AN EVALUATION OF RESIDENTIAL CONSERVATION SERVICE PROGRAMS IN THE DISTRICT OF COLUMBIA

Phylicia A. Fauntleroy, Ph.d

Director, Office of Economics
Public Service Commission of The District of Columbia*
450 Fifth Street, Northwest Washington, D.C. 20001

INTRODUCTION

The purpose of the paper is to illustrate how profiles of participants and nonparticipants can provide information useful for determining the effectiveness of Residential Conservation Service (RCS) programs. To this end, the author seeks to illustrate:

1. How (RCS) program evaluations, whose scope is determined by research design methods, can be useful in (a) identifying issues, success, and problems in the RCS programs, and (b) formulating economic energy demand models based on information gathered through the program evaluation.

2. As an example, the analysis of the demographic, attitudinal, and housing and energy system characteristics of RCS participants and nonparticipants is shown to be useful in understanding some of the factors that contribute to residential energy conservation behavior (e.g. (a) requesting an RCS audit and (b) implementing or not implementing conservation measures are recommended).

3. How the RCS participant and nonparticipant profiles can be useful in identifying problems and issues in the design of RCS programs and in the way the programs are being implemented. In keeping with the guidelines set by the sponsors of this conference, the emphasis in this paper will be on the conceptual framework, methodology, and empirical results rather than on the policy implications.

An evaluation of RCS programs can be conducted on three levels: 1) outreach effectiveness; (2) educational effectiveness; and (3) energy consumption impacts. This paper is devoted to an analysis of both the outreach and educational effectiveness of the RCS programs undertaken by the Potomac Electric Power Company (PEPCO) and the Washington Gas Light Company (WGL) in the District of Columbia. Dr. Subodh Mathur's paper examines the energy consumption impacts of these programs. Therefore, the two papers are complementary because the extent to which the audits affect energy consumption depends, among other things, on the extent to which participants implement any of the conservation measures that are recommended.

Pertinent questions under outreach effectiveness are:

1. Who is being reached by the programs and why?

2. Who is not being reached and why?

These two questions can be examined by exploring the determinants or factors which lead residential households to request an RCS audit.

The effectiveness of RCS audits in convincing participants to implement conservation measures is the subject of the educational effectiveness. My analysis shows that factors and criteria additional to those involved in requesting an audit are important.

Before presenting the results of the analyses, let me provide some background information on the RCS programs and the underlying evaluation conceptual framework.

BACKGROUND

RCS audits have been provided in the District of Columbia by PEPCO since 1978 and by WGL since October, 1984. Together they have performed approximately 14,000 audits over this period. In the last two years, 1985 and 1986, they performed nearly 6,300 audits with PEPCO accounting for 70 percent of the total and WGL performing the remainder. (See Table 1 for more detailed information.) Depending on how the eligible population is defined, in the two years, the two programs reached approximately three percent of the D.C. residential population or approximately four percent of PEPCO's and WGL's residential customers. Most of the penetration is among owners - the program reached approximately five percent of potential owner occupied units and approximately six percent of PEPCO's and WGL's residential customers who own their homes. In contrast, outreach to renters has been negligible, less than one percent.

In Formal Case No. 743, Order No. 7617 (dated July 16, 1982) and as amended in Order No. 7738 (dated February 15, 1983), the District of Columbia Public Service Commission

established a set of goals, evaluation criteria, and reporting requirements for the RCS programs in its jurisdiction. The evaluation goals were as follows:

1. A reduction in the costs of energy to all classes of customers through installation of energy conservation measures by residential customers;

2. Reduction in the growth in demand for energy by the residential class; and

3. Maximum participation practicable by low income residential customers.

These three goals can be regrouped as follows:

1. Outreach effectiveness of the RCS programs (item 3)

2. Energy consumption impacts, present and future (item 2)

3. Utility company impacts (item 1).

The evaluation criteria set by the Commission are as follows (sequence changed):

1. Proportion of potential participation in the program, measured in terms of the number of customers of varying income levels who actually took part in the program

2. Extent of actual energy savings to customers due to implementation of audits' recommendations

3. Proportion of the potential penetration by the program, measured in kilowatt hours and therm sales

4. Cost effectiveness (i.e., whether there are net savings due to avoided costs to the utilities)

These four criteria are directly related to the three goals. Criterion number 1 is related to the outreach effectiveness of the RCS programs. Criterion number 2 pertains to the energy consumption impacts. Criteria numbers 3 and 4 relate to the impacts of the programs on PEPCO and WGL, and, hence, other ratepayers.

Finally, PEPCO and WGL were required to file four types of reports as indicated below:

1. Annual reports profiling RCS participants (or a statistically valid *sample) and a statistically valid sample of nonparticipants

2. Energy avoidance studies which compare the energy consumption (pre and one year post audit) of RCS participants to nonparticipants over the same period

3. Quantification of the evaluation criteria stated above after two years of operations

4. Annual statements on program costs.

Information for the above stated reports was collected by PEPCO and WGL at two different times. First, at the time of the audit, information was obtained from many participants on demographic characteristics, housing and energy characteristics, how they learned of the program and existing conservation measures. Postaudit telephone surveys of RCS participants were conducted between 2 months and about one year after audits were completed. (It appears that RCS participants should be given at least one year for implementation before reliable implementation rates can be ascertained). The focus during the postaudit surveys was on demographic information and implementation rates for each conservation measure that had been recommended. RCS participants were also asked why they did and did not implement conservation measures.

At the same time the postaudit telephone surveys of RCS participants occurred, telephone surveys were conducted of samples of nonparticipants. Nonparticipants were asked questions regarding their demographic profile, the extent to which they were familiar with the RCS programs and, if so, why they had never asked for an audit, and implementation rates for the same set of conservation measures over the same period of time as were asked of the RCS participants. Some RCS nonparticipants were also asked why they did or did not implement conservation measures. However, an inadequate amount of information was collected on both the housing and energy system characteristics of nonparticipants. Also inadequate information was collected on the extent to which nonparticipants had already implemented conservation options.

Table 2 summarizes the data sets that were compiled by both PEPCO and WGL in response to the Commission's Orders. The data bases that are starred (*) are also the ones which were utilized by Commission Staff in the evaluation of the RCS programs. The figures contained in this paper are based on an analysis of PEPCO's 1986 data set and WGL's 1985 and 1986 data sets. The three data sets are of comparable size.

The Office of Economics of the District of Columbia Public Service Commission, through contracts with the Center for Applied Research on Urban Policy (CARUP) at the University of the District of Columbia (UDC) and both utilities, was able to obtain the audit input and

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*The Commission required the sample sizes to be statistically significant at the 95% confidence interval.

postaudit survey data tapes from PEPCO and WGL, have them installed on a mainframe computer at UDC, and then access them either on the premises of UDC, from the Commission Office, or from our computers at home. Dr. Subodh Mathur, econometrician and consultant to Commission Staff, performed all of the SAS programming. He also conducted the difficult task of merging the information obtained at the time of the audits with the information obtained subsequently during postaudit telephone surveys in order to compare preaudit and postaudit behavior. Together we renamed and recoded most of the more than 800 variables in the data sets in order to evaluate PEPCO's and WGL's programs on a consistent basis.

UDC's Computer Center had two features which were especially useful. First, the computer system is set up for modem connection at the 2400 baud rate. (Use of 1200 baud modems proved to be entirely too slow, and thus was not practicable.) Second, the university's computer system is set up for full rather than half duplex usage.

EVALUATION CONCEPTUAL FRAMEWORK

The evaluation of the RCS programs was aimed at addressing four basic questions as follows:

1. Who is being reached by the RCS programs and how do they compare to nonparticipants?

2. Why are the programs reaching some households and not others?

3. To what extent have the programs been effective in getting households to implement conservation measures and why?

4. What has been the impact of the programs on the energy consumption of participants as compared to nonparticipants?

This paper addresses questions 1 through 3 and Dr. Mathur's paper addresses question 4. Questions 1 and 2 are indicators of the outreach effectiveness of the RCS programs and questions 3 and 4 are indicators of the effectiveness of the programs in educating participants and on their energy consumption.

For evaluation purposes, RCS programs should be viewed within the broader context of the determinants of residential energy consumption. Chart 1 provides an illustration. It identifies eight factors, internal to the residential household unit, which influence the household's energy consumption. These factors are:

1. Homeownership status (owners versus renters)

2. Demographic characteristics

3. Housing characteristics

4. Energy system characteristics

5. Attitudes, priority given to conservation and awareness of energy prices

6. Existing conservation measures or lack thereof

7. Evaluation of the RCS audit by the household

8. Implementation rates for additional measures based on the audit.

As the chart also shows, there are additional factors, external to the household unit, which may influence its energy consumption. They are:

1. Building codes and their enforcement

2. Level payment plans

3. Submetering laws.

Moreover, there are external factors which influence a residential customer's decision whether or not to implement additional conservation measures. They include:

1. Availability and cost of conservation options

2. Availability and cost of contractors and persons to install the options

3. Availability of external sources of funds and incentive programs.

METHODOLOGY

The eight factors internal to the residential household unit are measured by the following variables:

1. Homeownership Status

a. percent of households who own

b. percent of households who rent

2.   Demographic Characteristics

    a. median household annual income or income class

    b. median mortgage or rental costs (annual or monthly)

    c. median educational levels

    d. median family size

    e. percent of households with children

    f. percent of households with persons aged 65 and over

    g. median age

    h. percent employed full-time

    i. percent retired

    j. percent unemployed

3. Housing Characteristics

    a. most prevalent type of house - detached, townhouse, or apartment

    b. median size measured by area square foot or number of heated rooms

    c. median age of house or year built

4. Energy Systems Characteristics

    a. heating systems

        i. percentage of households using gas, electricity or oil for heating

        ii. median annual heating costs

        iii. median age or year purchased

    b. water heating systems

        i. percent gas or electric

        ii. median size measured by capacity

    c. cooling systems

        i. percent of households which have air conditioning

        ii. percent of households which have central air conditioning

    iii. median size

    iv. median annual cooling costs

    v. median age or year built

5. Attitudes and Awareness

    a. why requested an audit

    b. percent who know prices of electricity or gas

    c. purpose of audits and priority given to conservation in comparison to time constraints and comfort goals

    d. how learned of audit

6. The information required for item 6 is the lack of existing conservation measures and recommendation rates for each conservation measure recommended during audits. The recommendations are sorted into four cost categories (no expenditure, low cost of less than $100, medium cost of $100-$1000, and high cost of greater than $1000) based on the actual reported costs of implementation by RCS participants.

