796

Variances	T	DF	Prob>|T|
Unequal	0.0640	67.0	0.9492
Equal	0.0633	67.0	0.9497

For H0: Variances are equal, F' = 1.33 DF = (36,31) Prob>F' = 0.4226

RSQCL=0 FUEL=OIL EPLAN=2 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	67	5555.04925373	3797.47754761	463.93572195
PRE	64	5477.75531250	3667.88056624	458.48507078

Variances	T	DF	Prob>|T|
Unequal	0.1185	129.0	0.9059
Equal	0.1184	129.0	0.9059

For H0: Variances are equal, F' = 1.07 DF = (66,63) Prob>F' = 0.7828

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0 FUEL=OIL EPLAN=3 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	75	5245.48533333	2395.21899582	276.57606640
PRE	76	4962.29842105	2858.00349361	327.83548445

Variances	T	DF	Prob>|T|
Unequal	0.6602	145.2	0.5101
Equal	0.6595	149.0	0.5106

For H0: Variances are equal, F' = 1.42 DF = (75,74) Prob>F' = 0.1299

RSQCL=0 FUEL=OIL EPLAN=3 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	177	5271.80661017	2229.23023516	167.55920518
PRE	180	5596.29738889	2385.55141574	177.80850431

Variances	T	DF	Prob>|T|
Unequal	-1.3281	354.1	0.1850
Equal	-1.3274	355.0	0.1852

For H0: Variances are equal, F' = 1.15 DF = (179,176) Prob>F' = 0.3677

RSQCL=0 FUEL=OIL EPLAN=4 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	46	7623.85217391	4222.14923322	622.52194212
PRE	47	7820.50319149	3974.05535495	579.67555056

Variances	T	DF	Prob>|T|
Unequal	-0.2312	90.4	0.8177
Equal	-0.2313	91.0	0.8176

For H0: Variances are equal, F' = 1.13 DF = (45,46) Prob>F' = 0.6838

RSQCL=0 FUEL=OIL EPLAN=4 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	41	8601.31195122	5621.50986284	877.93234277
PRE	39	8890.32974359	6259.17246140	1002.26973059

Variances	T	DF	Prob>|T|
Unequal	-0.2169	76.1	0.8289
Equal	-0.2175	78.0	0.8284

For H0: Variances are equal, F' = 1.24 DF = (38,40) Prob>F' = 0.5034

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0 FUEL=OIL EPLAN=5 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	43	6577.45558140	5185.67678123	790.80829534
PRE	41	7310.51414634	6810.54147692	1063.62788295

Variances	T	DF	Prob>|T|
Unequal	-0.5531	74.7	0.5819
Equal	-0.5566	82.0	0.5793

For H0: Variances are equal, F' = 1.72 DF = (40,42) Prob>F' = 0.0836

RSQCL=0 FUEL=OIL EPLAN=5 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	80	4710.10125000	3304.92930082	369.50232887
PRE	87	4794.79724138	3304.08321566	354.23490317

Variances	T	DF	Prob>|T|
Unequal	-0.1655	163.8	0.8688
Equal	-0.1655	165.0	0.8688

For H0: Variances are equal, F' = 1.00 DF = (79,86) Prob>F' = 0.9957

Normalized Annual Consumption of 1990 Participants (by R-squared level)

RSQCL=0 FUEL=PROP EPLAN=1 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	9029.66000000	.	.
PRE	2	10747.38000000	4195.70293898	2966.81000000

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	-0.3343	1.0	0.7946

NOTE: All values are the same for one CLASS level.

RSQCL=0 FUEL=PROP EPLAN=2 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	4093.46000000	.	.
PRE	1	3934.83000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

RSQCL=0 FUEL=PROP EPLAN=3 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	4834.54000000	.	.
PRE	3	3880.04333333	2668.05088239	1540.39989516

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	0.3098	2.0	0.7860

NOTE: All values are the same for one CLASS level.

RSQCL=0 FUEL=PROP EPLAN=4 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	2	4482.16000000	2705.50368190	1913.08000000
PRE	2	3552.98500000	902.82686715	638.39500000

Variances	T	DF	Prob>|T|
Unequal	0.4607	1.2	0.7175
Equal	0.4607	2.0	0.6902

For H0: Variances are equal, F' = 8.98 DF = (1,1) Prob>F' = 0.4101

Normalized Annual Consumption of 1990 Participants (by R-squared level)

RSQCL=0.5 FUEL=ELEC EPLAN=1 URBRUR=URBAN ***************************************

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	24521.58000000	.	.
PRE	3	14576.12000000	8522.36373424	4920.38899610

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	1.0106	2.0	0.4186

NOTE: All values are the same for one CLASS level.

RSQCL=0.5 FUEL=ELEC EPLAN=3 URBRUR=RURAL ***************************************

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	4	18280.07750000	10859.55628344	5429.77814172
PRE	5	16215.24200000	12010.16872045	5371.11073603

Variances	T	DF	Prob>|T|
Unequal	0.2704	6.8	0.7949
Equal	0.2669	7.0	0.7972

For H0: Variances are equal, F' = 1.22 DF = (4,3) Prob>F' = 0.9045

RSQCL=0.5 FUEL=ELEC EPLAN=3 URBRUR=URBAN ***************************************

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	8	10084.39375000	7404.45134570	2617.86887876
PRE	15	11371.89933333	5866.53678838	1514.73328542

Variances	T	DF	Prob>|T|
Unequal	-0.4257	11.8	0.6780
Equal	-0.4581	21.0	0.6516

For H0: Variances are equal, F' = 1.59 DF = (7,14) Prob>F' = 0.4338

RSQCL=0.5 FUEL=ELEC EPLAN=4 URBRUR=RURAL ***************************************

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	4	8725.52250000	3847.19070262	1923.59535131
PRE	1	20315.09000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	-2.6944	3.0	0.0741

NOTE: All values are the same for one CLASS level.

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.5 FUEL=GAS EPLAN=1 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	7	5114.82857143	5295.55436429	2001.53141459
PRE	12	5296.01750000	4368.57496130	1261.09896494

Variances	T	DF	Prob>|T|
Unequal	-0.0766	10.8	0.9404
Equal	-0.0808	17.0	0.9366

For H0: Variances are equal, F' = 1.47 DF = (6,11) Prob>F' = 0.5486

RSQCL=0.5 FUEL=GAS EPLAN=1 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	9	4532.57888889	1958.32041925	652.77347308
PRE	10	4099.42000000	1981.52521168	626.61329099

Variances	T	DF	Prob>|T|
Unequal	0.4787	16.8	0.6383
Equal	0.4784	17.0	0.6385

For H0: Variances are equal, F' = 1.02 DF = (9,8) Prob>F' = 0.9844

RSQCL=0.5 FUEL=GAS EPLAN=2 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	2	14964.92000000	8405.80257203	5943.80000000
PRE	2	12906.22000000	6935.13360425	4903.88000000

Variances	T	DF	Prob>|T|
Unequal	0.2672	1.9	0.8157
Equal	0.2672	2.0	0.8144

For H0: Variances are equal, F' = 1.47 DF = (1,1) Prob>F' = 0.8783

RSQCL=0.5 FUEL=GAS EPLAN=2 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	5	7025.99200000	3539.81375053	1583.05283478
PRE	2	15048.26000000	11725.75376252	8291.36000000

Variances	T	DF	Prob>|T|
Unequal	-0.9504	1.1	0.5107
Equal	-1.5653	5.0	0.1783

For H0: Variances are equal, F' = 10.97 DF = (1,4) Prob>F' = 0.0592

Normalized Annual Consumption of 1990 Participants (by R-squared level)

RSQCL=0.5 FUEL=GAS EPLAN=3 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	10	5194.63800000	1931.15517133	610.68488566
PRE	8	4252.14500000	1958.22558103	692.33729372

Variances	T	DF	Prob>|T|
Unequal	1.0209	15.0	0.3234
Equal	1.0226	16.0	0.3217

For H0: Variances are equal, F' = 1.03   DF = (7,9)   Prob>F' = 0.9458

RSQCL=0.5 FUEL=GAS EPLAN=3 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	15	4858.73000000	2465.85288174	636.68047634
PRE	9	3090.98000000	1354.56002691	451.52000897

Variances	T	DF	Prob>|T|
Unequal	2.2648	21.9	0.0338
Equal	1.9684	22.0	0.0617

For H0: Variances are equal, F' = 3.31   DF = (14,8)   Prob>F' = 0.0938

RSQCL=0.5 FUEL=GAS EPLAN=4 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	12	6585.19333333	2694.71477529	777.89715045
PRE	12	6767.99083333	4180.93507900	1206.93199666

Variances	T	DF	Prob>|T|
Unequal	-0.1273	18.8	0.9001
Equal	-0.1273	22.0	0.8999

For H0: Variances are equal, F' = 2.41   DF = (11,11)   Prob>F' = 0.1607

RSQCL=0.5 FUEL=GAS EPLAN=4 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	15	6216.67333333	3956.29318750	1021.51050853
PRE	15	6831.18933333	4313.97028345	1113.86233759

Variances	T	DF	Prob>|T|
Unequal	-0.4066	27.8	0.6874
Equal	-0.4066	28.0	0.6874

For H0: Variances are equal, F' = 1.19   DF = (14,14)   Prob>F' = 0.7505

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.5 FUEL=GAS EPLAN=5 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	10	5243.46300000	3993.29580206	1262.79101053
PRE	4	4565.53750000	1185.11132488	592.55566244

Variances	T	DF	Prob>|T|
Unequal	0.4860	11.7	0.6360
Equal	0.3266	12.0	0.7496

For H0: Variances are equal, F' = 11.35 DF = (9,3) Prob>F' = 0.0704

RSQCL=0.5 FUEL=GAS EPLAN=5 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	8	4794.82375000	3985.12720421	1408.95523500
PRE	5	3161.02600000	1012.53443953	452.81916727

Variances	T	DF	Prob>|T|
Unequal	1.1040	8.4	0.3004
Equal	0.8853	11.0	0.3949

For H0: Variances are equal, F' = 15.49 DF = (7,4) Prob>F' = 0.0188

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.5 FUEL=OIL EPLAN=1 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	11	3676.58636364	2412.12242008	727.28227416
PRE	16	5037.15937500	2529.89795156	632.47448789

Variances	T	DF	Prob>|T|
Unequal	-1.4116	22.3	0.1718
Equal	-1.3987	25.0	0.1742

For H0: Variances are equal, F' = 1.10   DF = (15,10)   Prob>F' = 0.9026

RSQCL=0.5 FUEL=OIL EPLAN=1 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	23	7417.26391304	7977.43990721	1663.41120793
PRE	22	8433.68045455	7238.74705358	1543.30605734

Variances	T	DF	Prob>|T|
Unequal	-0.4479	42.9	0.6565
Equal	-0.4470	43.0	0.6571

For H0: Variances are equal, F' = 1.21   DF = (22,21)   Prob>F' = 0.6591

RSQCL=0.5 FUEL=OIL EPLAN=2 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	13	5710.66384615	3368.94426137	934.37702143
PRE	7	6081.39857143	2324.20315354	878.46622009

Variances	T	DF	Prob>|T|
Unequal	-0.2891	16.6	0.7761
Equal	-0.2584	18.0	0.7990

For H0: Variances are equal, F' = 2.10   DF = (12,6)   Prob>F' = 0.3725

RSQCL=0.5 FUEL=OIL EPLAN=2 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	18	5461.94277778	3500.54828372	825.08714310
PRE	24	5456.12291667	3001.08936122	612.59480062

Variances	T	DF	Prob>|T|
Unequal	0.0057	33.4	0.9955
Equal	0.0058	40.0	0.9954

For H0: Variances are equal, F' = 1.36   DF = (17,23)   Prob>F' = 0.4847

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.5 FUEL=OIL EPLAN=3 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	26	6114.89576923	4268.87515352	837.19529650
PRE	22	39587.56545455	157332.70451403	33543.44530856

Variances	T	DF	Prob>|T|
Unequal	-0.9976	21.0	0.3298
Equal	-1.0865	46.0	0.2829

For H0: Variances are equal, F' = 1358.35 DF = (21,25) Prob>F' = 0.0000

RSQCL=0.5 FUEL=OIL EPLAN=3 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	43	5681.07651163	2716.31862705	414.23470719
PRE	40	5769.37150000	2871.60825316	454.04113139

Variances	T	DF	Prob>|T|
Unequal	-0.1437	79.7	0.8861
Equal	-0.1440	81.0	0.8859

For H0: Variances are equal, F' = 1.12 DF = (39,42) Prob>F' = 0.7223

RSQCL=0.5 FUEL=OIL EPLAN=4 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	9	9037.22444444	6901.01018120	2300.33672707
PRE	6	7974.01500000	4962.82951702	2026.06666619

Variances	T	DF	Prob>|T|
Unequal	0.3468	12.9	0.7343
Equal	0.3239	13.0	0.7511

For H0: Variances are equal, F' = 1.93 DF = (8,5) Prob>F' = 0.4849

RSQCL=0.5 FUEL=OIL EPLAN=4 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	18	9451.73388889	6048.47540205	1425.63932421
PRE	21	8543.63476190	4442.35027841	969.40030544

Variances	T	DF	Prob>|T|
Unequal	0.5267	30.8	0.6022
Equal	0.5393	37.0	0.5929

For H0: Variances are equal, F' = 1.85 DF = (17,20) Prob>F' = 0.1873

Normalized Annual Consumption of 1990 Participants (by R-squared level)

RSQCL=0.5 FUEL=OIL EPLAN=5 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	11	6034.71818182	2381.62929363	718.08825061
PRE	14	5801.33071429	2494.36485896	666.64704999

Variances	T	DF	Prob>|T|
Unequal	0.2382	22.1	0.8139
Equal	0.2368	23.0	0.8149

For H0: Variances are equal, F' = 1.10 DF = (13,10) Prob>F' = 0.9000

RSQCL=0.5 FUEL=OIL EPLAN=5 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	27	5038.54296296	3664.26674805	705.18846446
PRE	19	6049.52526316	3158.04318726	724.50479540

Variances	T	DF	Prob>|T|
Unequal	-0.9999	42.1	0.3231
Equal	-0.9740	44.0	0.3354

For H0: Variances are equal, F' = 1.35 DF = (26,18) Prob>F' = 0.5194

RSQCL=0.5 FUEL=PROP EPLAN=3 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	3148.66000000	.	.
PRE	1	3487.80000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

RSQCL=0.5 FUEL=PROP EPLAN=4 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	3062.64000000	.	.
PRE	1	5824.58000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

RSQCL=0.5 FUEL=PROP EPLAN=4 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	8578.34000000	.	.
PRE	2	9341.15500000	687.35728879	486.03500000

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	-0.9061	1.0	0.5313

NOTE: All values are the same for one CLASS level.

Normalized Annual Consumption of 1990 Participants (by R-squared level)

RSQCL=0.8 FUEL=ELEC EPLAN=1 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	5	14723.32800000	9056.93607144	4050.38494472
PRE	4	23286.84000000	6732.81205869	3366.40602935

Variances	T	DF	Prob>|T|
Unequal	-1.6260	7.0	0.1481
Equal	-1.5678	7.0	0.1609

For H0: Variances are equal, F' = 1.81 DF = (4,3) Prob>F' = 0.6536

RSQCL=0.8 FUEL=ELEC EPLAN=1 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	10	16854.61500000	3909.24727480	1236.21253252
PRE	8	18080.69750000	3947.70898543	1395.72589688

Variances	T	DF	Prob>|T|
Unequal	-0.6576	15.1	0.5207
Equal	-0.6584	16.0	0.5197

For H0: Variances are equal, F' = 1.02 DF = (7,9) Prob>F' = 0.9547

RSQCL=0.8 FUEL=ELEC EPLAN=3 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	27	17446.88037037	6673.94858798	1284.40200461
PRE	26	18370.22692308	7201.11784809	1412.25540104

Variances	T	DF	Prob>|T|
Unequal	-0.4837	50.3	0.6307
Equal	-0.4844	51.0	0.6302

For H0: Variances are equal, F' = 1.16 DF = (25,26) Prob>F' = 0.7019

RSQCL=0.8 FUEL=ELEC EPLAN=3 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	104	11137.56586538	6014.36574039	589.75708216
PRE	98	10929.64836735	6214.19473378	627.72846227

Variances	T	DF	Prob>|T|
Unequal	0.2414	198.3	0.8095
Equal	0.2416	200.0	0.8093

For H0: Variances are equal, F' = 1.07 DF = (97,103) Prob>F' = 0.7429

RSQCL=0.8 FUEL=ELEC EPLAN=4 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	5	13884.90600000	10497.81769470	4694.76679615
PRE	3	11563.63666667	1414.73468415	816.79745073

Variances	T	DF	Prob>|T|
Unequal	0.4871	4.2	0.6505
Equal	0.3692	6.0	0.7247

For H0: Variances are equal, F' = 55.06 DF = (4,2) Prob>F' = 0.0358

RSQCL=0.8 FUEL=GAS EPLAN=1 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	7	10921.44285714	8238.54935044	3113.87896360
PRE	3	14715.21000000	7679.27469468	4433.63131215

Variances	T	DF	Prob>|T|
Unequal	-0.7002	4.1	0.5214
Equal	-0.6785	8.0	0.5166

For H0: Variances are equal, F' = 1.15 DF = (6,2) Prob>F' = 1.0000

RSQCL=0.8 FUEL=GAS EPLAN=1 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	3	7668.02666667	2772.10314354	1600.47449615
PRE	1	4907.41000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	0.8624	2.0	0.4793

NOTE: All values are the same for one CLASS level.

