

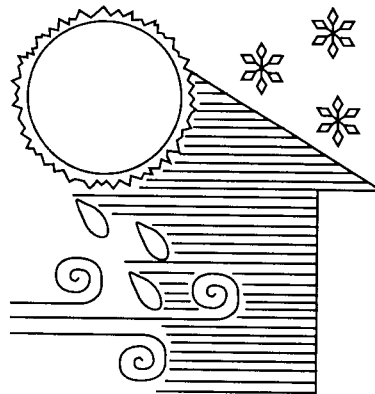


**OAK RIDGE
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**UTILITY INVESTMENTS IN
LOW-INCOME ENERGY-
EFFICIENCY PROGRAMS**

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**WEATHERIZATION ASSISTANCE PROGRAM
U. S. DEPARTMENT OF ENERGY**

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

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EXECUTIVE SUMMARY

BACKGROUND

This study is part of the U.S. Department of Energy (DOE)'s national evaluation of its Weatherization Assistance Program. The Weatherization Assistance Program was established in 1976 and is the largest residential energy conservation program in the nation. Its mission is to reduce heating and cooling costs for low-income households, particularly for the elderly, people with disabilities, and children, by improving the energy efficiency of their homes and ensuring their health and safety. DOE provides financial grants to State agencies who in turn administer the program and fund local agencies to perform the actual weatherization work.

DOE's Weatherization Program is faced with a need that far exceeds its budget. To stretch the effectiveness of its limited funding the DOE Program seeks to coordinate with related public- and private-sector programs. The significant growth of demand-side management (DSM) programs operated by electric and gas utilities has created promising opportunities for such partnerships in the low-income arena.

STUDY OBJECTIVES AND APPROACH

The primary objective of this study is to describe the DSM and conservation programs being operated by utilities for low-income customers. In particular, the focus is on programs that install major residential weatherization measures free-of-charge to low-income households. Answers to the following questions are sought:

- What are the goals of utility low-income DSM programs?
- What roles have public utility commission mandates played in creating and molding these programs?
- How much are utilities investing in these programs and how many low-income customers are being served?
- What types of measures and services are being provided and who is participating?
- To what extent are these programs being coordinated with DOE's Weatherization Program?

Answers to these questions will provide a foundation for closer coordination between utility and DOE low-income conservation activities.

This study focuses on utility low-income energy-efficiency programs that operated in 1992. Data on these programs were collected from a mail and telephone survey of utility program managers. Targeted follow-up phone calls were made to nonresponding utilities that were identified by key sources as possibly operating low-income energy-efficiency programs in 1992. These key sources included: a survey of State public utility commissions, issues of *Demand-Side Report*, a survey of 917 local weatherization agencies, and a survey of utility low-income programs operating

in 1989. Survey forms were mailed to approximately 600 utilities, and responses were obtained from 180 of them, including the vast majority of the targeted utilities,

MAJOR FINDINGS

Program Expenditures

Our survey identified 95 utility companies located in 33 states that operated 132 low-income energy-efficiency programs in 1992. Altogether these utilities spent \$140.6 million on the operation of their programs. This represents a 29% increase over the level of utility investments in 1989, as illustrated in Table A.1. This increase is primarily a result of the implementation of new programs between 1989 and 1992.

Table A.1 Comparison of Characteristics of Utility Low-Income Energy-Efficiency Programs in 1989 and 1992

Indicators	Programs in 1989	Programs in 1992
Number of Programs	102	132
Total Expenditures (in 1992 dollars)	\$109.3 million	\$140.6 million
Expenditures Per Program (in 1992 dollars)	\$1,071,000	\$1,065,000
Expenditures Per Participant (in 1992 dollars)	\$440	\$454

The average expenditure per program in 1992 was just over one million dollars, and the average expenditure per participant was approximately \$450. The diverse nature of utility low-income programs is reflected by the fact that expenditure levels varied widely around these mean values. For instance, average expenditures per program ranged from less than \$3,765 to \$27 million with a median budget of \$216,500. Similarly, programs serving more than half of the participants in 1992 had average expenditures of less than \$300 per participant, while programs serving a small fraction of the overall participants had average expenditures of more than \$3,000 per participant.

In general, utility expenditures per participating household are considerably lower than in DOE's Weatherization Program, which spent more than \$1,550 per participant in 1992. Utility expenditures per participant were especially low in programs that were implemented by electric utilities (\$307 per participant), that operated in the hot climate region (\$333), that were not mandated by regulatory commissions (\$300), and that were not coordinated with DOE's network of local agencies (\$255).

Program Goals and Regulatory Mandates

The most common primary goal of low-income energy-efficiency programs operating in 1992 was "to make energy services more affordable to low-income customers." Only 44% of the programs were operated primarily to provide a cost-effective energy resource, although this was a secondary goal for many programs. This "equity" emphasis is underscored by the fact that customer vulnerability was the most common type of household selection criteria employed by the utilities surveyed. In particular, 32% of the utility programs (serving 49% of the program participants) gave priority to elderly customers, persons with disabilities, and/or households with children. Further, checklists of measures were the most common criteria for determining the investment level of participating households. Savings-to-investment ratios were used by only 22% of the utilities (serving only 12% of the participants) as an investment criterion. Again, equity and not the efficiency of resource acquisition appears to dominate the design of these programs.

Fully 78% of the utility expenditures on low-income energy-efficiency programs identified in this report occurred under regulatory mandates. Orders by public utility commissions in ten states were examined as part of this study. These states accounted for 72% (\$101 million) of the total utility low-income program expenditures.

Commission mandates vary in terms of the stringency of their benefit/cost requirements. Some states require that low-income efficiency programs meet the same cost-effectiveness standard that all of their DSM programs must meet. Other state regulatory bodies provide greater flexibility to low-income programs (relative to other DSM investments) in meeting rigorous benefit/cost tests. Still other states operate low-income programs outside the framework of their integrated resource planning. The orders reviewed here indicate that a majority of the mandated low-income energy-efficiency investments are not subjected to strict resource cost tests, but are generally justified on the grounds of fairness and the equity of utility rate impacts.

Geographic Patterns

The regional distribution of utility low-income energy-efficiency programs, expenditures, and participants in 1992 deviated substantially from the regional distribution of the low-income population. Utility low-income energy-efficiency programs were concentrated in four areas of the country: California, the Pacific Northwest, the Upper Midwest, and the Northeast (see Figure A.1).

The uneven geographic distribution of utility low-income energy-efficiency investments means that opportunities for DOE-utility coordination are not readily available to every state and local weatherization agency. In many states and localities (particularly in the Southeast), government-funded weatherization programs provide the only outside support available for low-income households to improve the energy efficiency of their homes.

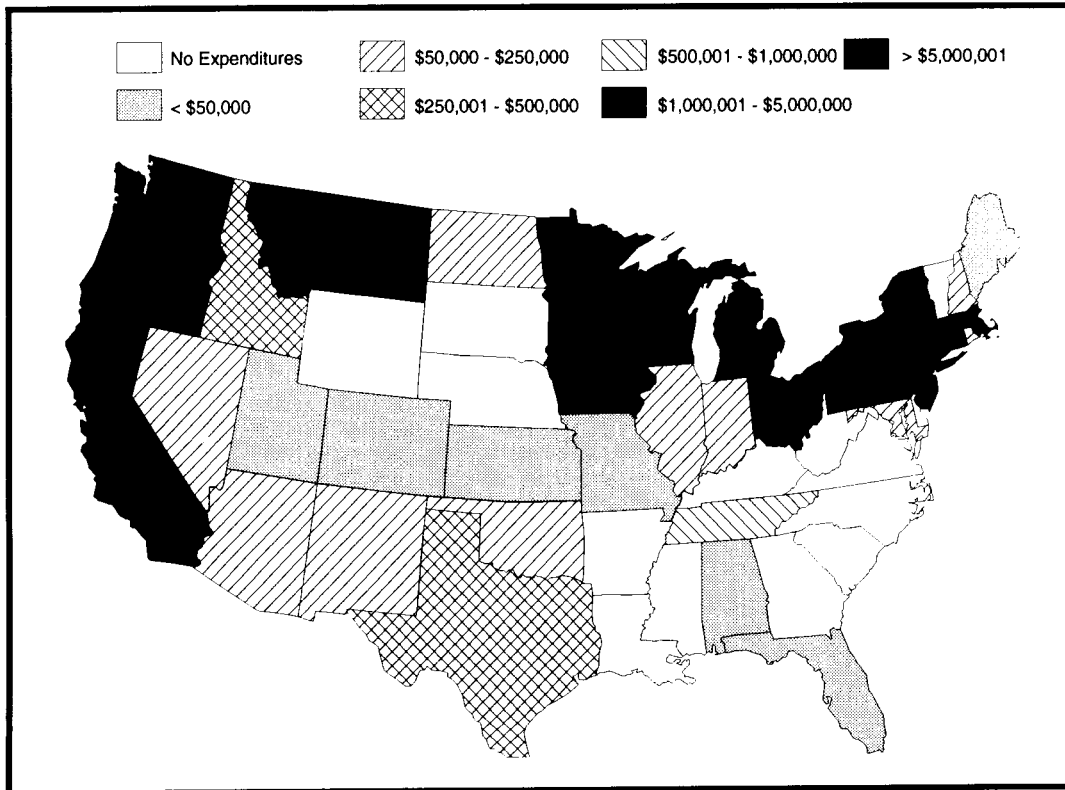


Fig. A.1 Geographic Distribution of Utility Expenditures on Low-Income Energy-Efficiency Programs in 1992

Characteristics of Weatherized Dwellings

The 132 utility programs represented in our survey served an estimated 313,000 participants in 1992. However, this total does not represent an unduplicated count. Twenty-two utilities operated more than one program and in some of these cases households could qualify for help from multiple programs. In addition, it is possible for some participants to qualify for assistance through programs operated by both their gas and electric utility companies.

Table A.2 indicates that slightly over half of the 313,000 dwellings served in 1992 were single-family homes, 5% were mobile homes, 33% were small multifamily dwellings, and 9% were

Table A.2 Types of Dwellings Served

Type of Dwelling	Utility Low-Income DSM Programs (1992)	DOE Weatherization Program (1989)	Low-Income Population (1990)
Single-Family	53%	61%	59%
Mobile Home	5%	18%	8%
Small Multifamily	33%	12%	14%
Large Multifamily	9%	9%	19%

units in large multifamily buildings. As is also true of DOE's Weatherization Program, utility low-income DSM programs underserve the needs of low-income households living in large multifamily buildings, relative to other subgroups.

Types of Measures Installed

The types of conservation measures emphasized by utility low-income energy-efficiency programs differ from the measures emphasized by DOE's Weatherization Program. This was true both in 1989 and 1992. Some key similarities and differences are noted below.

- Almost every utility low-income program had a client education or information component. This is also true of DOE's Weatherization Program.
- Unlike the DOE Weatherization Program, lighting retrofits were a common ingredient of utility low-income DSM programs: 61% of the participants in 1992 received one or more compact fluorescent light bulbs. This measure became an approved DOE program measure in 1994.
- Water-heating system measures were the third most common type of measure: at least one water-heating measure was a part of 59% of the utility low-income programs. The counterpart statistics for DOE's Weatherization Program is 56%. The most frequent measure in utility programs is the low-flow showerhead, while in the DOE program it is the more expensive water heater tank wrap.
- Only 24% of the utility program participants received any type of insulation. This is significantly less than in the DOE program, where 62% of participants received insulation in 1989.
- Window and door measures were installed in 20% of the dwellings that participated in the 132 utility programs in 1992. The most common measures in this category involved either replacing window glazings or replacing entire window units—measures which are installed twice as frequently in DOE's program. Storm windows were installed in only 1% of the utilities' participating dwellings. In contrast, storm windows were installed in 36% of the homes weatherized by the DOE program in 1989.
- Structural repairs were offered by many utility programs in 1992, but only 17% of participants benefited from them. The rate of structural repairs is roughly twice as high in DOE's program.

Gas utility programs in 1992 tended to involve more space-heating measures and health and safety measures. Electric utility programs, on the other hand, involved more lighting and appliance measures. Overall, the 1992 utility investments (particularly those of electric utilities) were overwhelmingly dedicated to low-cost measures, in contrast to DOE's Weatherization Program.

Coordination with DOE's Weatherization Program

Sixty-nine percent of the utility low-income energy-efficiency Programs in 1992 (i.e., 79 programs) used the DOE local agency network to deliver some or all of their weatherization services.

These 79 programs account for \$116.6 million (or 83%) of the total utility low-income program expenditures in 1992.

In 66 of these programs, local agencies received utility funding to deliver DSM services. Thus, half of the 132 utility programs that operated in 1992 involved contracting with local agencies. In total, the DOE network of local agencies received \$53.7 million from 61 utility programs, which represents slightly more than one-third (38%) of the \$140.6 million expended by utilities in 1992.

This report describes some of the many different arrangements whereby utilities contract with local agencies to deliver weatherization services. In particular, three types of coordinated programs are described.

- In parallel programs, the community action agency operates two independent weatherization programs—one entirely funded by the utility and a second funded by government agencies including DOE.
- In supplemental programs, utility funds are used to supplement a community action agency's DOE Weatherization Program, with no changes to the operation of the DOE program.
- In coupled programs, utility and DOE funds are used to deliver an integrated program that is distinct from the DOE Weatherization Program.

CONCLUSIONS

Utility low-income energy-efficiency investments have increased substantially over the past several years and have become an important resource for reducing the energy burden of the poor and improving the energy integrity of the low-income housing stock. Unlike DOE's Weatherization Program, these utility programs provide mainly low-cost measures, they are relatively modest in terms of expenditures per participant, and they are geographically concentrated.

A wide array of utility-government weatherization partnerships existed in 1992. These partnerships illustrate the broad potential of coordinated programs to benefit low-income households as well as utility ratepayers and investors.

ABSTRACT

The objective of this study is to describe the energy-efficiency programs being operated by utilities for low-income customers. The study focuses, in particular, on programs that install major residential weatherization measures free-of-charge to low-income households. A survey was mailed to a targeted list of 600 utility program managers. Follow-up telephone calls were made to key non-respondents, and a random sample of other non-respondents also was contacted. Completed surveys were received from 180 utilities, 95 of which provided information on one or more of their 1992 low-income energy-efficiency programs for a total of 132 individual programs.

These 132 utility programs spent a total of \$140.6 million in 1992. This represents 27% of the total program resources available to weatherize the dwellings of low-income households in that year. Both the total funding and the number of programs has grown by 29% since 1989. A majority of the 132 programs are concentrated in a few regions of the country (California, the Pacific Northwest, the Upper Midwest, and the Northeast). Although a majority of the programs are funded by electric utilities, gas utilities have a significantly greater average expenditure per participant (\$864 vs. \$307 per participant).

The most common primary goal of low-income energy-efficiency programs operating in 1992 was "to make energy services more affordable to low-income customers." Only 44% of the programs were operated primarily to provide a cost-effective energy resource. Based on a review of household and measure selection criteria, equity and not the efficiency of resource acquisition appears to dominate the design of these programs. This is corroborated by a review of 10 Commission orders, which indicated that a majority of the mandated low-income programs are not subjected to strict resource cost tests, but are generally justified on the grounds of fairness and the equity of utility rate impacts.

Utility-funded low-income energy-efficiency programs differ in significant ways from DOE's Weatherization Program. Lighting and appliance measures were common ingredients of utility low-income programs and are not generally a part of DOE's Program. Also, major measures such as insulation, storm windows, and doors were installed in a smaller percentage of the dwellings that participated in utility-sponsored programs compared to the DOE Program. This is consistent with the greater level of investment per participant in DOE's Program. Sixty-eight percent of the respondents indicated that their programs coordinated the delivery of their low-income programs with local agencies that provided energy services under DOE's Weatherization Program. Coordination consists of utilizing the local agencies to deliver energy services, in whole or in part, under utility programs. The utilities that coordinate with local agencies account for a total of \$115 million (or 83%) of the total utility expenditures on low-income energy-efficiency programs in 1992.

UTILITY INVESTMENTS IN LOW-INCOME ENERGY-EFFICIENCY PROGRAMS

1. INTRODUCTION

1.1 Background

This study is part of the U.S. Department of Energy's national evaluation of its Weatherization Assistance Program. The Weatherization Assistance Program was established by Title IV of the Energy Conservation and Production Act of 1976 (PL 94-385). It is administered by the U.S. Department of Energy (DOE), and its mission is to reduce heating and cooling costs for low-income families, particularly for the elderly, people with disabilities, and children, by improving the energy efficiency of their homes and ensuring their health and safety. DOE provides financial grants to State WAP agencies which in turn administer the program and fund local agencies or "subgrantees" to perform the actual weatherization work.

DOE's Weatherization Program is faced with a need for energy-efficiency improvements in low-income homes that far exceeds its budget. In 1990, 27 million households were federally eligible for DOE Weatherization (Eisenberg, et al., 1994).¹ Many of these households live in dwellings that have no insulation or storm windows; their homes are typically heated with inefficient and sometimes unsafe furnaces, boilers, or space heaters; and their heating and cooling bills are increased by leaking roofs, broken windows, and other structural problems. With annual DOE appropriations of less than \$200 million in recent years, the Program's challenge is immense.

Resource leveraging and coordination has enabled DOE's benefits to extend beyond the limits of its own budget. One type of leveraging was documented by Mihlmester, et al. (1992) and involves the use of DOE's network of state and local agencies to deliver weatherization services funded by organizations other than DOE. This type of leveraging allows sponsoring organizations to design programs that meet their particular needs and benefit from access to a trained network of weatherization professionals created, in large part, by DOE.

A second type of leveraging was documented by Power, et al. (1992) and involves the application of program rules and procedures to weatherization activities funded by other organizations. Between 1978 and 1989, \$4.3 billion was spent nationwide on full-scale weatherization programs. DOE accounted for only 45% of these funds, but fully 77% of the \$4.3 billion was spent according to DOE Weatherization Program rules and procedures. These leveraged funds included \$760 million from the Department of Health and Human Services (HHS) Low-Income Home Energy Assistance Program (LIHEAP), \$625 million from the Petroleum Violation

¹ Federal eligibility is defined as a household income that was at or below the higher of 150 percent of poverty or 60 percent of state median income.

Escrow (PVE) Fund, \$32 million from various state-financed weatherization programs, \$2 million from utilities, and \$19 million from other sources.

With increasing pressure on state and federal budgets, electric and gas utilities represent one of the few growing sources of low-income weatherization funding. In addition to the creation of new utility low-income DSM programs, the nature of these programs is evolving. This change is a function of the growing impact of integrated resource planning and evolving state mandates to serve low-income customers. Thus, the 1989 levels and types of utility investments previously documented by Power, et al. (1992) and Mihlmester, et al. (1992) have become outdated for DOE planning purposes. To provide a more up-to-date overview, this report describes utility investments in low-income DSM programs in 1992.

1.2 Study Objectives

The primary objective of this study is to describe the energy-efficiency programs being operated by utilities for low-income customers. In particular, the focus is on energy-efficiency programs that install major weatherization measures free-of-charge to low-income households. Answers to the following questions are sought:

- What are the goals of utility low-income DSM programs?
- What roles have public utility commission mandates played in creating and molding these programs?
- How much are utilities investing in these programs and how many low-income customers are being served?
- What DSM services are being provided and who is participating?
- To what extent are these programs being coordinated with DOE's Weatherization Program?

Answers to these questions will provide a foundation for closer coordination between utility and DOE low-income conservation activities.

1.3 Organization of Report

After describing the research methodology employed by this study in Section 1.4, the next five chapters present results. Chapter 2 provides an overview of utility low-income DSM programs that operated in 1992. Levels of investment and numbers of participants are described in Chapter 3. Chapter 4 describes the goals of these programs and the roles played by regulatory mandates. Chapter 5 profiles the types of measures installed by these programs and the nature of participants. Chapter 6 describes how these programs coordinate with DOE's Weatherization Program. The report ends with a set of conclusions (Chapter 7) and references (Chapter 8).

1.4 Research Methodology

Data on utility low-income energy-efficiency programs were collected via a mail survey followed up by telephone calls to reach key nonrespondents and to clarify survey responses. The questionnaire used in the mail survey is reproduced in Appendix A. It was mailed to a list of more than 600 utility program managers. The list of program managers was compiled from six sources:

1. the 36 gas and electric utilities that were identified by Power et al. (1993) as operating low-income DSM programs during 1989;
2. approximately 20 additional gas and electric utilities that provided in-kind contributions to the weatherization programs operated by local weatherization agencies in 1989 (Mihlmester, 1992);
3. approximately 20 gas and electric utilities whose low-income programs were described in one or more of the 1992 issues of the *Demand-Side Report*;
4. the 31 utilities that were added by State PSC/PUCs to lists compiled from the first three sources;²
5. utilities serving significant populations (10,000 gas customers or more where data was available, or electric utilities by state to represent 75% of the state's population); and
6. a database of 550 electric utility companies that provided information to DOE's Energy Information Administration on DSM programs they operated in 1991.³

There was considerable overlap among these six lists, resulting in a mailing list of about 600 utilities. The first four of these sources were considered key, because they included utilities that were likely to have operated a low-income DSM program in 1992.

Follow-up phone calls were made to all of the nonrespondents that were identified by the first four sources. Altogether, responses were obtained from 180 utilities, 93 of which provided information on one or more of their 1992 low-income energy-efficiency programs. During the process of reviewing earlier drafts of this report, it became apparent that we had missed programs in two states (Idaho and Montana), due to nonresponses for their utilities. Estimates of total utility low-income DSM investments in 1992 were obtained from the Weatherization Program managers in those states, along with estimates of how much of these expenditures were channeled through DOE's network of local agencies. These values are included in the three maps presented in this report (Figures 3.2, 3.3, and 6.3), but they are excluded from the analysis of program-by-program results, since they are state-wide numbers.

