

# ornl

**OAK RIDGE  
NATIONAL  
LABORATORY**

**MARTIN MARIETTA**

OPERATED BY  
MARTIN MARIETTA ENERGY SYSTEMS, INC.  
FOR THE UNITED STATES  
DEPARTMENT OF ENERGY

MARTIN MARIETTA ENERGY SYSTEMS LIBRARIES



3 4456 0070644 9

ORNL/CON-201

## **The Role of Auditor Sales Effectiveness in Residential Conservation Incentive Programs: A Case Study at Florida Power and Light**

Marilyn A. Brown  
Linda G. Berry  
Dennis L. White  
Peter Zeidler

OAK RIDGE NATIONAL LABORATORY

CENTRAL RESEARCH LIBRARY

CIRCULATION SECTION

4500N ROOM 175

**LIBRARY LOAN COPY**

DO NOT TRANSFER TO ANOTHER PERSON

If you wish someone else to see this  
report, send in name with report and  
the library will arrange a loan.

UCN 7969 3 9 77

Printed in the United States of America. Available from  
National Technical Information Service  
U.S. Department of Commerce  
5285 Port Royal Road, Springfield, Virginia 22161  
NTIS price codes—Printed Copy: A06 Microfiche A01

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

ENERGY DIVISION

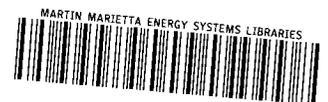
THE ROLE OF AUDITOR SALES EFFECTIVENESS IN RESIDENTIAL  
CONSERVATION INCENTIVE PROGRAMS: A CASE STUDY  
AT FLORIDA POWER AND LIGHT

Marilyn A. Brown  
Linda G. Berry  
Dennis L. White

Peter Zeidler  
Florida Power and Light Company  
9250 W. Flagler St.  
Miami, Florida 33102

Date Published: August 1986

OAK RIDGE NATIONAL LABORATORY  
Oak Ridge, Tennessee 37831  
Operated by MARTIN MARIETTA ENERGY SYSTEMS, INC.,  
under Contract No. DE-AC05-84OR21400  
for the U.S. DEPARTMENT OF ENERGY



3 4456 0070644 9



## CONTENTS

	page
LIST OF FIGURES.....	v
LIST OF TABLES.....	vii
ACKNOWLEDGEMENTS.....	ix
EXECUTIVE SUMMARY.....	xi
1. INTRODUCTION.....	1
1.1 POSTAUDIT INCENTIVE PROGRAMS AND THE ROLE OF AUDITOR SALESMANSHIP.....	1
1.2 AUDITOR RECRUITMENT, MONITORING AND MANAGEMENT.....	2
1.3 SALESMANSHIP LITERATURE REVIEW.....	5
1.4 ORGANIZATION OF REPORT.....	6
2. FLORIDA POWER AND LIGHT AND ITS RESIDENTIAL CONSERVATION PROGRAM.....	9
2.1 OVERVIEW.....	9
2.2 FPL's FIVE INCENTIVE PROGRAMS.....	10
2.2.1 Program Eligibility and Equipment/Materials.....	10
2.2.2 Program Procedures.....	12
2.2.3 MSR Hiring and Training.....	13
2.2.4 Program Participation Levels and Benefit/Cost Ratios.....	13
2.2.5 Timing and Sequencing of Participation in FPL's Five Incentive Programs.....	15
2.3 FPL's FIVE DIVISIONS.....	16
2.4 FOOTNOTES TO SECTION 2.....	22
3. RESEARCH DESIGN AND DESCRIPTION OF DATA SETS.....	25
3.1 OVERVIEW.....	25
3.2 DATA SETS FOR THE ANALYSIS OF MSR EFFECTIVENESS.....	25
3.2.1 MSR Characteristics.....	25
3.2.2 Household Characteristics.....	28
3.2.3 Measures of MSR Performance.....	28
3.2.4 Sample Sizes and Sample Attrition.....	30
3.3 FOOTNOTES TO SECTION 3.....	33
4. DESCRIPTIVE STATISTICS.....	35
4.1 CHARACTERISTICS OF MSRS.....	35
4.2 LEVELS OF PROGRAM PARTICIPATION.....	38

4.3	LEVELS OF MSR EFFECTIVENESS.....	38
4.4	FOOTNOTES TO SECTION 4.....	42
5.	CHARACTERISTICS OF PARTICIPATING HOUSEHOLDS.....	43
5.1	CHARACTERISTICS OF SURVEY PARTICIPANTS AND NONPARTICIPANTS.....	43
5.2	CHARACTERISTICS OF PROGRAM PARTICIPANTS VS. NONPARTICIPANTS.....	43
5.3	HOUSEHOLD CORRELATES OF MEAN INSTALLATION COSTS.....	50
6.	PREDICTORS OF MSR PERFORMANCE.....	53
6.1	CORRELATIONS AMONG THE MEASURES OF AUDITOR PERFORMANCE.....	53
6.2	MULTIVARIATE REGRESSION MODELS.....	53
6.2.1	Multivariate Regression Models of Closure Rates.....	55
6.2.2	Multivariate Regression Models of Mean Installation Costs.....	58
6.2.3	Age-Related Interaction Effects.....	60
7.	DISCUSSION AND CONCLUSIONS.....	63
7.1	REVIEW OF FINDINGS.....	63
7.2	IMPLICATIONS FOR THE DESIGN AND IMPLEMENTATION OF CONSERVATION PROGRAMS.....	66
8.	REFERENCES.....	69
9.	LIST OF ACRONYMS.....	71

## LIST OF FIGURES

	page
2.1 Time line of program participation for 1532 households who participated in one FPL program.....	17
2.2 Time line of program participation for 679 households who participated in two FPL programs.....	18
2.3 The five division's of FPL's Service area.....	19
3.1 MSR Background form.....	27
3.2 Daily survey log.....	29
4.1 Profile of FPL's Marketing Service Representative.....	36
4.2 Variation in HELP closure rates across MSRs.....	40
4.3 Variation in total closure rates across MSRs.....	41
5.1 Participant profiles, by program.....	46
6.1 Percent of total variance in closure rates explained by Division and household variables, MSR characteristics and household variables with MSR characteristics .....	56
6.2 Percent of total variance in mean installation costs explained by Division and household variables, MSR characteristics, and household variables with MSR characteristics.....	59



## LIST OF TABLES

		page
2.1	Participation rates in FPLs five incentive programs.....	14
2.2	Benefit/Cost estimates for FPLs five incentive programs.....	14
2.3	Demographic, housing, and climate characteristics by FPL Division.....	21
3.1	Contents of the three data bases.....	26
3.2	Number of surveyed households by survey type and source of information.....	32
3.3	Number of households with walk-through surveys retained for analysis.....	32
3.4	Number of MSRs completing at least 30 surveys and turning in at least 75% of logs, by Division.....	33
3.5	Comparisons of MSRs with high and low survey log turn-in rates.....	34
4.1	Correlations among MSR characteristics.....	37
4.2	Rates of program participation and eligibility, by division.....	39
5.1	Distributions of characteristics of FPL residential customers vs. home energy survey participants.....	44
5.2	Percent distribution of characteristics for program participants and nonparticipants.....	47
5.3	Correlations among household characteristics.....	49
5.4	Mean installation costs for program participants, by type of household and dwelling unit.....	51
6.1	Correlations among the closure rates.....	54
6.2	Regression coefficients for Division, household and MSR characteristics as predictors of closure rates.....	57
6.3	Regression coefficients for Division, household and MSR characteristics as predictors of mean installation costs.....	61



## ACKNOWLEDGEMENTS

This report was funded by the the U.S. Department of Energy's Office of State and Local Assistance Programs with matching resources supplied by the Florida Power and Light (FPL) Company in the form of manpower and computer time for data collection and analysis. It is part of a series of reports initiated by DOE which analyze utility energy efficiency programs. The series was initiated by DOE in an effort to evaluate selected conservation and load management activities of utilities in terms of their effectiveness as alternatives to the Residential Conservation Service audit program.

The assistance of several people has contributed significantly to the successful completion of this project. Eric Hirst of Oak Ridge National Laboratory (ORNL) and Sarah Kirchen of the U.S. Department of Energy were particularly helpful in reviewing the progress of our research throughout its various stages. We also appreciate the comments of those who reviewed drafts of this report, including W. G. (Biff) Bentley, Wayne Donenfeld, Carol Entriken, Sandra Perry, Steve Perry, and Susan Shapiro of FPL; Joseph Cooper, Mary Fowler, Lou Harris, Harry Lane, and Diane Pirkey of DOE; Tom Mason and Marty Schweitzer of ORNL; Kathryn McCarty of the Consumer Energy Council of America; and Clark Gellings of the Electric Power Research Institute. Also appreciated is the computer programming assistance provided by Bob March of FPL and the computer graphics of Sherri Snell (ORNL).



## EXECUTIVE SUMMARY

### PURPOSE OF STUDY

The purpose of this study was to better understand determinants of auditor sales effectiveness in utility energy conservation programs. More specifically, Oak Ridge National Laboratory joined with the Florida Power and Light Company (FPL) to examine characteristics of their Marketing Service Representatives (MSRs) and the effect of such characteristics on customer participation in four residential conservation incentive programs. The four programs are: the Conservation Water Heating Program (CWHP), the Residential Ceiling Insulation Program (RCIP), the Residential Window Treatment Program (RWTP), and the Home Energy Loss Prevention Program (HELP) which offers a package of low-cost measures. The study findings suggest that the needs of the households offered incentives are the primary determinants of program participation, but that the characteristics of the MSR are also influential.

### DATA SETS

This analysis of auditor salesmanship examines three data sets containing information on MSRs and the households they surveyed during two months of 1985. The MSR characteristics, household characteristics, and measures of MSR success in selling included in the data sets are summarized on page xii.

### METHODS OF ANALYSIS

Variability in MSR effectiveness in selling conservation is studied from a number of perspectives. Differences in customer response are examined by program, by FPL Division, by household type, and by various auditor characteristics. Since the MSR is the unit of analysis and household characteristics are considered mainly as control variables, household data are converted to percentages or mean values by MSR. Age of household, for example, is measured as the percentage of households surveyed by a given MSR that fall into various age cohorts. Regression models are developed to determine the influence of various MSR and household characteristics on customer participation.

### HOUSEHOLD EFFECTS

In general, the analysis shows that household characteristics are better predictors of response than MSR characteristics. For two programs and for the total closure rates, regression models based on household characteristics have 15-20% greater explanatory power than models based on MSR characteristics. For other programs, household characteristics explain slightly more of the variation in response than do MSR characteristics.

Our findings suggest that the ability of MSRs to generate participation from households is largely a function of how well each program meets the needs of the households surveyed. This is indicated by the fact that (1) program participation rates and installation costs vary by size and type of dwelling unit as well as age and race of the household head, (2) those household characteristics associated with high levels of participation vary across programs, and (3) the type of households attracted to a program is related to the nature of the costs and benefits of the program.

The dominant influence of household characteristics underscores the fact that the four incentive programs serve unique market niches. Elderly households, for example, have lower than average rates of participation in the ceiling insulation program, but higher rates in the window treatment and low-cost package programs. Similarly, participation rates for some programs are higher among white households, while participation rates for others are higher for Hispanic and black households.

In spite of the strong influence of household characteristics on participation, some variation in closure rates can be attributed to MSR characteristics. After household effects on closure rates are removed, the additional variation explained by MSR characteristics ranges from 0% to 14%. The latter levels of explanation compare favorably with other studies of salesperson performance. Overall, the regression models explain an average of more than 50% of the variation in closure rates.

#### MSR EFFECTS

When the influence of household characteristics and FPL geographic divisions upon closure rates is removed, MSR characteristics have consistent effects across programs. The set of MSR characteristics that explains variation is not the same in the regression models for every program, but the direction of influence of significant MSR characteristics is uniform for all programs. The effects of the MSR's characteristics are summarized below:

- Overall, extroversion is the strongest predictor of closure rates among all of the MSR characteristics examined.
- MSRs rated as extroverted by their supervisors have total closure rates that are 16% higher than the total closure rates of introverted MSRs.
- Educational level has a positive effect on closure rates for HELP and RWTP.
- Extroversion has a positive effect on HELP, RCIP, and total closure rates.
- The amount of experience an MSR has on the job has a negative effect on closure rates for HELP, RCIP, and RWTP.
- Female MSRs, with all else equal, have higher closure rates for RCIP and RWTP.
- Type of educational background is unrelated to closure rates. In particular, MSRs with engineering degrees do as well as MSRs with degrees in business.
- MSRs given high performance ratings by their supervisors do as well as those given low ratings.

Regression models that explain mean installation costs are generally weaker than models that predict closure rates. The greater importance of household as opposed to MSR characteristics also is more marked in the costs models. As was true of closure rates, the significant predictors of mean installation costs for one program may not be significant for one or more other programs. For RCIP, RWTP, and HELP, installation costs are significantly greater for larger homes. This is in keeping with the fact that the FPL subsidy for these three programs depends upon various dimensions of the home including size of the attic and window area. For the water heater program, however, installation costs are significantly greater in smaller homes.

Once the influence of varying market receptivity is taken into account in the regression models, only one MSR characteristic is found to be related to mean installation costs. In particular, MSRs with sales experience from a previous job generate installation costs in the HELP program that are \$7.38 higher than those produced by their colleagues without sales experience.

#### IMPLICATIONS FOR PROGRAM MANAGEMENT

Our findings suggest two major implications for program management:

- Auditors with outgoing, extroverted personalities who have previous experience in sales should be hired if one wishes to maximize customer response.
- Auditors should not be rewarded solely on the basis of simple performance measures such as program closure rates unless they work within very similar market areas.

The basis of these two conclusions is explained below.

Because extroversion is the characteristic that best distinguishes between MSRs with corrected high and low closure rates, program managers who wish to maximize sales should give preference to hiring extroverts. Personality tests such as the Eysenck Personality Questionnaire include validated extroversion scales which could be useful in the selection of new auditors. Applicants with a background in sales also might be given preference because they tend to produce higher levels of customer expenditures on conservation.

Because our findings show that an MSR's ability to generate participation is heavily dependent upon how well each program meets a household's needs, MSR performance cannot be evaluated fairly without program-specific corrections for household receptiveness. For three of the four programs (CWHP, RCIP, and RWTP) over half of the variation in closure rates is explained by household and FPL geographic division variables. The additional variation explained by MSR characteristics is less than 10% of the total. Thus, if variations in household receptiveness to programs are not controlled, the influence of MSR

characteristics on customer response cannot be isolated. In the case of FPL, it would be unfair to reward MSRs on the basis of uncorrected closure rates because the receptivity of the households they are selling to varies markedly. In utilities where all auditors deal with a similar mix of household types, such corrections to measures of performance may not be necessary.

Utilities could benefit from an industry-wide effort to develop a complete battery of tests that properly reflects the skills, aptitude, and personality traits which influence auditor performance. The sales aptitude test used in this research was not developed to assess the particular types of aptitude required to sell energy conservation. The success with which employee selection tests have been developed for other industries, such as insurance, suggests that the payback of such an effort to the energy services and utility industry could be considerable.

## CONCLUSIONS

Utilities are becoming increasingly sophisticated in the design of residential conservation and load management programs. Many information-only efforts have evolved into multi-faceted programs which offer a variety of incentives to customers who have conservation measures installed in their homes. The role of auditors in selling conservation and load shifting to customers is often critical to the success of such programs. This report has looked at one set of postaudit incentive programs in an attempt to understand the determinants of auditor sales effectiveness.

Although our findings must be viewed as preliminary, because they result from only one case study, they clearly indicate that program penetration is closely related to the fit of the offering to the needs of the household. They also suggest that selection, training, and management of MSRs can strongly influence program results.

Table S-1. Contents of the three data bases

MSR characteristics	Household characteristics
Age	Age of household head
Gender	Gender of household head(s) present at audit
Years of education	Race
Major area of academic study	Number of permanent residents in the household
Length of MSR experience	Housing type (single-family attached, single-family detached, mobile home)
Prior MSR experience (other jobs)	Square footage of the dwelling
Length of employment with FPL	Eligibility for CWHP, RCIP, and RWTP
Direct selling experience	
Prior job experience	
Sales training	
Performance rating	
Extroversion/introversion rating	
Sales aptitude score	
Division	

Measures of MSR success in selling conservation
Closure rate for CWHP (C1)
Closure rate for RCIP (C2)
Closure rate for RWTP (C3)
Closure rate for HELP (C4)
Total program closure rate (C1+C2+C3+C4)
Mean installation cost for CWHP (\$)
Mean installation cost for RCIP (\$)
Mean installation cost for RWTP (\$)
Mean installation cost for HELP (\$)



## 1. INTRODUCTION

### 1.1 POSTAUDIT INCENTIVE PROGRAMS AND THE ROLE OF AUDITOR SALESMANSHIP

In recent years the energy utility industry in the United States and elsewhere has capitalized upon lessons learned from implementing the U.S. Residential Conservation Service (RCS) audit program (Public Law 95-619). Many utilities have customized or substantially overhauled their audit programs to improve their cost-effectiveness in light of the particular supply and demand conditions they face. In general, utilities have moved beyond information-only programs in their conservation and load management efforts. One common modification to the RCS program involves abbreviated residential audits, which qualify customers to participate in one or more incentive programs.

Levels of participation in a postaudit incentive program are affected by two types of consumer decisions: (1) the decision to request an audit; and (2) the decision to participate and invest at various levels in the postaudit program. Analysis of participation rates in audit and incentive programs suggests that the likelihood of participation depends upon many factors. The effect of a given incentive, for example, depends upon the conditions of its implementation. Some studies suggest that non-financial features of incentive programs, such as program marketing, guarantees of consumer protection, and simplification of investment procedures, influence household behavior more strongly than the extent of subsidy (Stern, Berry, and Hirst, 1985).

Many studies have focused upon variations in rates of participation in home audit programs and underscore the wide ranging levels of household response. These studies have also provided some insight into attributes of program implementation which lead to success such as the type of audit and affiliation of the auditor. For example, the RCS program in Minnesota audited only 4% of the eligible homes in localities where energy audits were conducted by utility personnel, but audited 15% in places where local community groups conducted the audits (Polich, 1984). Similarly, by using local groups and direct personal contact, the Tennessee Valley Authority increased the proportion of its audits going to low-income households from 6 to 21% (Moulton, 1984).