7. Implementation rates

    a. Number of times each option is implemented divided by the number of times it was recommended (first definition)

    b. Number of times each option was implemented divided by the number of households in the sample (second definition)

8. Evaluation of the RCS programs by the customers

    a. Reasons why they implemented options

    b. Reasons why they did not implement options

    c. Usefulness of audits

The second definition of implementation rates is necessary when comparisons are made between participants and nonparticipants because there is no measure of recommendation rates for nonparticipants in the PEPCO samples. PEPCO did not ask nonparticipants whether or not they had implemented each measure prior to the 12 month period queried in the survey. To understand why conservation measures are or are not implemented, it is necessary to trace the connection between the basis or criteria used to recommend conservation measures and the implementation rates. To this end, the following comparisons were made:

1. The lack of existing conservation measures with the recommendation rates

2. Recommendation rates with the implementation rates for each conservation measure. For this analysis, implementation rates are measured based on the first definition.

The above information was calculated by Commission Staff at three levels: 1. for participants and for nonparticipants separately in the samples; 2. for owners and renters, separately; and 3. for owners for each of four income classes and for renters for each of four income classes.

Unfortunately, PEPCO and WGL did not use the same income class definitions, therefore the analysis by income class had to be undertaken separately for each utility. The four income classes for PEPCO are as follows:

1. under $15,000

2. $15,000 -$24,999

3. $25,000-$49,999

4. $50,000 and over

The four income classes for WGL are:

1. under $15,000

2. $15,000-$24,999

3. $25,000-$39,999

4. $40,000 and over.

SUMMARY PROFILES

1. Participants Versus Nonparticipants

A higher proportion of RCS participants (1) are homeowners, (2) have higher incomes, (3) are more educated, (4) have children and (5) are younger than nonparticipants. Overall,

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almost all of RCS participants are homeowners (94 percent), they have a median income of $35,000-$40,000, they are college graduates, they have no children, they are between 35 and 49 years old, and they are employed full-time.

In comparison, a substantially lower share of nonparticipants are homeowners (62 percent). Their median income is $25,000, they have some college education but have not graduated, they also have no children, and they are older (the majority are 50-64 years of age).

As shown in Table 3, there is not much variation in the demographic profiles of RCS participants and nonparticipants among the three data sets. The WGL data sets for participants have somewhat higher proportions of owners and lower percentages of households with children than does PEPCO's 1986 participant data set. PEPCO's nonparticipant data set has a somewhat lower median income than the WGL data sets; otherwise the demographic profiles of the data sets are nearly identical.

The demographic profiles provide some insight into why relatively high income and well-educated homeowners with no children and between 35-49 years of age requested audits. The relatively high income provides the financial basis for implementing measures the household deems worthwhile. The homeownership status is an added incentive to invest in conservation measures. Finally, the 35-49 age group was the principal home purchase group during the inflationary periods of the 1970s and high housing prices during the 1980s. Thus, this age group, with possibly high mortgages, has an incentive to minimize its energy costs.

Although low income households comprise a small percentage of the RCS participants (approximately twelve percent), nearly half of the low income households includes persons aged 65 and over. Senior citizens, facing a possible diminution of income and longer hours at home, are also likely candidates for home energy audits.

The housing characteristics of RCS participants also enhance the likelihood they would request an audit. The majority of RCS participants live in single family, detached houses which are at least 2,000 square feet and were built before 1940. Detached houses have more exposed walls; large houses may be more vulnerable to heat loss if conservation measures do not exist, and older houses are more likely to lack insulation and other conservation measures which were not installed when they were built.

Finally, the characteristics of the heating and cooling systems of RCS participants provide some insight into why RCS participants requested audits. In the District of Columbia, over 80 percent of the residential households use gas for heating and hot water heating. Most RCS participants and nonparticipants use gas for heating hot water heating. The majority of RCS participants have furnaces which are over ten years old, annual heating costs are approximately $1,001-$1,500 and annual cooling costs are $301-$400. The majority of participants also have air conditioning and almost half of these have central air conditioning. Half of the air conditioned units of participants are 7-8 years old. Although we do not have comparable information on nonparticipants, existing information suggests more RCS participants have air conditioning and particularly central air conditioning than nonparticipants.

Responses by RCS participants (after the audit) and nonparticipants to questions on the purposes of audits provide some insight into the relative priority they give to energy audits. Both participants and nonparticipants were asked the extent to which they agreed that the purposes of audits were to (1) save energy, (2) increase comfort, (3) save money, and (4) increase the resale value of the home. Two conclusions are evident from the information contained in Table 4. The first is the fact that the percentage of participants which agrees that each item is a purpose of the audits is higher for participants than for nonparticipants. This result suggests the audits may have had some positive influence in participants' attitudes about the audit. Second, in both cases, saving money is ranked last by both participants and nonparticipants. In contrast, comfort ranks high; first among nonparticipants and second among participants. If nonparticipants expect audits to address comfort questions first, then this could be a barrier to their participation in the program. Dr. Mathur discusses this issue in more detail in his paper.

Information on the extent to which participants (preaudit) and nonparticipants lacked conservation measures is contained in Table 5. It is difficult to analyze PEPCO's and WGL's data on the lack of existing conservation measures because the information is not always comparable. PEPCO has obtained more information on participants than has WGL but the measurement criteria for the two sources appear to be different because the companies asked different questions. Moreover, PEPCO did not obtain similar information for nonparticipants. WGL collected information on nonparticipants which could be used as a proxy. For example, WGL asked nonparticipants if they had not implemented a measure in the last twelve months, was it because they had already done it or because it was not applicable. The figures for WGL are derived on the basis of these data.

With these caveats in mind, the data suggest a majority of D.C. households lack many conservation measures prior to having an audit. One might conclude from this information that there is a sizeable potential among D.C. residential customers for implementing conservation measures.

Table 6 summarizes recommendation-rates for RCS participants in the PEPCO 1986 and WGL 1985 and 1986 data sets for each conservation measure. In most cases, PEPCO's recommendation rates are higher than WGL's rates. This result is consistent with the relatively higher lack of existing measures for PEPCO's RCS participants than for WGL's, where data exist on both sources. But, more importantly, the question arises, given similar demographic profiles and housing and energy systems characteristic among the three samples, why is there such a disparity in recommendation rates? The answer could lie in different criteria used by the companies in recommending measures. It is an issue, therefore, that warrants further investigation.

Tables 7, 8, and 9 present implementation rates on each conservation measure for which there is an expenditure by RCS participants and nonparticipants. The implementation rates in Table 7 are in accordance with the first definition (the number of times a measure is implemented divided by the number of times it is recommended). The implementation rates in Table 8 are

based on the second definition (the number of times a measure is implemented divided by the number of households in the sample). The list of measures in Table 8 is the same as in Table 7. Table 9 presents the implementation rates for conservation measures that do not require an expenditure of funds for implementation. Data on these nonexpenditure measures are available only from the PEPCO data set.

Six points are noteworthy regarding these tables. First, in most cases, although demographic and housing characteristics are similar among all three data sets, implementation rates for PEPCO's RCS participants are higher than the implementation rates for WGL's participants, whether measured by the first or second definitions. Second, implementation rates for WGL's nonparticipants are higher than for PEPCO's nonparticipants. Third, in PEPCO's sample, participants have, in most cases, higher implementation rates than nonparticipants, but the reverse is true in both of WGL's samples.

Fourth, in all three data sets, implementation rates are highest for such low cost items as caulking and weatherstripping and the medium cost storm windows and doors measures. They are lowest for the high priced items (replacing heating systems and air conditioners) but also many low cost items (such as automatic pilots, clock thermostats and duct or pipe insulation).

Fifth, on the basis of the PEPCO data on "no expenditure" measures, the audits were somewhat successful in getting people to take action. It appears that only professionally audited participants (as opposed to households with do-it-yourself audits) set their thermostats back during the winter more so after the audits than before. However, a higher proportion of both professionally audited and do it yourself audited households set back their thermostats at night than did nonparticipants. The practice of setting up thermostats at night during the summer also increased among households who had professional audits. Finally, a majority of RCS participants kept their water heater thermostats on medium or high before the audit. Although more RCS participants lowered their water heater temperature settings after the audit than before, a smaller proportion did so than nonparticipants. Sixth, overall, implementation rates for participants averaged 18 percent by the first definition and 12 percent by the second definition. The average implementation rate for nonparticipants was 16 percent by the second definition.

These results raise two questions: First, why are implementation rates for the WGL program higher for nonparticipants than for participants when the reverse is true for the PEPCO study, given the fact that both sample groups appear to be similar in their demographic and housing characteristics? Second, why are implementation rates so low among D.C. households when a sizeable potential for energy conservation appears to exist?

There are three possible sources of answers to these questions (1) RCS program design, (2) the way the programs are being implemented, and (3) consumer preferences. Further investigation is warranted in each of those areas.

Some insights may be gained by analyzing the reasons participants gave for implementing and not implementing conservation measures. Table 10 summarizes the results for

participants and nonparticipants in the PEPCO and WGL data sets (the WGL data sets are merged into one).

The three top reasons for implementing measures provided by participants and nonparticipants are similar; to save money, for comfort, and to save energy (or insulate). Saving money is clearly a necessary motivation for implementing conservation measures although it was the lowest ranked purpose of an audit (a possible proxy determinant for requesting an audit).

The three leading reasons for not implementing conservation measures are also similar in the PEPCO and WGL data sets but their relative ranking is different. The most frequently cited answer by WGL participants and nonparticipants was "no need for the measures" and the proportion of respondents giving this answer was slightly higher for participants than for nonparticipants. "Lack of cost-effectiveness" was the second leading answer by WGL participants. These responses suggest WGL has not been effective in convincing participants of the cost-effectiveness of its recommendations or conservation measures in general.

The three top responses in the PEPCO survey of participants only on this issue were: no money (46 percent); no need (10 percent); and no time (10 percent). (No money had ranked third among WGL participants and second among nonparticipants). It is unclear whether these responses mean there is a lack of availability of outside funds or that the respondents are not sufficiently convinced of the cost effectiveness of the measures to commit their own funds, much less borrow funds.