² The first three sources of information resulted in state-by-state lists of utilities that probably operated one or more low-income DSM programs in 1992. These lists were mailed to the Chairperson of each state's public utilities commission (PUC), who were asked to provide the names of any utilities that may have operated a program in 1992. A total of 18 PUCs responded, and a few of them added utilities to our lists.

³ At the time this survey was completed, 1992 was the latest year for which EIA data were available.

Follow-up phone calls also were made to a random sample of nonresponding utilities that were not cited by any of the key sources. This step was taken to determine how well the key sources had directed the surveying efforts to utilities with low-income programs in operation in 1992. None of these 20 utilities operated a low-income energy-efficiency program in 1992, suggesting that the vast majority of the nonrespondent to our survey did not repond because they had no such program.

Despite the low (~30%) response rate to our surveying, we succeeded in obtaining information from the vast majority of utilities on our four key lists. For instance, we obtained surveys from 28 of the 36 gas and electric utilities that were identified by the Power et al. (1992) study. These 28 utilities accounted for 92% of the funding of full-scale weatherization programs in 1989. Thus, our nonrespondents from that list of 36 operated smaller-than-average programs in 1989. In addition, we received surveys from 27 of the 31 gas and electric utilities that were identified by state PSC/PUCs. Despite the limitations due to nonresponses, the data analyzed in this report represent the most comprehensive documentation of utility low-income DSM programs assembled to date.

2. NATIONAL OVERVIEW OF GOALS, EXPENDITURES, AND PARTICIPANTS

Our survey identified 95 utility companies that operated 132 low-income energy-efficiency programs in 1992. Altogether these utilities spent \$140.6 million on the operation of their programs, and delivered energy-efficiency services to a total of 313,000 low-income participants. Because our survey does not necessarily represent a complete inventory of all of the utilities operating such programs in 1992, our indicators of total activity level should be treated as minimums.

2.1 PROGRAM GOALS

Energy-efficiency programs for low-income customers are operated by utilities for a variety of reasons. This diversity is outlined in the discussion of program goals below and in the subsequent description of the criteria used by utilities to select participants and to identify the amount to spend on upgrading the energy efficiency of their homes (see sections 2.2 and 2.3).

Utility program managers were asked to indicate whether each of four goals were a primary or secondary goal of their programs, and to describe any additional primary or secondary program goals.¹ The results indicate that the most common primary goal of low-income DSM programs operating in 1992 was "to make energy services more affordable to low-income customers" (Table 2.1). This was a primary goal for 72% of the programs studied, and a secondary goal for 26%. In only 2% of the programs was the goal of affordability "not at all important."

Table 2.1 Primary and Secondary Goals of 1992 Utility Low-Income DSM Programs

Program Goals	Primary	Secondary	Not at All
Make energy services more affordable to low-income customers	72%	26%	2%
Provide a cost-effective energy resource	44%	44%	12%
Reduce arrearages of low-income customers	26%	50%	24%
Improve customer relations and the utility's image	18%	69%	14%

The next most common goal was "to provide a cost-effective energy resource." However, this was a primary goal for only a minority (44%) of the programs. Thus, a majority of the 132 programs were not operated primarily for resource acquisition purposes, although this was a secondary goal for many programs.

¹ Respondents could identify more than one primary and secondary goal.

For more than one-quarter (26%) of the programs, the primary goal was "to reduce arrearages of low-income customers." This was also a secondary goal for 50% of the programs. For almost a quarter (24%) of the programs, reducing customers arrearages was not an objective of the program. The minimal emphasis given to this goal is consistent with the fact that few program evaluations have documented the impact of energy-efficiency investments on the payment behavior of low-income customers, although many analysts believe that the benefits to utilities may be significant.

"To improve customer relations and the utility's image" is a primary goal for only 18% of the programs, but it is a secondary goal for 69% of them. Thus, public relations is not "driving" the creation of these programs, but most program managers recognize the public relations benefits offered by operating programs for their low-income customers.

Other goals were noted for 37 of the low-income DSM programs, and in 24 of these cases, the other goal was the primary goal. The following other goals were the most common:

- to educate consumers about energy conservation,
- to reduce peak demand for energy,
- to improve comfort, health, and safety,
- to maintain housing quality and affordability, and
- to meet a PUC mandate.

2.1.1 Goals of Gas, Electric, and Combination Programs

The goals of low-income energy-efficiency programs operated by gas, electric, and combined utilities are similar in some respects, and dissimilar in other ways (Table 2.2). All three types of utilities operate low-income programs primarily to make energy services more affordable to low-income customers. Thus, in aggregate, these programs are not operated primarily to acquire cost-effective energy resources. Rather, they are operated more for equity reasons.

The second most important primary goal for gas utilities is to reduce arrearages of low-income customers. In contrast, the second most important goal for electric utilities is to provide a cost-effective energy resource. This reflects the stronger role of demand-side management programs as an energy resource in the electric utility industry compared to natural gas industry. The goals of program managers from combination utilities appear to be more similar to those of managers operating the all-electric programs. While energy affordability dominates as a primary goal for these programs, resource acquisition is a strong secondary goal and there is only limited focus on arrearage reductions.

Table 2.2 Primary and Secondary Goals by Type of Utility

Program Goals	Programs Operated By:					
	Gas Utilities (N = 32)		Combination Utilities (N = 19)		Electric Utilities (N = 79) ^a	
	Primary Goal	Secondary Goal	Primary Goal	Secondary Goal	Primary Goal	Secondary Goal
Make energy services more affordable to low-income customers	78%	22%	63%	32%	72%	27%
Provide a cost-effective energy resource	35%	58%	47%	32%	46%	41%
Reduce arrearages of low-income customers***	55%	29%	19%	38%	14%	64%
Improve customer relations and the utility's image	28%	52%	13%	67%	15%	76%

*** indicates that the designation of this goal as primary, secondary, or not applicable differs significantly across the three types of utilities, based on a chi-square test and a 0.001 level of significance.

^a Data on program goals were unavailable for two electric programs.

2.1.2 Goals of Mandated Programs

The goals of the mandated programs appear to be similar to the goals of the non-mandated programs (Table 2.3). The only slight difference is that mandated programs emphasize arrearage reductions more than programs that are not mandated.

Table 2.3 Primary and Secondary Goals of Mandated and Not Mandated Programs

Program Goals ^a	Mandated (N = 78) ^b		Not Mandated (N = 52)	
	Primary Goal	Secondary Goal	Primary Goal	Secondary Goal
Make energy services more affordable to low-income customers	73%	27%	70%	26%
Provide a cost-effective energy resource	37%	49%	54%	35%
Reduce arrearages of low-income customers	31%	51%	17%	50%
Improve customer relations and the utility's image	18%	66%	17%	72%

^a None of these goals differs significantly in terms of their importance to program managers of mandated vs. not mandated programs, based on chi-square tests and a 0.05 level of significance.

^b Data on program goals were unavailable for two mandated programs.

Program managers indicated that only 38 of the 78 mandated programs are expected to pass the same cost-effectiveness test that is applied to the utility's other DSM programs. Almost the same proportion is true of the nonmandated programs: 29 of these 52 programs are expected to meet the same cost-effectiveness test.

2.2 PROGRAM EXPENDITURES

The total expenditure of \$140.6 million by utilities on the operation of 132 low-income energy-efficiency programs in 1992 represents a significant increase over historic levels of investment. Specifically, it is 29% greater than the 1989 level of activity, both in terms of the number of programs and the total investment. According to Power et al. (1992, Table A-2), there were 102 utility low-income energy-efficiency programs in operation in 1989. Their 1989 investments totaled \$96.6 million, which is equivalent to an expenditure of \$109.3 million in 1992 dollars.² Thus, on an annualized basis and assuming a constant rate of growth, the number and expenditures of low-income energy-efficiency programs have increased by 10%.

During 1988, EPRI (1993) estimates that 485 electric utilities operated a total of 1,022 DSM programs, serving residential customers. By 1992, these numbers had increased to 623 electric utilities and 1,502 DSM programs. Thus, on an annualized basis (again assuming a constant rate of growth), the number of residential DSM programs has grown by 12% per year, which is comparable to the rate of increase in the number of low-income programs.

This rise in utility funding for low-income programs is consistent with the general increase in electric utility expenditures on DSM programs noted in recent studies by the Electric Power Research Institute (EPRI, 1993) and Hirst (1994). Hirst documents that electric utility expenditures on DSM programs increased from \$870 million in 1989 to \$2,360 million in 1992. On an annualized basis, this represents almost a 40% increase in expenditures each year, which far exceeds the rate of increase of utility expenditures on low-income programs.

Figure 2.1 shows the funding trends for the four primary sources of programmatic support for low-income weatherization:

- DOE's Weatherization Program,

² Thirty-six of the programs operating in 1989 provided full-scale weatherization, representing an investment of \$77.7 million (or \$88.0 million in 1992 dollars). "Full-scale weatherization programs" were defined as those offered at no charge that included:

- an evaluation of the unit's requirements according to a formal, written energy audit or evaluation procedure;
- the availability of a comprehensive package of major and minor energy efficiency measures from which to choose; and
- installation of at least one of the following: attic/ceiling, wall, or floor insulation; space or water heating system tune-up, repair, or replacement; and window replacements or storm windows.

An additional 66 programs operating in 1989 offered weatherization services that were less comprehensive, representing an investment of \$18.9 million (or \$21.4 million in 1992 dollars). "Miscellaneous programs" were defined to cover other measures or benefits utilities offered low-income households at no cost.

- U.S. Department of Health and Human Services' Low-Income Home Energy Assistance Program (LIHEAP),
- Petroleum Violation Escrow (PVE) funds, and
- utility low-income DSM programs.

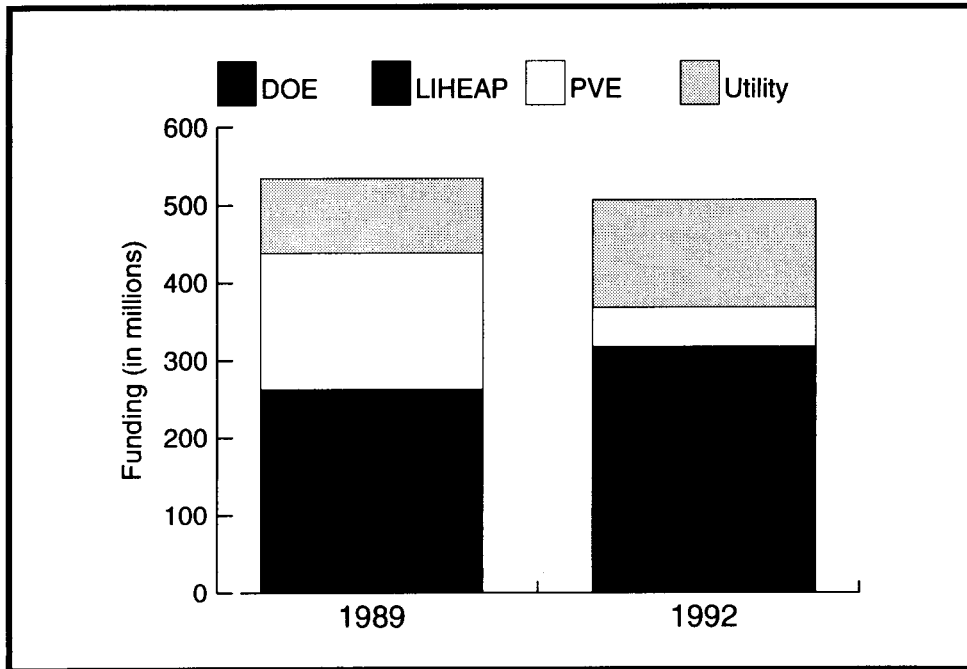


Figure 2.1 Four Major Sources of Weatherization Program Funds: 1989 vs. 1992

In 1989, utilities accounted for 19% of the total expenditures of these four types of programs. By 1992, the utility share had increased to 27%. This significant increase reflects the rise of utility funding and the decline in government funding (especially from PVE funds) in 1992 relative to 1989.

2.2.1 Expenditures per Program

The average budget of a utility low-income energy-efficiency program in 1992 was \$1.07 million, but the median budget per program was only \$216,500. The difference between these two values is a function of the positively skewed distribution shown in Figure 2.2.

Expenditures per program ranged widely from \$3,675 to \$27 million, with the two largest programs accounting for 33% of all 1992 program expenditures. These two programs, both located in California, are described below.

- The Pacific Gas and Electric Company's Energy Partners Program had the largest budget—\$27 million. It served 52,000 participants in 1992, with most participants receiving attic insulation, air leakage measures, water heater tank and pipe insulation, low-flow showerheads, water temperature reductions, compact

fluorescents, and client education. The average expenditure per participating household in 1992 was \$520.

- Southern California Gas Company's Direct Assistance Program was the second largest program, with a budget of \$18.4 million and 27,111 participants in 1992. The most common measures were client education, caulking and weatherstripping, air sealing, water heater and heating system replacements, low-flow showerheads, water aerators, electric outlet gaskets, and door replacements. The average expenditure per participating household in 1992 was \$680.

In addition to these two extremely large programs, six programs had budgets that ranged from \$4.2 to \$6.8 million. These included programs funded by the Public Service Electric and Gas Company of New Jersey, Michigan Consolidated Gas Company, a second (appliance replacement) program operated by the Southern California Gas Company, the City of Los Angeles Department of Water and Power, Columbia Gas of Ohio, and the Wisconsin Gas Company.

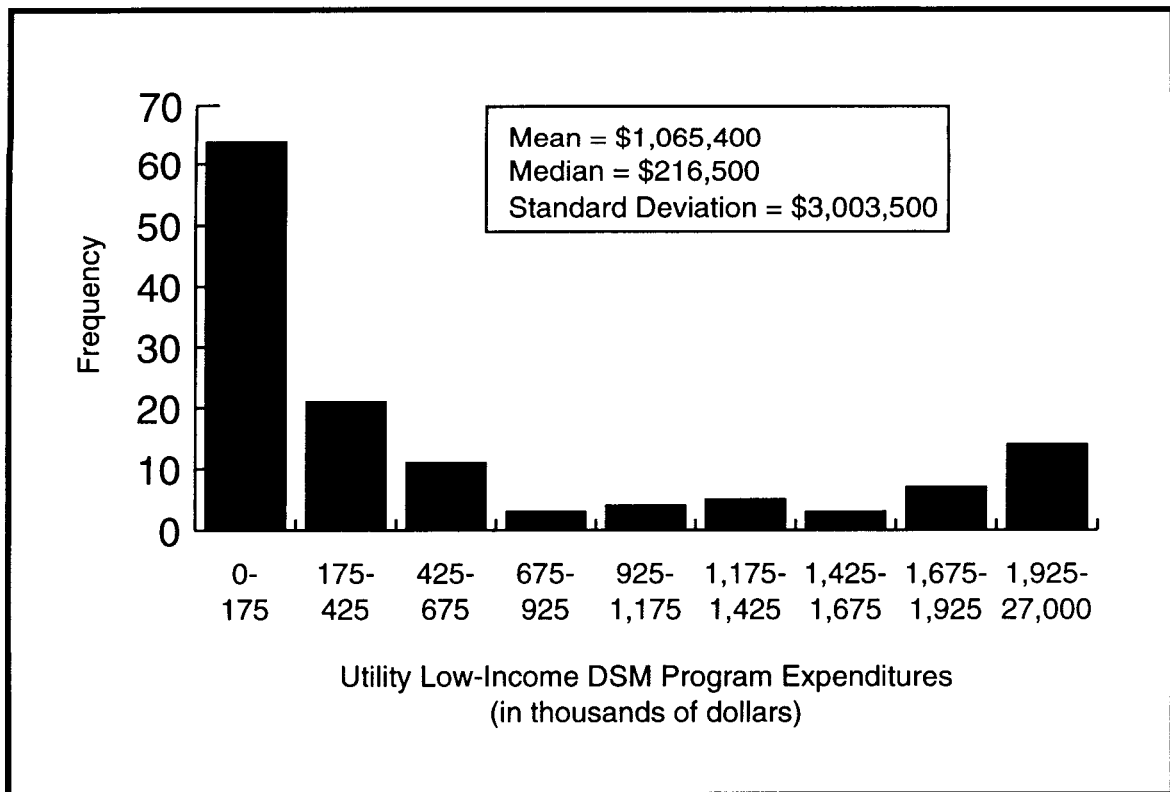


Figure 2.2 Distribution of 1992 Program Expenditures

Another six programs had annual budgets of \$2 million or more in 1992. Together with the six programs listed above, these twelve programs account for another 43.7% of the total expenditures in 1992. In summary, 14 large programs in eight states account for 76.4% of the low-income energy-efficiency expenditures in 1992. The geographic distribution of these expenditures is described in greater detail later in this chapter.

At the other extreme, 23 programs operated by 17 utilities spent less than \$50,000 on their low-income energy-efficiency programs in 1992. The following two programs had the smallest budgets.

- The Southern Connecticut Gas Company's Youth Energy Program was the smallest with an annual budget of only \$3,675.³ It worked in conjunction with the Community Action Agency of New Haven to provide low-cost weatherization services to low-income and elderly gas customers, as well as those customers with disabilities. The program hired and trained inner-city youth to install weatherization measures, including energy-efficient showerheads, weatherstripping, doorsweeps, attic insulation, attic vents, plastic interior storm windows, hot water pipe wraps, and caulking. The program weatherized approximately 150 homes in 1992, at a cost of only \$24.50 each. Thus, the program was next to the smallest in terms of level of investment per participant.
- The City of Loveland, Colorado's Plug-a-Leak Program had the next smallest budget, but it was quite different from the Youth Energy Program. In 1992, it contracted with the local community action agency to deliver a total of \$5,000 in weatherization services (primarily air infiltration measures but also some insulation) to 22 households, at a cost of \$227 per home. Thus, this program's small budget was reflected in the limited number of customers it served each year.

The 1992 average expenditure per program of \$1.07 million is essentially identical to the 1989 average of \$947,000 per program, after inflating from 1989 to 1992 dollars.⁴

2.2.2 Expenditures per Participant

The total utility budget of \$140.6 million in 1992 was used to serve approximately 313,000 participants that year. Twenty-two utilities operated more than one program and in some of these cases households could qualify for help from multiple programs. In addition, it is possible for some participants to qualify for assistance through programs operated by both their gas and electric utility companies. As a result, the total of 313,000 participants does not represent an unduplicated count.

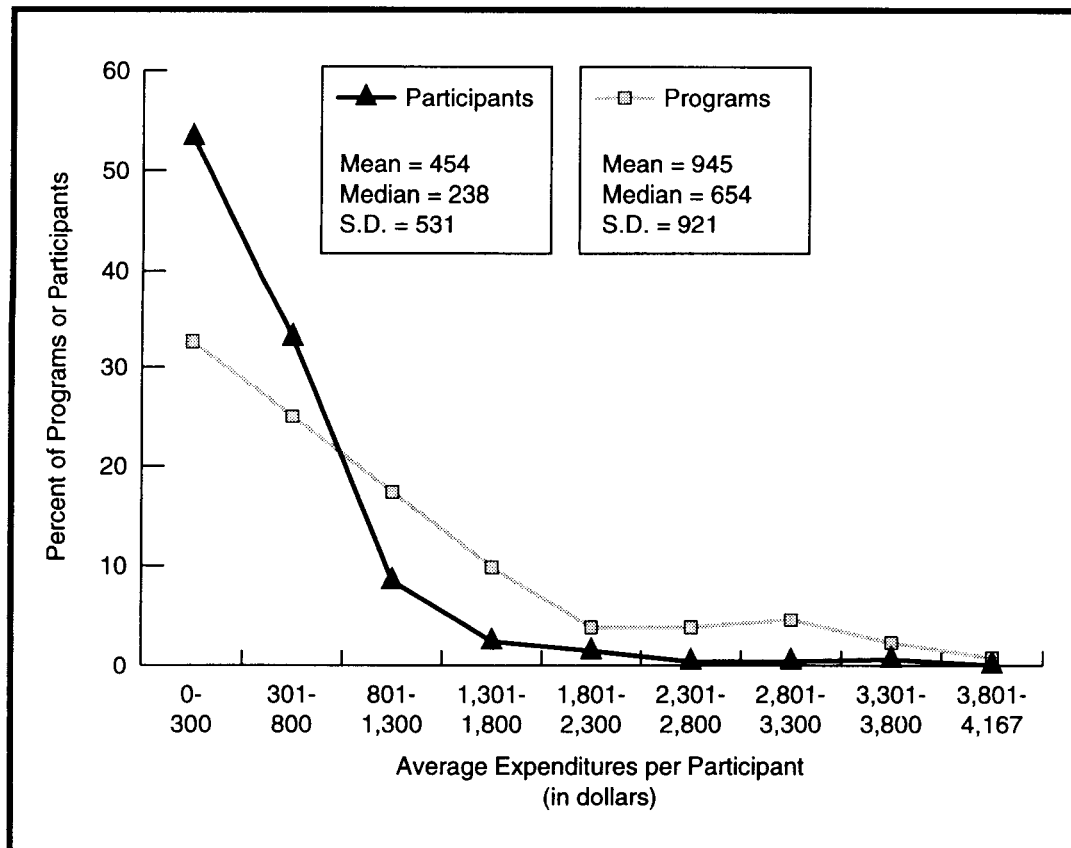
The average expenditure per participant in 1992 was \$451. This is comparable to the average utility investment of \$389 (or \$440 in 1992 dollars) for full-scale weatherization programs in 1989 (Power, et al., 1992).⁵ In both years, the average utility investment per dwelling was substantially lower than the average investment per unit generally provided by DOE's Program. Dwellings participating in the DOE Weatherization Program received average expenditures of \$1,550 in 1989 (Brown, et al., 1993) and a comparable amount in 1992.

³ The Southern Connecticut Gas Company operated several low-income programs in 1992, with total expenditures of \$565,000.

⁴ The 1989 average expenditure per program is a weighted average of the \$2,158,000 average expenditure on 36 full-scale weatherization programs and \$286,000 average expenditure on 66 miscellaneous low-income DSM programs (source: Power et al., 1992).