Fewer studies have focused upon variations in consumer response to postaudit incentive programs. Data reported by Stern (1985) illustrate that the extent of this variation can be considerable. For example, the percentage of loans per audit varied from 0.7 to 28.1 across nine utilities participating in New York State's Home Insulation and Conservation Program. While some of this variation is probably due to varying levels of need for the program across the nine utilities, features of program implementation are undoubtedly also a factor.

Despite the growing recognition that how a program is implemented can greatly affect its success, little attention has been given to understanding factors which lead to high or low customer response

rates. This paper explores one such factor by examining data on five incentive programs offered by the Florida Power and Light (FPL) Company. Our focus is on the effect of FPL's auditors (or Marketing Service Representatives) on customer response rates and on the identification of auditor characteristics which generate high levels of program participation and investments in retrofits.

The MSR plays a key role in the success of FPL conservation programs. For the typical customer who receives a home energy survey, the MSR provides the first direct personal contact with FPL. Psychologists stress the importance of such personal contacts in programs designed to motivate conservation actions and investments (Yates and Aronson, 1983; Stern and Aronson, 1984). Customer beliefs about programs and the desire to participate are likely to be strongly influenced by the MSR.

Recognizing the importance of the motivational or "salesmanship" component of the MSR's job, FPL joined the U.S. Department of Energy in supporting this analysis which is designed to identify determinants of MSR effectiveness in selling conservation programs and retrofit measures to residential customers. The purpose of this report is to understand MSR effects on customer response to FPL postaudit conservation programs. To achieve this goal the variability in MSR effectiveness in selling conservation is studied from a number of perspectives. Differences in customer response are examined by program, by division, by household type and by various MSR characteristics. Multivariate models that consider the combined influence of all of these factors are developed. Although the central focus is on the effects of MSR characteristics on response, the moderating influence of the other factors is considered throughout the analysis. The information developed here on the correlates and predictors of MSR closure rates should aid FPL in the design of recruitment, training, monitoring and management policies. Perhaps the findings will be useful to other audit program managers as well.

## 1.2 AUDITOR RECRUITMENT, MONITORING AND MANAGEMENT

The utility industry has developed few norms concerning the hiring, training, monitoring, and management of residential auditors. There also has been little effort to measure MSR effectiveness in selling programs or to use information on effectiveness as a guide to modifying management procedures or rewarding auditors. A literature review of utility practices concerning auditors revealed an abundance of technical training manuals and curricula, but very little about the determinants of auditor effectiveness. In particular, there appears to be an absence of studies examining the role of auditor characteristics on program participation.

Because our literature search produced so little information about auditor effects, we conducted telephone conversations with audit program managers at seven utilities. The managers interviewed included representatives of CONNSAVE, Florida Power Corporation, Lincoln Electric System, Metropolitan Edison which is an operating

company of General Public Utilities, Nashville Electric System which is a distributor for the Tennessee Valley Authority, Oklahoma Gas and Electric, and Pacific Gas and Electric. None of the managers had completed studies of auditor effects, but they did provide valuable information on their auditor recruitment, monitoring and management procedures. This information is summarized below.

Our interviews with program managers showed that there is great diversity in auditor recruitment policies. Florida Power Corporation hires only recent college graduates in the fields of business or marketing. Lincoln Electric System hires only technical school graduates with heating and air conditioning training. CONNSAVE tries to hire auditors with technical ability, but has no specific degree requirements. Nashville Electric System requires a high school diploma and hires auditors with varied backgrounds including engineering, business, marketing and sales. Oklahoma Gas and Electric promotes all of their auditors from among the ranks of current employees and gives preference to those with business degrees. Pacific Gas and Electric hires college graduates with degrees in a variety of areas including business, marketing, sales, environmental studies, education, and liberal arts. Metropolitan Edison promotes some auditors from within the organization, hires some who have two or more years training in electrical engineering or systems, and hires some auditors who have college degrees in business or marketing.

The examples presented above suggest that there are three major groups from which utilities recruit audit personnel: (1) college graduates in business, marketing or sales, (2) college or technical school graduates in engineering, and (3) current employees who are promoted from within. When employees are promoted from within the organization, preference is sometimes given to employees with business or engineering degrees. In other cases, degrees are not considered in the selection process. Since FPL recruits MSRs from each of the three major groups, one goal of our research is to determine if members of any of the three groups consistently elicit higher customer response rates. In addition to the factors of educational level and major area of study, we examine the effects of MSR age, gender, prior job experience, sales training, and sales aptitude on customer response rates.

Utility programs also vary a great deal in the way that auditor performance is monitored. Several utilities we interviewed, including Florida Power Corporation and Lincoln Electric System, monitor performance by conducting postaudit interviews with customers to assess how satisfied customers are with their audit and auditor. Oklahoma Gas and Electric considers the number of completed audits, the number of postaudit program participations, the estimated effect on kWh usage per participant, and customer satisfaction in evaluating their auditors. Metropolitan Edison monitors the number of program participations generated by each auditor and considers kWh and KW reductions.

Since the major purpose of conservation programs is to reduce consumption, measurements of reduction in energy use are the most

direct indicators of program success. It is prohibitively expensive and time-consuming, however, to measure the energy savings produced by each auditor in each home served. Other measures related to energy savings such as rates of program participation are more easily calculated for the purpose of evaluating auditor effects. In this study, for example, MSR performance is measured in two ways: (1) the closure rate, which is defined as the ratio of the number of program participations generated to the number of home energy surveys conducted, and (2) the mean participant installation cost per MSR which reflects the MSR's ability to elicit sizeable investments from program participants. Florida Power and Light, like most utilities, does not routinely collect these measures of performance. Supervisor ratings of MSR performance are the current method of employee evaluation at FPL.

It seems likely that monitoring and rewarding sales of measures would increase MSR performance in this area. When Pacific Gas and Electric (PG&E) offered an employee incentive program that awarded credits toward merchandise for successful selling, their levels of audit requests and of loan and rebate usage increased markedly. The PG&E employee incentive system was designed by Maritz Motivation, Inc. which develops similar systems to motivate many types of sales personnel. In the Maritz system, credits are awarded for each sale made and the credits can be redeemed for merchandise shown in a catalog. Vacation trips are included as catalog awards and top sales people at PG&E won trips to Hawaii.

The PG&E employee incentive system operated for the past two years in conjunction with an increased advertising effort. The combination of employee incentives and increased advertising produced such a high level of customer response that budgets for conservation programs were being exceeded. As a result, both the employee incentives and the high level of advertising were recently discontinued. Desired levels of customer participation now are expected to continue without the motivational system.

No other utility interviewed offered material incentives for sales performance. Several had nonmonetary rewards for the top performers such as auditor of the month or auditor of the year awards. Lincoln Electric set up job positions such as Auditor 1, Auditor 2, etc., and advanced auditors on the basis of customer interviews, with higher positions receiving higher salaries.

The value of various employee monitoring and incentive systems cannot be determined directly from the data we have collected on FPL's MSRs. We do consider the related issues of how well various MSR characteristics, sales aptitude test scores and supervisor ratings predict closure rates. Other factors that may influence closure rates such as household characteristics and divisional differences also are considered. We expect that household characteristics will moderate the relationship between MSR characteristics and sales performance measures. That is, MSRs will be most effective in selling conservation programs to the households that are most receptive to such expenditures. Further, the receptivity of households to specific conservation measures and programs is expected to vary by FPL

Division because of differences in the housing stock and in the demographic composition of the populations. In addition, divisional differences in supervisory practices may moderate the associations between MSR characteristics and sales performance measures.

### 1.3 SALESMANSHIP LITERATURE REVIEW

There is extensive literature on the determinants of salesperson performance. The insurance industry, for example, has conducted research on determinants of sales agent success since 1922. The Life Insurance Marketing and Research Association (LIMRA), a nonprofit trade association, has developed tests for selecting life insurance agents that are significantly related to agent success and failure. Researchers in the areas of business administration, management and marketing also conduct a good deal of work on the determinants of salesperson performance. Business, marketing and applied psychology journals contain many articles dealing with determinants of salesperson performance. A recent review of research on salesperson performance (Churchill, Ford, Hartley, and Walker, 1985) identified 409 citations from 63 journals in the 1918-1982 time period. There are also a number of textbooks dealing with the management and/or testing of sales personnel (e.g., Guion, 1965; Churchill, Ford, and Walker, 1985).

Two major themes in this literature are especially relevant to our analysis of MSR effectiveness. First is the guideline that useful models of salesperson performance must incorporate multiple causes. In their review of salesperson performance, Churchill, Ford, Hartley, and Walker (1985) found that on average less than 4% of the variation in salesperson performance is associated with any single predictor of that performance. Thus, multiple-determinant frameworks have become increasingly prominent.

What range of factors should be included in a multiple-determinant model of salesperson performance? One useful taxonomy is provided by the Churchill, Ford and Walker (1985) model of salesperson performance. When ordered by the amount of real variation in performance explained, the six basic types of factors they identify rank as follows: (1) personal factors, (2) skill, (3) role perceptions, (4) aptitude, (5) motivation, and (6) organizational/environmental factors.

Personal factors refer to such characteristics as age, education, and job experience. Skill level is the individual's learned proficiency at performing the necessary tasks; it can change rapidly with learning and experience. The role attached to the position of salesperson in any firm represents the set of activities or behaviors to be performed by any person occupying that position, defined largely by the expectations of supervisors, customers, and others. The aspects of role perceptions which affect job performance include role accuracy, perceived role conflict, and perceived role ambiguity. Aptitude consists of relatively enduring personal abilities and is related to physical factors, mental abilities, and personality characteristics. Motivation can be defined as the desire to expend effort on specific sales tasks. This can be influenced by things the sales manager does, such as how he or she

supervises or rewards the individual. Finally, organizational-environmental factors include company advertising expenditures, the sales territory potential, and the intensity of competition.

The top ranking of personal factors is due, in part, to the fact that the use of personal history items in predicting on-the-job performance has a long and particularly successful history in the insurance industry (Brown, 1978). Early versions of insurance agent selection tests relied mainly on personal factors such as age, number of dependents, marital status, education, years since leaving school, selling experience, membership and offices in organizations, home ownership, number of investments and life insurance ownership. Later versions of the selection tests added personality items and other factors (Thayer, 1977).

A second major theme in the literature on salesperson performance is that moderator variables are important. This theme implies that the type of customers to which a company sells, the type of products it sells, the types of measures it uses to evaluate salesperson performance, and the types of management practices it uses all may affect the relationships between performance and various predictors of that performance (Churchill, Ford, Hartley, and Walker, 1985). Two examples will illustrate this point. The first example, from the insurance industry, is that the validity of sales agent selection tests varies with the quality of local management. That is, with good local management the test has higher validity (better predictive ability) than it does with poor local management. In other words, the influence of personal factors, skill, and aptitude on performance is stronger with good local management and weaker with poor management (Thayer, 1977). The second example is taken from (Churchill, Ford, Hartley, and Walker (1985). They found that personal factors explain the most variation in performance for persons selling services. Organizational/environmental factors make the most difference when salespeople are selling industrial goods. These findings indicate that the strength of relationships between major determinants and salesperson performance varies by type of product sold. This suggests that past evidence concerning key salesperson characteristics may not generalize to the case of home energy audits at which conservation programs and measures are sold. This auditor sales situation may differ from other personal sales events in ways that affect the role of salesperson traits. Since there are no previous studies of predictors of auditor effectiveness, this paper is the first application of research on sales performance to this area.

#### 1.4 ORGANIZATION OF REPORT

This report contains six major sections. The purpose and context of the report were described above. In Section 2, a brief history of FPL's involvement in residential conservation programs and a detailed description of its current program offerings and of its five divisions are presented. Section 3 provides an overview of the research design, including a description of the data sets, the measures of MSR

performance, and the MSR and household variables to be used as predictors of MSR success in selling conservation.

Presentation of our findings begins in Section 4 with a detailed description of Florida Power and Light Company's sales force of Marketing Service Representatives and the levels of program participation it has generated. Section 5 presents the results of a comparison of participants and nonparticipants in the utility's audit and incentive programs. Attention then turns to the impact of MSR characteristics upon rates of participation in the incentive programs (Section 6). Section 7 summarizes our findings and discusses their implications for the design and implementation of conservation programs.



## 2. FLORIDA POWER AND LIGHT AND ITS RESIDENTIAL CONSERVATION PROGRAM

### 2.1 OVERVIEW

Florida Power and Light (FPL) provides electric service to 2.5 million customers in the rapidly growing eastern and southern portions of Florida. It is dependent primarily upon fossil fuels. During the twelve months ending in September 1985, FPL used the following amounts of fuel to produce its required generation: nuclear (36%), natural gas (20%), oil (14%), and net interchange and purchased power (30%). Faced with the high costs of capacity expansion, FPL is committed to conservation and load management programs. These programs have also become an important state policy since the the cost of new power plants is believed to be too expensive for ratepayers to absorb. Within the context of the 1980 Florida Energy Efficiency and Conservation Act (FEECA), FPL is mandated to reverse the historical relationship in which growth rates of peak power demand and energy consumption have exceeded the rates of increase in numbers of residential customers.

In particular, the Florida Public Service Commission (FPSC) has required that FPSC-regulated utilities (including FPL) meet demand and energy reduction targets. These utilities are to (1) bring the rate of growth in peak demand to 72.25% of the rate of growth in residential customers by 1989 and (2) reduce the growth rate of kilowatt hour consumption to an average of 75% of the annual growth in the number of residential customers for the 1980-89 period.

Since the early 1980s, the Florida Public Service Commission has emphasized energy audit quotas to meet its reduction targets. Initially there was an emphasis on class A audits involving on-site inspections and detailed cost-benefit calculations for specific retrofit measures.

The utility soon realized that audits alone would not achieve its mandated reductions. A 1982 study (FPL, 1982), for instance, indicated that class A audits generate only a small reduction in energy use. As a result, FPL developed a less expensive walk-through (class B) audit designed to meet state audit quotas and at the same time act as a gateway to a set of incentive programs designed to increase the penetration of energy conservation measures. Like audit programs in other utilities and states such as California, FPL's sought to increase the role of the auditor as a persuader and decrease the technical component by prepackaging many of the calculations on the payback of specific retrofit measures (Walker, Rauh, and Griffin, 1985).

By 1983, FPL had developed a strategic conservation program relying on walk-through audits and a slate of incentive conservation programs offering utility cost-sharing to households who make energy-efficiency investments. Initially incentives were offered in the areas of whole house cooling and heating equipment, solar film window treatments, water heaters, and ceiling insulation. During the spring of 1984 FPL added a fifth incentive program called Home Energy Loss<sub>1</sub> Prevention, to encourage installation of low cost conservation measures.

Participation in most of FPL's conservation programs requires that the customer first have a Residential Energy Survey conducted by a FPL Marketing Service Representative (MSR). This survey is typically a walk-through survey--while class A surveys are still available from FPL, they constitute less than 1% of the surveys currently being completed. At the end of each survey, the MSR recommends particular conservation practices and measures to the household. The recommendations are based on an inspection of the home and its energy usage and a comparison with similar homes in the region. At the same time, the MSR determines whether or not the household qualifies for any of the incentive programs and calculates the level of cost-sharing available to the household. An additional element introduced to the energy survey in 1984 was the Five Star Rating Program, developed to determine a home's overall energy efficiency. Homes qualifying as four or five star -- the highest ratings possible -- receive a certificate attesting to their energy efficiency. Less efficient homes are provided recommendations to elevate their ratings.

## 2.2 FPL'S FIVE INCENTIVE PROGRAMS

This paper focuses on auditor effects on participation in FPL's five cost-sharing incentive programs: Conservation Cooling and Heating, Conservation Water Heating, Residential Ceiling Insulation, Residential Window Treatment, and Home Energy Loss Prevention. These programs vary substantially in costs to the customer, benefits to the utility, eligibility, and participation procedures.

### 2.2.1 Program Eligibility and Equipment/Materials

Eligibility for all five incentive programs is limited to occupied residences in which all energy used is residential in nature. Additional eligibility requirements vary by program and are presented below along with details on the types of equipment and materials installed as part of each program.

Conservation Cooling and Heating (CCHP): This program promotes purchases of high efficiency air conditioning and heating equipment, including heat recovery systems which operate in conjunction with a central air conditioner or heat pump cooling/heating system to heat water. Florida Power and Light pays up to \$600 toward replacement of whole house cooling or cooling/heating equipment, with efficient central air conditioning or heat pump systems, and \$177 toward the installation of heat recovery systems. Qualified air conditioning systems must have a minimum seasonal energy-efficiency rating (SEER) of 8.5; qualified central heat pump systems must have a minimum SEER/EER of 8.0 and a minimum Coefficient of Performance (COP) of 2.5. Incentive payments for central air conditioners and heat pumps depend on system size and energy-efficiency rating. The energy conservation incentives apply only to a residential dwelling

that has been served by FPL for at least one year and to equipment installed after January 1982, when the program began.

**Conservation Water Heating (CWHP):** This program began in January 1982. It seeks to stimulate installations of three alternatives to conventional electric resistance water heating -- solar water heaters, water heating heat pumps, and heat recovery units. FPL helps customers install these high-efficiency alternatives by contributing up to \$400 for a solar system, up to \$186 for a heat pump water heater, and up to \$177 for a heat recovery unit.

**Residential Ceiling Insulation (RCIP):** Florida Power and Light pays up to \$300 toward the installation of ceiling insulation to a minimum value of R-19. The amount paid depends on the size of the attic space and the quality of any existing insulation. To be eligible, homes must have been built prior to 1982, they must have whole house electric air conditioning or heating, and the insulation must have been completed after October 1981, the month the program began.

**Residential Window Treatment (RWTP):** Florida Power and Light's Window Treatments program began in October 1981. It covers three energy-savers: solar reflective film, solar screens, and awnings and shutters. Florida Power and Light pays up to \$150; the amount paid depends on the square footage of sun-exposed glass. To be eligible, the entire residence must be cooled electrically by either a central air conditioning system or individual room air conditioners. Also, the household must have unshaded, single-pane, clear glass with eastern, western or southern exposure. Window areas with due north exposure, or which are permanently shaded by trees or other forms of window treatments are not eligible. Further, the solar film and solar screens installed must have shading coefficients of .45 or less. Eligible solar film must have been installed since October 1981, and eligible solar screen, awnings, and shutters since July 1983.