2. Owner Versus Renter Profiles

It has already been shown that the RCS programs of PEPCO and WGL have reached primarily owner-occupied households. The penetration rate for renter households is negligible. Thus, it is useful to analyze the owner versus renter profiles of RCS participants and nonparticipants for insights into why there is an owner bias in the programs. The owner/rental distinction is important because, in the District of Columbia, over 80 percent of the low income live in rental units.

Table 11 summarizes the demographic profiles, housing characteristics and energy systems of RCS participant and nonparticipant owners and renters. The basic patterns are similar for both PEPCO's and WGL's data sets. The following conclusions are evident:

1. The median income of owners is higher than renters for both participants and nonparticipants.

2. Both participant and nonparticipant owners have more education than their renter counterparts.

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3. Both participant and nonparticipant owners tend to be older than participant and nonparticipant renters. However, participant owners are younger than the nonparticipant owners and participant renters are younger than nonparticipant renters.

4. In most cases, a larger proportion of owners than renters have children or retired members of the household.

Although the information on housing characteristics is more limited than on demographic characteristics (see Table 11), there is evidence that the housing characteristics of owners favor their interest in RCS audits. Owners appear to have larger and older houses than renters. Most owners have single family, detached houses while most renters live in apartments or townhouses.

Heating and air conditioning systems of owners make them likely candidates for audits as compared to renters. Although the vast majority of both use gas for heating and hot water heating and have air conditioning, owners' heating and cooling costs are higher than renters' heating and cooling units (possibly related to the differences in housing characteristics). Both owners and renters have relatively old heating and air conditioning units; the heating units are even older than the air conditioning units. Owners are also more likely to have air conditioning, including central air conditioning, than renters.

The key difference in attitudes about audits appears to be between participants and nonparticipants as well as owners and renters. (See Table 12) "Saving energy" was the most prevalent response of both participant owners and renters. In contrast, nonparticipant owners cited resale value most often. Nonparticipant renters cited "comfort."

It appears from Table 13 that owners and renters have similar needs for energy audits and the implementation of conservation measures based on the proportion of households which lack each conservation measure as per the PEPCO 1986 RCS data set. (Comparable information is not available from WGL's data sets.) However, it should also be pointed out that the sample size of renters is relatively small (ranging from 19-31) compared to the sample size of owners (ranging between 171-241). Thus, the figures for the renters are not as reliable.

The PEPCO data on recommendation rates (see Table 14) show participant owners, in most cases, have higher recommendation rates than participant renters, but the reverse is true in the WGL data sets. However, the WGL renter data sets are too small (only six in the 1985 data set and 15 in the 1986 data set) to yield reliable results. Therefore, participant owner versus renter comparisons of recommendation rates are highly dubious.

Although the same sample size problem exists for the implementation rates of participant renters, by both definitions, nonparticipant owners have higher implementation rates than nonparticipant renters. (See Tables 15 and 16.) In this latter case, the sample sizes of

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nonparticipant renters are substantially larger (ranging from between 118 and 200 households) than for participant renters.

The PEPCO audits appear to be successful in getting both participant owners and renters to set thermostats back at night in the winter and set thermostats up in the summer but owners do so more so than renters (see Table 17). The audits were less successful in convincing participant owners and renters to lower their water heater settings although some improvement occurred among owners.

Reasons for implicating conservation measures are similar for participant and nonparticipant owners and renters saving money, comfort, and saving energy (see Table 18). However, the reasons given for not implementing measures differ between the two groups. Owners cite lack of money, need and cost effectiveness. In contrast, renters cite their rental status as the overwhelming barrier.

3. Low Income Versus High Income Profiles

As is evident from the goals and evaluation criteria set by the District of Columbia Public Service Commission, reaching low income households is one of the three major goals of the RCS program. It is thus useful to analyze the profiles of low income versus high income RCS participants and nonparticipants and by owners and renters for insights into this issue. As a reminder, low income is defined as households having incomes under $15,000. High income is defined as $50,000+ in the PEPCO sample; in the WGL samples it is $40,000+.

The demographic profiles of low and high income households in the three data sets is contained in Table 19. The information is provided in four categories (1) participant owners, (2) participant renters, (3) nonparticipant owners and (4) nonparticipant renters. Despite these breakdowns, the patterns are the same in almost all categories. To summarize:

1. Low income households have less education than high income households.

2. Low income households have smaller family sizes (except for nonparticipant renters where the reverse is true).

3. The median age of low income respondents is higher than for high income respondents (data are available for the PEPCO data set only).

4. A lower percentage of low income households have children than do high income households (except nonparticipant renters where the reverse is true).

5. Low income households are more likely to have retired persons than high income households. In fact, nearly half of the low income participant households are comprised of senior citizens

The relatively small family sizes and the absence of children among low income participants reflects the large senior citizen composition of the low income participant group. Moreover, even greater potential to reach low income senior citizens appears to exist given the fact, according to the PEPCO sample, 82 percent of the low income nonparticipant owners had members of the household who were aged 65 or over.

The RCS programs do not appear, however, to be reaching low income renter households, and, particularly, those which are relatively large and with children. Reaching this group may well require resources beyond the scope of the existing RCS programs. Housing characteristics of RCS participants appear to vary with income. This is not the case for nonparticipants. All three data sets show similar patterns as follows (See Table 20):

1. A majority of low income participant owners live in townhouses; a majority of high income participant owners live in single family, detached housing.

2. A majority of low income participant renters live in apartments; a majority of high income participant renters live in townhouses.

3. A majority of both low and high income nonparticipant owners live in single family, detached houses.

4. In the PEPCO data set, both high and low income nonparticipant renters live in single family detached housing; in the two WGL data sets, both low and high income nonparticipant renters live in apartments.

Information on the age of houses or year they were built is available only for participant owners and renters in PEPCO's set. Both low and high income participant owners live in housing built before 1940. In comparison, both low and high income participant renters live in newer housing but built before 1960.

Two measures of the size of the houses were used - the square footage and the number of heated rooms. The square footage data were collected only by PEPCO. They show low income participant owners and renters live in smaller housing than high income owner and renter participants. The information on the number of heated rooms is available for nonparticipants only and was collected by both PEPCO and WGL. In every case, low income households live in smaller housing than high income households.

In summary, high income participant households live in larger, and detached housing and low income participant households live in smaller apartments or townhouses. Both high and low income participant owners live in relatively old housing compared with high and low income participant renters. Thus, high income participant households satisfy more criteria for the likelihood of requesting an audit than do low income participant households.

The only heating system characteristics appear to vary with income are the age of the units and heating costs. (See Table 21.) Data are available for RCS participants only in the PEPCO data set. Low income households have older furnaces than high income households although the majority of both have units which are more than ten years old (also possibly related to their housing characteristics). A majority of both high income participant owners and renters reported annual heating costs of $1,000 - $1,500. In contrast, low income participant owners had median annual heating costs of $501- $1,000 and low income participant renters had median annual heating costs of about $300.

Table 22 presents the cooling systems data for participant and nonparticipant owners and renters by income class. It provides some supporting evidence for why high income households account for the majority of RCS participants. First, high income households are more likely to have air conditioning than low income households. Moreover, a larger proportion of high income households who have air conditioning have central air conditioning. The majority of low income households who have air conditioning (both participants and nonparticipants) have window units. The majority of high income participants have central air conditioning. Second, high income households, in most cases, have older air conditioning units than low income households. Third, high income participants have larger annual cooling costs - the median was $401 a year - compared to $301 for low income participant owners and $201 for low income participant renters.

How households view the purposes of the audits may be a factor in whether or not they request an audit. Table 23 provides the data by income class. It shows low income participants appear to expect audits to address comfort as the principal issue; higher income households appear to put more emphasis on saving energy first. In both cases, saving money was mentioned the least often. Thus, failure of the public to recognize the financial savings which could be associated with conservation may be a barrier to the expansion of the programs.

Nonparticipants' views on the purpose of audits are particularly important for they may provide clues to why this group has not requested an audit. Owners with incomes under $50,000 cite resale value most frequently as the purpose of an audit; owners with incomes of $50,000+ cite saving energy first. In comparison, however, low income renters cite comfort first; middle income renters cite resale value most frequently; and high income renters cite saving energy and comfort.

Table 24 enables one to compare the lack of conservation measures for RCS participant owners and renters by income class in PEPCO's 1986 data set. The table reveals that the lack of conservation measures is prevalent in all income classes. In many cases, the existence of conservation measures is no more prevalent for high income households than for low income households. This conclusion appears also to be applicable for both owners and renters. However, the small renter sample sizes yield unreliably high percentages.

Table 25 presents the recommendation rates for low income and high income participants in both the PEPCO and WGL data sets for each conservation measure. The sample sizes for

renter participants in each income class are too small to provide reliable results. Therefore, the analysis focuses on low income versus high income owners.

The most significant conclusion from this table is that recommendation rates for low income households are not always greater than for high income households and this is evident in all three data sets. It further corroborates the fact that the need for home energy audits is widespread among all income classes. However, it also confirms the need to reach the low income owner households.

Tables 26 and 27 present the implementation rates for low and high income participant and non participant households for each conservation measure and for the PEPCO and WGL data sets. The principal result is that, in some instances, low income households have higher implementation rates than high income households and this occurs even for some of the more expensive items. The same pattern is evident among nonparticipants but to a lesser extent, particularly in the WGL data sets. (See Table 28.)

How then do the reasons for implementing conservation measures vary by income class? Table 29 presents the supporting data. At least three observations can be made. First, comfort is clearly more important to low income than high income households and especially in the PEPCO data set. Second, also in the PEPCO data set, saving money, ironically, is cited more frequently by high income than low income households. Third, in the WGL 1986 data set, both low income and high income renters cited tax credits most frequently as the reason they implemented conservation measures. This response must reflect the lack of the mortgage interest tax deduction for this group.

There are striking similarities in the responses of low income and high income households to why they did not implement conservation measures. Among owners, the leading answers were, in each sample, "too costly," "no time," "don't need," and "not cost effective." Among renters, "renting" was the response of the majority of both high and low income households.