⁵ The average expenditure per participant for the 66 miscellaneous programs operating in 1989 and identified by Power et al. (1992) is unknown.

The distribution of investments per participant is highly skewed (Figure 2.3). Half of the programs had expenditures of \$654 or less per participant, while 5% of the programs had expenditures that exceeded \$3,054 per participant. The larger programs tended to have smaller expenditures per participant than the smaller programs. Thus, when the average expenditure per participant for each of the 132 programs is calculated, and then these averages are averaged, the result is a mean of \$945. This far exceeds the national average of \$454 and the median of \$328, which are strongly influenced by the relatively low level of expenditure per participant of some of the larger programs.



* The distribution of expenditures for the 132 programs presented above is unweighted. Thus, the average expenditure per participant for the 132 programs is \$945, while the total program expenditures divided by the total number of participants is \$450.

Figure 2.3 Distribution of Utility Expenditures Per Low-Income Participant, by Percent of Programs and Participants in 1992

Table 2.4 indicates that the level of investment for individual participants was determined in a variety of ways. Checklists of DSM measures were the most common criteria and were used to serve 49% of the participants in 41% of the programs. When checklists are used, utility staff or their

place at the time of the dwelling's inspection. Thus, no structure-specific analysis is conducted to determine whether or not some of these measures may be unnecessary.

Table 2.4 Criteria for Determining Investment Level Per Participant

Investment Level Criteria	Percent of Participants Covered	Percent of Programs	Percent of Expenditures
Measures checklist	49%	41%	59%
Uniform investment level	26%	11%	6%
Savings-to-investment ratio	12%	22%	18%
Level of energy consumption	7%	21%	22%
Written energy analysis	5%	18%	12%
Other cost-effectiveness test	3%	9%	7%

A uniform investment level was the next most common approach, being applied to weatherize 26% of the participants. Savings-to-investment ratios were used by 22% of the programs, and level of consumption (i.e., investing more in dwellings that consume a great deal of energy) was used by 21% of the programs. A written energy analysis was completed for only 5% of the participants.

Other criteria were noted by utility program managers, including the following:

- blower door test results (e.g., air sealing until infiltration is less than 2,000 cfm);
- DOE, state, or community action agency weatherization guidelines;
- maximum expenditure per house (ranging from \$250 to \$3,300, based on four utilities); and
- heating system diagnostics and safety inspection.

2.3 NUMBERS OF PARTICIPANTS AND TYPES OF DWELLINGS SERVED

The 132 utility low-income DSM programs identified in this report served an estimated 313,000 households in 1992. Because our report does not distinguish between full-scale weatherization programs and other low-income DSM investments, it is unclear whether or not levels of participation in 1992 represent an increase over 1989. In 1989, 195,000 households participated in full-scale weatherization programs. The number of participants in the 66 miscellaneous programs identified by Power et al. (1992) as operating in 1989 is unknown.

On average, 2,370 households participated in each of the programs in 1992. Annual participation levels ranged from a low of 11 (for the Electric Energy Services Program operated by the Minnesota Power and Light Company) to a high of 62,069 participants (for the Better Idea Program funded by the City of Los Angeles).

Our data on the types of units participating in 1992 utility low-income energy-efficiency programs are problematic. Often the utilities did not maintain separate records for the low-income participants in their weatherization programs, and had to estimate the types of participating low-income units by using data from all program participants. When utilities did maintain separate data on low-income participants, they sometimes used different classification schemes from the one employed on the survey form.⁶ The coding scheme we used to handle such inconsistencies causes the number of small multifamily dwellings to be underestimated, although the magnitude of this bias is not great.

Our data indicates that slightly over half of the dwellings served by utility low-income energy-efficiency programs in 1992 were single-family homes, 5% were mobile homes, 33% were small multifamily dwellings, and 9% were units in large multifamily buildings. Table 2.5 compares these percentages with the distribution of dwellings served by DOE's Weatherization Assistance Program in 1989 and the distribution of the low-income population in 1990. The latter is based on households that participated in the 1990 Residential Energy Consumption Survey and were at or below 150% of the poverty level.

Table 2.5 Types of Dwellings Served

Type of Dwelling	Utility Low-Income Programs (1992)	DOE Weatherization Program (1989)^a	Low-Income Population (1990)^b
Single-Family	53%	61%	59%
Mobile Home	5%	18%	8%
Small Multifamily	33%	12%	14%
Large Multifamily	9%	9%	19%

^a Source: Brown et al. (1993)

^b Source: Eisenberg et al. (1994)

One major difference between the DOE Program and utility programs is in the participation of mobile homes. Mobile homes were served in utility programs at less than one-third the rate of the DOE program. This can partly be explained by the fact that mobile homes use more non-utility heating fuels than any other type of dwelling. Households that heat with non-utility fuels are not excluded from DOE's Weatherization Program, but they are ineligible for most of the programs

⁶ In a few cases, utilities did not keep separate statistics for single-family detached units and small multifamily units (in which case we coded all of the units as single-family detached). In a few other cases they did not keep separate statistics for small and large multifamily buildings (in which case we coded all of the units as large multifamily). As a result of this coding scheme, the number of small multifamily units is underestimated. However, the magnitude of this bias is believed to be small because the incompatible categorizations were limited to a small number of utilities.

offered by gas and electric utility companies. Another explanation for the lower level of mobile home participation in utility-sponsored programs is the fact that nearly 40% of low-income mobile home occupants live in the South, where there are limited utility investments in low-income energy-efficiency programs.

Utility programs are also distinct from the DOE Weatherization Program in terms of the higher rate of participation of small multifamily dwellings and the lower rate of participation of single-family dwellings. In this regard they differ dramatically from the distribution of the eligible population and the types of dwellings served under the Weatherization Assistance Program. Unlike utility programs, the DOE Weatherization Program focuses primarily on single-family dwellings, which comprised 61% of the dwellings it weatherized in 1989 and a comparable percentage of eligible homes (Table 2.5).

Table 2.6 documents that a variety of criteria were used by utilities to select participants in their low-income energy-efficiency programs. Indicators of customer vulnerability were the most

Table 2.6 Household Selection Criteria

Household Selection Criteria	Percent of Participants	Percent of Programs	Percent of Expenditures
Vulnerability of Customers:	49%	32%	42%
Priority for elderly	49%	31%	42%
Priority for persons with disabilities	19%	25%	36%
Priority for children	4%	12%	8%
Type or Amount of Heating Fuel Consumed:	31%	60%	63%
Type of heating fuel or system	30%	58%	57%
Minimum fuel consumption	7%	19%	20%
Participation in Other Assistance Programs:	29%	36%	48%
Participation in LIHEAP	29%	35%	48%
Participation in AFDC ^a	21%	9%	31%
Fuel Arrears or Billing Program:	5%	11%	5%
Minimum level of arrears	1%	7%	2%
Participation in budget/level billing	4%	4%	2%
Cost-Effectiveness of Conservation Investment:	2%	5%	1%
Strict cost-test	2%	5%	1%

^a The AFDC Program offers Aid to Families with Dependent Children.

common type of household selection criteria employed by the utilities surveyed. In particular, 32% of the utility programs (serving 49% of the program participants) gave priority to elderly customers, persons with disabilities, and/or households with children. These vulnerable subgroups are also targeted by DOE's Program.

Type of heating fuel or system, was the second most important household selection criterion. Unlike the Weatherization Assistance Program, utility programs are fuel-specific and sometimes only treat customers that have particular types of heating systems (e.g., central heating systems vs. space heaters for some programs operated by electric utilities). Electric utilities will generally not offer full-scale weatherization services to households that do not heat with electricity, but they often offer a package of electric DSM measures such as compact fluorescents and water-heating measures for installation in dwellings that are not all-electric. Gas utility programs serve primarily gas-heated dwellings and typically will not offer DSM services to homes heated by other fuels.

Another fuel-related criterion for selecting households is their level of fuel consumption. Eighteen percent of the programs give priority to serving participants who have high levels of energy consumption. These participants typically offer the utility a higher level of energy savings per dollar invested in conservation measures. Some local weatherization agencies also employ this criterion when selecting households for participation in DOE's Weatherization Program.

A third set of criteria used to select households is participation in other federal programs. By marketing their programs to participants in other federal assistance programs, utilities are able to ensure the income eligibility of participants. These linkages can also offer the added feature of targeting higher energy consumers (e.g., LIHEAP) or vulnerability (AFDC).

Only 5% of the programs use a strict cost-test to select households. However, some of the other criteria, such as a minimum level of fuel consumption or utility bill arrears, target low-income households that generally offer above average returns on investment. The limited focus on strict cost-effectiveness tests is consistent with the mandates underlying many utility programs, as described in the following chapter. Low-income participants and households with special vulnerabilities are served primarily for reasons of distributional fairness and need rather than for reasons of energy resource economics.

Additional selection criteria were noted for 88 (or 67%) of the programs. The most commonly mentioned of these are noted below:

- participation in percent of income payment (PIP) plan
- special needs or hardship priority
- high consumption (e.g., large usage first or high January energy users)
- location in low-income census area or neighborhood (e.g., door-to-door delivery or neighborhood blitz is used to locate participants)
- request by customer in response to marketing
- referrals from community action agencies or other government programs.

2.3.1 Expenditures and Participants by Type of Utility

More than half (61%) of the utility low-income DSM programs operating in 1992 were run by 81 electric utility companies (Table 2.7). However, many of these programs were relatively small in terms of both total budget (averaging only \$631,000 per program) and expenditure per participants (averaging only \$307). As a result, electric utility companies accounted for only 36% of the total expenditures.

Table 2.7 Expenditures and Participants in Programs Operated by Gas, Electric, and Combination Utilities in 1992

	Number of Programs	Average Program Expenditure	Total Program Expenditures	Average Expenditure per Participant***	Average Number of Participants per Program
Gas	32	\$1,670,000	\$53,500,000	\$864	1,936
Combination	19	\$1,900,000	\$36,000,000	\$447	4,358
Electric	81	\$631,000	\$51,200,000	\$307	2,074

*** indicates that expenditures per participant differ by type of utility, based on an analysis of variance and a 0.001 level of significance.

The opposite profile is true for energy-efficiency programs run by gas utilities: they are fewer but tend to be larger. Gas utilities operated 24% of the programs in 1992 and accounted for 38% of the expenditures. Their average expenditures per participant (\$864) were nearly three times the average for the electric programs. Our survey data indicates that low-income programs operated by gas utilities in 1992 did not serve any households in large multifamily buildings (Figure 2.4). This may be due, in part, to the fact that natural gas is not as common a heating fuel in these larger buildings as in single-family homes.

Combined gas and electric utilities account for only 14% of the programs identified in this survey. Due largely to the influence of the \$27 million PG&E program, their average program expenditure was the largest of the three types of utilities (averaging \$1.9 million) they account for 26% of the 1992 program expenditures documented here. Combination utilities spent only \$447 per participant, but they operated large programs in terms of the numbers of participants served (averaging 4,358 participants per program).

The situation in 1992 was somewhat different from 1989 (Power, et al., 1992).⁴ Combination utilities were relatively less active in 1992, representing only 15% of the programs compared to 29% in 1989. Electric utilities, on the other hand, were more active in 1992, representing 61% of the programs in 1992 compared to 43% in 1989.

⁴ The numbers for 1989 are based on 36 full-scale weatherization programs. Information on type of utility is not available for the 66 miscellaneous programs operating in 1989 and identified by Power, et al. (1992).

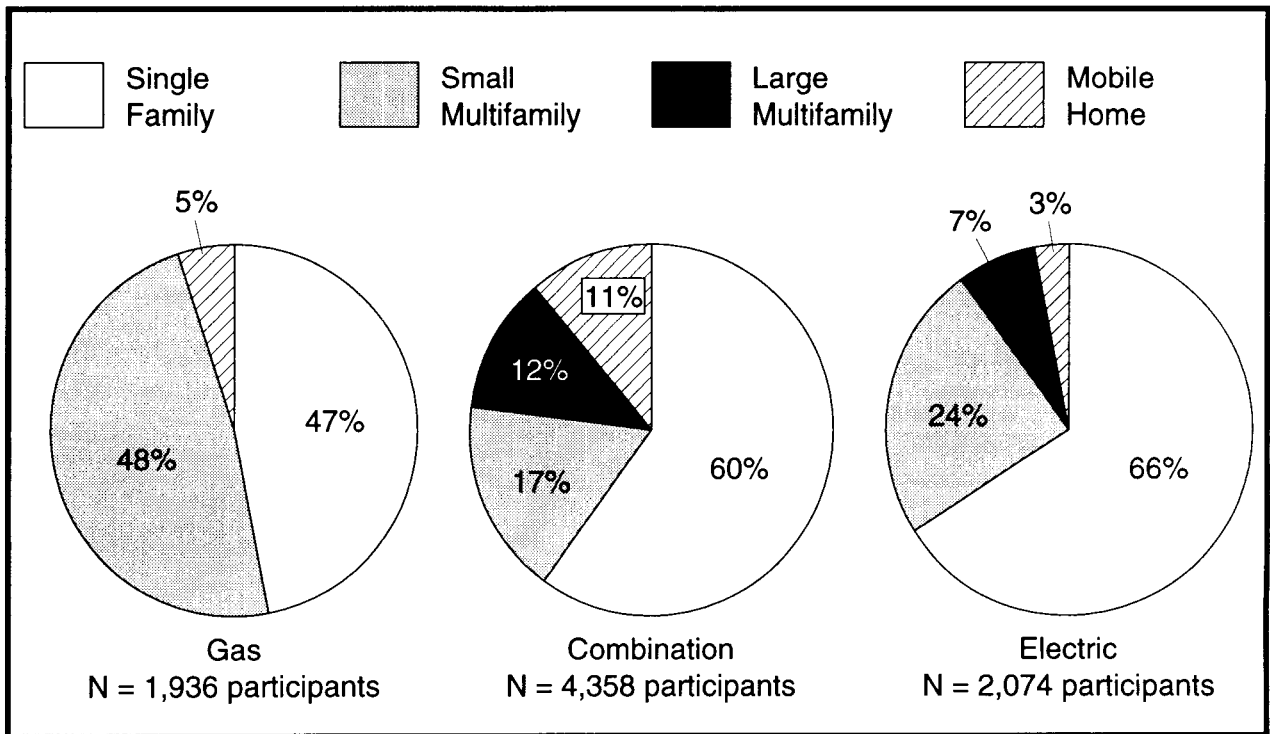


Figure 2.4 Types of Dwellings Served by Programs Operated by Gas, Electric, and Combination Utilities in 1992

2.3.2 Expenditures and Participants by Program Regulation

More than half of the utility low-income energy-efficiency programs that operated in 1992 (i.e., 78 or 59% of the programs) were mandated by their state public utilities commission (PUC) or other regulatory body (Table 2.8). These programs were located in 19 different states and account for 76% of all expenditures.

Table 2.8 Expenditures and Participants in Mandated Programs

	Number of Programs	Average Program Expenditure (in millions)	Total Program Expenditures (in millions)	Average Expenditure per Participant***	Average Number of Participants per Program
Mandated	78	\$1.36	\$106.4	\$548	2,500
Not Mandated	54	\$0.63	\$34.2	\$300	2,181

*** indicates that expenditures per participant are statistically larger in mandated programs, based on t-statistics and a 0.001 level of significance.

The 78 mandated programs spent more per participant (\$548 vs. \$300) than the 54 non-mandated programs. They also appear to be larger in total program expenditures (\$1.36 million vs. \$0.63 million), although this difference is not statistically significant. More than \$106 million of program funding in 1992 came from programs that were mandated, while only \$34.2 million was spent in programs that were not mandated. A higher proportion of participants in mandated programs resided in single-family homes, compared with the participants in programs that were not mandated (Figure 2.5).

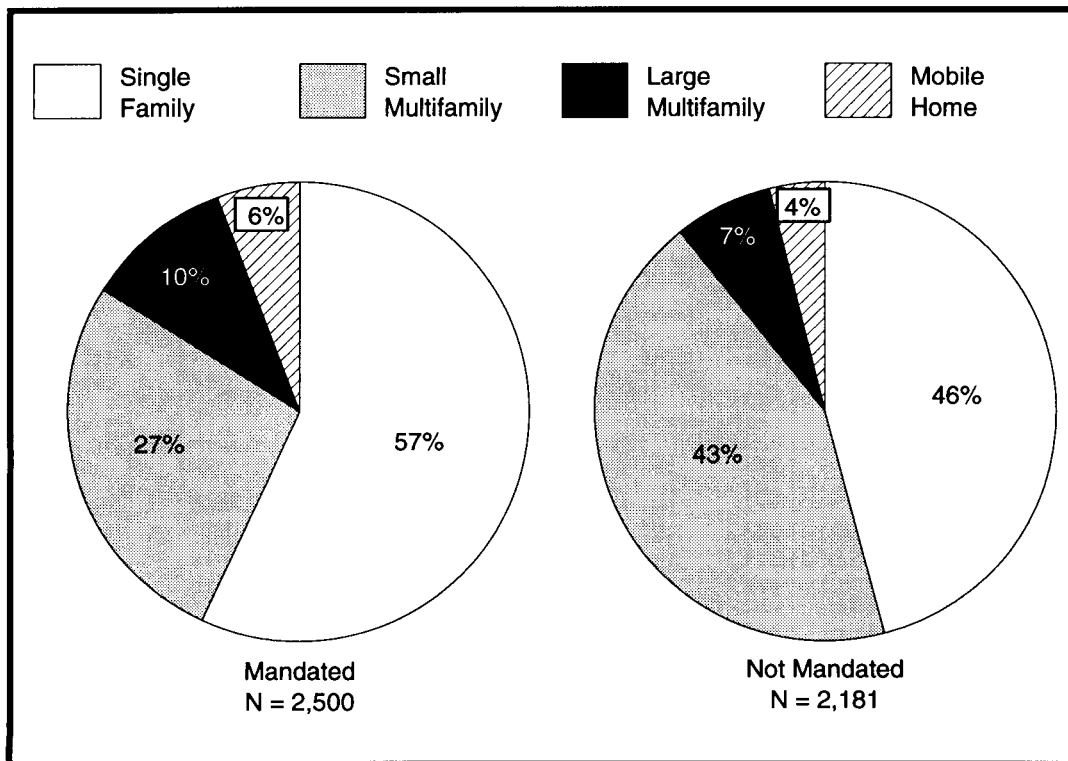


Figure 2.5 Types of Dwellings Served by Mandated vs. Non-Mandated Programs

3. GEOGRAPHIC PATTERNS

As Chapter 2 illustrated, the utility low-income conservation programs that operated in 1992 were wide-ranging in terms of their goals, budgets, participants, and expenditures per dwelling. Some of this variation can be explained by geographical factors. For instance, low-income households require energy-efficiency improvements based on the climatic conditions they face and the nature of their housing stock. Also important is the regulatory environment and the energy demand and supply conditions that cause some utilities to operate more vigorous DSM programs than other utilities. DSM programs, in general, are largest in regions of the country that face near- or long-term energy supply shortfalls and have a tradition of integrated resource planning. With some notable exceptions, levels of utility investment in low-income DSM programs correspond closely to levels of investment in DSM programs overall.

This chapter first looks at the geographic pattern of utility investments across the three climate regions used in the National Weatherization Evaluation. These regions include: (1) the cold climate region—i.e., the northern tier of states that are cold with minimal summer cooling load; (2) the moderate climate region—i.e., the middle tier which has both significant heating and cooling energy usage; and (3) the hot climate region—i.e., the southern tier of generally warm climate states with some heating, and substantial cooling loads. California, in this regionalization was divided between the moderate and hot climate regions (Beschen and Brown, 1991). The chapter then turns to a more detailed state-by-state analysis of geographic patterns.

3.1 REGIONAL PATTERNS

The regional distribution of utility low-income energy-efficiency programs, expenditures, and participants in 1992 was not closely aligned with the distribution of the eligible population. This conclusion is substantiated by comparing the statistics shown in Tables 3.1 and 3.2.

More than two-thirds of the utility low-income energy-efficiency programs that operated in 1992 (i.e., 92 or 70% of the programs) were located in the moderate climate region. The cold climate region had the next largest number, with 27 programs. Only 10% of the programs (13 in total) were located in the hot climate region. In contrast, the hot climate region contained 45% of the low-income population.

The regional distribution of expenditures by the 132 utility programs in 1992 also deviates from the regional distribution of the low-income population. In particular, only 25% of utility low-income program expenditures occur in the hot region, while 45% of the low-income population lives there. This shortfall is even more apparent when the program expenditures of four utilities operating in Southern California are excluded. Without these four programs, the total expenditures in the hot region are less than \$1.5 million, or approximately 1% of the national total.

Table 3.1 Geographic Distribution of Utility Low-Income Energy-Efficiency Programs and Expenditures

Climate Region	Number of Programs	Total Program Expenditures
Cold	27 (20%)	\$25,000,000 (18%)
Moderate	92 (70%)	\$80,900,000 (57%)
Hot	13 (10%)	\$34,700,000 (25%)

Table 3.2 Geographic Distribution of Program Participants

Climate Region	Number of Participants	Participants in DOE's Weatherization Program (1989)^a	Low-Income Population (1990)^b
Cold	41,400 (13%)	19%	12%
Moderate	166,800 (53%)	58%	43%
Hot	104,500 (33%)	23%	45%

^a Source: Based on data from the 1990 Residential Energy Consumption Survey, as described in Brown, et al. (1993).

^b Source: Based on data from the National Weatherization Evaluation, as described in Brown, et al. (1993).

The regional distribution of households served by utility programs in 1992 matches the regional distribution of low-income households marginally better. In particular, the hot climate region represents 33% of the utility program participants. However, when the four Southern California programs are excluded, this number drops to 1%. The DOE Weatherization Program also serves a smaller-than-proportionate number of the low-income households in the hot climate region—a pattern that reflects the grant allocation formula.¹ However, DOE provides a more equitable distribution of funding throughout the hot climate region, compared to the distribution of utility expenditures.