**Home Energy Loss Prevention (HELP):** This is FPL's most recent cash incentive program. It began on a test basis in January 1984 and on a permanent basis four months later. It encourages the installation of up to 15 inexpensive measures by qualified contractors. Florida Power and Light pays half the installation cost, to a maximum FPL contribution of \$75, for a set of measures which may include any of the following:

- Caulk doors
- Caulk windows
- Weatherstrip doors
- Weatherstrip windows
- Door sweep
- Door threshold
- Water heater insulation wrap

Pipe insulation  
 Low flow showerhead  
 Faucet restrictor  
 Showerhead adaptors  
 Duct system maintenance  
 Reflective window film (for areas <20 sq. ft.)  
 Electrical outlet gaskets  
 Storm inserts for jalousie windows

Measures to weatherize the building envelope are only installed in houses with whole house electric cooling and/or heating. Measures geared toward water heating are restricted to homes with electric water heating.

### 2.2.2 Program Procedures

Procedures by which households request participation in programs, contractors are assigned to jobs, and incentive payments are made vary across the five programs. For the water heating, ceiling insulation, and window treatment programs, the steps are similar. An FPL home energy survey must be conducted prior to installation of eligible energy-saving measures. At the time of the survey, Marketing Service Representatives give the customer any appropriate certificates specifying eligible installations and maximum incentive payments and directories of participating contractors who meet FPL's work specifications. The household selects a participating contractor and arranges for installation. Upon completion of the work, the customer gives the contractor the certificate and pays the contractor any additional amount owed. The contractor then submits the certificate and an invoice to FPL for payment. A MSR then determines whether or not the installation meets program standards.

The procedures for HELP depend upon whether or not the customer requests the program in advance of a home survey. If the program is "presold"--that is, a contractor convinces a household to sign up for HELP in advance of a survey--then the contractor who solicited the HELP participation is awarded the job. This option creates an incentive for contractors to promote the program. If the program is not presold, households either sign up for HELP at the time of the energy survey or contact FPL subsequently either through the Watt-Wise<sup>TM</sup> toll-free hotline or by contacting their local FPL office. Florida Power and Light then awards jobs to contractors on a rotating basis. In either event, a home survey must occur before the HELP installation. During the survey, the MSR designates applicable measures and completes a cost estimate sheet specifying locations for the work, listing the cost of each measure, and indicating an estimated total cost. In order to request a HELP installation the customer signs the cost estimate sheet and returns it to FPL. The contractor makes the appointment with the customer and completes the installation as directed. Partial payment is collected from the customer at the time of the installation. The contractor applies to FPL for the incentive payment, at which point an MSR determines whether or not the installation meets program standards through an inspection or a review of paperwork.

The Conservation Cooling and Heating Program is the only FPL incentive program which does not require a home survey. Customers contact participating cooling and heating contractors, with the assistance of a directory of contractors which is sent to customers upon request. The contractor visits the customer's home, suggests appropriate heating and cooling equipment, and calculates the incentive payment. After the system is installed, the customer pays a portion of the costs; the contractor applies directly to FPL for the incentive payment. An MSR determines whether or not the installation meets program standards.

### 2.2.3 MSR Hiring and Training

There are no formal requirements for hiring MSRs. The hiring procedures vary among FPL Divisions and essentially rely on the judgment of supervisors. Marketing Service Representatives tend to be recruited from two major groups: (1) FPL employees who have worked in customer service jobs, and (2) college graduates in business and engineering. Some MSRs with other employment and educational backgrounds also are hired (Section 4).

All MSRs attend a two-week training course. This course includes five days of technical training which prepares MSRs to perform the measurements and calculations of the home energy survey. On the fifth day of this part of the course the trainees are tested for certification. The second week of the course includes three days of motivational and sales training and detailed information on the company's conservation programs and services.

After completing the two-week course, the trainees receive on-the-job training by joining an experienced MSR in conducting home energy surveys. The survey typically takes 1 to 1 1/2 hours to complete. About 75% of the time is spent on measurements and calculations and about 25% is spent talking to the customer. The MSR may choose whether or not to have the customer accompany him/her during the measurement process. The paperwork, which mainly consists of determining the size of the incentive payments for which the customer qualifies, is done away from the customer.

### 2.2.4 Program Participation Levels and Benefit/Cost Ratios

Recent levels of participation in the five incentive programs vary from 14,000 installations a year for the window treatment program to almost 40,000 for HELP (Table 2.1). These rates have increased substantially over time.

The benefit/cost statistics shown in Table 2.2 are based on engineering estimates of energy savings. They reflect costs and benefits to FPL for the second quarter of 1985, as reported by FPL to the Florida Public Service Commission.<sup>3</sup> The estimates indicate that the residential ceiling insulation program is the most advantageous to FPL, with a benefit/cost ratio of 12.38. Residential Window Treatment Program, HELP, and CCHP are intermediate in terms of the benefit/cost ratio, and the water heater program is lowest with a ratio of 3.93.

Table 2.1 Participation rates in FPL's five incentive programs

	1985 goals: number of installations	1985 goals: installations per survey	Number of installations as of 7/1985	Program start date
CCHP	31,000	N/A <sup>a</sup>	73,305	1/1982
CWHP	15,422	.142	36,070	1/1982
RCIP	19,486	.180	44,944	10/1981
CWTP	14,070	.130	47,487	10/1981
HELP	39,600	.366	46,470	2/1984

<sup>a</sup>Installation per survey is not applicable to the Conservation Cooling and Heating Program because it does not require a survey for eligibility.

Source: Second quarter 1985 FEECA Report.

Table 2.2 Benefit/Cost estimates for FPL's five incentive programs

	Cost per installation (\$)	Annual kWh savings per installation	Winter kW saved per installation	Summer kW saved per installation	kWh+kW \$ saved per installation	Total benefit/ cost ratio
CCHP	437.99	2603	.82	1.06	2,614	5.97
CWHP	361.38	n.a.	n.a.	n.a.	1,419	3.93
RCIP	168.25	2051	.72	.81	2,082	12.38
CWTP	101.44	636	.00	.32	694	6.84
HELP	78.61	606	.25	.16	537	6.83

<sup>a</sup>"n.a." refers to information which is not available.

Source: Second quarter 1985 FEECA Report.

Significant differences in FPL costs per installation and the kilowatt (KW) and kilowatt-hour (kWh) savings per installation cause the benefit-cost ratios to vary substantially. The two energy-efficient equipment programs (CCHP and CWHP) generated \$2,614 and \$1,418, respectively, in kWh and KW benefits, but their costs are also in excess of \$430 and \$360. On the other hand, the ceiling insulation program provides more than \$2000 in savings per installation through reduced kWh and KW consumption, and FPL program costs are less than \$170. Home Energy Loss Prevention Program and the window treatment program have relatively low levels of program benefits and costs.

#### 2.2.5 Timing and Sequencing of Participation in FPL's Five Incentive Programs

The cost-benefit analysis of FPL's incentive programs presented in the previous section treats each of the five programs independently. Yet FPL designed its portfolio of incentive programs with the idea of obtaining certain desirable synergistic effects. In particular, HELP was developed to provide an easy entree to FPL's more expensive incentive programs. It was assumed that households would be receptive to HELP since it requires only a small monetary investment and offers a short payback period. If HELP indeed plays the role of a "gateway" to other conservation programs, then the benefits it brings to FPL are greater than simply the sum of kWh and KW savings attributable to HELP's 15 low-cost conservation measures. This section characterizes the sequencing and timing of participation in FPL's five incentive programs. As such it assesses whether or not HELP serves as an entree to the more expensive programs, and provides other information that was useful as background for designing an appropriate research design for studying MSR effects.

The data discussed here were derived from a sample of 2,263 households randomly drawn from those who received a FPL home energy survey between April 1 and November 31, 1984 and who participated in one or more of FPL's five incentive programs before July 1, 1985.<sup>4</sup> Unlike the data set for studying MSR effects which is described in Section 3, this data set excludes program nonparticipants and contains little information about the nature of participating households other than date of participation. It offers insight that the other data set does not because of its more extensive time frame. It includes households who had an FPL survey as early as April, 1984 and who have therefore had more than a year to take advantage of the incentive programs. Indeed, the amount of postsurvey time built into the sample described in Section 3 is based on findings about average customer response time resulting from analysis of this data set on the timing and sequence of program participation.

In total, this data set contains information on 3084 program participations, with the average household participating in 1.36 programs. Rates of program participation vary from 8.3% for CCHP to 54.4% for HELP. Sixty-eight percent of the sample households participated in only one program, 29% in two, 3% in 3, and less than one percent in four or five programs.

Since fewer than 4% of the households included in this sample participated in more than two incentive programs, an analysis of the sequencing and timing of participation can effectively be limited to one- and two-program participations. The first issue to be addressed was the extent of "preselling"--that is, the frequency with which program participation precedes a survey. When presurvey program participation occurs, Marketing Service Representatives cannot affect the program participation decision. Thus, presold program participation is not a valid measure of auditor effectiveness. It was found that participation in the cooling and heating program (CCHP) preceded a home energy survey for nearly half of the participants, while preselling occurred only 2 to 5% of the time for the other programs. As a result, CCHP is not dealt with in the analysis of auditor salesmanship, and presold participations are excluded from all of the results presented below.

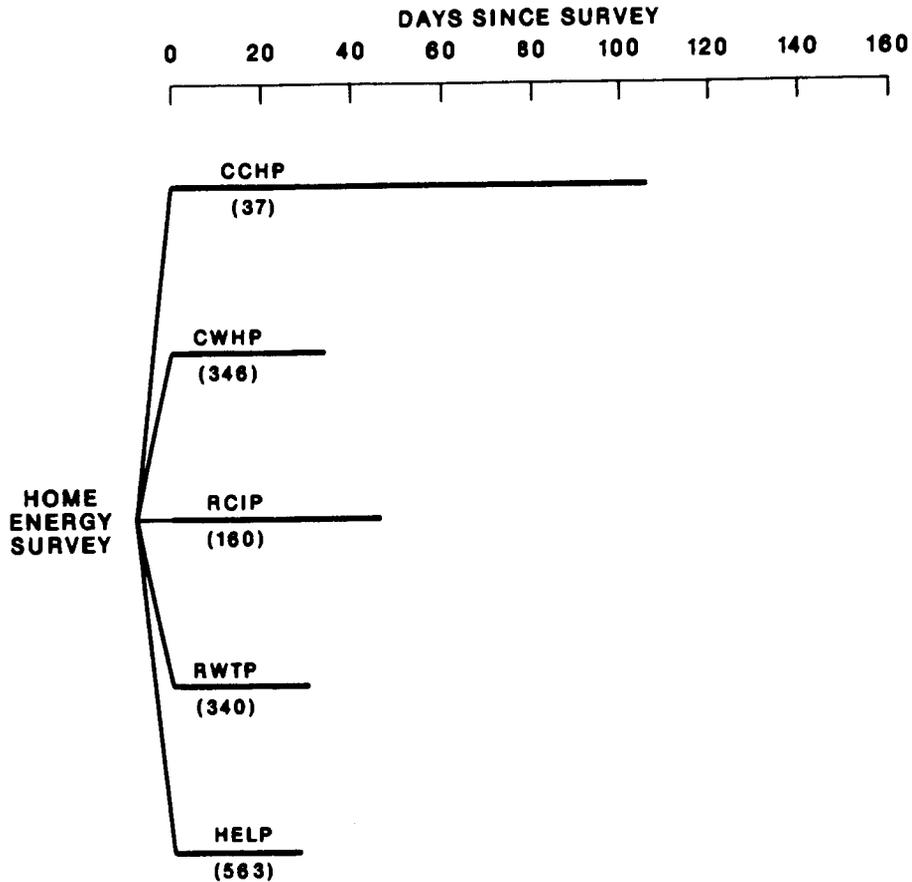
Figures 2.1 and 2.2 describe the 1532 single-program and the 639 two-program participations occurring over the 15-month period. They show that the cooling and heating program (CCHP) generates the greatest proportion of multiple participations (in particular, there were 37 single-program participants vs 51 instances where CCHP was succeeded by another program). The water heater program (CWHP) is least effective at generating multiple program participation with 346 single-program participants and only 62 two-program participants.

For nearly half of the two-program participants, HELP was the first program they accepted. This supports the view that HELP acts as an entree to FPL's other more expensive programs. The Residential Window Treatment Program is also frequently the first of two programs in which a household participates. However, 146 of the 155 participations following RWTP are with HELP and not with the more cost-beneficial or energy-saving programs.

On average, single-program participation occurred between 28 and 46 days from the time of the home energy survey (Figure 2.1), with the exception of the cooling and heating program where there is a 106-day lapse time. For two-program participants, the second program participation tends to occur within 20 to 60 days of the survey, excluding participations in CCHP. These results indicate that the 15-week, 105-day response period allowed in the data set designed to measure MSR effects is sufficient to capture the vast majority of responses to program offerings made at the time of a survey.

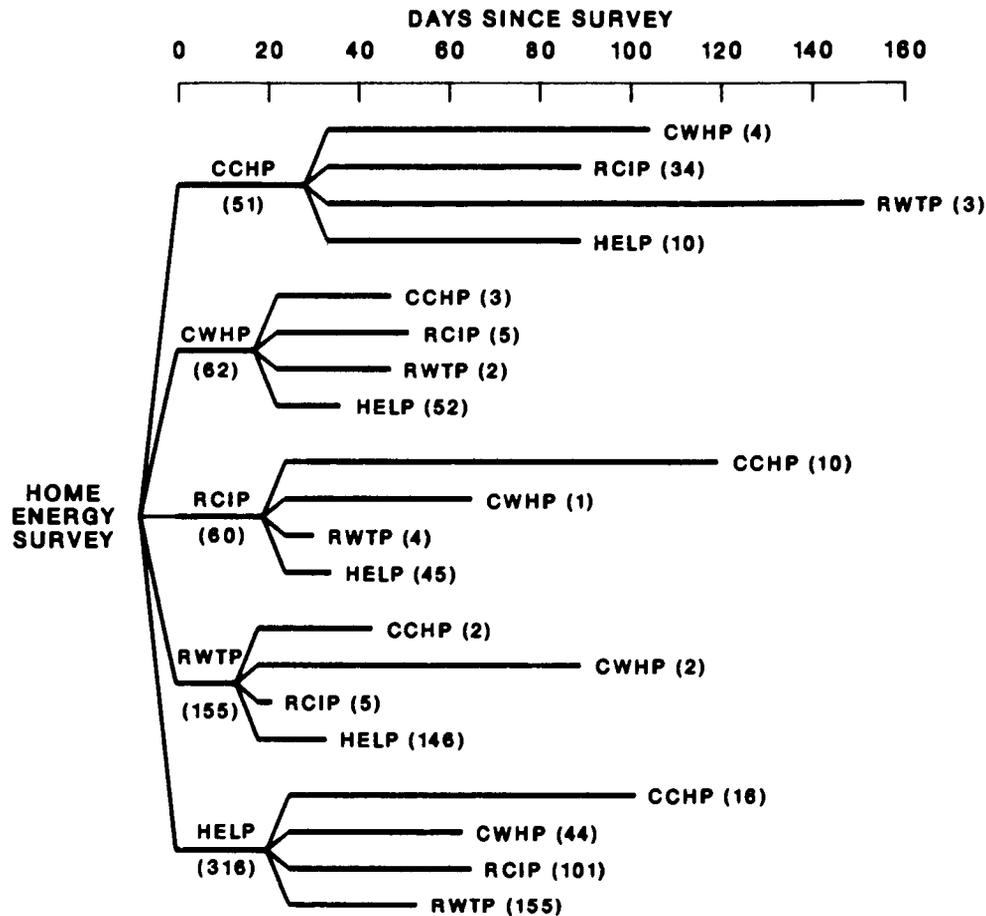
### 2.3 FPL'S FIVE DIVISIONS

Florida Power and Light Company's service area is comprised of five distinct geographic areas known as Divisions (Figure 2.3). While there are many FPL system-wide requirements which lead to uniformity in the implementation of conservation programs across Division, there is also considerable autonomy given to the Divisions in the administration of their conservation programs. This autonomy reflects the fact that the Divisions are faced with residential customers and housing stocks which differ considerably. This section discusses some of the similarities and



Program acronyms are: CCHP=Conservation Cooling and Heating Program; CWHP=Conservation Water Heating Program; RCIP=Residential Ceiling Insulation Program; RWTP=Residential Window Treatment Program; and HELP=Home Energy Loss Prevention.

Fig. 2.1. Time line of program participation for 1532 households who participated in one FPL program. (Numbers in parentheses are the number of households.)



Program acronyms are: CCHP=Conservation Cooling and Heating Program; CWHP=Conservation Water Heating Program; RCIP=Residential Ceiling Insulation Program; RWTP=Residential Window Treatment Program; and HELP=Home Energy Loss Prevention.

Fig. 2.2 Time line of program participation for 679 households who participated in two FPL programs. (Numbers in parentheses are the number of households represented by each branch of the tree diagram.)