SUMMARY AND CONCLUSION

The empirical analysis of the profiles of RCS participants and nonparticipants provides a foundation for addressing the outreach and educational effectiveness of PEPCO's and WGL's RCS programs. Both programs appear to be reaching similar types of residential households based on demographic, housing and energy characteristics. That is, participants tend to be high income, well educated, young homeowners with relatively old housing and energy systems, high heating and cooling costs, and large and detached housing. Almost half of low income participants are senior citizens. On the basis of all of these characteristics, the program appears to be reaching suitable residential households. However, the issues of how to reach more of these persons and how to reach many of the more difficult to reach households such as the renters and the low income requires further investigation.

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Both PEPCO's and WGL's RCS programs have not been as effective in convincing participants to implement measures that have been recommended, despite an apparent interest in saving energy and lowering utility bills by participants who voluntarily requested audits. This is evidenced by the relatively low implementation rates given the high recommendation rates. Moreover, implementation rates the for WGL's program participants are even lower than for nonparticipants.

As a consequence of the weak implementation performance of RCS participants, the RCS programs of both PEPCO and WGL have clearly not met the objectives set by the Commission. The next step, therefore, is to examine the more detailed aspects of the program designs and the way the programs are being operated in an effort to improve their chances of meeting these goals. Additional research on residential conservation behavior is also warranted.

FUTURE RESEARCH

An analysis of the profiles of participants and nonparticipants is a necessary first step in evaluating RCS programs. As such, the conclusions from the empirical analysis can serve as hypotheses which are then subjected to more stringent econometric and other in depth analyses. Additionally, the profiles are useful in identifying issues of program design and operation which warrant further investigation.

Dr. Mathur and I are considering several follow-up studies. First, an investigation is already underway with respect to the issue of why the WGL implementation results are different from the PEPCO results, given the similarities in the demographic and housing characteristics. Second, we are considering the formulation of logit or probit econometric models which will better explain implementation behavior and how it is related to income and other factors. Third, as Dr. Mathur describes in more detail in his paper, we are planning to examine the role of comfort and time as well as conservation preferences in the utility functions of residential consumers and reformulate demand models taking these factors into consideration. Finally, I am investigating an auxiliary proposal to improve the outreach to low income households (80 percent of whom live in rental housing) which will be beneficial both to the utility companies and the rentpayers. In any event, all of these proposed research projects first required an understanding of the profiles of RCS participants and nonparticipants in the District of Columbia.

CHART 1

EVALUATION CONCEPTUAL FRAMEWORK

THE CUSTOMER

| Programs and Policies |

Homeownership Versus Rental

+

Demographic Characteristics

+

Housing Characteristics

+

Energy Systems

+

Existing Conservation Measures

+

Attitudes & Awareness

+

Implementation Rates

=

Energy Consumption

External Source of Funds

Contractors

Conservation Measures

Marketing

The Utility Company
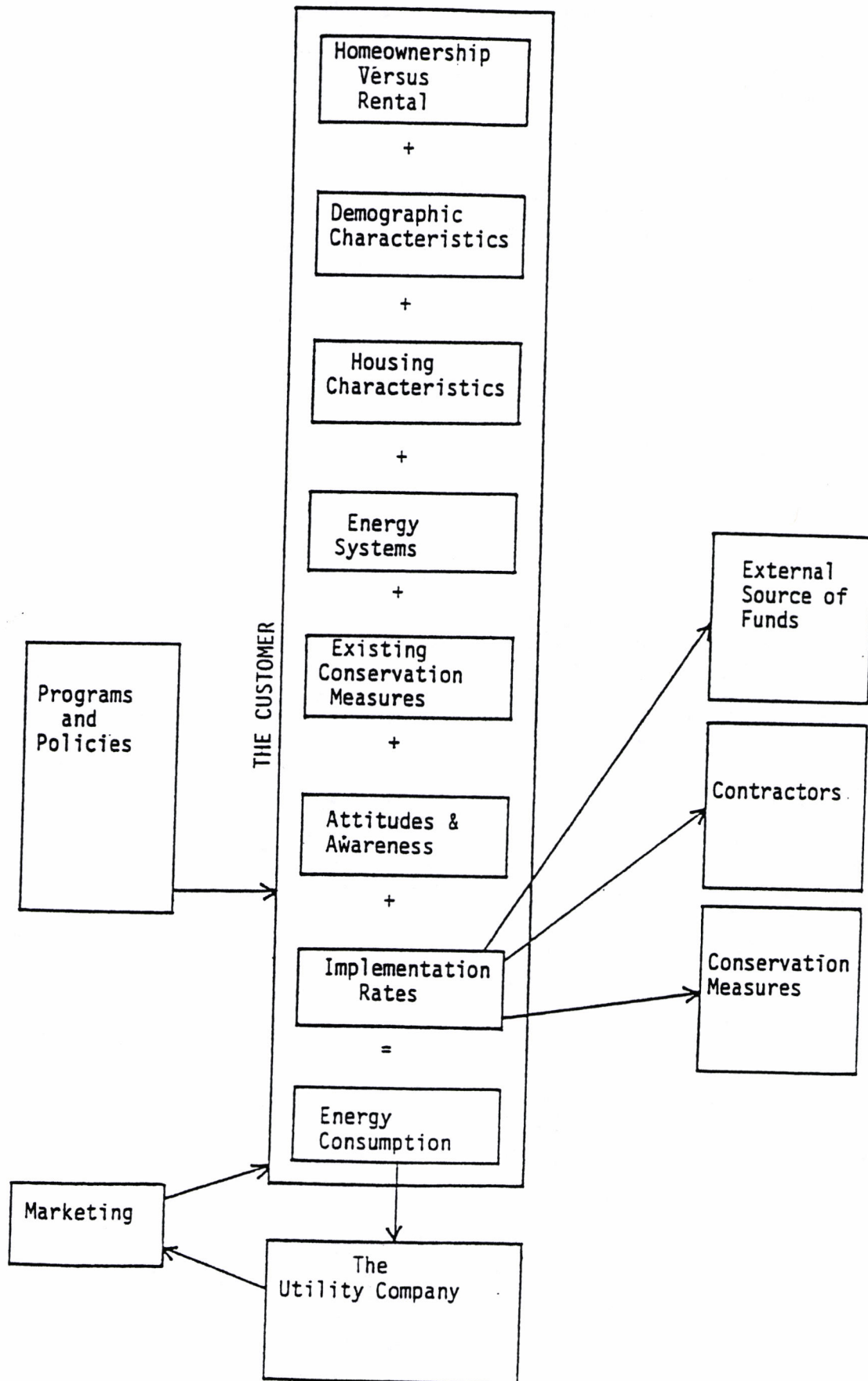
TABLE 1

NUMBER OF RCS AUDITS, 1985-1986

CATEGORY	PEPCO	WGL	TOTAL
No. Requested			
1985	2,073	840	2,877
1986	2,681	1,149	3,830
	4,718	1,980	6,707
No. Completed			
1985	1,813	721	2,534
1986	2,612	1,143	3,755
	4,425	1,864	6,289
% Completed			
1985	89	86	88
1986	97	99	98
	94	94	94

Sources: Pepco's Response to Staff Data Request No. 13.1 and
WGL's Response to Staff Data Request No. 9.1

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TABLE 2

A. DATA BASES FOR RCS PARTICIPANTS, PEPCO, & WGL

Audit Type	RCS Population	Sample Size		Energy Avoidance	
	No	No	%	No	%
I	1985 Reports - Pepco				
	A. 1/84-9/30/84 - Period of Audit		B. Date of Survey Jan/Feb 1985 (4 mos)		
Prof	947	270	29	26	3
DIY	186	92	49	17	9
Total	1133	362	32	43	4
II	1986 Report - Pepco				
	A. 10/1/84-9/30/85 - Period of Audit		B. Date of Survey March-May 1986 (6	
Prof	1258	300	24	110	?
DIY	209	40	19	9	4
Total	1467	*340	23	119	8
III	1985 - WGL				
	A. 10/1/84 - 9/30/85		B. None		
Total	663	*249	33	NA	NA
IV	1986 - WGL				
	A. 9/1/85 - 8/31/86		B. Date of Survey November 1986(3mos	
Total	1175	*299	25	188	23

* Utilized by District of Columbia Public Service Commission Staff in this paper

TABLE 2

9.   DATA BASES FOR NONPARTICIPANTS, PEPCO & WGL

	Eligible	Annual Report		Energy Avoidance Study	
	No.	No.	%	No.	%
I	1985 Reports-Pepco				
	179,000	385	0.2	14	0
II	1986 Reports-Pepco				
	181,710	*380	0.2	104	0
III	1985 Annual Reports-WGL				
	130,000	*387	0.3	0	0
IV	1986 Annual Reports-WGL				
	130,000	*390	0.3	328	0.3

* Utilized by District of Columbia Public Service Commission Staff for this paper

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TABLE 3
DEMOGRAPHIC, HOUSING & ENERGY SYSTEMS CHARACTERISTICS,
RCS PARTICIPANTS AND NONPARTICIPANTS

CATEGORY	PARTICIPANTS			NONPARTICIPANTS		
	PEPCO '86	WGL '85	WGL '86	PEPCO '86	WGL '85	WGL '86
DEMOGRAPHIC PROFILES						
MEDIAN INCOME	$35,000-$49,999	$40,000 +	$40,000 +	$15,000-$24,999	$25,000-$39,999	$25,000-$39,999
MEDIAN AGE	35-49	NA	NA	50-64	NA	NA
MEDIAN FAMILY SIZE	2-3	2	2	2	2	2
MEDIAN EDUCATION	College Grad	College Grad	College Grad	Some College	Some College	Some College
% OF HH WITH PERSONS AGED 65+	25	24	22	31	20	22
% OF HH WITH CHILDREN	44	36	37	31	35	35
% OWNERS	89	94	97	57	67	60
% RENTERS	11	6	3	43	33	40
% LOW INCOME	18	12	11	34	24	21
% HIGH INCOME	37 ($50,000 +)	61 ($40,000 +)	63 ($40,000 +)	17 ($50,000)	33 ($40,000 +)	37 ($40,000 +)
HOUSING CHARACTERISTICS						
PRINCIPAL HOME TYPE	Two story	Single, Detached	One story	One story	Single, Detached	Single, Detached
MEDIAN NUMBER OF ROOMS	7	NA	-	7	NA	NA
MEDIAN YEAR BUILT	Pre 1940	NA	NA	NA	NA	NA
ENERGY SYSTEMS						
MEDIAN HEATING FUEL**	Gas 87%	GAS 94%	GAS 94%	Gas 81%	GAS 72%	NA
MEDIAN WATER HEATING FUEL	GAS	GAS	GAS	GAS	GAS	GAS
MEDIAN TYPE OF HEATING SYSTEM	Hot Water (50%)	NA	NA	NA	NA	NA
MEDIAN AGE	10 years	12 years	10 years	NA	NA	NA
MEDIAN HEATING COST ($)*	1,001-1,500	NA	NA	NA	NA	NA
% WITH AIR CONDITIONING	78	42	59	75	NA	NA
% WITH CENTRAL AIR CONDITIONING	47	42	45	26	NA	NA
MEDIAN AGE*	Pre 1970	7 years	7 years	NA	NA	NA
MEDIAN SIZE	2.5 Tons	NA	NA	NA	NA	NA
MEDIAN COOLING COST ($)*	301-400	NA	NA	NA	NA	NA

*Professional audits only
** Gas refers to central gas.