Table 3.3 and Figure 3.1 provide a profile of the average level of expenditures and participation in each of the three climate regions. The hot climate region has the largest expenditures per program (averaging \$2.7 million) and the largest number of participants per program (averaging 8,036). However, these large expenditures and participation levels are due primarily to the four

¹ The formula used by DOE to allocate Weatherization Program funds to states uses squared heating degree days and squared cooling degree days. Since heating degree days vary widely across the states, ranging from 0 to 12,012, while cooling degree days have a narrower range, from 8 to 3,538, the squaring of both terms gives heating degree days much greater emphasis on the allocation.

programs operating in Southern California. When these programs are removed, the average expenditure per program drops to less than \$200,000 per program for the remaining nine programs operating in the hot region.

Average expenditures per participant are greatest in cold climate programs and least in hot climate programs. This is consistent with the high percentage of single-family participation in the cold climate region and the dominance of small multifamily dwellings weatherized in the hot region (Figure 3.1). As with the other characteristics of the low-income utility programs in the hot region, the apparent dominance of small multifamily participation in this region at large is primarily due to the focus of the Southern California programs on this housing submarket.

Table 3.3 Expenditures and Participants, by Climate Region

Climate Region	Average Program Expenditure	Average Expenditure per Participant***	Average Number of Participants per Program
Cold	\$930,000	\$608	1,588
Moderate	\$880,000	\$488	1,813
Hot	\$2,700,000	\$333	8,036

*** indicates that expenditures per participant differ by climate region, based on analysis of variance and 0.01 and 0.001 levels of significance, respectively.

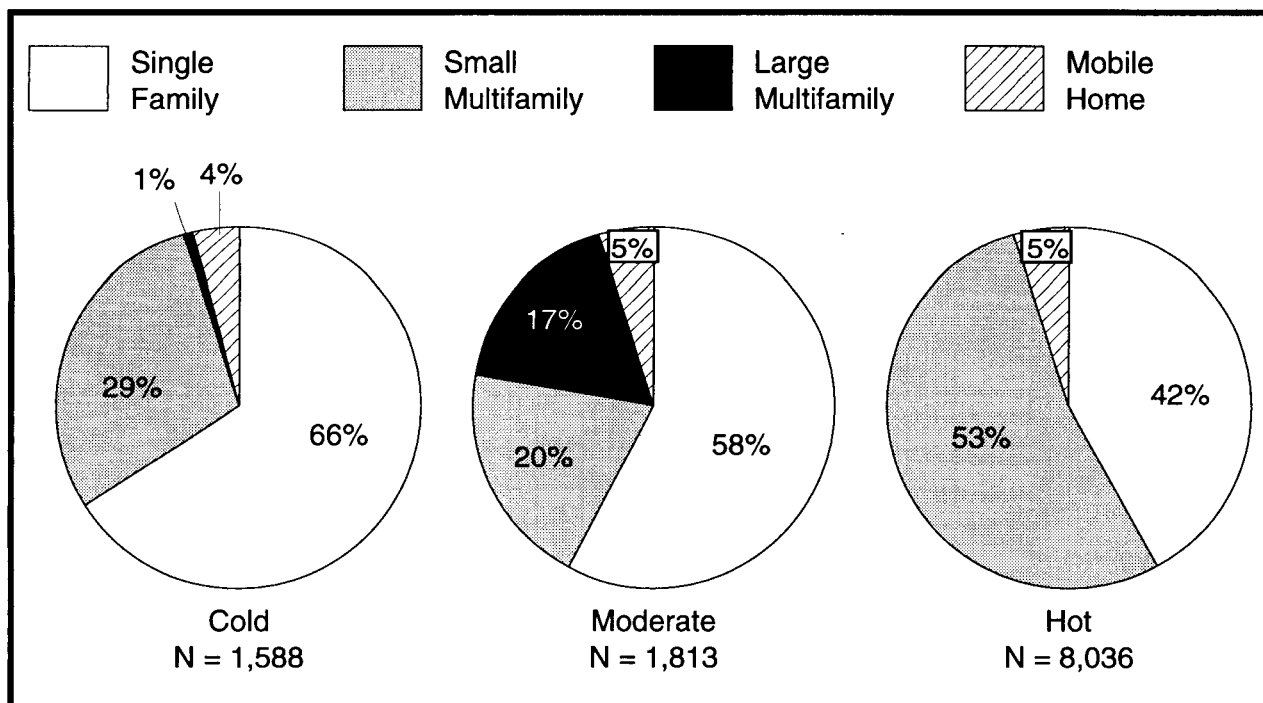


Figure 3.1 Types of Dwellings Served in the Cold, Moderate, and Hot Climate Regions

3.2 STATE PATTERNS

Figure 3.2 identifies four areas of the U.S. where utility low-income energy-efficiency programs were concentrated: California, the Pacific Northwest, the Upper Midwest, and the Northeast. California utilities account for \$60 million (or 43%) of the \$140.6 million spent in 1992 by the utilities that responded to our survey. In addition, they operated the three largest programs operating that year—Pacific Gas and Electric Company’s Energy Partners Program, Southern California Gas Company’s Direct Assistance Program, and Southern California Edison Company’s Expanded Weatherization Program. In the Pacific Northwest, 14 programs operated in Oregon and Washington; in the Midwest, 30 programs operated in Ohio, Wisconsin, and Minnesota; and in the Northeast, 43 programs operated in New York, New Jersey, Pennsylvania, Connecticut, and Massachusetts. No other state had responses of more than five utility low-income programs in 1992. Similar levels of concentration are evidenced whether one examines the number of programs, number of participants, or total program expenditures per state.

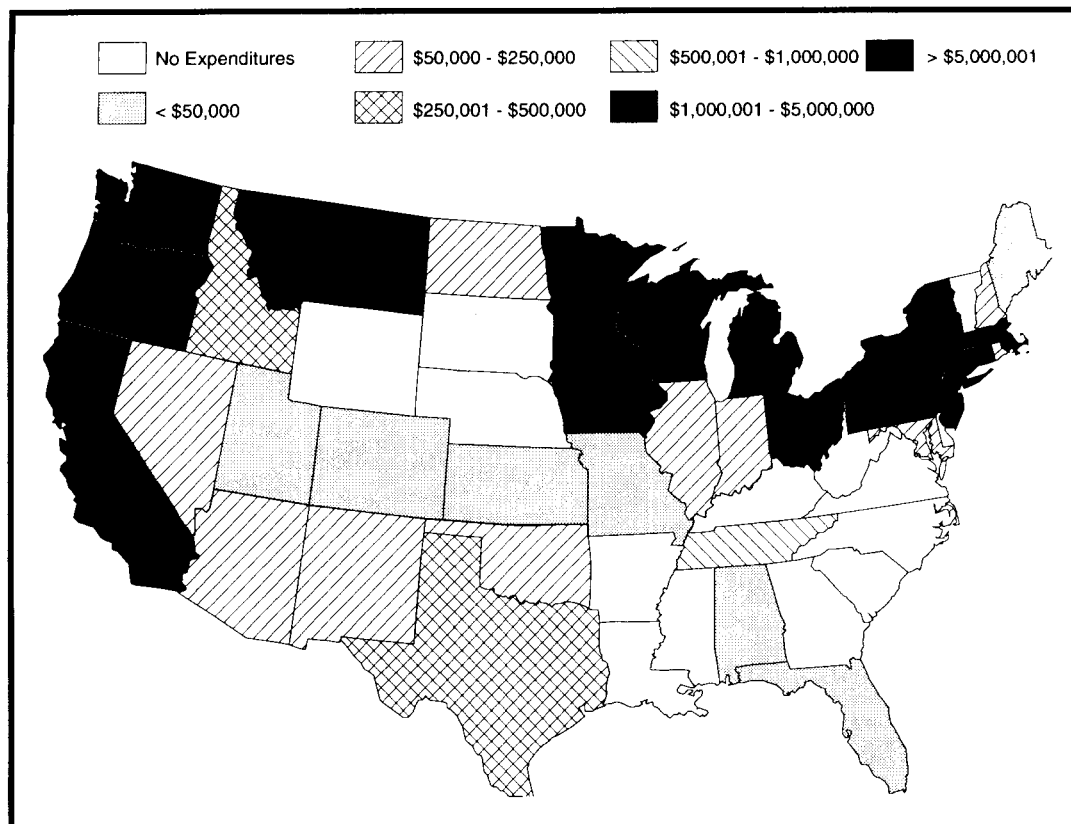


Figure 3.2 Geographic Distribution of Utility Expenditures on Utility Low-Income DSM Programs in 1992

Few programs operated in the Southeast in 1992. Nebraska, Idaho, and the Dakotas comprise another cluster of states in which few programs were identified. In contrast, the Southwest had several programs serving Texas, Oklahoma, Arizona, and New Mexico. However, these programs were much less consequential than the multimillion dollar efforts in California, the Pacific Northwest, the Upper Midwest, and the Northeast.

The same level of geographic concentration exists in terms of average expenditure per low-income household in each state (Figure 3.3). Normalization based on the number of low-income households in each state slightly reduces the relative magnitude of investments in highly populated northeastern and midwestern states such as Michigan, Ohio, New York, and Pennsylvania.

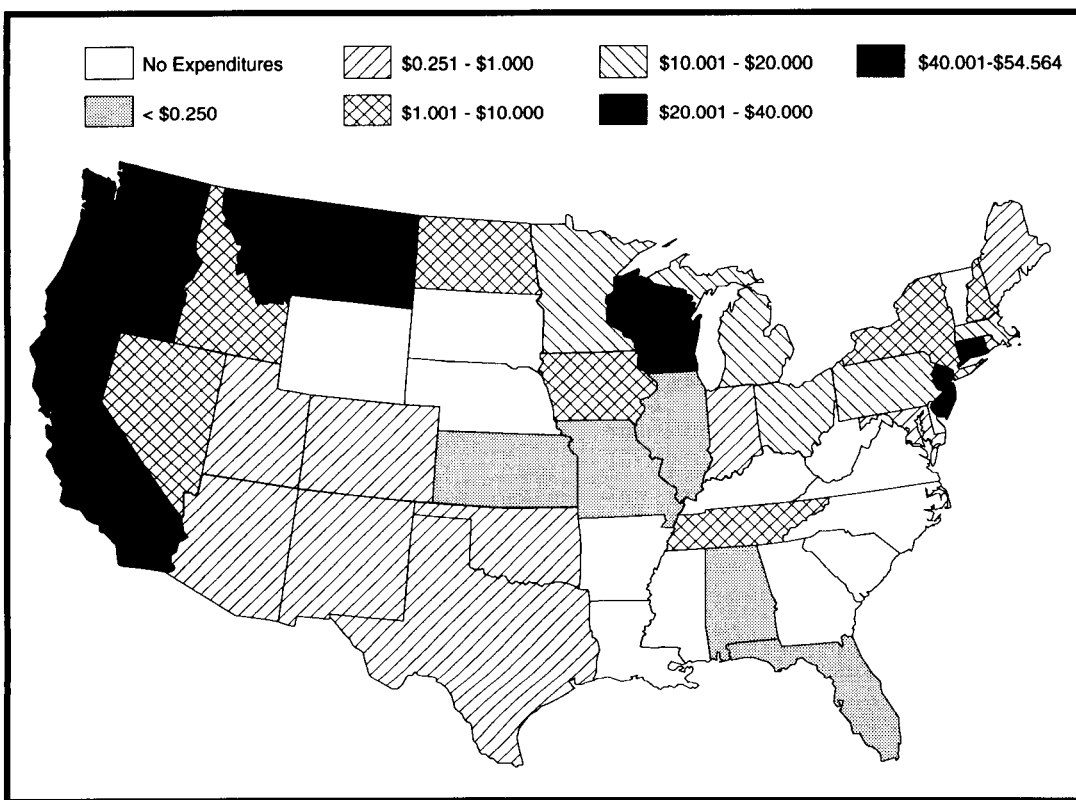


Figure 3.3 Geographic Distribution of Average Utility Expenditures Per Low-Income Household in 1992

3.3 IMPLICATIONS

The uneven geographic distribution of utility low-income energy-efficiency investments means that opportunities for DOE-utility coordination are not readily available to every state and local weatherization agency. In many states and localities (particularly in the Southeast), government-funded weatherization programs provide the only outside support available for low-income households to improve the energy efficiency of their homes.

4. REGULATORY PATTERNS

A significant level of utility investment in low-income energy-efficiency programs is occurring under orders promulgated by public utility commissions. Commission orders seek to insure that low-income households benefit from the trend towards increased investment in energy-efficiency resources. In some cases, commissions have not only approved utility-initiated programs for low-income energy efficiency, but also have required utility companies under their jurisdictions to create and operate such programs. Federal policy, as stated in the Energy Policy Act of 1990, also encourages this trend because it explicitly requires the utilization of Integrated Resource Planning (IRP) by electric and gas utilities.

Commission orders for investments by utilities in low-income energy-efficiency come in a wide variety of packages. In particular, commission orders vary in terms of the degree to which they require low-income efficiency programs to meet the same economic standards as other investments. Orders from ten states were examined as part of this study, to provide a broad overview of alternative structures being applied around the country. In 1992, these states accounted for 72% (\$101 million) of the total utility low-income program investments identified in this survey. In all 10 cases, a commission has affirmatively ordered or approved low-income energy efficiency initiatives. Additionally, in all 10 states, some degree of coordination is also occurring between the utility low-income efficiency programs and the DOE Weatherization network.

The commission orders fall into three general categories that are defined in this analysis by the degree to which low-income energy-efficiency programs and other DSM investments are required to meet the same cost-effectiveness standards. These categories are:

- flexible DSM rules;
- strict DSM rules; and
- stand-alone low-income rules.

See Table 4.1 for a summary of the state orders that fit into these categories.

Flexible DSM rules are those in which utility investments in low-income energy-efficiency, while under the general umbrella of the utility IRP-DSM process, are not required to meet as rigorous a cost-effectiveness hurdle as are other utility DSM investments. Examples of such orders are those in California, Georgia, Kansas, and Minnesota.

Strict DSM rules are those in which low-income efficiency programs are required to meet the same cost-effectiveness standard as other DSM investments. The level of stringency of those standards varies from state to state depending on the particular Commission's inclination to encourage more or less DSM investment. Examples of such states include New York and Colorado.

Table 4.1 Typology of Commission Rules for Low-Income DSM Programs

Type of Rules	Characteristics	States Examined
Flexible DSM Rules	Less Demanding DSM Benefit/Cost Standards for Low-Income Programs	California, Georgia, Kansas, Michigan, ^a Minnesota
Strict DSM Rules	Same DSM Benefit/Cost Standards Apply to Low-Income Programs	Colorado, New York
Stand-Alone Rules	Commission Order Operates Outside the DSM Process	Massachusetts, ^b Michigan, ^a Pennsylvania, Wisconsin

^a Michigan represents a mixing of both flexible and stand-alone DSM rules.

^b Unlike the other states examined, Massachusetts involves a single-utility, limited duration mandated program.

Stand-alone low-income rules are those that are not themselves integrated into the utility's IRP process and are specifically targeted to the low-income customers for reasons that stand apart from rationales underlying DSM and IRP. These may include the need to reduce arrearages and bad debt, the objective of making energy services more affordable to low-income households, or the desire to reduce the need for energy assistance or other subsidies. Examples of such programs are those in Pennsylvania, Wisconsin, Massachusetts, and Michigan.

The distinctions between these three categories are somewhat arbitrarily drawn in order to highlight the variety of approaches that are taken to low-income energy efficiency. In fact, there may be significant overlap among approaches taken towards low-income energy efficiency programs, even by a single commission within the same proceeding.

Furthermore, the significance of the distinction between "flexible" and "strict" DSM rules speaks only to the particular commission's treatment of the low-income program components relative to other programs, not to the nature or quality of the broader DSM orders themselves. The broader DSM rules themselves may be more or less stringent for all DSM resources depending on the orientation of the commission, making it more or less likely that any kind of DSM will be pursued.

4.1 FLEXIBLE RULES

4.1.1 California

The most significant example of a DSM order with flexible low-income rules is that issued by the California Public Utility Commission. It is important, not only in terms of the relatively large financial commitment made to low-income weatherization in that state, but also because of the huge influence that California's DSM proceedings have had on commissions in other jurisdictions.

At the Commission's instigation, interested parties in the California DSM planning process convened in 1989 to define areas of consensus and disagreement regarding the future of DSM. Utilities, state agencies, ratepayer groups, energy services companies, independent power producers

and environmental advocates were all part of the collaborative proceeding. It produced "An Energy-Efficiency Blueprint for California," that is the principal structure that underlies current DSM activity in California. This structure includes rules governing the following:

- principles for designing DSM programs,
- guidelines for cost-effectiveness testing,
- principles governing shareholder incentives,
- the role of measurement and evaluation, and
- the design of pilot bidding programs.

The Commission is moving in the direction of establishing what it considers a level playing field for energy-efficiency and supply-side resources. This means that ultimately, it would like to have a competitive bidding process for all of its utility resources, with agreed methods for evaluating and measuring externalities such as environmental impacts. Investments in DSM would be evaluated and incentives for such investments paid, based on actual performance. The approach seems intended to remove barriers and obstacles to DSM resources without playing favorites among the supply and demand options available.

The Commission has ordered that DSM resources be measured against the Total Resource Cost test (TRC), a particular form of benefit/cost (b/c) evaluation. The TRC test is a relatively strict standard for DSM resources because it does not take societal benefits like environmental improvements into account on the benefit side of the equation.

As to low-income programs, which are called "Direct Assistance" in California, the Commission acknowledges that a strict TRC standard may not be appropriate and that TRC is an important but not the sole measure of effectiveness for low-income programs. This exception is recognized because of the inequitable distribution of cost impacts of DSM on low-income consumers. This does not mean that low-income programs cannot meet a TRC test but that their ability to do so is not the only criterion for program survival.

The key here is that economic efficiency alone is not the measure to be applied to justify low-income programs as is the case with other DSM investments. This principle is incorporated in DSM Rule 11 which states that direct assistance programs should be treated less strictly than other DSM programs for equity reasons. Likewise, company incentives for utility weatherization can be more flexible given the uncertain nature of savings in "direct weatherization." Utilities can therefore be paid based on units of installation rather than on the basis of demonstrated savings.

4.1.2 Kansas

The Kansas Commission has been conducting an IRP proceeding in which it has concluded that the TRC Test is the appropriate standard for evaluating DSM investments. The Commission

requires that each utility prepare its DSM plan to include a Supply-only plan and a Societal Cost plan incorporating externalities as well as TRC and "Preferred" Plans.

The Kansas Commission requires that "cost-effective" programs be provided to all customer classes, including low-income customers, to mitigate concerns about the unfair distributive effects of DSM. Furthermore, it requires that possible rate impacts be considered in designing the final DSM plan. The "preferred" plan is therefore not necessarily one that meets strict TRC standards but leaves room for consideration of other issues, equity among them.

The rate-impact issue is important for low-income program managers. Utility regulation traditionally makes a major point of "cost-of-service" regulation in which ratepayers are charged for the cost of the utility service delivered based on the rate class in which they fall, such as residential, commercial, and industrial. Everyone in a given rate class, which is defined in terms of common cost characteristics, is expected to face the same rate structure as a matter of fairness and nondiscrimination. When utilities finance DSM and all ratepayers pay the cost of that financing, the participants stand to directly benefit because of reduced energy demand and the nonparticipants may not. Since low-income households are presumed to have less discretionary resources with which to invest in DSM it is often presumed that they are more likely to fall into the disadvantaged group of nonparticipants. This is one of the justifications employed by the Kansas Commission and others for insisting that all rate classes, including low-income customers, be allowed to participate in DSM programs, even if this sometimes means violating strict economic efficiency standards in program selection.

In so far as low-income DSM programs in Kansas are concerned, utilities have been ordered to consider "other benefits to society," expected from the program in addition to strict economic or environmental benefits. This allows for consideration of all the multiple motivations for low-income efficiency investments that are unrelated to the resource acquisition principles of IRP and DSM such as reduced arrearages, improved health and safety of low-income customers, reduced utility bad debt, and improved service affordability for low-income households.

4.1.3 Minnesota

Another example of flexible DSM rules can be found in the State of Minnesota. The state's legislative mandate for the creation of energy-efficiency programs (The Omnibus Energy Bill) requires the electric and gas utilities to devote a percentage of their activity towards low-income customers. This requirement overrides the cost-effectiveness standards that otherwise must be met by DSM programs.

The Minnesota utilities' Biennial Conservation Plans must explicitly note the resources and number of low-income customers that will be affected by each program and specify those programs aimed at low-income consumers. For example, Minnegasco in its 1992-94 Plan, indicated that its

budget for the residential class was \$4.9 million, of which \$2 million was to be spent on a variety of low-income programs. The low-income plans include weatherization of both single-family and multifamily units. Some of the investment is in conjunction with the DOE Weatherization Assistance Program and a portion of it is targeted to households that have incomes at or below 185 percent of the poverty level but exceeding the eligibility standards for the Weatherization Assistance Program.

As part of the plan, the utility evaluates each DSM component under Utility-Cost, Participant, Revenue-Requirements, and Rate-Impact Measure benefit/cost tests. These are alternative measures of benefits and costs to the TRC, also developed in California proceedings, which facilitate an understanding of the varied impacts of a particular DSM measure from many points of view. In its description of its largest low-income program, Project Choice, the company plan notes that the program has a benefit/cost ratio that is less than one for all tests except the Participant-Cost test. A ratio of less than one means that costs exceed benefits and, in this case, only the low-income recipient of low-income efficiency program services stands to gain economically. The company is also quick to note that many beneficiaries of low-income weatherization have been able to reduce their need for energy assistance, eliminate crisis situations or improve their payment performance because of the program.