### FLORIDA POWER & LIGHT COMPANY SERVICE AREA

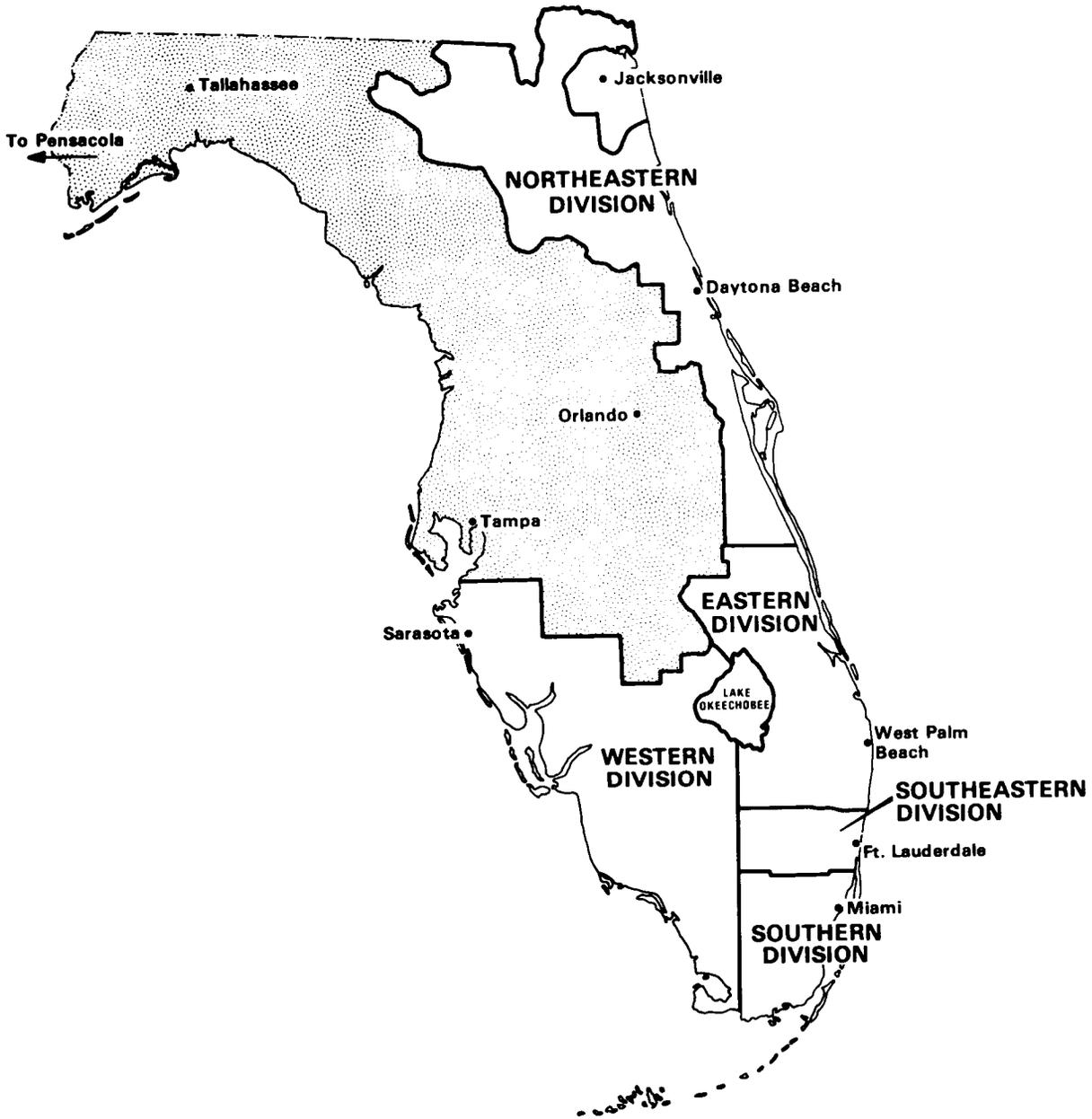


Fig. 2.3 The five division's of FPL's service area.

dissimilarities which characterize the FPL Divisions. As such it provides a backdrop for subsequently discussing Division-specific findings concerning MSR performance.

Each FPL Division offers the same portfolio of conservation programs, including the walk-through survey and five incentive programs. While some of the advertising for these programs differs across Division, there are also company-wide efforts to attract participants. Sales are generated through television, radio and print advertising. Brochures are distributed to customers inquiring about programs through the Watt-Wise<sup>TM</sup> telephone service or in response to advertising or through programs presented to consumer groups. The Watt-Wise Line<sup>TM</sup> provides taped energy conservation messages on conservation programs through a toll free telephone service. Employees present programs to consumer groups including school children, civic and social groups, businesses and the elderly.

While MSR training programs are similar across FPL's five Divisions, MSR hiring and monitoring is left largely to the Division offices. Indeed, within each Division there are several FPL supervisors who oversee the work of different groups of MSRs. This decentralized approach to MSR supervision suggests that MSRs from different Divisions and different work groups within Divisions are faced with different management practices.

Marketing Service Representatives from different Divisions also serve different residential markets, in terms of demographic and housing characteristics as well as heating and cooling requirements (Table 2.3). The western division, with its headquarters in Sarasota, has the oldest population. More than half of its residential customers are headed by a household member over 60 years of age. As a result, its households and homes are slightly smaller than average. The West also has the largest proportion of mobile homes--in which nearly one fifth of its households reside. It has an average income level.

In contrast, the northeastern Division has the youngest population and the lowest average household income of the five Divisions. Its households and homes are average in size. It has a disproportionate number of mobile homes and a small proportion of single-family detached dwellings.

The eastern and southeastern Divisions are similar with a high proportion of elderly residents, smaller than average households, and higher than average incomes. The East, however, is typical of the FPL system in terms of dwelling types, while the Southeast has fewer mobile homes and more single-family detached dwellings.

The southern Division is characterized by the oldest housing stock, a relatively young population, few mobile homes, a high proportion of nonwhite residents, and lower than average household incomes.

Table 2.3. Demographic, housing, and climate characteristics, by FPL Division

	Division:					
	Total	North-eastern	Western	Eastern	South-eastern	Southern
Average age of household heads (years)	51.4	49.3	53.9	52.4	52.5	49.1
Average household income (1983-\$)	26,800	23,900	26,600	30,100	28,800	24,300
Average household size (no. of people)	2.5	2.6	2.4	2.3	2.4	2.6
Race:						
Hispanic (%)	8.3	1.4	2.4	3.0	3.3	0.7
Black (%)	13.8	11.5	7.0	1.5	11.1	17.3
White (%)	83.9	87.3	90.8	84.4	87.8	77.2
Average square footage of dwellings	1320	1317	1314	1382	1294	1305
Average age of homes (years)	12.5	12.0	11.2	10.8	12.8	14.6
Dwelling type:						
Single-family attached (%)	51.7	65.2	51.3	47.6	45.6	53.0
Single-family detached (%)	39.0	18.0	29.6	42.3	49.1	44.5
Mobile homes (%)	9.3	16.8	19.1	10.1	5.3	2.5
Heating degree days	--	6,492	2,792	2,052	2,052	1,355
Cooling degree days	--	9,424	11,969	13,368	13,368	14,313

Sources: FPL's 1984 Home Energy Survey and the U.S. Census of Population, 1980.

## 2.4 FOOTNOTES TO SECTION 2

<sup>1</sup> Florida Power and Light has a variety of additional residential conservation programs, but none of these offer incentives. The Select and Save Program provides information targeted to purchasers of high-efficiency refrigerators, freezers, and room air conditioners. The Residential Pool Pump Program focuses on resetting swimming pool filtration pump time clocks to energy-efficient schedules by shifting use from on-peak to off-peak periods. Through its Passive Solar Home Program, FPL sells blueprints for passive solar homes designed for the specific climates of various regions of Florida. The Conservation Awareness Program provides conservation information to residential customers through a toll-free hotline using taped conservation messages, visits by the Watt-Wise Van, speeches, displays, visits, newspaper articles, brochures, and other public information activities.

In the near future, FPL will be adding load management programs to its current conservation efforts. The first to be implemented will be the Residential Load Control Program. An incentive will be offered to residential customers who agree to allow FPL to control appliances, such as central air conditioners and heaters, water heaters, and pool pumps. Control is to be exercised by cycling or interrupting the equipment during peak load periods. The program will be offered on a trial basis in certain areas of Dade County during 1986-87. Florida Power and Light has also advocated the required use of Time-of-Use (TOU) rates, but the Florida Public Service Commission (FPSC) has not granted this request. Instead, the FPSC prefers voluntary TOU rates.

<sup>2</sup> In each of the programs, contractors are required to respond within ten days after they are assigned an installation. This is facilitated by the large number of contractors who have been certified to work with FPL's incentive programs. Approximately 3300 contractors work with FPL on the incentive programs. In the HELP program where preselling is allowed, 36 contractors are assigned to HELP on a normal basis (i.e., as requests are received following a survey), and 30 are assigned to the preselling of HELP. Summer is the peak season for program participation. These are the only months during which a contractor supply constraint may be present, and the constraint tends to be limited to CCHP and RCIP.

<sup>3</sup> Florida Power and Light costs for each conservation program reflect total company expenditures for recurring and non-recurring costs. Kilowatt is a unit of power, and kilowatt-hour is a unit of energy, equivalent to the energy transferred in one hour by one kilowatt of power. Kilowatt savings, also called "demand" savings, result from reducing electricity consumption during peak hours translating into reduced capacity requirements for a utility. Net KW-related savings result from avoiding the construction of new generating units, the subsequent impact on fuel mix, and from avoiding the construction of new transmission and distribution facilities. Kilowatt-hour savings result from reduced electricity consumption as if measured at the customer's meter and is the sum of avoided marginal fuel costs and the gain in off-system sales.

<sup>4</sup> A subset of 2263 households remained in the sample after removing households with (1) missing data (N=2), (2) more than one survey (N=410), (3) program participations before April 1--the date HELP became fully established (N=46), and (4) more than one program participation on a single day (N=72).



### 3. RESEARCH DESIGN AND DESCRIPTION OF DATA SETS

#### 3.1 OVERVIEW

In keeping with the findings that there are many predictors of salesperson performance and that moderator variables are important (as reviewed in Section 1.3), we obtained information on a number of possible determinants of MSR performance. The three types of variables that reflect characteristics of the MSRs are: personal factors (e.g., age, education, prior job experience), aptitude and skill factors (measured by a standardized test and by supervisor ratings).

A fourth factor reflects organizational/environmental conditions measured in terms of dummy variables for the geographic divisions of FPL and characteristics of the households surveyed by each MSR. Because the effectiveness with which Marketing Service Representatives can sell conservation programs depends upon the receptiveness of households to such expenditures, several household characteristics are considered as possible moderator variables include the customer's age, race and sex; housing type and size; and the number of residents in the household.

Information on role perceptions or motivational factors was not collected because acquiring information on them requires more in-depth and one-to-one interviewing than was possible in this project. Thus, of the six types of factors seen by Churchill, Ford, and Walker (1985) to influence salesperson performance, we have collected information on four. These four types of factors are the easiest to measure.

#### 3.2 DATA SETS FOR THE ANALYSIS OF MSR EFFECTIVENESS

The analysis of MSR effectiveness required the development of three data sets: (1) MSR characteristics, (2) household characteristics, and (3) measures of MSR success in selling conservation programs and retrofits. The process of developing each of these data sets is described below (Sec. 3.2.1-3.2.3). An overview of the contents of each of these data sets is given in Table 3.1. In the last part of this section (3.2.4) sample sizes and the causes of sample attrition are discussed.

##### 3.2.1 MSR Characteristics

The MSR characteristics data were obtained from two sources: (1) an MSR Background form (Fig. 3.1) which was completed by FPL supervisors for all of the utility's full-time MSRs (N=99), and (2) a sales aptitude test which was administered to the same MSRs by following the standard procedures recommended by the publisher of the test. The sales aptitude test was the "Aptitudes Associates Test of Sales Aptitude: A Test for Measuring Knowledge of Basic Principles of Selling," published by Martin M. Bruce, Ph.D., Publishers, Larchmont, New York. Briefly, the test is designed to measure knowledge and understanding of basic principles of selling. It was developed by administering trial questions to salesmen and to groups in nonsales

Table 3.1 Contents of the three data bases

MSR characteristics	Household characteristics
Age Gender Years of education Major area of academic study Length of MSR experience Prior auditor experience Length of employment with FPL Direct selling experience Prior job experience Sales training Performance rating Extroversion/introversion rating Sales aptitude score Division	Age of household head Gender of household head(s) present at audit Race Number of permanent residents in the household Housing type (single-family attached, single-family detached, mobile home) Square footage of the dwelling Eligibility for CWHP, RCIP, and RWTP

Measures of MSR success in selling conservation
Closure rate for CWHP (C1) Closure rate for RCIP (C2) Closure rate for RWTP (C3) Closure rate for HELP (C4) Total program closure rate (C1+C2+C3+C4)  Mean installation cost for CWHP (\$) Mean installation cost for RCIP (\$) Mean installation cost for RWTP (\$) Mean installation cost for HELP (\$)



occupations; after extensive trials the questions that best discriminated between sales and nonsales groups were retained.

### 3.2.2 Household Characteristics

The household characteristics data were obtained from the HELP Daily Survey Logs (Fig. 3.2). These Logs were completed by the MSRs for 12,493 households they surveyed between May 6 and July 5, 1985. On the logs the MSR recorded (1) the date of the survey, (2) characteristics of the customer and the dwelling (e.g., customer age, race, sex, and square footage of the dwelling), (3) recommended HELP measures and eligible programs and (4) a rating of the customer's level of interest in each program. The logs completed by each MSR were summarized to provide aggregate descriptors of the types of households each MSR surveyed over the study period. For example, age of household head is measured as the percentages of households surveyed by a given MSR that fall into various age groups.

### 3.2.3 Measures of MSR Performance

Simultaneous with the development of the data base containing information from the survey logs, FPL developed a data base called FOCUS which contains program participation data for the households surveyed during the May 6 to July 5, 1985, study period. Participation data for these households were collected for the period from May 6 to October 11, 1985. The FOCUS data base indicates that 17,149 households were surveyed during the study period. Of these 17,149 households, 10,153 participated in one or more of the incentive programs between May 6 and October 11.

Combining survey log with FOCUS data makes possible the calculation of two types of measures of MSR success in selling conservation: closure rates, which are defined as the number of participations in a given program or programs per 100 households surveyed by an MSR, and mean installation costs, which are defined as the cost of installing each program averaged across all the program participants surveyed by a given MSR. Closure rates measure the ability of MSRs to generate participation in FPL's incentive programs. Installation costs reflect the MSR's ability to generate sizeable investments in conservation measures from program participants. Recall that CCHP is not included in the analysis of MSR performance because nearly half of CCHP participations are presold (i.e., the household decides to participate before an MSR conducts a home energy survey).

Since program participation data were collected through October 11, 1985, and the study period for surveys was May 6 through July 7, 1985, every household surveyed during the nine-week study period had at least three months to respond to MSR offers of program participation. However, the response time available varies from 23 weeks for households surveyed during the first week of the study period (May 6-10) to 15 weeks for those surveyed during the last week (July 1-5). An examination of the potential bias introduced by varying available response times was therefore conducted. It focused on the

# H.E.L.P. DAILY SURVEY LOG

SPECIAL CODE NUMBER FOR MSR

DATA ITEMS	CUSTOMER INFORMATION						
ACCOUNT NUMBER							
FIRST NAME, LAST NAME							
CITY OR TOWN, ZIP							
DATE OF AUDIT							
	MEASURES APPLICABLE TO HOME (✓)			FOR EMP USE ONLY			
CAULK DOORS	( )						
CAULK WINDOWS	( )						
WEATHERSTRIP DOORS	( )						
WEATHERSTRIP WINDOWS	( )						
DOOR SWEEP	( )						
THRESHOLD	( )						
WTR HTR WRAP	( )						
PIPE INSULATION	( )						
LOW FLOW SHOWERHEAD	( )						
FAUCET RESTRICTOR	( )						
ADAPTORS	( )						
DUCT SYSTEM MAINT.	( )						
REFLECTIVE WINDOW FILM	( )						
ELECTRICAL OUTLET GASKET	( )						
JALOUSIE STORM INSERTS	( )						
ESTIMATED SQUARE FOOTAGE	LESS THAN 1,000 <input type="checkbox"/>	1,000- 1,499 <input type="checkbox"/>	1,500- 1,999 <input type="checkbox"/>	2,000- 2,499 <input type="checkbox"/>	2,500 OR MORE <input type="checkbox"/>		
ESTIMATED CUSTOMER AGE	UNDER 21 <input type="checkbox"/>	21- 30 <input type="checkbox"/>	31- 40 <input type="checkbox"/>	41- 50 <input type="checkbox"/>	51- 60 <input type="checkbox"/>	61- 70 <input type="checkbox"/>	71 OR OLDER <input type="checkbox"/>
SEX	MALE <input type="checkbox"/>		FEMALE <input type="checkbox"/>				
RACE	WHITE <input type="checkbox"/>	BLACK <input type="checkbox"/>	ORIENTAL <input type="checkbox"/>	HISPANIC <input type="checkbox"/>	OTHER <input type="checkbox"/>		
NUMBER OF PERMANENT RESIDENTS	_____						
HOUSE TYPE	SINGLE FAMILY ATTACHED <input type="checkbox"/>		SINGLE FAMILY UNATTACHED <input type="checkbox"/>		MOBILE HOME <input type="checkbox"/>		
OTHER PROGRAMS (Check if eligible)	LEVEL OF CUSTOMER INTEREST						
	HIGH	MODERATE	LOW	(For EMP use only)			
CEILING INSULATION ( )	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
WINDOW TREATMENT ( )	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
WATER HEATING							
SOLAR ( )	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
HEAT PUMP WTR. HTR. ( )	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
HEAT RECOVERY UNIT ( )	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

Fig. 3.2. Daily Survey Log.

rate and speed of program participation across the nine-week period and the distribution of surveys by MSRs over the study period.

Rates of program participation increase over the nine-week study period despite the shorter response time allowed households who are surveyed in later weeks. The average number of program participations per household surveyed during the first four weeks is 1.13, while the average participation rate during the last four weeks is 1.30. The average number of days from a survey to a program participation decreases only slightly from 15.0 for households surveyed during the first four weeks to 14.3 for the last month of participants, despite the fact that the latter group has considerably less time available to respond to program offerings. These numbers suggest an increasing responsiveness to the incentive programs as summer approaches--a seasonal effect which counteracts any biases due to the shorter response times available to households surveyed later in the study period. An analysis of variance of participation rates and response times for each MSR and for each week of the study period indicates that there are no significant differences across the nine weeks. Thus, when taken together, neither seasonal variations in customer receptiveness nor variations in allowable response time appear to bias the analysis of MSR effectiveness.

In developing the closure rates we considered the problem of household eligibility for programs. Since nearly all households are eligible for HELP, no adjustment for eligibility is needed in calculating HELP closure rates. For the other programs, however, eligibility is not universal. FPL data indicate that, on the average, about 55% of households are eligible for CWHP and RCIP, and 70% for RWTP. Since some MSRs survey more eligible households than others, it would seem useful to define closure rates as the number of participations per 100 eligible surveyed households.