TABLE 4

PURPOSE OF AUDITS - PARTICIPANTS AND NONPARTICIPANTS - PEPCO 1986
DATA SET ONLY

CATEGORY	PERCENT THAT AGREES

Participants*

Save Energy	77
Comfort	73
Resale Value	62
Save ($)	59

Nonparticipants

Save Energy	62
Comfort	62
Resale Value	60
Save ($)	51

* Post Audit

TABLE 5

LACK OF EXISTING CONSERVATION MEASURES - RCS PARTICIPANTS AND NONPARTICIPANTS

MEASURES	PARTICIPANTS			NONPARTICIPANTS		
	PEPCO '86	WGL '85	WGL '86	PEPCO '86	WGL '85	WGL '86
HIGH COST (> $1,000)						
REPLACE AIR CONDITIONER	46	13	14	NA	58	69
REPLACE HEATING SYSTEM	59	60	53	NA	55	74/68 *
MEDIUM COST ($100 - $1,000)						
STORM WINDOWS	42	NA*	NA	NA	71	81
STORM DOORS	58	NA	NA	NA	67	80
WALL INSULATION	80	NA	NA	NA	66	75
CEILING INSULATION	69	NA	NA	NA	67	77
SHADING	-	NA	NA	NA	72	77
LOW COST (< $100)						
CAULKING	88	NA	NA	NA	76	84
WEATHERSTRIPPING	91	NA	NA	NA	77	84
WATER TANK INSULATION	79	87	76	NA	73	82
DUCT INSULATION	53	NA	NA	NA	62	80
PIPE INSULATION	-	NA	NA	NA	70	78
AUTOMATIC PILOT	70	0.4	4	NA	71	80
CLOCK THERMOSTAT	90	59	72	NA	68	82
FLOOR INSULATION	83	NA	NA	NA	64	79
FLUE	-	2	5	NA	65	81

* The first number refers to furnaces and the second number refers to oil burners.
NA means not available.

TABLE 6

RECOMMENDATION RATES OF RCS PARTICIPANTS FOR EACH
CONSERVATION MEASURE

	PARTICIPANTS		
MEASURES	PEPCO '86 %	WGL '85 %	WGL '86 %
HIGH COST (> $1,000)			
REPLACE AIR CONDITIONER	16	11	14
REPLACE HEATING SYSTEM	61	57	52
MEDIUM COST ($100 - $1,000)			
STORM WINDOWS	68	70	74
STORM DOORS	62	10	40
WALL INSULATION	44	24	31
CEILING INSULATION	67	66	77
SHADING	0	1	19
LOW COST (< $100)			
CAULKING	86	75	83
WEATHERSTRIPPING	88	70	62
WATER TANK INSULATION	73	86	77
DUCT INSULATION	12	5	11
PIPE INSULATION	19	1	16
AUTOMATIC PILOT	70	1	1
CLOCK THERMOSTAT	69	58	72
FLOOR INSULATION	59	36	54
FLUE	42	2	5

TABLE 7

IMPLEMENTATION RATES (FIRST DEFINITION) FOR EACH CONSERVATION MEASURE FOR RCS PARTICIPANTS

	PARTICIPANTS		
MEASURES	PEPCO '86 %	WGL '85 %	WGL '86 %
HIGH COST (> $1,000)			
REPLACE AIR CONDITIONER	6	4	7
REPLACE HEATING SYSTEM	11	9	6
MEDIUM COST ($100 - $1,000)			
STORM WINDOWS	24	12	28
STORM DOORS	24	37	19
WALL INSULATION	13	12	8
CEILING INSULATION	19	24	20
SHADING	-	0	9
LOW COST (< $100)			
CAULKING	65	57	49
WEATHERSTRIPPING	57	36	40
WATER TANK INSULATION	28	21	16
DUCT INSULATION	17	17	6
PIPE INSULATION	27	0	23
AUTOMATIC PILOT	11	0	0
CLOCK THERMOSTAT	15	13	14
FLOOR INSULATION	11	12	8
FLUE	14	0	7
AVERAGE	22	16	16

TABLE 8

IMPLEMENTATION RATES (SECOND DEFINITION) FOR EACH CONSERVATION MEASURE FOR RCS

MEASURES	PEPCO '86		WGL '85		WGL '86	
	PARTICIPANTS %	NONPARTICIPANTS %	PARTICIPANTS %	NONPARTICIPANTS %	PARTICIPANTS %	NONPARTICIPANTS %
HIGH COST (> $1,000)						
REPLACE AIR CONDITIONER	1	6	0.4	11	1	14
REPLACE HEATING SYSTEM	9	2	5	14	3	18/12*
MEDIUM COST ($100 - $1,000)						
STORM WINDOWS	16	15	26	37	21	40
STORM DOORS	15	9	1	28	8	37
WALL INSULATION	6	3	3	14	2	14
CEILING INSULATION	12	5	16	20	15	21
SHADING	-	-	0	24	2	24
LOW COST (< $100)						
CAULKING	56	39	42	41	40	45
WEATHERSTRIPPING	50	39	25	44	25	42
WATER TANK INSULATION	20	6	18	17	12	18
DUCT INSULATION	2	3	1	12	1	13
PIPE INSULATION	5	3	0	17	4	14
AUTOMATIC PILOT	8	-	0	16	0	11
CLOCK THERMOSTAT	10	5	8	19	10	21
FLOOR INSULATION	6	2	4	13	4	12
FLUE	6	-	0	11	0	15

*The first number refers to furnaces and the second number refers to oil burners.

TABLE 9

IMPLEMENTATION RATES OF "NO EXPENDITURE" MEASURES FOR PARTICIPANTS AND NONPARTICIPANTS IN PEPCO'S 1986 DATA SET ONLY

CATEGORY	PERCENTS
1. WINTER SETBACK	
Participants	
Preaudit	
Professional	28
Do it Yourself	75
Postaudit	
Professional	58
Do it Yourself	53
Nonparticipants	37
2. SUMMER SETUP	
Participants	
Preaudit	
Professional	2
Do it Yourself	24
Postaudit	
Professional	25
Do it Yourself	22
Nonparticipants	12
3. PILOT OFF - PREAUDIT*	
Participants	21
Nonparticipants	NA
4. % WITH WATER HEATER SETTING ON LOW*	
1985	27
1986	19
5. LOWERED WATER HEATER SETTINGS	
Participants	
Preaudit	31
Postaudit	39
Nonparticipants	46

* Professional Audits Only

TABLE 10

REASONS WHY RCS PARTICIPANTS AND NONPARTICIPANTS DID AND DID NOT IMPLEMENT CONSERVATION MEASURES

LEADING REASONS	PEPCO		WGL			
	PARTICIPANTS		PARTICIPANTS		NONPARTICIPANTS	
	Why Implemented					
#1	Save $	35%	Save $	45%	Save $	38%
2	Comfort	22%	Comfort	24%	Comfort	19%
3	Save energy	21%	Insulate	17%	Insulate	18%
	Why Not Implemented					
#1	No	46%	Not Needed	27%	Not Needed	25%
2	Not Needed	10%	Not Cost Effective	24%	No Money	23%
3	No Time	10%	No Money	20%	Renting	20%

TABLE 11

DEMOGRAPHIC, HOUSING & ENERGY SYSTEMS CHARACTERISTICS
OF RCS PARTICIPANT AND NONPARTICIPANT OWNERS AND RENTERS

| | PARTICIPANTS | | | | NONPARTICIPANTS | | | |
| | OWNERS | | RENTERS | | OWNERS | | RENTERS | |
CATEGORY	PEPCO	WGL	PEPCO	WGL	PEPCO	WGL	PEPCO	WGL
DEMOGRAPHIC CHARACTERISTICS								
MEDIAN INCOME ($,000)	35.0-49.9	40.0+	15.0-24.9	15.0-24.9	25.0-34.9	25.0-34.9	10.0-14.9	15.0-24.9
MEDIAN FAMILY SIZE	2-3	2-3	2	3	2	3	2	2
MEDIAN EDUCATION	COLL GRAD	COLL GRAD	HS GRAD	SOME COLL	SOME COLL	SOME COLL	HS GRAD	SOME COLL
% OF HH WITH PERSONS AGED 65+	24	23	23	29	36	26	24	7
% OF HH WITH CHILDREN	41	37	41	33	31	35	32	31
MEDIAN AGE	35-49	NA	18-24	NA	50-64	NA	35-49	NA
HOUSING CHARACTERISTICS								
PRINCIPAL HOME TYPE	SINGLE, DETACHED	SINGLE, DETACHED	APT	APT/TH	SINGLE, DETACHED	SINGLE, DETACHED	SINGLE, DETACHED	APT
MEDIAN SIZE ('000 Sq. ft.)	2	NA	1.2	NA	NA	NA	NA	NA
MEDIAN YEAR BUILT	PRE 1940	NA	1940-60	NA	NA	NA	NA	NA
ENERGY SYSTEMS CHARACTERISTICS								
MEDIAN HEATING FUEL	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS
MEDIAN WATER HEATING FUEL	GAS	GAS	GAS	GAS	GAS	GAS	GAS	GAS
MEDIAN TYPE OF HEATING SYSTEM	HOT WATER	NA	FORCED AIR	NA	NA	NA	NA	NA
MEDIAN AGE	110 YEARS	NA	110 YEARS	NA	NA	NA	NA	NA
MEDIAN YRLY HEATING COST ($)	1,001-1,500	NA	501-1,000	NA	NA	NA	NA	NA
% WITH AIR CONDITIONING	79	NA	74	NA	79	NA	60	NA
MEDIAN AGE OF A/C	6-10 YEARS	NA	10 YEARS	NA	NA	NA	NA	NA
MEDIAN SIZE OF A/C	2.5 TONS	NA	2.0 TONS	NA	NA	NA	NA	NA
MEDIAN YRLY COOLING COST ($)	301-400	NA	201-300	NA	NA	NA	NA	NA