RSQCL=0.8 FUEL=GAS EPLAN=2 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	7966.42000000	.	.
PRE	3	7556.96666667	3816.10769935	2203.23080748

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	0.0929	2.0	0.9344

NOTE: All values are the same for one CLASS level.

RSQCL=0.8 FUEL=GAS EPLAN=3 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	5	5118.49000000	3174.27206443	1419.57762303
PRE	1	5367.87000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	-0.0717	4.0	0.9463

NOTE: All values are the same for one CLASS level.

RSQCL=0.8 FUEL=GAS EPLAN=3 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	6	7470.71000000	3537.87548018	1444.33161666
PRE	3	5166.22666667	3176.59582280	1834.00845340

Variances	T	DF	Prob>|T|
Unequal	0.9872	4.6	0.3736
Equal	0.9478	7.0	0.3748

For H0: Variances are equal, F' = 1.24 DF = (5,2) Prob>F' = 1.0000

RSQCL=0.8 FUEL=GAS EPLAN=4 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	12	8820.63083333	6475.12021006	1869.20619816
PRE	7	10316.44714286	5590.65701646	2113.06973300

Variances	T	DF	Prob>|T|
Unequal	-0.5302	14.3	0.6041
Equal	-0.5091	17.0	0.6172

For H0: Variances are equal, F' = 1.34 DF = (11,6) Prob>F' = 0.7494

RSQCL=0.8 FUEL=GAS EPLAN=4 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	3	8802.39666667	3053.59337955	1762.99295968
PRE	3	5866.32666667	5668.52615875	3272.72510366

Variances	T	DF	Prob>|T|
Unequal	0.7898	3.1	0.4864
Equal	0.7898	4.0	0.4738

For H0: Variances are equal, F' = 3.45 DF = (2,2) Prob>F' = 0.4498

Normalized Annual Consumption of 1990 Participants (by R-squared level)

RSQCL=0.8 FUEL=GAS EPLAN=5 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	4	4340.14750000	1893.15296886	946.57648443
PRE	5	3907.48600000	2480.56104802	1109.34062514

Variances	T	DF	Prob>|T|
Unequal	0.2967	7.0	0.7753
Equal	0.2869	7.0	0.7825

For H0: Variances are equal, F' = 1.72 DF = (4,3) Prob>F' = 0.6853

RSQCL=0.8 FUEL=GAS EPLAN=5 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	5119.11000000	.	.
PRE	4	6479.60750000	2845.18223999	1422.59112000

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	-0.4277	3.0	0.6977

NOTE: All values are the same for one CLASS level.

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.8 FUEL=OIL EPLAN=1 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	5	5056.13600000	2707.53557008	1210.84671724
PRE	6	5272.61166667	3187.59622196	1301.33070830

Variances	T	DF	Prob>|T|
Unequal	-0.1218	9.0	0.9058
Equal	-0.1198	9.0	0.9073

For H0: Variances are equal, F' = 1.39 DF = (5,4) Prob>F' = 0.7741

RSQCL=0.8 FUEL=OIL EPLAN=1 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	7	6656.71142857	3754.45804569	1419.05175668
PRE	10	5733.20100000	3398.54846152	1074.71538769

Variances	T	DF	Prob>|T|
Unequal	0.5188	12.2	0.6132
Equal	0.5286	15.0	0.6048

For H0: Variances are equal, F' = 1.22 DF = (6,9) Prob>F' = 0.7563

RSQCL=0.8 FUEL=OIL EPLAN=2 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	2	11615.50000000	13550.15996866	9581.41000000
PRE	3	7746.66666667	10043.30805514	5798.50660919

Variances	T	DF	Prob>|T|
Unequal	0.3455	1.7	0.7691
Equal	0.3739	3.0	0.7333

For H0: Variances are equal, F' = 1.82 DF = (1,2) Prob>F' = 0.6195

RSQCL=0.8 FUEL=OIL EPLAN=2 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	11	4333.00181818	3276.79662294	987.99135569
PRE	8	5616.04750000	3682.71117740	1302.03502334

Variances	T	DF	Prob>|T|
Unequal	-0.7850	14.1	0.4454
Equal	-0.8004	17.0	0.4345

For H0: Variances are equal, F' = 1.26 DF = (7;10) Prob>F' = 0.7123

RSQCL=0.8 FUEL=OIL EPLAN=3 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	8	100348.26250000	271145.00395782	95864.23549171
PRE	10	3725.28100000	1421.94817867	449.65949593

Variances	T	DF	Prob>|T|
Unequal	1.0079	7.0	0.3471
Equal	1.1358	16.0	0.2728

For H0: Variances are equal, F' = 9999.99 DF = (7,9) Prob>F' = 0.0001

RSQCL=0.8 FUEL=OIL EPLAN=3 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	16	5572.13062500	2498.47315643	624.61828911
PRE	15	5023.50400000	2431.74980017	627.87509855

Variances	T	DF	Prob>|T|
Unequal	0.6195	29.0	0.5405
Equal	0.6189	29.0	0.5408

For H0: Variances are equal, F' = 1.06 DF = (15,14) Prob>F' = 0.9242

RSQCL=0.8 FUEL=OIL EPLAN=4 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	4	7142.15000000	1875.87148090	937.93574045
PRE	7	8770.75142857	5969.09570012	2256.10611064

Variances	T	DF	Prob>|T|
Unequal	-0.6666	7.8	0.5244
Equal	-0.5204	9.0	0.6153

For H0: Variances are equal, F' = 10.13 DF = (6,3) Prob>F' = 0.0844

RSQCL=0.8 FUEL=OIL EPLAN=4 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	5	6993.97800000	3763.82510338	1683.23375732
PRE	4	12360.04500000	10730.37087006	5365.18543503

Variances	T	DF	Prob>|T|
Unequal	-0.9543	3.6	0.4006
Equal	-1.0555	7.0	0.3263

For H0: Variances are equal, F' = 8.13 DF = (3,4) Prob>F' = 0.0709

Normalized Annual Consumption of 1990 Participants
(by R-squared level)

RSQCL=0.8 FUEL=PROP EPLAN=3 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	1	16468.16000000	.	.
PRE	1	15698.26000000	.	.

Variances	T	DF	Prob>|T|
Unequal	.	.	.
Equal	.	.	.

NOTE: All values are the same for one CLASS level.

RSQCL=0.8 FUEL=OIL EPLAN=5 URBRUR=RURAL **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	5	4658.87200000	231.15193676	103.37428875
PRE	5	5501.98200000	1759.35991942	786.80967534

Variances	T	DF	Prob>|T|
Unequal	-1.0624	4.1	0.3464
Equal	-1.0624	8.0	0.3191

For H0: Variances are equal, F' = 57.93 DF = (4,4) Prob>F' = 0.0017

RSQCL=0.8 FUEL=OIL EPLAN=5 URBRUR=URBAN **

Variable: NAC

PREPOST	N	Mean	Std Dev	Std Error
POS	9	7691.90222222	3034.15856272	1011.38618757
PRE	10	5249.63200000	2404.15923408	760.26190374

Variances	T	DF	Prob>|T|
Unequal	1.9302	15.3	0.0724
Equal	1.9550	17.0	0.0672

For H0: Variances are equal, F' = 1.59 DF = (8,9) Prob>F' = 0.5019

Normalized Annual Consumption of 1990 Participants (by R-squared level)

Appendix E:
Cost Effectiveness

Appendix E contains installation costs and participant dollar savings used in the cost effectiveness analysis presented in chapter 4, section 7 of the technical report.

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1989 TOTAL INSTALLATION COSTS (nominal dollars)

	total	urban	rural	owners	renters
E1	129,798.65	58,848.85	70,949.80	64,683.80	65,079.85
E2	110,483.21	60,108.03	50,375.18	85,706.03	24,777.18
E3	182,137.31	110,802.16	71,335.15	75,062.36	107,074.95
E4	152,230.20	73,694.83	78,535.37	55,963.52	96,266.68
E5	238,378.55	99,101.96	139,276.59	133,987.47	104,391.08
all	813,027.92	402,555.83	410,472.09	415,403.18	397,589.74

primary space heating fuel

	total	elec	gas	oil	prop
E1	129,798.65	10,996.20	48,443.10	64,314.15	114.55
E2	110,483.21	1,051.77	13,088.85	86,186.48	0.00
E3	182,137.31	18,104.77	85,062.78	70,043.72	994.60
E4	152,230.20	6,680.95	91,364.78	54,003.42	90.00
E5	238,378.55	13,086.28	86,005.02	118,636.54	2,804.94
all	813,027.92	49,919.97	323,964.53	393,184.31	4,004.09

1989 NU INSTALLATION COSTS (nominal dollars)

	total	urban	rural	owners	renters
E1	81,977.56	44,116.05	37,861.51	50,403.00	31,539.56
E2	94,865.93	51,331.43	43,534.51	77,958.60	16,907.33
E3	132,880.32	90,780.07	42,100.25	58,105.64	74,774.68
E4	60,776.35	29,721.85	31,054.49	30,815.74	29,960.61
E5	149,805.15	72,910.40	76,894.75	98,529.98	51,275.17
all	520,305.30	288,859.79	231,445.51	315,812.95	204,457.35

primary space heating fuel

	total	elec	gas	oil	prop
E1	81,977.56	10,658.63	5,041.20	61,289.04	98.69
E2	94,865.93	1,043.03	125.85	85,098.37	0.00
E3	132,880.32	17,806.54	40,590.99	66,830.41	981.81
E4	60,776.35	6,597.00	775.21	53,227.59	90.00
E5	149,805.15	12,997.72	454.65	118,418.62	2,804.94
all	520,305.30	49,102.91	46,987.91	384,864.04	3,975.44

1989 GAS CO. INSTALLATION COSTS (nominal dollars)

	total	urban	rural	owners	renters
E1	47,821.09	14,732.80	33,088.29	14,280.80	33,540.29
E2	15,617.28	8,776.60	6,840.67	7,747.43	7,869.85
E3	49,256.99	20,022.09	29,234.90	16,956.72	32,300.27
E4	91,453.85	43,972.98	47,480.88	25,147.78	66,306.07
E5	88,573.40	26,191.56	62,381.84	35,457.49	53,115.91
all	292,722.62	113,696.04	179,026.58	99,590.23	193,132.39

primary space heating fuel

	total	elec	gas	oil	prop
E1	47,821.09	337.58	43,401.90	3,025.11	15.86
E2	15,617.28	8.74	12,963.00	1,088.11	0.00
E3	49,256.99	298.23	44,471.79	3,213.31	12.79
E4	91,453.85	83.95	90,589.57	775.83	0.00
E5	88,573.40	88.56	85,550.37	217.92	0.00
all	292,722.62	817.06	276,976.62	8,320.27	28.65

Program Costs of 1989 Installations

1989 TOTAL PROGRAM COSTS (nominal dollars)

	total	urban	rural	owners	renters
E1	166,407.06	75,446.58	90,960.48	82,927.22	83,434.97
E2	141,643.89	77,060.90	64,583.00	109,878.56	31,765.34
E3	233,507.32	142,052.80	91,454.52	96,232.95	137,274.37
E4	195,165.21	94,479.72	100,685.49	71,747.47	123,417.73
E5	305,610.84	127,052.68	178,558.16	171,777.30	133,833.54
all	1,042,334.31	516,092.68	526,241.64	532,563.49	509,725.95

primary space heating fuel

	total	elec	gas	oil	prop
E1	166,407.06	14,097.57	62,105.99	82,453.31	146.86
E2	141,643.89	1,348.41	16,780.43	110,494.51	0.00
E3	233,507.32	23,211.04	109,053.89	89,798.85	1,275.12
E4	195,165.21	8,565.25	117,133.30	69,234.54	115.38
E5	305,610.84	16,777.13	110,261.88	152,096.79	3,596.05
all	1,042,334.31	63,999.40	415,335.49	504,078.01	5,133.40

1989 NU PROGRAM COSTS (nominal dollars)

	total	urban	rural	owners	renters
E1	105,098.51	56,558.54	48,539.97	64,618.66	40,434.98
E2	121,621.92	65,808.95	55,812.98	99,946.04	21,675.87
E3	170,357.89	116,383.68	53,974.20	74,493.75	95,864.13
E4	77,917.71	38,104.60	39,813.10	39,507.01	38,410.70
E5	192,056.19	93,474.05	98,582.15	126,319.38	65,736.82
all	667,052.21	370,329.81	296,722.40	404,884.83	262,122.50

primary space heating fuel

	total	elec	gas	oil	prop
E1	105,098.51	13,664.79	6,463.02	78,575.00	126.52
E2	121,621.92	1,337.21	161.34	109,099.51	0.00
E3	170,357.89	22,828.70	52,039.27	85,679.26	1,258.72
E4	77,917.71	8,457.62	993.85	68,239.90	115.38
E5	192,056.19	16,663.60	582.88	151,817.41	3,596.05
all	667,052.21	62,951.89	60,240.38	493,411.09	5,096.67

1989 GAS CO. PROGRAM COSTS (nominal dollars)

	total	urban	rural	owners	renters
E1	61,308.55	18,888.04	42,420.51	18,308.56	42,999.99
E2	20,021.98	11,251.95	8,770.01	9,932.52	10,089.46
E3	63,149.43	25,669.12	37,480.31	21,739.19	41,410.24
E4	117,247.49	56,375.12	60,872.39	32,240.46	85,007.03
E5	113,554.64	33,578.63	79,976.01	45,457.92	68,096.72
all	375,282.11	145,762.87	229,519.24	127,678.66	247,603.45

primary space heating fuel

	total	elec	gas	oil	prop
E1	61,308.55	432.79	55,642.97	3,878.31	20.33
E2	20,021.98	11.21	16,619.08	1,395.00	0.00
E3	63,149.43	382.34	57,014.61	4,119.59	16.40
E4	117,247.49	107.63	116,139.45	994.65	0.00
E5	113,554.64	113.54	109,679.00	279.38	0.00
all	375,282.11	1,047.50	355,095.11	10,666.92	36.73

Dollars Saved by 1989 WRAP Participants
(by Urban/Rural Status)

	Urban/Rural Location		ALL
	RURAL	URBAN	
	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participants
	SUM	SUM	SUM
E_PLAN			
1	146149.11	166629.30	312778.41
2	137632.08	725597.85	863229.93
3	171656.30	314131.54	485787.84
4	368428.55	373931.41	742359.96
5	422277.50	296821.38	719098.88
ALL	1246143.55	1877111.48	3123255.03

Dollars Saved by 1989 WRAP Participants (by Owner/Renter Status)

	Owner/Renter Status			ALL
	H	N	T	
	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participants
	SUM	SUM	SUM	SUM
E_PLAN				
1	138357.78	654.39	173766.24	312778.41
2	783757.09	.	79472.84	863229.93
3	188013.81	.	297774.03	485787.84
4	278672.09	.	463687.88	742359.96
5	395840.73	.	323258.15	719098.88
ALL	1784641.50	654.39	1337959.14	3123255.03

Dollars Saved by 1989 WRAP Participants
(by Primary Space Heating Fuel)

	Primary Space Heating Fuel						
	BLANK	ELEC	GAS	OIL	OTHER	PROP	ALL
	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participant
	SUM	SUM	SUM	SUM	SUM	SUM	SUM
E_PLAN							
1	754.54	104039.54	85059.10	121776.66	791.12	357.46	312778.4
2	44.03	815.26	30160.79	831753.21	456.65	.	863229.9
3	2707.78	129463.54	191336.92	157621.09	670.04	3988.47	485787.8
4	1060.15	32[illegible]35.29	447705.79	260699.21	.	359.53	742359.9
5	218.75	63477.13	306472.16	317177.49	220.18	31533.18	719098.8
ALL	4785.26	330330.76	1060734.75	1689027.66	2137.99	36238.63	3123255.0

Installation Costs of 1990 Installations

1990 TOTAL INSTALLATION COSTS (nominal dollars)

	total	urban	rural	owners	renters
E1	87,546.12	44,736.72	42,809.40	40,499.10	47,047.02
E2	157,922.38	103,273.46	54,648.92	103,064.10	54,858.28
E3	266,294.36	140,625.40	125,668.96	89,615.28	176,679.08
E4	597,538.85	299,516.41	298,022.44	212,431.46	385,107.39
E5	623,163.63	363,410.70	259,752.93	382,839.68	240,323.95
all	1,732,465.34	951,562.69	780,902.65	828,449.62	904,015.72

primary space heating fuel

	total	elec	gas	oil	prop
E1	87,546.12	4,553.50	31,061.25	42,827.57	757.00
E2	157,922.38	2,317.40	18,556.71	127,696.66	1,537.50
E3	266,294.36	30,262.58	42,487.19	162,429.26	1,964.21
E4	597,538.85	13,571.44	276,792.16	285,368.19	6,376.66
E5	623,163.63	1,136.01	161,368.75	403,548.50	3,282.58
all	1,732,465.34	51,840.93	530,266.06	1,021,871.12	13,917.95