Obtaining accurate information on which households were eligible turned out to be difficult. Information on program eligibility was elicited by the Daily Survey Logs (Fig. 3.2); but these data were flawed for several reasons. First, on the average, MSRs turned in survey logs for only 82% of the households they surveyed. Thus, eligibility data are not available for all households surveyed. Second, eligibility is subject to interpretation as indicated by the fact that 3-5% of those households participating in each program were coded as ineligible. Because of these data problems, we elected to employ raw closure rates (i.e., number of participations per 100 households surveyed) as the dependent variables in all subsequent analyses. Eligibility rates (i.e., number of households eligible for a program per 100 households surveyed) are treated as predictors of closure rates. This approach allows the explanatory power of the eligibility measures to enter into the analysis of MSR effectiveness without contaminating the relationships between MSR effectiveness and its other predictors.

#### 3.2.4 Sample Sizes and Sample Attrition

After examining the 12,493 survey logs completed during the May 6-July 5 study period, 546 logs were dropped from the household

characteristics data set for one or more of the following reasons: missing or invalid household account numbers; duplicate households; household absent, canceled, or refused survey; household had previously participated in HELP; or invalid MSR code. Altogether, 11,947 survey logs were retained after these data quality checks.

Some of the households included in the FOCUS data base were also excluded from further analysis. In theory, every household that received a home energy survey during the May 6-July 5 study period should have both a survey log on file and an entry in the FOCUS data base indicating that a survey was conducted. Actually, there are 6,666 households on the FOCUS data base which have no survey logs and 1,465 households with survey logs that are not entered onto FOCUS (Table 3.2).<sup>1</sup> Of the 18,613 households that received a survey during the study period, 15,100 were given walk-through surveys, 1,679 participated in mass surveys (i.e., all of the households surveyed in a condominium or apartment complex have only one survey log turned in), 76 received class A surveys, and 1,720 required no survey because they were interested only in cooling, heating, or heat recovery units. We lack information on the nature of 38 surveys (Table 3.2). For our analysis of MSR effectiveness in selling conservation programs we retained only the walk-through surveys in our data set. Other survey types were dropped so that MSR closure rates would be calculated in a uniform manner for all MSRs.

Determining how to handle the 3,541 households who had a walk-through survey that are in FOCUS but that do not have survey logs was more difficult. Without a survey log, an MSR code number could not be easily associated with the FOCUS record of a household's participation in programs. Yet accurate MSR performance measures could only be obtained if the correct ratios of surveys conducted to participations achieved were available. Because measures of MSR performance in selling programs are the key dependent variable on which our analysis rests, considerable effort was devoted to the problem of identifying which MSR did each survey. Using a complex set of assumptions and a convoluted program which decoded a set of MSR identifiers that were on the FOCUS data base, we were able to assign our MSR codes to 2,462 of the 3,541 households with walk-through surveys that appeared only on the FOCUS data base. This made it possible to use data on these households in our calculations of closure rates. However, since their household characteristics are unknown, data on these households cannot be used in other parts of the analysis.

Table 3.2 shows that a total of 15,100 households received walk-through surveys. For various reasons, some of which are explained above, 1,564 of these households had to be dropped from the data set. Thus, the final data set includes 13,529 households (i.e., 90% of the total population of households receiving walk-through surveys during the study period) as shown in Table 3.3.

Some of the MSRs are dropped from the data sets because they conducted too few surveys or because they turned in too few survey logs for the calculation of meaningful descriptors of the households they

Table 3.2 Number of surveyed households by survey type  
and by source of information

Sources of available data	Walk-thru survey	Mass survey	Class A survey	Other <sup>a</sup>	Totals
Survey log and FOCUS	10,094	21	51	316	10,482
Survey log only	1,465	0	0	0	1,465
FOCUS only	<u>3,541</u>	<u>1,658</u>	<u>25</u>	<u>1,442</u>	<u>6,666</u>
Totals	15,100	1,679	76	1,758	18,613

<sup>a</sup>This column includes 38 households for whom type of survey is not known and 1,720 households who were visited by an MSR simply to qualify for CCHP or a heat recovery system under CWHP and therefore did not require a survey.

Table 3.3 Number of households with walk-through surveys retained for analysis

Sources of available data	Number of households
Survey log and FOCUS	9,614
Survey log only	1,457
FOCUS only	<u>2,458</u>
Total	13,529

surveyed. Specifically, the five MSRs who completed fewer than 30 surveys in our May 6-July 5 study period and the 22 MSRs who turned in survey logs for fewer than 75% of the households they surveyed are excluded from analyses that include household characteristics.<sup>2</sup> Thus, in analyses that include household characteristics our sample size is 72 MSRs, while in analyses that include only MSR characteristics only the five MSRs with fewer than 30 completed surveys are dropped. These five MSRs are dropped so that closure rates will be based on enough surveys to be robust.

### 3.3 FOOTNOTES TO SECTION 3

<sup>1</sup> There are several reasons for these mismatches. First, many MSRs did not turn in survey logs for households that they surveyed. MSR log turn-in rates varied from a low of 33% to a high of 98% with a mean of 82%. Secondly, some of the 6,666 households on FOCUS that lack survey logs did not receive a standard walk-through survey.

<sup>2</sup> Differences between the MSRs with high and low turn-in rates were analyzed to identify possible biases introduced by dropping those with low turn-in rates from the sample. As Table 3.4 shows the proportion of MSRs with at least 30 surveys and at least a 75% log turn-in rate varies markedly by division. The southern Division had the lowest turn-in rates. Less than half of the MSRs in the southern Division had turn-in rates of at least 75%. The southeast Division had the next lowest turn-in rates with about three-fourths of the MSRs exceeding the 75% level.

Table 3.4 Number of MSRs completing at least 30 surveys and turning in at least 75% of logs, by Division

Division	Total MSRs	MSRs with at least 30 surveys	MSRs with logs for at least 75% of surveys	Average turn in rate (%)
Northeastern	16	13	13	92
Western	19	19	16	84
Eastern	18	18	16	88
Southeastern	21	20	16	85
Southern	<u>25</u>	<u>24</u>	<u>11</u>	<u>68</u>
Totals/means	99	94	72	82

In order to identify possible biases introduced by analyzing only a subset of FPL's active MSRs, the 72 MSRs (with the log turn-in rates above 75%) to be retained throughout the analyses were compared with the 22 MSRs (with log turn-in rates below 75%) to be excluded from some analyses (Table 3.5). Comparisons of the groups with high and low turn-in rates show few significant differences in MSR characteristics. Age, education, length and type of experience were similar. Both groups were over 70% male and had similar sales aptitude scores. The only MSR characteristics that differed significantly were the performance ratings and the extroversion ratings that were assigned by supervisors. The group with low turn-in rates received both higher performance and higher extroversion ratings.

Table 3.5. Comparison of MSRs with high and low survey log turn-in rates<sup>a</sup>

Descriptors:	MSRs with turn-in rates above 75% N=72	MSRs with turn-in rates below 75% N=22	All MSRs N=94
Performance rating for MSR	103.1	106.7	103.9
Extrovert rating for MSR (0,1)	0.73	0.94	0.76
Closure rate for CWHP	13.4	17.9	14.5
Closure rate for RWTP	29.3	22.3	27.6
Closure rate for HELP	39.5	28.9	37.1
Percent white household heads	86.4	66.2	81.7
Percent male household head present at survey	44.4	37.9	42.9
Percent mobile homes	6.1	0.8	4.9

<sup>a</sup>For each of the descriptors shown, MSRs with high versus low turn-in rates are statistically different at a .05 level of significance. Other descriptors were tested for which differences are not significant such as age and gender of MSRs, MSR sales experience, MSR extroversion ratings, mean size of homes surveyed, and mean age of household heads surveyed.

The two groups showed several significant differences in program closure rates but the pattern was not uniform. The group with higher turn-in rates had lower closure rates for CWHP, but higher rates for RWTP and HELP. In terms of household characteristics, the same group was more likely to survey households that were white, that had the male household head present at the survey, and that lived in mobile homes. These differences may be due to the especially low turn-in rates in the southern Division (Table 3.4) which has more nonwhite households and fewer mobile homes than is typical for the entire FPL service area (Table 2.6). Differences in the characteristics of households surveyed by MSR groups with high and low turn-in rates suggest that households with survey logs on file may also differ from households without survey logs. We were unable to test this potential source of bias in our model results because we have no information on households that do not have logs.

#### 4. DESCRIPTIVE STATISTICS

##### 4.1 CHARACTERISTICS OF MARKETING SERVICE REPRESENTATIVES

Florida Power and Light offers a useful case study of MSR correlates of sales effectiveness because of the diversity of its MSR "sales force." Marketing Service Representatives come from a variety of educational and employment backgrounds, they span a wide range of ages, and they are drawn from both genders (Fig. 4.1). This variation enables us to test the influence of a variety of MSR characteristics upon sales performance.

Most MSRs come from two major groups: FPL employees in customer service jobs and college graduates in business or engineering. In particular, 33% of FPL's MSRs have studied business and 22% have training in engineering. The social sciences, humanities, trade, and vocational fields are other areas of study from which MSRs have been drawn. Most MSRs have completed at least some college coursework, but only half of them have four-year college degrees.

Most MSRs are male (75%) and their ages range from 21 to 49. The majority of MSRs are between 24 and 35 years of age--only 11% of the MSRs are younger than 24 and 18% are older than 35.

About 22% of the MSRs held jobs that required direct face-to-face selling before joining FPL. Most prior non-FPL job experience was in trade, sales or military occupations. Those MSRs who had job assignments at FPL prior to becoming an MSR were most likely to have worked as Customer Service Representatives, Customer Account Clerks, Meter Readers, Record Clerks, or Customer Service Clerks.

MSR scores on the Aptitudes Associates Test of Sales Aptitude are also wide ranging. When converted to percentile ranks using "sales applicants" as a normative group, MSRs have lower than average scores. This suggests that MSRs are less knowledgeable about selling principles than the typical applicant for a sales job dealing with other products.

In an effort to better describe the MSR sales force, Table 4.1 presents the correlations among MSR characteristics. First, nearly all of the MSR characteristics are intercorrelated, but none of the correlations are particularly high. One cluster of variables suggests that there is a subgroup of MSRs who are younger than average, more highly educated and oriented toward engineering, with fewer months of experience as MSRs, and with lower performance and extroversion ratings. Another cluster of variables includes several measures of salesmanship aptitude and performance. In particular, MSRs with high scores on the sales aptitude test are given high performance and extroversion ratings by their supervisors.

<u>Major Area of Study</u>	<u>Age/Gender Distribution</u>
33% business	75% male
	age ranges from 21 to 49
22% engineering	67% are 25 to 35 years old
<u>Educational Level</u>	<u>Sales Aptitude Tests Scores</u>
50% have a four-year college degree	range from 0 to 99
12% have associate degrees	38% are less than 20
16% have only a high school degree	11% are greater than 80

Fig. 4.1 Profile of FPL's Marketing Service Representatives

Table 4.1. Correlations among MSR characteristics<sup>a</sup>

MSR characteristics	Age	Education	Engineering education	MSR experience prior to FPL	Months employed by FPL	Months of prior MSR work at FPL	Performance Rating	Extrovert rating
Years of age								
Years of education	-0.528***							
Engineering education (0,1)	-0.431***	0.378***						
MSR experience prior to FPL (0,1)	0.30**	-0.546***	-0.517***					
Months employed by FPL	0.551***	-0.575***	-0.406***	0.595***				
Months of prior MSR work at FPL	0.498***	-0.434***	-0.332**	0.607***	0.602***			
Performance rating	0.273*	-0.262*	-0.208	0.305**	0.319**	0.263*		
Extrovert (0,1)	0.239*	-0.206*	-0.417***	0.247	0.296**	0.177	0.302**	
Sales aptitude score	0.133	-0.125	-0.104	0.059	0.131	-0.126	0.287**	0.320**

<sup>a</sup>Based on data for 94 MSRs. \*, \*\*, and \*\*\* indicate that simple correlations are significant at the .05, .01, and .001 levels, respectively.

## 4.2 LEVELS OF PROGRAM PARTICIPATION

Table 4.2 describes the mean levels of program participation and eligibility, by Division.<sup>2</sup> As expected, rates of participation are on average highest for HELP (37%) and lowest for CWHP (14.5%) and RCIP (23%). Mean installation costs range from \$69 for HELP to \$243 for RCIP, \$341 for CWTP, and \$3,319 for CWHP. The average household expenditures are \$35, \$87, \$118, and \$2963, respectively. Thus, the mean household expenditure on HELP is smallest of all the programs both in magnitude and as a proportion of total installation costs. The mean household expenditure on CWHP is greatest both in magnitude and as a proportion of total installation costs.

The same table documents a high variability in levels of program participation across geographic Divisions. As one example, the mean rate of participation in CWHP ranges from 5.5% in the Southeastern Division to 20.1% in the Southern Division. The table also shows that Divisions which have high participation rates in one program may have low participation rates in another. For example, while the Southeast had the lowest rate of participation in CWHP, its rates of participation in RCIP, RWTP, and HELP are higher than the FPL-wide rates of participation.

Eligibility for CWHP, RCIP, and RWTP varies significantly across Divisions, generally paralleling rates of program participation. (Eligibility for HELP is assumed to be 100% in all Divisions.) Using the Southeast as an example again, it has a low rate of eligibility for (and participation in) CWHP, but higher than average eligibility rates (and participation rates) for RCIP and RWTP. As with program participation, Divisions tend to have a high rate of eligibility for one program and a low rate of eligibility for another. The West and East are exceptions to this, the former having higher than average eligibility rates for all programs and the latter having lower than average eligibility rates for all programs.

## 4.3 LEVELS OF MSR EFFECTIVENESS

Paralleling the variability in program market penetration across Divisions, measures of sales effectiveness vary considerably across MSRs. Focusing on HELP as one example, closure rates range from 5.2 to 78.9% with a mean of 37.1 and a standard deviation of 14.8 (Figure 4.2). Mean installation costs vary from \$30 to \$108 with a mean of \$69 and a standard deviation of \$17. Figure 4.3 documents the wide range of total closure scores achieved by the MSRs. This large variation is consistent with the argument that MSRs do indeed differ in their abilities to sell conservation. On the other hand, the FPL service area is so large and heterogeneous that differences in household receptivity could account for the large variation in auditor performance.

The argument explored in this report is that levels of MSR effectiveness vary because MSRs differ in their salesmanship abilities and because the markets served by MSRs vary in terms of receptivity to energy conservation expenditures. An analysis of variance of MSR and

Table 4.2. Rates of program participation and eligibility, by division

	Division: <sup>a</sup>					
	Total	Northeastern	Western	Eastern	Southeastern	Southern
Percent of Surveyed Households Participating:						
CWHP	14.5	16.2	18.2	13.9	5.5	20.1
RCIP	23.3	26.8	18.3	14.6	26.4	31.6
RWTP	28.2	19.2	29.6	36.2	33.6	18.6
HELP	36.6	43.3	23.8	48.3	40.4	32.3
Total	102.6	105.5	89.9	113.0	105.8	102.7
Mean Installation Costs (\$):						
CWHP	3319	3044	3342	3263	3185	3669
RCIP	342	365	325	305	363	357
RWTP	242	234	221	264	232	264
HELP	69	74	67	56	69	79
Percent Surveyed Households Eligible:						
CWHP	61.2	66.6	71.8	49.4	52.8	65.4
RCIP	51.3	55.9	53.3	35.3	53.4	58.2
RWTP	68.4	67.1	72.7	66.9	71.2	62.1
HELP	100.0	100.0	100.0	100.0	100.0	100.0

<sup>a</sup> Analysis of variance indicates that the mean values for each of these program participation and eligibility variables differ significantly across divisions, using  $p=.001$ .

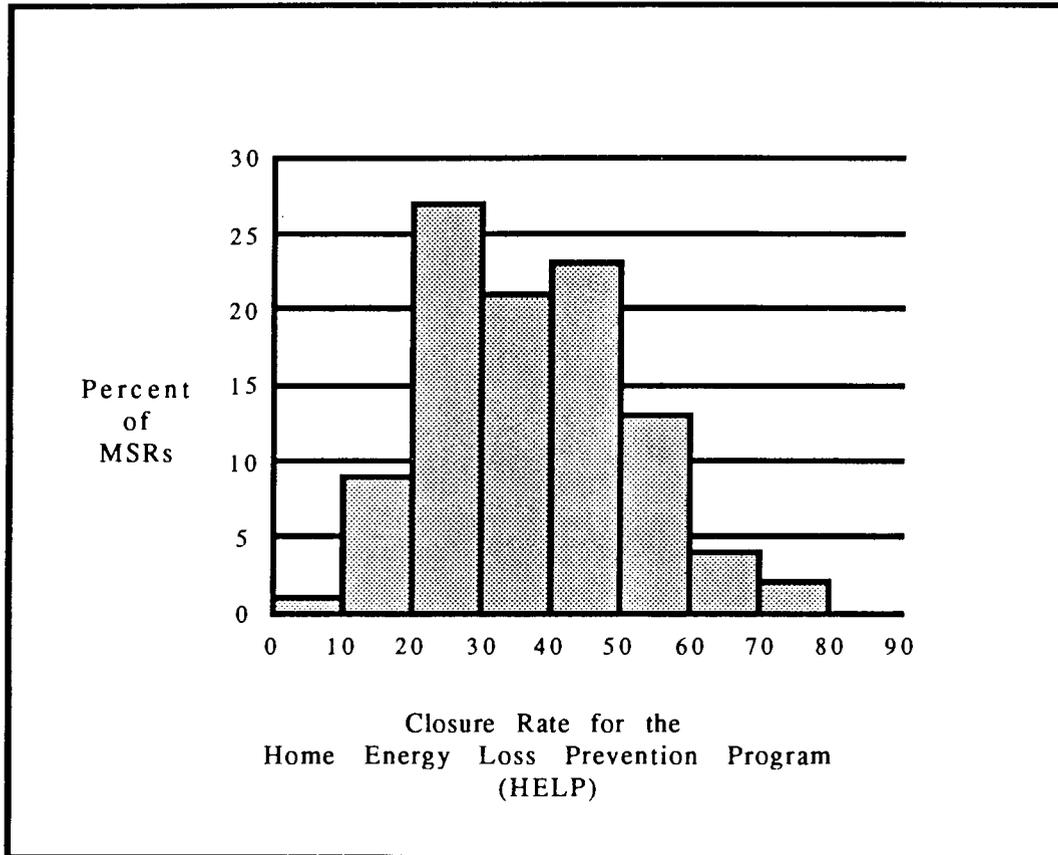


Fig. 4.2. Variation in HELP closure rates across MSRs.