4.1.4 Georgia

In Georgia, the explicit purpose of the IRP is to promote energy-efficiency through a bold and aggressive approach that will increase rates to finance DSM. The Commission recognizes and actually welcomes the differential rate burden imposed by DSM on participants and nonparticipants as a way of creating an incentive for ratepayers to participate in DSM.

Georgia Power Company's IRP plan, approved in August 1992, provides for a commercial and industrial DSM program and five residential programs, one of which is to be targeted to low-income households. The motivation for including a low-income program was the Commission's desire to "mitigate non-participant rate impacts within the affected class," as well as to insure low-income participation in the benefits of energy-efficiency.

The Commission ordered that Georgia Power expand its proposed \$3.7 million per annum low-income program by an additional \$3 million in order to achieve an annual participation of 20,000 households in audits. The goal is to achieve a low-income penetration rate of 39 percent for lighting measures and 49 percent for water-heating measures. The funds are to be administered by the Governor's Office of Energy Resources in order to maximize integration and coordination with other low-income resources.

4.2 STRICT DSM RULES

4.2.1 Colorado

A number of states have provided low-income programs under the same standards that apply to all DSM programs under a given utility's integrated resource plan. Colorado is one such state.

In Colorado, court challenges have resulted in a prohibition on commission initiatives that would appear to favor one group over another within a rate class. This would make it difficult to create a program that is targeted to the low-income customer group and financed by other residential ratepayers unless it could be demonstrated to be related to cost or type of service provided.

The Colorado Commission order deals with this difficult issue by creating a partnership with the Department of Housing (DoH) in which weatherization administrative costs and certain other expenses are allocated to DoH. This arrangement is intended to enable the weatherization program to meet the strict requirements of a TRC test. The Commission views its low-income program, though part of a separate docket, to be an integral part of its DSM program. Costs of the program for Public Service of Colorado, a combination electric and gas utility, are borne by electric and gas consumers in proportion to the savings of each particular energy resource expected to result from the weatherization program.

4.2.2 New York

In New York, nine major utilities were directed to establish utility low-income energy efficiency programs with services delivered through the Weatherization Assistance Program, for-profit energy service companies (ESCOs), or some combination of the two.

All programs ordered by the Commission are to be measured against TRC, Utility and Rate Impact Measurement (RIM) tests, the tests applied to measure cost effectiveness for other DSM activity. The Commission views these activities as an experiment to determine whether, among other things, low-income DSM can be cost-effectively delivered.

In ordering the experimental \$10 million per year low-income programs, the Commission has noted the doubts of advocates that the programs formally known as Utility Low-Income Energy-Efficiency Programs (ULIEEP), can meet all these cost tests. It has also noted the possibility that the need to meet these tests will make it difficult to coordinate efforts with the Weatherization Assistance Program. It has nonetheless decided to proceed with these programs and evaluate performance against the standards with the understanding that these issues will be revisited after a trial period.

The utilities were instructed to develop a joint evaluation methodology for their low-income programs in which actual energy bills will be used to evaluate program effectiveness. Preliminary estimates by the major New York utilities indicate that none of the proposed low-income programs pass the Rate Impact Measurement test, the very toughest standard which requires that a DSM

measure be neutral or beneficial to both participants and nonparticipants. A significant number may prove to have positive benefit/cost ratios under the Total Resource Cost test.

One major issue that is raised by these two examples is the need to formulate utility financed low-income energy-efficiency programs that meet rigorous standards of cost-effectiveness. Because many of the ULIEEP programs are being delivered in cooperation with DOE's network of local agencies, the New York Department of State (in collaboration with the North Carolina Department of Commerce, the New York Energy Research and Development Authority, and four utilities) commissioned Oak Ridge National Laboratory to develop evaluation methods targeted to the needs of jointly funded DSM programs (Brown and Hill, 1994).

4.3 STAND-ALONE PROGRAMS

In a number of states, Commission orders for low-income energy-efficiency measures are not explicitly a function of IRP-DSM proceedings. Rather, they are the product of a concern by the Commission or state legislature with the problems of low-income energy affordability and access to utility services. While this by no means indicates that benefit/cost considerations are entirely irrelevant, the significance of these measurements is subordinate to the perceived need to address low-income issues apart from the "resource acquisition" purposes of IRPs.

4.3.1 Pennsylvania

One example of such a program is the Pennsylvania Low-Income Usage Reduction Program (LIURP). From 1988 through 1991, 5,000 gas and 24,000 electric-heated households received full weatherization under the LIURP.

The purposes of LIURP are "energy usage reduction, reduced utility bills, and lower arrearages for low-income families." Other potential benefits include bad-debt management and energy conservation, job creation, improved safety and comfort, and improved utility-community relations.

The program serves both electric and gas customers with household incomes at or below 150 percent of the poverty level. For natural gas utilities, funding is at 0.2 percent of the prior year's jurisdictional revenues. For electric utilities, the cost of weatherization is to be spread over five years and is not to exceed 0.2 percent of revenues per year.

The LIURP programs are coordinated with existing low-income energy assistance and weatherization programs and they target high energy users. Households receive an audit and installation of measures with payback periods of seven years or less, except for sidewall insulation and furnace replacement. These can have up to a 12-year payback period. Usage reduction education is a fundamental component of the Commission's order. Gas utilities performing weatherization are also ordered to install basic electric measures such as compact fluorescents.

4.3.2 Wisconsin

Another state that has a similar order in effect for low-income household energy-efficiency is Wisconsin. This Commission has ordered that large gas utilities spend 0.2 percent of revenues on low-income weatherization and has ordered electric utilities to devote 0.1 percent of revenues to these purposes.

The Commission's justification for funding the low-income conservation programs with ratepayer revenues is based on an important component of the state's public utility statutes. Wisconsin statute S.196.37 (2) states:

"Whenever the PSCW shall find regulations, measurements, practices, acts or services to be unjust, unreasonable, insufficient, preferential, unjustly discriminatory or otherwise unreasonable and unlawful. . . . The PSCW shall determine and make any just and reasonable order relating to a measurement, regulation, practice, act or service to be furnished, imposed, observed and followed in the future."

The PSCW found that, since low-income households pay for but generally do not participate in other conservation programs, an energy-efficiency program of significant scale was warranted as a remedial measure.

The programs of the Wisconsin utilities, like those in Pennsylvania, are targeted at households at or below 150 percent of the poverty level. In addition, low-income households with high bills and the least ability to pay are the target population. The programs are highly integrated and coordinated with DOE Weatherization and LIHEAP-funded weatherization. Lighting and refrigeration measures are explicitly included in the mix of potential program measures.

4.3.3 Michigan

As previously noted, the flexible, strict, and stand-alone classifications presented above are, to some extent, artificial in that a given commission order may exhibit characteristics of more than one category. For example, in Michigan, the state legislature mandated the creation of a "Positive Billing" program that would combine below-cost payment schedules, energy efficiency investments and arrearage forgiveness for selected low-income consumers. Such a mandate cuts through the DSM requirements and provides authority for a stand-alone program.

At the same time, Michigan Consolidated Gas Company (MichCon) incorporated its low-income energy-efficiency programs into its "Energy Conservation Report and Three Year Plan" in 1992. The benefit/cost standards for program evaluation were quite liberal and the programs were expected to have a positive benefit/cost ratio, even for nonparticipants. The Michigan Plan therefore also exhibits the characteristics common to a flexible order.

4.3.4 Massachusetts

Another program of interest was created by the Settlement Agreement involving the Boston Edison Company and a variety of intervenors in a case involving the Pilgrim Nuclear Power Plant as described in the Company's petition for approval of DSM programs in April 1992.

The Company agreed to devote \$75 million of the settlement funds to energy efficiency, of which \$5 million was to be targeted for the elderly, low-income, and public facilities. Funds were to be spent on weatherization of low-income and other residential heating customers as well as the retrofit of electrically heated public housing owned by the state and federal governments.

In this case, the important factor is not the benefit/cost ratios, which turn out to be positive for the programs proposed, but the revenue source. Since the company was devoting funds from a settlement agreement rather than ratepayer financing to the program, the Commission was provided with additional flexibility regarding program structure. Ratepayers were not funding these particular programs directly through the rate structure.

The reader might be well advised to view the characteristics of Commission orders on a continuum. They range from strict standards for low-income programs under demanding economic efficiency criteria, to legislatively authorized low-income programs that stand on their own merits outside the IRP-DSM process. Low-income initiatives are tailored to the inclinations and authorities available to particular commissions. This brief review reflects some of the ways that this has been done in jurisdictions around the country. Overall, the orders reviewed here indicate that a majority of the mandated low-income energy-efficiency investments are not subjected to strict resource cost tests, but are generally justified on the grounds of fairness and the equity of utility rate impacts.

5. TYPES OF MEASURES INSTALLED

5.1 INSTALLATION RATES

The types of conservation measures emphasized by utility low-income energy-efficiency programs in 1992 were distinct from the measures emphasized by DOE's Weatherization Program. This was true in 1989, as well.¹

The following analysis of the measures installed and services delivered by utility DSM programs is based on approximated data. Knowing that many program managers would not be willing to assemble exact statistics, the survey asked them to use ranges to describe installation rates for individual measures: "never" (0%), "sometimes" (1-25%), "often" (26-50%), "most times" (51-75%), "almost always" (76-99%), and "every unit" (100%) (see Table C.1). The midpoints of these ranges are used to estimate the following descriptors:

- the percent of participants receiving each measure,
- the percent of programs offering each measure, and
- the average rate of installation of each measure across programs.

We will focus primarily upon information collected on 13 broad categories of measures—e.g., insulation, air leakage control, and structural repairs (see Table 5.1). Rates of installation of specific measures (e.g., high-density wall insulation, blower-door assisted air sealing, and roof repairs) are presented in Table C.2 in Appendix C.

5.1.1 Utility Programs in 1992

Almost every utility low-income energy-efficiency program in 1992 had a client education or information component, and 86% of participants received some form of program-sponsored energy-efficiency education or information (Table 5.1). Most often this involved the distribution of written materials (86% of participants) or on-site education as part of the home visit (71% of participants). For 16% of the participants, however, information was received at a demonstration or training center where conservation materials and technologies were exhibited. Client education is also a common element of DOE's Weatherization Program. Seventy-two percent of its participants received on-site education in 1989, and 61% received written literature.

Lighting was the second most common type of measure. Sixty-two percent of the participants in 1992 received one or more lighting measures, and more than half of the programs

¹ Practices of DOE's Weatherization Assistance Program in 1989 are documented in Mihlmester, et al. (1992) and Brown, et al. (1993). Data from these two reports are used in this chapter to compare the DOE program with utility programs. Since the utility data are for 1992 and the DOE program data are for 1989, contemporaneous comparisons are not possible.

offered lighting retrofits. By far the most common measure in this category is the compact fluorescent light bulb. This measure was installed in 61% of the participating dwellings. Compact fluorescents were not an approved measure in DOE's Weatherization Program in 1992, but they were added to the approved list in 1994.

Table 5.1 Types of Measures Installed in 1992^a

Measure	Percent of Participants Receiving Measure	Percent of Programs Offering Measure	Mean Installation Rate Per Program
Client Education/Information	86%	85%	76%
Lighting	62%	54%	35%
Water-heating System	45%	59%	50%
Air Leakage Control	36%	82%	56%
Insulation	24%	72%	38%
Windows and Door Energy Measures	20%	63%	29%
Structural Repairs	17%	63%	26%
Appliances	14%	26%	12%
Space Heating System	13%	59%	26%
Multifamily Measures	9%	41%	22%
Other Health and Safety Repairs	6%	34%	18%
Space Cooling System	5%	24%	7%
Mobile Home Measures	4%	32%	16%

^a Based on data from 126 programs that served 303,280 dwellings in 1992.

Water-heating measures were the third most common type of measure; at least one water-heating measure was a part of 59% of the utility low-income programs operating in 1992, and 45% of participants received at least one such measure. Within this category, low-flow showerheads were the most common measure, being received by 43% of the 1992 participants. Water-heater tank insulation was the next most common water-heater measure, being installed in 34% of participating homes. Water-heating measures were also installed in most (56%) of the participating dwellings in DOE's program. The major difference is that water-heater tank insulation was the most common DOE water-heater measure, while low-flow showerheads were installed in only 8% of the DOE-weatherized homes.

Air leakage control measures were installed in 82% of the utility low-income DSM programs in 1992. However, only 36% of participants received any type of air leakage measure in 1992. The

most common measure was general caulking and weatherstripping (29% of participants). In addition, it is estimated that 18% of the units served received distribution system leakage control, and 9% of participants received blower-door assisted air sealing. Thus, the air leakage control measures used by these programs in 1992 included several advanced practices, similar to those used in DOE's Weatherization Program.

Insulation is installed far less frequently in utility low-income energy-efficiency programs than in DOE's Weatherization Program. Seventy-two percent of the programs offered some type of insulation, but only 24% of participants received any insulation. In contrast, 62% of the homes weatherized by the DOE program in 1989 received insulation. Attic insulation is by far the most frequently installed type of insulation in both the utility programs and the DOE program. Rim and band joist insulation was the next most common type of insulation in utility programs, being installed in 8% of participating dwellings in 1992 compared to 14% of the DOE program. Wall and floor insulation were installed less frequently in utility programs in 1992 (averaging 4% to 5% of participants) compared with the DOE program (which averaged 19% and 12%, respectively, in 1989).

Window and door measures were installed in 20% of the dwellings that participated in the 132 utility programs in 1992. The most common measures in this category involved either replacing window glazings or replacing entire window units—measures that were installed twice as frequently in DOE's program in 1989. Storm windows were installed in only 1% of the utilities' participating dwellings. In contrast, storm windows were installed in 36% of the homes weatherized by the DOE program in 1989.

Structural repairs were offered by many utility programs in 1992, but only a small percentage (17%) of participants benefited from them. For instance, structural repairs were made to 4% of the walls, 3% of the roofs, and 1% of the floors in dwellings that participated in the utility programs. The rate of structural repairs is roughly twice as high in DOE's program. For instance, structural repairs were made to 6% of the walls, 9% of the roofs, and 5% of the floors in dwellings that participated in the DOE program in 1989.

Approximately, one-quarter (26%) of the utility programs offered appliance measures, and 14% of the participants in 1992 received at least one appliance retrofit or replacement. Nine programs replaced refrigerators, making it the next most common measure in this category. Altogether, 7% of the participants in 1992 received a new energy-efficient refrigerator. Replacing refrigerators is not an approved measure in DOE's Weatherization Program.

Space-heating system measures were offered by 59% of the programs in 1992, but only 13% of the participants received any assistance with their space-heating systems. The following heating system improvements comprise the majority of these activities: clean and tune-up (7% of participants), heating system replacement (7%), safety problem fixed (8%), and heating system

repaired (5%). Space-heating system measures were more prominent in the DOE program: in 1989, 30% of DOE program participants received one or more space-heating system measure.

Space cooling system measures and measures that are tailored to large (over 4-unit) multifamily buildings and mobile homes were not common components of utility low-income energy-efficiency programs in 1992.² Altogether, fewer than 10% of the participants received these measures. Space cooling and multifamily measures also were not prominent features of DOE's Weatherization Program in 1989, although air conditioner replacements and other cooling measures are likely to become more common now that they are approved measures. Mobile home measures were installed in 13% of DOE's participating dwellings in 1989, reflecting the slightly greater level of participation of mobile homes in DOE's program compared to utility programs.

5.1.2 Utility Programs in 1989

The measures most commonly offered by the 36 full-scale utility weatherization programs operating in 1989 (Power, et al., 1992) were the following.

- Attic insulation
- Water heater and duct insulation
- Weatherstripping or caulking
- Storm windows or doors
- Wall insulation
- Basement insulation
- Window replacement
- Home repairs
- Heating system repair/tune-up
- Heating system replacement

Unfortunately, the frequency of usage of these measures in 1989 was not measured.

By definition, these 36 programs offered more major measures than was true in the 66 miscellaneous utility programs operating during 1989. The most frequent measures offered in these miscellaneous programs were:

- Client education at home
- Weatherstripping and caulking
- Client education by mail
- Water heater wrap
- Low cost/no cost kits
- Heating system replacement
- Heating system tune-up/repair

These lists indicate an emphasis on client education and low-cost measures that was also true of utility programs in 1992. Between 1989 and 1992, a new low-cost measure has become a mainstay of utility low-income DSM programs: the compact fluorescent light bulb. On the other hand, the prominence of storm windows and doors noted in 1989 full-scale utility programs appears to have diminished by 1992, as has any emphasis on wall and basement insulation.

² Multifamily measures include space conditioning control systems, water heater distribution systems, repair and replacement of ventilation fans, and public area lighting. Mobile home measures include vapor barriers, underpinning, and skirting.

5.2 FACTORS ASSOCIATED WITH INSTALLATION RATES

5.2.1 Installation Rates by Type of Utility

Gas, electric, and combined utilities each have distinct profiles in terms of the measures that they installed in their 1992 low-income DSM programs (Table 5.2).

Table 5.2 Measures Installed, by Type of Utility

Measure	Gas Programs ^a (N = 31)		Combined Programs ^b (N = 19)		Electric Programs ^c (N = 76)	
	Percent of Participants Receiving Measure	Mean Installation Rate Per Programs	Percent of Participants Receiving Measure	Mean Installation Rate Per Programs	Percent of Participants Receiving Measure	Mean Installation Rate Per Programs
Client Education/Information	92%	72%	97%	78%	78%	77%
Lighting***	2%	9%	94%	52%	69%	42%
Water-Heating System*	37%	48%	18%	31%	62%	55%
Air Leakage Control	58%	68%	32%	50%	29%	53%
Insulation	55%	44%	13%	29%	17%	38%
Windows and Door Energy Measures	34%	39%	9%	18%	20%	27%
Space Heating System	33%	37%	14%	30%	4%	21%
Appliances	1%	5%	32%	15%	10%	15%
Multifamily Measures**	1%	5%	3%	34%	15%	27%
Structural Repairs	50%	31%	12%	27%	8%	33%
Other Health and Safety**	19%	31%	5%	23%	2%	11%
Space Cooling System	7%	3%	11%	15%	2%	7%
Mobile Home Measures	5%	14%	2%	18%	5%	17%

*, **, and *** indicate that mean installation rates are significantly different across the three types of utilities at the 0.05, 0.01, and 0.001 levels, respectively, based on F-statistics.

a Based on 31 gas programs that served 61,766 participants in 1992.

b Based on 19 combined programs that served 82,794 participants in 1992.

c Based on 76 electric programs that served 158,720 participants in 1992.

Gas utility programs tended to install more space-heating measures and health and safety measures, reflecting the fact that gas-heating systems are more likely than electric systems to be the source of health and safety problems. Windows and doors, air leakage control, and insulation also were more frequent elements of gas utility programs than electric utility programs. These findings are consistent with the greater average expenditure for participants of gas programs compared with electric or combined programs.

Electric utility programs, on the other hand, targeted electric end uses including lighting and appliances. Installation rates for multifamily measures also were slightly higher in electric than gas programs, reflecting the greater percentage of multifamily participants in electric than gas programs. In contrast, investments in insulation, structural repairs, and windows and doors were much lower in programs run by electric rather than gas utilities.

Participants in programs operated by combined gas and electric utility companies received particularly low rates of installation of many different types of measures including: air leakage control (32%), water-heating measures (18%), insulation (13%), and windows and doors (9%). In reality, these low rates were dominated by the influence of PG&E's Energy Partners Program, which accounts for 52,000 of the 82,794 participants represented in this category. When the 52,000 participants in PG&E's program were removed from this category, the installation rates of combined programs increased to levels that more closely resemble those of gas and electric utilities. This can be detected by comparing the mean installation rates per program across the three types of utilities.

5.2.2 Installation Rates by Type of Program

Table 5.3 compares the measures installed in mandated and non-mandated programs. For the most part, the differences are not statistically significant. The patterns, however, suggest a tendency for mandated programs to be more comprehensive. In 1992, mandated programs installed more insulation, windows and door measures, air leakage control measures, and structural repairs. This pattern is consistent with the fact that the average expenditure per participant in mandated programs in 1992 was nearly twice the average for non-mandated programs (see Chapter 2).

In contrast, non-mandated programs tend to install more lighting measures. This finding is consistent with the fact that electric or combined electric and gas utilities accounted for 87% of the participants in non-mandated programs in 1992, but only 76% of the participants in mandated programs.

Table 5.3 Measures Installed, by Programs that are Mandated or Not Mandated

Measure	Mandated Programs ^a (N = 74)		Non-Mandated Programs ^b (N = 52)	
	Percent of Participants Receiving Measure	Mean Installation Rate Per Programs	Percent of Participants Receiving Measure	Mean Installation Rate Per Programs
Client Education/ Information	81%	72%	94%	81%
Lighting	51%	35%	79%	36%
Water-Heating System	39%	54%	56%	45%
Air Leakage Control	48%	57%	16%	55%
Insulation*	34%	44%	7%	30%
Windows and Door Energy Measures	27%	29%	8%	27%
Structural Repairs	25%	25%	5%	26%
Appliances	15%	13%	13%	12%
Space Heating System	14%	24%	11%	29%
Multifamily Measures	11%	22%	5%	23%
Other Health and Safety Repairs	4%	18%	10%	17%
Space Cooling System	8%	7%	1%	8%
Mobile Home Measures	5%	13%	4%	21%

*, **, and *** indicate that mean installation rates are significantly different across the two types of programs at the 0.05, 0.01, and 0.001 levels, respectively, based on t-statistics.

^a Based on 74 mandated programs that served 187,259 participants in 1992.

^b Based on 52 mandated programs that served 116,021 participants in 1992.

5.2.3 Installation Rates by Climate Region

Several of the measures shown in Table 5.4 were installed more often in utility low-income programs located in the cold and moderate climate regions than in the hot region. These measures include space-heating system measures, windows and doors, appliances, mobile home measures, and health and safety repairs.