1990 NU INSTALLATION COSTS (nominal dollars)

	total	urban	rural	owners	renters
E1	57,587.29	33,316.02	24,271.27	33,187.37	24,399.91
E2	136,132.88	86,569.72	49,563.16	91,931.92	44,200.96
E3	222,987.31	113,031.20	109,956.11	76,058.79	146,928.52
E4	324,714.62	176,860.29	147,854.33	170,484.28	154,230.35
E5	453,395.06	303,265.38	150,129.68	318,064.65	135,330.41
all	1,194,817.16	713,042.61	481,774.56	689,727.02	505,090.15

primary space heating fuel

	total	elec	gas	oil	prop
E1	57,587.29	4,400.00	4,373.77	40,946.84	750.00
E2	136,132.88	2,317.40	934.53	124,720.20	1,517.55
E3	222,987.31	29,704.27	4,569.97	159,114.61	1,907.98
E4	324,714.62	13,506.88	9,581.11	281,880.37	6,341.81
E5	453,395.06	1,133.16	3,049.10	398,966.89	3,282.58
all	1,194,817.16	51,061.70	22,508.48	1,005,628.92	13,799.92

1990 GAS CO. INSTALLATION COSTS (nominal dollars)

	total	urban	rural	owners	renters
E1	29,958.83	11,420.69	18,538.13	7,311.72	22,647.10
E2	21,789.50	16,703.75	5,085.76	11,132.18	10,657.32
E3	43,307.05	27,594.21	15,712.85	13,556.49	29,750.56
E4	272,824.23	122,656.12	150,168.11	41,947.18	230,877.04
E5	169,768.57	60,145.32	109,623.25	64,775.03	104,993.54
all	537,648.18	238,520.08	299,128.09	138,722.60	398,925.57

primary space heating fuel

	total	elec	gas	oil	prop
E1	29,958.83	153.50	26,687.48	1,880.73	7.00
E2	21,789.50	0.00	17,622.18	2,976.46	19.95
E3	43,307.05	558.31	37,917.22	3,315.58	56.23
E4	272,824.23	64.56	267,211.05	3,487.82	34.85
E5	169,768.57	2.85	158,319.65	4,581.61	0.00
all	537,648.18	779.22	507,757.58	16,242.20	118.03

1990 TOTAL PROGRAM COSTS (nominal dollars)

	total	urban	rural	owners	renters
E1	112,237.63	57,354.26	54,883.36	51,921.47	60,316.16
E2	202,462.81	132,400.71	70,062.10	132,132.30	70,330.51
E3	341,400.02	180,287.39	161,112.63	114,890.37	226,509.65
E4	766,068.71	383,992.02	382,076.69	272,345.63	493,723.08
E5	798,920.70	465,907.05	333,013.65	490,815.78	308,104.92
all	2,221,089.86	1,219,941.43	1,001,148.43	1,062,105.55	1,158,984.31

primary space heating fuel

	total	elec	gas	oil	prop
E1	112,237.63	5,837.77	39,821.76	54,906.66	970.50
E2	202,462.81	2,971.00	23,790.44	163,712.23	1,971.14
E3	341,400.02	38,797.84	54,470.28	208,240.81	2,518.20
E4	766,068.71	17,399.13	354,858.62	365,853.43	8,175.13
E5	798,920.70	1,456.41	206,881.19	517,365.32	4,208.40
all	2,221,089.86	66,462.15	679,822.30	1,310,079.65	17,843.37

1990 NU PROGRAM COSTS (nominal dollars)

	total	urban	rural	owners	renters
E1	73,829.21	42,712.47	31,116.74	42,547.54	31,281.66
E2	174,527.80	110,985.84	63,541.95	117,860.40	56,667.40
E3	285,878.65	144,910.52	140,968.13	97,510.41	188,368.24
E4	416,297.13	226,741.97	189,555.17	218,567.67	197,729.48
E5	581,270.60	388,798.35	192,472.25	407,771.60	173,499.00
all	1,531,803.39	914,149.15	617,654.26	884,257.63	647,545.78

primary space heating fuel

	total	elec	gas	oil	prop
E1	73,829.21	5,640.98	5,607.35	52,495.49	961.53
E2	174,527.80	2,971.00	1,198.10	159,896.29	1,945.56
E3	285,878.65	38,082.06	5,858.88	203,991.29	2,446.11
E4	416,297.13	17,316.36	12,283.37	361,381.91	8,130.45
E5	581,270.60	1,452.76	3,909.07	511,491.51	4,208.40
all	1,531,803.39	65,463.14	28,856.77	1,289,256.50	17,692.05

1990 GAS CO. PROGRAM COSTS (nominal dollars)

	total	urban	rural	owners	renters
E1	38,408.42	14,641.78	23,766.62	9,373.92	29,034.49
E2	27,935.01	21,414.88	6,520.15	14,271.90	13,663.11
E3	55,521.37	35,376.88	20,144.50	17,379.96	38,141.41
E4	349,771.58	157,250.05	192,521.52	53,777.96	295,993.60
E5	217,650.10	77,108.71	140,541.39	83,044.18	134,605.92
all	689,286.47	305,792.28	383,494.18	177,847.92	511,438.54

primary space heating fuel

	total	elec	gas	oil	prop
E1	38,408.42	196.79	34,214.42	2,411.17	8.97
E2	27,935.01	0.00	22,592.34	3,815.94	25.58
E3	55,521.37	715.78	48,611.39	4,250.71	72.09
E4	349,771.58	82.77	342,575.25	4,471.52	44.68
E5	217,650.10	3.65	202,972.12	5,873.81	0.00
all	689,286.47	998.99	650,965.53	20,823.15	151.32

Dollars Saved by 1990 WRAP Participants
(by Urban/Rural Status)

	Urban/Rural Location		ALL
	RURAL	URBAN	
	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participants
	SUM	SUM	SUM
E_PLAN			
1	69364.34	97616.22	166980.55
2	236078.34	495688.64	731766.98
3	216913.29	262163.63	479076.92
3P	97499.31	80878.44	178377.75
4	1796751.81	1331796.90	3128548.71
5	1031485.55	1157975.74	2189461.30
ALL	3448092.64	3426119.57	6874212.21

Dollars Saved by 1990 WRAP Participants
(by Owner/Renter Status)

	Owner/Renter Status		
	H	T	ALL
	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participants
	SUM	SUM	SUM
E_PLAN			
1	80407.38	86573.17	166980.55
2	482030.61	249736.37	731766.98
3	206061.70	273015.22	479076.92
3P	224.97	178152.78	178377.75
4	848267.41	2280281.30	3128548.71
5	1267218.94	922242.35	2189461.30
ALL	2884211.02	3990001.19	6874212.21

Dollars Saved by 1990 WRAP Participants
(by Primary Space Heating Fuel)

	Primary Space Heating Fuel						ALL
	BLANK	ELEC	GAS	OIL	OTHER	PROP	
	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participants	Dollars Saved by Participants
	SUM	SUM	SUM	SUM	SUM	SUM	SUM
E_PLAN							
1	1012.70	30300.61	43903.57	84997.02	2036.01	4730.63	166980.55
2	173.08	1060.98	128168.98	562578.70	.	39785.25	731766.98
3	6093.26	149043.51	76169.46	230892.42	8656.68	8221.59	479076.92
3P	56586.54	.	169.72	121621.49	.	.	178377.75
4	4699.44	51600.89	1687658.25	1229750.67	2555.93	152283.54	3128548.71
5	21082.66	4216.42	781649.17	1298955.47	1167.00	82390.58	2189461.30
ALL	89647.68	236222.41	2717719.16	3528795.77	14415.62	287411.58	6874212.21

Appendix F: Arrearage Impacts

Appendix F presents supporting data for the WRAP arrearage reductions evaluation, included in chapter 4, section 8 of the technical report.

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Appendix F: Arrearage Impacts

Section 1: 1988 Installations

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MONTHLY CHANGE IN ARREARAGE 1988

FUEL	EPLAN	U/R	SAMPLE SIZE	-11 TO 0 AVG	1 TO 12 AVG	ADJUSTED 1 TO 12 AVG 3.61%	REAL DELTA	REAL % DELTA
ALL	ALL	ALL	316	-18.0	-4.6	-4.4	13.6	-75.4%
ALL	ALL	RURAL	209	-18.9	-0.9	-0.9	18.0	-95.3%
ALL	ALL	URBAN	107	-16.5	-11.5	-11.1	5.4	-32.7%
ALL	1	ALL	26	-37.5	-43.8	-42.2	-4.7	12.6%
ALL	1	RURAL	15	-41.4	-45.3	-43.7	-2.3	5.4%
ALL	1	URBAN	11	-31.9	-41.8	-40.3	-8.4	26.3%
ALL	2	ALL	1	-3.2	2.8	2.7	5.9	-186.4%
ALL	2	URBAN	1	-3.2	2.8	2.7	5.9	-186.4%
ALL	3	ALL	289	-16.5	-1.0	-1.0	15.5	-94.2%
ALL	3	RURAL	194	-17.3	2.4	2.3	19.6	-113.5%
ALL	3	URBAN	95	-15.0	-8.1	-7.8	7.2	-48.0%
BLANK	ALL	ALL	9	-33.3	-33.9	-32.7	0.6	-1.8%
BLANK	ALL	RURAL	5	-12.8	-27.1	-26.1	-13.3	103.7%
BLANK	ALL	URBAN	4	-58.6	-42.3	-40.9	17.7	-30.3%
BLANK	1	ALL	1	-80.6	-68.6	-66.2	14.4	-17.9%
BLANK	1	RURAL	1	-80.6	-68.6	-66.2	14.4	-17.9%
BLANK	3	ALL	8	-27.3	-29.6	-28.6	-1.3	4.8%
BLANK	3	RURAL	4	4.2	-16.7	-16.1	-20.3	-486.1%
BLANK	3	URBAN	4	-58.6	-42.3	-40.9	17.7	-30.3%
ELEC	ALL	ALL	15	17.8	-1.5	-1.4	-19.3	-108.1%
ELEC	ALL	RURAL	2	-1.7	-2.7	-2.6	-0.9	54.4%
ELEC	ALL	URBAN	13	20.6	-1.2	-1.1	-21.7	-105.5%
ELEC	1	ALL	2	15.1	-1.7	-1.6	-16.7	-110.7%
ELEC	1	RURAL	1	-1.4	3.6	3.5	4.9	-344.1%
ELEC	1	URBAN	1	31.5	-7.1	-6.8	-38.3	-121.7%
ELEC	3	ALL	13	18.1	-1.3	-1.3	-19.4	-107.1%
ELEC	3	RURAL	1	-1.7	-8.8	-8.5	-6.9	411.5%
ELEC	3	URBAN	12	19.8	-0.8	-0.8	-20.6	-104.1%
GAS	ALL	ALL	122	-25.7	-16.5	-15.9	9.7	-38.0%
GAS	ALL	RURAL	89	-18.8	-13.0	-12.5	6.2	-33.1%
GAS	ALL	URBAN	33	-44.1	-25.7	-24.8	19.3	-43.8%
GAS	1	ALL	17	-55.1	-62.3	-60.1	-5.0	9.1%
GAS	1	RURAL	8	-69.3	-75.3	-72.7	-3.4	4.9%
GAS	1	URBAN	9	-42.7	-50.5	-48.7	-6.1	14.2%
GAS	3	ALL	105	-20.7	-9.1	-8.8	11.9	-57.6%
GAS	3	RURAL	81	-13.7	-6.9	-6.7	7.0	-51.2%
GAS	3	URBAN	24	-44.6	-16.3	-15.8	28.8	-64.6%
OIL	ALL	ALL	162	-15.3	5.3	5.1	20.5	-133.6%
OIL	ALL	RURAL	109	-20.2	9.8	9.4	29.6	-146.7%
OIL	ALL	URBAN	53	-5.6	-3.9	-3.8	1.8	-32.3%
OIL	1	ALL	6	2.9	-1.8	-1.7	-4.6	-157.9%
OIL	1	RURAL	5	3.4	-2.2	-2.1	-5.5	-161.2%
OIL	1	URBAN	1	-0.2	-0.2	-0.2	0.0	-3.5%
OIL	2	ALL	1	-3.2	2.8	2.7	5.9	-186.4%
OIL	2	URBAN	1	-3.2	2.8	2.7	5.9	-186.4%
OIL	3	ALL	155	-16.3	5.6	5.4	21.6	-133.2%
OIL	3	RURAL	104	-21.3	10.3	10.0	31.3	-146.7%
OIL	3	URBAN	51	-5.7	-4.1	-3.9	1.7	-30.5%
OTHER	ALL	ALL	8	-10.1	7.4	7.2	17.2	-171.0%
OTHER	ALL	RURAL	4	-8.0	13.3	12.8	20.8	-259.9%
OTHER	ALL	URBAN	4	-12.5	1.5	1.4	13.9	-111.6%
OTHER	3	ALL	8	-10.1	7.4	7.2	17.2	-171.0%
OTHER	3	RURAL	4	-8.0	13.3	12.8	20.8	-259.9%
OTHER	3	URBAN	4	-12.5	1.5	1.4	13.9	-111.6%

MONTHLY CHANGE IN ARREARAGE 1988
URBAN PARTICIPANTS

FUEL	EPLAN	U/R	SAMPLE SIZE	-11 TO 0 AVG	1 TO 12 AVG	ADJUSTED 1 TO 12 AVG 3.61%	REAL DELTA	REAL % DELTA
ALL	ALL	URBAN	107	-16.5	-11.5	-11.1	5.4	-32.7%
ALL	1	URBAN	11	-31.9	-41.8	-40.3	-8.4	26.3%
ALL	2	URBAN	1	-3.2	2.8	2.7	5.9	-186.4%
ALL	3	URBAN	95	-15.0	-8.1	-7.8	7.2	-48.0%
BLANK	ALL	URBAN	4	-58.6	-42.3	-40.9	17.7	-30.3%
BLANK	3	URBAN	4	-58.6	-42.3	-40.9	17.7	-30.3%
ELEC	ALL	URBAN	13	20.6	-1.2	-1.1	-21.7	-105.5%
ELEC	1	URBAN	1	31.5	-7.1	-6.8	-38.3	-121.7%
ELEC	3	URBAN	12	19.8	-0.8	-0.8	-20.6	-104.1%
GAS	ALL	URBAN	33	-44.1	-25.7	-24.8	19.3	-43.8%
GAS	1	URBAN	9	-42.7	-50.5	-48.7	-6.1	14.2%
GAS	3	URBAN	24	-44.6	-16.3	-15.8	28.8	-64.6%
OIL	ALL	URBAN	53	-5.6	-3.9	-3.8	1.8	-32.3%
OIL	1	URBAN	1	-0.2	-0.2	-0.2	0.0	-3.5%
OIL	2	URBAN	1	-3.2	2.8	2.7	5.9	-186.4%
OIL	3	URBAN	51	-5.7	-4.1	-3.9	1.7	-30.5%
OTHER	ALL	URBAN	4	-12.5	1.5	1.4	13.9	-111.6%

Arrearage Impacts of 1988 Rural Installations

MONTHLY CHANGE IN ARREARAGE 1988
RURAL PARTICIPANTS

FUEL	EPLAN	U/R	SAMPLE SIZE	-11 TO 0 AVG.	1 TO 12 AVG	ADJUSTED 1 TO 12 AVG 3.61%	REAL DELTA	REAL % DELTA
ALL	ALL	RURAL	209	-18.9	-0.9	-0.9	18.0	-95.3%
ALL	1	RURAL	15	-41.4	-45.3	-43.7	-2.3	5.4%
ALL	3	RURAL	194	-17.3	2.4	2.3	19.6	-113.5%
BLANK	ALL	RURAL	5	-12.8	-27.1	-26.1	-13.3	103.7%
BLANK	1	RURAL	1	-80.6	-68.6	-66.2	14.4	-17.9%
BLANK	3	RURAL	4	4.2	-16.7	-16.1	-20.3	-486.1%
ELEC	ALL	RURAL	2	-1.7	-2.7	-2.6	-0.9	54.4%
ELEC	1	RURAL	1	-1.4	3.6	3.5	4.9	-344.1%
ELEC	3	RURAL	1	-1.7	-8.8	-8.5	-6.9	411.5%
GAS	ALL	RURAL	89	-18.8	-13.0	-12.5	6.2	-33.1%
GAS	1	RURAL	8	-69.3	-75.3	-72.7	-3.4	4.9%
GAS	3	RURAL	81	-13.7	-6.9	-6.7	7.0	-51.2%
OIL	ALL	RURAL	109	-20.2	9.8	9.4	29.6	-146.7%
OIL	1	RURAL	5	3.4	-2.2	-2.1	-5.5	-161.2%
OIL	3	RURAL	104	-21.3	10.3	10.0	31.3	-146.7%
OTHER	ALL	RURAL	4	-8.0	13.3	12.8	20.8	-259.9%
OTHER	3	RURAL	4	-8.0	13.3	12.8	20.8	-259.9%