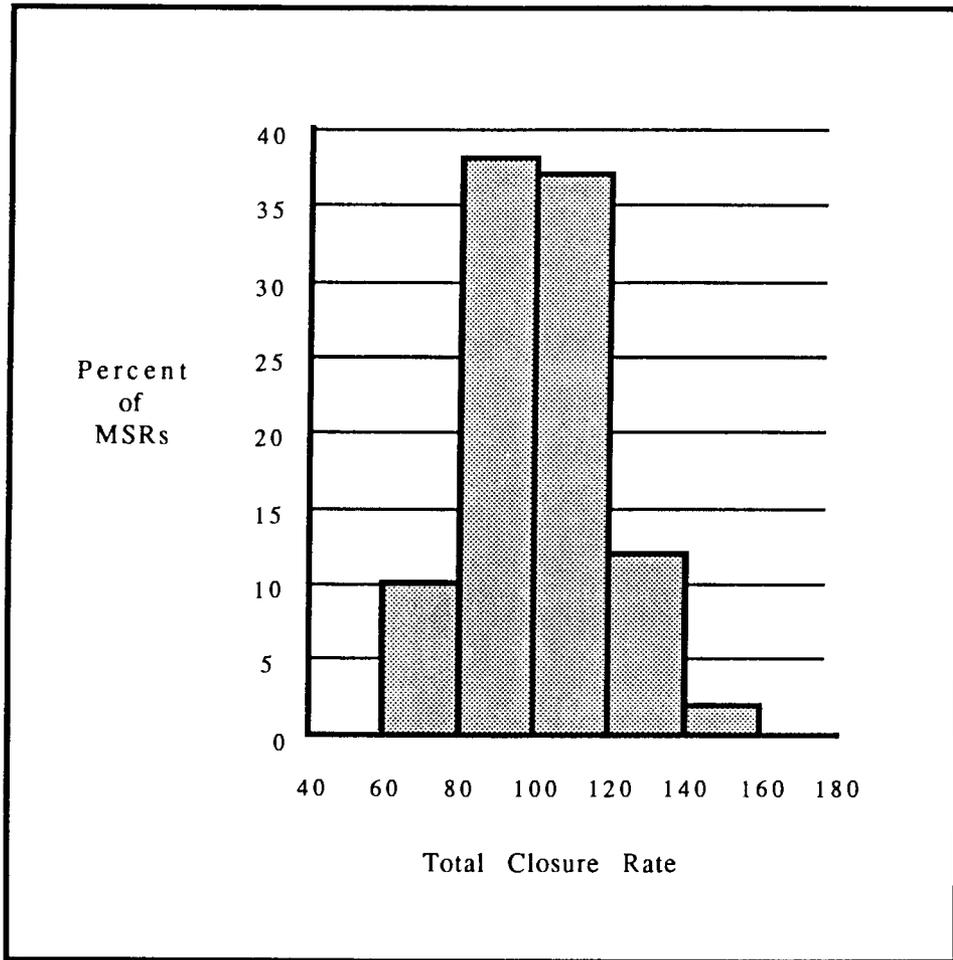


Fig. 4.3. Variation in total closure rates across MRSs.

household characteristics shows that both MSR and market variables differ significantly across the Divisions of FPL. As an example, the percent of MSRs with an engineering background varies from 5 (in the Western Division) to 50 (in the Southeastern Division). In terms of household characteristics, only 5.6% of those households surveyed in the West were nonwhite, while 46.5% of those surveyed in the South were nonwhite. Since both types of variables differ, it is not possible to attribute the cross-Division variation in levels of program participation to either MSR or household variables (or some combination of both) without further analysis. The next section of this report looks at household correlates of MSR effectiveness. Results of a multivariate analysis, using household and MSR characteristics as predictors of MSR effectiveness, are presented in the Section 6.

#### 4.4 FOOTNOTES TO SECTION 4

<sup>1</sup> "Sales applicants" refers to a sample of salesmen in the South, primarily Florida, who were tested by a consulting group at the time they were being considered for employment by various clients. These clients distribute products in the following fields: cement, dry goods, lumber, paper, industrial mill supplies, fertilizer, seed and grain, metals, gas appliances, electrical appliances, and other tangible products. Details of the sales aptitude test's development, scoring, normative groups, and validation can be obtained from Martin M. Bruce, Ph.D., Publishers, 50 Larchwood Rd., Larchmont, New York, 10538.

<sup>2</sup> Keep in mind that measures of MSR effectiveness, such as closure rates, are based on MSR-level data as aggregated across those households surveyed by each of the 94 MSRs. Levels of program participation are household-level measures and are therefore based on a population of 13,529. Closure rates and rates of program participation will differ slightly because MSRs differ in the success with which they sell conservation, and they survey different numbers of households. For example, the mean closure rate for HELP based on 94 MSRs is 37.1%, even though 36.6% of the surveyed households participated in HELP.

## 5. CHARACTERISTICS OF PARTICIPATING HOUSEHOLDS

### 5.1 CHARACTERISTICS OF SURVEY PARTICIPANTS AND NONPARTICIPANTS

Households can be expected to have varying receptivity to conservation programs. As is the case in most audit programs across the country, FPL's home energy surveys are most attractive to particular segments of its market.

A number of evaluations of home energy audit programs demonstrate that customers who choose to obtain audits differ from the general population of eligible customers. In particular, audit participants typically have higher educational and income levels than the population at large, and they are disproportionately middle-aged (Berry, Soderstrom, Hirst, Newman, and Weaver, 1981; Olsen and Cluett, 1982; Brown and Macey, 1985).

In general, FPL home energy survey participants differ from the population of all FPL residential customers in a similar manner (Table 5.1). Although data on the income of households obtaining FPL home energy surveys are not available, the higher percentage of single-family detached dwellings among participants suggests that their income is higher than that of the general population. Over 68% of households having surveys occupied single-family detached dwellings as compared to 51.7% in the general population. Survey participants also have slightly larger dwellings than the general population. In particular, they are less likely to occupy dwellings with less than 1,000 square feet and more likely to occupy dwellings with 1,000-1,499 square feet.

An examination of the age of household heads shows marked differences between survey participants and the general population of residential customers (Table 5.1). Forty-five percent of all FPL customers are over 60 years of age, but only 28% of survey participants are elderly. In keeping with this finding, survey participants are slightly younger and have slightly larger households than nonparticipants.

### 5.2 CHARACTERISTICS OF PROGRAM PARTICIPANTS VS. NONPARTICIPANTS

After a household decides to obtain a survey, it must then decide in which, if any, of the four FPL incentive programs to participate. The literature offers little guidance as to what types of households participate in programs (such as FPL's) that provide subsidies to contractors for the installation of conservation measures. Correlates of participation in postaudit low-interest loan programs, however, have been identified. According to case studies of loan programs at the Bonneville Power Administration and the Northern States Power Project, low-interest loan participants are better educated, wealthier, younger, and have larger homes than nonparticipants (Tonn and Berry, forthcoming; Hirst, et al., 1983). Thus, they differ from

Table 5.1. Distributions of characteristics of FPL residential customers vs. home energy survey participants

	FPL residential customers	Survey participants <sup>b</sup>
Square footage of dwelling	1,320 <sup>a</sup>	1,359
Less than 1,000 (%)	45	25
1,000 - 1,499 (%)	28	48
1,500 - 1,999 (%)	18 <sup>a</sup>	19
2,000 - 2,499 (%)	5	6
Greater than 2,500 (%)	3	2
Age of household head in years	51.4 <sup>a</sup>	49.0
Under 21 (%)	0.3	0.5
21-50 (%)	39.1	52.0
51-60 (%)	15.9	19.1
Over 60 (%)	44.7	28.4
Number of permanent residents	2.5	2.8
Dwelling type		
Single-family detached (%)	51.7	68.8
Single-family attached (%)	39.0	25.6
Mobile homes (%)	9.3	5.6
Race and ethnicity <sup>c</sup>		
Hispanic (%)	8.8	6.6
Black (%)	13.8	4.7
White (%)	83.9 <sup>a</sup>	87.6

<sup>a</sup>The differences in means or percentages for these variables were not statistically significant. All of the other comparisons of differences in proportions in the table are significant at  $p \geq 0.01$ .

<sup>b</sup>The distribution of percentages for the characteristics in this column were obtained from the HELP Daily Survey Logs completed on 11,497 homes surveyed between May 6, 1985 and July 5, 1985.

<sup>c</sup>These percentages are for the state of Florida and were obtained from U.S. Bureau of the Census, County and City Data Book, 1983, U.S. Government Printing Office, 1983. They total to more than 100% because persons with Hispanic surnames are also coded as Black, White, or Oriental. The percentages for other characteristics were obtained from a mailed sample survey conducted by FPL in 1984. A stratified random sample of 10,035 customers was drawn from the population of 2,145,365 residential customer accounts on record as of January 26, 1985.

nonparticipants in much the same way as audit participants differ from those households that do not participate in audits.

Figure 5.1 and Table 5.2 illustrate that the characteristics of participants and nonparticipants in FPL's incentive programs are significantly different. Further, profiles of participants in each of the four programs are distinct, although HELP and RWTP are somewhat similar in terms of the participants they attract. Paralleling this diversity, some correlates of the decision to participate in an incentive program are the same and some are different from correlates of the survey participation decision.

The Conservation Water Heating Program is significantly more attractive to younger and middle-aged households than to elderly households, and concomitant with this, participants have larger than average households. This finding suggests, logically enough, that households which use more hot water and for which hot water heating may represent a larger fraction of their utility bills are more likely to invest in efficient water heating equipment. Further, participants in this program are drawn disproportionately from medium-sized and single-family detached houses. This program attracts proportionately more black and Hispanic participants than any of the other three incentive programs, with 18% of its participants coming from these minority groups compared with 11% of survey participants. According to FPL employees, this is due to an aggressive marketing campaign waged by several contractors who attempted to generate interest among minority groups in purchasing new water heater equipment.

Participants in the Residential Ceiling Insulation Program are similar to those in the water heater program in that they are predominantly occupants of single-family detached housing. However, participants in RCIP are not very different from nonparticipants in terms of age of household head, the number of household members, and size of dwelling unit.

The Residential Window Treatment Program and HELP are similar in that they draw disproportionately from households headed by elderly residents (more than 40% of the participants in RWTP are 61 years of age or older; in HELP 32% are elderly) and smaller than average households (RWTP participants have, on average, 2.4 permanent residents compared with 3.1 for nonparticipants; in HELP the average is 2.8). Perhaps related to this age bias, program participation in RWTP is significantly greater among households where a female household head was present at the survey. Both programs attract disproportionate numbers of white participants and households living in single-family attached houses.

The patterns of response to programs described above can be better understood by looking at how household characteristics are related to one another. For instance, there is a cluster of variables which correlate with age of household head. As is shown in Table 5.3, older households tend to have fewer household members and smaller homes. They tend to occupy attached dwelling types and mobile homes more

<b>CWHP</b>	<b>RCIP</b>	<b>RWTP</b>	<b>HELP</b>
young or middle aged household heads	N/A	older household heads	older household heads
larger households	N/A	smaller households	smaller households
medium-sized houses	N/A	smaller houses	medium-sized houses
single-family detached houses	single-family detached houses	single-family attached houses	single-family attached houses
many Hispanic and Black, few White households	many Hispanic but few Black households	many White, but few Hispanic or Black households	many White, but few Black households

Fig. 5.1 Participant profiles, by program\*

\*This figure identifies those household and dwelling unit characteristics which are related to program participation. The descriptors are relative. For instance, "older household heads" are over-represented in HELP relative to their proportion among surveyed households. They are not the dominant age group among participants.

N/A — not applicable, variable was unrelated to participation in this program.

Table 5.2. Percent distribution of characteristics for program participants and nonparticipants

	CWHP		RCIP	
	Participants	Non- participants	Participants	Non- participants
Age of household head				
Under 21				
21 - 30	9.3*	7.6		
31 - 40	35.2***	21.8		
41 - 50	26.5***	18.2	20.7*	18.9
51 - 60	16.1**	18.7	20.3*	17.9
61 - 70	8.1***	24.0	19.7**	22.6
Over 70	1.5***	6.4		
Number of permanent residents	4.1***	2.7	2.8**	2.9
Female household head at survey			39.4***	44.0
Square footage of dwelling				
Less than 1000	11.9***	26.2		
1,000 - 1,499	51.4***	45.7	44.7*	46.9
1,500 - 1,999	25.1***	17.1	19.6*	17.7
2,000 - 2,499				
Greater than 2,500				
Dwelling type				
Single-family detached	87.0***	63.1	78.6***	62.8
Single-family attached	8.6***	27.8	16.2***	27.8
Mobile homes	1.1***	6.1	2.3***	6.3
Race and ethnicity				
Hispanic	9.8***	5.9	8.8***	5.7
Black	8.6***	3.9	2.3***	5.1
White	77.3***	86.7		
Eligibility	95.9***	56.7	96.5***	39.2

\*, \*\*, and \*\*\* indicate significant differences in the percent of surveyed households who are program participants versus nonparticipants, at the .05, .01, and .001 levels, respectively. There are blanks in the table where participants and nonparticipants are not significantly different.

Table 5.2. Percent distribution of characteristics for program participants and nonparticipants (continued)

	RWTP		HELP	
	Participants	Non- participants	Participants	Non- participants
Age of household head				
Under 21				
21 - 30	5.0***	9.0	6.5***	8.7
31 - 40	16.4***	26.4	21.6***	24.7
41 - 50	14.3***	21.3		
51 - 60	21.4***	17.2		
61 - 70	33.1***	17.4	25.2***	19.9
Over 70	7.3***	5.1	6.4*	5.3
Number of permanent residents				
	2.4***	3.1	2.8***	2.9
Female household head at survey				
	40.5***	44.0		
Square footage of dwelling				
Less than 1000	30.0***	22.0	23.3*	25.1
1,000 - 1,499	45.0*	47.1		
1,500 - 1,999	15.0***	19.4	19.9***	17.0
2,000 - 2,499	5.1*	6.2		
Greater than 2,500	1.6**	2.5		
Dwelling type				
Single-family detached	47.4***	73.9		
Single-family attached	40.3***	19.2	27.3***	24.1
Mobile homes	9.4***	3.8	4.1***	6.3
Race and ethnicity				
Hispanic	4.2***	7.3		
Black	1.1***	5.9	3.3***	5.3
White	91.2***	83.1	87.6***	84.1
Eligibility				
	96.3***	58.2	N.A. <sup>a</sup>	N.A. <sup>a</sup>

\*, \*\*, and \*\*\* indicate significant differences in the percent of surveyed households who are program participants versus nonparticipants, at the .05, .01, and .001 levels, respectively. There are blanks in the table where participants and nonparticipants are not significantly different.

<sup>a</sup>All households are assumed to be eligible for HELP.

Table 5.3. Correlations among household characteristics<sup>a</sup>

	Age of household head	Number of household members	Square footage of dwelling	Whites	Hispanics	Blacks
Age of household head (years)						
Number of household members	-0.652***					
Square footage of dwelling	-0.435***	0.299**				
Dwelling type						
Attached (%)	0.262**	-0.310**				
Detached (%)	-0.375***	0.381***	0.195*	-0.239*	0.219*	0.201*
Mobile home (%)	0.397***	-0.295**	-0.257**	0.428***	-0.339***	-0.261**
Race and ethnicity						
Whites (%)	0.473***	-0.554***				
Hispanics (%)	-0.388***	0.559***				
Blacks (%)	-0.320***					

<sup>a</sup>Based on data for 72 MSRs. \*, \*\*, and \*\*\* indicate that simple correlations are significant at the .05, .01, and .001 levels, respectively.

frequently than other age groups. Older households also are more likely to be white than are younger households.

The profiles of program participants described above support the notion that the four incentive programs serve unique market niches. As a result, MSRs are likely to find that the households in their service areas are more receptive to some programs than to others, depending upon how well each program matches the service area's needs. In order to identify the effectiveness with which MSRs sell the conservation programs, it will therefore be necessary to account for varying market receptiveness on a program-by-program basis.

### 5.3 HOUSEHOLD CORRELATES OF MEAN INSTALLATION COSTS

Table 5.4 presents the mean installation costs for program participants, by type of household and dwelling unit. Size of dwelling unit is the household variable most closely related to level of conservation expenditure, but its direction of influence is not uniform across programs. Expenditures on RCIP, RWTP, and HELP all increase with dwelling size, while expenditures on the water heater program are greater for smaller than for larger homes. Expenditures on CWHP, RWTP, and HELP are greatest for households with four or more members. In addition, expenditures tend to be greater for households headed by younger or middle-aged persons rather than older households. This is consistent with the fact that younger and middle-aged households tend to live in larger homes.

These findings reinforce the need to develop program-specific measures of market receptiveness as a prerequisite to identifying MSR effects. The types of households that spend a large amount of money on conservation programs differ by program.

Table 5.4. Mean installation costs for program participants, by type of household and dwelling unit

	CWHP	RCIP	RWTP	HELP
Age of household head	***	n.s.	*	***
Under 21	3,995		228	69
21 - 30	3,496		231	67
31 - 40	3,568		259	75
41 - 50	3,456		267	76
51 - 60	3,125		249	70
61 - 70	2,816		237	60
Over 70	2,739		206	62
Number of permanent residents	***	n.s.	*	***
1 person	3,292		228	61
2 persons	2,675		242	65
3 persons	3,458		256	75
4 or more persons	4,080		307	72
Household head at survey	*	*	n.s.	*
Female	3,474	344		71
Male	3,312	366		68
Square footage of dwelling	***	***	***	***
Less than 1000	3,577	266	203	58
1,000 - 1,499	3,460	343	256	67
1,500 - 1,999	3,199	411	257	78
2,000 - 2,499	3,283	510	309	87
Greater than 2,500	2,961	717	336	94
Dwelling type	n.s.	***	***	***
Single-family detached		364	339	76
Single-family attached		259	204	55
Mobile homes		812	262	53
Race and ethnicity	***	***	*	***
Hispanic	3,822	298	194	78
Black	3,882	320	257	66
White	3,280	362	248	68

\*, \*\*, and \*\*\* indicate that installation costs differ significantly across the categories of a variable, at the .05, .01, and .001 levels, respectively. N.s. indicates no significant differences based on an analysis of variance.