Table 5.4 Measures Installed, by Climate Region

	Cold Climate (N = 23)		Moderate Climate (N = 90)		Hot Climate (N = 13)	
	Percent of Participants Receiving Measure	Mean Installation Rate Per Programs	Percent of Participants Receiving Measure	Mean Installation Rate Per Programs	Percent of Participants Receiving Measure	Mean Installation Rate Per Programs
Client Education/ Information	92%	77%	78%	75%	95%	79%
Lighting	62%	42%	63%	35%	60%	24%
Water-Heating System**	31%	28%	44%	55%	52%	56%
Air Leakage Control**	13%	32%	45%	61%	30%	64%
Insulation	14%	31%	27%	42%	23%	22%
Windows and Door Energy Measures	18%	25%	25%	30%	12%	29%
Space Heating System	18%	34%	15%	26%	8%	11%
Appliances	17%	18%	23%	12%	0%	2%
Structural Repairs	12%	22%	14%	26%	25%	30%
Multifamily Measures	5%	20%	12%	23%	5%	24%
Other Health and Safety Repairs	12%	27%	8%	17%	0%	4%
Space Cooling System	7%	15%	6%	5%	4%	10%
Mobile Home Measures	7%	15%	6%	17%	1%	12%

*, **, and *** indicate that mean installation rates are significantly different across the three climate regions at the 0.05, 0.01, and 0.001 levels, respectively, based on F-statistics.

^a Based on 23 programs in the cold region that served 39,001 participants in 1992.

^b Based on 90 programs in the moderate region that served 158,805 participants in 1992.

^c Based on 13 programs in the hot region that served 104,464 participants in 1992.

Programs operating in the hot region, on the other hand, completed structural repairs and installed water-heater measures more often than in the cold and moderate regions. The higher frequency of structural repairs may reflect the fact that low-income housing in the hot region is more

dilapidated than low-income housing in other regions of the country (Brown, et al., 1993). The prevalence of water-heater measures reflects the large number of participants in Southern California's utility programs who received low-flow showerheads.

In conclusion, none of the climate regions installed an especially comprehensive array of DSM measures, relative to the other regions. This is consistent with the fact that levels of expenditure per participant are similar across regions (Chapter 3). Nevertheless, participants of programs operating in the cold and moderate regions benefited from higher rates of installation for several major measures, relative to participants in the hot region.

6. COORDINATION WITH DOE'S WEATHERIZATION PROGRAM

The U. S. Department of Energy and Department of Health and Human Services, as well as numerous state agencies fund programs that improve the energy efficiency of low-income housing. (See Chapter 2 for an overview of the magnitude of this funding.) HHS has created federal incentive funds that reward leveraging of its funds with resources from electric and natural gas utilities. Similarly, DOE has proposed to establish a leveraging incentive fund for its low-income Weatherization Program. In addition, some state legislatures have appropriated funds for weatherization that are contingent on the expenditure of matching utility resources. Leveraging is seen as a means for government resources to meet a greater share of the weatherization needs of low-income households.

This chapter describes the magnitude and types of collaboration that existed in 1992 between these DOE-funded local agencies and the utility industry. Since many of the same local agencies that deliver low-income weatherization services for DOE also deliver weatherization services for HHS and state agencies (Power and Brown, 1993), the following statistics on coordinated programs cover the majority of public/private low-income weatherization partnerships.

6.1 OVERVIEW OF COORDINATED PROGRAMS

Utilities were asked to report whether their low-income programs were delivered in whole or in part by any of the local agencies that deliver energy services for DOE's Weatherization Program. Sixty-nine percent of the utility program managers who responded to this question (79 out of 115 responses) indicated that their programs did use these local agencies to deliver some or all of their weatherization services. These 79 programs account for \$116.6 million (or 83%) of the total utility low-income DSM program expenditures in 1992.

In 11 of these 79 programs, no utility program funding was received by DOE's local agency network. In an additional 7 programs, the survey respondents were unable to estimate the magnitude of the contracts with local agencies. The remaining 61 programs estimated how much utility funding local agencies received to deliver energy-efficiency services. Thus, at least half of the 132 utility programs that operated in 1992 involved contracting with local agencies. In total, the DOE network of local agencies received \$53.7 million from these 61 utility programs, which represents slightly more than one-third (38%) of the \$140.6 million expended by utilities in 1992.

Mihlmester et al. (1992, p. 37) estimated that \$42.2 million of utility funding was received by local weatherization agencies for the operation of various energy programs in 1989. (This is equivalent to an investment of \$47.7 million in 1992 dollars.) Some of these 1989 energy programs were limited to client education or the delivery of low-cost measures such as compact fluorescents or weatherstripping and caulking—i.e., types of programs that are excluded from the inventory of 1992

programs. Considering this difference, it is concluded that local agencies have increased their utility budgets for low-income energy-efficiency programs by at least \$6 million in 1992 dollars (or a 13% increase) between 1989 and 1992.

In 1992, the 61 programs that paid DOE's local agency network to deliver energy-efficiency services to their low-income customers were larger than the average utility low-income program operating that year (Table 6.1). Ten of the twelve largest low-income energy-efficiency programs operating in 1992 are among these 61. On average, the 61 programs expended \$1.68 million per program, compared with an average expenditure of \$510,000 for other programs.

Table 6.1 Expenditures and Participants in Coordinated Programs

	Number of Programs^a	Average Program Expenditure (in millions)	Total Program Expenditures (in millions)	Average Expenditure per Participant^{***}	Average Number of Participants per Program
Coordinated	61	\$1.68	\$102.6	\$649	2,609
Not Coordinated	48	\$0.51	\$24.5	\$255	2,083

^a 23 respondents either did not provide an answer regarding their use of the States' Weatherization Programs or they provided contradictory responses. In either case their response was recorded with a missing value.

^{***} indicates that expenditures per participant are larger in coordinated programs, based on t-statistics and a 0.001 level of significance.

The average level of expenditure channeled through DOE's local agency network by each of these 61 coordinated programs was \$881,000, but there was wide variation around this mean (Figure 6.1). Half of the utility program expenditures by local agencies involved budgets of less than \$173,000 (Figure 6.1). At the other extreme, are several multi-million dollar budgets for local agencies.

The Southern California Gas Company's Direct Assistance Program represented the largest coordinated effort in 1992 with a budget of \$11.6 million that was spent by 13 community action agencies to deliver weatherization services. The next largest budget was PG&E's expenditure of \$5.4 million for weatherization services from DOE's local agency network. PG&E's Energy Partners Program (described in Chapter 4) solicits bids from private and not-for-profit organizations to deliver its DSM program to low-income clients. In 1992, 16 agencies were selected via this competitive bidding process. Another large expenditure in 1992 was the \$4.3 million that Columbia Gas of Ohio channeled through Ohio's community action agencies to low-income households, as part of its Warm Choice Program. This Program was designed as a "wrap around" service to complement the DOE Weatherization Program. It meets some of the low-income energy-efficiency needs that cannot be

met by DOE because of budget limitations (e.g., space-heating system replacements) or program rules and procedures (e.g., water-heater replacements).

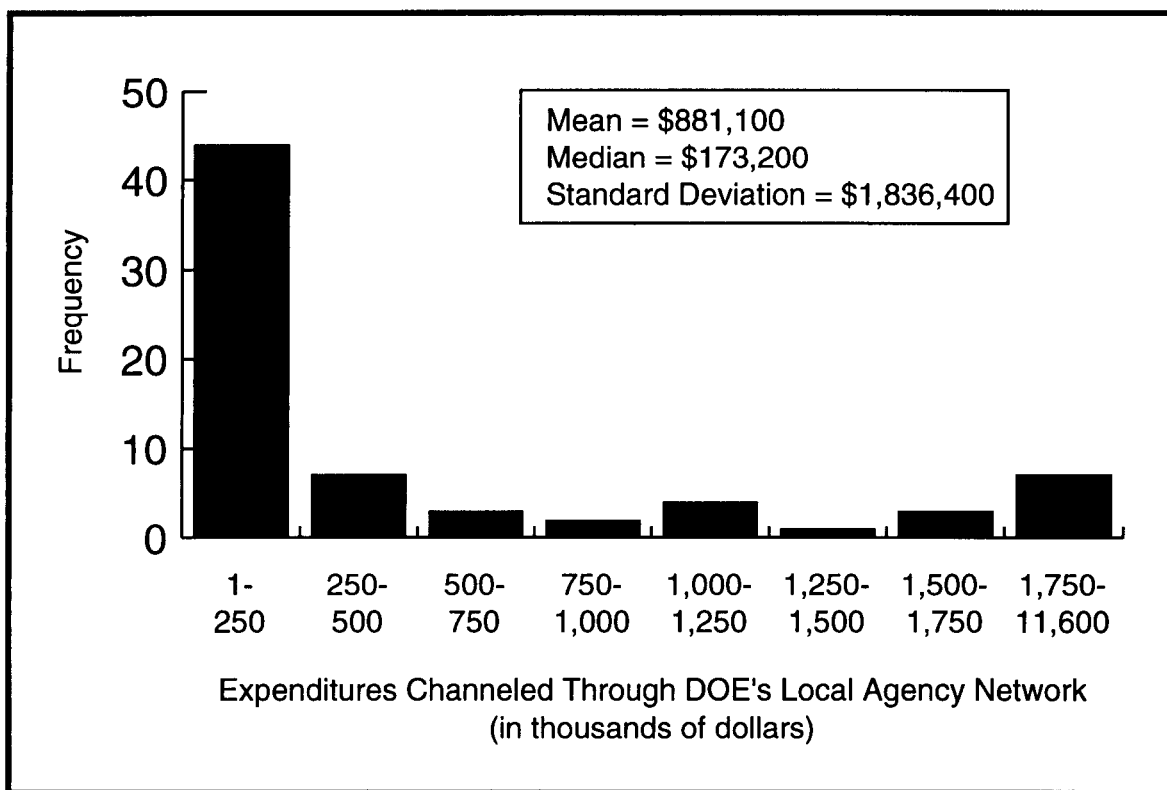


Figure 6.1 Distribution of Utility Expenditures in 61 Coordinated Programs

6.1.1 Types of Measures Installed

Coordinated programs in 1992 tended to be more comprehensive than non-coordinated programs in terms of the types and numbers of measures installed (Table 6.2). This is consistent with the higher average expenditure per participant that characterizes coordinated programs (Table 6.1). In particular, participants in coordinated programs received more lighting (17% vs. 5%), insulation (40% vs. 6%), windows and door measures (30% vs. 11%), and air leakage control (58% vs. 15%). Water-heating measures and client education are the only noteworthy exceptions to this general pattern. For these relatively low-cost measures, non-coordinated programs have higher installation rates.

As a whole, the coordinated programs are more similar to DOE's Weatherization Program in terms of the measures they install. This similarity is not surprising since many coordinated programs operate by adding utility funding to a local agency's pre-existing DOE weatherization program, without significantly altering the agency's type of service delivery.

Table 6.2 Types of Measures Installed in Coordinated Programs

Measure	Coordinated (N = 57)		Non-Coordinated (N = 47)	
	Percent of Participants Receiving Measure	Mean Installation Rate Per Programs	Percent of Participants Receiving Measure	Mean Installation Rate Per Programs
Client Education/ Information*	78%	67%	95%	84%
Lighting	41%	29%	80%	42%
Water-Heating System	36%	46%	63%	58%
Air Leakage Control	58%	59%	15%	54%
Insulation***	40%	47%	6%	24%
Windows and Door Energy Measures*	30%	23%	11%	36%
Structural Repairs*	30%	29%	5%	17%
Appliances	17%	17%	5%	7%
Space Heating System	20%	32%	5%	21%
Multifamily Measures	8%	25%	7%	18%
Other Health and Safety Repairs	9%	21%	3%	10%
Space Cooling System	10%	7%	1%	7%
Mobile Home Measures	7%	19%	2%	10%

*, **, and *** indicate that mean installation rates are significantly different across the three types of utilities at the 0.05, 0.01, and 0.001 levels, respectively, based on F-statistics.

a Based on 57 coordinated programs that served 150,363 participants in 1992.

b Based on 47 non-coordinated programs that served 99,773 participants in 1992.

6.1.2 Types of Dwellings Served

Coordinated programs tend to serve a higher proportion of single-family dwellings and a lower proportion of small multifamily dwellings compared to programs that are not coordinated with DOE's network of local agencies (Figure 6.2). This pattern is consistent with the historic focus of the DOE Weatherization Program on single-family dwellings. The pattern is also consistent with the distribution of the low-income population in terms of the types of dwellings they occupy: 58% of

participants in coordinated programs (in 1992) occupied single-family homes, while 59% of the low-income population (in 1990) resided in single-family homes.

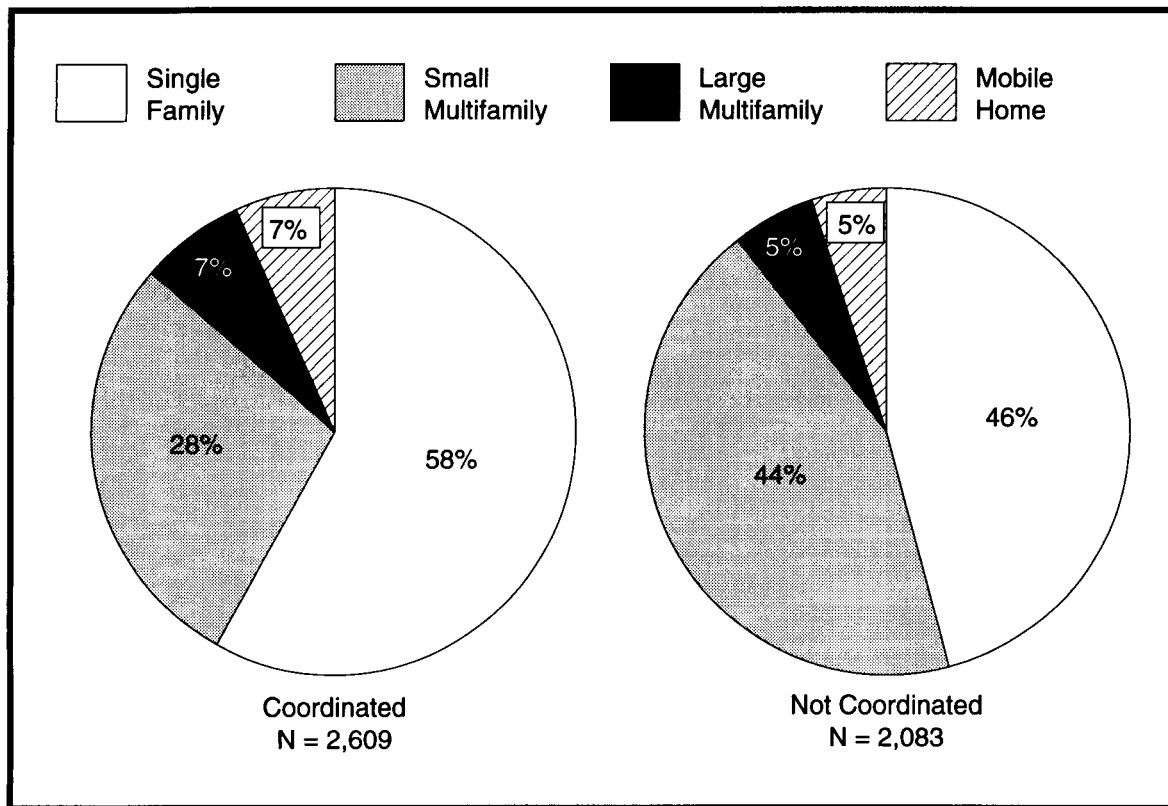


Figure 6.2 Types of Dwellings Served by Coordinated Programs

6.1.3 Geographic Distribution of Coordinated Expenditures

Figure 6.3 maps the \$53.7 million of utility resources received by DOE's network of local agencies. Compared to the distribution of total utility expenditures on low-income DSM programs (Figure 3.2), the coordinated expenditures show even greater geographic concentration. In particular, Florida and Southern California represent the only areas in the Southeast or Southwest that employed DOE's local agency network in 1992. Most of the coordinated expenditures are concentrated in California, the Pacific Northwest, the Upper Midwest plus Ohio, and the Mid-Atlantic States.

Comparing Figures 3.2 and 6.3 suggests that several parts of the country offer particularly promising opportunities for future coordination. Utility low-income energy-efficiency expenditures are substantial, while funded coordination appeared not to exist in 1992 in the following states: Michigan, Massachusetts, Tennessee, and Texas.

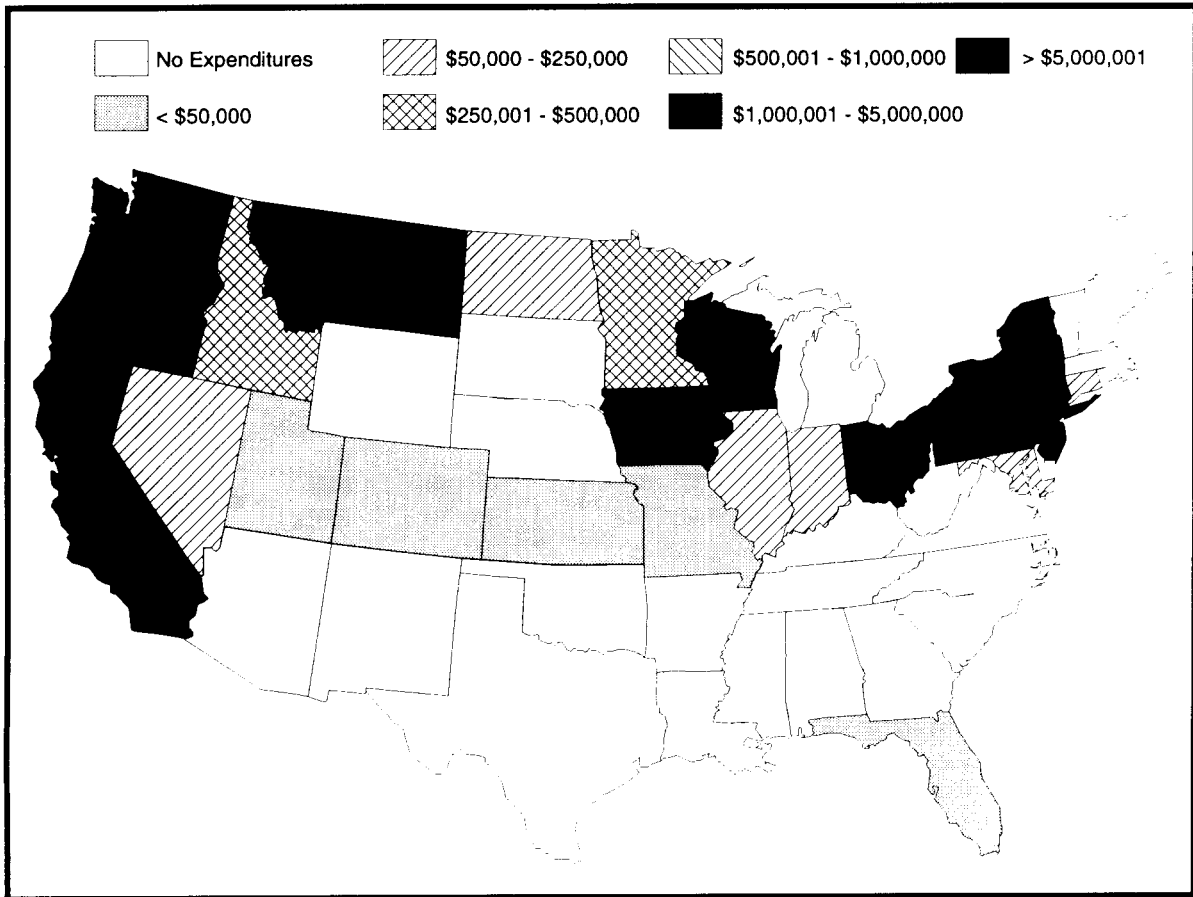


Figure 6.3 Geographic Distribution of Utility Expenditures in 61 Coordinated Programs

6.2 TYPES OF COORDINATION

Utilities coordinate with DOE's Weatherization Program in many different ways. Sometimes the coordination is limited to referrals and various exchanges of information, with no associated financial transactions. In other cases, DOE's state or local network of agencies receives utility funding to provide DSM services. The following two sections describe the types of coordination and joint delivery of weatherization services that existed in 1992.

6.2.1 Types of Funded Coordination

Many different arrangements exist whereby utility companies pay DOE's network of agencies to deliver weatherization services. Three common types are summarized in Table 6.3 and are described below.¹ Detailed case studies of each of these types is provided in Brown and Hill (1994).

¹ These three types of programs are not distinguished by whether the utility funds community action agencies directly or if they channel funds through state agencies. The most common arrangement is for the utility to contract directly with the local agency. However, sometimes the state weatherization program receives utility funding to subcontract with community action agencies. This is the case, for instance, for several utilities in both Iowa and New York. A variation on this operated in Indiana in 1992, where a utility contracted with the

Table 6.3 Three Types of Funded Coordination

1.	Parallel Programs
	The community action agency operates two independent weatherization programs—one entirely funded by the utility and a second funded by DOE. The nature of the utility DSM program is defined by the utility and may be quite distinct from the DOE-funded program. Households generally participate in one or the other of the programs, but not both. Utilities that fund parallel programs may in fact have many contractors—community action agencies as well as for-profit energy services companies.
2.	Supplemental Programs
	These programs use utility funds to supplement the agency's DOE Weatherization Program, with no changes to the operation of the DOE program. The result may be a greater production of weatherized homes by the agency, the installation of a greater number of DOE-approved measures, or both.
3.	Coupled Programs
	These programs employ a combination of utility and DOE funds to deliver weatherization services as part of an integrated program that is distinct from the agency's pre-existing DOE weatherization program. This type of program has the potential to outperform parallel and supplemental programs, by taking advantage of the unique capabilities of each partner.