MONTHLY CHANGE IN ARREARAGE 1988
PLAN E1 PARTICIPANTS

FUEL	EPLAN	U/R	SAMPLE SIZE	-11 TO 0 AVG	1 TO 12 AVG	ADJUSTED 1 TO 12 AVG	REAL DELTA	REAL % DELTA
						3.61%		
ALL	1	ALL	26	-37.5	-43.8	-42.2	-4.7	12.6%
ALL	1	RURAL	15	-41.4	-45.3	-43.7	-2.3	5.4%
ALL	1	URBAN	11	-31.9	-41.8	-40.3	-8.4	26.3%
BLANK	1	ALL	1	-80.6	-68.6	-66.2	14.4	-17.9%
BLANK	1	RURAL	1	-80.6	-68.6	-66.2	14.4	-17.9%
ELEC	1	ALL	2	15.1	-1.7	-1.6	-16.7	-110.7%
ELEC	1	RURAL	1	-1.4	3.6	3.5	4.9	-344.1%
ELEC	1	URBAN	1	31.5	-7.1	-6.8	-38.3	-121.7%
GAS	1	ALL	17	-55.1	-62.3	-60.1	-5.0	9.1%
GAS	1	RURAL	8	-69.3	-75.3	-72.7	-3.4	4.9%
GAS	1	URBAN	9	-42.7	-50.5	-48.7	-6.1	14.2%
OIL	1	ALL	6	2.9	-1.8	-1.7	-4.6	-157.9%
OIL	1	RURAL	5	3.4	-2.2	-2.1	-5.5	-161.2%
OIL	1	URBAN	1	-0.2	-0.2	-0.2	0.0	-3.5%

Arrearage Impacts of 1988 Plan E2 Installations

MONTHLY CHANGE IN ARREARAGE 1988 PLAN E2 PARTICIPANTS						ADJUSTED		REAL
			SAMPLE	-11 TO 0	1 TO 12	1 TO 12	REAL	%
FUEL	EPLAN	U/R	SIZE	AVG	AVG	AVG	DELTA	DELTA
						3.61%		
ALL	2	ALL	1	-3.2	2.8	2.7	5.9	-186.4%
ALL	2	URBAN	1	-3.2	2.8	2.7	5.9	-186.4%
OIL	2	ALL	1	-3.2	2.8	2.7	5.9	-186.4%
OIL	2	URBAN	1	-3.2	2.8	2.7	5.9	-186.4%

MONTHLY CHANGE IN ARREARAGE 1988
PLAN E3 PARTICIPANTS

FUEL	%PLAN	U/R	SAMPLE SIZE	-11 TO 0 AVG	1 TO 12 AVG	ADJUSTED 1 TO 12 AVG 3.61%	REAL DELTA	REAL % DELTA
ALL	3	ALL	289	-16.5	-1.0	-1.0	15.5	-94.2%
ALL	3	RURAL	194	-17.3	2.4	2.3	19.6	-113.5%
ALL	3	URBAN	95	-15.0	-8.1	-7.8	7.2	-48.0%
BLANK	3	ALL	8	-27.3	-29.6	-28.6	-1.3	4.8%
BLANK	3	RURAL	4	4.2	-16.7	-16.1	-20.3	-486.1%
BLANK	3	URBAN	4	-58.6	-42.3	-40.9	17.7	-30.3%
ELEC	3	ALL	13	18.1	-1.3	-1.3	-19.4	-107.1%
ELEC	3	RURAL	1	-1.7	-8.8	-8.5	-6.9	411.5%
ELEC	3	URBAN	12	19.8	-0.8	-0.8	-20.6	-104.1%
GAS	3	ALL	105	-20.7	-9.1	-8.8	11.9	-57.6%
GAS	3	RURAL	81	-13.7	-6.9	-6.7	7.0	-51.2%
GAS	3	URBAN	24	-44.6	-16.3	-15.8	28.8	-64.6%
OIL	3	ALL	155	-16.3	5.6	5.4	21.6	-133.2%
OIL	3	RURAL	104	-21.3	10.3	10.0	31.3	-146.7%
OIL	3	URBAN	51	-5.7	-4.1	-3.9	1.7	-30.5%
OTHER	3	ALL	8	-10.1	7.4	7.2	17.2	-171.0%
OTHER	3	RURAL	4	-8.0	13.3	12.8	20.8	-259.9%
OTHER	3	URBAN	4	-12.5	1.5	1.4	13.9	-111.6%

Appendix F:
Arrearage Impacts

Section 2:
1989 Installations

Table of Contents:

Arrearage Impacts of 1989 Installations

PREPOST	N	Mean	Std Dev	Std Erro
pos	2533	-17767.42992499	85684.71260847	1702.4946252
pre	2531	-29451.82418017	89051.76379460	1770.0945018

Variances	T	Method	DF	Prob>|T|
Unequal	4.7576	Satterthwaite	5054.2	0.0001
		Cochran	.	0.0001
Equal	4.7576		5062.0	0.0000

For H0: Variances are equal, F' = 1.08 DF = (2530,2532) Prob>F' = 0.052

EPLAN=1 ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	865	-24240.36184971	117609.90335573	3998.85668159
pre	863	-32624.26303592	88197.28828620	3002.27060867

Variances	T	Method	DF	Prob>|T|
Unequal	1.6766	Satterthwaite	1602.3	0.0938
		Cochran	.	0.0940
Equal	1.6761		1726.0	0.0939

For H0: Variances are equal, F' = 1.78   DF = (864,862)   Prob>F' = 0.0000

EPLAN=2 ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	165	-26084.00606061	52845.65545455	4114.02869749
pre	165	-24470.54545455	63171.75714808	4917.91462406

Variances	T	Method	DF	Prob>|T|
Unequal	-0.2516	Satterthwaite	318.1	0.8015
		Cochran	164.0	0.8016
Equal	-0.2516		328.0	0.8015

For H0: Variances are equal, F' = 1.43   DF = (164,164)   Prob>F' = 0.0228

EPLAN=3 **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	1151	-12966.05647263	56205.75588397	1656.6971723
pre	1151	-20309.12597741	81664.13160331	2407.0975255

Variances	T	Method	DF	Prob>|T|
Unequal	2.5129	Satterthwaite	2039.8	0.0120
		Cochran	1150.0	0.0121
Equal	2.5129		2300.0	0.0120

For H0: Variances are equal, F' = 2.11 DF = (1150,1150) Prob>F' = 0.0000

EPLAN=4 **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Erro
pos	195	-7739.93333333	65346.27088730	4679.5436545
pre	195	-56074.82564103	115102.89902813	8242.6898039

Variances	T	Method	DF	Prob>|T|
Unequal	5.0995	Satterthwaite	307.3	0.0001
		Cochran	194.0	0.0000
Equal	5.0995		388.0	0.0000

For H0: Variances are equal, F' = 3.10 DF = (194,194) Prob>F' = 0.0000

EPLAN=5 **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	157	-21018.52229299	102026.91620450	8142.63436855
pre	157	-51208.87261146	117192.98938037	9353.01877760

Variances	T	Method	DF	Prob>|T|
Unequal	2.4345	Satterthwaite	306.2	0.0155
		Cochran	156.0	0.0160
Equal	2.4345		312.0	0.0155

For H0: Variances are equal, F' = 1.32 DF = (156,156) Prob>F' = 0.0845

Arrearage Impacts of 1989 Installations

URBRUR=RURAL **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Erro
pos	1229	-19916.38974776	103133.19064610	2941.8634619
pre	1228	-29037.05211726	89342.39712300	2549.5199656

Variances	T	Method	DF	Prob>|T|
Unequal	2.3429	Satterthwaite	2406.6	0.0192
		Cochran	.	0.0193
Equal	2.3428		2455.0	0.0192

For H0: Variances are equal, F' = 1.33 DF = (1228,1227) Prob>F' = 0.000

URBRUR=URBAN **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Erro
pos	1304	-15742.06825153	650[illegible]9.90949975	1801.9444853
pre	1303	-29842.72217959	88809.52404239	2460.2958536

Variances	T	Method	DF	Prob>|T|
Unequal	4.6238	Satterthwaite	2387.1	0.0001
		Cochran	.	0.0001
Equal	4.6243		2605.0	0.0000

For H0: Variances are equal, F' = 1.86 DF = (1302,1303) Prob>F' = 0.000

EPLAN=1 URBRUR=RURAL ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	421	-27345.51306413	158959.23568010	7747.19911199
pre	420	-35568.04761905	110754.70136998	5404.27605732

Variances	T	DF	Prob>|T|
Unequal	0.8705	750.2	0.3843
Equal	0.8701	839.0	0.3845

For H0: Variances are equal, F' = 2.06   DF = (420,419)   Prob>F' = 0.0000

EPLAN=1 URBRUR=URBAN ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	444	-21296.06306306	54801.93644772	2600.7848081[illegible]
pre	443	-29833.31602709	59380.19166899	2821.2380463[illegible]

Variances	T	DF	Prob>|T|
Unequal	2.2249	879.0	0.0263
Equal	2.2251	885.0	0.0263

For H0: Variances are equal, F' = 1.17   DF = (442,443)   Prob>F' = 0.0918

EPLAN=2 URBRUR=RURAL ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Erro
pos	72	-26899.20833333	59887.15379095	7057.7687585
pre	72	-29984.61111111	69336.10574536	8171.3384256

Variances	T	DF	Prob>|T|
Unequal	0.2858	139.1	0.7755
Equal	0.2858	142.0	0.7755

For H0: Variances are equal, F' = 1.34 DF = (71,71) Prob>F' = 0.2195

EPLAN=2 URBRUR=URBAN ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Erro
pos	93	-25452.88172043	47005.13793930	4874.2057447
pre	93	-20201.59139785	57978.05616562	6012.0443598

Variances	T	DF	Prob>|T|
Unequal	-0.6785	176.5	0.4984
Equal	-0.6785	184.0	0.4983

For H0: Variances are equal, F' = 1.52 DF = (92,92) Prob>F' = 0.0455

EPLAN=3 URBRUR=RURAL **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	544	-16025.67830882	53687.21482044	2301.82034549
pre	544	-17254.27389706	45902.36964626	1968.04786226

Variances	T	DF	Prob>|T|
Unequal	0.4057	1060.4	0.6851
Equal	0.4057	1086.0	0.6851

For H0: Variances are equal, F' = 1.37 DF = (543,543) Prob>F' = 0.0003

EPLAN=3 URBRUR=URBAN **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	607	-10223.99011532	58278.31490538	2365.4438331
pre	607	-23046.91762768	103691.29856306	4208.69997923

Variances	T	DF	Prob>|T|
Unequal	2.6560	954.1	0.0080
Equal	2.6560	1212.0	0.0080

For H0: Variances are equal, F' = 3.17 DF = (606,606) Prob>F' = 0.0000

EPLAN=4 URBRUR=RURAL **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Erro
pos	96	-15942.03125000	56656.00559451	5782.4293571
pre	96	-37485.65625000	120113.51419254	12259.0342076

Variances	T	DF	Prob>|T|
Unequal	1.5894	135.3	0.1143
Equal	1.5894	190.0	0.1136

For H0: Variances are equal, F' = 4.49 DF = (95,95) Prob>F' = 0.0000

EPLAN=4 URBRUR=URBAN **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Erro
pos	99	213.61616162	72191.95299222	7255.5642714
pre	99	-74100.68686869	107585.38765535	10812.7382962

Variances	T	DF	Prob>|T|
Unequal	5.7071	171.4	0.0001
Equal	5.7071	196.0	0.0000

For H0: Variances are equal, F' = 2.22 DF = (98,98) Prob>F' = 0.0001

EPLAN=5 URBRUR=RURAL **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	96	-8121.19791667	53749.73975156	5485.80984161
pre	96	-58073.75000000	130462.74640541	13315.29829731

Variances	T	DF	Prob>|T|
Unequal	3.4687	126.3	0.0007
Equal	3.4687	190.0	0.0006

For H0: Variances are equal, F' = 5.89 DF = (95,95) Prob>F' = 0.0000

EPLAN=5 URBRUR=URBAN **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	61	-41315.95081967	147666.43485668	18906.7495898
pre	61	-40405.13114754	92550.92264829	11849.93137080

Variances	T	DF	Prob>|T|
Unequal	-0.0408	100.8	0.9675
Equal	-0.0408	120.0	0.9675

For H0: Variances are equal, F' = 2.55 DF = (60,60) Prob>F' = 0.0004

OWNRENT=H **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Erro
pos	1171	-26235.87959009	57839.09124267	1690.2191318
pre	1170	-31565.28461538	85929.97014293	2512.1856470

Variances	T	Method	DF	Prob>|T|
Unequal	1.7601	Satterthwaite	2047.7	0.0785
		Cochran	.	0.0786
Equal	1.7604		2339.0	0.0785

For H0: Variances are equal, F' = 2.21 DF = (1169,1170) Prob>F' = 0.000

OWNRENT=T **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	1354	-10298.07459380	103547.06079819	2814.02818977
pre	1353	-27557.82557280	91790.82268600	2495.45856974

Variances	T	Method	DF	Prob>|T|
Unequal	4.5890	Satterthwaite	2667.1	0.0001
		Cochran	.	0.0001
Equal	4.5888		2705.0	0.0000

For H0: Variances are equal, F' = 1.27 DF = (1353,1352) Prob>F' = 0.0000

Arrearage Impacts of 1989 Installations

EPLAN=1 OWNRENT=H **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	428	-26985.14953271	51990.86054930	2513.07309949
pre	427	-28467.59953162	52813.53865905	2555.82627129

Variances	T	DF	Prob>|T|
Unequal	0.4136	852.7	0.6793
Equal	0.4136	853.0	0.6793

For H0: Variances are equal, F' = 1.03 DF = (426,427) Prob>F' = 0.7459

EPLAN=1 OWNRENT=T **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	436	-21470.96100917	157488.08384659	7542.3113158
pre	435	-36752.83908046	112592.29525034	5398.3873602

Variances	T	DF	Prob>|T|
Unequal	1.6476	787.7	0.0998
Equal	1.6470	869.0	0.0999

For H0: Variances are equal, F' = 1.96 DF = (435,434) Prob>F' = 0.0000

EPLAN=2 OWNRENT=H **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Errc
pos	130	-26336.51538462	49590.58066072	4349.3816450
pre	130	-23804.85384615	64303.15282144	5639.7595848

Variances	T	DF	Prob>|T|
Unequal	-0.3555	242.4	0.7225
Equal	-0.3555	258.0	0.7225

For H0: Variances are equal, F' = 1.68   DF = (129,129)   Prob>F' = 0.0034

EPLAN=2 OWNRENT=T **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Errc
pos	35	-25146.11428571	64333.13821442	10874.2850963
pre	35	-26943.11428571	59605.79529699	10075.2183003

Variances	T	DF	Prob>|T|
Unequal	0.1212	67.6	0.9039
Equal	0.1212	68.0	0.9039

For H0: Variances are equal, F' = 1.16   DF = (34,34)   Prob>F' = 0.6588

EPLAN=3 OWNRENT=H **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	445	-26422.93483146	42151.95529361	1998.19431694
pre	445	-27826.65393258	105839.84530626	5017.28984869

Variances	T	DF	Prob>|T|
Unequal	0.2599	581.4	0.7950
Equal	0.2599	888.0	0.7950

For H0: Variances are equal, F' = 6.30 DF = (444,444) Prob>F' = 0.0000

EPLAN=3 OWNRENT=T **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	699	-4125.26895565	62189.39921091	2352.21910694
pre	699	-15277.66237482	61271.34816056	2317.4952271[illegible]

Variances	T	DF	Prob>|T|
Unequal	3.3774	1395.7	0.0008
Equal	3.3774	1396.0	0.0008

For H0: Variances are equal, F' = 1.03 DF = (698,698) Prob>F' = 0.6945

EPLAN=4 OWNRENT=H **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Errc
pos	80	-12942.21250000	48352.86149576	5406.0142605
pre	80	-67341.46250000	101282.05710923	11323.6782298

Variances	T	DF	Prob>|T|
Unequal	4.3353	113.2	0.0001
Equal	4.3353	158.0	0.0000

For H0: Variances are equal, F' = 4.39 DF = (79,79) Prob>F' = 0.0000

EPLAN=4 OWNRENT=T **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Errc
pos	115	-4120.95652174	74928.79802612	6987.1464435
pre	115	-48237.16521739	123637.76186285	11529.2807417

Variances	T	DF	Prob>|T|
Unequal	3.2724	187.8	0.0013
Equal	3.2724	228.0	0.0012

For H0: Variances are equal, F' = 2.72 DF = (114,114) Prob>F' = 0.0000

EPLAN=5 OWNRENT=H **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	88	-33582.28409091	129094.53595816	13761.52377194
pre	88	-44442.14772727	106726.58036724	11377.09169424

Variances	T	DF	Prob>|T|
Unequal	0.6082	168.1	0.5439
Equal	0.6082	174.0	0.5438

For H0: Variances are equal, F' = 1.46 DF = (87,87) Prob>F' = 0.0777

EPLAN=5 OWNRENT=T **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	69	-4995.17391304	45759.07786953	5508.7456257
pre	69	-59838.89855072	129614.09841425	15603.7038095

Variances	T	DF	Prob>|T|
Unequal	3.3143	84.7	0.0014
Equal	3.3143	136.0	0.0012

For H0: Variances are equal, F' = 8.02 DF = (68,68) Prob>F' = 0.0000

FUEL=ELEC **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	325	-8351.17846154	66858.70776043	3708.65383141
pre	324	-23892.79938272	91257.80070773	5069.87781710

Variances	T	Method	DF	Prob>|T|
Unequal	2.4742	Satterthwaite	592.1	0.0136
		Cochran	.	0.0139
Equal	2.4753		647.0	0.0136

For H0: Variances are equal, F' = 1.86 DF = (323,324) Prob>F' = 0.0000

FUEL=GAS **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	940	-16950.83829787	64644.04200662	2108.45616783
pre	940	-43326.61808511	103927.33256467	3389.73582947

Variances	T	Method	DF	Prob>|T|
Unequal	6.6072	Satterthwaite	1571.0	0.0001
		Cochran	939.0	0.0000
Equal	6.6072		1878.0	0.0000