## 6. PREDICTORS OF MARKETING SERVICE REPRESENTATIVES PERFORMANCE

This section begins by comparing the five closure rates and four measures of installation costs to determine how much they overlap in measuring MSR effectiveness. Regression models are then presented for each of the nine measures of auditor performance. These models predict closure rates and mean installation costs on the basis of MSR, household, and divisional characteristics.

### 6.1 CORRELATIONS AMONG THE MEASURES OF AUDITOR PERFORMANCE

The previous sections showed a general lack of consistency across programs in the household correlates of participation. Those types of households which participate in different programs vary considerably. Indeed, in several instances a household characteristic is positively correlated with participation in one program and negatively correlated with participation in another program. The same is true of mean installation costs. Those household characteristics which correlate with high installation costs are different across the programs. This general lack of consistency should translate into considerable variation in the ability of MSRs to sell different programs to their service areas.

Table 6.1 verifies that closure rates and mean installation costs for different programs are not highly correlated. Indeed, MSRs with high closure rates for the window treatment program tend to generate less than average levels of participation in the water heater and ceiling insulation programs as indicated by the correlations of  $-.329$  and  $-.349$  for CWHP and RCIP, respectively. This supports the notion that the four incentive programs serve unique market niches and that to some extent MSRs may be able to successfully sell only the one or two programs which are most appropriate to the market areas they serve. Thus, it is necessary to examine each program separately in order to identify the relationship between MSR characteristics and level of program participation.

### 6.2 MULTIVARIATE REGRESSION MODELS

This section describes the results of a set of multivariate regression analyses of MSR effectiveness. Regression models are first presented and discussed for each program's closure rate and for the total closure rate (section 6.2.1). Regression models of mean installation costs for each of the four programs are then presented and discussed (section 6.2.2). For both types of effectiveness measures, the analytic approach is similar. It employs ordinary least squares regression, using a hierarchical stepwise procedure for the inclusion of independent variables.

All of the variables measuring household characteristics shown in Table 5.4, including dummy variables for Divisions, are first considered

Table 6.1. Correlations among the closure rates

	CWHP	RCIP	RWTP	HELP
<u>Closure rates:</u>				
<u>Closure rates:</u>				
CWHP				
RCIP				
RWTP	-.329***	-.349***		
HELP	-.415***			
Total		.316**	.389***	.740***
<u>Closure rates:</u>				
<u>Mean installation cost:</u>				
CWHP	.303**			
RCIP				
RWTP	.231*		-.205*	
HELP		.408***	-.338***	
<u>Mean installation cost:</u>				
<u>Mean installation cost:</u>				
CWHP				
RCIP	-.070			
RWTP	.040	.169		
HELP	-.040	.301**	.067	

\*, \*\*, and \*\*\* indicate correlation coefficients that are significant at the .05, .01, and .001 levels, respectively.

for inclusion. Since it is necessary to have fewer dummy variables than Divisions, no dummy variable was included for the northeastern Division. These household variables are entered into the regression equation one at a time until the partial F-statistics of all remaining variables fall below a .10 level of significance. Variables measuring MSR characteristics are then considered for inclusion, and the same stepwise procedure is used to add them to the regression model.

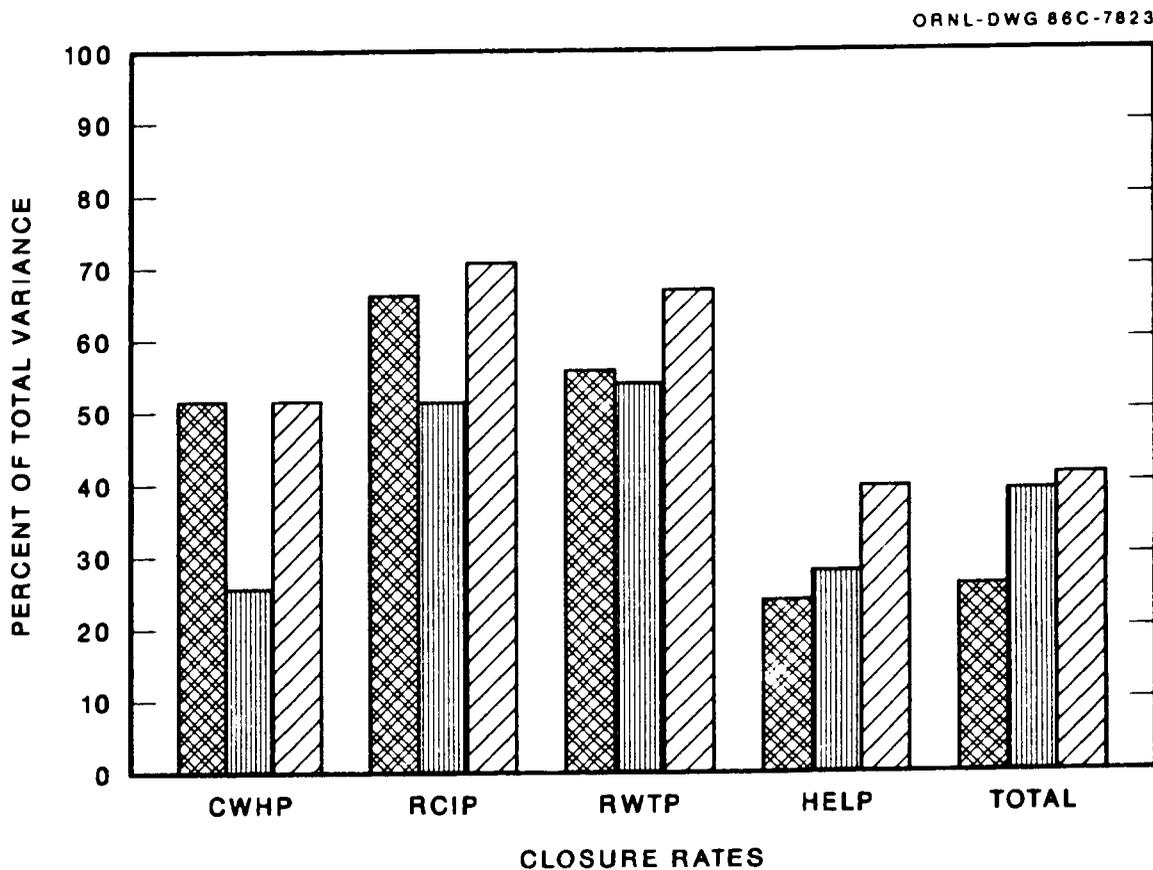
This hierarchical stepwise approach is consistent with the view of household characteristics as measures of the varying receptiveness each MSR faces in selling conservation programs. Their effects must first be controlled in order to isolate the influence of MSR characteristics. With this hierarchical approach it is possible to estimate the amount of variation in MSR effectiveness which can be explained by MSR characteristics once the influence of household characteristics has been taken into account.

Models are also developed for household and MSR characteristics treated separately. Stepwise inclusion is used for each of these.

#### 6.2.1 Multivariate Regression Models of Closure Rates

For three of the four programs, household characteristics are better able to explain variations in closure rates than are MSR characteristics (Fig. 6.1). For HELP and the total closure rate, however, MSR characteristics are better than household variables in explaining levels of MSR performance. Once household variables are controlled (the third bars in Fig. 6.1), the percent of variation explained by MSR characteristics ranges from zero for CWHP to 12% for HELP and 14% for the total closure rate. Overall, the models in which all predictors are included have considerable explanatory power, with adjusted coefficients of determination ranging from .346 (for HELP) to .677 (for RCIP).

Table 6.2 presents the regression coefficients for each of the variables which entered into the combined regression equations for the five closure rates. The first five independent variables shown on the table are Division dummy variables and rates of eligibility. In general, these are the strongest predictors of closure rates. Of the remaining household characteristics, the following were significant: percent middle-aged household heads (positively correlated with CWHP closure rate); percent of surveys where a female household head was present (positively correlated with CWHP closure rate); percent elderly household heads (positively correlated with RWTP closure rate); and percent young household heads (positively correlated with HELP closure rate). Other household characteristics identified as correlates of program participation in Table 5.3 are subsumed in the regression analysis by the Division dummies and eligibility. For instance, Table 5.3 indicates that closure rates for RCIP are significantly less for older household heads. This relationship is partly captured by the negative dummy variable for the western Division (which has the highest proportion of household heads over 60 of all the Divisions), and the positive coefficient for program eligibility.



Program acronyms are: CWHP=Conservation Water Heating Program; RCIP=Residential Ceiling Insulation Program; RWTP=Residential Window Treatment Program; and HELP=Home Energy Loss Prevention.

Fig. 6.1. Percent of total variance in closure rates explained by Division and household variables (left bars), MSR characteristics (middle bars), and household variables with MSR characteristics (right bars).

Table 6.2. Regression coefficients for Division, household and MSR characteristics as predictors of closure rates

	Closure rates:				
	CWHP	RCIP	RWTP	HELP	Total
(1)					
Intercept	7.34	18.72***	-12.33	16.55	64.85*
East Division (0-1)		-11.52***	11.20***		[8.35]
Southeast Division (0-1)	-10.43***		11.75***	[-5.86]	
West Division (0-1)		-13.12***	[5.22]	-16.31	-20.85***
Eligibility (%)	0.07*	0.19***	0.17*		0.45** <sup>a</sup>
Female household head at survey (%)	-0.12*				
Household head age 30 years or less (%)			-0.28		
Household head age 31-60 years (%)	0.15***				
Household head age over 60 years (%)			0.16*		
(2)					
FPL employment (months)			0.07***		
MSR experience (months)		-0.05		-0.24*	
MSR male (0-1)		-3.04	-3.62		
MSR education (years)			1.20	1.78*	
Extroversion (0-1)		4.10*		7.63*	16.22***
Sales aptitude test score			0.10		
R <sup>2</sup>	.515	.707	.668	.396	.412
Adjusted R <sup>2</sup>	.486	.677	.608	.346	.375
F-statistic	17.79***	23.70***	11.25***	7.86***	11.19
Number of MSRs	72	66	67	66	69

\*, \*\*, and \*\*\* indicate that regression coefficients are significantly different from zero at the .05, .01, and .001 levels, respectively, according to partial F-statistics.

[ ] identifies Division variables which enter during the second stage of the regression analysis along with the MSR characteristics.

<sup>a</sup> Eligibility with respect to RWTP.

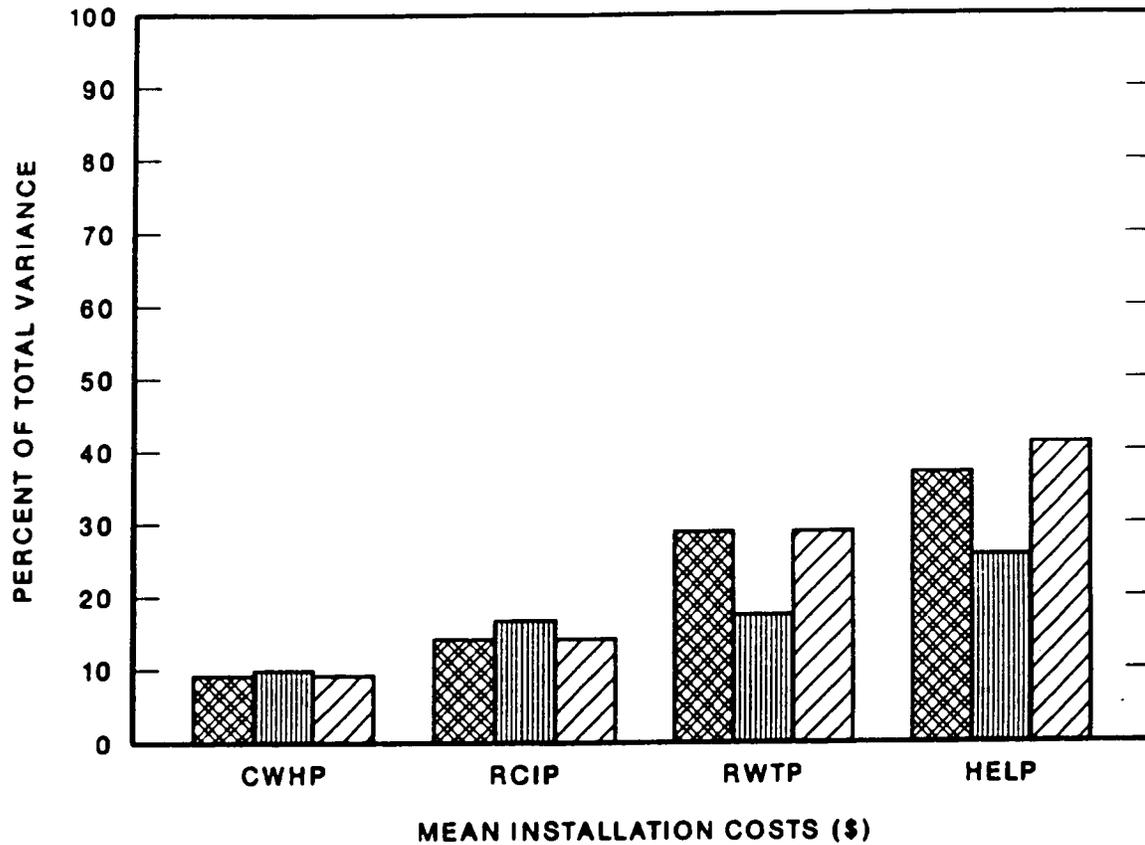
The regression coefficients for the MSR characteristics highlight the key role of extroversion (Table 6.2). Other MSR characteristics also enter the models, but their levels of significance are generally not as great. The significant findings are summarized below:

- o Those MSRs rated as extroverted by their supervisors have total closure rates which are 16% higher than the total closure rates of introverted MSRs. Extroversion is also related to closure rates for RCIP and HELP, with extroversion leading to rates which are 4% or 8% higher, respectively, than the closure rates of introverted MSRs.
- o Months of FPL employment is a positive predictor of RWTP closure rates. (For each added year of experience, the closure rate increases by 0.8%.)
- o Months of MSR experience is a weak negative correlate of closure rates for RCIP and HELP. (The decrement in closure rate for each additional year of experience is -0.6% and -2.8%, respectively.)
- o Male gender for MSRs is a weak negative correlate of closure rates for RCIP and RWTP. (Female MSRs had 3 and 4% higher closure rates, respectively.)
- o Years of education of MSRs is positively correlated with RWTP and HELP closure rates. (Each additional year of education contributes 1 and 2% to the closure rates, respectively.)
- o Raw score on the sales aptitude test is positively correlated with the closure rate for RWTP. (A score in the 100th percentile increases the closure rate by 10% compared with a score in the 0 percentile.)

#### 6.2.2 Multivariate Regression Models of Mean Installation Costs

Figure 6.2 summarizes the results of the regression analysis of mean installation costs. Compared with the explanatory power of the models of closure rates, the models of installation costs are weak. Only in the case of HELP are the coefficients of determination greater for the model of costs than the model of closure rates. The adjusted  $R^2$  values for the full (the right-hand bars in Figure 6.2) regression models of installation costs range from 0.06 for CWHP to 0.37 for HELP.

For two of the programs, household characteristics (represented by the left-hand bars) provide higher  $R^2$ 's than MSR characteristics (the middle bars), but neither type of model is strong. Two Division dummy variables are prominent, as are measures of house size and demographic characteristics. In general, the higher the percentage of detached houses and the larger the homes, the greater the installation costs. Further, the greater the percent of young household heads, the higher the CWHP installation costs, and the greater the percent of old household heads, the lower the RWTP installation costs.



Program acronyms are: CWHP=Conservation Water Heating Program; RCIP=Residential Ceiling Insulation Program; RWTP=Residential Window Treatment Program; and HELP=Home Energy Loss Prevention.

Fig. 6.2. Percent of total variance in mean installation costs explained by Division and household variables (left bars), MSR characteristics (middle bars), and household variables with MSR characteristics (right bars).

When both types of variables are allowed to enter the models, only one MSR characteristic enters and it is included in only one of the four models. In particular, sales experience via a previous job has a positive partial regression coefficient of 7.38 when regressed against HELP installation costs, indicating that MSRs with sales experience generate installation costs that are \$7.38 higher than the costs generated by MSRs without sales experience.

### 6.2.3. Age-Related Interaction Effects

The regression analyses described above treat age of household head and MSR as independent predictors of MSR effectiveness. This section explores the potential increment to MSR effectiveness that can be gained by matching MSRs to customers in terms of age. It is possible that young MSRs are most effective at surveying young households, while older MSRs do best with elderly households. Indeed, this is the assumption behind Georgia Power Company's conservation program called "Seniors Lending a Helping Hand." As part of this program, senior citizens have been hired by the utility to offer weatherization services to their contemporaries, and the results have been exemplary. Similar outreach approaches are used at Nashville Electric, Puget Power, and Southwest Gas, where elderly employees or volunteers visit elderly households, install measures during the visit, and offer information and counseling services (Berry, White, and Hubbard, 1986). The existence of an age-interaction effect is tested by creating a term that reflects the percentage of households surveyed by an MSR for which the household head and MSR are in the same age cohort. Those cohorts examined are: 30 years of age or younger; 31 to 40; and 41 to 50. It is not possible to explore the potential benefits of having elderly MSRs survey elderly households, since the oldest MSR is only 49 years of age.

The level of significance of the age-interaction variable is reflected by its partial F-statistic when added to the regression equations shown in Tables 6.2 and 6.3. The variable was found to be insignificant in each of the nine equations. Thus, there would appear to be no benefit to matching auditor and household age, at least within the limited age range of 21 to 50 years.

Table 6.3 Regression coefficients for Division, household and MSR characteristics as predictors of mean installation costs

	Mean Installation Costs:			
	CWHP	RCIP	RWTP	HELP
(1)				
Intercept	3016.1**	272.2***	280.5***	56.8***
East Division (0-1)	44.40**		-15.09***	
South Division (0-1)	-56.17	-37.37*		
Houses lt 1000 sq. ft. (%)		-0.91*	-0.28*	
Houses 1500-2500 sq. ft. (%)				
Houses gt 2500 sq. ft. (%)	7.93*			
Detached houses (%)	0.96	0.16*		
Female household head at survey (%)	-10.16		0.35**	
Household head age 31-60 years (%)	10.95*			
Household head age over 60 years (%)			-0.95*	
(2)				
MSR sales experience (0-1)				7.38*
R <sup>2</sup>	0.092	0.142	0.289	0.411
Adjusted R <sup>2</sup>	0.065	0.104	0.247	0.366
F-statistic	3.396*	3.748*	6.820***	9.201***
Number of MSRs	70	72	72	72

\*, \*\*, and \*\*\* indicate that regression coefficients are significantly different from zero at the .05, .01, and .001 levels, respectively, according to partial F-statistics.