In parallel programs, the community action agency operates two independent weatherization programs—one entirely funded by the utility and a second funded by DOE. The nature of the utility DSM program is defined by the utility and may be quite distinct from the DOE-funded program. Households generally participate in one or the other of the programs, but not both. Utilities that fund parallel programs may in fact have many contractors—community action agencies as well as for-profit energy services companies.

The operation of two distinct (i.e., parallel) programs by individual community action agencies is illustrated by the Bonneville Power Administration's Weather Wise Program. Bonneville requires that a particular type of heat loss analysis be used to identify eligible conservation measures. Further, the list of eligible measures is different from DOE's approved measures; it requires radon testing (which is not funded by DOE), but it does not allow incidental repairs (which are a part of the DOE Program). PG&E's Energy Partnership Program illustrates the use of many contractors. Community action agencies periodically compete with private-sector companies for PG&E contracts to deliver conservation services.

state's association of local agencies rather than the state weatherization program. In particular, PSI Energy contracted with the Indiana Community Action Program Directors Association (ICDA) to provide PSI demand-side management services and measures. ICDA, in turn, subcontracted with local agencies to provide the services.

In supplemental programs, utility funds are used to supplement a community action agency's DOE Weatherization Program, with no changes to the operation of the DOE program. The result may be a greater production of weatherized homes by the agency, the installation of a greater number of DOE-approved measures, or both.

An example of a supplemental program is provided by the Niagara Mohawk Power Corporation, which pays \$100 per energy audit to community action agencies operating in its 23-county service territory. This utility funding allows the agencies to spend more DOE funding on the installation of measures.

In coupled programs, utility and DOE funds are used to deliver an integrated program that is distinct from the DOE Weatherization Program. These programs have the potential to outperform parallel and supplemental programs by taking advantage of the unique capabilities of each partner. Often, the utility funds are used to install measures that are either excluded from the DOE Program or that might not be installed by local agencies due to limited funding. The most typical measures targeted by these programs are compact fluorescents and water-heater measures.

The Iowa Southern Utilities Company operates a Low-Income Weatherization Program that has many of the standard features of a coupled program. The utility contracts directly with the state weatherization program, which in turn contracts the weatherization work to its local network of nonprofit agencies. Both Iowa Southern and DOE funds are used to weatherize the homes of eligible, all-electric customers. In particular, the Iowa Southern funding ensures that households receive low-flow showerheads, faucet aerators, water-heater wraps, pipe insulation, and compact fluorescent light bulbs. Columbia Gas of Ohio's Warm Choice Program (described in Section 6.1) is another example of a coupled program. Its "wrap around" service was designed specifically to enhance the DOE Weatherization Program in ways that met the specific needs of the utility—i.e., the replacement of inefficient furnace and water-heater systems.

6.2.2 Types of Unfunded Coordination

The 11 coordinated programs that involve no financial transactions employ various types of referrals and information exchanges between utilities and local agencies. Sometimes the referrals are primarily to the utility DSM program. This is the case, for instance, when state or local agencies provide utilities with lists of income-eligible households or when households who received DOE-funded weatherization services are referred to the utility for additional energy services. Local agencies in Michigan, for instance, refer their clients to the Michigan Consolidated Gas Company's Conservation Assistance Program for additional weatherization measures, and in Vermont households are referred to the City of Burlington's Heat Exchange Program for assistance in switching to electric heating systems. Some state and local agencies also distribute utility brochures and pamphlets of energy information to participants in DOE's Weatherization Program.

In other instances, referrals are made to the DOE network. For instance, several utilities refer their low-income clients at the time of the utility audit or after participation in the utility's DSM program to the DOE Weatherization Program for additional services. The East Ohio Gas Company, for instance, referred approximately 300 of the participants in its Housewarming Program to local community action agencies for possible furnace replacements. The Ohio Power Company provides another example of this. Its Targeted Energy Efficiency Program weatherizes eligible all-electric homes and refers households with non-electric space heating systems to the DOE Program.

The Atlantic City Electric Company's Low-income Comfort Master Program provides an example of a coordinated effort that involves multiple steps in the referral process. Local community action agencies recruit and verify the income eligibility of clients, and then refer them to the utility's DSM program. After the Comfort Master Program installs basic blower-door-guided air sealing measures, Atlantic Electric's air sealing contractors provide the community action agencies information about further work that is needed such as storm windows and heating system replacements. The same households then may become participants in DOE's Weatherization Program. Similarly, Jersey Central Power and Light provides home energy audits free of charge to households that are scheduled to be weatherized by local community action agencies.

In some utility service areas, low-income households have been known to participate in multiple weatherization programs, leading to the possible replication of efforts (e.g., when duplicate home energy audits are conducted or when furnaces are tuned up by one program and then replaced by a second). To maximize the combined impacts of both utility and DOE efforts, systems of job coordination have been initiated. Such systems operated in 1992 in the Wisconsin Natural Gas Company's Low-Income Weatherization Program and in the Elizabethtown Gas Company's Low-Income Weatherization Program.

This chapter has documented the strong and diverse partnerships that have emerged between gas and electric utilities and the state and local agencies that deliver government-funded weatherization programs. As government agencies become more budget conscious and utilities strive to maintain their competitive edge, coordinated programs appear to be an attractive way to deliver energy-efficiency services to low-income households.

7. CONCLUSIONS

In 1989, utility-funded energy-efficiency programs represented 19% of the total resources available to conserve energy in the dwellings of low-income households in the United States. By 1992, the utility share had grown to 27%. This significant increase reflects the rise of utility funding and the decline in government funding in 1992 relative to 1989. Thus, utility low-income DSM investments have increased in importance in recent years as a mechanism for improving the energy-efficiency of homes occupied by low-income households and for reducing the energy burden of the poor.

Unlike DOE's Weatherization Program, low-income energy-efficiency programs operated by utilities in 1992 were concentrated in a few regions of the country (California, the Pacific Northwest, the Upper Midwest, and the Northeast). They also were dominated by states in which utility low-income weatherization programs were mandated by regulatory bodies. Thus, the opportunities for leveraging are unevenly distributed across the country, and they are particularly sparse in the Southeast.

On average, utility programs spent less per participant than the DOE Weatherization Program. Expenditures by electric utility programs were especially small. Consistent with this, utility low-income programs in 1992 installed fewer major building envelope measures such as attic and wall insulation and storm windows and doors. On the other hand, they installed more lighting and appliance measures and more low-flow showerheads.

These differences represent both a challenge and opportunity for DOE's network of state and local agencies to find mutually beneficial ways of coordinating their efforts. The wide array of utility-government partnerships that existed in 1992 illustrate the potential of coordinated programs to benefit low-income households as well as utility ratepayers and investors.

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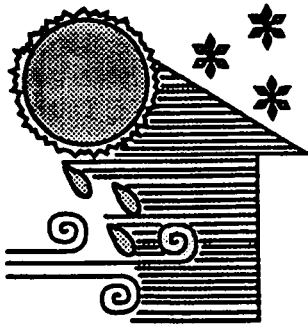
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APPENDIX A
SURVEY QUESTIONNAIRE



U.S. DEPARTMENT OF ENERGY

NATIONAL WEATHERIZATION EVALUATION

This questionnaire requests information concerning the operation of utility programs that offered demand-side management (DSM) or conservation services at no cost to low-income households in 1992.

The following definitions are used in referring to dwelling types:

Single-family: a single-family dwelling that is an independent structure, not joined to any adjacent dwelling.

Small Multifamily (2-4 units): a structure consisting of 2 to 4 dwelling units that are integrated into a single structure which has a common roof and foundation or slab for all involved dwellings (duplex, small apartment building, etc.).

Large Multifamily (5+ units): a structure consisting of 5 or more dwelling units that are integrated into a single structure which has a common roof and foundation or slab for all involved dwellings (large apartment building, cooperative, etc.).

Please complete one questionnaire for each DSM or conservation program that your utility operated in 1992 that provided services at no-cost to low-income participants.

Please return your completed questionnaire to:

Dr. Marilyn A. Brown
Oak Ridge National Laboratory
P.O. Box 2008, MS 6206
Oak Ridge, TN 37831-6206

FAX: 615-574-4747

If you have any questions, we would be glad to help. Feel free to contact Mark Beyer at (615) 482-2721, or Marilyn Brown, ORNL evaluation manager at (615) 574-5939.

Thank you very much for your assistance.

Questions 1-7 are designed to determine the rationale and size of the DSM program in 1992, and the number of the low-income households served. We ask that you provide exact information where possible, or a firm estimate in the event that precise figures are not available.

1. What is the official name of this program ? _____
2. Was this program mandated by the body that regulates your utility? **YES NO**
3. Was this program expected to pass the same cost-effectiveness test that is applied to your utility's other DSM Programs ? **YES NO**
4. What were the primary and secondary goals of this program ?

	Primary	Secondary	Not at all
a.) to make energy services more affordable to low-income customers	<input type="checkbox"/> P	<input type="checkbox"/> S	<input type="checkbox"/> N
b.) to provide a cost-effective energy resource	<input type="checkbox"/> P	<input type="checkbox"/> S	<input type="checkbox"/> N
c.) to reduce arrearages of low-income customers	<input type="checkbox"/> P	<input type="checkbox"/> S	<input type="checkbox"/> N
d.) to improve customer relations and the utility's image	<input type="checkbox"/> P	<input type="checkbox"/> S	<input type="checkbox"/> N
e.) other: _____	<input type="checkbox"/> P	<input type="checkbox"/> S	<input type="checkbox"/> N
5. What was the total utility budget for this low-income program in 1992 ? \$ _____
6. How many low-income households participated in this program in 1992 ? _____
7. Please indicate the number of each dwelling unit type served, or the percentage of the total units served, by this program.

Unit Types	Estimate Number of Units	Not Known
1. Single-family		
2. Small Multifamily (2-4 units)		
3. Large Multifamily (5+ units)	# Buildings: _____ # Dwellings: _____	
4. Mobile Homes		

Questions 8-10 attempt to define how program participants were selected and how utility company resources were invested in 1992.

8. Please indicate the household selection criteria used in this program from those listed below. (Check all that apply.)

	Type of Heating Fuel or System		Strict Cost-test
	Priority for Elderly		Participation in Other Programs
	Priority for Children		LIHEAP
	Priority for Persons with Disability		AFDC
	A Minimum Level of Arrears		Budget or Level Billing
	Minimum Fuel Consumption		Other _____

9. How much did this utility program invest in each household in 1992 ? (Please give actual dollars spent or a firm estimate that includes all administrative, overhead, labor and materials costs.)

Average investment level per household: \$ _____

10. Please indicate the manner in which the crew decided the investment level per household under this program in 1992. (Check all that apply.)

	Level of energy consumption		Measures check list (please attach)
	Savings to investment ratio		Written energy analysis (please attach an example)
	Other cost-effectiveness test		Other _____
	Uniform investment level		Other _____

Questions 11-13 attempt to identify partnerships between the utilities and government sponsored conservation programs. We are especially interested in cooperation with State weatherization programs.

11. Did this program, either directly or through energy services companies, use any non-profit agencies to deliver energy conservation services in 1992 ?

YES NO Don't Know (If you do not know the non-profit status of your service providers, please attach a list of these service providers.)

12. To your knowledge, did any of the non-profit organizations also provide energy services under the 1992 State weatherization programs ?

YES NO Don't Know (If you do not know, please attach a list of these service providers.)

IF YES Please estimate your utility program expenditures in 1992 made through entitites working in your utility program and in the State weatherization program: \$ _____

13. Please describe any direct coordination between this utility program and the State weatherization programs. (Please give utility program expenditures involved through this coordination.)

None, **OR** describe: _____

14. Please indicate the types of energy conservation assistance provided to low-income households under this program. (Circle one letter in each row, indicating the percentage/frequency of units that receive the indicated measure.)

Measure	Never (0%)	Some- times (1- 25%)	Often (26- 50%)	Most times (51- 75%)	Almost Always (76- 99%)	Every Unit (100%)
Mobile home Measures	N	S	O	M	A	E
vapor barrier	N	S	O	M	A	E
under pinning or skirting	N	S	O	M	A	E
other _____	N	S	O	M	A	E
Multi-family Measures	N	S	O	M	A	E
space conditioning control system	N	S	O	M	A	E
water heater distribution system	N	S	O	M	A	E
repair/replace ventilation fans	N	S	O	M	A	E
public area lighting measures	N	S	O	M	A	E
other _____	N	S	O	M	A	E
Insulation	N	S	O	M	A	E
attic insulation, first install	N	S	O	M	A	E
attic insulation, additional	N	S	O	M	A	E
wall insulation, normal	N	S	O	M	A	E
wall insulation, high density	N	S	O	M	A	E
floor insulation	N	S	O	M	A	E
rim or band joist	N	S	O	M	A	E
other _____	N	S	O	M	A	E
Air Leakage Control:	N	S	O	M	A	E
general caulking/weatherstripping	N	S	O	M	A	E
air sealing, with blower door bypass testing	N	S	O	M	A	E
air sealing, no blower door bypass testing	N	S	O	M	A	E
distribution system leakage control (eg., duct sealing, duct repair, etc.)	N	S	O	M	A	E
other (not windows) _____	N	S	O	M	A	E

Measure	Never (0%)	Some- times (1- 25%)	Often (26- 50%)	Most times (51- 75%)	Almost Always (76- 99%)	Every Unit (100%)
Windows and Door Energy Measures	N	S	O	M	A	E
storm windows	N	S	O	M	A	E
thermal replacement windows	N	S	O	M	A	E
window films or shades	N	S	O	M	A	E
window frame repair/reconstruction	N	S	O	M	A	E
window glazing	N	S	O	M	A	E
storm doors	N	S	O	M	A	E
other _____	N	S	O	M	A	E
Space Heating System:	N	S	O	M	A	E
clean and tune-up	N	S	O	M	A	E
entire system replacement	N	S	O	M	A	E
set back thermostat	N	S	O	M	A	E
component retrofits: _____	N	S	O	M	A	E
safety problems fixed: _____	N	S	O	M	A	E
repairs: _____	N	S	O	M	A	E
other _____	N	S	O	M	A	E
Water Heating System:	N	S	O	M	A	E
tank insulation	N	S	O	M	A	E
entire system replacement	N	S	O	M	A	E
pipe insulation	N	S	O	M	A	E
low flow showerheads	N	S	O	M	A	E
temperature reduction	N	S	O	M	A	E
other _____	N	S	O	M	A	E
Lighting and Appliances:	N	S	O	M	A	E
compact fluorescents	N	S	O	M	A	E
replace AC unit	N	S	O	M	A	E
waterbed replaced with standard mattress	N	S	O	M	A	E
refrigerator replacements	N	S	O	M	A	E
other _____	N	S	O	M	A	E

Measure	Never (0%)	Some- times (1- 25%)	Often (26- 50%)	Most times (51- 75%)	Almost Always (76- 99%)	Every Unit (100%)
Client Education/Information:	N	S	O	M	A	E
written materials	N	S	O	M	A	E
home visits/on-site education	N	S	O	M	A	E
center based demonstration or training	N	S	O	M	A	E
other _____	N	S	O	M	A	E
Space Cooling System	N	S	O	M	A	E
tune-up	N	S	O	M	A	E
entire system replacement	N	S	O	M	A	E
install/replace fans	N	S	O	M	A	E
set-back thermostat	N	S	O	M	A	E
other _____	N	S	O	M	A	E
Structural Repairs	N	S	O	M	A	E
attic ventilation	N	S	O	M	A	E
roof	N	S	O	M	A	E
repair doors/threshold	N	S	O	M	A	E
replace doors	N	S	O	M	A	E
walls	N	S	O	M	A	E
floor	N	S	O	M	A	E
other _____	N	S	O	M	A	E
Other Health and Safety Repairs	N	S	O	M	A	E
smoke detectors installed/battery replaced	N	S	O	M	A	E
radon testing	N	S	O	M	A	E
carbon monoxide testing	N	S	O	M	A	E
other _____	N	S	O	M	A	E

APPENDIX B
LIST OF UTILITIES WITH LOW-INCOME DSM PROGRAMS IN 1992

Table B.1 Utility Names and Contacts

Utility Name	Contact Address	Phone Number
Alabama Municipal Elec Auth Res Direct Load Management	J Marlin Wade P.O. Drawer 5220 Montgomery, AL 36103	(205) 262-1126
Arizona Public Service Co. Low-Income Housing Retrofit	William Pascarella P.O. Box 53999 Phoenix, AZ 85072-3999	(602) 250-2908
Imperial Irrigation District Residential Energy Services	Leamon W Murphy P.O. Box 937 Imperial, CA 92251	(619) 339-9571
Los Angeles, City of Better Idea Program	Carol Ushijima P.O. Box 111, Room 1236 Los Angeles, CA 90051	(213) 481-5664
Pacific Gas & Electric Co. Energy Partners Program	Jeff Crowe 444 Market St. San Francisco, CA 94106	(415) 973-8401
Southern California Edison Co. Expanded Weatherization	Warren Ferguson P.O. Box 800 2244 Walnut Grove Avenue Rosemead, CA 91770	(818) 302-2934 (818) 302-9220 fax
Southern California Gas Co. Direct Assistance/WX	Roman J. LaRiva 10375 Slusher Drive Sante Fe Springs, CA 90670	(310) 946-5366
Southern California Gas Co. Direct Assistance/Appliances	Roman J. LaRiva 10375 Slusher Drive Sante Fe Springs, CA 90670	(310) 946-5366
Loveland, City of Plug-a-Leak Service	Gail W. Doxtader 200 North Wilson, Bldg 1 Loveland, CO 80537	(303) 962-3554
Southern Connecticut Gas Co. Limit the GAP	Beth Karayiannes 855 Broad Street Bridgeport, CT 06604	(203) 382-8163
Southern Connecticut Gas Co. Family Services Woodfield	Beth Karayiannes 855 Broad Street Bridgeport, CT 06604	(203) 382-8163
Southern Connecticut Gas Co. Homeworks	Beth Karayiannes 855 Broad Street Bridgeport, CT 06604	(203) 382-8163
Southern Connecticut Gas Co. REEACH	Beth Karayiannes 855 Broad Street Bridgeport, CT 06604	(203) 382-8163

Table B.1 Utility Names and Contacts (cont.)

Utility Name	Contact Address	Phone Number
Southern Connecticut Gas Co. Fuel Bank	Beth Karayiannes 855 Broad Street Bridgeport, CT 06604	(203) 382-8163
Southern Connecticut Gas Co. Youth Energy	Beth Karayiannes Same as above	(203) 382-8163
United Illuminating Co. Homeworks	John V DiBiaso P.O. Box 1564 80 Temple Street New Haven, CT 06506	(203) 787-7783
Western Massachusetts Elec Co. Spectrum Domestic Hot Water	Gail Spence Northeast Utilities NUE 2-07G 107 Selden St. Hartford, CT 06141-0270	(203) 665-4514
Western Massachusetts Elec Co. NU: Spectrum SF, MF, & Public	Gail Spence Same as above	(203) 665-4514
Western Massachusetts Elec Co. NE: SF, MF, Public Connecticut	Gail Spence Same as above	(203) 665-4514
Yankee Gas Services Company Attic Insulation Program	C. Goodwin 599 Research Parkway Meriden, CT 06450-1030	(203) 235-0243
Florida Power Corp. Home Energy Fix-Up	J R Chafin P.O. Box 14042 3201 34th Street South St Petersburg, FL 33733	(813) 866-4712
Gainesville Regional Utilities Florida Fix	J F Hancock Box 490 Station 16 Gainesville, FL 32602	(904) 374-2811
Idaho Power Weatherization Program	Tim Paul Department of Health and Welfare 7th Floor Towers Building 450 West State Boise, ID 83720	(208) 334-5737
Interstate Power Co. Low-Income Insulation Grant	S M Manternach P.O. Box 769 1000 Main Street Dubuque, IA 52004-0769	(319) 582-5421
Interstate Power Co. Electric Energy Mngmt Prg	S M Manternach same as above	(319) 582-5421

Table B.1 Utility Names and Contacts (cont.)

Utility Name	Contact Address	Phone Number
Iowa Southern Utilities Co. Iowa Electric Weatherization	Gene Reuter P.O. Box 351 2000 First Street Southeast Cedar Rapids, IA 52401 Jim Newton Iowa Department of Human Rights	(515) 242-6119 fax
Iowa Electric Light & Power Co. L-I Weatherization	Michael M. Nutt 300 Sheridan Avenue Centerville, IA 52544	(515) 437-4400
Iowa Southern Utilities Co. Low-Income Program	Michael M. Nutt 300 Sheridan Avenue Centerville, IA 52544	(515) 437-4400
Midwest Gas Midwest Gas Weatherization	Terry O Gorman P.O. Box 778 401 Douglas Street Sioux City, IA 51102	(712) 277-7587
Midwest Power Inc. Low-Income Weatherization	P.O. Box 657 Des Moines, IA 50303	(515) 281-2368
Peoples Natural Gas Peoples Natural Gas/Iowa Wx	Jim Newton Iowa Department of Human Rights IA	(515) 242-6314
Iowa-Illinois Gas & Electric Low-Income Weatherization	Susan Knoedel 1830 Second Ave, Suite 100 Rock Island, IA 61201	(309) 793-3808
Northern Illinois Gas Co. Low-Income Hi Eff Frnc Replc	Shirley MoyLee 1700 W. Ferry Road Naperville, IL 60563	(708) 983-8888
Indiana Michigan Power Co. Energy Fitness Program (EFP)	G C Dean P.O. Box 60 One Summit Square Fort Wayne, IN 46801	(614) 223-2780
PSI Energy Inc. PSI Energy Low-Income Prgm	Teresa A Zaus 1000 East Main Street Plainfield, IN 46168	(317) 838-1115
Board of Public Utilities Home Energy Survey	George Powell 700 Minnesota Avenue Kansas City, Kansas City, KS 66106	(913) 573-9151
Boston Edison Co. Energy Fitness Van Program	George T Thompson P-344 800 Boylston Street Boston, MA 02199	(617) 424-2000

Table B.1 Utility Names and Contacts (cont.)