For H0: Variances are equal, F' = 2.58 DF = (939,939) Prob>F' = 0.0000

UEL=OIL **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	1167	-21821.04712939	102644.85941582	3004.70456090
re	1166	-20955.72641509	76475.26719823	2239.60654415

ariances	T	Method	DF	Prob>|T|
nequal	-0.2309	Satterthwaite	2155.6	0.8174
		Cochran	.	0.8174
qual	-0.2309		2331.0	0.8174

or H0: Variances are equal, F' = 1.80 DF = (1166,1165) Prob>F' = 0.0000

UEL=PROP ***

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	6	-15162.83333333	58755.91072026	23987.00010619
re	6	-18857.00000000	21829.47588926	8911.84621351

ariances	T	Method	DF	Prob>|T|
nequal	0.1444	Satterthwaite	6.4	0.8897
		Cochran	5.0	0.8909
qual	0.1444		10.0	0.8881

or H0: Variances are equal, F' = 7.24 DF = (5,5) Prob>F' = 0.0486

Arrearage Impacts of 1989 Installations

EPLAN=1 FUEL=ELEC **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	132	-6730.57575758	58318.53768234	5075.97716925
pre	131	-18949.19847328	57610.25450245	5033.43130641

Variances	T	Method	DF	Prob>|T|
Unequal	1.7093	Satterthwaite	261.0	0.0886
		Cochran	.	0.0898
Equal	1.7092		261.0	0.0886

For H0: Variances are equal, F' = 1.02 DF = (131,130) Prob>F' = 0.8894

EPLAN=1 FUEL=GAS **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	288	-31113.16319444	75518.67727794	4449.98073412
pre	288	-53093.99652778	83974.97684963	4948.27296503

Variances	T	Method	DF	Prob>|T|
Unequal	3.3030	Satterthwaite	567.7	0.0010
		Cochran	287.0	0.0011
Equal	3.3030		574.0	0.0010

For H0: Variances are equal, F' = 1.24 DF = (287,287) Prob>F' = 0.0727

EPLAN=1 FUEL=OIL **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	406	-25639.01231527	155125.96238458	7698.77224646
pre	405	-24024.72098765	99735.46408858	4955.89505488

Variances	T	Method	DF	Prob>|T|
Unequal	-0.1763	Satterthwaite	691.2	0.8601
		Cochran	.	0.8601
Equal	-0.1762		809.0	0.8602

For H0: Variances are equal, F' = 2.42 DF = (405,404) Prob>F' = 0.0000

EPLAN=2 FUEL=GAS **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	12	-38000.33333333	74248.32103315	21433.64406768
pre	12	-58240.75000000	90256.70220505	26054.86565713

Variances	T	Method	DF	Prob>|T|
Unequal	0.5999	Satterthwaite	21.2	0.5549
		Cochran	11.0	0.5607
Equal	0.5999		22.0	0.5547

For H0: Variances are equal, F' = 1.48 DF = (11,11) Prob>F' = 0.5280

EPLAN=2 FUEL=OIL **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	136	-24609.50000000	52014.38424926	4460.19665290
pre	136	-21623.96323529	60966.24803117	5227.81263940

Variances	T	Method	DF	Prob>|T|
Unequal	-0.4345	Satterthwaite	263.5	0.6643
		Cochran	135.0	0.6647
Equal	-0.4345		270.0	0.6643

For H0: Variances are equal, F' = 1.37 DF = (135,135) Prob>F' = 0.0661

EPLAN=3 FUEL=ELEC **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	169	-14383.47337278	66571.43446034	5120.87957387
pre	169	-19886.00591716	88065.02976457	6774.23305881

Variances	T	Method	DF	Prob>|T|
Unequal	0.6480	Satterthwaite	312.7	0.5175
		Cochran	168.0	0.5179
Equal	0.6480		336.0	0.5174

For H0: Variances are equal, F' = 1.75 DF = (168,168) Prob>F' = 0.0003

EPLAN=3 FUEL=GAS ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	451	-9874.55210643	56182.84474581	2645.54683517
pre	451	-26508.41019956	103260.54420634	4862.34912380

Variances	T	Method	DF	Prob>|T|
Unequal	3.0050	Satterthwaite	695.0	0.0028
		Cochran	450.0	0.0028
Equal	3.0050		900.0	0.0027

For H0: Variances are equal, F' = 3.38 DF = (450,450) Prob>F' = 0.0000

PLAN=3 FUEL=OIL **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	498	-16858.64658635	37255.15297851	1669.44332367
re	498	-15572.82128514	55198.59875655	2473.50835529

ariances	T	Method	DF	Prob>|T|
nequal	-0.4309	Satterthwaite	872.0	0.6667
		Cochran	497.0	0.6667
qual	-0.4309		994.0	0.6666

or H0: Variances are equal, F' = 2.20 DF = (497,497) Prob>F' = 0.0000

PLAN=3 FUEL=PROP **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	4	-33422.75000000	60896.82907659	30448.41453829
re	4	-15003.00000000	24596.11247061	12298.05623530

ariances	T	Method	DF	Prob>|T|
nequal	-0.5609	Satterthwaite	4.0	0.6052
		Cochran	3.0	0.6140
qual	-0.5609		6.0	0.5952

or H0: Variances are equal, F' = 6.13 DF = (3,3) Prob>F' = 0.1706

EPLAN=4 FUEL=ELEC **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	12	17699.25000000	103540.63064335	29889.60548700
pre	12	-77037.33333333	112785.93288360	32558.49435558

Variances	T	Method	DF	Prob>|T|
Unequal	2.1435	Satterthwaite	21.8	0.0435
		Cochran	11.0	0.0553
Equal	2.1435		22.0	0.0434

For H0: Variances are equal, F' = 1.19 DF = (11,11) Prob>F' = 0.7817

EPLAN=4 FUEL=GAS ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	123	-10019.00000000	69339.88147500	6252.16655974
pre	123	-68497.40650407	132624.37739041	11958.33739096

Variances	T	Method	DF	Prob>|T|
Unequal	4.3336	Satterthwaite	184.1	0.0001
		Cochran	122.0	0.0000
Equal	4.3336		244.0	0.0000

For H0: Variances are equal, F' = 3.66 DF = (122,122) Prob>F' = 0.0000

EPLAN=4 FUEL=OIL ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	59	-8180.93220339	44621.63905816	5809.24259516
pre	59	-26037.94915254	59725.13921100	7775.55083206

Variances	T	Method	DF	Prob>|T|
Unequal	1.8398	Satterthwaite	107.4	0.0686
		Cochran	58.0	0.0709
Equal	1.8398		116.0	0.0684

For H0: Variances are equal, F' = 1.79 DF = (58,58) Prob>F' = 0.0281

PLAN=5 FUEL=ELEC **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	12	32726.58333333	97895.87399650	28260.10460222
re	12	-81144.91666667	258754.67971331	74696.04199328

ariances	T	Method	DF	Prob>|T|
nequal	1.4258	Satterthwaite	14.1	0.1757
		Cochran	11.0	0.1817
qual	1.4258		22.0	0.1680

or H0: Variances are equal, F' = 6.99   DF = (11,11)   Prob>F' = 0.0032

PLAN=5 FUEL=GAS **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	66	-12597.46969697	44147.54123730	5434.18667397
re	66	-66008.89393939	111964.74860174	13781.90784251

ariances	T	Method	DF	Prob>|T|
nequal	3.6053	Satterthwaite	84.7	0.0005
		Cochran	65.0	0.0006
qual	3.6053		130.0	0.0004

or H0: Variances are equal, F' = 6.43   DF = (65,65)   Prob>F' = 0.0000

EPLAN=5 FUEL=OIL **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	68	-41625.73529412	139913.06000339	16966.95072933
pre	68	-36352.97058824	89433.27978401	10845.37820573

Variances	T	Method	DF	Prob>|T|
Unequal	-0.2618	Satterthwaite	113.9	0.7939
		Cochran	67.0	0.7942
Equal	-0.2618		134.0	0.7938

For H0: Variances are equal, F' = 2.45 DF = (67,67) Prob>F' = 0.0003

EPLAN=5 FUEL=PROP ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	2	21357.00000000	46205.18550985	32672.00000000
pre	2	-26565.00000000	19735.35026292	13955.00000000

Variances	T	Method	DF	Prob>|T|
Unequal	1.3489	Satterthwaite	1.4	0.3721
		Cochran	1.0	0.4061
Equal	1.3489		2.0	0.3098

For H0: Variances are equal, F' = 5.48 DF = (1,1) Prob>F' = 0.5140

Arrearage Impacts of 1989 Installations

Appendix F: Arrearage Impacts

Section 3: 1990 Installations

Table of Contents:

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	2072	-1190.20463320	36800.25665403	808.45522467
pre	2073	-23706.18282682	71342.35788949	1566.92354986

Variances	T	Method	DF	Prob>|T|
Unequal	12.7700	Satterthwaite	3102.1	0.0001
		Cochran	.	0.0001
Equal	12.7682		4143.0	0.0000

For H0: Variances are equal, F' = 3.76 DF = (2072,2071) Prob>F' = 0.0000

PLAN=1 **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	370	-323.12162162	31271.80096193	1625.74351839
re	370	-20156.36756757	49133.49392374	2554.32871869

ariances	T	Method	DF	Prob>|T|
nequal	6.5504	Satterthwaite	625.8	0.0001
		Cochran	369.0	0.0000
qual	6.5504		738.0	0.0000

or H0: Variances are equal, F' = 2.47 DF = (369,369) Prob>F' = 0.0000

PLAN=2 **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	177	-972.12429379	36654.17390573	2755.09642260
re	177	-21557.25423729	55929.32441014	4203.90545418

ariances	T	Method	DF	Prob>|T|
nequal	4.0955	Satterthwaite	303.6	0.0001
		Cochran	176.0	0.0001
qual	4.0955		352.0	0.0001

or H0: Variances are equal, F' = 2.33 DF = (176,176) Prob>F' = 0.0000

PLAN=3 **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	877	-144.27023945	36330.31046198	1226.78741599
re	878	-22032.14578588	88453.07529052	2985.14670151

ariances	T	Method	DF	Prob>|T|
nequal	6.7819	Satterthwaite	1165.0	0.0001
		Cochran	.	0.0001
qual	6.7791		1753.0	0.0000

or H0: Variances are equal, F' = 5.93 DF = (877,876) Prob>F' = 0.0000

EPLAN=4 **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	330	-3786.52727273	46970.03813511	2585.61550167
pre	330	-37387.93333333	69355.53326625	3817.89645186

Variances	T	Method	DF	Prob>|T|
Unequal	7.2872	Satterthwaite	578.3	0.0001
		Cochran	329.0	0.0000
Equal	7.2872		658.0	0.0000

For H0: Variances are equal, F' = 2.18 DF = (329,329) Prob>F' = 0.0000

EPLAN=5 **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	318	-2510.70440252	31835.04426821	1785.22063499
pre	318	-19456.55660377	42957.26249401	2408.92366227

Variances	T	Method	DF	Prob>|T|
Unequal	5.6518	Satterthwaite	584.5	0.0001
		Cochran	317.0	0.0000
Equal	5.6518		634.0	0.0000

For H0: Variances are equal, F' = 1.82 DF = (317,317) Prob>F' = 0.0000

RBRUR=RURAL **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	721	-1181.23439667	42753.57032328	1592.22616311
re	722	-20431.34903047	91670.41257371	3411.61949290

ariances	T	Method	DF	Prob>|T|
nequal	5.1131	Satterthwaite	1020.8	0.0001
		Cochran	.	0.0001
qual	5.1108		1441.0	0.0000

or H0: Variances are equal, F' = 4.60 DF = (721,720) Prob>F' = 0.0000

RBRUR=URBAN **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	1351	-1194.99185788	33206.48389971	903.43147665
re	1351	-25456.31606218	57575.36540718	1566.42291745

ariances	T	Method	DF	Prob>|T|
nequal	13.4168	Satterthwaite	2158.6	0.0001
		Cochran	1350.0	0.0000
qual	13.4168		2700.0	0.0000

or H0: Variances are equal, F' = 3.01 DF = (1350,1350) Prob>F' = 0.0000

EPLAN=1 URBRUR=RURAL ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	152	574.21710526	28949.58619977	2348.12150724
pre	152	-17294.17105263	40297.27225100	3268.54038613

Variances	T	Method	DF	Prob>|T|
Unequal	4.4398	Satterthwaite	274.1	0.0001
		Cochran	151.0	0.0000
Equal	4.4398		302.0	0.0000

For H0: Variances are equal, F' = 1.94 DF = (151,151) Prob>F' = 0.0000

EPLAN=1 URBRUR=URBAN ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	218	-948.78899083	32844.90377000	2224.53758071
pre	218	-22152.02752294	54455.20549702	3688.17189850

Variances	T	Method	DF	Prob>|T|
Unequal	4.9228	Satterthwaite	356.4	0.0001
		Cochran	217.0	0.0000
Equal	4.9228		434.0	0.0000

For H0: Variances are equal, F' = 2.75 DF = (217,217) Prob>F' = 0.0000

PLAN=2 URBRUR=RURAL **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	53	-648.92452830	42966.61017306	5901.91780433
re	53	-16113.11320755	45689.90114585	6275.99058815

ariances	T	Method	DF	Prob>|T|
nequal	1.7950	Satterthwaite	103.6	0.0756
		Cochran	52.0	0.0785
qual	1.7950		104.0	0.0756

or H0: Variances are equal, F' = 1.13 DF = (52,52) Prob>F' = 0.6593

PLAN=2 URBRUR=URBAN **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	124	-1110.26612903	33792.09131150	3034.61938306
re	124	-23884.18548387	59792.86558570	5369.55784128

ariances	T	Method	DF	Prob>|T|
nequal	3.6924	Satterthwaite	194.3	0.0003
		Cochran	123.0	0.0003
qual	3.6924		246.0	0.0003

or H0: Variances are equal, F' = 3.13 DF = (123,123) Prob>F' = 0.0000

EPLAN=3 URBRUR=RURAL **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	254	-1341.06692913	40618.63734692	2548.63998001
pre	255	-19409.65490196	136903.74445805	8573.24503201

Variances	T	Method	DF	Prob>|T|
Unequal	2.0202	Satterthwaite	298.5	0.0443
		Cochran	.	0.0444
Equal	2.0168		507.0	0.0442

For H0: Variances are equal, F' = 11.36 DF = (254,253) Prob>F' = 0.0000

EPLAN=3 URBRUR=URBAN **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	623	343.66934189	34452.41684628	1380.30693457
pre	623	-23105.55698234	58084.37389127	2327.10130120

Variances	T	Method	DF	Prob>|T|
Unequal	8.6667	Satterthwaite	1011.5	0.0001
		Cochran	622.0	0.0000
Equal	8.6667		1244.0	0.0000

For H0: Variances are equal, F' = 2.84 DF = (622,622) Prob>F' = 0.0000

```
:PLAN=4 URBRUR=RURAL ************************************************************

'ariable: ARREARAG

'REPOST       N                Mean             Std Dev          Std Error
----------------------------------------------------------------------------
›os          154       -3201.22077922      54795.08422435      4415.51371837
›re          154      -28421.79220779      64783.77694160      5220.42551558

'ariances          T    Method          DF     Prob>|T|
---------------------------------------------------------
'nequal      3.6886    Satterthwaite   297.8    0.0003
                       Cochran         153.0    0.0003
:qual        3.6886                    306.0    0.0003

'or H0: Variances are equal, F' = 1.40    DF = (153,153)    Prob>F' = 0.0391

PLAN=4 URBRUR=URBAN ************************************************************

'ariable: ARREARAG

REPOST       N                Mean             Std Dev          Std Error
----------------------------------------------------------------------------
os          176       -4298.67045455      39013.04409223      2940.71884508
re          176      -45233.30681818      72396.05088762      5457.05766131

ariances          T    Method          DF     Prob>|T|
---------------------------------------------------------
nequal      6.6035    Satterthwaite   268.7    0.0001
                      Cochran         175.0    0.0000
qual        6.6035                    350.0    0.0000

or H0: Variances are equal, F' = 3.44    DF = (175,175)    Prob>F' = 0.0000
```

EPLAN=5 URBRUR=RURAL **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	108	-656.84259259	44884.84526841	4319.04624971
pre	108	-17984.32407407	51983.96699466	5002.15955632

Variances	T	Method	DF	Prob>|T|
Unequal	2.6219	Satterthwaite	209.5	0.0094
		Cochran	107.0	0.0100
Equal	2.6219		214.0	0.0094

For H0: Variances are equal, F' = 1.34 DF = (107,107) Prob>F' = 0.1304

EPLAN=5 URBRUR=URBAN **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	210	-3464.11904762	22429.09724840	1547.75475383
pre	210	-20213.70476190	37599.27101997	2594.59619873

Variances	T	Method	DF	Prob>|T|
Unequal	5.5441	Satterthwaite	341.0	0.0001
		Cochran	209.0	0.0000
Equal	5.5441		418.0	0.0000