## 7. DISCUSSION AND CONCLUSIONS

### 7.1 REVIEW OF FINDINGS

The purpose of this report is to examine Marketing Service Representative effects on customer response to Florida Power and Light's postaudit incentive programs. Levels of participation in these programs are affected by two types of consumer decisions: (1) the decision to request a home energy survey; and (2) the decisions to participate and to invest at various levels in each postaudit program. Because the MSR has contact with households only after an audit request is made, this analysis concentrates on the incentive program participation decision. Although the decision to request an audit is of obvious importance, it is not the major focus of this study.

Many previous studies have shown that the decision to request an audit is related to factors such as household income, education, number of household members and age. Households with higher income and educational levels are more likely to request audits. Elderly households and households with fewer members are less likely to request audits. In general, the correlates of the decision to request an audit among FPL customers follow the same pattern found in other utilities. Age is a particularly important factor for FPL programs. Although 45% of all FPL customers are over 60 years of age, only 28% of home energy survey participants are elderly.

In FPL programs, some correlates of the program participation decision are the same and some are different from correlates of survey participation. Even though the elderly are much less likely to request a survey, for example, once they have received a survey they are more likely than younger customers to participate in the incentive programs--particularly those which involve lower-cost conservation measures. Each incentive program also has a set of correlates associated with its participation decision that is different from the correlates of the other programs. It is not clear how typical FPL patterns are since correlates of participation in postaudit incentive programs have received little research attention. It also is more difficult to compare customer response patterns across postaudit incentive programs of various utility companies than across audit programs because the nature of the program offerings is more diverse.

To identify determinants of participation in postaudit incentive programs, customer response is measured in two ways: closure rates and mean installation costs. Closure rates are defined as the number of participations in a given program or programs per 100 households surveyed. Mean installation costs are the average dollars spent per household participating in the given program. Closure rates and mean installation costs are calculated for four incentive programs and used as indicators of MSR effectiveness in eliciting customer program participation. In addition, an aggregate or total closure rate is defined as the sum of the closure rates for the four separate programs. The four incentive programs studied are the Conservation Water Heating Program, the Residential Ceiling Insulation Program, the Residential

Window Treatment Program, and the Home Energy Loss Prevention Program which offers fifteen low-cost weatherization and water heating measures.

Variability in MSR effectiveness in selling conservation is studied from a number of perspectives. Differences in customer response are examined by program, by FPL Division, by household type, and by various MSR characteristics. The analysis shows that household characteristics tend to be better predictors of closure rates and installation costs than are MSR characteristics. This is particularly true when examining the closure rates and installation costs associated with individual programs. When total closure rates are studied, the role of many household variables is "washed out," and MSR characteristics become the more important predictors of success. These findings support the idea that households have varying receptiveness to conservation program offerings. It also suggests that variations in household receptiveness must be statistically controlled before one can isolate the effects of MSR characteristics on customer response--particularly when response rates to individual programs are being studied.

In spite of the dominant influence of household characteristics on levels of participation in each of the programs, some variation in closure rates can be attributed to MSR characteristics. After household effects on closure rates are removed with a stepwise regression procedure, the additional variation explained by MSR characteristics ranges from 0% for CWHP to 12% for HELP and 14% for the total closure rate. The latter levels of explanation compare favorably with other studies of salesperson performance (Churchill, Ford, Hartley, and Walker, 1985). All-in-all, the regression models are highly successful with on average more than 50% of the variation in closure rates being explained.

The regression models underscore the fact that the four incentive programs serve unique market niches. The MSRs with higher proportions of households under 60 years of age have higher closure rates for RCIP and CWHP, while RWTP closure rates are a good deal higher among MSRs serving many elderly households. Closure rates for HELP and RWTP are higher among MSRs with higher proportions of white households, while RCIP and CWHP closure rates are higher for MSRs serving many nonwhite households.

When the influence of household characteristics and Divisions upon mean installation costs is removed, MSR characteristics have consistent effects across programs. The set of MSR characteristics that explains significant variation in closure rates is not the same in the regression models for every program; but the direction of influence of significant MSR characteristics is uniform for all programs. Marketing Service Representative's educational level, for example, has a positive effect on closure rates for HELP and RWTP. Extroversion has a positive effect on HELP, RCIP and total closure rates. The amount of experience an MSR has on the job has a negative effect on closure rates for HELP, RCIP and RWTP. Female MSRs, with all else equal, have higher closure rates for RCIP and RWTP.

Overall, extroversion is the strongest predictor of closure rates among all of the MSR characteristics examined. Those MSRs rated as extroverted by their supervisors have total closure rates that are 16% higher than the total closure rates of introverted MSRs.

Those MSR characteristics which are unrelated to level of performance include type of educational background and performance rating. In particular, MSRs with engineering degrees do as well as MSRs with degrees in business. Further, MSRs given high ratings by their supervisors do as well as those given low ratings.

Regression models that explain variation in mean installation costs are generally weaker than models that predict closure rates. The greater significance of household as opposed to MSR characteristics also is more marked in the costs models. As was true of closure rates, there is inconsistency in the household correlates of mean installation costs. For RCIP, RWTP, and HELP, installation costs are significantly greater for larger homes. This is in keeping with the fact that the FPL subsidy for these three programs depends upon various dimensions of the home including size of the attic and window area. For the water heater program, however, installation costs are significantly greater in smaller homes.

Once the influence of varying market receptivity is taken into account through the inclusion of household variables in the regression models of mean installation costs, only one MSR characteristic is found to be related to MSR effectiveness. In particular, MSRs with sales experience via a previous job generate installation costs in the HELP program that are \$7.38 higher than the costs attributable to MSRs without sales experience.

Division effects are found to be very significant throughout the analysis. Dummy variables for FPL's regional Divisions are generally the strongest predictors of closure rates. Total closure rates vary from a low of 90 in the western Division to a high of 113 in the eastern Division. The patterns of program-specific closure rates also vary strongly across the Divisions. These variations in closure rates probably are due mainly to differences in household characteristics across Divisions. Households in different Divisions vary greatly in their levels of eligibility for specific programs and in many other characteristics as well. The Divisions also differ significantly in the types of MSRs they employ. The percentage of MSRs with engineering backgrounds, for example, ranges from 5% to 50%.

Limitations of the current study should be noted for future research. First, our measurement of sales aptitude and extroversion could be improved. The sales aptitude test used here was not developed to assess the particular types of aptitude required to sell energy conservation, and it appears to offer little, if any, explanatory power. The measurement of extroversion was based on supervisor judgements. Personality tests exist which are more valid measures of extroversion; these should be used in future research on auditor salesmanship.

Second, our analysis does not include several of the household characteristics which are generally believed to affect levels of participation in conservation programs. The omissions are largely due to the fact that the Daily Survey Logs were meant to be completed in an unobtrusive manner without requiring that the auditors ask questions of the household. As a result, information on variables such as household income, education, and years of residence in the dwelling was not collected. Further, past energy consumption patterns are not included as predictors in the models developed here. As a result, much of the unexplained variation in closure rates and installation costs are probably attributable to unmeasured differences in the market potential of areas served by each auditor.

Improvements to the research design employed here might also have resulted in more definitive and complete explanations of auditor performance. For instance, the problems associated with correcting measures of performance for differences in the receptivity of households could have been avoided by examining a utility in which the mix of households served by different auditors is similar. This might be the case, for instance, in a utility where households are randomly assigned to auditors, or where auditors work in specific geographic areas which are changed frequently enough that differences balance out after a short period of time.

Finally, it should be noted that our findings cannot necessarily be generalized to other program settings. At utilities where auditors are able to maintain contact with some or all of the households they survey via callbacks or other means, the influence that they could exert upon the household's conservation decision making would likely be greater. Similarly, if a utility were to reward its auditors for generating high levels of participation, differences in their abilities to sell conservation effectively might be more apparent. Florida Power and Light does not reward its MSRs for generating high participation levels, but it does reward contractors for selling conservation by offering each contractor the work which he/she generates through contacts preceding an FPL survey. Some utilities also reward their auditors for the amount of sales they generate. Recall that PG&E developed a successful incentive program that rewarded auditors for selling installations. Private sector energy service companies also frequently offer employee incentives based on sales effectiveness (McCarty, 1985).

## 7.2 IMPLICATIONS FOR THE DESIGN AND IMPLEMENTATION OF CONSERVATION PROGRAMS

The findings described above underscore the importance of program design as a determinant of the success with which conservation can be sold to residential customers. In the case of FPL, the ability of MSRs to generate participation from households depends greatly upon how well each program meets the needs of the households surveyed. This is indicated by the fact that (1) program participation rates and installation costs vary by size and type of dwelling unit as well as age and race of the household head, (2) those household characteristics associated with high levels of participation vary across programs, and

(3) the type of households attracted to a program is related to the nature of the costs and benefits of the program.

As a result, variations in household receptiveness to program offerings must be controlled before the effects of auditor characteristics on customer response can be isolated. It is inadvisable for utilities to reward their auditors on the basis of simple measures such as program closure rates if the auditors work within market areas that are significantly different from one another in ways which might affect levels of program participation. In the case of FPL, program-specific corrections for household receptiveness are needed to evaluate fairly the performance of MSRs. In utilities where all auditors deal with the same mix of household types, measures of program participation or conservation effort among audited households would not require such adjustments, and closure rates or other such measures are appropriate.

Our results suggest that the effect of auditor salesmanship upon customer response to conservation programs is fairly weak. This is based upon the finding that levels of program participation do not vary greatly, if at all, across different types of MSRs based on their background training and demographic characteristics. The great variation in current utility practices indicates that there are few norms concerning auditor recruitment, monitoring, and management. Managers of audit programs differ in the skills they believe are important determinants of auditor effectiveness. In keeping with the wide-ranging hiring practices of the utility industry, our findings show that high-performing auditors come from a variety of backgrounds. For instance, in the FPL system they are as likely to have engineering as business training.

Our findings suggest, however, that utilities should give preference to hiring auditors with outgoing, extrovert personalities and who have previous job experience in sales. Extroversion is the MSR characteristic found to best distinguish MSRs with high versus low closure rates, and a background in sales leads to higher levels of customer expenditure on conservation. Personality tests such as the Eysenck Personality Questionnaire (Buros, 1978) exist which include extroversion scales that have been validated. These could be useful in the selection of new auditors.

An industry-wide effort is needed to develop a complete battery of tests that properly reflects the skills, aptitude, and personality traits which influence auditor performance. The sales aptitude test used here was not developed to assess the particular types of aptitude required to sell energy conservation, and it appears to offer little, if any, explanatory power. The success with which employee selection tests have been developed for other industries, such as insurance, suggests that the payback of such an effort to the energy services and utility industry could be considerable.

Utilities are becoming increasingly sophisticated in the design of residential conservation and load management programs. Many information-only efforts have evolved into multi-faceted programs which offer a variety of incentives to customers who have conservation

measures installed in their homes. The role of auditors in "selling" conservation and "load shifting" to customers is often critical to the success of such programs. This report has looked at one set of postaudit programs in an attempt to understand the role of auditor salesmanship. Our findings must be seen as preliminary in nature, however, since they are the result of only one case study and there are no other systematic analyses of auditor effects against which they can be compared. Further research is needed to validate, refine and expand our findings. The goal is to develop a body of research that can be used to improve auditor selection, training, and performance and thus the overall effectiveness of residential conservation programs.

## 8. REFERENCES

- Berry, Linda, Jon Soderstrom, Eric Hirst, Bobbie Newman, and Rose Weaver. 1981. Review of Evaluations of Utility Home Energy Audit Programs. ORNL/CON-58. Oak Ridge, TN: Oak Ridge National Laboratory.
- Brown, Marilyn A. and Susan M. Macey. 1985. "Evaluating the Impact of Two Energy Conservation Programmes in a Midwestern City" Applied Geography, 5: 39-53.
- Brown, Steven H. 1978. "Long-Term Validity of a Personal History Item Scoring Procedure." Journal of Applied Psychology, 63(6): 673-676.
- Churchill, Gilbert A., Jr. Neil M. Ford, Steven W. Hartley, and Orville C. Walker, Jr. 1985. "The Determinants of Salesperson Performance: A Meta-Analysis." Journal of Marketing Research, 22: 103-118, May.
- Churchill, Gilbert A., Jr., Neil M. Ford and Orville C. Walker, Jr. 1985. Sales Force Management, revised edition, Richard D. Irwin, Inc.: Homewood, IL.
- Florida Power and Light Company. 1982. The Impact of Class A Audits on Energy Conservation Among Large Usage Residential Customers, Miami, FL.
- Florida Power Corporation. 1984. Walk-Thru Audit/Fixup Follow-up Study, Miami, FL.
- Frey, Cynthia and Duncan G. LaBay. 1983. "A comparative study of energy consumptions and conservation across family life cycle," in Advances in Consumer Research, ed. Richard P. Bagozzi and Alice Tybout, pp. 641-646. Association for Consumer Research: Ann Arbor, MI.
- Guion, Robert M. 1965. Personnel Testing. McGraw Hill Book Co.: NY.
- Hirst, Eric. 1984. "Household Energy Conservation: A Review of the Federal Residential Conservation Service," Public Administration Review, 44(5), September, October.
- Hirst, Eric, Benson Bronfman, Richard Goeltz, John Trimble, and David Lerman. 1983. Evaluation of the BPA Residential Weatherization Pilot Program, Oak Ridge National Laboratory, ORNL/CON-124.
- Kreitler, Virginia and Todd Davis. 1986. Alternatives to the RCS Program: An Evaluation Based on Case Study Program Experience, Synergic Resources Corporation, Bala Cynwyd, PA.

- McCarty, Kathryn S. 1985. Innovative Energy Service Companies Serving the Residential Market: A Case Study Approach. (Washington, D.C.: Consumer Energy Council of America Research Foundation).
- Moulton, D.H. 1984. "The Impact of Utility-Sponsored Energy Conservation Loan Programs on Low-income Households, " in Doing Better: Setting an Agenda for the Second Decade. Washington, D.C.: American Council for an Energy-Efficient Economy.
- Olsen, Marvin E. and Christopher Cluett. 1982. "Voluntary energy conservation through neighborhood programs: Design and evaluation," Energy Systems and Policy, 6: 161-192.
- Polich, M.D. 1984. "Minnesota RCS: The Myths and the Realities," in Doing Better: Setting an Agenda for the Second Decade. Washington, D.C.: American Council for an Energy-Efficient Economy, Vol. G, pp. 141-151.
- Stern, Paul C. 1985. Energy Efficiency in Buildings: Behavioral Issues, Washington, D.C.: National Academy Press, forthcoming.
- Stern, Paul C., Linda G. Berry, and Eric Hirst. 1985. "Residential Conservation Incentives," Energy Policy, X: 133-142.
- Stern, Paul C. and Elliot Aronson (eds.) 1984. Energy Use; The Human Dimension. Committee on Behavioral and Social Aspects of Energy Consumption and Production. National Research Council, W. H. Freeman: NY.
- Thayer, Paul W. 1977. "Somethings Old, Somethings New," Personnel Psychology, 30: 513-525.
- Tonn, Bruce and Linda Berry. Forthcoming. "Determinants of Participation in Home Energy Audit/Loan Programs: Discrete Choice Model Results," Energy: The International Journal, in press.
- Walker, James A., Theodor N. Rauh, and Karen Griffin. 1985. "A Review of the Residential Conservation Service Program," Annual Review of Energy, 10: 285-315.
- Yates, Suzanne M. and Elliot Aronson. 1983. "A social-psychological perspective on energy conservation in residential buildings," American Psychologist. pp. 435-443, April.

**9. LIST OF ACRONYMS**

<b>CCHP</b>	<b>Conservation Cooling and Heating Program</b>
<b>CWHP</b>	<b>Conservation Water Heating Program</b>
<b>FPL</b>	<b>Florida Power and Light Company</b>
<b>HELP</b>	<b>Home Energy Loss Prevention Program</b>
<b>MSR</b>	<b>Marketing Service Representative</b>
<b>RCIP</b>	<b>Residential Ceiling Insulation Program</b>
<b>RCS</b>	<b>Residential Conservation Service</b>
<b>RWTP</b>	<b>Residential Window Treatment Program</b>



## Internal Distribution

- |                       |                                |
|-----------------------|--------------------------------|
| 1. L. G. Berry        | 14. V. C. Mei                  |
| 2. M. A. Brown        | 15-17. W. R. Mixon             |
| 3. R. S. Carlsmith    | 18. C. G. Rizy                 |
| 4. T. M. Dinan        | 19. J. P. Stovall              |
| 5. W. Fulkerson       | 20. B. E. Tonn                 |
| 6. M. S. Guy          | 21. D. L. White                |
| 7. C. W. Hagan        | 22. T. J. Wilbanks             |
| 8. E. A. Hirst        | 25. Central Research Library   |
| 9. R. B. Honea        | 26. Document Reference Section |
| 10. J. O. Kolb        | 27-28. Laboratory Records      |
| 11. J. M. MacDonald   | 29. Laboratory Records (RC)    |
| 12. F. C. Maienschein | 30. ORNL Patent Office         |
| 13. K. F. McKinley    |                                |

## External Distribution

31. Jaime G. Carbonell, Associate Professor of Computer Science, Carnegie-Mellon University, Pittsburgh, PA 15213
32. S. Malcolm Gillis, Dean, Graduate School, Duke University, 4875 Duke Station, Durham, NC 27706
33. Fritz R. Kalhammer, Vice President and Head of the Energy Management and Utilization Division, Electric Power Research Institute, P.O. Box 10412, Palo Alto, CA 94303
34. Roger E. Kasperson, Professor of Government and Geography, Graduate School of Geography, Clark University, Worcester, MA 01610
35. Martin Lessen, Consulting Engineer, 12 Country Club Drive, Rochester, NY 14618
36. Office of Assistant Manager for Energy Research and Development, DOE-ORO
37. Institute for Energy Analysis, ORAU-Library
- 38-67. Technical Information Center, DOE, P.O. Box 62, Oak Ridge, Tennessee 37831
- 68-556. Decision Systems Research Section External Distribution Mailing List and extra copies to M. S. Hubbard, 4500N, MS H-32