NA means not available

TABLE 12

PURPOSES OF AUDITS - RCS PARTICIPANT AND NONPARTICIPANT OWNERS AND RENTERS (Pepco's 1986 Data Set Only)

PERCENT THAT AGREES

CATEGORY	PARTICIPANTS		NONPARTICIPANTS	
	OWNERS %	RENTERS %	OWNERS %	RENTERS %
Save Energy	77	86	57	64
Comfort	72	36	58	69
Resale Value	66	43	62	63
Save ($)	60	60	47	55

TABLE 13

LACK OF EXISTING CONSERVATION MEASURES - RCS PARTICIPANT OWNERS AND RENTERS

	PEPCO 1986	
MEASURES	OWNERS %	RENTERS %
HIGH COST () $1,000)		
REPLACE AIR CONDITIONER	44	25
REPLACE HEATING SYSTEM	61	46
MEDIUM COST ($100 - $1,000)		
STORM WINDOWS	42	45
STORM DOORS	58	57
WALL INSULATION	80	72
CEILING INSULATION	76	100
SHADING	--	--
LOW COST (($100)		
CAULKING	88	85
WEATHERSTRIPPING	91	89
WATER TANK INSULATION	78	55
DUCT & PIPE INSULATION	47	57
FLUE	NA	NA
AUTOMATIC PILOT	85	100
CLOCK THERMOSTAT	89	100
FLOOR INSULATION	89	100

TABLE 14

RECOMMENDATION RATES FOR EACH CONSERVATION MEASURE BY RCS PARTICIPANT
OWNERS AND RENTERS

MEASURES	PEPCO 1986		WGL 1985		WGL 1986	
	OWNERS %	RENTERS %	OWNERS %	RENTERS %	OWNERS %	RENTERS %
HIGH COST (> $1,000)						
REPLACE AIR CONDITIONER	12	10	11	--	18	--
REPLACE HEATING SYSTEM	62	48	55	82	52	60
MEDIUM COST ($100 - $1,000)						
STORM WINDOWS	67	65	67	100	76	87
STORM DOORS	62	55	9	33	39	33
WALL INSULATION	43	32	17	67	31	20
CEILING INSULATION	70	39	70	33	77	60
SHADING	--	--	0.5	--	20	7
LOW COST (< $100)						
CAULKING	25	87	74	100	82	67
WEATHERSTRIPPING	25	84	68	100	83	60
WATER TANK INSULATION	73	78	64	100	77	73
DUCT INSULATION	14	10	4	--	11	
PIPE INSULATION	24	0	--	--	15	40
FLUE	39	35	0.5	--	15	--
AUTOMATIC PILOT	65	66	1	--	4	--
CLOCK THERMOSTAT	75	--	59	50	74	90
FLOOR INSULATION	62	39	35	--	--	50

TABLE 15

INPLEMENTATION RATES (FIRST DEFINITION) FOR EACH CONSERVATION MEASURE BY RCS PARTICIPANT

OWNERS AND RENTERS

	PECO 1984		MAY 1985		MAY 1986	
MEASURES	OWNERS %	RENTERS %	OWNERS %	RENTERS %	OWNERS %	RENTERS %
HIGH COST (> $1,000)						
REPLACE AIR CONDITIONER	3	8	5	:	9	:
REPLACE HEATING SYSTEM	9	7	10	28	7	0
MEDIUM COST ($100 - $1,000)						
STORM WINDOWS	23	20	35	17	22	23
STORM DOORS	24	6	12	0	17	0
WALL INSULATION	13	0	16	0	5	0
CEILING INSULATION	17	0	24	0	19	11
SHADING			0		11	0
LOW COST (< $100)						
CAULKING	47	52	54	33	51	23
WEATHERSTRIPPING	43	50	33	17	34	17
WATER TANK INSULATION	28	19	21	17	18	9
DUCT INSULATION	15	33	25	:	7	0
PIPE INSULATION	22	:	:	:	28	0
FANS	16	0	0	:	18	:
AUTOMATIC PILOT	10	10	0	:	25	:
CLOCK THERMOSTAT	12	0	12	0	15	0
FLOOR INSULATION	11	0	13	:	7	11

TABLE 16

IMPLEMENTATION RATES (SECOND DEFINITION) FOR EACH CONSERVATION MEASURE FOR RCS PARTICIPANT AND NONPARTICIPANT OWNERS AND RENTERS

	PEPCO '86				WGL '85				WGL '86			
	PARTICIPANTS		NONPARTICIPANTS		PARTICIPANTS		NONPARTICIPANTS		PARTICIPANTS		NONPARTICIPANTS	
MEASURES	OWNERS	RENTERS	OWNERS	RENTERS	OWNERS	RENTERS	OWNERS	RENTERS	OWNERS	RENTERS	OWNERS	RENTERS
HIGH COST () $1,000)												
REPLACE AIR CONDITIONER												
REPLACE HEATING SYSTEM											21/100	12/100
MEDIUM COST ($100 $1,000)												
STORM WINDOWS												
STORM DOORS												
WALL INSULATION												
CEILING INSULATION												
SHADING												
LOW COST (($100)												
CAULKING												
WEATHERSTRIPPING												
WATER TANK INSULATION												
DUCT & PIPE INSULATION												
FLUE												
AUTOMATIC PILOT												
CLOCK THERMOSTAT												
FLOOR INSULATION												

* The first number refers to furnaces and the second number refers to oil burners

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TABLE 17

IMPLEMENTATION OF "NO EXPENDITURE" MEASURES BY PARTICIPANT AND NONPARTICIPANT OWNERS AND RENTERS
PEPCO'S 1986 DATA SET ONLY

CATEGORY	OWNERS	RENTERS
1. WINTER SETBACK Participants		
Preaudit		
Professional	29	25
Do it Yourself	76	67
Postaudit		
Professional	61	38
Do it Yourself	52	67
Nonparticipants	45	27
2. SUMMER SETUP Participants		
Preaudit		
Professional	2	6
Do it Yourself	25	0
Postaudit		
Professional	25	21
Do it Yourself	25	0
Nonparticipants	14	9
3. PILOT OFF		
Professional	21	18
4. WATER HEATER SETTINGS GREATER THAN LOW*		
1985	73	--
1986	81	35
5. LOWERED WATER HEATER SETTINGS Participants		
Preaudit	31	33
Postaudit	40	17
Nonparticipants	52	36

* Professional Audits Only

TABLE 16

REASONS WHY RCS PARTICIPANT AND NONPARTICIPANT OWNERS AND RENTERS
DID AND DID NOT IMPLEMENT CONSERVATION MEASURES

LEADING REASONS	FEPCO		NGL			
	PARTICIPANTS		PARTICIPANTS		NONPARTICIPANTS	
	OWNERS	RENTERS	OWNERS	RENTERS	OWNERS	RENTERS
Why Implemented						
1	Save $ 35%	Comfort 33%	Lower Bills 45%	Lower Bills 41%	Lower Bills 40%	Lower Bills 34%
2	Comfort 21%	Save $ 22%	Comfort	Save Energy 29%	Comfort 19%	Comfort 22%
3	Save Energy 8%	Save Energy 15%	Insulate	Insulate 29%	Insulate 19%	Insulate 18%
Why Not Implemented						
1	No $ 50%	Renting 49%	Not Need 49%	Renting 63%	Renting 32%	Renting 55%
2	Not Need 11%	No $ 20%	Not C/E 20%	No Money 25%+	Not Need 17%	No $ 11%
3	Not C/E 10%+	Not Need 6%	No $ 6%	Not C/E 52%+	Not C/E 17%+	Not Need 8%

*C/E - Cost Effective

TABLE 19

DEMOGRAPHIC PROFILES OF RCS PARTICIPANT AND NONPARTICIPANT OWNERS AND RENTERS
BY INCOME CLASS

CATEGORY	PEPCO 1986		WGL 1985		WGL 1986	
	Low Income	High Income	Low Income	High Income	Low Income	High Income
PARTICIPANT OWNERS						
MEDIAN EDUCATION	Some HS	Post Grad	HS Grad	Post Grad	Some HS	Post Grad
MEDIAN FAMILY SIZE	2	3	2	3	2	2
MEDIAN AGE	50-64	35-49	NA	NA	NA	NA
% OF HH WITH PERSONS AGED 65+	49	10	37	15	78	12
% OF HH WITH CHILDREN	40	48	26	45	17	91
PARTICIPANT RENTERS						
MEDIAN EDUCATION	Some HS	Post Grad	HS Grad	Post Grad	Some HS	Col Grad
MEDIAN FAMILY SIZE	1	4	1	3	3	5
MEDIAN AGE	50-64	35-49	NA	NA	NA	NA
% OF HH WITH PERSONS AGED 65+	40	0	50	0	67	0
% OF HH WITH CHILDREN	NA	NA	0	100	50	50
NONPARTICIPANT OWNERS						
MEDIAN EDUCATION	HS Grad	Post Grad	HS Grad	Col Grad	HS Grad	Post Grad
MEDIAN FAMILY SIZE	2	3	2	3	2	3
MEDIAN AGE	65+	35-49	NA	NA	NA	NA
% OF HH WITH PERSONS AGED 65+	82	11	61	9	55	12
% OF HH WITH CHILDREN	8	46	29	40	21	44
NONPARTICIPANT RENTERS						
MEDIAN EDUCATION	HS Grad	Post Grad	HS Grad	Post Grad	HS Grad	Col Grad
MEDIAN FAMILY SIZE	1	2	2	2	3	2
MEDIAN AGE	35-49	25-34	NA	NA	NA	NA
% OF HH WITH PERSONS AGED 65+	29	0	26	5	9	5
% OF HH WITH CHILDREN	NA	NA	33	21	59	22