For H0: Variances are equal, F' = 2.81 DF = (209,209) Prob>F' = 0.0000

```
WNRENT=H ************************************************************************

ariable: ARREARAG

REPOST        N                    Mean                Std Dev              Std Error
-------------------------------------------------------------------------------------
os          844         -7992.97156398         36858.62680103          1268.72625683
re          844        -26057.01658768         51916.14244377          1787.02732001

ariances           T   Method                 DF      Prob>|T|
---------------------------------------------------------------
nequal        8.2424   Satterthwaite      1520.7        0.0001
                       Cochran             843.0        0.0000
qual          8.2424                      1686.0        0.0000

or H0: Variances are equal, F' = 1.98     DF = (843,843)     Prob>F' = 0.0000

WNRENT=T ************************************************************************

ariable: ARREARAG

REPOST        N                    Mean                Std Dev              Std Error
-------------------------------------------------------------------------------------
os         1228          3485.31270358         36037.45313564          1028.38304364
re         1229        -22091.77786819         82043.97878902          2340.29590243

ariances           T   Method                 DF      Prob>|T|
---------------------------------------------------------------
nequal       10.0056   Satterthwaite      1685.1        0.0001
                       Cochran                 .        0.0001
qual         10.0028                      2455.0        0.0000

or H0: Variances are equal, F' = 5.18     DF = (1228,1227)     Prob>F' = 0.0000
```

EPLAN=1 OWNRENT=H **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	171	-7585.88888889	30985.36064118	2369.50975025
pre	171	-21738.09356725	48708.47785215	3724.83039739

Variances	T	Method	DF	Prob>|T|
Unequal	3.2058	Satterthwaite	288.2	0.0015
		Cochran	170.0	0.0016
Equal	3.2058		340.0	0.0015

For H0: Variances are equal, F' = 2.47 DF = (170,170) Prob>F' = 0.0000

EPLAN=1 OWNRENT=T **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	199	5917.74874372	30223.75888617	2142.50546191
pre	199	-18797.19597990	49578.00989418	3514.49193957

Variances	T	Method	DF	Prob>|T|
Unequal	6.0045	Satterthwaite	327.3	0.0001
		Cochran	198.0	0.0000
Equal	6.0045		396.0	0.0000

For H0: Variances are equal, F' = 2.69 DF = (198,198) Prob>F' = 0.0000

```
'PLAN=2 OWNRENT=H **************************************************************

...iable: ARREARAG

?REPOST        N                 Mean              Std Dev            Std Error
-------------------------------------------------------------------------------
)os           102       -5287.80392157       34419.51228937      3408.03955238
)re           102      -28897.67647059       50168.97098512      4967.46833546

Variances          T    Method              DF     Prob>|T|
-----------------------------------------------------------
Jnequal       3.9192    Satterthwaite      178.8     0.0001
                        Cochran            101.0     0.0002
Equal         3.9192                       202.0     0.0001

For H0: Variances are equal, F' = 2.12    DF = (101,101)    Prob>F' = 0.0001

PLAN=2 OWNRENT=T ***************************************************************

ariable: ARREARAG

REPOST         N                 Mean              Std Dev            Std Error
-------------------------------------------------------------------------------
os            75        4897.20000000       38959.88798578      4498.70036324
re            75      -11574.28000000       61880.85814246      7145.38602125

ariances           T    Method              DF     Prob>|T|
-----------------------------------------------------------
nequal        1.9508    Satterthwaite      124.7     0.0533
                        Cochran             74.0     0.0549
qual          1.9508                       148.0     0.0530

or H0: Variances are equal, F' = 2.52    DF = (74,74)    Prob>F' = 0.0000
```

EPLAN=3 OWNRENT=H **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	292	-6665.19178082	34792.91905709	2036.10158037
pre	292	-18686.75684932	37707.25145669	2206.64998405

Variances	T	Method	DF	Prob>|T|
Unequal	4.0039	Satterthwaite	578.3	0.0001
		Cochran	291.0	0.0001
Equal	4.0039		582.0	0.0001

For H0: Variances are equal, F' = 1.17 DF = (291,291) Prob>F' = 0.1706

EPLAN=3 OWNRENT=T **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	585	3110.61709402	36671.00752125	1516.15956167
pre	586	-23699.13139932	104945.65331009	4335.26497899

Variances	T	Method	DF	Prob>|T|
Unequal	5.8374	Satterthwaite	726.0	0.0001
		Cochran	.	0.0001
Equal	5.8335		1169.0	0.0000

For H0: Variances are equal, F' = 8.19 DF = (585,584) Prob>F' = 0.0000

PLAN=4 OWNRENT=H **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	121	-15252.62809917	55177.53339919	5016.13939993
re	121	-53613.27272727	82392.50982017	7490.22816547

ariances	T	Method	DF	Prob>|T|
nequal	4.2553	Satterthwaite	209.6	0.0001
		Cochran	120.0	0.0000
qual	4.2553		240.0	0.0000

or H0: Variances are equal, F' = 2.23 DF = (120,120) Prob>F' = 0.0000

PLAN=4 OWNRENT=T **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	209	2851.74162679	40154.12025643	2777.51857652
re	209	-27994.31578947	58738.03472603	4062.99481991

ariances	T	Method	DF	Prob>|T|
nequal	6.2674	Satterthwaite	367.6	0.0001
		Cochran	208.0	0.0000
qual	6.2674		416.0	0.0000

or H0: Variances are equal, F' = 2.14 DF = (208,208) Prob>F' = 0.0000

EPLAN=5 OWNRENT=H **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	158	-7074.18354430	29537.57856681	2349.88357857
pre	158	-21415.22784810	41550.48135355	3305.57881018

Variances	T	Method	DF	Prob>|T|
Unequal	3.5360	Satterthwaite	283.4	0.0005
		Cochran	157.0	0.0005
Equal	3.5360		314.0	0.0005

For H0: Variances are equal, F' = 1.98 DF = (157,157) Prob>F' = 0.0000

EPLAN=5 OWNRENT=T **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	160	1995.73125000	33435.63833738	2643.31930419
pre	160	-17522.36875000	44347.98593437	3506.01612984

Variances	T	Method	DF	Prob>|T|
Unequal	4.4452	Satterthwaite	295.6	0.0001
		Cochran	159.0	0.0000
Equal	4.4452		318.0	0.0000

For H0: Variances are equal, F' = 1.76 DF = (159,159) Prob>F' = 0.0004

Arrearage Impacts of 1990 Installations

UEL=ELEC **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	205	4551.28780488	58752.04095462	4103.42053410
re	205	-21525.66829268	60657.25751202	4236.48663047

ariances	T	Method	DF	Prob>|T|
nequal	4.4214	Satterthwaite	407.6	0.0001
		Cochran	204.0	0.0000
qual	4.4214		408.0	0.0000

or H0: Variances are equal, F' = 1.07 DF = (204,204) Prob>F' = 0.6490

UEL=GAS **

ariable: ARREARAG

REPOST	N	Mean	Std Dev	Std Error
os	511	-256.58708415	35035.02502029	1549.85825889
re	511	-26790.75342466	60826.03853861	2690.78552477

ariances	T	Method	DF	Prob>|T|
nequal	8.5450	Satterthwaite	814.8	0.0001
		Cochran	510.0	0.0000
qual	8.5450		1020.0	0.0000

or H0: Variances are equal, F' = 3.01 DF = (510,510) Prob>F' = 0.0000

FUEL=OIL **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	1042	-2916.39059501	31905.86255465	988.40886180
pre	1043	-21238.97411314	78475.21715604	2429.91102735

Variances	T	Method	DF	Prob>|T|
Unequal	6.9847	Satterthwaite	1377.6	0.0001
		Cochran	.	0.0001
Equal	6.9823		2083.0	0.0000

For H0: Variances are equal, F' = 6.05 DF = (1042,1041) Prob>F' = 0.0000

FUEL=PROP **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	15	-9638.53333333	49705.81670312	12833.98668672
pre	15	-6033.46666667	30919.60985678	7983.40893643

Variances	T	Method	DF	Prob>|T|
Unequal	-0.2385	Satterthwaite	23.4	0.8136
		Cochran	14.0	0.8149
Equal	-0.2385		28.0	0.8132

For H0: Variances are equal, F' = 2.58 DF = (14,14) Prob>F' = 0.0865

EPLAN=1 FUEL=ELEC **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	24	9307.75000000	39451.22957939	8052.94851624
pre	24	-29429.08333333	63051.73345403	12870.38119670

Variances	T	Method	DF	Prob>|T|
Unequal	2.5515	Satterthwaite	38.6	0.014[illegible]
		Cochran	23.0	0.0178
Equal	2.5515		46.0	0.0141

For H0: Variances are equal, F' = 2.55 DF = (23,23) Prob>F' = 0.0288

EPLAN=1 FUEL=GAS **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	111	3288.61261261	29167.94611530	2768.49892750
pre	111	-20853.92792793	60648.85726716	5756.53478084

Variances	T	Method	DF	Prob>|T|
Unequal	3.7796	Satterthwaite	158.3	0.0002
		Cochran	110.0	0.0003
Equal	3.7796		220.0	0.0002

For H0: Variances are equal, F' = 4.32 DF = (110,110) Prob>F' = 0.0000

EPLAN=1 FUEL=OIL **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	210	-3023.90476190	29496.62199312	2035.46029544
pre	210	-18393.21904762	38607.91219067	2664.19905209

Variances	T	Method	DF	Prob>|T|
Unequal	4.5841	Satterthwaite	391.0	0.0001
		Cochran	209.0	0.0000
Equal	4.5841		418.0	0.0000

For H0: Variances are equal, F' = 1.71 DF = (209,209) Prob>F' = 0.0001

EPLAN=1 FUEL=PROP **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	1	59483.00000000	.	.
pre	1	69817.00000000	.	.

Variances	T	Method	DF	Prob>|T|
Unequal	.	Satterthwaite	.	.
		Cochran	.	.
Equal	.		.	.

NOTE: All values are the same for one CLASS level.

:PLAN=2 FUEL=GAS ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	21	-7595.00000000	56331.90847202	12292.63021973
pre	21	-24869.71428571	78856.82251343	17207.96943959

Variances	T	Method	DF	Prob>|T|
Unequal	0.8169	Satterthwaite	36.2	0.4194
		Cochran	20.0	0.4236
Equal	0.8169		40.0	0.4188

For H0: Variances are equal, F' = 1.96   DF = (20,20)   Prob>F' = 0.1410

:PLAN=2 FUEL=OIL ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	152	-1220.17105263	31952.35319750	2591.67807209
pre	152	-20162.84210526	52651.05250096	4270.56428037

Variances	T	Method	DF	Prob>|T|
Unequal	3.7920	Satterthwaite	248.9	0.0002
		Cochran	151.0	0.0002
Equal	3.7920		302.0	0.0002

For H0: Variances are equal, F' = 2.72   DF = (151,151)   Prob>F' = 0.0000

EPLAN=2 FUEL=PROP **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	1	-7420.00000000	.	.
pre	1	-52748.00000000	.	.

Variances	T	Method	DF	Prob>|T|
Unequal	.	Satterthwaite	.	.
		Cochran	.	.
Equal	.		.	.

NOTE: All values are the same for one CLASS level.

EPLAN=3 FUEL=ELEC **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	168	5384.22619048	57642.57743998	4447.22139972
pre	168	-17959.25595238	59511.87883506	4591.44113339

Variances	T	Method	DF	Prob>|T|
Unequal	3.6519	Satterthwaite	333.7	0.0003
		Cochran	167.0	0.0003
Equal	3.6519		334.0	0.0003

For H0: Variances are equal, F' = 1.07 DF = (167,167) Prob>F' = 0.6805

EPLAN=3 FUEL=GAS **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	148	-4599.13513514	24717.63631916	2031.77718973
pre	148	-18085.13513514	42834.00245079	3520.93331257

Variances	T	Method	DF	Prob>|T|
Unequal	3.3175	Satterthwaite	235.1	0.0011
		Cochran	147.0	0.0011
Equal	3.3175		294.0	0.0010

For H0: Variances are equal, F' = 3.00 DF = (147,147) Prob>F' = 0.0000

EPLAN=3 FUEL=OIL **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	368	-1385.55434783	28911.32450219	1507.10697205
pre	369	-23644.75880759	114117.47633852	5940.71852567

Variances	T	Method	DF	Prob>|T|
Unequal	3.6318	Satterthwaite	415.2	0.0003
		Cochran	.	0.0003
Equal	3.6275		735.0	0.0003

For H0: Variances are equal, F' = 15.58 DF = (368,367) Prob>F' = 0.0000

EPLAN=3 FUEL=PROP **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	8	-17464.62500000	42148.34435636	14901.69005508
pre	8	-7207.12500000	14320.08299495	5062.91389644

Variances	T	Method	DF	Prob>|T|
Unequal	-0.6518	Satterthwaite	8.6	0.5317
		Cochran	7.0	0.5354
Equal	-0.6518		14.0	0.5251

For H0: Variances are equal, F' = 8.66 DF = (7,7) Prob>F' = 0.0108

```
EPLAN=4 FUEL=ELEC *****************************************************************

Variable: ARREARAG

PREPOST        N                    Mean              Std Dev              Std Error
-----------------------------------------------------------------------------------------
pos           12         -15535.08333333       99001.23908358         28579.19601750
pre           12         -54672.75000000       67907.09243869         19603.08904968

Variances          T    Method                DF    Prob>|T|
--------------------------------------------------------------
Unequal       1.1293    Satterthwaite        19.5      0.2725
                        Cochran              11.0      0.2828
Equal         1.1293                         22.0      0.2709

For H0: Variances are equal, F' = 2.13    DF = (11,11)    Prob>F' = 0.2268

EPLAN=4 FUEL=GAS ******************************************************************

Variable: ARREARAG

PREPOST        N                    Mean              Std Dev              Std Error
-----------------------------------------------------------------------------------------
pos          158           3238.03164557       41253.95151603          3281.98816296
pre          158         -40880.95569620       74535.53052405          5929.72842383

Variances          T    Method                DF    Prob>|T|
--------------------------------------------------------------
Unequal       6.5097    Satterthwaite       244.9      0.0001
                        Cochran             157.0      0.0000
Equal         6.5097                        314.0      0.0000

For H0: Variances are equal, F' = 3.26    DF = (157,157)    Prob>F' = 0.0000
```

EPLAN=4 FUEL=OIL **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	134	-7382.04477612	44513.63896806	3845.39272122
pre	134	-30229.26119403	67053.32245511	5792.52480993

Variances	T	Method	DF	Prob>|T|
Unequal	3.2861	Satterthwaite	231.2	0.0012
		Cochran	133.0	0.0013
Equal	3.2861		266.0	0.0012

For H0: Variances are equal, F' = 2.27 DF = (133,133) Prob>F' = 0.0000

EPLAN=4 FUEL=PROP **

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	5	-11384.80000000	64934.65425102	29039.66020015
pre	5	-9982.80000000	31322.16273982	14007.69701771

Variances	T	Method	DF	Prob>|T|
Unequal	-0.0435	Satterthwaite	5.8	0.9668
		Cochran	4.0	0.9674
Equal	-0.0435		8.0	0.9664

For H0: Variances are equal, F' = 4.30 DF = (4,4) Prob>F' = 0.1869

```
EPLAN=5 FUEL=ELEC *************************************************************

Variable: ARREARAG

PREPOST          N                 Mean                 Std Dev             Std Error
-----------------------------------------------------------------------------------------
pos              1        -8501.00000000                       .                     .
pre              1       -33236.00000000                       .                     .

Variances             T     Method              DF     Prob>|T|
---------------------------------------------------------------
Unequal               .     Satterthwaite        .            .
                            Cochran              .            .
Equal                 .                          .            .

NOTE: All values are the same for one CLASS level.


EPLAN=5 FUEL=GAS **************************************************************

Variable: ARREARAG

PREPOST          N                 Mean                 Std Dev             Std Error
-----------------------------------------------------------------------------------------
pos             73        -2295.80821918          38077.56000756         4456.64130571
pre             73       -23523.75342466          48396.41795049         5664.37227711

Variances             T     Method              DF     Prob>|T|
---------------------------------------------------------------
Unequal          2.9453     Satterthwaite    136.4       0.0038
                            Cochran           72.0       0.0043
Equal            2.9453                      144.0       0.0038

For H0: Variances are equal, F' = 1.62    DF = (72,72)    Prob>F' = 0.0436
```

EPLAN=5 FUEL=OIL ***

Variable: ARREARAG

PREPOST	N	Mean	Std Dev	Std Error
pos	178	-4041.09550562	29035.36925785	2176.29293605
pre	178	-13760.02808989	39180.34088895	2936.69070819

Variances	T	Method	DF	Prob>|T|
Unequal	2.6589	Satterthwaite	326.4	0.0082
		Cochran	177.0	0.0086
Equal	2.6589		354.0	0.0082

For H0: Variances are equal, F' = 1.82 DF = (177,177) Prob>F' = 0.0000

Appendix G: Process Evaluation Documentation

Appendix G documents the development, design, and process evaluations summarized in chapter 2 of this report. The complete evaluations appear in the two companion documents by Steven Ferrey and Technical Development Corporation.

Table of Contents:

The customer records analysis examines the timeliness of paperflow and installations by several different CAAs, representing the five regions of the WRAP service area.