Utility Name	Contact Address	Phone Number
Chicopee, City of Energy Edge Plus	Charles A Paton P.O. Box 405 725 Front Street Chicopee, MA 01021-0405	(413) 598-8311
Eastern Edison Co. Energy Solutions	Kenneth E Karspeck P.O. Box 543 750 West Center Street W Bridgewater, MA 02379	(508) 559-1000
Potomac Edison Wx Res. Asst. Program Energy Conservation Department	Al Bingman 10435 Downsville Pike Hagerstown, MD	(301) 791-5600
Central Maine Power Company High-Use Elec Lifeline (HELP)	Robert E Tuoriniemi Edison Drive Augusta, ME 04336	(207) 623-3521
Consumers Power Co. L-I Qualified Free Instal	D DaPra 212 West Michigan Avenue Jackson, MI 49201	(517) 788-0135
Michigan Consolidated Gas Co. Fitness Audits	Ron McGarvey 500 Griswold Detroit, MI 48226	(313) 256-5644
Michigan Consolidated Gas Co. DSS-Conservation Assistance	Ron McGarvey 500 Griswold Detroit, MI 48226	(313) 256-5644
Minnegasco Inc. Project Choice-Weatherization	Jen Peterson 201 S. 7th St. Minneapolis, MN 55402	(612) 463-1371
Minnegasco Inc. M-200	Jen Peterson 201 S. 7th St. Minneapolis, MN 55402	(612) 463-1371
Northern Minnesota Utilities Conservation Grant Project	Russell Luippaka 910 Cloquet Avenue Cloquet, MN 55720	(218) 879-4651
Northern States Power Co. Appliance Recycling	Lois M. Gribneau 414 Nicollet Mall (RS-5) Minneapolis, MN 55401	(612) 229-2389
Minnesota Power & Light Co. Electric Energy Services	Steve Betzler 30 West Superior Street Duluth, MN 55802	(218) 722-2641

Table B.1 Utility Names and Contacts (cont.)

Utility Name	Contact Address	Phone Number
Northern States Power Co. CAA Low-Income Proj (CAALIP)	Lois M. Gribneau 414 Nicollet Mall (RS-5) Minneapolis, MN 55401	(612) 229-2389
Northern States Power Co. L-I Lighting Retrofit	Lois M. Gribneau same as above	(612) 229-2389
Northern States Power Co. Quest	Lois M. Gribneau same as above	(612) 229-2389
Northern States Power Co. Audit & Svcs for Low Income	Lois M. Gribneau same as above	(612) 229-2389
"People's Natural Gas"-Utility Corp. Low-Income Weatherization Prog.	W. Mohler P.O. Box 393 International Falls, MN	(218) 283-4471
Montana Power Weatherization Program	Jim Nolan, Program Manager Dept of Social and Rehabilitation Services P.O. Box 4210, Capitol Station Helena, Montana 59604-4210	(406) 444-4545
Rochester Public Utilities Weatherization	R A Clark 4000 East River Road NE Rochester, MN 55903	(507) 280-1555
Union Electric Co. Energy Conserv & Mgmt Prog	Milly Martin 1901 Chouteau Avenue St Louis, MO 63166 Bill Bunch Southeast Missouri CAA	(314) 554-2478 (314) 431-5191
Cass County Electric Coop Inc. Load Management/ Conservation	Scott Handy P.O. Box 8 Kindred, ND 58051	(701) 428-3292
Atlantic City Electric Co. L-I Comfort Master	D F Jones 6801 Black Horse Pike Pleasantville, NJ 08232	(609) 645-4890
Jersey Central Power & Light Weatherization Assistance Prog.	Kevin Connelly 300 Madison Avenue Morristown, NJ 07962	(201) 455-8280
Public Service Electric & Gas PSE&G L-I Workshop Program	Joseph J Flanagan P.O. Box 570 80 Park Plaza Newark, NJ 07101	(201) 430-6140
Elizabethtown Gas Company Low-Income Weatherization	Laurie Hassis P.O. Box 3175 One Elizabethtown Plaza Union, NJ 07083-1975	(908) 289-5000

Table B.1 Utility Names and Contacts (cont.)

Utility Name	Contact Address	Phone Number
Public Service Electric & Gas Low-Income Direct Grant	Joseph J Flanagan P.O. Box 570 80 Park Plaza Newark, NJ 07101	(201) 430-6140
Public Service Electric & Gas Attic Insulation Program	Joseph J Flanagan P.O. Box 570 80 Park Plaza Newark, NJ 07101	(201) 430-6140
Public Service Electric & Gas Low-Income Seal-Up Program	Joseph J Flanagan P.O. Box 570 80 Park Plaza Newark, NJ 07101	(201) 430-6140
Public Service Co.-New Mexico Weatherization Program	Rafael Tapia Alvarado Square Albuquerque, NM 87158	(505) 848-4681
Boulder City, City of CDBG Weatherization Program	Jeffrey Patlovich P.O. Box 367 Boulder City, NV 89005	(303) 293-9282
Sierra Pacific Power Co. Weatherization Programs	Kay Grosulak P.O. Box 10100 6100 Neil Road Reno, NV 89520	(702) 689-4677
Consolidated Edison Co. of NY Single Family ULIEEP	Hyman Schoenblum Four Irving Place, Room 523 New York, NY 10003	(212) 477-3922
Consolidated Edison Co. of NY Multi-family ULIEEP	Hyman Schoenblum Four Irving Place, Room 523 New York, NY 10003	(212) 477-3922
Niagara Mohawk Power Corp. NIMO & NY State Joint Wx Pgm	Thomas J. Enright 300 Erie Blvd. West Syracuse, NY 13202	(315) 428-6732
Niagara Mohawk Power Corp. Power Partnership Program	Charles Rubado 300 Erie Blvd. West Syracuse, NY 13202	(315) 428-7257
National Fuel Gas Dist Corp. ULIEEP Util. L-I Energy Eff Prog.	Cliff Mason 10 Lafayette Square Buffalo, NY 14203	(716) 827-6005
Orange & Rockland Utilities Project ASSIST	Jim Cuccaro One Blue Hill Plaza Pearl River, NY 10965	(914) 577-2803

Table B.1 Utility Names and Contacts (cont.)

Utility Name	Contact Address	Phone Number
Orange & Rockland Utilities BesTeam Door-to-door WX Prog	Peter W Hall One Blue Hill Plaza Pearl River, NY 10965	(914) 577-2803
Orange & Rockland Utilities House Warmer	Peter W Hall One Blue Hill Plaza Pearl River, NY 10965	(914) 577-2803
Orange & Rockland Utilities Operation Discover	Peter W Hall One Blue Hill Plaza Pearl River, NY 10965	(914) 577-2803
Orange & Rockland Utilities ECB Grant Program	Peter W Hall One Blue Hill Plaza Pearl River, NY 10965	(914) 577-2803
Orange & Rockland Utilities Mobile Home Seal-up	Peter W Hall One Blue Hill Plaza Pearl River, NY 10965	(914) 577-2803
American Electric Power Svc. Targeted Energy Efficiency	Marsha Ryan 1 Riverside Plaza Columbus, OH 43215	(614) 223-2780
Cincinnati Gas & Electric CG & E Weatherization Prog	Carol Jones 139 E Fourth Street Cincinnati, OH 45202	(513) 281-2000
Columbia Gas of Ohio Warm Choice II	W. Conin Sharp 200 Civic Center Drive Columbus, OH 43216-0117	(614) 460-4617
Columbia Gas of Pennsylvania Warm Choice	W. Conin Sharp 200 Civic Center Drive Columbus, OH 43216-0117	(614) 460-4617
Dayton Power & Light Co. Low-Income Technologies	Keith Valiquette 1900 Dryden Rd Dayton, OH 45401	(513) 643-5044
Dayton Power & Light Co. Helping Hands	Keith Valiquette 1900 Dryden Rd Dayton, OH 45401	(513) 643-5044
Dayton Power & Light Co. Operation VIP	Keith Valiquette 1900 Dryden Rd Dayton, OH 45401	(513) 643-5044
East Ohio Gas Company Housewarming	John Wilbur P.O. Box 5759 Cleveland, OH 44101	(216) 736-6413

Table B.1 Utility Names and Contacts (cont.)

Utility Name	Contact Address	Phone Number
Ohio Edison Co. Energy Fitness Weatherization	J H McCann, II & Mark Rosati 76 South Main Street Akron, OH 44308	(216) 384-5870
Ohio Edison Co. Low-Income Wx Pilot	J H McCann, II & Mark Rosati 76 South Main Street Akron, OH 44308	(216) 384-3772
Ohio Power Co. Targeted Energy Efficiency	301 Cleveland Avenue, SW Canton, Canton, OH 97204	(216) 438-7841
Oklahoma Gas & Electric Co. Hand -N- Hand	Rita Pangborn P.O. Box 321, M/C 1058 Oklahoma, OK 73101	(405) 272-3015
Ashland, City of Weatherwise	Patrick K Caldwell 20 East Main Street Ashland, OR 97520	(503) 482-3211
Bonneville Power Administration WeatherWise Programs/SF dwell	Terry Roberts Portland, OR 97208	(503) 230-5478
Bonneville Power Administration WeatherWise Program/MF dwell	Terry Roberts Portland, OR 97208	(503) 230-5478
Eugene Water and Electric Board EWEB/HACSA L-I Weatherization	Marilynne Blakely P.O. Box 10148 500 E 4th Avenue Eugene, OR	(503) 484-2411
Pacific Power and Light Low-Income Weatherization	920 S.W. Sixth Portland, OR 97204	(503) 256-6800
Portland General Electric Co. Low-Income Weatherization	Joe Feltz 121 Southwest Salmon Street Portland, OR 97204	(503) 464-7132
Equitable Gas Company Low-Income Usage Reduction	Ken Ruffing Suite 2000 Allegheny Center Mall Pittsburgh, PA 15212-5352	(414) 442-3000
Metropolitan Edison Co. WARM	Ronald F. Horn 2800 Pottsville Pike P.O. Box 16001 Reading, PA 19640	(215) 921-6397
Pennsylvania Electric Co. Low-income Usage Reduction Prog.	D. R. Myers 1001 Broad Street Johnstown, PA 15907	(814) 533-8207

Table B.1 Utility Names and Contacts (cont.)

Utility Name	Contact Address	Phone Number
Pennsylvania Gas & Water Co. Low-income Usage Reduction Prog.	Harry E Dowling Wilkes Barre Center 39 Public Square Wilkes Barre, PA 18711	(717) 829-3461
Pennsylvania Gas & Water Co Energy Survey Programs	Bernie Maorak 41 North Main Street Wilkes Barre, PA 18711	(717) 829-3461
Pennsylvania Power & Light Co. Winter Relief Asst Program	James D Werley Financial Reporting TW-12 Two North Ninth Street Allentown, PA 18101-1179	Main (215) 774-5151 (610) 774-6503
Pennsylvania Power Co. Projects CURE	E. D. Preston P.O. Box 891 One East Washington Street New Castle, PA 16103	(412) 656-5394
People's Natural Gas Co. BFR Residential Wx Program	Sadie Kroeck 625 Liberty Avenue Pittsburgh, Pittsburgh, PA 15222	(412) 497-6539
People's Natural Gas Co. Be-Weatherwise Wx Program	Sadie Kroeck 625 Liberty Avenue Pittsburgh, Pittsburgh, PA 15222	(412) 497-6539
Philadelphia Gas Works Conservation Works	Bernadette Gant-Jones 800 W. Montgomery Ave, 318 Philadelphia, PA 19122	(412) 684-6808
UGI Corp. Low-Income Usage Reduction	Joseph Rymer P.O. Box 1389 247 Wyoming Avenue Kingston, PA 18704	(717) 283-0611
West Penn Power Co. L-I Usage Reduction/Elec Heat	Richard W McLeary P.O. Box 248 800 Cabin Hill Drive Greensburg, PA 15601	(412) 838-6280
Blackstone Valley Electric Co. Energy Solutions	Kenneth E Karspeck P.O. Box 1111 Lincoln, RI 02865	(508) 559-1000
Newport Electric Corp. Energy Solutions	Larry D Settle P.O. Box 4128 12 Turner Road Middletown, RI 02840	(401) 847-4480

Table B.1 Utility Names and Contacts (cont.)

Utility Name	Contact Address	Phone Number
Memphis Light Gas & Water Project MAX (max assist example)	Paul Bolden P.O. Box 430 Memphis, TN 38101-0430	(901) 528-4983
Houston Lighting & Power Co. Weatherization Assistance Prog.	A S Ecton P.O. Box 1700 Houston, TX 77251	(713) 220-5330
Kerrville Public Utility Board KPUB Weatherization Program	Ben Lucas 2250 Memorial Blvd Kerrville, TX 78028	(512) 257-3050
Mountain Fuel Supply Co. Demand Side Management	Brad Markus P.O. Box 11368 Salt Lake City, UT 84139	(801) 534-5555
Burlington, City of Heat Exchange	Chris Burns 585 Pine Street Burlington, VT 05401	(802) 865-7337 (802) 865-7400 fax
Puget Sound Power & Light Co. Low-Income Weatherization	Tom Shannon OBC08N P.O. Box 97034 Bellevue, WA 98009	(206) 462-3135
Seattle City Light Multi-Family Conservation, L-I	Debra Tachinbana 1015 3rd Avenue Seattle, WA 98104-1198	(206) 684-3874
Seattle City Light Low-Income Electric Program	Debra Tachinbana 1015 3rd Avenue Seattle, WA 98104-1198	(206) 684-3874
Tacoma, City of WeatherWise	Wally Croshaw P.O. Box 11007 Tacoma, WA 98411	(206) 502-8363
Tacoma, City of MatchMaker	S J Klein P.O. Box 11007 Tacoma, WA 98411	(206) 593-8295
Washington Water Power Co. CAA Energy Exchanger Program	Carole Heinen E 1411 Mission Spokane, WA 99207	(509) 482-4790
Washington Water Power Co. CAA Electric Weatherization	Carole Heinen E 1411 Mission Spokane, WA 99207	(509) 482-4790
Washington Water Power Co. CAA Gas Weatherization	Carole Heinen E 1411 Mission Spokane, WA 99207	(509) 482-4790

Table B.1 Utility Names and Contacts (cont.)

Utility Name	Contact Address	Phone Number
City Gas Co. WX Assistance Program	Dan Jahuke P.O. Box 370 Antigo, WI 54409	(509) 627-4351
Grant Electric Coop Dual Fuel Program	Richard E Kolb 231 North Sheridan Road Lancaster, WI 53813	(608) 723-2121
Madison Gas & Electric Co. Weatherization Assistance Prog.	Jeffrey C Newman P.O. Box 1231 133 South Blair Street Madison, WI 53701	(608) 252-7149
Northern States Power Co. Utility Weatherization Program	Max Therou P.O. Box 8 100 North Barstow Street Eau Claire, WI 54701	(715) 839-2594
Wisconsin Electric Power Co. Comm. Partnership Energy Cons.	Dale A Landgren P.O. Box 2046 Room p401 Milwaukee, WI 53201	(414) 221-2977
Wisconsin Gas Co. Low-Income Weatherization Prog.	John Nelson 626 E. Wisconsin Avenue Milwaukee, WI 53202	(414) 291-7000
Wisconsin Natural Gas Co. Low-Income Weatherization Prog.	Randolph P. Chase 233 Lake Avenue Racine, WI 53401	(414) 637-7681
Wisconsin Gas Co. Weatherization Program	John Nelson 626 E. Wisconsin Avenue Milwaukee, WI 53202	(414) 291-7000

APPENDIX C
SUPPLEMENTAL TABLES

Table C.1 Types of Measures Installed (% of Programs)^a

Type of Measure	Never (0%)	Some- times (1-25%)	Often (26-50%)	Most times (51-75%)	Almost always (76-99%)	Every unit (100%)
Client Education/Information	15	4	2	6	18	55
Lighting	46	11	3	9	18	12
Water-heating System	8	18	21	20	23	7
Air Leakage Control	18	15	10	7	32	18
Insulation	28	18	15	18	16	5
Appliances	74	7	7	7	4	1
Windows and Doors	37	21	19	7	14	2
Structural Repairs	38	27	14	12	7	3
Space Heating System	41	25	10	7	8	7
Multifamily Measures	59	14	6	5	10	6
Other Health and Safety	66	12	7	3	4	8
Space Cooling System	76	17	2	2	2	2
Mobile Home Measures	68	10	6	8	7	2

^a Numbers in the table represent percentages of the utility low-income DSM programs that installed a particular type of measure at a given level of frequency.

Table C.2 Specific Types of Measures Installed in 1992^a

Measure	Percent of Participants Receiving Measure	Mean Installation Rate (Percent) Per Program
Client Education/Information	86	76
Written materials	86	73
Home visits/on-site education	71	67
Center based demonstration or training	16	14
Other	4	16
Lighting	62	35
Compact fluorescents	62	35
Others	1	1
Water-heatingSystem	45	50
Tank insulation	34	42
Entire system replacement	4	8
Pipe insulation	27	41
Low flow showerheads	43	46
Temperature reduction	21	32
Other	25	10
Air Leakage Control	36	57
General caulking/ weatherstripping	29	51
Air sealing, with a blower door	9	37
Air sealing, without a blower door	7	21
Distribution system leakage control	18	21
Other	10	7
Insulation	23	38
Attic insulation (first time)	22	28
Attic insulation (added)	22	34
Wall insulation (normal density)	4	16
Wall insulation (high density)	4	15
Floor insulation	5	18
Rim or band joist	8	19
Other	1	4
Appliances	14	12
Replace AC unit	0	1
Waterbed replaced with standard mattress	0	1
Refrigerator replacements	12	2
Other	7	8
Windows and Door Energy Measures	20	29
Storm windows	3	13
Thermal replacement windows	6	10
Window film or shades	3	9
Window frame repair/reconstruction	2	11
Window glazing	9	13
Storm doors	1	5
Other	8	7

^a Based on data from 126 programs that served 303,280 dwellings in 1992.

Table C.2 Specific Types of Measures Installed in 1992 (cont.)^a

Measure	Percent of Participants Receiving Measure	Mean Installation Rate (Percent) Per Program
Structural Repairs	17	26
Attic ventilation	8	26
Roof	3	6
Repair doors/threshold	17	16
Replace doors	12	8
Walls	4	8
Floors	1	6
Other	1	2
Space Heating System	13	26
Clean and tune-up	6	14
Entire system replacement	6	14
Set back thermostat	4	10
Component retrofits	1	5
Safety problem fixed	8	14
Repairs	5	7
Other	4	6
Multifamily Measures	9	23
Space conditioning control system	2	8
Water heater distribution system	4	11
Repair/replace ventilation fans	1	3
Public area lighting measures	5	11
Other	2	10
Other Health and Safety Repairs	6	18
Smoke detectors installed/battery replaced	1	4
Radon testing	1	4
Carbon monoxide testing	6	17
Other	2	6
Space Cooling System	5	7
Tune-up	0	3
Entire system replacement	0	3
Install/replace fans	0	1
Set-back thermostat	1	3
Other	5	3
Mobile homes Measures	4	16
Vapor barrier	2	9
Under pinning or skirting	1	5
Other	4	13

^a Based on data from 126 programs that served 303,280 dwellings in 1992.

APPENDIX D
LIST OF REVIEWED ORDERS, AGREEMENTS, AND PLANS

CALIFORNIA

1. Decision 92-02-075, February 20, 1992: Order instituting Rulemaking on the Commission's own motion to establish rules and procedures governing utility demand-side management; and, Order instituting investigation on the Commission's own motion to establish procedures governing demand-side management and the competitive procurement thereof.
2. An Energy Efficiency Blueprint for California
Report of the Statewide Collaborative Process, January 1990.

COLORADO

3. Commission Order Approving Settlement Agreement, Docket No. 91A-783EG; In The Matter Of The Application Of Public Service Company of Colorado For Authority To Implement A Low-Income Energy Efficiency Assistance Program. Adopted November 25, 1992.

GEORGIA

4. Docket No 4131-U, issued: 8/31/92.
Re: Amended order approving and Adopting Integrated Resource Plan Applicable To Georgia Power Co.
5. Docket No. 4132-U, decided January 5, 1993.
Re: Application of Georgia Power Company for Certification of Demand-Side Programs.

KANSAS

6. Docket no. 180,056-U, June 25, 1993.
Order regarding Motion to establish IRPs for all Kansas gas and electric utilities.

MASSACHUSETTS

7. DPU 90-335, April 8, 1992
Boston Edison Company petition for approval of DSM programs for the year 1991, including recovery of direct program costs, lost base revenues, and an incentive payment.

MICHIGAN

8. Case No. U-9475, April 12, 1990.
Order Approving Settlement Agreement in the matter of Michigan Consolidated Gas Co. authority to file revised rate schedules.

9. Case No. U-10013, May 6, 1992
Order Approving Settlement Agreement, Michigan Consolidated Gas Company. Application for approval of its biennial energy conservation report and three-year conservation plan, and related cost recovery surcharges.
10. Michigan Consolidated Gas Company, Energy Conservation Report and Three Year Plan; September 1991, revised February 1992.

MINNESOTA

11. Minnegasco Conservation Improvement Program Biennial Plan for 10/1/92-9/30/94. Submitted to the Minnesota Department of Public Service May 1, 1992.

PENNSYLVANIA

12. Docket No: L-92, Regulations Regarding Residential Low Income Usage Reduction Programs, and Bureau of Consumer Services recommended amendments

NEW YORK

13. Case 89-M-124, Order Concerning 1992-93 Utility Low Income Energy Efficiency Program Plans, September 14, 1992.

WISCONSIN

14. The Utility Role In Low-Income Weatherization: A Wisconsin Perspective, Bureau of Conservation and Energy Efficiency, Public Service Commission of Wisconsin; September, 1988.
15. Community Based Demand Side Demonstration Project, December 27, 1991. Prepared by Wisconsin Electric Power Company.

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