NA Means not available
Low Income is defined as <$15,000 a year
High Income is defined as $50,000+ in Pepco sample; $40,000+ in WGL sample

TABLE 20

HOUSING CHARACTERISTICS OF RCS PARTICIPANT AND NONPARTICIPANT OWNERS AND RENTERS
BY INCOME CLASS

CATEGORY	PEPCO 1986		WGL 1985		WGL 1986	
	Low Income	High Income	Low Income	High Income	Low Income	High Income
PARTICIPANT OWNERS						
PRINCIPAL HOME TYPE	TH	SD	SD	SD	TH	SD
MEDIAN YEAR BUILT	PRE 1940	PRE 1940	NA	NA	NA	NA
MEDIAN SIZE ('000 SF)	1.4-1.6	2.0-2.2	NA	NA	NA	NA
PARTICIPANT RENTERS						
PRINCIPAL HOME TYPE	Apt	TH	Apt	TH	Apt	TH
MEDIAN YEAR BUILT	Pre 1960	Pre 1960	NA	NA	NA	NA
MEDIAN SIZE ('000 SF)	(1	2.0-2.2	NA	NA	NA	NA
NONPARTICIPANT OWNERS						
PRINCIPAL HOME TYPE	SD	SD	SD	SD	SD	SD
MEDIAN YEAR BUILT	NA	NA	NA	NA	NA	NA
MEDIAN SIZE (No. of Rooms)	6	7	7	9	8	10
NONPARTICIPANT RENTERS						
PRINCIPAL HOME TYPE	SD	SD	Apt	Apt	Apt	Apt
MEDIAN YEAR BUILT	NA	NA	NA	NA	NA	NA
MEDIAN SIZE (No. of Rooms)	3	7	5	6	6	7

TH - TOWN HOUSE
SD - SINGLE FAMILY, DETACHED
NA - NOT AVAILABLE
Low Income is defined as (\$15,000 a year
High Income is defined as \$50,000+ in Pepco sample; \$40,000+ in WGL sample

TABLE 21

HEATING SYSTEM CHARACTERISTICS OF RCS PARTICIPANT
AND NONPARTICIPANT OWNERS AND RENTERS BY INCOME CLASS

CATEGORY	PEPCO 1986		WGL 1985		WGL 1986	
	Low Income	High Income	Low Income	High Income	Low Income	High Income
PARTICIPANT OWNERS						
MEDIAN HEATING FUEL	G (77%)	G (87%)	G (95%)	G (97%)	G (96%)	G (94%)
MEDIAN WATER HEATING FUEL	G (95%)	G (87%)	G (100%)	G (97%)	G (96%)	G (98%)
MEDIAN TYPE OF HEATING SYSTEM	HW (54%)	HW (55%)	NA	NA	NA	NA
MEDIAN AGE (YRS)	15-20	12-15	15	10	11	10
MEDIAN HEATING COST (PROF. ONLY) ($)	501-1000	1000-1500	NA	NA	NA	NA
PARTICIPANT RENTERS						
MEDIAN HEATING FUEL	G (60%)	G (80%)	G (100%)	G (100%)	G (100%)	G (100%)
MEDIAN WATER HEATING FUEL	G (40%)	G (80%)	G (100%)	G (100%)	G (100%)	G (100%)
MEDIAN TYPE OF HEATING SYSTEM	HW (60%)	HW (80%)	NA	NA	NA	NA
MEDIAN AGE (YRS)	20	15	15*	12*	18	10
MEDIAN HEATING COST (PROF. ONLY) ($)	301	1001-1500	NA	NA	NA	NA
NONPARTICIPANT OWNERS						
MEDIAN HEATING FUEL	G (92%)	G (80%)	NA	NA	G (76%)	G (80%)
MEDIAN WATER HEATING FUEL	G (86%)	G (76%)	NA	NA	NA	NA
MEDIAN TYPE OF HEATING SYSTEM	NA	NA	NA	NA	NA	NA
MEDIAN AGE (YRS)	NA	NA	NA	NA	NA	NA
MEDIAN HEATING COST (PROF. ONLY) ($)	NA	NA	NA	NA	NA	NA
NONPARTICIPANT RENTERS						
MEDIAN HEATING FUEL	G (52%)	G (50%)	NA	NA	G (79%)	G (71%)
MEDIAN WATER HEATING FUEL	G (75%)	G (75%)	NA	NA	NA	NA
MEDIAN TYPE OF HEATING SYSTEM	NA	NA	NA	NA	NA	NA
MEDIAN AGE (YRS)	NA	NA	NA	NA	NA	NA
MEDIAN HEATING COST (PROF. ONLY) ($)	NA	NA	NA	NA	NA	NA

TABLE 22

COOLING SYSTEM CHARACTERISTICS OF RCS PARTICIPANT AND
NONPARTICIPANT OWNERS AND RENTERS BY INCOME CLASS

CATEGORY	PEPCO 1986		WGL 1985		WGL 1986	
	Low Income	High Income	Low Income	High Income	Low Income	High Income
PARTICIPANT OWNERS						
% WITH AIR CONDITIONING	62	33	21	19	13	65
MEDIAN AGE	PRE '70	PRE '79	NA	NA	NA	NA
MEDIAN SIZE	2.5	2.5	NA	NA	NA	NA
MEDIAN COOLING COST ($)*	(301	(401	NA	NA	NA	NA
TYPE OF A/C-WU %	65	41	53	41	53	43
TYPE OF A/C-CE %	35	51	16	17	40	56
PARTICIPANT RENTERS						
% WITH AIR CONDITIONING	67	80	0	0	50	33
MEDIAN AGE	1979+	PRE '71	NA	NA	7	10
MEDIAN SIZE	NA	NA	NA	NA	NA	NA
MEDIAN COOLING COST ($)*	(201	(401	NA	NA	NA	NA
TYPE OF A/C-WU %	65	0	100	100	80	75
TYPE OF A/C-CE %	55	75	NA	NA	20	25
NONPARTICIPANT OWNERS						
% WITH AIR CONDITIONING	65	75	NA	NA	NA	NA
TYPE OF A/C-WU %	67	28	NA	NA	NA	NA
TYPE OF A/C-CE %	17	25	NA	NA	NA	NA
NONPARTICIPANT RENTERS						
% WITH AIR CONDITIONING	64	100	NA	NA	NA	NA
TYPE OF A/C-WU %	70	50	NA	NA	NA	NA
TYPE OF A/C-CE %	22	50	NA	NA	NA	NA

WU - Window Units
CE - Central electric
*Professional audits only
Low income is defined as $15.000 per year.
High income is defined as $50.000 + per year in the Pepco data set;
$40.000 + per year in the WGL data sets.

TABLE 23

PURPOSES OF AUDITS - RCS PARTICIPANT AND NONPARTICIPANT OWNERS AND RENTERS (Pepco's 1986 Data Set Only)

	PERCENT THAT AGREES							
	OWNERS ('000)				RENTERS ('000)			
CATEGORY	(\$15	\$15-\$24.9	\$25-\$49.9	(\$50+	(\$15	\$15-\$24.9	\$25-\$49.9	(\$50+
PARTICIPANTS								
Save Energy	87	77	81	81	79	100	100	100
Comfort	92	90	68	66	93	100	100	60
Resale Value	88	87	59	52	20	100	63	60
Save (\$)	69	73	66	52	60	100	67	40
NONPARTICIPANTS								
Save Energy	51	66	58	67	55	79	82	86
Comfort	68	62	51	63	67	68	79	86
Resale Value	76	66	65	65	50	100	100	75
Save (\$)	67	59	47	39	55	61	69	57

TABLE 24

LACK OF EXISTING CONSERVATION MEASURES (PREAUDIT): PEPCO'S 1986 DATA SET

OWNERS VS RENTERS

MEASURES	OWNERS (%)												RENTERS (%)											
	<15,000		15,000-24,999			25,000-49,999			50,000				<15,000		15,000-24,999			25,000-49,999			50,000			
	%	No	SS	%	No	SS	%	No	SS	%	No	SS	%	No	SS	%	No	SS	%	No	SS	%	No	SS
HIGH COST (> $1000)																								
REPLACE AIR CONDITIONER	44	4	9	40	2	5	38	11	29	45	19	42	20	1	5	0	0	0	25	1	4	33	1	3
REPLACE HEATING SYSTEM	75	27	36	63	15	24	54	38	71	61	51	83	57	8	14	50	1	2	25	2	8	50	2	4
MEDIUM COST ($100-$1000)																								
STORM WINDOWS	54	21	39	40	12	30	37	29	79	42	39	93	27	4	15	100	2	2	56	5	9	60	3	5
STORM DOORS	64	25	39	50	15	30	53	42	79	61	57	93	40	6	15	50	1	2	63	5	9	100	5	5
WALL INSULATION	83	29	35	86	24	28	72	54	75	83	74	89	57	8	14	100	2	2	89	8	9	75	3	4
CEILING INSULATION	74	28	38	93	25	27	75	56	75	73	66	91	100	9	9	100	2	2	100	5	5	100	5	5
LOW COST (< $100)																								
CAULKING																								
WEATHERSTRIPPING	97	38	39	93	28	30	84	66	79	85	79	93	100	15	15	100	2	2	78	7	9	100	5	5
DOOR	75	36	38	100	24	24	89	63	71	88	73	83	86	12	14	100	2	2	100	8	8	75	3	4
WATER TANK INSULATION	66	25	38	97	28	29	84	63	75	72	65	90	60	9	15	100	2	2	78	7	9	80	4	5
DUCT INSULATION																								
PIPE INSULATION																								
DOOR	55	20	38	54	13	24	38	27	71	49	41	83	50	7	14	50	1	2	75	6	8	50	2	4
FLUE																								
AUTOMATIC IGNITION	75	28	38	85	17	20	83	48	58	84	61	73	100	8	8	100	2	2	100	6	6	100	4	4
CLOCK THERMOSTAT	100	38	38	100	24	24	89	63	71	81	67	83	100	14	14	100	2	2	100	8	8	100	4	4
FLOOR INSULATION	100	37	37	80	24	30	84	63	75	92	81	88	90	9	10	100	2	2	100	6	6	100	5	5