Appendix G: Process Evaluation Documentation

Section 1: Audit Invoice Forms

LOW INCOME/SPECIAL NEEDS WEATHERIZATION PROGRAM **E1**

Name: Last ______________________ First ______________________ Date ___ /___ ___

Address ______________________ Apt. # ____ City ______________________ ST ____ ZIP ______

Phone (___) ________	Household Income	Source of Income (Check all that apply)	Dwelling Type:		Main Heating Fuel	Secondary Heating Fuel	Water Heating Fuel
Household Information (Specify # of each)	Under 5,000 ____	Wages ____	Own ___ Rent ___ (Check One)	Oil	_	_	_
Total # in household ____	5,000-9,999 ____	Social Security ____	Detached S. F. ____	Electric	_	_	_
# of children ____	10,000-14,999 ____	Welfare (G.A.) ____	Town/Row House ____	Gas	_	_	_
# of elderly ____	15,000-19,999 ____	AFDC ____	Duplex ____	Propane	_	_	_
# of handicapped ____	20,000-24,999 ____	Other ____	4 or more units ____	Other	_	_	_
	25,000-29,999 ____						

	Measure	Priority	Number Installed And Billed	Unit Cost	Total Measure Cost	Lighting Measure Cost	Comments (Use Back for Additional Space)
1	Set Waterheater Thermostat	1		$ 2.00			
2a	Fluorescent (Comp 18 watt)	1		$ 2.00			
2b	Fluorescent (Twin 15 watt)	1		$ 2.00			
2c	Fluorescent (Quad 22 watt)	1		$ 2.00			
2d	Fixture (22 watt)	1		Cost + 10%			
2e	Fixture (32 watt)	1		Cost + 10%			
2f	Fixture (40 watt)	1		Cost + 10%			
2g	Fixture (22/32 watt)	1		Cost + 10%			
3	Outlet Gasket	2		$ 0.80			
4	Low-Flow Showerhead	1		$12.00			
5	Waterheater Wrap	1		$20.00			
6	Low- Flow Aerator	1		$ 3.50			
7	Door Sweep	2		$ 8.00			
8	Caulk Window(s)	2		$ 6.00			
9	Caulk Ext Door(s)	2		$ 6.00			
10	Weatherstrip Window(s)	2		$ 7.15			
11	Weatherstrip Door(s)	2		$15.00			
12	Attic Hatchway Insulation	3		$ 4.00			
13	Interior Caulking	2		$ 0.35/lf			
14	Basement Window Covering	3		$ 4.50			
15	Insulate Heating Duct	1		$ 3.50/lf.			
16	Insulate Vertical Attic Door	3		$13.00			
17a	Install Pipe Insulation, Tube	1		$ 1.00/lf			
17b	Install Pipe Insulation, Spiral	1		$1.20/lf			
18	Sill Plate Caulk	2		$ 0.65/lf			
19	Insulate Pull-Down Stair	3		$35.00			
	SUBTOTAL OF MEASURES COST						
	ADMINISTRATIVE FEE + 10 %						OTHER (A)
	OTHER FEE (As Approved by LIU)						LIGHTING (B)
	PLAN E 1 TOTAL (NON-LIGHTING NTX $150)				A	B	E1 GRAND TOTAL

E2

		Total Cost			Billed to Wrap	
28a	Clean, Tune, & Test		1		Cost	
28b	Heating Sys.Repairs		1		Cost	
29	Burner Replacement		1		Cost	
30	Furnace Replacement		1		Cost	
31	Sidewall Insulation		2		Cost	# of Sq. Ft. ________

Customer Signature on File: Yes _____ No _____

Signature ______________________ Date ___ /___ /___

SUBTOTAL OF SUB-CONTRACTORS COST

+ 10 % ADMINISTRATIVE FEE

TOTAL E2 PLAN (NTX $600)

TOTAL CHARGE (ADD E1 TOTAL & E2 TOTAL)

TO BE COMPLETED BY CAP

CAP JOB NO________________ AUDIT DATE ___/___/___

AUDITOR NO________________ AUDIT NO ____________

INST. DATE ___/___/___ ELEC ACCT NO ____________

GAS CODE________ ACCT NO ________________

FOR CONN SAVE USE ONLY:

W.O. # ________________ INSPECT (Y/N) ________

INSPECT DATE ___/___/___ INSPECTOR NO________

Original Form Should Be Returned To: CONN SAVE—C/O L.I. Weatherization Unit, P.O. Box 9207, Wethersfield, CT 06109 Revised 1/22/90 (RMS)

LOW INCOME/SPECIAL NEEDS WEATHERIZATION PROGRAM E3

	Measure	Pri-ority	Number Required Per Audit	Number To Be Installed	Number Installed And Billed	Unit Cost	Column A Measure Cost	Column B Measure Cost	Comments (Use Back for Additional Space)
1	Set Waterheater Thermostat	1				$ 2.00			
2a	Fluorescent (Comp 18 watt)	1				$ 2.00			
2b	Fluorescent (Twin 15 watt)	1				$ 2.00			
2c	Fluorescent (Quad 22 watt)	1				$ 2.00			
2d	Fixture (22 watt)	1				Cost + 10%			
2e	Fixture (32 watt)	1				Cost + 10%			
2f	Fixture (40 watt)	1				Cost + 10%			
2g	Fixture (22/32 watt)	1				Cost + 10%			
3	Outlet Gasket	2				$ 0.80			
4	Low-Flow Showerhead	1				$12.00			
5	Waterheater Wrap	1				$20.00			
6	Low- Flow Aerator	1				$ 3.50			
7	Door Sweep	2				$ 8.00			
8	Caulk Window(s)	2				$ 6.00			
9	Caulk Ext Door(s)	2				$ 6.00			
10	Weatherstrip Window(s)	2				$ 7.15			
11	Weatherstrip Door(s)	2				$15.00			
12	Attic Hatchway Insulation	3				$ 4.00			
13	Interior Caulking	2				$ 0.35/lf			
14	Basement Window Cover	3				$ 4.50			
15	Insulate Heating Duct	1				$ 3.50			
16	Insulate Vertical Attic Door	3				$13.00			
17a	Install Pipe Insulation, Tube	1				$1.00/lf			
17b	Install Pipe Insulation, Spiral	1				$1.20/lf			
18	Sill Plate Caulk	2				$0.65/lf			
19	Insulate Pull-Down Stair	3				$35.00			
21	Minor Carpentry	3				Cost + 10%			
22	Calib/Replace Thermostat	1				Cost + 10%			
26	Replace Broken Glass	1				Cost + 10%			
32	Minor Plumbing	3				Cost + 10%			
33	Miscellaneous	3				Cost + 10%			

" I agree that the number installed and charged is correct."

Customer Signature

X ______________________

Date ____/____/____

SUBTOTAL OF MEASURES COST		
SERVICE CHARGE	$25.00	
WALK-THROUGH AUDIT	$25.00	
TOTAL E3 PLAN (NTX $500)		
NO SHOW		
LANDLORD PERMISSION FEE		
OTHER FEE		
COLUMN A NTX $250		

A ____

B ____

E3 TOTAL NTX $500 ____

(As Approved by LIU)

(As Approved by LIU)

COLUMN B NTX= $500, LESS SUM OF COLUMN A

FOR CUSTOMER NO-SHOWS

	Authorized	Date	Time
1st			
2nd			
3rd			

TO BE COMPLETED BY CAP

INSTALL DATE ____/____/____

SIGNATURE ______________________

FOR CONN SAVE USE ONLY:

W.O. # ____________ COR NO ______ INSPECT (Y/N) ______

ELECTRIC ACCT NO ______________________

GAS CODE ______ ACCT NO ______________________

Original Form Should Be Returned To: CONN SAVE—C/O L.I. Weatherization Unit, P.O. Box 9207, Wethersfield, CT 06109

CONN SAVE NOTES:

Revised 1/23/90 KMS

LOW INCOME/SPECIAL NEEDS WEATHERIZATION PROGRAM

E4

	Measure	Priority	Number Required Per Audit	Number To Be Installed	Number Installed And Billed	Unit Cost	Total Measure Cost	Comments (Use Back for Additional Space)
1	Set Waterheater Thermostat	1				$ 2.00		
2a	Fluorescent (Comp 18 watt)	1				$ 2.00		
2b	Fluorescent (Twin 15 watt)	1				$ 2.00		
2c	Fluorescent (Quad 22 watt)	1				$ 2.00		
2d	Fixture (22 watt)	1				Cost + 10%		
2e	Fixture (32 watt)	1				Cost + 10%		
2f	Fixture (40 watt)	1				Cost + 10%		
2g	Fixture (22/32 watt)	1				Cost + 10%		
3	Outlet Gasket	3				$ 0.80		
4	Low-Flow Showerhead	1				$12.00		
5	Waterheater Wrap	1				$20.00		
6	Low- Flow Aerator	1				$ 3.50		
7	Door Sweep	3				$ 8.00		
8	Caulk Window(s)	3				$ 6.00		
9	Caulk Ext Door(s)	3				$ 6.00		
10	Weatherstrip Window(s)	3				$ 7.15		
11	Weatherstrip Door(s)	3				$15.00		
12	Attic Hatchway Insulation	4				$ 4.00		
13	Interior Caulking	3				$ 0.35/lf		
14	Basement Window Covering	4				$ 4.50		
15	Insulate Heating Duct	1				$ 3.50/lf		
16	Insulate Vertical Attic Door	4				$13.00		
17a	Install Pipe Insulation, Tube	1				$ 1.00/lf		
17b	Install Pipe Insulation, Spiral	1				$ 1.20/lf		
18	Sill Plate Caulk	3				$ 0.65/lf		
19	Insulate Pull-Down Stair	4				$35.00		
21	Minor Carpentry	3				Cost + 10%		
22	Calibrate/Replace Thermostat	1				Cost + 10%		
23	Vent Damper (Gas)	1				Cost + 10%		
24	Pilotless Ignition System (Gas)	4				Cost + 10%		
25	Increase Ceiling Insulation	3				Cost + 10%		
26	Replace Broken Glass	1				Cost + 10%		
27a	Window Treatment	4				Cost + 10%		
27b	Window Replacement	4				Cost + 10%		
27c	Window Locks	3				$ 2.50		
28a	Clean, Tune, & Test	2				Cost + 10%		
28b	Heating System Repairs	2				Cost + 10%		
29	Burner Replacement	2				Cost + 10%		
30	Furnace Replacement	2				Cost + 10%		
31	Increase Sidewall Insulation	3				Cost + 10%		
32	Minor Plumbing	3				Cost + 10%		
33	Miscellaneous	3				Cost + 10%		

" I agree that the number installed and charged is correct."

Customer Signature **Date**

X ______________________ ___/___/___

SUBTOTAL OF MEASURES COST		
+ 10 %		
LANDLORD PERMISSION FEE		
OTHER FEE		(As Approved by LIU)
PLAN E 4 TOTAL		NTX $1,500 (or $3,000)

FOR CAP USE ONLY

AUDIT DATE ___/___/___ AUDITOR NO____________

AUDIT NO ____________ INSTALL DATE ___/___/___

Original Form Should Be Returned To: CONN SAVE—C/O L.I. Weatherization Unit, P.O. Box 9207, Wethersfield, CT 06109

FOR CONN SAVE USE ONLY:

W.O. # ________ TOWN ____________ DIST.________

REG____________ COR NO______ INSPECT (Y/N) ________

ELECTRIC ACCT NO____________

GAS CODE________ ACCT NO____________

Revised 1/21/90 [illegible]

LOW INCOME/SPECIAL NEEDS WEATHERIZATION PROGRAM

E5

	Measure	Priority	Number Required Per Audit	Number To Be Installed	Number Installed And Billed	Unit Cost	Total Measure Cost	Comments (Use Back for Additional Space)
1	Set Waterheater Thermostat	1				$ 2.00		
2a	Fluorescent (Comp 18 watt)	1				$ 2.00		
2b	Fluorescent (Twin 15 watt)	1				$ 2.00		
2c	Fluorescent (Quad 22 watt)	1				$ 2.00		
2d	Fixture (22 watt)	1				Cost + 10%		
2e	Fixture (32 watt)	1				Cost + 10%		
2f	Fixture (40 watt)	1				Cost + 10%		
2g	Fixture (22/32 watt)	1				Cost + 10%		
3	Outlet Gasket	3				$ 0.80		
4	Low-Flow Showerhead	1				$12.00		
5	Waterheater Wrap	1				$20.00		
6	Low- Flow Aerator	1				$ 3.50		
7	Door Sweep	3				$ 8.00		
8	Caulk Window(s)	3				$ 6.00		
9	Caulk Ext Door(s)	3				$ 6.00		
10	Weatherstrip Window(s)	3				$ 7.15		
11	Weatherstrip Door(s)	3				$15.00		
12	Attic Hatchway Insulation	4				$ 4.00		
13	Interior Caulking	3				$ 0.35/lf		
14	Basement Window Covering	4				$ 4.50		
15	Insulate Heating Duct	1				$ 3.50/lf		
16	Insulate Vertical Attic Door	4				$13.00		
17a	Install Pipe Insulation, Tube	1				$ 1.00/lf		
17b	Install Pipe Insulation, Spiral	1				$ 1.20/lf		
18	Sill Plate Caulk	3				$ 0.65/lf		
19	Insulate Pull-Down Stair	4				$35.00		
21	Minor Carpentry	3				Cost + 10%		
22	Calibrate/Replace Thermostat	1				Cost + 10%		
23	Vent Damper (Gas)	1				Cost + 10%		
24	Pilotless Ignition System (Gas)	4				Cost + 10%		
25	Increase Ceiling Insulation	3				Cost + 10%		
26	Replace Broken Glass	1				Cost + 10%		
27a	Window Treatment	4				Cost + 10%		
27b	Window Replacement	4				Cost + 10%		
27c	Window Locks	3				$ 2.50		
28a	Clean, Tune, & Test	2				Cost + 10%		
28b	Heating System Repairs	2				Cost + 10%		
29	Burner Replacement	2				Cost + 10%		
30	Furnace Replacement	2				Cost + 10%		
31	Increase Sidewall Insulation	3				Cost + 10%		
32	Minor Plumbing	3				Cost + 10%		
33	Miscellaneous	3				Cost + 10%		

"I agree that the number installed and charged is correct."

Customer Signature X ____________ Date __/__/__

SUBTOTAL OF MEASURES COST		
+ 10 %		
LANDLORD PERMISSION FEE		
OTHER FEE		(As Approved by LIU)
PLAN E 5 TOTAL		NTX $1,500 (or $3,000)

FOR CAP USE ONLY

AUDIT DATE ___/___/___ AUDITOR NO________

AUDIT NO ________ INSTALL DATE ___/___/___

Original Form Should Be Returned To: CONN SAVE—C/O L.I. Weatherization Unit, P.O. Box 9207, Wethersfield, CT 06109

FOR CONN SAVE USE ONLY:

W.O. # ______ TOWN ________ DIST.______

REG________ COR NO______ INSPECT (Y/N) ______

ELECTRIC ACCT NO__________

GAS CODE________ ACCT NO__________

Revised 1/22/90 KMS

Appendix G: Process Evaluation Documentation

Section 2: Literature Review Bibliography

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Gregory, J. & Williams, L., *"Fuel Savings Results: Results of a Consumer Education Pilot Study, 11/86-3/88."* Draft report, Cleveland State University, 1989.

Hammarlund, J., *"Marketing Conservation in the Multi-Family Sector: Lessons Learned."* ACEEE, 1990.

Haeri, M., *"Towards an Optimal Mechanism for the Delivery of Low-Income Residential DSM Services."* ACEEE, 1990.

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Quaid, M., *"An Evaluation of the Community Energy Workshop: An Energy Conservation Pilot Program for Low-Income Households."* Argonne National Laboratory Conference, 1990.

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Schwartz, D. & True, B., *"What Households Do When Electricity Prices Go Up -- An Econometric Analysis with Policy Implications."* ACEEE, 1990.

U.S. General Accounting Office (GAO), forthcoming report which surveys the energy conservation and financial needs of the low-income families in federally assisted housing.

Witts, P. & Kushler, M., *"An Evaluation of the Michigan Low-Income Weatherization Energy Education and Incentives Program."* Michigan PSC, 1989.

Appendix G: Process Evaluation Documentation

Section 3: Customer Survey Forms

(AFTER CODING INFORMATION ON FRONT SHEET, BEGIN INTERVIEW HERE.)

Interviewer: Complete

COL. 1 Male 2 Female

Hello, my name is ____ and I'm calling from First Market Research Corporation. We are conducting a survey of Northeast Utilities and Yankee Energy System customers who received energy conservation services through the WRAP program. We are interested in finding out about how the services affected your energy costs and comfort at home, and whether you were satisfied with the service. This information will be used to help the utilities improve their customers programs.

---

1. To begin with, how did you hear about the WRAP program? (READ ANSWERS IF NECESSARY.)

COL.
1 Contacted By The Community Action Agency
2 Contacted By Another Social Service Agency
3 Contacted By A Representative Of The Utility
4
5
6
7
8
9
0
X Don't Know
Y Other____________(Specify)

---

2. Did the auditor visit your home on the date the visit was scheduled?

COL.
1 Yes
2 No
3 Don't Know

---

3. I'm going to read you some statements about the energy inspection. As I read each one, please tell me how strongly you agree or disagree with the statement. First take (READ FIRST ITEM). Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree with this statement? Next take ... (REPEAT FOR EACH ITEM IN LIST.)

	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Don't Know	COL.
The energy audit was thorough	1	2	3	4	5	
The auditor was courteous	1	2	3	4	5	
The auditor answered my questions	1	2	3	4	5	
The auditor explained things I could do to save energy in my home	1	2	3	4	5	

---

4. Did the inspector leave written materials about saving energy with you before leaving?

COL.		Skip To
1	Yes	5
2	No	
3	Don't Know	6

---

5. Did these materials help you understand how to save energy in your home?

COL.
1 Yes
2 No
3 Don't Know

---

6. I'm going to read a list of improvements that are made as part of the program. As I read the list, please tell me which of these improvements were made to your home as part of the program. First take ... (READ ITEMS. CIRCLE ALL THAT APPLY UNDER QUESTION 6 BELOW.)