No = Number
SS = Sample Size

TABLE 25

RECOMMENDATION RATES FOR EACH CONSERVATION MEASURE OF RCS PARTICIPANT OWNERS AND RENTERS BY INCOME CLASS

| | PEPCO 1984 | | | | WGL 1985 | | | | WGL 1986 | | | |
| | OWNERS % | | RENTERS % | | OWNERS % | | RENTERS % | | OWNERS % | | RENTERS % | |
MEASURES	Low Income	High Income	Low Income	High Income	Low Income	High Income	Low Income	High Income	Low Income	High Income	Low Income	High Income
HIGH COST (> $1,000)												
REPLACE AIR CONDITIONER	6	16	7	20	--	--			4	20	3	0
REPLACE HEATING SYSTEM	64	65	60	60	68	12			57	52	83	33
MEDIUM COST ($100 - $1,000)												
STORM WINDOWS	69	73	40	100	47	74			74	77	100	67
STORM DOORS	67	68	40	100	11	9			30	42	50	50
WALL INSULATION	36	46	33	20	37	24			48	29	17	17
CEILING INSULATION	69	69	40	0	74	69			74	77	33	83
SHADING	--	--	--	--	--	1			13	22	--	--
LOW COST (< $100)												
CAULKING	7	85	67	100	84	73			91	79	100	83
WEATHERSTRIPPING	74	87	88	80	63	67			78	56	83	100
WATER TANK INSULATION	64	69	60	80	73	82			61	81	100	50
DUCT INSULATION	8	12	13	0	--	--			22	11	--	--
PIPE INSULATION	31	24	0	0	--	--			13	13	50	50
FLUE	46	44	20	40	--	1			4	5	--	--
AUTOMATIC PILOT	69	75	60	80	--	2			--	5	--	--
CLOCK THERMOSTAT	62	63	67	60	42	58			83	69	67	83
FLOOR INSULATION	54	67	33	60	53	34			57	48	67	50

* Sample sizes are too small to provide meaningful information

TABLE 26

IMPLEMENTATION RATES (FIRST DEFINITION) FOR EACH CONSERVATION MEASURE BY RCS PARTICIPANT OWNERS AND RENTERS BY INCOME CLASS

MEASURES	PEPCO 1986				WGL 1985				WGL 1986			
	OWNERS %		RENTERS %		OWNERS %		RENTERS %		OWNERS %		RENTERS %	
	Low Income	High Income	Low Income	High Income	Low Income	High Income	Low Income	High Income	Low Income	High Income	Low Income	High Income
HIGH COST (> $1,000)												
REPLACE AIR CONDITIONER	33	0	0	0	-	7	0	0	0	10	-	-
REPLACE HEATING SYSTEM	12	2	11	0	23	5	11	0	0	0	0	0
MEDIUM COST ($100 - $1,000)												
STORM WINDOWS	37	21	17	20	33	34	17	20	53	25	17	25
STORM DOORS	30	22	17	0	50	9	17	0	14	17	0	-
WALL INSULATION	13	7	0	0	0	11	0	0	0	7	0	-
CEILING INSULATION	19	11	17	0	21	24	17	0	24	22	0	20
SHADING	-	-	-	-	-	0	-	-	0	9	0	-
LOW COST (< $100)												
CAULKING	74	70	58	60	56	52	58	60	52	50	17	20
WEATHERSTRIPPING	65	58	50	75	42	26	50	75	33	28	0	33
WATER TANK INSULATION	40	20	11	30	0	23	11	30	29	17	0	33
DUCT INSULATION	50	18	0	0	-	-	0	0	20	0	-	-
PIPE INSULATION	17	20	0	0	-	-	0	0	67	20	0	0
FLUE	-	-	11	25	-	0	11	25	0	13	0	-
AUTOMATIC PILOT	26	7	10	25	25	10	10	25	-	29	-	-
CLOCK THERMOSTAT	31	11	0	33	30	12	0	33	11	17	0	20
FLOOR INSULATION	24	0							0	9	0	33

* Sample sizes are too small to be meaningful (4 in (<$15,000 and 1 in $40,000))

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TABLE 27

IMPLEMENTATION RATES (SECOND DEFINITION) FOR EACH CONSERVATION MEASURE BY RCS PARTICIPANT
OWNERS AND RENTERS BY INCOME CLASS

MEASURES	PEPCO 1986 OWNERS %		PEPCO 1986 RENTERS %		WGL 1985 OWNERS %		WGL 1985 RENTERS* %		WGL 1986 OWNERS %		WGL 1986 RENTERS %	
	Low Income	High Income	Low Income	High Income	Low Income	High Income	Low Income	High Income	Low Income	High Income	Low Income	High Income
HIGH COST (> $1,000)												
REPLACE AIR CONDITIONER	5	1	0	0	--	1			0	2	0	0
REPLACE HEATING SYSTEM	8	1	7	0	16	3			0	4	0	0
MEDIUM COST ($100 - $1,000)												
STORM WINDOWS	26	15	7	20	16	25			39	19	17	17
STORM DOORS	21	15	7	0	5	1			4	7	0	0
WALL INSULATION	5	3	0	0	0	3			0	2	0	0
CEILING INSULATION	13	8	7	0	16	17			17	17	0	17
SHADING	--	--	--	--	--	--			0	2	0	0
LOW COST (< $100)												
CAULKING	72	59	47	60	47	38			48	61	17	17
WEATHERSTRIPPING	62	51	40	60	26	18			26	16	0	33
WATER TANK INSULATION	31	11	7	40	0	19			17	14	0	17
DUCT INSULATION	0	5	0	0	--	2			4	0	--	--
PIPE INSULATION	15	4	0	0	--	--			9	3	0	0
FLUE	8	9	7	0	--	--			0	6	--	--
AUTOMATIC PILOT	18	2	--	20	--	0			--	1	--	--
CLOCK THERMOSTAT	26	10	0	20	11	6			9	12	0	17
FLOOR INSULATION	13	5	0	20	16	5			0	5	0	17

* Sample sizes are too small, 14 for low income and 1 for $40,000.

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TABLE 28

IMPLEMENTATION RATES (SECOND DEFINITION) FOR EACH CONSERVATION MEASURE BY RCS
NONPARTICIPANT OWNERS AND RENTERS BY INCOME

| | PEPCO 1986 | | | | WGL 1985 | | | | WGL 1986 | | | |
| | OWNERS % | | RENTERS % | | OWNERS % | | RENTERS % | | OWNERS % | | RENTERS % | |
MEASURES	Low Income	High Income	Low Income	High Income	Low Income	High Income	Low Income	High Income	Low Income	High Income	Low Income	High Income
HIGH COST (> $1,000)												
REPLACE AIR CONDITIONER	8	15	3	0	3	12	2	14	30/30*	9	15	23
REPLACE HEATING SYSTEM	0	2	0	0	19	19	2	10	24/30*	17/12*	9	23
MEDIUM COST ($100 - $1,000)												
STORM WINDOWS	19	17	11	0	45	47	12	33	45	42	24	68
STORM DOORS	14	7	3	0	35	39	7	19	41	40	24	32
WALL INSULATION	5	7	0	0	19	16	0	19	21	23	6	5
CEILING INSULATION	11	2	1	14	35	27	7	19	24	28	15	9
SHADING	:	:	:	:	13	36	7	20	17	23	18	18
LOW COST (< $100)												
CAULKING	38	57	26	43	35	55	17	33	41	47	24	50
WEATHERSTRIPPING	38	57	26	43	42	64	14	43	38	47	21	41
WATER TANK INSULATION	11	9	4	14	19	17	0	10	21	24	9	23
DUCT INSULATION	8	0	0	0	7	20	0	10	14	18	12	9
PIPE INSULATION	8	0	0	:	23	29	2	10	17	20	9	14
FLUE	:	:	:	:	12	12	0	19	14	18	15	9
AUTOMATIC PILOT	3	7	7	0	13	27	5	19	18	17	6	5
CLOCK THERMOSTAT	3	2	0	14	23	31	5	10	28	26	15	14
FLOOR INSULATION					16	19	5	14	18	18	9	5

* First number refers to furnaces and second number refers to oil burners.

TABLE 29

REASONS WHY RCS PARTICIPANT AND NONPARTICIPANT OWNERS AND RENTERS BY INCOME DID AND DID NOT IMPLEMENT CONSERVATION MEASURES

PEPCO 1986 DATA SET

PARTICIPANTS

LEADING REASONS	OWNERS				RENTERS			
	Low Income	%	High Income	%	Low Income	%	High Income	%
#1	Comfort	31	Comfort	17	Comfort	56	Save $	33
2	Save $	26	Save $	39	Save $	22	Cheap to do	11
3	Save energy	11	Save energy	21	Save energy/	11	Save energy	33
	Broken equipment	11			Cheap to do			
#1	Too costly	51	Too costly	42	Renting	53	Too costly	40
2	No time	8	Not cost Efficient	18	Don't need	13	Renting	20
3	Don't need	3	Don't need	12	Too costly/ No time	7	No time	20

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TABLE 29

REASONS WHY NCS PARTICIPANT AND NONPARTICIPANT OWNERS AND RENTERS BY INCOME DID AND DID NOT IMPLEMENT CONSERVATION MEASURES

NGL 1985 & 1986 DATA SETS

Leading Reasons	PARTICIPANTS								NONPARTICIPANTS							
	OWNERS				RENTERS				OWNERS				RENTERS			
	Low Income	%	High Income	%	Low Income	%	High Income	%	Low Income	%	High Income	%	Low Income	%	High Income	%
Why Implemented																
1	Lower bills	35	Lower bills	47	Save energy	100	Lower bills	50	Lower bills	28	Lower bills	41	Tax credit	27	Tax credit	24
2	Comfort	29	Insulate	26	-		Insulate	26	Comfort	22	Insulate	19	Lower bills	25	Lower bills	24
3	Insulate	21	Comfort	23	-		Comfort	23	Insulate	18	Comfort	16	Comfort	18	Insulate	16
Why Not Implemented																
1	Too costly	41	Don't need	30	Renting	71	Renting	40	Too costly	44	Don't need	35	Renting	51	Renting	51
2	Don't need	23	Not cost efficient	29	Too costly	14	Too costly	20	Don't need	23	Not cost efficient	16	Too costly	13	Too costly	15
3	Not cost efficient	15	Too costly	14	-		Not cost efficient	20	Not cost efficient	20	Too costly	16	Don't need	12	Don't need	13

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