QUEST. 6 COL.	IMPROVEMENTS	QUESTION 7 Very Good	Good	Poor	Very Poor	Don't Know.	COL.
1	Energy efficient light bulbs	1	2	3	4	5	
2	Water heat wrap	1	2	3	4	5	
3	Weather stripping in doors and windows	1	2	3	4	5	
4	Storm windows	1	2	3	4	5	
5	Roof insulation	1	2	3	4	5	
6	Low flow shower head and/or faucet	1	2	3	4	5	
7	Clock thermostat	1	2	3	4	5	
8	Anything else___________________	1	2	3	4	5	

7. How would you rate the quality of the workmanship of each of the improvements that were made? Would you rate (READ FIRST ITEM CIRCLED UNDER QUESTION 6 ABOVE) as very good, good, poor or very poor? (REPEAT FOR EACH ITEM CIRCLED UNDER QUESTION 6 AND RECORD RESPONSE UNDER QUESTION 7 ABOVE.)

CHECK BOX ON QUESTION 7. IF THERE IS A CIRCLE IN THE BOX, ASK QUESTION 8. OTHERWISE, SKIP TO QUESTION 9.

8. What problems did you have the the improvement? (PROBE: What was the specific problem?)

COL.	COL.
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
0	0
X	X
Y	Y

---

9. Did the installers, that is the company that actually made the improvements to your home, come when they said they would?

COL.
1 Yes
2 No
3 Don't Know

---

10. Did the installers complete their work at the time they said they would?

COL.
1 Yes
2 No
3 Don't Know

---

11. Did the installers explain how to operate and maintain the items they put in?

COL.
1 Yes
2 No
3 Don't Know

---

12. Did the installers answer any other questions you had about how to save energy in your home?

COL.
1 Yes
2 No
3 Don't Know

---

13. Did the installers clean up to your satisfaction after completing their work?	COL. 1 Yes 2 No 3 Don't Know	
14. In general, would you say you are very satisfied, somewhat satisfied, somewhat dissatisfied or very dissatisfied with the work done by the installer?	COL. 1 Very Satisfied 2 Somewhat Satisfied 3 Somewhat Dissatisfied 4 Very Dissatisfied 5 Don't Know	
15. Did a representative of your local utility inspect the installation?	COL. 1 Yes 2 No 3 Don't Know	Skip To 16 19
16. Did the inspector identify any problems with the installation that he or she felt the installer needed to come back and fix?	COL. 1 Yes 2 No 3 Don't know	Skip To 17 19
17. Please describe the problem the inspector identified. (PROBE FOR SPECIFICS.) Anything else?	COL. 1 2 3 4 5 6 7 8 9 0 X Y	COL. 1 2 3 4 5 6 7 8 9 0 X Y
18. Did the installer come back and fix the problem identified by the inspector?	COL. 1 Yes 2 No 3 Don't Know	
19. Now I'd like to ask you a few questions about your experience and practices since the installation. Since the installation was completed, do you feel more comfortable in your home, less comfortable, or about the same?	COL. 1 More Comfortable 2 Less Comfortable 3 About The Same 4 Don't Know	
20. What fuel do you use most often to heat your home?	COL. 1 Electricity 2 Natural Gas 3 Oil 4 Wood 5 Other_____________(Specify) 6 Don't Know	
21. Since the installation do you use more (FUEL USED FROM QUESTION 20.), less or about the same?	COL. 1 Use More 2 Use Less 3 Use About The Same 4 Don't Know	

22. At what temperature do you set your thermostat at night?

COL.
1
2
3
4
5
6
7
8
9
0 Don't Control Own Thermostat
X Don't Know
Y Other_____________(Specify)

---

23. Is this night setting higher, lower, or the same as it was prior to the installation?

COL.
1 Higher
2 Lower
3 About The Same
4 Don't Know

---

24. What kind of equipment do you use most often to heat your home?

COL.
1 Central Heating
2 Space Heaters, Such As Electric Quartz Or Kerosene Heaters
3 Wood Stoves
4 A Gas Cooking Store
5 Other_____________(Specify)

6 Don't Know

---

25. Have you used any other equipment, such as an electric space heater or gas stove, to heat your home?

COL.		Skip To
1	Yes	26
2	No	
3	Don't Know	27

---

26. Since the installation, would you say you use this extra heating equipment more often, less often, or about as often as you did before the installation?

COL.
1 More Often
2 Less Often
3 About As Often
4 Don't Know

---

27. Overall, how would you rate the service that Northeast Utilities provides to its customers? Would you say it is very good, good, poor, or very poor?

COL.
1 Very Good
2 Good
3 Poor
4 Very Poor
5 Don't Know

---

28. Since the installation, would you say that your overall opinion of your local utility company is better, worse, or about the same a it was prior to the installation?

COL.
1 Better
2 Worse
3 About The Same
4 Don't Know

---

29. Now I have a few questions for background purposes only.

How long have you lived in your current home?

COL.
1 Less Than 1 Year
2 1 - 2 Years
3 3 - 5 Years
4 6 Years Or More
5 Don't Know

Appendix G: Process Evaluation Documentation

Section 4: List of Interviewees

List of Interviewees

Northeast Utilities

Sara Ellison, Community Relations Manager
Marilyn Brossmer, Northern Regional Office
Marge Brannigan, Community Outreach Representative

CONN Save

Steve Kelly, Low Income Unit Manager
John Greeno,
Pearl Bouchard
Dean Sandstrom

Community Action Agencies (Energy Directors)

Ron Mattana, WACAP
Joanne Balschak, NOW
Christopher Sardo, TVCCA
Larry Eliot, MCAA
Jim Pistano, CAGM

Department of Human Resources

Marion Wojick

Public Utilities Commission

Mark Quinlan

Appendix G: Process Evaluation Documentation

Section 5: Customer Records Analysis

In an effort to determine the extent to which set procedures were followed in serving participants and the elapsed time between the various steps in providing service, TDC examined customer records for each of five Community Action Agencies. The original focus of this analysis was to track the flow of paper from receipt of a customer application through audit workorder and delivery, to installation of measures and submission of invoice for same. The five CAAs were selected to represent each region of the state and to illustrate the variation among the three top-performing agencies, and between the top performing agencies and two agencies that fell short of their goals for program year 1989:

Agency	Region	Customers Served as % of Agency's 1989 Goal	# Records Sampled
NOW	Western	167%	1,252
TVCCA	Eastern	144%	624
WACAP	Northern	118%	1,104
HRA	Central	63%	388
TEAM	Southern	21%	109
		Total:	3,477

The objective of this analysis was to identify, for each agency and for the group as a whole, the range of times (measured in days) elapsed between the following key points in the customer service sequence:

(1) preliminary work: from the initial customer application to the issuance of a workorder assigning a Community Action Agency (CAA) to schedule and perform an audit or walk-through energy survey (E3, E4 and E5 only);

(2) audit completion: from the issuance of the workorder to the completion of the audit (E4 and E5 only);

(3) installation: from the completion of the audit to the installation of the recommended measures (E1, E2, E4 and E5);

(4) 90-day period: total time elapsed from the issuance of a workorder to the completion of the installation work, supposed not to exceed 90 days (E3, E4, and E5);

(5) billing: time elapsed between completion of the installation work

The method for identifying these ranges was to perform calculations between selected date fields within the "WrapTrack" customer service database. The date fields used in these calculations are described below:

- S_DATEISUE = date the WRAP application is processed by an NU Community Outreach Representative (COR). Applications may be sent by a customer either to an NU Representative, or to CONN Save, whose address appears on the application form. If CONN Save receives an application, it forwards it to one of the regional NU offices, where the application is processed by a COR and sent back in to CONN Save for assignment to a Community Action Agency. The date the application is processed by the COR is the date which gets entered into the S_DATEISUE field.

  This field applies only to the E3, E4, and E5 subprograms. E1 and E2 customers do not become part of the WRAP customer database until the CAA files an invoice for WRAP measures completed. Thus the first time period TDC sought to analyze (time lapsed between initial application and issuance of a workorder to the CAA) could be analyzed only for E3, E4, and E5 customers.

- DATE_TOCAP = date CONN Save dispatches a workorder to a CAA, requesting that the community agency schedule and perform an audit or walk-through energy survey. Again, this field applies only to the E3, E4, and E5 subprograms.

- P_DATE_AUD = date the audit is performed. This field applies to all but the E3 subprogram, for which a walk-through energy survey is substituted for the more extensive RCS energy audit. In the case of the E4 and E5 subprograms, the audit date may be recorded as soon as the CAA sends the audit in to CONN Save for processing.

  In the case of the E1 and E2 subprograms, the customer does not show up in the WrapTrack system until after the installation work has been completed. There is a space on the E1/E2 invoice form for the CAA to record the date of the audit received by customers receiving E1 and E2 services, but the position of this space on the form is ambiguous: its placement on the page suggests that it need only be filled out in the case of an E2 customer. CONN Save has not focused on tracking this date for the E1 and E2 subprograms.

- P_DATE_INS = date the WRAP measures are installed. This field applies to all five of the subprograms.

- DATE_BACK = date the invoice is received by CONN Save after all work has been completed. Because the installation date (P_DATE_INS) is not entered until an invoice has been submitted, it is effectively the time elapsed between the initial workorder date (DATE_TOCAP) and the invoice receipt date (DATE_BACK) that triggers an "overdue" when the 90-day limit is reached. As both the P_DATE_INS and the DATE_BACK fields apply to all five subprograms, it is possible to look at the range of times required for CAAs to submit invoices subsequent to completing installations. For the E3, E4, and E5 subprograms only, it is possible to look at how well the various agencies did at completing work and submitting invoices within 90 days of being sent an initial workorder.

<u>Limitations of Customer Service Record Analysis</u>

The customer service record analysis is limited by two factors:

(1) The structure of the WRAP program limits the most comprehensive analysis to the most comprehensively documented subprograms: E4 and E5. Only the amount of time between audit and installation and between installation and invoice submission can be determined for the E1 and E2 subprograms, and only the preliminary work (application to workorder issuance), between workorder and installation (or invoice submission) and the time between installation and invoice submission can be analyzed for the E3 subprogram.

(2) The quality of the data taken from the CONN Save database is inconsistent. In many cases, date fields that should in theory contain dates are empty.

In some cases, the dates entered in a given customer record do not follow the sequence prescribed by the customer service process. There is one instance where a logical explanation can be posited for the reversed date sequence. About a third of one CAA's E4 and E5 subprogram records show the audit date, P_DATE_AUD, <u>preceding</u> the date a workorder was sent to the CAA requesting an audit be done. The most likely explanation for this is that these represent E3 customers for whom the CAA requested an upgrade to E4 or E5 status; in this case, the agency may have received a verbal "o.k." to upgrade the customer to a higher subprogram, and have proceeded with the audit prior to receiving a written workorder from CONN Save. (It is not possible to verify this possibility from the database.) In other instances where date sequences are reversed, or where activities that cannot logically have happened on the same day are recorded as happening on the same date, it is likely a case of inaccurate data.

Within these limitations, it is possible to look at a subset of the records. The findings of this analysis are presented in six tables, described below.

Findings

Table 1 — Application Processing to Workorder Dispatch: E3, E4 and E5 subprograms.

Sixty-six percent of the 3,477 customer records contain entries in the two date fields (S_DATEISUE and DATE TOCAP) required to calculate the number of days elapsed between the date an NU Community Outreach Representative (COR) processes an application and the date CONN Save dispatches a workorder instructing one of the Community Action Agencies (CAAs) to schedule and perform an energy audit or energy survey. In many cases (anywhere from 3% to 22% of a CAA's customers), the workorder was dispatched on the same day the application was processed.

Table 2 — Workorder Dispatch to Completion of Audit: E4 and E5 subprograms.

Only 23% of all customer records in the sample included both a workorder dispatch date (DATE_TOCAP) and an audit completion date (P_DATE_AUD). The proportion of the individual agencies' customer customer load assigned to either the E4 or E5 subprogram ranged from 15% for one agency to 32% for another.

The median turn-around time for completion of an audit from the date of workorder dispatch was 42 days. However, this accounts only for customer records which showed a positive (>1 day) time lapse between workorder dispatch and audit completion. In a total of 248, or 31% of the 788 E4 and E5 records examined, the sequence was reversed, with the audit completion date preceding the workorder dispatch date. The practice of upgrading E3 customers to the E4 or E5 subprograms might account for this apparent anomaly, although there is no way to be certain to what extent the sequence reversal is a function of inaccurate data. A subprogram upgrade might result in a CAA completing the audit after receiving a verbal "o.k." to upgrade an E3 customer to E4 or E5. There could be some lag between the date of the verbal o.k. and the official dispatch of a new workorder, requesting a full audit rather than the pared-down energy survey.

Table 3 — Completion of Audit to Completion of Installation: E1, E2, E4 and E5 subprograms.

This table should encompass all but the E3 subprogram customers, who do not receive a full energy audit. Only 37% of the 3,477 records sampled include dates in both the P_DATE_AUD and P_DATE_INS fields, suggesting either some missing dates or a large proportion of customers who received audits but did not have any measures installed. It is not possible to determine from the sampled records which of these two possibilities is the case, or whether both factors account for this.

Thirteen percent of the 1,297 records examined show zero days having elapsed between the audit date and the measure installation date. While this would be plausible in the case of the E3 subprogram (for which a walk-through energy survey is completed in lieu of a full-length audit), E3 customers by definition should not be showing up in this table -- for the very reason that the energy survey, unlike the audit, is not tracked by the WrapTrack customer record system.

For those records (85% of the sub-sample of 1,297) which do show a positive number of days elapsed between audit and measure installation, the median value was 75 days. The individual agency medians ranged from 32 days to 93 days. The agency with the lowest median (TVCCA) also happened to have the lowest percentage (17%) of its records included in this subsample. WACAP, with a median audit to installation time of 93 days, had the largest number of records in the sample (510), but HRA another of the smaller agencies, had the largest percentage (50%) of its total customer records included in this subsample.

Table 4 <u>Workorder Dispatch to Installation</u>: **E3, E4 and E5 subprograms.**

The CAAs are expected to completed with their work within 90 days of the initial workorder dispatch date. Approximately 85%, or 1,943 of the 2,297 customer records for which dates were entered in both the application processing and workorder dispatch date fields, have both a workorder dispatch and a measure installation (P_DATE_INS) date. In 18% of these records at least one of the two dates appears to have been entered inaccurately, resulting in a negative or zero-day period elapsed between the two events.

Of the 1,584 records which show both dates in the proper sequence, 63% show 90 days or fewer having elapsed between the two events.

Table 5 <u>Workorder Dispatch to Invoice Submission</u>: **E3, E4 and E5 subprograms.**

As an alternative measure of how well the Community Action Agencies (CAAs) were able to meet the 90-day limit, records featuring dates in both the workorder dispatch and invoice submission (DATE_BACK) date fields were also examined. Only 51% of the 3,477 record sample had both a workorder dispatch and an invoice submission date, as compared with 56% that had both dispatch and installation dates.

Of the 1,757 records in this subsample, 450 (26%) appeared to have inaccurate data: this includes both records showing zero days elapsed and records which show the sequence of events (initial workorder and final invoice submission) reversed. Of the remaining 74% (1,307 records), 64% showed a passage of 90 days or fewer from the workorder dispatch to the date an invoice was received from the CAA.

Table 6 **<u>Installation to Invoice Submission</u>: all subprograms.**

Finally, all records showing both an installation date (P_DATE_INS) and an invoice submission date (DATE_BACK) were examined. This subsample amounted to 2,561 records, or 74% of the total sample. Again, a large number of records (567, or 22%) were in reversed sequence, the invoice submission date preceding the installation date. Of the 78% (1,994 records) that were in proper order, the median time elapsed between installation and invoice submission was 22 days.

<u>Conclusions</u>

The number of invalid entries for the time elapsed from work order dispatch to completion of audit (31%); from work order dispatch to completion of installation (18%); from the dispatch to invoice submission (26%); and from installation to invoice (22%); makes difficult any generalizations from an analysis of the data. Apparently CONN Save did not demonstrate sufficient or consistent quality control in its data entry activities and/or checking the data submissions from the CAAs. This problem is highlighted by the absence of identifiable trends in the time periods for which valid entries have been recorded.

For example, one would expect that the agencies whose performance surpassed expectations would have shorter elapsed time from work order dispatch to completed installation. There are no such correlations--except in the case of TEAM in Tables 2 and 4. Table 4 reveals that the agency with the worst record on completions is also the only agency to significantly surpass the ninety day requirement from work order dispatch date to completed installation (110 day median, based on 34 records). TEAM also required an average of 21 days to process applications and receive a work order dispatch from CONN Save--the other four agencies required an average of 11 days. Yet data from the other four agencies--including an "underperforming" CAA--demonstrate no clear trends. Therefore the recommendation which suggests itself from this analysis addresses the quality of the data entry process for record tracking. CONN Save can be more vigilant in monitoring the data entry process and troubleshoot more frequently to detect and respond to elapsed times which surpass expectations. More agency-specific recommendations could follow from more extensive interviews between CONN Save staff and CAA program managers.

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